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# PAIN IN EUROPE XII

## TARGETING PAIN AND ITS COMORBIDITIES IN THE DIGITAL AGE

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# ABSTRACT BOOK

# TABLE OF CONTENTS

# ORAL POSTER PRESENTATIONS

# Wednesday, 27 April 2022

## 08:30-10:00

# Oral Poster Presentation I - Basic Research/Translational I

### Abstract no.: 322

### THERMAL HYPERALGESIA AND MECHANICAL ALLODYNIA IN ITCH: INVOLVEMENT OF TRPV1 AND TRPA1 CHANNELS

M. Tsagareli[1], I. Nozadze[1], M. Iodi Carstens[2], G. Gurtskaia[1], E. Carstens[2]

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**Background and aims**: Previous studies have shown that intraplantar injection of pruritogens in mice elicited thermal hyperalgesia and mechanical allodynia suggesting that histamine and nonhistaminergic pruritogens elicit painful as well as itchy dysesthesias. In this study, we tested if histamine, chloroquine, a peptide of the bovine adrenal medulla (BAM8-22), and the tethered septa-peptide Ser-Leu-Ile-Gly-Arg-Leu (SLIGRL) elicit thermal hyperalgesia and mechanical allodynia in adult male mice.

**Methods**: The latency of hindpaw withdrawal from a noxious heat stimulus (Hargreaves test) and the threshold for hindpaw withdrawal from a von Frey mechanical stimulus was measured.

**Results**: Intraplantar injection of histamine resulted in significant thermal hyperalgesia ($p<0.001$) and mechanical allodynia ($p<0.001$) ipsilaterally that persisted for 1 h. Pretreatment with the TRPV1 antagonist AMG-517 (10 or 20 µg), but not the TRPA1 antagonist HC-030031 (50 or 100 µg), significantly attenuated the magnitude and time course of thermal hyperalgesia and mechanical allodynia elicited by histamine ($p<0.001$ for both), indicating that these effects are mediated by TRPV1. In contrast, pretreatment with the TRPA1 antagonist significantly reduced thermal hyperalgesia and mechanical allodynia elicited by chloroquine ($p<0.001$ for both), BAM-822 ($p<0.01$, $p<0.001$, respectively), and SLGRL ($p<0.05$, $p<0.001$, respectively), indicating that effects elicited by these non-histaminergic itch mediators require TRPA1.

**Conclusions**: TRPV1 and TRPA1 channel inhibitors might prove to be useful in the clinical treatment of increased pain and allodynia that may be symptoms in patients suffering from chronic itch.

**Acknowledgments:** This work was supported by the Rustaveli National Science Foundation of Georgia (#217076).

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### Abstract no.: 372

### EVIDENCE FOR DRG NEURO-INFLAMMATION WITHOUT PERIPHERAL INFLAMMATION IN THE AUTOANTIBODY PASSIVE-TRANSFER MODEL OF FIBROMYALGIA SYNDROME

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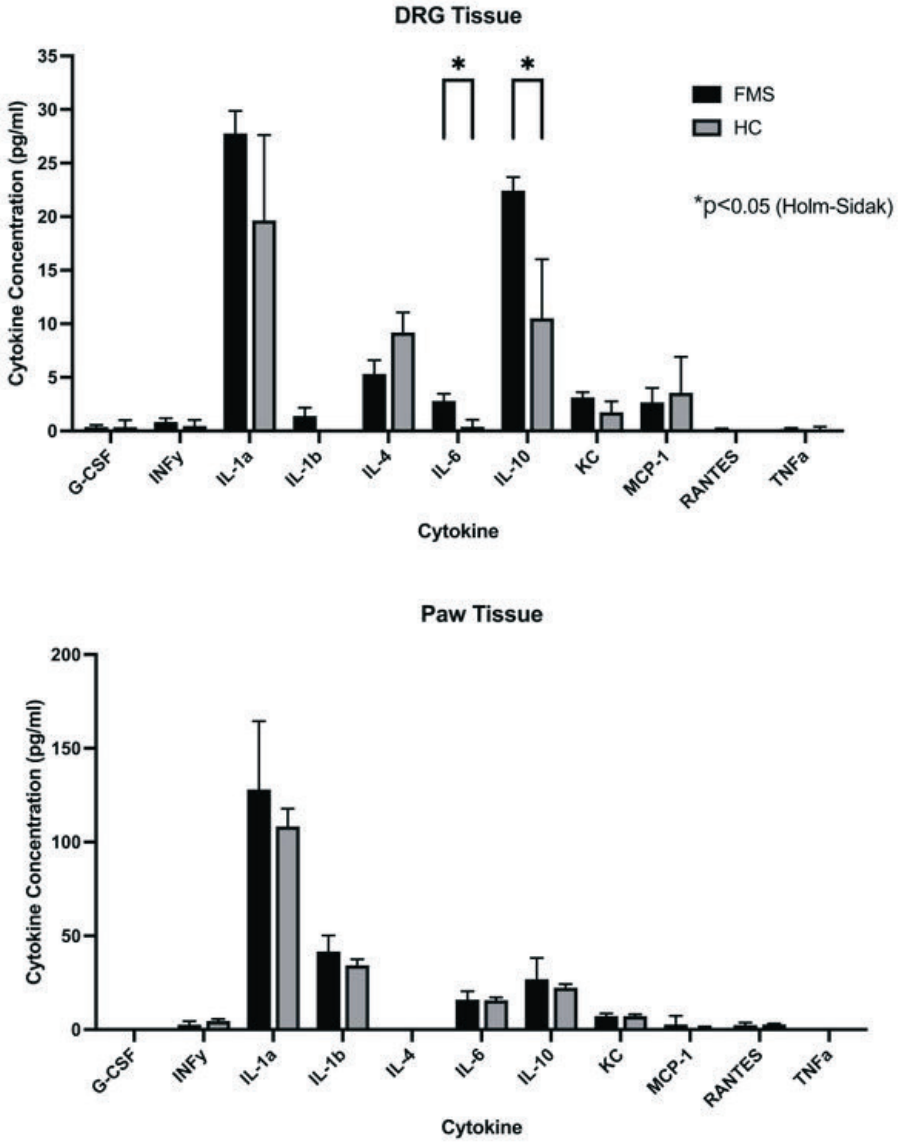
**Background and aims**: Fibromyalgia syndrome (FMS) is a chronic widespread pain condition. The FMS passive-transfer mouse model has demonstrated the mechanistic role of auto-antibodies in disease development. FMS auto-antibodies locate to the mouse dorsal root ganglion (DRG). We hypothesised that binding results in localised inflammation.

**Methods**: Human serum or plasma was obtained from UK FMS patients (American College of Rheumatology 1990/2010 criteria, Ethics: Haydock, ref.15/NW/0467). Mice (n=3/group) were injected intraperitoneally with 8mg purified IgG/day, derived from either of three FMS patients or three healthy controls (HC) (total n=18 mice), for three consecutive days; tissues were harvested on day 4, snap frozen and later thawed and homogenised. A Milliplex® assay (mcytomag-70k-pmx-11plex, Merck, Darmstadt, Germany) was run as per manufacturer's instructions with 10µg total protein/well on a Bio-Plex200 System (Bio-Rad Laboratories Ltd., Hercules, CA, USA). Data was analysed with GraphPad Prism v9 (GraphPad Software Inc., San Diego, CA, USA). Statistical significance ($p<0.05$) was calculated with Mann-Whitney tests for unpaired data and adjusted for multiple comparisons.

**Results**: DRG, but not paw IL-10 protein concentrations were significantly increased in FMS-IgG compared with HC-IgG treated mice (Figure 1). Higher values were evident for each FMS-patient injected group (not shown). IL-6 was also significantly increased in FMS-IgG treated mice (undetectable-values imputed as 0pg/ml).

**Figure 1**




**Conclusions**: These data provide first evidence of a localised DRG inflammatory response in the passive-transfer model of FMS. Cytokines mediate pain development in several neuropathic pain models. The cellular source of these mediators in the FMS model, and their relevance for the pro-nociceptive FMS phenotype requires further study.

## Abstract no.: 428

### TO SLEEP OR NOT TO SLEEP: A PRELIMINARY REPORT ON THE IMPACT OF TOTAL SLEEP DEPRIVATION ON PERIPHERAL AND CENTRAL PAIN MECHANISMS

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**Background and aims**: Chronic pain and poor sleep are often reported in unison, but how impaired sleep may yield increased pain sensitivity is not clear. Therefore, this study aimed to use a total sleep deprivation (TSD) model to investigate the impact of disrupted sleep on central pain mechanisms and widespread muscle hyperalgesia.

**Methods**: Twenty-three, healthy right-handed participants (F: 9; age±SD: 25.87±6.96) attended the baseline session after a night of habitual sleep, while the second session was conducted after one night of TSD (24 hrs after the baseline session). At baseline and after TSD, muscle pain sensitivity (pressure pain thresholds; PPTs) was measured at mm. supra- and infraspinatus, trapezius ascendens, and gastrocnemius, while temporal summation of pain (TSP) and pressure detection thresholds (PDT) with and without a conditioning stimulus were assessed by cuff algometry.

**Results**: Significantly lower PPTs were found after TSD compared to baseline (p=0.001) for all muscles except supraspinatus (p=0.058). At baseline, conditioned PDT was significantly increased compared to non-conditioned PDT (28.31±2.47 vs. 40.52±5.45, respectively, p=0.006), indicating a functional descending pain control. Conversely, after TSD, this increase in PDT was abolished (33±3.34 vs. 35.97±4.75, p=0.42), which may suggest that sleep is important to maintain proper descending pain control. A trend towards higher non-conditioned PDTs was found after TSD when compared to baseline (p=0.054). Temporal summation of pain was not affected by TSD (3.02±1.13 vs. 3.94±0.47, baseline versus TSD session respectively, p=0.38).

**Conclusions**: These preliminary data suggest that TSD impairs descending pain control and induces widespread muscle hyperalgesia.

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## Abstract no.: 443

### PREOPERATIVE QUANTITATIVE SENSORY TESTING PREDICTING CHRONIC POSTOPERATIVE PAIN AND POSTOPERATIVE PAIN RELIEF FOLLOWING TOTAL KNEE ARTHROPLASTY SURGERY: A SYSTEMATIC REVIEW

K. Kilic[1], T.H. Sejersgaard-Jacobsen[1], M.K. Jørgensen[1], D.B. Larsen[1], A. Troelsen[2,2], L. Arendt-Nielsen[1], K.K. Petersen[1]

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**Background and aims**: Studies on preoperative quantitative sensory testing (QST) demonstrate an association with chronic postoperative pain (CPP). This systematic review focuses on the predictive value of QST for CPP after total knee arthroplasty (TKA) surgery. The primary outcome was the predictive value of preoperative QST for CPP in primary TKA patients.

**Methods**: MEDLINE and EMBASE were systematically searched for studies on QST and CPP after TKA defined by assessment of visual Analogue Scales, Numeric Rating Scales or the Western Ontario and McMaster Universities Osteoarthritis Index.

**Results**: The systematic search resulted in 131 studies where 14 studies (1609 cases) were eligible for inclusion. A wide range of QST modalities were used including thermal stimuli (n=3), pressure stimuli (n=10), temporal summation of pain (TSP) (n=6), conditioned pain modulation (CPM) (n=8), and exercise-induced hypoalgesia (n=1). Pressure stimuli was predictive for CPP in 4/10 studies (40%), TSP in 4/6 studies (67%), and CPM in 3/8 studies (38%). In total QST was predictive in 11/14 studies (79%). The overall predictive value of QST for CPP ranged between 3.2-37.9% ($R^2$=0.032-0.379.) Low-to-moderate bias was identified with main bias components being prognostic factor of measurement, outcome, and confounders.

**Conclusions**: This systematic review illustrated that preoperative QST is statistically significantly associated with CPP following TKA. The predictive value is low-to-moderate and therefore QST is not recommended as a stand-alone decision support tool and additional measures should systematically be evaluated to develop more sensitive preoperative predicting tools which may help guiding surgeons and patients to judge risk-benefits.

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## Abstract no.: 457

### THE EFFECT OF SELECTIVE SPATIAL ATTENTION ON THE DEVELOPMENT OF SECONDARY HYPERALGESIA: A REPLICATION STUDY

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**Background and aims**: Central sensitization refers to the increased excitability of nociceptive neurons in the central nervous system after intense or sustained peripheral nociceptor activation. It causes an increased mechanical pain sensitivity at the injured location and the surrounding area (secondary hyperalgesia) and is hypothesized to play a key role in the development of pain chronicity.

Cognitive factors represent potentially malleable mechanisms that could affect central sensitization. It was recently shown that the experimental induction of central sensitization can be modulated by selective spatial attention, making attention a promising intervention target for clinical pain. To assess the robustness of this mechanism we conducted a preregistered replication study in a larger independent sample.

**Methods**: In a double-blind, within-subject design, study we investigated the impact of selective spatial attention on the development of secondary hyperalgesia. Sixty-seven healthy volunteers performed a detection task that required focusing attention towards one forearm while secondary hyperalgesia was simultaneously induced on both forearms using high-frequency stimulation (HFS).

**Results**: Our results showed a significant increase in mechanical sensitivity directly (T1) and 20 minutes (T2) after HFS. In contrast to the previous study, we did not find a significant difference in the development of secondary hyperalgesia between the attended vs unattended arm.

**Conclusions**: One explanation for the non-replication could be that the bottom-up capture of attention caused by HFS was too strong in comparison to the top-down modulation exerted by the detection task. To enhance the efficiency of top-down modulation, we may need to reconsider the role of goal relevance during the attentional task.

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## Abstract no.: 461

### PALMITOYLETHANOLAMIDE IS POSITIVELY CORRELATED TO HEAT PAIN-EVOKED BRAIN ACTIVITY

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**Background and aims**: The pain experience is shaped by complex central processing of ascending signals and descending modulatory pathways. Individual differences in pain can be observed using pain-evoked brain activity. The endocannabinoid (eCB) system has been posited to contribute to individual differences in pain, but there are limited data to corroborate this. Rodent research has shown that eCBs are present at every level of the nociceptive system, throughout the cortex, and in key structures of the descending modulatory circuit. Here, we explore whether eCBs are related to pain-evoked brain activity in humans.

**Methods**: Twelve participants gave informed consent, provided a blood sample and underwent a functional MRI (fMRI) scan while receiving noxious heat stimuli. Plasma eCB (*N*-arachidonoylethanolamine–AEA; 2-arachidonoylglycerol–2-AG) and related *N*-acylethanolamines (NAE: *N*-palmitoylethanolamide–PEA; and *N*-oleoylethanolamide–OEA) were quantified using liquid chromatography-tandem mass spectrometry. Participants underwent three fMRI runs with 6 painful heat stimuli on the left lower calf. fMRI data underwent standard preprocessing, and group-level maps were computed using mixed effects.

**Results**: We found heat-evoked activation in the bilateral insula, mid-cingulate cortex (MCC), and primary somatosensory/motor cortices. The activation level was correlated with eCBs and NAEs using Pearson's correlations. We found that activity in the bilateral insula and MCC was positively correlated with plasma PEA (all $r>0.48$, $p<0.05$).

**Conclusions**: These are the first data to identify a relationship between NAEs and pain-evoked brain activity, further advancing our understanding of the contribution of these endogenous ligands to acute pain processing. Future studies should reproduce these findings in a larger sample.

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## Abstract no.: 505

### PORCINE SENSORY NEURONS AS A FUNCTIONAL CELLULAR MODEL SYSTEM TO STUDY NEUROPATHIC PAIN

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**Background and aims**: New therapies against pain often fail during translation from pre-clinical rodent models to clinics. This stresses the need for more representative prototypes for the human nociceptive apparatus. Porcine unmyelinated afferents have been shown to more closely mimic their human counterparts, including the presence of cutaneous silent nociceptors (Obreja et al., 2010). As availability of human neuronal material is very restricted, we aim here to characterize porcine nociceptors for their potential use in pain research.

**Methods**: Porcine dorsal root ganglia were extracted after circulatory arrest, dissected, purified, and cultured. Characterization was performed by immunostainings and current clamp electrophysiology. We evaluated the resting membrane potential, action potential threshold, action potential characteristics and high frequency firing abilities of small to medium sized neurons.

**Results**: The cultured sensory neurons showed immune reactivity for a range of expected markers including Tuj1, Nav1.7, Nav1.8, TRPV1, Substance P and CGRP, confirming their sensory neuron identity. Current clamp characterization showed an RMP or -62.41 +/- 12.45 mV (n=126), an action potential amplitude of 95.42 +/-14.09mV (n=144) and an action potential half width of 5.59 +/-6.02ms (n=144). 91.6% of the recorded action potentials showed a “shoulder” defined via an infliction point in the descending phase. This is comparable with published human sensory neurons current clamp datasets (Davidson et al., 2014).

**Conclusions**: We have shown that we established the culture and assessment of porcine sensory neurons as a representative cellular model for pain research in human. In future studies we aim to consolidate these data by combining electrophysiological with transcriptomic data (Patch-Seq).

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## Abstract no.: 518

### METHYLGLYOXAL-INDUCED EFFECTS ON AXONAL PROPERTIES OF HUMAN C-FIBERS

M. Düll[1,2], K. Riegel[2], V. Ries[2], A.-L. Szedlik[2], M. Strupf[2], T. Fleming[3], S. Sauer[2], B. Namer[2,4]

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**Background and aims**: Patients with diabetic neuropathy (DN) might suffer from painful symptoms, but simultaneously experience loss of nerve fibre function. Methylglyoxal (MGO), a reactive dicarbonyl from the glucose metabolism, influences key targets of the nociceptive system such as TRPA1 and voltage-gated sodium channel subtypes $Na_v1.8$ and $Na_v1.7$. We showed that MGO causes pain and hyperalgesia in healthy human subjects with a crucial involvement of TRPA1 through predominant activation of mechano-insensitive C-nociceptors (CMi). This project consecutively investigates the effects of MGO on axonal properties of C-fibers with a focus on electrical stimulation in psychophysical and microneurography (MNG) testing.

**Methods**: Healthy human subjects underwent psychophysical analyses with different transcutaneous electrical stimulation protocols pre-/post MGO microinjections. We included rectangular pulses for the evaluation of the electrical pain threshold and frequency-dependent pain sensations as well as (half)-sinewave-shaped stimulation for preferential and differential C-fibre activation. Additionally, MNG recordings were performed to investigate differences in electrical excitability, activity-dependent conduction velocity slowing and slowly depolarizing ramps with (half)-sinewave-shaped pulses pre-/post MGO microinjections in the receptive fields.

**Results**: We observed a sensitization to different electrical stimuli after MGO application in psychophysical testing. After MGO microinjections in MNG, CMi fibers showed a tendency towards sensitized axonal properties, whereas mechano-responsive C-fibers (CM) displayed characteristics fitting with desensitization.

**Conclusions**: MGO influences reactions to electrical stimulation in healthy human subjects. Contrasting (de)sensitizing MGO-induced effects on axonal properties of CM- and CMi-fibers might be reflecting a differential expression of $Na_v1.8$ and $Na_v1.7$ on these fibre types and could correlate to positive and negative symptoms in patients with DN.

### Abstract no.: 599

## MICRONEUROGRAPHIC PROFILES OF PATIENTS WITH SMALL FIBER NEUROPATHY – SUITABLE FOR DIAGNOSTIC PURPOSE?

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**Background and aims**: Patients with small-fiber-neuropathy suffer from both negative and positive symptoms such as loss of temperature perception and ongoing pain. We assessed profiles of peripheral nociceptor properties and correlated them with the clinical phenotype.

**Methods**: Twelve small-fiber-neuropathy patients took part in the study. Patients were examined clinically by quantitative sensory testing according to the German Network for neuropathic pain and by nerve fiber density asessment in skin biopsies. Peripheral C-nociceptor function was objectively assessed by microneurography. For microneurographic recordings of C-nociceptors, a needle electrode was inserted into the nervus peroneus superficialis at ankle level and signals were recorded using the custom made software DAPSYS.

**Results**: In patients with superficial positive symptoms in the skin, more spontaneous activity was observed than in patients without pain or pure deep pain in the bone and muscle. Similar amounts of fibers with hypo-function were observed in both patient groups. Individual nociceptor response profiles as assessed by microneurography correlated with the phenotype when enough nerve fibers could be recorded. In single cases with difficult recording conditions and no pathological findings, no conclusion on individual level could be drawn. For the first time in this patient collective, we provide definitions for different pathological nociceptor classes.

**Conclusions**: Microneurography is a reliable method to find correlates to both positive and negative symptoms and might be suitable as a functional diagnostic tool for small-fiber-neuropathy. The diagnostic yield, however, strongly depends on the recording conditions. Thus, new developments towards simplified techniques and analysing procedures as well as unified nerve fiber classifications are strongly needed.

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# Wednesday, 27 April 2022

## 10:30-12:00

# Oral Poster Presentation II
# Basic Research/Translational II

### Abstract no.: 624

## DO Aβ AFFERENTS CONTRIBUTE TO THE NOCICEPTIVE WITHDRAWAL REFLEX IN HUMANS?

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**Background and aims**: The role of pain as a 'warning' system necessitates a rapid transmission of information from the periphery for the execution of appropriate motor responses. Pain in humans is thought to be signaled exclusively by slowly conducting Aδ and C afferents. Consistent with that, the nociceptive withdrawal reflex (NWR) – a physiological withdrawal response of the limb away from a painful stimulus – is defined by its latency in the Aδ range (≥90ms, e.g. Ydrefors et al. 2019, J Clin Med). We recently identified that human skin is equipped with ultrafast nociceptors (Aβ-range; Nagi et al. 2019, Sci Adv). Here, we tested whether the NWR in humans has an ultrafast (<90ms) component and whether it corresponds to pain perception.

**Methods**: In **Study 1**, we revisited the NWR and pain responses from Ydrefors et al. to search for ultrafast-reflex responses and asked whether pain was dependent on reflex-response latency.

In **Study 2,** we used intradermal electrical stimulation to evoke NWR and compared reflex and pain responses before, during and upon recovery from a preferential ischemic block of Aβ fibers.

**Results**: In **Study 1**, we identified an abundance of ultrafast-reflex responses with corresponding pain ratings similar to the reflex-responses in the conventional latency range (≥90ms).

In **Study 2**, the use of intradermal stimulation evoked short latency (<90ms) reflex responses, and both the reflex and pain were abolished during the Aβ-fiber block.
**Conclusions**: These observations indicate the presence of an ultrafast NWR component with a likely contribution from the Aβ afferents.

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## Abstract no.: 625

### PERIPHERAL SIGNALING PATHWAYS OF NON HISTAMINERGIC ITCH IN HUMANS

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**Background and aims**: In the last years pruritic agonists of MRGP receptors have been extensively scrutinized with respect to itch sensation mainly in cellular approaches and animal models. We set out to investigate the action of BAM 8-22, beta-alanine and cowhage extract in human.

**Methods**: Nineteen subjects took part in the study. Single C-fiber responses to different pruritogens (BAM 8-22, beta-alanine, Cowhage extract) were recorded using microneurography. For microneurographic recordings of C-nociceptors, a needle electrode was inserted into the nervus peroneus superficialis at ankle level and signals were recorded using the custom made software DAPSYS.

**Results**: Microneurography showed that all tested CM-nociceptors were activated by beta-alanine and the most by BAM 8-22. Silent nociceptors (CMi) were rarely activated by beta-alanine or BAM 8-22. Most very high threshold fibers were activated by BAM 8-22 or by beta-alanine. Injection of cowhage extract activated CM-fibers and some CMi-fibers. A special bursting discharge pattern was observed in 18% of CM-fibers by beta-alanin, in 30% by BAM 8-22 and 11% by cowhage extract. This pattern consists of regular trains of action potentials for few seconds and breaks of 20-60 seconds. Within the first 4 seconds of the burst 10-30 action potentials with 10-30 Hz were observed.

**Conclusions**: We conclude that CM-fibers are major players in non-histaminergic itch evoked by beta-alanine and BAM 8-22. The special discharge pattern might contribute to signalling the difference between itch and pain.

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## Abstract no.: 626

### FACTORS OBSTRUCTING AND FACILITATING OPIOID WEANING IN CHRONIC NON-CANCER PAIN PATIENTS: A QUALITATIVE STUDY

E. Begley[1], C. Montgomery[1], H. Poole[1], H. Sumnall[2], B. Frank[3]

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**Background and aims**: Evidence suggests that Chronic Non-Cancer Pain (CNCP) patients taking opioids above 120mg Morphine Equivalent daily Dose (MED) are at increased risk of harm. Medical guidance recommend patients reduce or discontinue their opioid medication, however there is limited research on how to safely and effectively do this alongside patient concerns that pain will increase. There is a need to understand the challenges HCPs and patients face in order to better support opioid weaning. This study aimed to understand the lived experiences of opioid weaning among Health Care Professionals (HCPs) and CNCP patients.

**Methods**: Qualitative study incorporating semi-structured interviews with 16 HCPs and 13 CNCP patients. Data was analysed using Thematic Analysis.

**Results**: Engaging patients into a weaning plan and having the knowledge or resources to support them when they '*hit a wall*' was a barrier for HCPs. Being adequately equipped with relevant knowledge on weaning and having access to Multi-Disciplinary Team Support (MDT) were perceived as facilitating factors. Patient barriers to weaning included fear of increasing pain, withdrawal and having alternative options to manage their pain. Patients perceived HCP consistency, continued HCP and peer support and pain education as facilitating factors.
**Conclusions**: Treating and managing CNCP is considered one of the most challenging issues in primary care. Engaging patients and orchestrating a plan to reduce opioid medication adds to the complexity. Any intervention designed to support opioid weaning should include ways to address barriers and incorporate facilitating factors informed by lived experiences to improve acceptability and engagement.

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## Abstract no.: 725

### A NOVEL TOOL FOR SELECTING OPTIMAL ANTAGONIST DOSE AND TIMING FOR CENTRAL MU-OPIOID RECEPTOR BLOCKADE IN HUMAN PAIN RESEARCH

M. Trøstheim[1,2], M. Eikemo[2], S. Leknes[1,2]

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**Background and aims**: Pain is thought to be regulated by the brain's mu-opioid system. To study the role of endogenous mu-opioids in human pain regulation, pharmacological blockade of mu-opioid receptors using opioid antagonist drugs is a convenient tool. However, antagonist doses used in basic human pain research to achieve full mu-opioid receptor blockade are often based on very limited data.

**Methods**: Here, we provide a detailed overview of central opioid receptor blockade after opioid antagonism based on modelling of existing positron emission tomography data. We also create models and web applications for estimating opioid receptor blockade with intravenous (IV) naloxone and oral (PO) naltrexone.

**Results**: Common doses of IV naloxone (0.10-0.15 mg/kg) and PO naltrexone (50 mg) are more than sufficient to produce full (>90%) blockade of central mu-opioid receptors for the duration of a typical experimental session (~60 minutes). Simulations indicate that these doses also produce considerable kappa-opioid receptor blockade and some blockade of delta-opioid receptors. Our models show that lower doses of IV naloxone (e.g. 0.01 mg/kg) still achieve full mu-opioid receptor blockade, but for a shorter duration. Naloxone's short time-to-peak blockade and blockade half-life (~94 minutes) makes it suitable for designs requiring short intersession intervals and delay between drug administration and outcome assessment. Naltrexone is better suited for designs requiring prolonged blockade due to its 72-hour blockade half-life.

**Conclusions**: This overview and convenient web tools can help pain researchers select appropriate antagonists, doses and assessment time points for future studies and determine the achieved blockade in previous studies.

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## Abstract no.: 697

### CHANGES IN THE PREVALENCE OF ACUTE MUSCULOSKELETAL PAIN IN THE SWEDISH POPULATION 2004-2020

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**Background and aims**: Back and neck pain are among the most important explanations of disability in Sweden and elsewhere. Pain is often a lifelong episodic condition. Short term as well as long term consequences are driving disability rates and the distribution of acute pain summarize over both. Here we identify overtime changes in the prevalence of acute musculoskeletal pain in the Swedish population.

**Methods**: In a large yearly nationally representative cross-sectional postal survey 2004-2020 (15 waves, n=150 000, response rate 50 percent, ages 18-84) three items concerned pain: Do you have any of the following troubles or symptoms? Shoulder or neck pain; back or hip pain, sciatica; pain or aches in hands, elbows, legs or knees. Answering alternatives were; no; yes, slightly; yes, severe. Pain refers to severe pain in at least one these three locations.

**Results**: Twelve percent of the men and 18 percent of the women reported pain in 2020. Pain increased with age, figures for age groups 16-29, 30-44, 45-64, and 65-84 were; 6, 10, 18, and 21 percent. The prevalence was also higher among less educated, unemployed, and persons on sick leave. Overtime the prevalence of pain in the whole adult Swedish population decreased from 18 percent in 2004 to 15 percent in 2020. The corresponding decrease among persons on sick leave was from 59 to 48 percent.

**Conclusions**: There is a close association between pain and disability apparent in the high prevalence among persons on sick leave. This calls for further investigations in the future.

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## Abstract no.: 752

### AN ARTIFICIAL INTELLIGENCE SOLUTION TO DETECT POTENTIAL NON-RESPONSE TO CHRONIC-PAIN TREATMENT BASED ON THE FIRST MEDICAL ENCOUNTER

L.I. Moreira[1], A. Bessa[2], N. Ziviani[2,3], M.J. Teixeira[1], J. Rosi[1], M. Nishio[1], D.C. Araujo[2,3], A.P. Macedo[3], G.T. Kubota[1], V. Silva[1], A. Veloso[2], D. Ciampi de Andrade[1,4]

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**Background and aims**: It remains fully unknown how to differentiate patients who will respond to current evidence-based treatment from those who will not. We performed a machine learning approach to clinical data gathered at the first medical encounter using a dedicated pain medical record system to predict who would have a good pain outcome at the last medical visit up to 12 months thereafter.

**Methods**: A big data supervised machine learning approach was undertaken to predict patients who will respond positively to the treatment. The prediction models were built using features derived solely from the first medical encounter. We improve prediction performance by combining multiple models based on a novel diversification criterion in order to account for different chronic pain etiologies.

**Results**: A total of 506 patients with chronic pain of several etiologies undergoing their first consultation in a tertiary pain center were included. A total of 338 variables were fed into machine learning algorithms, which were used to unveil complex relationships between these variables. These algorithms use data from the first medical encounter to produce models designed to predict a long-term pain outcome, yielding a sensitivity and specificity of 0.69 and 0.73, respectively, with an area under the curve of ~0.80. When inputted with variables from the second visit, AUC numbers improved to 0.85.

**Conclusions**: The use of machine learning algorithms may provide new insights into personalized and prediction - medicine, and this may impact patient management in a positive way.

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## Abstract no.: 978

### THE PREDICTIVE VALUE OF FEAR AVOIDANCE BELIEFS FOR SURGICAL OUTCOME FOLLOWING LUMBAR DEGENERATIVE DISEASE: A SYSTEMATIC REVIEW AND BEST EVIDENCE SYNTHESIS

W. Van Bogaert[1,2,3], H. Tegner[4], I. Coppieters[1,5,6], E. Huysmans[1,2,3,5], J. Nijs[1,5,7], M. Moens[1,8,9,10,11], L. Goudman[1,3,8,9,12], R. Buyl[13], M. Lundberg[1,14,15]

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**Background and aims**: This systematic review aims to evaluate the predictive value of preoperative fear avoidance beliefs for outcome following surgery for lumbar degenerative disease.

**Methods**: An extensive search was performed in Pubmed/Medline, EMBASE, PsycINFO, CINAHL and the Cochrane library for articles published up until October 2021. Observational studies that included patients undergoing surgery for lumbar degenerative disease, as well as evaluated fear avoidance beliefs (i.e., pain-related fear, pain catastrophizing, anxiety) in relation to a surgical outcome measure (i.e., pain intensity, functional status and quality of life) were included in the review and best evidence synthesis.

**Results**: A total of 24 studies (n=17,881) were included in this review. Following evidence synthesis, 3 studies reported no significant predictive value of preoperative pain-related fear for postoperative pain intensity resulting in moderate evidence for this relationship. Moderate evidence was found indicating no significant predictive value of preoperative pain-related fear for postoperative functional status, as 6 out of 8 relevant studies reported this result. Only 1 study reported on the predictive value of preoperative pain catastrophizing for postoperative quality of life, resulting in limited evidence for this negative predictive relationship. All other relationships were found to have conflicting evidence.

**Conclusions**: Best evidence synthesis showed moderate evidence indicating no significant predictive value of preoperative pain-related fear for pain or function following surgery for lumbar degenerative disease. Limited evidence was found for preoperative pain catastrophizing as a negative predictor for postoperative quality of life. As current evidence regarding the predictive value of preoperative fear avoidance beliefs is mixed, further research is warranted.

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## Abstract no.: 992

### DISCRIMINATION OF INNOCUOUS AND NOXIOUS TOUCH INTENSITY VARIES DEPENDING ON SKIN SITE

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**Background and aims**: The ability to discriminate between different levels of innocuous stimulation has received considerable scientific interest in the field of somatosensation, whereas less is known about our capacity to discriminate between different levels of mechanical pain. In this study, we sought to measure the capacity for mechanical pain discrimination in the hand and foot dorsum using psychophysical methods.

**Methods**: Twenty human participants (21-33 years) were tested using a two-alternative forced choice (2AFC) paradigm to measure discrimination ability. Mechanical detection thresholds (MDT) and mechanical pain thresholds (MPT) were also measured at the same sites using the method of limits. To achieve this, we used von Frey monofilaments to deliver a range of mechanical forces (0.008-300 g) covering the innocuous and painful range, and compared performance using the Weber fraction (WF).

**Results**: The results from the 2AFC task revealed that the foot was significantly better ($p<0.0001$; paired t-test) at discriminating mechanical forces in the noxious range (WF=0.51) than the hand (WF=0.88). This contrasts with discrimination in the non-painful range where the hand performed better (WF 0.016 vs 0.019 foot; $p=0.0084$). Furthermore, MDT was lower in the hand (0.13 g vs 0.26 g foot; $p<0.0001$) and MPT was lower in the foot (64 g vs 95 g hand; $p<0.0001$).

**Conclusions**: The hand was more sensitive at discriminating innocuous tactile stimuli, and the foot was more sensitive at discriminating mechanical pain. In ongoing studies, we are examining if these differences between the hand and foot can be explained by differences in peripheral innervation or depend on central processing.

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### Abstract no.: 1111

## A PLACEBO-CONTROLLED, DOUBLE-BLIND STUDY INVESTIGATING THE LINK BETWEEN CHILDHOOD TRAUMA, PAIN, AND OPIOID REWARD

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**Background and aims**: Experiences of childhood trauma (abuse and neglect) are disproportionately higher in those with opioid use disorder (OUD) and chronic pain. Childhood trauma may affect the reinforcing and rewarding properties of opioid drugs and responses to pain, potentially via developmental changes to the endogenous opioid system. This has been supported by pre-clinical research, yet not in non-addicted humans.

**Methods**: Physically healthy participants with either a history of severe childhood trauma or no previous history of childhood trauma attended two sessions (one week apart) where they received either an intramuscular active dose of morphine (0.15mg/kg) or a very low dose control (0.01mg/kg) in a randomised, double-blind design. Physical pain threshold and tolerance were measured pre- and post-drug administration using the cold water pressor test, alongside acute subjective and behavioural responses over 2.5 hours.

**Results**: The trauma group reported liking the effects of morphine, feeling more euphoric and wanting more of the drug over the session, as well as feeling less nauseous, dizzy, and dislike of the effects of morphine compared to the non-trauma comparison group. Although morphine increased pain threshold and tolerance, these did not differ by group. However, pain catastrophising was higher in those with childhood trauma.

**Conclusions**: Childhood trauma may sensitise individuals to the pleasurable effects of opioids and reduce sensitivity to the aversive effects, providing compelling evidence for individual differences in opioid reward sensitivity. There may also be interpretational differences in the experience and management of pain. These findings have implications for interventions, the prescribing of opioids, and reducing stigmas surrounding OUD.

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# Wednesday, 27 April 2022

## 13:00-14:30

# Oral Poster Presentation III
# Clinical I

### Abstract no.: 382

## AN EDUCATIONAL E-HEALTH TOOL SUPPORTING APPROPRIATE (PRE)SELECTION FOR SPINAL CORD STIMULATION IN CHRONIC PAIN: IMPLEMENTATION AND VALIDATION

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**Background and aims**: At EFIC 2019, we proposed the prototype of an educational e-health tool to support the appropriate (pre)selection of patients for spinal cord stimulation (SCS). The tool provides an integrated approach, assessing clinical and psychosocial factors that may be relevant for the consideration of SCS. We here present the 18-month results on implementation and validation.

**Methods**: The multilanguage online tool was made available in April 2021 when the manuscript on its development and underlying consensus study was published (Eur J Pain 2020;24:1169-81). Educational meetings in various countries have been organised to present and discuss the tool. Simultaneously, a retrospective study was conducted to explore the relationship between the tool recommendations, centre decisions and patient outcomes.

**Results**: Until October 2021, thirty national meetings (including workshops, webinars and lectures) have reached around 750 participants in seven European countries. An equal number of implanters, referrers and supporting staff have registered to use the tool for educational purposes. Feedback was very positive, particularly for the integrated approach.

Retrospective application of the tool to 491 patients from 12 European centres showed that nearly all patients (98.4%) were considered for indications included in the tool. Tool recommendations were significantly associated with both centre decisions and patient outcomes after SCS at 6-month follow-up (P<.001).

**Conclusions**: The e-health tool has been positively received by a large group of health care professionals in Europe. The retrospective study suggested predictive value of the e-health tool for patient outcomes, which will be further evaluated in a prospective validation study.

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## Abstract no.: 151

### DIGITAL TREATMENT OF BACK PAIN – CLINICAL LONG-TERM RESULTS AND HEALTHCARE COST DATA OF THE CLUSTER-RADOMIZED RISE-UP TRIAL

J.A. Priebe[1], L. Kerkemeyer[2], K.K. Haas[1], K. Achtert[2], L.F. Moreno Sanchez[3], P. Stockert[1], P. Schuster[1], R. Thoma[4], S. Jedamzik[3], J. Reichmann[5], S. Franke[6], L. Sundmacher[6], U. Marschall[7], S. Schwab[8], M. Hermann[9], V. Amelung[2], T.R Toelle[1]

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**Background and aims**: The cluster-randomized controlled Rise-uP trial is a GP centered back pain treatment approach comprising four digital elements: (1) electronic case report form, (2) clinical decision support, (3) teleconsultation between GPs and pain specialists for patients at risk for development chronic back pain, and (4) the multidisciplinary Kaia back pain app. Here we present the 12-month long-term results.

**Methods**: In the cluster-randomized controlled Rise-uP trial 933 patients were treated according to the guideline-oriented Rise-uP approach while 312 patiens received standard of care. Pain ratings as well as psychological, functional and wellbeing measures (PROMs) were assessed at baseline and a 3-, 6- and 12 months follow-up. Individual healtcare cost data were provided by health insurances.

**Results**: The Rise-uP group showed a significant stronger pain reduction compared to the control group after 12 months (IG: -46% vs. CG: -24%; $p < .001$). The Rise-uP group was also superior in all other PROMs. Cost analyses showed cost-differences of -80% in favour of Rise-uP (difference-in-difference analysis). Healthcare costs in the control group increased by $M = +208$ €, the costs in the Rise-uP group were reduced by $M = -39$ € ($p = .011$). Cost-effectiveness analysis showed savings of 312€ per point reduction on the NRS pain scale.

**Conclusions**: Compared to an actively treated control group, the digital treatment algorithm Rise-uP including a digital backpain app shows - at the same time - strong clinical and economic superiority. Thus, digital medicine in backpain treatment seems to be a valuable complement or alternative to standard-of-care.

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## Abstract no.: 306

### PREHABILITATION BEFORE TOTAL KNEE ARTHROPLASTY: A SYSTEMATIC REVIEW ON THE USE AND EFFICACY OF STRATIFIED CARE

S. Vervullens[1,2,3], L. Meert[1,2,3], I. Baert[1,3], R. Smeets[2,3,4], P. Verdonk[5,6], F. Rahusen[7], M. Meeus[1,8,3]

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**Background and aims**: The goal was to assess if previous clinical trials on prehabilitation in knee osteoarthritis (KOA) patients awaiting total knee arthroplasty (TKA) focused on stratified care. Secondly, to summarize and compare the long-term effects of stratified and non-stratified care.

**Methods**: A systematic literature search on three databases was performed. All relevant articles published up to April 19, 2021 reporting '(randomized controlled) clinical trials or prospective cohort studies' (S) related to the key words 'total knee arthroplasty' (P), 'preoperative conservative interventions' (I), 'pain, function, quality of life and/or satisfaction' (O) were included.

**Results**: After screening 3498 records, 18 studies were assessed for risk of bias. Twelve studies had a low-, two a moderate-, three a serious-, and one a high risk of bias. The latter was excluded. Five studies provided a 'stratified'-, and twelve a 'non-stratified prehabilitation care'. In four stratified studies the study sample was chosen considering a predefined intervention, and in the fifth study the prehabilitation was stratified to patients' needs. Direct comparison between the two approaches was not possible. Weak evidence was found for a biopsychosocial prehabilitation compared to no prehabilitation on function (stratified studies), and a pain neuroscience education prehabilitation compared to biomedical education on satisfaction (non-stratified studies) six months post TKA. Strong evidence was found for exercise prehabilitation compared to no prehabilitation on pain six months, and on function 12 months post TKA (non-stratified studies).

**Conclusions**: Based on these results, more research of stratified prehabilitation care focusing on patient characteristics in KOA patients awaiting TKA is necessary.

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## Abstract no.: 325

### INDIVIDUALS WITH HIGH-FUNCTIONING AUTISM SPECTRUM DISORDER PRESENT A PRO-NOCICEPTIVE PAIN PROFILE

T. Hoffman[1], T. Bar-Shalita[2], E. Gal[3], M. Kalingel-Levi[3], C. Buxbaum[4], N. Yarovinsky[5], Y. Granovsky[4,6], I. Weissman-Fogel[1]

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**Background and aims**: One of the suggested mechanisms underlying autism spectrum disorder (ASD) is an excitatory and inhibitory (E/I) imbalance, yet this has not been systematically tested in central pain processing research. We applied a variety of laboratory pain measurements to examine the functioning of ascending facilitatory and descending inhibitory pain pathways in adults with ASD. We assumed that the E/I imbalance would be manifested as hypersensitivity to supra-threshold stimuli, increased temporal summation, and less efficient pain inhibition.

**Methods**: Fifty-two adults diagnosed with high-functioning ASD (aged 19-50 [median = 24.5] years, 10 females) and 52 age- and sex-matched healthy subjects participated. Participants underwent a battery of pain psychophysical tests including supra-threshold repetitive heat (46, 49, 52 °C) and pinprick stimuli, tonic heat pain, habituation to 2 series of heat pain stimuli, heat pain temporal summation, and conditioned pain modulation.

**Results**: The ASD group demonstrated hypersensitivity to single (i.e., responses to 1$^{st}$ and 10$^{th}$ stimulus in the temporal summation test; $p$=0.001), repetitive (46°C: $p$=0.018; 49°C: $p$=0.003; 52°C: $p$<0.001) and tonic ($p$=0.013) heat pain stimuli. Yet they demonstrated inhibitory pain modulation efficiency similar to controls.

**Conclusions**: Individuals with ASD are widely believed to be hyposensitive to pain as was demonstrated in self and observational clinical reports. Our study found that individuals with high-functioning ASD demonstrate hyperalgesia to pain stimuli yet sufficient ability to modulate pain. These findings suggest a pro-nociceptive pain profile that is elicited by facilitation in pain transmitting pathways, which is in accordance with the E/I imbalance mechanism underlying ASD.

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## Abstract no.: 342

### THE EFFECT OF A PAIN EDUCATIONAL VIDEO INTERVENTION UPON CHILD PAIN-RELATED MEMORY: THE MODERATING ROLE OF PARENTAL (NON-)PAIN-ATTENDING VERBALIZATIONS

E. Rheel[1,2], K. Ickmans[1,3,4], A. Wauters[2], D.M. Van Ryckeghem[2,5,6], K. Barbé[7], A. Malfliet[1,3,8], T. Vervoort[2]

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**Background and aims**: Early memories of pain contribute to fear, and to the maintenance and/or development of chronic pain into adulthood. Accordingly, understanding determinants that may play a role in children's pain memory development is key. This study examined the effect of an engaging pain educational video intervention in healthy children before undergoing an experimental pain task upon children's pain-related memory, and the moderating role of parental (non-)pain-attending verbalizations.

**Methods**: Seventy-seven children (8-15 years old) were randomly allocated to the experimental group (i.e., pain educational video) or control group (i.e., no video). Parent-child interactions before and after the pain task were videotaped, allowing coding of parental (non-)pain-attending verbalizations. Children's memories of pain intensity and pain-related fear were elicited two weeks later.

**Results**: Recalled pain intensity (but not recalled pain-related fear) of children in the experimental group was significantly lower compared to the control group (p=.028). Further, parental pain-attending verbalizations before the pain task moderated the impact of the video intervention upon children's recalled pain-intensity (p=.038), such that children in the control group whose parents used less pain-attending verbalizations reported higher recalled pain intensity, whereas children whose parents used more pain-attending verbalizations reported lower recalled pain intensity. Children in the experimental group seemed to be less affected by their parents' pain-attending verbalizations.

**Conclusions**: Children's pain memories are key in pain assessment, pain management, and the transition of acute to chronic pain, hence findings of this study might have important implications for the development or maintenance of maladaptive pain-related behavior in children.

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## Abstract no.: 345

### HIP, KNEE, AND FOOT PAIN: MUTUAL INFLUENCE AND MEDIATING ROLES OF OBESITY, SARCOPENIA, AND INFLAMMATION

M.R Radojčić[1], R.S Perera[2], D.J Hart[3], T.D Spector[3], N.K Arden[1]

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**Background and aims**: Hip, knee, and foot pain are frequently reported among ageing women, but how pain in one influences the other joints is unclear. Besides proximal hypersensitivity, inflammation and reduced activity leading to obesity or sarcopenia could have mechanistic roles. We aimed to investigate the mutual influence of pain in lower limb joints and whether the mechanism involves body fat and lean mass and systemic inflammation in middle-aged English women.

**Methods**: We utilised data from the Chingford Study. Joint pain defined the presence of hip, knee, or foot pain episodes in the last year. We used total fat mass (TFM) and total lean mass (TLM) measured by dual-energy X-ray absorptiometry and serum high-sensitivity C-reactive protein (hs-CRP). Using binary logistic regression parallel mediation model, we investigated how each joint influences the other two and whether TFM, TLM and hs-CRP mediated effects between the joints.

**Results**: We included 695 women (mean age=60.6, SD=5.9). We found that pain in each lower limb joint influenced pain in the other two. Women had 3.2 higher odds of having hip pain if reported knee pain and 2.4 odds if reported foot pain. Knee pain odds was 2.5 higher in women with foot pain, and TFM mediated 10% of foot-knee effects. We did not find that TLM or hs-CRP mediated any effect.

**Table 1. Mutual effects of pain in lower limb joints, direct and indirect via obesity, sarcopenia, and inflammation (cross-sectional mediation analyses)**

| *Predictor* | *Mediator* | *Outcome* | |
|---|---|---|---|
| | | Knee pain<br>*OR (95% CI)* | Hip pain<br>*OR (95% CI)* |
| Foot pain | Total Fat Mass<br>Total Lean Mass<br>hs-CRP | **2.52** (1.71, 3.71)<br>**1.11** (1.02, 1.22)<br>1.02 (0.96, 1.10)<br>1.00 (0.97, 1.03) | **2.36** (1.58, 3.52)<br>0.99 (0.91, 1.08)<br>1.06 (0.99, 1.16)<br>0.99 (0.92, 1.06) |
| | | Foot pain<br>*OR (95% CI)* | Hip pain<br>*OR (95% CI)* |
| Knee pain | Total Fat Mass<br>Total Lean Mass<br>hs-CRP | **2.53** (1.72, 3.73)<br>**1.08** (1.01, 1.19)<br>1.04 (0.99, 1.12)<br>0.99 (0.92, 1.03) | **3.15** (2.18, 4.56)<br>0.98 (0.79, 1.08)<br>1.05 (0.99, 1.12)<br>0.94 (0.77, 1.01) |
| | | Foot pain<br>*OR (95% CI)* | Knee pain<br>*OR (95% CI)* |
| Hip pain | Total Fat Mass<br>Total Lean Mass<br>hs-CRP | **2.38** (1.59, 3.54)<br>1.02 (0.97, 1.10)<br>1.03 (0.99, 1.11)<br>1.00 (0.97, 1.05) | **3.16** (2.19, 4.57)<br>1.02 (0.97, 1.08)<br>1.01 (0.98, 1.06)<br>0.99 (0.92, 1.01 |

OR – odds ratio; CI – confidence interval; hsCRP – high-sensitivity C-reactive protein.

Models were constructed using logistic regression path analysis parallel method to estimate direct effects of predictors and indirect effects of predictors through mediators on the lower limb joint episode. Models were adjusted for age, smoking, use of hormone replacement therapy, menopause status, medication use, and body height.

**Conclusions**: Pain in either lower limb joint increases the chance of pain in the other two joints. The mechanism between foot and knee pain partially includes obesity.

## Abstract no.: 498

## BODY WEIGHT-SUPPORTED TRAINING FOR PATIENTS WITH COMPLEX REGIONAL PAIN SYNDROME (CRPS)

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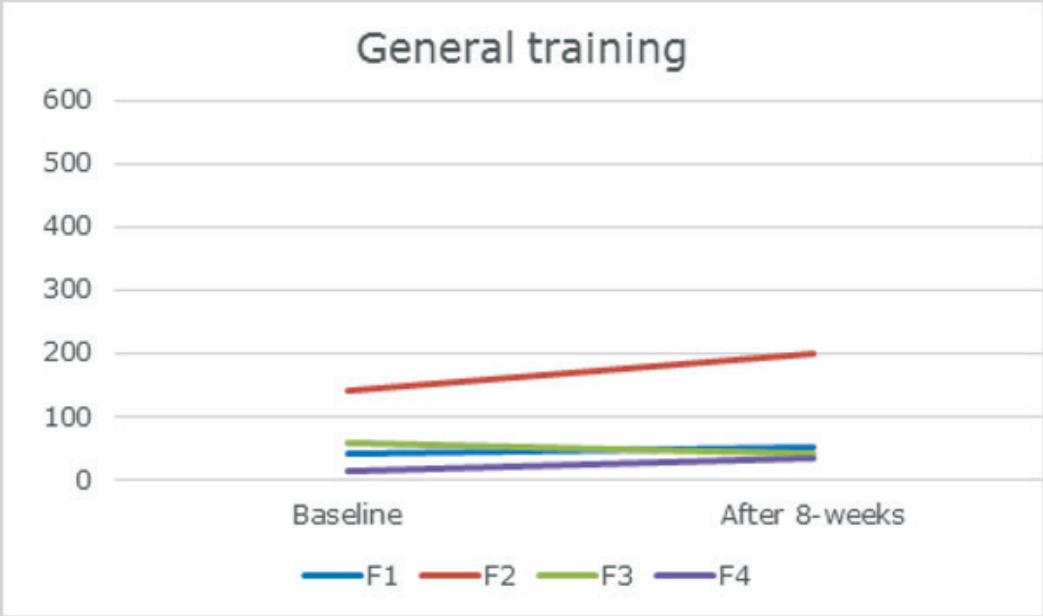
**Background and aims**: Clinical guidelines for non-pharmacological treatment of CRPS are lacking. CRPS is a very painful condition with immobilization in the affected limb. No data are available for Body Weight-supported training (BWST) to patients with CRPS in the foot, but positive results are found for other painful conditions. Hypothesis; Regular BWST will reduce pain while walking, increase walking distance and functional level.

**Methods**: From Autumn 2019 to Summer 2021, 9 patients with CRPS in the foot participated in an 8- week BWST intervention, twice a week for maximum 25 minutes per session of BWST treadmill training. Main outcome measures were Six-Minute Walk test and Patient Specific Functional Scale. The patients rated pain (NRS) before walking test, after 5 meter, and of end of test. Results were compared with 4 patients receiving general training.

**Results**: Gait distance increased by median 60m (from median 78m to 240m) and functional level in daily activities increased by median 2.8 (from median 1.8 to 4.2). The control group increased gait distance by median 15m (from median 50m to median 45m), functional level scores were reduced by median 0.1 (from median 2.7 to 2.6). For both outcome parameters, the BWST group performed significantly better (P<0.001). The level of pain decreased at baseline and after test in 7/10 patients in the BWST group and in 1/4 in the control group.


**Conclusions**: BWST is a promising non-pharmacological treatment for patients with CRPS in the foot. Furthermore, the training form is gentle and safe. Significant improvement in both main outcome parameters were observed.

### Abstract no.: 660

#### INCIDENCE OF CHRONIC PAIN IN PATIENTS HOSPITALIZED BY COVID-19: OBSERVATIONAL STUDY

G.A. Moreira de Barros[1], M.A. Marchetti Calônego[1], D. Inomata[1], M. Lopes Amaral Barbosa[1], R. Abbud Soares[1], R. Mendes[1], C.L. Miranda[2], C. Souto de Melo[1], M.A. Ornellas[1]

*[1]Sao Paulo State University (UNESP) Medical School, Botucatu, Brazil, [2]Teaching Hospital, UNESP, Botucatu, Brazil*

**Background and aims**: Covid-19 is a systemic pandemics disease caused by the virus SARS-CoV-2. One of the disease's imposed challenges is the care of recovered patients, in especial those undergoing Intensive Care Unit (ICU) treatment, as Post-Intensive Care Syndrome, often a painful condition, may occurs. The aims of this study was to assess the presence of chronic pain in patients who were discharged after being hospitalized for COVID-19 infection.

**Methods**: A cross-sectional observational study was carried out with patients recovered from COVID-19 infection. The study was conducted in accordance with the research guidelines outlined by RECORD (REporting of studies Conducted using Observational Routinely-collected health Data statement). The survey data were obtained from telephone interviews. Adult subjects were recruited using data obtained from electronic medical records of hospitalized patients from March 2020 to May 2021 with a diagnosis of COVID-19 confirmed by RT-PCR test.

**Results**: A total 243 individuals were included, 28% of the in the ICU. Only 10% of individuals underwent mechanical ventilation. Approximately 32% of respondents had, for a period longer than three months after hospital discharge, pain related to infection by COVID-19. The incidence of chronic pain was higher (46%) among those who were intubated. There was also a higher incidence of chronic pain among patients admitted to the ICU (37%) compared to those admitted to the ward (29%).

**Conclusions**: We may concluded that COVID-19 patients admitted to the ICU, or who were intubated, have a higher incidence of chronic pain after their medical discharge.

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# Wednesday, 27 April 2022

## 14:40-16:10

# Oral Poster Presentation IV
# Clinical II

### Abstract no.: 672

#### CHRONIC PAIN AND LANGUAGE: A TOPIC MODELLING APPROACH TO PERSONAL PAIN DESCRIPTIONS

D. A.P. Nunes[1,2], J. Ferreira-Gomes[3], C. Vaz[4,3], D. Santos Oliveira[4], S. Pimenta[4], F. Neto[3], D. Martins de Matos[1,2]

*[1]INESC-ID, Lisbon, Portugal, [2]Instituto Superior Técnico, Universidade de Lisboa, Lisbon, Portugal, [3]Faculdade de Medicina da Universidade do Porto, Porto, Portugal, [4]CHUSJ, Centro Hospitalar Universitário de São João, Porto, Portugal*

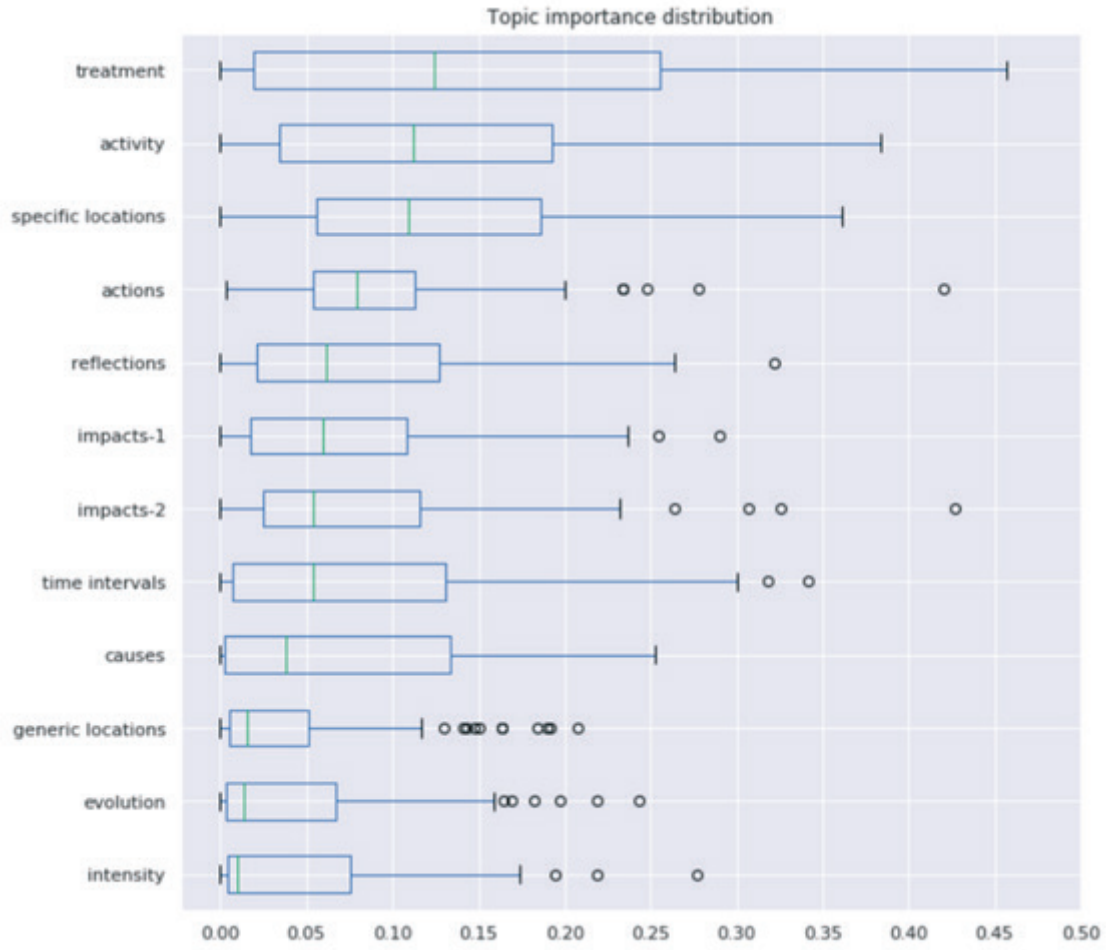
**Background and aims**: Verbal communication conveys key information to health professionals that otherwise would not be accessible, such as intrinsic qualities of the painful experience and the patient. Previous work has successfully applied manual linguistic analyses to the language of pain, some resulting in questionnaires widely used in clinical settings. However, their fixed, lexicon-based qualities do not allow for the analysis of spontaneous verbal accounts and complex semantic structures. Moreover, these analyses are language-dependent and cannot be easily adapted to other languages. We present an approach to automatically recognise complex semantic patterns in spontaneous accounts of chronic pain, and use these patterns to quantify, qualify, and compare experiences of pain from a verbal standpoint.

**Methods**: 94 patients suffering of chronic pain were interviewed following a 7-question script to obtain descriptions of their experience of pain. Using the transcribed text, topic models were applied to discover the main linguistic patterns.

**Results**: Word importance was measured for all patients:


Patients were automatically grouped according to the importance given to the extracted topics, showing distinct clusters:

Topic importance (percentage) distribution was calculated for the whole population:




**Conclusions**: Overcoming the limitations of manual verbal analysis of chronic pain patients, our method allows for the automatic extraction of novel insights of spontaneous verbal accounts of chronic pain, based on Machine Learning methodologies. Moreover, it is implicitly subordinated to the socio-cultural and linguistic background of the considered patients, which is a substantial limitation of manual approaches. We argue that our results are clinically relevant for the assessment and management of chronic pain.

## Abstract no.: 687

### COMPLEX REGIONAL PAIN SYNDROME WHAT IS THE OUTCOME? A SYSTEMATIC REVIEW OF THE COURSE AND SEVERITY OF CRPS SYMPTOMS AT 12 MONTHS AND BEYOND

S. Johnson[1,2], F. Cowell[3], S. Gillespie[3], A. Goebel[1,2]

*[1]University of Liverpool, Liverpool, United Kingdom, [2]The Walton Centre NHS trust, Liverpool, United Kingdom, [3]Liverpool University Foundation Trust, Liverpool, United Kingdom*

**Background and aims**: To improve CRPS treatment, it is imperative to understand the degree, nature, and relative importance of any ongoing CRPS related problems. This systematic review aimed to summarise the published data concerning measures of recovery and impact of CRPS symptoms at 12 months from symptom onset and beyond.

**Methods**: Databases of MEDLINE, EmBase, and PsychINFO were searched from inception to May 2020. Study cohorts were eligible if they included adult patients with the primary complaint of CRPS ≥12 months duration and included outcomes reporting change in CRPS signs and symptoms, and physical & social disability. Prospero registration: CRD42021241785.

**Results**: 22 included studies suggest CRPS often substantially improves within 12 months from onset. Pain and motor dysfunction are the most dominant long-term features of CRPS persisting for 51-89% of patients at 12 months and beyond. On average for all patients who had CRPS, grip strength was found to be reduced by 25-66% and range of motion by 20-25% at ≥12 months. Such losses were found to compromise activity and prevented return to work for 30-40% of cases. A further 27-35% of persons returning to work required some form of workplace adaptation although data capturing this was poor. Quality assessment highlighted limitations in the literature, such as high attrition bias and variations in diagnostic criteria.

**Conclusions**: The review found first-time quantitative data on function and work status for CRPS ≥12 months. Despite general improvements in features of CRPS, the ongoing impact of CRPS on hand function and work status is surprisingly high.

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## Abstract no.: 766

### TRANSIENT HYPOALGESIA AFTER COVID-19 INFECTION

J. Becker[1], A. Papagianni[1], C. Sommer[1], H.L. Rittner[1]

*[1]University Hospital of Würzburg, Würzburg, Germany*

**Background and aims**: Gustatory and olfactory deficits as described by Mahmoud et al. (2021, PMID: 33577069) and Polat et al. (2021, PMID: 33427776) or pain conditions, such as myalgia or headache as reported by Meyer-Frießem et al. (2021, PMID: 33490851) are often-cited complications during COVID-19 disease. However, there is no clear evidence of affection of the peripheral nervous system. Recently, Hentsch et al. (2021, PMID: 34654780) described a case series of transient pain disappearance in three cancer patients during their COVID-19 episode. Here, we report the case of a 48-year-old man suffering from persistent dysgeusia and hypoalgesia after COVID-19 disease in 2020.

**Methods**: We performed clinical and electrophysiological examinations, QST, electrical C-fibre stimulation, iontophoresis and a skin punch biopsy of the lower leg.

**Results**: The patient presented with persistent gustatory and olfactory deficits, painlessness and loss of sensitivity after pinprick stimuli seven months after a mild-moderate SARS-CoV-2 infection. QST revealed increased thermal detection thresholds at the face but no changes at the foot. Electrical C-fibre stimulation elicited higher pain ratings than in healthy controls. Most importantly, the axon flare reaction after histamine- and acetylcholine-iontophoresis was absent. Skin punch biopsy revealed a reduced intraepidermal nerve fibre density, TRPV1 and CGPR immunoreactivity were inconspicuous. All symptoms improved after 5 months.

**Conclusions**: Transient hypoalgesia can occur either during the acute episode or as a long-term sequela after COVID-19 infection. Affection of the peripheral nociceptive system should be studied in the future.

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## Abstract no.: 949

### FUNCTIONAL AND STRUCTURAL EVALUATION OF SMALL NERVE FIBERS IN PATIENTS SUFFERING FROM HYPERMOBILE EHLERS DANLOS SYNDROME/HYPERMOBILITY SPECTRUM DISORDER

A. Fernandez[1,2,3], B. Aubry-Rozier[3], M. Vautey[2], C. Berna[1,2,3], M.R. Suter[1,3]

*[1]Lausanne University Hospital, Pain Center, Department of Anesthesiology, Lausanne, Switzerland, [2]Lausanne University Hospital, Center for Integrative and Complementary Medicine, Department of Anesthesiology, Lausanne, Switzerland, [3]University of Lausanne, Faculty of Biology and Medicine, Lausanne, Switzerland*

**Background and aims**: The Ehlers Danlos syndromes (EDS) are heritable connective tissue disorders. The most frequent, the hypermobile form (hEDS) is the only one without an identified genetic mutation. hEDS diagnosis relies on clinical symptoms including generalized joint hypermobility, an association of systemic manifestations and musculoskeletal complications. Patients suffering from symptomatic joint hypermobility, yet not fulfilling the hEDS criteria, enter the Hypermobility Spectrum Disorder (HSD) category. In addition to musculoskeletal pain, hEDS/HSD patients often describe burning sensations, paresthesia and allodynia, suggesting a neuropathic component. Small fiber neuropathy has been suggested by prior studies but these preliminary findings with limited sample sizes and sole reliance on intraepidermal nerve fiber density (IENFD) called for further investigations.

**Methods**: In this retrospective chart analysis, both structural (IENFD) and functional (Quantitative Sensory Testing) evaluations of small nerve fibers in 79 hEDS/HSD patients were analyzed in combination with clinical assessments.

**Results**: All the patients reported moderate to severe pain interfering with daily life. A sensory loss of function affecting small fibers (QST) was reported in 55/79 patients (70%) and a decreased density of nerve fibers (IENFD) in 54/69 patients (78.2%). Hence a small fiber neuropathy (both abnormal IENFD and QST) was definite in 40/69 patients (57%), possible in 23/69 patients (34%) and excluded in only 6/69 patients (9%).

**Conclusions**: The pain experience in hEDS/HSD is likely to be multifactorial. In addition to nociceptive pain due to joint instability and a component of central sensitization, these results add strong evidence for a peripheral neuropathic contribution.

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## Abstract no.: 990

### THE EFFECT OF VIRTUAL REALITY ON POST-SURGICAL PAIN: A RANDOMIZED, CONTROLLED TRIAL

E.J. Lier[1], R. van Boekel[1], N. Maandag[2], K. Vissers[1], M. Smits[1], J. Oosterman[3], M. de Vries[1], H. van Goor[1]

*[1]Radboudumc, Nijmegen, Netherlands, [2]Sint Maartenskliniek, Nijmegen, Netherlands, [3]Donders Institute for Brain, Cognition and Behaviour, Nijmegen, Netherlands*

**Background and aims**: Optimizing post-surgical analgesia might improve patient's wellbeing and recovery. This study investigates the effectiveness of Virtual Reality (VR) analgesia as add-on pain treatment in postsurgical patients.

**Methods**: This pilot randomised controlled trial included patients after major surgery, who reported a pain score ≥4. All patients received standard perioperative care and pain management. Participants were randomised for a control group, or one of three VR interventions with various hardware and software specifications. Participants were instructed to use VR at least 3 times daily for 10 minutes, on postoperative day 2-4. Primary outcome was change in mean daily VAS pain score. Secondary outcomes included anxiety- and stress levels, pain around a VR session, and adverse events.

**Results**: Of 112 patients enrolled, 100 were evaluable (37 control and 63 VR). Baseline characteristics and pain, anxiety, and stress levels did not differ between groups. Pre-liminary results showed no significant effects in favor of VR for pain, anxiety and stress outcomes. No differences were observed for outcomes before and directly after VR. VR was used less than advised, mainly due to illness, too much pain, nausea or fatigue. Adverse events were mild to moderate and included nausea, disorientation, fatigue, and worsening of pain.

**Conclusions**: Results suggest no improved outcomes for patients using VR compared to standard postoperative care, with caution due to small sample size and large variation in individual- and disease factors. Improving VR interventions, taking into account context-specific factors and individual experiences for a personalized VR technology intervention, may increase the effectiveness of VR.

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## Abstract no.: 998

### SECOND OPINION FOR (LOW) BACK PAIN PATIENTS THAT HAVE BEEN RECOMMENDED SPINAL SURGERY – A NECESSITY. RESULTS OF AN INTERDISCIPLINARY EVALUATION OF 7565 PATIENTS IN GERMANY

M. Ueberall[1], T. Nolte[2], G. Mueller-Schwefe[3], H. Kletzko[4]

*[1]IFNAP - Private Institute of Neurological Sciences, Nuernberg, Germany, [2]Pain and Palliative Care Center, Wisbaden, Germany, [3]Pain and Palliative Care Center, Goeppingen, Germany, [4]IMC - Integrated Managed Care GmbH, Limburg, Germany*

**Background and aims**: Spinal surgery is increasingly performed in patients with (low) back pain [(L)BP] refractory to nonsurgical pain management, despite solid indicators that these approaches are predominantly driven by economic reasons rather than individual patient needs. Second opinion (2ndOp) may improve the quality of care for these patients.

**Methods**: Descriptive evaluation of a prospective German program for (L)BP patients that have been recommended elective spinal surgery and who used the opportunity to question necessity and sense of this 1st opinion (1stOp) on a voluntary basis. 2ndOp concept has been developed by IMC, a German network of pain specialists, and consisted of three individual one-hour evaluations each by a pain-certified physician, physiotherapist, and psychotherapist, followed by an interdisciplinary pain conference. 2ndOp services were free of charge for patients and were financed by various statutory health insurance companies in Germany within the framework of an integrated care contract according to §§ 140a-d Social Code V.

**Results**: Overall, 7565 (L)BP patients (58.8% female, age: 52.8±14.5 [range: 11-91] years) participated. Spinal surgery has been confirmed in only 374 (4.9%), whereas the 2ndOp teams recommended a specialized outpatient multimodal outpatient pain therapy in 4415 patients (58.4%) and a modified conservative therapy within the framework of the statutory standard care in 2776 (36.7%).

**Conclusions**: 2ndOp performed by an interdisciplinary group of pain experts was followed by major discrepancies vs. 1stOp regarding diagnosis and need for elective spinal surgery and should be established as a standard operating procedure in (L)BP patients.

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## Abstract no.: 622

### WHAT IS A NORMAL/ABNORMAL TEMPORAL SUMMATION AND CONDITIONED PAIN MODULATION RESPONSE?

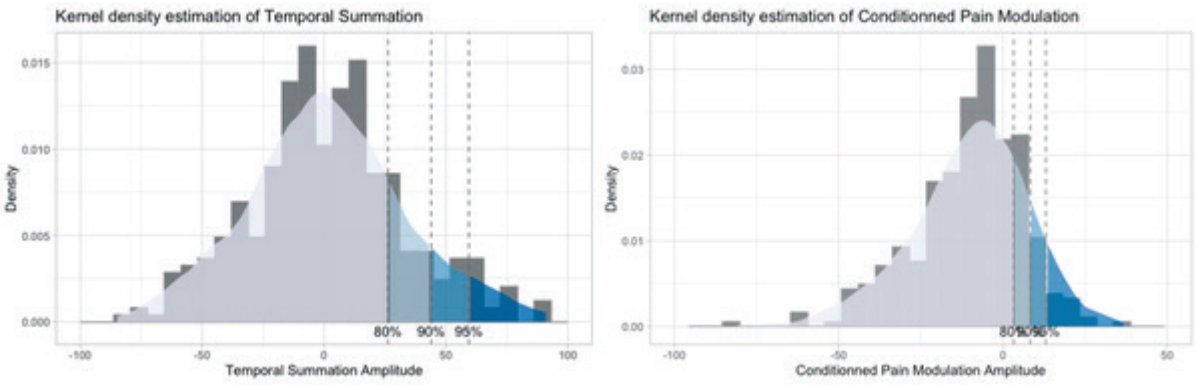
M. Vincenot[1], C. Cloutier-Langevin[2], M. Bordeleau[1], F. Camirand-Lamyre[2], L. Gendron[1], G. Léonard[1], S. Marchand[1]

*[1]Université de Sherbrooke/Faculté de Médecine et des Sciences de la Santé, Sherbrooke, Canada, [2]Université de Sherbrooke/Faculté de Sciences, Sherbrooke, Canada*

**Background and aims**: Temporal summation (TS) and Conditioned Pain Modulation (CPM) had been suggested to predict a positive response to some pharmacological treatments in chronic pain patients. Normative values in healthy subjects would help to determine a deficit of these mechanisms are still lacking. The objective of this study was to develop normative data in pain-free individuals for TS and CPM.

**Methods**: Participants (n=355) took part in a protocol assessing TS and CPM. A first stimulation (baseline) was applied with a thermode on the left forearm at a constant intensity for 2 minutes. During a second stimulation (conditioning stimulus) participants immersed their right forearm in a cold-water bath. Finally, a third stimulation (conditioned stimulus) was applied under the same conditions as the baseline. Pain perception (VAS score 0-100 points) was continuously recorded. TS was interpreted as the change in pain perception scores during the baseline stimulus, and CPM was calculated by the difference in pain perception scores between the baseline and the conditioned stimulus. The percentiles were computed using a non-parametric method and density curve were performed with a kernel density estimation.

**Results**: The percentile analysis indicates that a change in pain perception beyond 59 points for ST and 13 points for CPM corresponds to the 95th percentile at which 5% of a population set exceed the referenced value.




**Conclusions**: These findings could be used as a complementary tool to highlight a deficit in endogenous pain mechanisms and help health professionals rely on standardized endogenous pain modulation scales to personalized pain treatment.

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## Abstract no.: 684

### BODY PERCEPTION DISTURBANCE IN ADOLESCENT COMPLEX REGIONAL PAIN SYNDROME PATIENTS

L. Höfel[1], N. Draheim[1], A. Schramm[1], B. Roth[1], J.-P. Haas[2]

*[1]Center for Pain Therapy for Young People, Garmisch-Partenkirchen, Germany, [2]German Center for Pediatric and Adolescent Rheumatology, Garmisch-Partenkirchen, Germany*

**Background and aims**: The key symptom of Complex regional pain syndrome (CRPS) is severe continuing pain. Patients report symptoms in the categories “sensory”, “vasomotor”, “sudomotor/edema” and/or “motor/trophic” (Budapest criteria). Furthermore, patients might experience changes in body perception which we regularily assess.

**Methods**: To assess body perception disturbance (BPD) in adolescent CRPS patients before and after a three week in-house treatment, we applied the German translation (by Tschopp, M. et. al) of the “Bath CRPS body perception disturbance scale” (Lewis, J.). The scale asks for perception abnormality; subjective changes in size, weight, pressure and temperature; the desire to amputate the limb and concludes with an illustration of the mental representation of the affected and unaffected limb.

28 patients (4 ♂), age 12 – 18 years (⌀ 15,1) were assessed. Time span of CRPS was 8,8 months (2 weeks – 2,9 years), mean pain intensity was 6,9 (NRS 0-10).

**Results**: BPD decreased over the 3 week in-house treatment ($p$=.0002), perception of position ($p$=.001) and positive emotions ($p$=.001) improved the most. BPD did not correlate with gender, localization, time span or (significantly reduced; $p$=.009) pain intensity. 9 patients expressed a desire for amputation.

**Conclusions**: A variance in body perception was observed in young patients with CRPS. As a treatment effect, body perception normalized. So far, our clinical impression is that a value of > 26/57 is critical.

We conclude that besides Budapest Criteria, body perception should be assessed. Standard values and whether BPD plays a role in other chronic pain syndromes should be the focus of further research.

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# POSTER BOARD PRESENTATION

# Wednesday, 27 April 2022

## 12:00-12:45

# Acute pain

### Abstract no.: 339

### TEMPORAL DYSREGULATION OF CIRCULATING MICRORNAS AFTER ACUTE EXPERIMENTAL PAIN

R. Giordano[1,2], H. Okutani[1], M.C. Gerra[3], S. Lo Vecchio[1], A. Stensballe[2], K.K. Petersen[1], L. Arendt-Nielsen[1]

*[1]Center for Neuroplasticity and Pain (CNAP), SMI, Department of Health Science and Technology, Faculty of Medicine, Aalborg University, Aalborg Ø, Denmark, [2]Translational Biomarkers in Pain and Precision Medicine, Department of Health Science and Technology, Faculty of Medicine, Aalborg University, Aalborg Ø, Denmark, [3]Department of Chemistry, Life Science, and Environmental Sustainability, University of Parma, Parma, Italy*

**Background and aims**: Within the group of non-codingRNAs are microRNAs that can modulate several biological pathways, including pain. In a previous model of acute pain, dysregulation of non-codingRNAs expression was reported in the circulation of healthy subjects after acute pain induction. This project aimed to evaluate temporal expression of circulating microRNA in plasma of healthy subjects after hypertonic saline injection.

**Methods**: Twenty participants were randomly allocated in two groups, and received either hypertonic (pain) or isotonic (control) saline injection in the first dorsal interosseous muscle of their dominant hand. Pain intensity for both groups was recorded on a tablet for 20 minutes after injection. Blood was sampled at baseline, 30 minutes, 3 hours, 24 hours after injection. MicroRNA extracts were used for RNA sequencing with the Illumina NextSeq. Changes in microRNA transcript counts were considered statistically significant with the dual criteria of the observed change in expression >2folds and False Discovery Rate $p<0.05$.

**Results**: Significantly higher pain intensities were found for the hypertonic compared to the isotonic saline injections ($p<0.001$). After 30min from the injection 4 microRNAs were dysregulated significantly in the pain group compared to controls ($p<0,0001$). The number of significantly altered miRNAs raised to 24 in the pain group after 3h from injection and to 42 after 24h from baseline ($p<0,0001$).

**Conclusions**: Several microRNAs were consistently detected in the circulation in healthy subjects after painful muscle stimulation. The study revealed for the first time the temporal expression of circulating microRNAs in an acute pain model, highlighting these microRNAs to be involved in pain pathways.

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### Abstract no.: 405

### POSTOPERATIVE PAIN MANAGEMENT BETWEEN SURGICAL WARDS

A. Bytyqi[1], F. Kryeziu[2], V. Kryeziu[2], A. Bytyqi[1], B. Sylaj[3]

*[1]General Hospital 'Prim. Dr. Daut Mustafa', Prizren, Republic of Kosovo, Albania, [2]National Institute of Public Health, Prizren, Republic of Kosovo, Albania, [3]Adult Centre Bruderhaus Diakoni, Bad Urach, Germany*

**Background and aims**: Postoperative pain has been poorly managed for decades. The burden of untreated postoperative pain is high. Persistent postoperative pain is common after most surgical procedures. There is good quality evidence that supports many of the common agents utilized in multimodal therapy, however, there is a lack of evidence regarding optimal postoperative protocols or pathways.

**Methods**: The approach was quantitative. The research was realized for a period of five years. Data were collected from patients in surgery, urology, orthopedics, ENT, ophthalmology, and gynecology/obstetrics. All patients gave consent to participate in study. General anesthesia was the most common form of anesthesia.

**Results**: From 1924 patients 1270 (66.2%) were females and 33.8% were males. From them reported that mean of maximum pain was 5.38/10 and minimum pain was 1.17/10. Regarding the wards general surgery patients reported the worst pain (maxpain 6.06/10) and less pain was in Ophtalmology (maxpain 1.94/10). Only 33.3% have used objective data like oral interpretation or pain scale to evaluate postoperative pain. At all wards 40 % of health care professionals reported that give analgesics as needed.

| Table 1. Report of pain on each ward | | | |
|---|---|---|---|
| | | Maxpain | Minpain |
| ENT | Mean | **5.17** | **96.** |
| | N | 230 | 230 |
| | Std. Deviation | 1.721 | 997. |
| Eye | Mean | **1.94** | **28.** |
| | N | 191 | 191 |
| | Std. Deviation | 2.389 | 582. |
| General | Mean | **6.06** | **1.41** |
| | N | 604 | 604 |
| | Std. Deviation | 1.918 | 1.371 |
| Gyn | Mean | **6.31** | **1.62** |
| | N | 474 | 474 |
| | Std. Deviation | 1.791 | 1.287 |
| Ortho | Mean | **5.67** | **1.18** |
| | N | 198 | 198 |
| | Std. Deviation | 1.392 | 944. |
| Uro | Mean | **4.51** | **53.** |
| | N | 219 | 219 |
| | Std. Deviation | 1.687 | 879. |
| Total | Mean | **5.39** | **1.17** |
| | N | 1916 | 1916 |
| | Std. Deviation | 2.244 | 1.238 |

**Conclusions**: Patients after surgical procedures reported severe pain-related outcomes. It is needed to evaluation the pain in the sheet of vital signs monitoring. It is needed to educate staff for the evaluation of postoperative pain in those wards. Wounds infiltration with local anesthetic is good to make every day practice. To have the best results in the treatment of postoperative pain, the administration of analgesic should be done on schedule and not as needed.

## Abstract no.: 459

### ACUTE POSTOPERATIVE PAIN AND COGNITIVE FUNCTION AFTER BARIATRIC LAPAROSCOPIC SURGERY IN THE SETTING OF AN ERAS PROGRAM (ENHANCED RECOVERY AFTER SURGERY PROGRAM)

L. Gómez Salinas[1,2], Y. Sastre Peris[2,1], E. Salas Rezola[1], U. Toral Toral[1], J.J. Ballesta[2,3]

*[1]Hospital General Universitario de Alicante, Alicante, Spain, [2]Instituto de Investigación Sanitaria y Biomédica de Alicante, Alicante, Spain, [3]Universidad Miguel Hernández de Elche (Instituto de Investigación, Desarrollo e Innovación en Biotecnología Sanitaria de Elche), Elche, Spain*

**Background and aims**: Severe obesity is associated with premature mortality and several comorbid conditions.The adverse effects of obesity on health can be reversed by successfull weight loss. Specific criteria established by the NIH consensus panel indicate that bariatric surgery is appropiate for all patients with BMI >40 kg/m$^2$ and for patients with BMI 35-40 kg/m$^2$ with associated comorbid conditions. Enhanced Recovery After Surgery programs (ERAS programs) are intended to provide optimal perioperative care in bariatric surgery. Up to date there are not reports on the impact of ERAS program in acute pain and cognitive function. The aim of this work is to assess the intensity of pain and the cognitive function in these patients.

**Methods**: Clinical data were collected from patients subjected to bariatric laparoscopic surgery. Pain Visual Analogic Scale (VAS) were performed 12 and 24 hours after the end of anesthesia. To assess cognitive function Trail Making Test (TMT) were performed before and 24 hours after the surgery. Data are expressed as means +/- SD.

**Results**: 41 subjects were prospectively studied (age 48.2 +/-8.7 years, 65.9% women, BMI 45.1 +/- 9.2 kg/m$^2$). Pain VAS was improved at 24 as compared to 12 hours (4.1 +/- 2,1 vs 5.2+/-2.3, p<0.0001). Postoperative TMT A and B scores were significantly lower than preoperative ones (TMT A: 37.4 +/- 16.6 s vs 43.4 +/- 16.6 s p<0.0001; TMT B: 65.9 +/- 29.4 s vs 74.9 +/- 24.4 s p<0.0001).

**Conclusions**: ERAS program is effective in preventing pain and cognitive disfunction in obese patient subjected to bariatric laparoscopic surgery.

## Abstract no.: 633

### EFFECT OF A CANNABIS EXTRACT ON ACUTE PAIN AND ON ANALGESICS REQUIREMENTS: A DOUBLE-BLINDED, RANDOMIZED24 , HOURS FOLLOW-UP STUDY

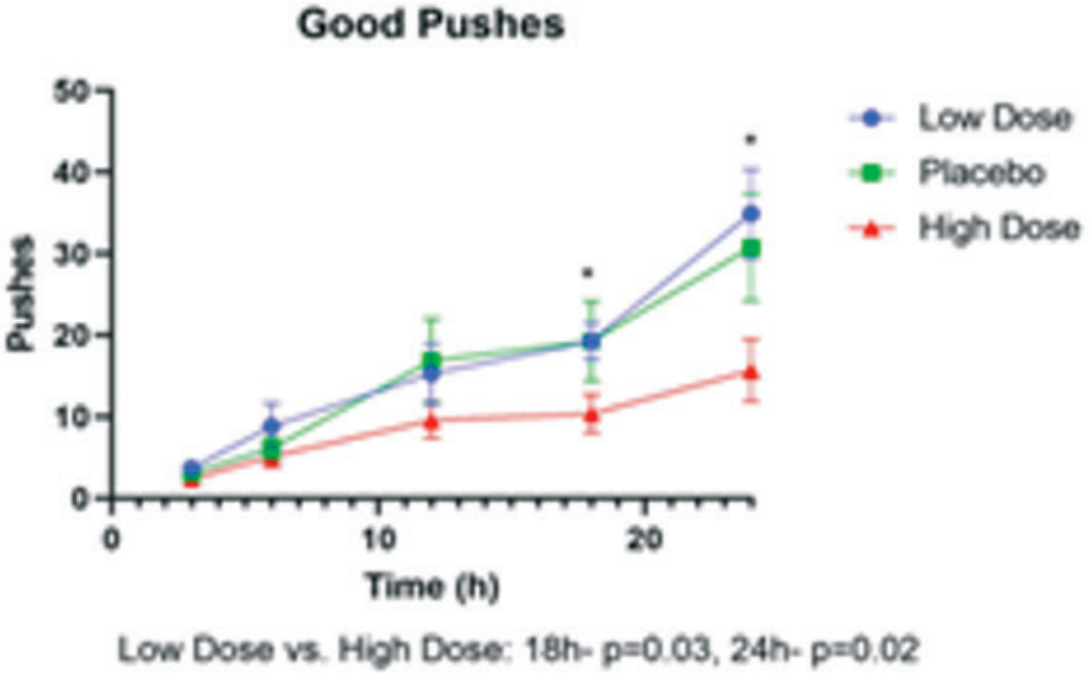
E. Davidson[1], A. Eyal[2], N. Raz[2]

*[1]Hadassah Hebrew University Hospital, Jerusalem, Israel, [2]Bazelet Medical Cannabis Group, Or Akiva, Israel*

**Background and aims**: Medical cannabis consumers are a newer group of cannabis users, for whom the most frequent indication is managing chronic pain. There is only sparse data regarding the use of cannabinoids in acute pain conditions. Some have stated that cannabis has no role in management of acute pain while others have demonstrated primary evidence for opioid sparing and analgesic properties in post-operative or acute pain conditions. The aim of this pilot study was to examine cannabis analgesic function in acute radicular pain in humans.

**Methods**: A double blinded, randomized, prospective study conducted on healthy adult patient's naïve to cannabis, admitted to emergency room with recent onset, acute radicular pain symptoms. Radicular pain symptoms had dermatomal pattern corresponding to physical exam and a recent CT/MRI, demonstrating intervertebral bulging lumbar disk. Patients were randomly divided into one of three groups: high dose (20mg THC, 20mg CBD), low dose (10mg THC, 10mg CBD) and placebo single sublingual administration. Patients were connected to a PCA (patient-controlled administration) morphine pump allowing self-administration of opioid for pain. Patients were followed up for 24 hrs with regard to pain, opioid consumption anxiety and other parameters.

**Results**: 36 patients were recruited, 12 in each group. Patients receiving the higher dose of cannabis demonstrated a significant opioid sparing effect but no pain reduction.




**Conclusions**: In this acute neuropathic clinical pain condition, we demonstrated significant opioid sparing effect in patient's naïve to cannabis who were administered one dose of sublingual high dose cannabis.

### Abstract no.: 987

## MEAN POSTOPERATIVE PAIN MEASUREMENTS AFTER ORTHOPAEDICAL SURGERIES IMPROVING MULTIMODAL ANALGESIA PROTOCOL

I. Golubovska[1,2], A. Miscuks[1,2], V. Lebedeva[1]

*[1]University of Latvia, Faculty of Medicine, Riga, Latvia, [2]Hospital of Traumatology and Orthopaedics', Riga, Latvia*

**Background and aims**: Perioperative pain management is a challenging process after orthopaedic surgery. Multimodal analgetic approach uses a combination of different classes of analgesic and non-analgesic and procedures. The aim of study was to analyse postoperative painin years between 2018 till and 2021 after a modification of multimodal analgesia protocol, including regional anaesthesia.

**Methods**: A retrospective cross-sectional study of patients who underwent different orthopaedic surgical procedures. Pain intensity was evaluated using a Visual Analogue Scale (VAS). All patients received a multimodal perioperative approach and were asked about pain four times a day. Pain intensity was categorized as 0-3.9 for mild pain, 4-6.9 for moderate pain, 7-10 for severe pain.

**Results**: A total of 376 patients were included. Analysing the average pain on the surgery day, 228 patients (60.6%) felt mild pain, 125 patient (33.2%) felt moderate pain and only 23 patients (6.1%) felt severe pain, on the second day, 216 patients (57.4%) felt mild pain, 129 patients (34.3%) felt moderate pain, 31 patients (8.2%) felt severe pain.Mostly mild postoperative pain on the first day experienced 73.2% of patients after rotator surgery and 72,1% after hip replacement, most severe was after knee replacement surgery by 18.6%. On the second day, 85% of patients had the mildest mean pain after hip replacement and 16,9% had the most severe mean pain after knee replacement.

**Conclusions**: The results show that people still experience great pain after surgery, mostly mild pain. An interesting point is that moderate and severe pain increased on the second day.

# Cancer pain

### Abstract no.: 493

## BIOPSYCHOSOCIAL RISK FACTORS FOR PAIN AND PAIN-RELATED DISABILITY ONE YEAR AFTER SURGERY FOR BREAST CANCER

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**Background and aims**: Knowledge regarding risk factors for pain in the long term after surgery for breast cancer may be of great value in preventing this prevalent and debilitating side effect. Despite the biopsychosocial nature of pain, the predictive value of both pre- and postoperative biopsychosocial functioning for long-term pain intensity and pain-related disability has not yet been studied.

**Methods**: One hundred sixty-six women planned for unilateral breast cancer surgery were included in this prospective cohort study. Pre- and postoperative outcomes related to pain, psychosocial and somatosensory functioning (questionnaires and quantitative sensory testing) were evaluated as risk factors for pain intensity (Visual Analog Scale) and pain-related disability (Pain Disability Index) one year after surgery for breast cancer. Both bivariable and stepwise linear regression analyses were performed.

**Results**: The most consistent biopsychosocial risk factors were symptoms related to altered central somatosensory functioning (Central Sensitization Inventory), psychological symptoms and social support (psychological symptoms and support subscale of McGill Quality of Life Questionnaire). Results also showed that a pre- and postoperative disturbed functioning of the somatosensory nervous system in the surgical area could provide additional information regarding pain intensity or pain-related disability in the long term after surgery for breast cancer.

**Conclusions**: This study revealed several biopsychosocial characteristics that might be used to identify women more vulnerable to have pain and pain-related disability in the long term after surgery for breast cancer, allowing for more effective pain management and prevention.

## Abstract no.: 608

### NEW PAIN TREATMENT AND PALLIATIVE RADIOTHERAPY DURING THE COVID-19 PANDEMIC

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**Background and aims**: Radiotherapy is an effective palliative treatment for metastatic disease. The current COVID-19 pandemic has led us to consider shorter courses, new guidelines and prioritize cases clinically urgent. The purpose of this study is to analyze our practice in palliative treatment, new potential strategies and hypofractionation.

**Methods**: 252 patients who receive palliative radiation treatment from March 2020 to March 2021 were reviewed. We analyze how the treatment line has been modified throughout the 1 year of the pandemic and other items related to the different therapeutic options as mortality, reirradiation, primary localization and intention.

**Results**: Median age was 68 years (range 33-95y), 66% males, 34% females. Main primary tumors were 30% lung, 12% prostate and 10% breast. 65% patients had painful bone metastases, 15% brain metastases, 14% cord compression, 4% bleeding and 2% superior vena cava obstruction. Advanced disease was detected in 12% as debut. Half of patients were treated in the two first months of the pandemic than later.

Treatment provided was:

| Gy/fr | Daily fraction | patients% |
|---|---|---|
| 8 | 1 | 27 |
| 6 | 1 | 5 |
| 5 | 4 | 4 |
| 4 | 5 | 43 |
| 3 | 10 | 20 |
| 2 | 20 | 1 |

8 patients required reirradiation. Currently, 66% died.

**Conclusions**: Radiotherapy plays a critical role improving quality of life in patients with advanced disease, even in the midst of the COVID-19 pandemic.

During the first months of confinement, short radiation therapy cycles prevailed over the long ones, as the normal schemes of fractionation coinciding with a greater number of sessions gained importance as time went on.

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## Abstract no.: 609

### CANCER PAIN IN THE ERA OF COVID-19: THE ROLE OF RADIOTHERAPY

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**Background and aims**: Radiation therapy is critical for the treatment of painful bone metastases, providing an improvement in the quality of life of cancer patient. During the coronavirus disease 2019 (COVID-19) pandemic period, radiation oncologists have adapted to the situation, modifying the fractionations to shorter schedules, to prevent the risk of infection in palliative patient.

**Methods**: Patients who receive antialgic palliative radiation treatment for painful bone metastases from March-2020 to March-2021 were reviewed. In this review we analyze the evolution of treatment schedules in related to the pandemic, as well as other data of interest related to the treatment

**Results**: 178patients were analyzed, with an average age of 68years (36-93years). 67.42% of the patients were males and 32.58% females. Most frequently primary tumors were 38% lung, 21% prostate and 18% breast. Pain bone metastasis were diagnosed as a debut symptom in 19 patients (10.67%). 7 patients (3.93%) required reirradiation. 110 patients (68%) died. Treatment schedules were: 99patients (55.62%) received 5 fractions of 4Gy, 43 (24.16%) single fraction of 8Gy, 21 (11.80%) 10 fractions of 3Gy. Months with the highest incidence by COVID-19 were used shortest divisions and single session treatments.

| Gy/fr | Daily fraction | patients % |
|---|---|---|
| 8 | 1 | 24.16 |
| 6 | 1 | 3.37 |
| 5 | 4 | 3.93 |
| 4 | 5 | 55.62 |
| 3 | 10 | 11.80 |
| 2 | 20 | 1.12 |

**Conclusions**: Cancer pain is one of the main reasons for radiotherapy treatment. During the pandemic, patients have been diagnosed in more advanced stages, in many cases as metastatic disease. Therefore, the need for treatment has increased. The option of shorter schedules is beneficial for the patient, since by reducing visits to the hospital the risk of infection decreases, without worsening the effectiveness of the treatment.

## Abstract no.: 611

### IS RE-IRRADIATION MORE FREQUENT IN SINGLE-FRACTION VS CONVENTIONAL MULTIFRACTION? ANALYZING OUR PRACTICE

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**Background and aims**: Palliation of painful bone metastases encompasses a significant portion of radiation treatments. The COVID-19 pandemic has led us to consider shorter courses and hypofractionation. The purpose of this study is to analyze our practice: efficacy of single-fraction vs standard multifraction radiotherapy for alleviation of pain in patients with bone metastases.

**Methods**: 178 patients who receive radiation treatment for painful bone metastases from March 2020 to March 2021 were reviewed. We analyze rate of re-irradiation and how the treatment line has been modified throughout the 1 year of the pandemic.

**Results**: Median age was 68 years (range 36-93), 67% males, 33% females. Main primary tumors were 40% lung, 13% prostate and 32% breast. . Advanced disease was detected in 11% as debut.

Treatment provided was:

| Gy/fr | Daily fraction | patients% |
|---|---|---|
| 8 | 1 | 24 |
| 6 | 1 | 3 |
| 5 | 4 | 4 |
| 4 | 5 | 56 |
| 3 | 10 | 12 |
| 2 | 20 | 1 |

Only 8 patients required reirradiation, 75% of them had received single fraction. Currently, 62% died.

**Conclusions**: Painful bone metastases is not an oncologic emergency but requires Radiotherapy for symptom management.

Radiotherapy has improved quality of life in patients with advanced disease in the midst of the COVID-19 pandemic, when short radiation therapy cycles prevailed over the long ones.

Almost single-fraction has shown to be an effective treatment option for patients with painful bone metastases, conventional multifraction should be considered for patients expected to have relatively long survival.

### Abstract no.: 1104

## BONE CANCER INDUCES MULTIMODAL PAIN-RELATED BEHAVIOR IN RATS OF BOTH SEXES

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**Background and aims**: Cancer-induced bone pain (CIBP) is a common symptom in patients with bone metastases with impairment of their quality of life. Treatment options are limited because the underlying mechanisms are still unknown. Rodent studies are increasingly performed; however, assessment of pain-related behaviour is predominantly based on traditional methods, which is partially indicative of clinically relevant pain. For that reason, we developed a home cage observation (HCM) assay to detect rat-specific behaviour during bone cancer progression.

**Methods**: Sprague Dawley rats received an injection with either heat-deactivated (sham-group) or potent cancer cells (Walker 256, CIBP-group) into the right tibia. Couples of two rats were kept in custom-made cages for HCM 17d in various husbandry combinations. Mechanical (PWT) and heat withdrawal thereshold measured on d17. Two blinded experimenters rated videos of two night hours using a specific ethogram, including a wide range of individual and social behaviours.

**Results**: Equal or mixed cagemates showed no change in food intake but social and ambulation behavior in both sexes. In both sexes, with different cage mates (CIBP-$Sham_{BY}$), the prevalence of social resting shifted toward individual resting. Mixed housing condition leads to PWT at both hindpaw of $Sham_{BY}$ rats without a clinical diagnosis of bone cancer. The indicates a social pain transfer to the $Sham_{BY}$ by CIBP rats. This transfer is sex independent and has not been described previously in CIBP model.

**Conclusions**: CIBP modulates rodent-specific behavior in a cagemate dependent manner in rats. HCM enables researchers to minimize averse effects for animal and to maximize clinical impact of their findings.

# Central neuropathic pain

### Abstract no.: 421

## CERVICAL MYELOPATHY: A MODEL FOR SEGMENTAL HYPEREXCITABILITY AND NEUROPATHIC PAIN?

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**Background and aims**: The pathophysiology of central neuropathic pain is poorly understood. Non-traumatic, degenerative cervical myelopathy with focal spinal cord lesions is ideally suited to study structure-function associations related to the presence of neuropathic pain.

**Methods**: Individuals fulfilling the criteria of definite neuropathic pain (n=8) were identified within a cohort of myelopathy patients (n=16). Neuropathic symptoms were characterized with the Neuropathic Pain Symptoms Inventory (NPSI) questionnaire. Tract-specific MRI of the cervical cord was performed to assess the lesion volume and the extent of damage to the dorsal horn, spinothalamic tract, and dorsal columns. Quantitative sensory testing (QST) (i.e., thermal and mechanical detection and pain thresholds) was performed in the painful area (C6 or C8 dermatome) and contact heat-evoked potentials (CHEPs) were recorded after stimulation of the same area to assess the functional integrity of the spinothalamic tract.

**Results**: Total lesion volume and tract-specific damage was similar for individuals with and without neuropathic pain ($p>0.05$ for all areas). QST revealed signs of mechanical hypersensitivity in both groups (mechanical pain threshold: 74±120mN (pain group);177±241mN (pain-free group)). Only warm detection thresholds were lower in individuals with compared to the ones without neuropathic pain ($p=0.038$), indicating less sensory loss to warm stimuli compared to pain-free individuals. Functional preservation of the spinothalamic system (measured by CHEPs) was seen in 88% of patients with compared to only 38% without neuropathic pain.

**Conclusions**: This data suggests that segmental hyperexcitability needs to be accompanied by residual spinothalamic tract function (spared CHEPs) to precipitate segmental pain in cervical myelopathy.

## Abstract no.: 541

# PATHOGENIC INSIGHTS FOR REDUCING THALAMIC HEMORRHAGE-INDUCED PAIN AND DEPRESSION BY REGULATING MICROGLIA AND MED1/BDNF/TRKB SIGNALING

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**Background and aims**: Central post-stroke pain (CPSP) is a neuropathic pain syndrome occurring after somatosensory system damage. Its pathogenetic mechanisms remain poorly understood. A maladaptive thalamo-cortical reorganization has been suggested, with a pivotal role of microglia as key cells in early neuroinflammation. Treatment of chronic pain includes N-palmitoylethanolamide (PEA), a lipid with anti-inflammatory properties in different neuropathic pain syndromes. Our aim was to investigate the pharmacological efficacy of PEALut, a co-ultramicronized combination of PEA and luteolin (an antioxidant flavonoid), in a murine model of thalamic hemorrhage (TH)-induced CPSP.

**Methods**: TH was obtained injecting collagenase-IV in thalamic ventral posterolateral (VPL) nucleus. The effect of PEALut on microglia was studied through immunofluorescence, in the early phase of pathology. In the late phase we investigated CPSP-related depression, analyzing hippocampal neurotransmitters release and neuronal activity in LEC-DG pathway. Moreover, we carried out biomolecular analysis of BDNF, its receptor TrkB, and MED1 (Mediator Complex subunit 1), recently suggested to negatively regulate BDNF expression. Finally, we investigated this signaling in cerebral post-mortem specimens from patients suffering hemorrhagic stroke.

**Results**: PEALut significantly reduced tactile allodynia compared to vehicle-treated mice(PWT:0.85gf±0.27 vs 0.06gf±0.02;P<0.01) by reducing perilesional microglial activation 3 and 7 days post-TH(Fig 1). Consistently, PEALut significantly reduced depressive-like behavior(IT:62,37s±4,97 vs 103,38s±7,97;P<0.0001;Fig.2), restoring neurochemical, electrophysiological and MED1/BDNF/TrkB signaling (Fig.3).

Fig.1

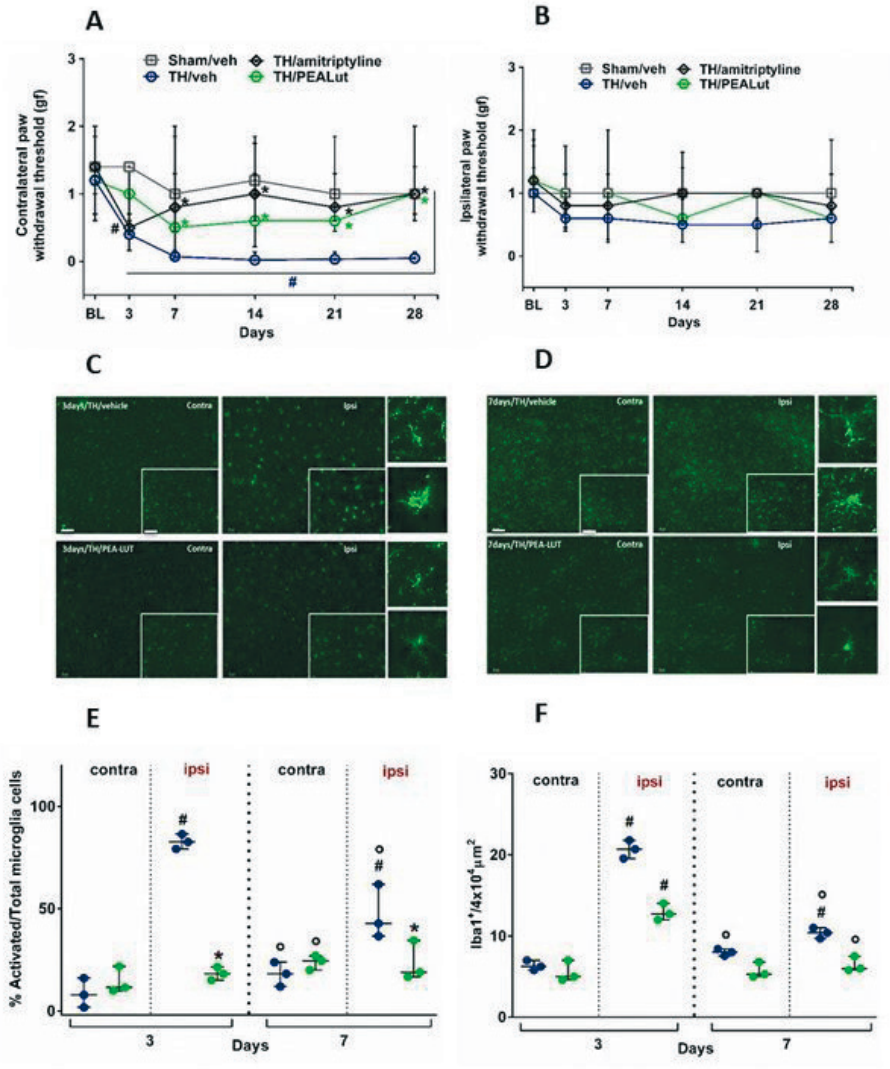

Fig.2

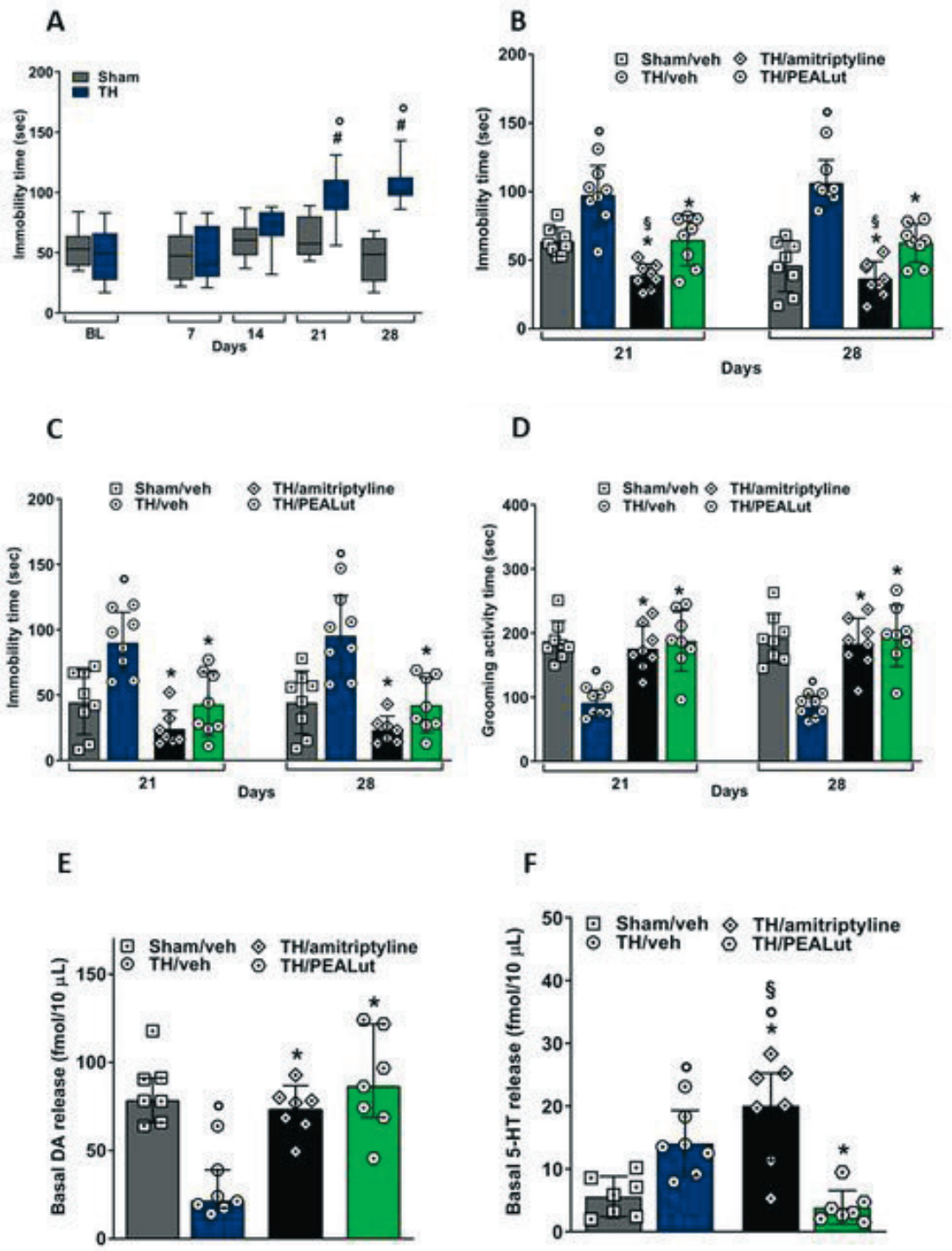
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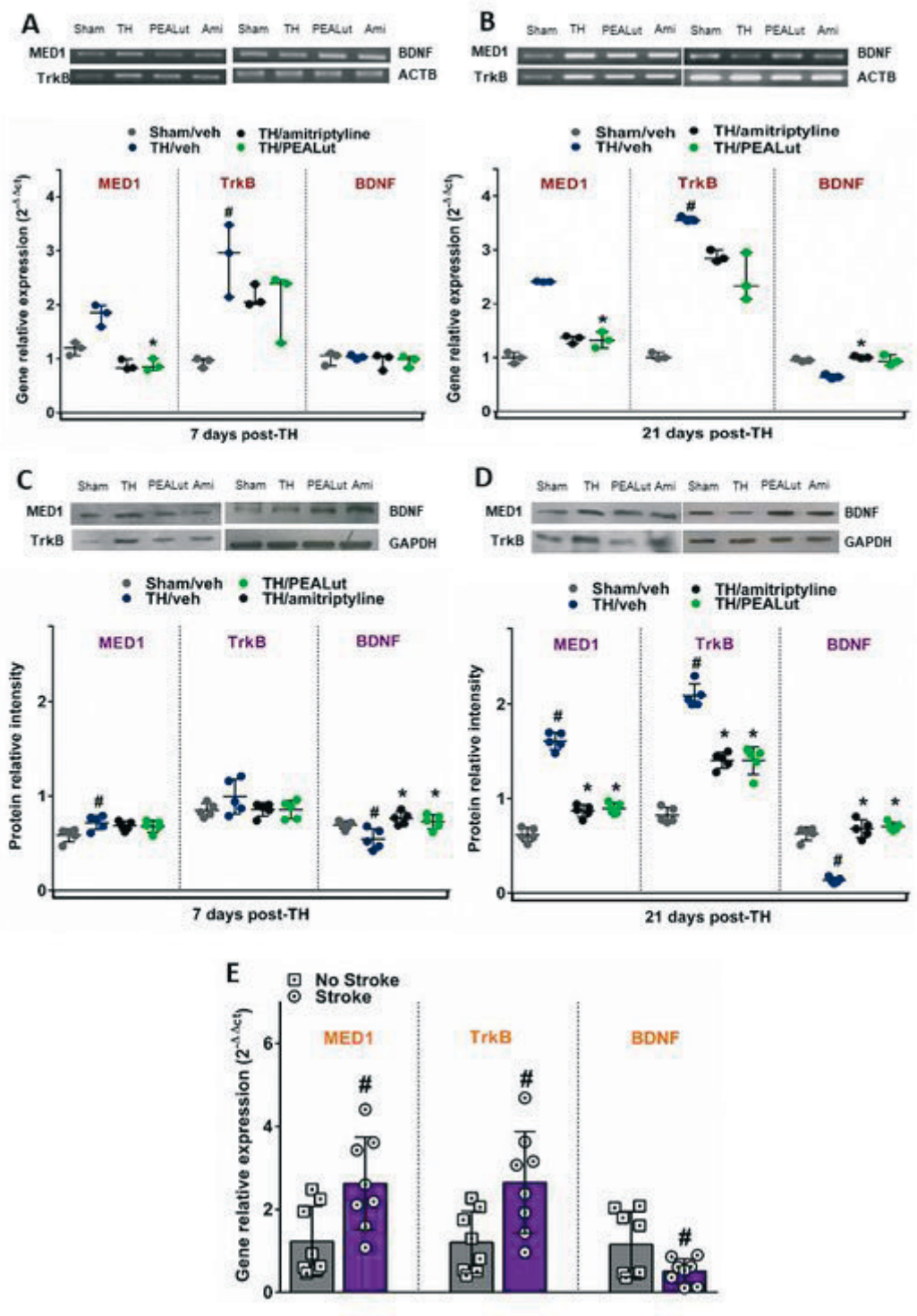
Fig.3




**Conclusions**: These results pave the way for better investigating MED1/BDNF/TrkB in CPSP-related depression and propose PEALut as an adjuvant treatment. Interestingly, the same pathological changes in MED1/BDNF/TrkB pathway were found in human specimens, suggesting a translational potential of our findings.

## Abstract no.: 1090

### ALTERATIONS IN PLASMA ENDOCANNABINOID AND N-ACYLETHANOLAMINE LEVELS IN PATIENTS WITH MULTIPLE SCLEROSIS

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**Background and aims**: Multiple sclerosis (MS) is a chronic, autoimmune disease of the central nervous system that causes progressive neurodegeneration. Pain is one of the most common and disabling clinical symptoms in patients with MS. The endocannabinoid system is one of the key systems that modulates pain. The aim of the present study was to investigate whether chronic MS is associated with alterations in circulating levels of endocannabinoids (anandamide [AEA] and 2-arachidonyl glycerol [2-AG]) and related *N*-acylethanolamines (*N*-palmitoylethanolamide[PEA] and *N*-oleoylethanolamide [OEA]).

**Methods**: 114 patients with MS and 73 healthy controls (HCs) were recruited and consented to approved procedures. Pain scores were measured using Leeds Assessment of Neuropathic Symptoms and Signs (S-LANSS) and painDETECT. Blood samples were collected. Additional clinical data including Patient Health Questionnaire-9 (PHQ-9), fatigue severity scale (FSS) score, Visual Analogue Fatigue Scale (VAFS), and medication/disease current/history were collected. Plasma 2-AG, AEA, PEA and OEA were quantified by LC-MS/MS.

**Results**: Plasma levels of AEA, PEA and OEA were significantly higher in patients with MS compared to HCs ($p<0.0001$). Patients with MS had higher scores in the PHQ-9 and FSS ($p<0.0001$) compared to HCs. When MS and HCs were analysed together, AEA, PEA and OEA were positively correlated with FSS and VAFS, and AEA and OEA with PHQ-9 ($p<0.01$).

**Conclusions**: Circulating levels of AEA, PEA and OEA were elevated in patients with MS, and positively correlated with some clinical measures. Further study is required to determine the relevance of these findings to MS pathophysiology and potential biomarker-based diagnosis.

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## Abstract no.: 1166

### OPIOID-INDUCED HYPERALGESIA (OIH) IN NEUROPATHIC PAIN (CCI MODEL) IS ACCOMPANIED BY ABNORMAL PHOSPHORYLATION OF MU OPIOID (MOR) RECEPTORS IN THE MOUSE SPINAL CORD

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**Background and aims**: Opioids provide robust analgesic effects in acute pain, but their prolonged use results in the development of opioid-induced hypersensitivity (OIH) that shares many symptoms with neuropathic pain (here modelled with chronic constriction injury to the sciatic nerve – CCI). The exact molecular foundations of symptoms observed in OIH and CCI are yet to be determined, with prospect to find new therapies and prevention measures.

**Methods**: To determine the changes, common traits and differences in molecular mechanisms underlying neuropathic pain (mouse CCI model) and OIH (daily intraperitoneal morphine injections), we examined protein level expression (Western Blot, Luminex) in mouse spinal cord 1, 7 and 14 days of morphine treatment after CCI.

**Results**: Both OIH and CCI are accompanied by the intensified release of peptides (prohormones, cytokines) that may lower the excitability threshold of the neurons and thus promote nociception/hypersensitivity. Herein we confirm that the level of pronociceptive substance P is increased 1-14 days after CCI combined with morphine treatment. In addition, the increase of beta-endorphin expression (day 1) may explain the consecutive hyposensitiveness to exogenous opioids, the latter resulting from compensation mechanisms. Importantly, the proportion of phosphorylated mu opioid receptors (pMOR) in the lumbar spinal cord changes, although the level of MORs remains steady.

**Conclusions**: The modulated phosphorylation of MOR is a distinct characteristics of nerve injury and opioid-induced hypersensitivity states, and it may contribute to the diminished effects of exogenous opioids under these conditions.

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# Complex Regional Pain Syndrome

## Abstract no.: 215

### PATIENTS WITH LOWER-LIMB COMPLEX REGIONAL PAIN SYNDROME (CRPS) ARE MORE SENSITIVE TO VISUAL THAN PROPRIOCEPTIVE INFORMATION TO CONTROL UPRIGHT STANDING

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**Background and aims**: Previous work reported bilateral proprioceptive impairment for patients suffering of a unilateral Complex Regional Pain Syndrome (CRPS), suggesting deficit in the processing of afferent information (Mouraux, Lenoir et al. 2021). A decrease in leg proprioception can lead to an increase in the contribution of visual information to control balance in humans (Henry and Baudry 2019). The objective of the present study is to determine whether lower-limb CRPS increases the reliance of balance control to visual information.

**Methods**: The displacement of the centre of pressure (CoP) was recorded from a force platform during 40-s epoch in 11 patients (49±13 yr), suffering from chronic distal lower-limb CRPS, and 11 age- and sex-matched healthy individuals (controls). Participants maintained upright standing with eyes open (EO) and closed (EC) before and after 30 min of bilateral Achilles tendon vibration (1-mm amplitude, 80-Hz frequency). Vibration was used to depress the leg proprioceptive system (Baudry and Duchateau 2020).

**Results**: Before vibration CRPS patients exhibited greater CoP displacement than controls in EC only (363mm vs 240mm, p=0.040). Vibration did not influence CoP displacement in patients (363mm to 402.6mm, +11%, p=0.520) whereas COP excursion increased in controls, only in EC condition (240mm to 289.4mm, +20.5%, p=0.019).

**Conclusions**: The results indicates that patients with CRPS are more sensitive to visual than proprioceptive information to control upright standing, in contrast with healthy participants who exhibit the opposite behavior. This study supports the rationale of a decreased contribution of leg proprioception to control balance in patients with CRPS.

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## Abstract no.: 408

### TRENCH FOOT AS A COMPLICATION OF BILATERAL COMPLEX REGIONAL PAIN SYNDROME

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**Background and aims**: We describe a case of bilateral lower limb CRPS (type 1) in a 25yr old woman who presented to our pain clinic. Her condition was complicated by the development of cold immersion injury also known as trench foot.

**Methods**: The patient presented with a three-month history of bilateral burning pain in her feet. Heat hyperalgesia was a significant feature also. She developed bilateral pitting oedema to the level of the knees with hyperaemia of the skin in the affected areas. Her condition deteriorated resulting in significant skin breakdown/ulceration. Collateral history revealed self-management of nocturnal heat hyperalgesia symptoms with prolonged cold-water immersion and cold compress wraps. With dermatology involvement, a diagnosis of cold immersion injury (trench foot) was made. She was prescribed potassium permanganate soaks, emollient therapy and advised to cease cold-water immersion. Her skin integrity and overall condition improved.

**Results**: Bilateral CRPS is rare. One case series found it to account for 0.5% of cases. Sudomotor features (e.g. oedema), vasomotor features (e.g. skin colour changes) and heat hyperalgesia are seen in up to 70%, 40% and 17% of cases respectively. Trench foot has historically been associated with military conflicts. It is relatively rare outside of these. It can result in significant peripheral neuropathy. Clinical features are similar to some of those seen in CRPS.

**Conclusions**: Trench foot is a rare, non-freezing cold injury that displays many features similar to CRPS. Our case highlights the importance of a thorough history and assessment in patients presenting with suspected CRPS and the value of multi-disciplinary management.

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## Abstract no.: 432

### PSYCHOLOGICAL AND PAIN MEASURES DISCRIMINATE BETWEEN COMPLEX REGIONAL PAIN SYNDROME (CRPS) SUBTYPES AND CHRONIC LIMB PAIN: A CLUSTER ANALYSIS MODEL

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**Background and aims**: CRPS is a heterogeneous syndrome comprising of different subtypes based on nerve lesion and Budapest criteria. We aimed at investigating clinical features of CRPS subtypes compared to chronic limb pain (CLP), based on psychological and evoked pain measures.

**Methods**: Sixty-one chronic CRPS 1&2 and 31 CLP patients participated, aged 36.1±12.9 years, 55 females (59.8 %), evaluated by the and CRPS severity Score (CSS). Cluster analysis was applied to classify the sample, based on 8 factors representing evoked pain measures (intensity of hyperalgesia, hyperpathia, and dynamic allodynia, allodynia area), and psychological measures (Cambridge Depersonalization Scale [CDS], Tampa Scale of Kinesiophobia [TSK], Brief Symptom Inventory [BSI], and Beck Depression Inventory [BDI]).

**Results**: 3 clusters were created with significant differences in CSS means ($F_{2,89}$=36.74, $p$<.001); 'CRPS' (78.7% CRPS and 6.5% CLP patients, CSS=12.1 ±2.54), 'CLP' (64.5% CLP and 4.9% CRPS patients, CSS=6.2 ±2.28) and 'Mixed' (16.4% CRPS and 29% CLP patients, CSS= 8.9±2.8). MANOVA revealed significant between-clusters differences in all measures, with allodynia and hyperalgesia demonstrating the largest effect size ($p$<.001, $\eta^2$>.58). The 'CRPS' demonstrated higher scores for psychological and evoked pain measures vs. the 'CLP'. The 'Mixed' cluster exhibited similarities to CRPS in psychological factors and to CLP in evoked pain measures.

**Conclusions**: The findings indicate mutual associations between psychological and abnormal evoked-pain responses, emphasizing their contribution to differentiating between chronic pain conditions. The results imply a CRPS continuum, suggesting a 'Mixed' group of CRPS with 'remission of some features' or 'CRPS-not otherwise specified' subtypes.

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## Abstract no.: 455

### (RE)INVESTIGATING HAND REPRESENTATION AND MOTOR IMAGERY IN COMPLEX REGIONAL PAIN SYNDROME

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**Background and aims**: Hand laterality judgments (HLT) are widely used to measure body representation difficulties in Complex Regional Pain Syndrome (CRPS), as well as in its rehabilitation, with the aim to activate motor imagery and restore the cortical representation of the affected limb. The potential of these tasks to elicit motor imagery is critical to their use in therapy, yet, the influence of the biomechanical constraints (BMC) on HLT reaction time, supposed to reflect motor imagery, is rarely verified.

**Methods**: Here we investigated the influence of BMC on the perception of hand postures and movements.

**Results**: In a first HLT experiment, CRPS patients were significantly slower than controls in judging hand stimuli, whether or not they corresponded to their affected hand. Reaction time patterns reflecting BMC were inconclusive in CRPS and controls, questioning the validity of the task in activating motor imagery. A second experiment therefore directly investigated the influence of implicit knowledge of BMC on perceptual hand movement judgments. Participants judged the perceived path of movement between two depicted hand positions, with only one of two proposed paths that is biomechanically plausible. While the controls mostly chose the biomechanically plausible path, CRPS patients did not, indicating a disturbed perception and/or use of BMC.

**Conclusions**: These findings show non-lateralized body representation impairments in CRPS, possibly related to difficulties in using correct knowledge of the body's biomechanics. Most importantly, they indicate that it seems highly challenging to measure motor imagery and BMC indexes with the HLT, which has important implications for the rehabilitation with these tasks.

## Abstract no.: 483

### INCA: INTERLEUKIN-1 RECEPTOR ANTAGONIST TREATMENT FOR REFRACTORY COMPLEX REGIONAL PAIN SYNDROME

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**Background and aims**: Complex Regional Pain Syndrome (CRPS) is an uncommon and debilitating cause of chronic limb pain associated with inflammation and autonomic features. It is usually preceded by trauma but its pathophysiology is not fully understood. Animal models using immunoglobulin transfer from patients with CRPS show increased nociceptive behaviours that can be blocked by interleukin-1 receptor antagonists but not steroids. This suggests specific autoimmune mechanisms involving interleukin-1 play a significant role in the pathophysiology of CRPS. Anakinra is an interleukin-1 receptor antagonist that may be a potential treatment in refractory CRPS.

**Methods**: We propose a prospective phase II study to test the safety and tolerability of anakinra administration in 30 adult patients with refractory CRPS. Patients will be recruited between two tertiary UK pain management centres over 18 months. Inclusion criteria include CRPS of 18 months to 10 years and they will be offered a 120-day course of self-administered subcutaneously daily anakinra injections.

**Results**: Primary outcome will be safety and tolerability measured by the proportion of patients with serious or condition specific adverse events. Secondary outcomes will be changes in pain intensity, retention rate, CRPS severity score, Brief Pain Inventory (BPI), Hospital Anxiety and Depression scale (HADS), Patient Health Questionnaire (PHQ)-9 and EQ5D. Limb sensitivity will be measured by quantitative sensory testing and volume measurement by a figure of eight method.

**Conclusions**: The INCA study aims to determine if anakinra is safe and tolerated; results will assist in development of a randomised clinical trial to determine its efficacy in patients with refractory CRPS.

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## Abstract no.: 503

### LOCALIZING SENSITIZATION ALONG THE NOCICEPTIVE NEURAXIS IN PATIENTS WITH COMPLEX REGIONAL PAIN SYNDROME

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**Background and aims**: Thermal and mechanical hyperalgesia beyond the initial area of injury are common in complex regional pain syndrome (CRPS) and mediated by sensitization along the nociceptive neuraxis. The aim of this study was to disentangle the involvement of peripheral and central sensitization in chronic CRPS.

**Methods**: Nineteen chronic CRPS patients and 30 healthy subjects were recruited. Heat, pinprick and pressure pain thresholds as well as the stimulus-response function (pinprick) were assessed in the affected, contralateral and distant (control) limb. Additionally, temporal summation of pain (TSP) was assessed in the affected and control limb. The readouts were compared to healthy subjects and across stimulation areas. Additionally, hypersensitivity was assessed within two subgroups of CRPS patients (low (<40%) and high pain extent (>40% of limb affected by pain).

**Results**: The affected limb of CRPS patients was more sensitive to pinprick stimuli compared to the contralateral limb ($p<0.05$). Additionally, we found thermal and mechanical hyperalgesia in the control limb of CRPS patients (heat: $p<0.05$, pinprick and pressure: $p<0.001$). The contralateral limb of CRPS patients with a high compared to low pain extent was more sensitive to pinprick stimuli ($p<0.05$). Only patients with a high pain extent showed increased TSP in the affected limb compared to healthy subjects ($p<0.001$).

**Conclusions**: Patients with chronic CRPS show both, signs of peripheral (more sensitive affected compared to contralateral limb) and central sensitization (more sensitive control limb compared to healthy subjects). Moreover, CPRS patients with a high pain extent show more signs of spinal sensitization as assessed with TSP.

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## Abstract no.: 623

### FRACTALKINE RECEPTOR (CX3CR1) ACTIVATION RESULTS IN HYPERALGESIA AND NEUROINFLAMMATION IN A PASSIVE TRANSFER-TRAUMA MOUSE MODEL OF COMPLEX REGIONAL PAIN SYNDROME (CRPS)

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**Background and aims**: Complex Regional Pain Syndrome (CRPS) is a severe, chronic pain condition, which develops after a small injury. The most common symptoms are hyperalgesia, edema and autonomic disorders. The pathophysiology is unknown, but immune response against sensory nerve-derived antigens, complex neuro-immune-vascular interactions and neuroinflammation are involved. Since treatment is unsatisfactory, it is necessary to identify the key mediators and new therapeutic targets. Here we investigated the role of the fractalkin, CX3C inflammatory chemokine receptor 1 (CX3CR1) expressed on microglia cells and macrophages in our passive transfer-trauma mouse CRPS model.

**Methods**: Female C57Bl/6 mice were treated daily with purified IgG from CRPS patients or healthy volunteers. Plantar skin-muscle incision was performed to model the microinjury. The paw mechanonociceptive threshold was measured by dynamic plantar aesthesiometry and volume by plethysmometry, astrocyte and microglia in pain-related central nervous system regions by glial fibrillary acidic protein (GFAP) and Iba1 immunohistochemistry, respectively, in wild-type and CX3CR1-deficient mice. In wild-type mice, we tested the effect of the CX3CR1 antagonist (AZD 8797).

**Results**: Daily i.p. injections of CRPS IgG induced significantly greater mechanical hyperalgesia during the 7-day experimental period after plantar skin-muscle incision, as well as astrocyte and microglia markers in the spinal cord dorsal horn, periaqueductal gray and somatosensory cortex as compared to healthy IgG treatment. CX3CR1 gene deficiency significantly reduced CRPS IgG-induced the mechanical hyperalgesia and glia cell activation.

**Conclusions**: In CRPS-associated chronic pain, central nervous system neuroinflammatory mechanisms may play an important role via CX3CR1 activation, therefore, CX3CR1 inhibition may represent new analgesic perspectives.

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## Abstract no.: 902

### COMPLEX REGIONAL PAIN SYNDROME AND RISK FACTORS IN ADULT POPULATION: A SYSTEMATIC REVIEW

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**Background and aims**: Complex Regional Pain Syndrome (CRPS) is a chronic debilitating pain condition whose physiopathology is still not fully understood and its treatment remains controversial. Therefore, understanding which risk factors may contribute to the development of this syndrome is a high-priority information for public health, physicians and the decision-making process.

**Methods**: A systematic review of case control and cohort studies was performed following the PRISMA guidelines. An electronic search among seven databases, MEDLINE, Cochrane, Scielo, Google Academy, Web of Science, Scopus and Embase, was conducted. Risk of bias was assessed following the Newcastle-Ottawa scale.

**Results**: From initially 708 identified studies, only 9 fulfilled the eligibility criteria. Among them, characteristics regarding the upper limb after fracture seemed to be a contributing factor for CRPS, this included high pain levels over 5 out of 10 on a numeric rating scale and characteristics of the fractures itself, high impact fractures or open methods reduction. Other risk factors such as being female, suffering other pain comorbidities, psychological, genetic and metabolic factors were also described.

**Conclusions**: Despite overall low risk of bias found in the included studies and the aforementioned risk factors, these results when combined were inconsistent for a meta-analysis, therefore, more research is advisable.

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## Abstract no.: 1040

### THERAPY TREATMENT FOR CHRONIC COMPLEX REGIONAL PAIN SYNDROME WITHIN A CLINICAL SETTING

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**Background and aims**: Guidelines support the inclusion of a variety of physiotherapy interventions for CRPS management but do not describe how treatments can be integrated as part of clinical pathways (1,2). Evidence of current practice and treatment pathways, therefore, is needed to inform future best practice guidelines (3,4).

**Aim:** To describe and evaluate a clinical pathway for patients with longstanding CRPS.

**Methods**: Retrospective case series review of CRPS patients completing a physiotherapy clinical pathway at a tertiary pain centre. Treatments were selected based on patients presenting symptoms using a mechanistically informed treatment pathway. Outcomes relating to physical function, pain and neglect-like symptoms were collected pre and post-treatment. Ethics approval was obtained.

**Results**: 91 CRPS patients with complete outcome sets (January 2016 and January 2020).

Desensitisation (84%) and treatments to address altered limb perception and neglect (89%) were most common. Significant improvement following treatment was observed across all outcomes; the Patient Specific Functional Scale (PSFS) p=0.001 (mean diff=1.6 points,95% CI), The Brief Pain Inventory (BPI) functional interference p=0.05 (mean diff= 0.83,95% CI), BPI average pain p=0.001 (mean diff=1.28,95% CI), BPI worst pain p=0.001 (mean diff= 1.2,95% CI), and The Neglect Symptom Scale p=0.05 (mean diff= 0.35,95% CI). High baseline pain was negatively correlated with PSFS, r=-0.29, p=0.009 (95% CI).

**Conclusions**: Longstanding CRPS is often refractory to medications and interventional treatments. Physiotherapy treatment using a mechanism-informed treatment pathway was associated with significant improvements in all outcome domains. Further work is needed to help inform and optimise clinical treatment algorithms.

# COVID-19 associated pain

## Abstract no.: 216

### THE IMPACT OF THE COVID-19 PANDEMIC ON EUROPEANS WITH CHRONIC PAIN

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**Background and aims**: Approximately 20% of the adult population in Europe are affected by chronic pain and the COVID-19 pandemic has had and is still having a great impact on the quality of life of people living with chronic pain.

**Methods**: PAE involved its member organisations in translating the English questions into 7 languages. The online survey consisted of eight parts with a total of 56 questions completed by 970 citizens. The collected data were analysed by Dr Cristian Chifu from the Business Faculty of Babeș- Bolyai University, Cluj-Napoca, Romania.

**Results**: People living with chronic pain have been unable to access the health services they need. We have recorded an increase in the intensity of their pain, the interference that pain makes to their lives, and greater sleep disturbance. Captured also is a decrease in people's mood, and disruption to their social lives. Some people living with chronic pain report they have no one they can talk to when it comes to their mood or any psychological issues, not even a family member. Medications remained available, however, access to other treatment and medical services are reported as difficult or very difficult. It is, therefore, unsurprising that the overall quality of life has decreased for those in pain due to the pandemic.

Read more here: https://pae-eu.eu/wp-content/uploads/2021/03/Full_report_PAE-in-depth-COVID-19-Survey-Final.pdf

**Conclusions**: It is clear from this survey that the Covid-19 pandemic has had a complex and profound impact on people living with chronic pain. we

## Abstract no.: 689

### ICF-BASED IMPAIRMENTS DUE TO PAIN AFTER MILD COVID INFECTION

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**Background and aims**: World Health Organization estimates that approximately 10% of population might develop postcovid syndrome after covid-19 infection, including pain. The aim of this study was to assess pain-related impairments in functioning and activity according to International Classification of Functioning and Disability (ICF).

**Methods**: Internet-conducted sampling of ICF-based questionnaire was performed before participation in a multimodal rehabilitation study for postcovid syndrome. Impairments were scored as none, mild, moderate, severe and total.

**Results**: Among 100 participants (mean age of 44.5 years), 82% were women, 61% with higher education and 56% working full or part time. 67% reported to be healthy before the infection and 11% reported short hospitalization, except 1 (1%) participant. Functional impairments due to pain problems were scored by 82% of participants and by 88% because of pain during last week, mostly as moderate, 49% and 48%, respectively. Pain in one part of body (b2801) was reported by 90% of participants, mostly as severe (30%) or moderate (37%). Pain in multiple body parts (b2802) by 83% of participants, mostly as moderate (39%) or mild (26%). Generalized pain (b2800) was scored by 65% of participants, in 31% as moderate. Impairments scored by 90% and 60% of participants were due to pain perceived as worst or lightest, respectively. Impairments by 57% were scored due to irradiating pain and by 8%, 11%, 18% and 30% of participants due to sensitivity to touch, vibration, temperature, and hypersensitivity, respectively.

**Conclusions**: Results indicate that functional impairments due to pain after mild covid-19 infection were scored by major part of participants.

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## Abstract no.: 907

### CHANGE IN AMOUNT OF PHYSICAL ACTIVITY DURING THE FIRST COVID-19 LOCKDOWN IS INVERSLY CORRELATED TO CHANGE IN CHRONIC PAIN INTENSITY

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**Background and aims**: Physical activity significantly decrease in response to COVID-19. Chronic pain and physical activity have a reciprocal influence: reduced activity inceases the risk for developing chronic pain and people with chronic pain often reduce the intensity of their physical activity.

We investigated the relationship between physical acitivity during the COVID-19 lockdown and the development of chronic pain.

**Methods**: This study was conducted as an cross-sectional study using an open web-based survey . Participants were recruited through self-help groups for people with chronic pain in Germany, Austria, and Switzerland for two weeks, starting from July 1st, 2020.

Participants rated their pain intensitybefore and during the lockdown in the first wave of COVID-19. Likewise, the weekly amount of physical activity was assessed. We calculated the differences in self-reported mean pain levels and amount of weekly hours with physical activity before and during the first COVID-19 lockdown.

**Results**: The correlation of the mean pain differences before and during the COVID-19 lockdown with the weekly physical activity before and during the lockdown and the difference between them was -0.054, -0.395, and -0.448.

**Conclusions**: Our data show the close correlation of changes in physical activity and chronic pain during the first wave of COVID-19.

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# Headache

## Abstract no.: 280

### CERVICAL MUSCULOSKELETAL DYSFUNCTION AND SIGNS OF SENSITIZATION DURING THE MIGRAINE CYCLE IN EPISODIC MIGRAINE PATIENTS

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**Background and aims**: This study aimed to assess cervical musculoskeletal dysfunction (CMD) in episodic migraine (EM) patients during the 4 phases of the migraine cycle controlling for the presence of neck pain and correlating them with signs of widespread sensitization.

**Methods**: In this multicenter, cross-sectional, observational study, differences in CMD were assessed during the 4 migraine phases in EM patients and compared with healthy controls controlling for the presence of neck pain. Total cervical active range of motion (AROM), flexion rotation test (FRT), activation pressure score (APS), and cervical pressure pain threshold (PPT) were assessed. Signs of widespread sensitization were assessed by evaluating hand and leg PPTs. Bonferroni-corrected p-value was adopted for the between group's difference ($p=0.013$) and a p-value of 0.05 in the correlation analysis.

**Results**: In the 211 subjects included, FRT and APS were reduced in all 4 phases of the migraine cycle versus controls ($p<0.002$). AROM ($p<0.002$) and cervical PPT ($p<0.023$) were reduced in ictal EM versus controls with no significant difference between controls and EM in other phases ($p>0.023$). AROM was positively correlated with leg PPT ($r=0.22$;$p=0.023$), FRT was positively correlated hand PPT ($r=0.19$; $p=0.045$), and cervical PPT was positively correlated with hand ($r=0.51$;$p<0.001$) and leg ($r=0.69$;$p<0.001$) PPTs.

**Conclusions**: EM had reduced cervical muscle functionality and upper-cervical passive mobility in the 4 phases of the migraine cycle independently by the presence of neck pain. The active mobility and the pain threshold of the cervical spine were reduced in ictal EM patients and those with higher signs of widespread sensitization.

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## Abstract no.: 281

### ASSESSING WHICH RISK FACTORS COULD PREDICTING THE PRESENCE OF NECK PAIN IN MIGRAINE PATIENTS

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**Background and aims**: This study aimed to assess which risk factors could predict the presence of interictal neck pain in migraine patients.

**Methods**: In this multicenter, cross-sectional, observational study, episodic and chronic migraine patients were divided into migraine without interictal neck pain (MwoNP) or migraine patients with interictal neck pain (MNP). Interictally, the following variables were assessed: Headache characteristic: headache frequency, intensity, and duration, use of drugs, headache disability index (HDI) and quality of life (SF-36 questionnaire); cervical musculoskeletal dysfunction: active range of motion (AROM) in flexion, extension, right/left lateral flexion, right/left rotation; flexion rotation test (FRT), activation pressure score (APS). Quantitative sensory testing: static pressure pain threshold (sPPT) over the cervical and trigeminal area; dynamic PPT (dPPT) over the cervical area; hand and leg sPPTs (widespread PPTs). A univariate logistic regression model was used to determine risk factors associated with neck pain. Then, a multivariate Stepwise logistic regression model including as predictors only the variables resulting with a p-value<0.05 in the univariate analysis was conducted.

**Results**: A total of 75 patients were included. The stepwise backward logistic regression model, including headache frequency, use of drugs, HDI, SF-36, flexion, extension, right rotation, and cervical dPPT as predictors, indicated that at an alpha level of $p<0.05$, four predictors (frequency, SF-36; extension, cervical dPPT) could predict the presence of neck pain. ($Chi2\ (4)=38.269$; $p<0.001$.

**Conclusions**: Neck pain in migraine patients could be predicted by increased headache frequency, worse level of quality of life, impaired active cervical extension, and increased mechanical neck hyperalgesia.

## Abstract no.: 282

### MUSCULOSKELETAL DYSFUNCTIONS AND QUANTITATIVE SENSORY TESTING IN MIGRAINE PATIENTS WITH AND WITHOUT NECK PAIN

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**Background and aims**: This study aimed to assess cervical musculoskeletal dysfunction (CMD) and quantitative sensory testing (QST) in migraine patients with concomitant mechanical neck pain (MNP) and without concomitant mechanical neck pain (MwoNP).

**Methods**: In this multicenter, cross-sectional, observational study, episodic and chronic migraine patients were assessed interictally and compared with healthy controls. Migraine patients were divided into MwoNP or MNP according to the presence of concomitant mechanical neck pain, and the following variables were assessed: CMD: cervical active range of motion (AROM) in flexion, extension, right/left lateral flexion, right/left rotation, flexion rotation test (FRT), activation pressure score (APS). QST: trigeminal static pressure pain threshold (sPPT); cervical sPPT and cervical dynamic PPT (dPPT); hand sPPT and hand mechanical pain threshold (MPT).

**Results**: A total of 127 subjects were included. FRT and APS were reduced in MwoNO and MNP compared to controls ($p<0.001$). Compared to controls, MwoNP had reduced AROM in left lateral flexion ($p=0.025$) while MNP had reduced AROM in flexion ($p<0.001$), extension ($p<0.001$), and in right rotation ($p=0.002$), reduced trigeminal sPPT ($p=0.001$), cervical dPPT ($p<0.001$), cervical sPPT ($p<0.006$), hand sPPT ($p=0.001$), and hand MPT ($p=0.002$). No other differences were found between groups.

**Conclusions**: Interictal migraine patients, independently by the presence of concomitant neck pain, present a reduction in functionality of deep neck flexors muscles and reduced passive mobility of the cervical spine. On the other hand, impairment of active cervical movement and increased trigeminal, cervical, and widespread sensitization were consistent only in a subgroup of migraine patients with concomitant neck pain.

## Abstract no.: 283

### TRIGEMINOCERVICAL SENSITIZATION DURING THE MIGRAINE CYCLE IN EPISODIC MIGRAINE PATIENTS

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**Background and aims**: This study aims to assess mechanical pain thresholds from trigeminal and cervical areas during the 4 phases of a migraine cycle in episodic migraine patients (EM) and correlate signs of trigeminocervical sensitization with the interval from the last and the next headache attack.

**Methods**: In this multicenter, cross-sectional, observational study, differences in quantitative sensory tests (QST) were assessed during the 4 migraine phases in EM patients and compared with healthy controls. Temporal summation of pain (TSP) to repeated mechanical pain stimuli, pressure pain threshold (PPT), and mechanical pinprick pain threshold (MPT) were assessed from the trigeminal area; PPT was assessed from the cervical area. The correlations between QST and the interval from the last/next headache attack were analyzed in each phase.

**Results**: A total of 181 subjects were included. TSP was facilitated in ictal EM versus controls (p=0.004); the pain thresholds to all stimuli from the trigeminal and cervical areas were reduced in all 4 phases of the migraine cycle versus controls (p<0.033). A positive correlation was found between the interval from the next headache attack and QST results in preictal EM (trigeminal MPT= r=0.45; p=0.005; cervical PPT (r=0.35; p=0.031) and interictal EM (cervical PPT (r=0.34; p=0.048). No other significant correlation was found (p>0.056).

**Conclusions**: EM patients show signs of trigeminocervical sensitization in the trigeminal-cervical area in all phases of the migraine cycle, with patients in the ictal phase showing the most prominent sensitization. Signs of trigeminocervical sensitization increase, approaching the next headache attack.

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## Abstract no.: 294

### NATIONAL ACUPUNCTURE DETOXIFICATION ASSOCIATION, (NADA) TREATMENT HELPS PATIENTS COPE DURING MOH AND PREGNANCY

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**Background and aims**: 1. Patients with Medication Overuse Headache (MOH)/pregnancy, often suffer from abstinences and increased headaches during tapering of drugs. These symptoms may be alleviated by NADA.

**Methods**: 34 patients with MOH (31) or pregnant (3), (M:7; F:27), were offered NADA treatment, twice a week for 2 months or more.

Five sterile needles were applied in 5 fixed sites in each ear.

At visit 1, the patient would fill in two questionnaires, a Pain Catastrophizing Scale (PCS), a HIT-6 scale including a VAS scale.

During the 2 months the NADA treatment were going on, the patients would fill in a headache calendar on a daily basis.

After 2 months the patients would fill in the HIT-6 scale, the PCS and give an evaluation of the treatment and note if they would wish to receive NADA again.

**Results**: 8 patients did not fill in the questionnaires. 8 patients only completed the first questionnaire. 2 patients completed both questionnaires but did not do the evaluation.

The remaining 16 patients completed all the questionnaires and the evaluation.

There was no difference between the first questionnaires and the questionnaires completed after 2 months. Same severity of headaches and disabilities according to the HIT-6 and PCS were reported.

2 out of 16 patients did not want to receive NADA again.

The remaining patients obtained a better sleep, had less tensions, felt calmness and coped easier during the medication discontinuation.

**Conclusions**: Patients with MOH/ pregnancy, may respond to NADA.

Better sleep, greater surplus energy to cope with the headache were reported.

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## Abstract no.: 301

### COPING WITH HEADACHE AND QUALITY OF LIFE

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**Background and aims**: The relationship between headache and quality of life is complex. Pain is considered to have a detrimental impact on quality of life. In patients with such a chronic conditions, increasing and maintaining quality of life becomes a prime health care goal. Coping is an intentional cognitive and behavioural effort to manage stress. The headache pain itself can also be viewed as a stressor that needs to be dealt with.

The aim of this study were to investigate pain coping and quality of life of patients with chronic headache.

**Methods**: The sample comprise 96 participants, patients from the outpatient pain clinic, 79 female and 17 male, aged between 18 and 84 years.

Pain intensity was assessed with VAS, pain coping was assessed using the Pain Coping and Cognition List (PCCL), and subjective quality of life was assessed with one general question from PWI: How are you satisfied with your life as a whole.

**Results**: Pain catastrophizing showed significant association with quality of life, while the frequency of headaches per month and average intensity did not.

Cognitive style of catastrophizing was significantly negatively correlated to subjective quality of life, active coping, and internal locus of control for pain, while positively with external locus of control. Furthermore, internal locus of control was in significant negative correlation with VAS.

**Conclusions**: These results offer practical implications in improving quality of life of patients with chronic headaches by acting on the cognitions and pain coping style.

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## Abstract no.: 598

### ALCOHOL EVOKES PERIORBITAL ALLODYNIA VIA ACETALDEHYDE AND TRPA1 IN MICE

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**Background and aims**: Alcoholics can cause individuals headaches associated with hangover and provoke migraine attacks in migraineurs. The TRPV1 is selectively gated by 1-3% concentrations of ethanol and by this mechanism signals pain and inflammation. The TRPA1 is gated by an unprecedented series of ROS, RNS, RCS and unsaturated and saturate aldehydes, including the ethanol metabolite, acetaldehyde. The aim is to to investigate the role of TRP channels in mediating prolonged responses that may be relevant for the delayed ethanol-evoked headaches in patients.

**Methods**: Ethanol and acetaldehyde were administered by local injection in the mice periorbital area. Spontaneous nociception was assessed by measuring the time that the animal spent face rubbing the injected area with its paws. Periorbital mechanical allodynia was evaluated by applying the von Frey filaments to the periorbital region before and after ethanol or acetaldehyde.

**Results**: Local injection of ethanol in mice provoke a delayed and prolonged mechanical allodynia. TRPV1 deletion prevented the immediate nociceptive response, but did not affect the delayed mechanical allodynia. The pretreatment with the alcohol dehydrogenase inhibitor prevented the allodynia evoked by periorbital ethanol. In addition, genetic deletion of TRPA1 prevented ethanol- and acetaldehyde-evoked allodynia underling that the aldehyde and not its precursor gates TRPA1 and plays a major role in the ethanol-evoked allodynia.

**Conclusions**: The present study explored the role of TRP channels in mediating prolonged responses that may be relevant for the delayed ethanol-evoked headaches in patients. Results underline that TRPA1 may be a molecular target form an effective treatment for pain in alcoholics.

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## Abstract no.: 653

### MIGRAINE: PREVALENCE, TRIGGERS AND IMPACT IN AN IRISH UNIVERSITY

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**Background and aims**: Migraine is a complex neurological condition exhibited by a unilateral headache of moderate to severe intensity, aggravated by routine physical activity and accompanied by symptoms such as phonophobia, photophobia, nausea, and vomiting (Peroutka et al, 2017). To date, migraine prevalence rates, triggers and treatments have not been established in the Irish university context. Hence this study was undertaken.

**Methods**: A cross-sectional anonymous online survey was made available via Survey Monkey to University College Dublin students. Migraine prevalence was determined via self-report of clinically diagnosed migraine (ICHD-III criteria). Data were imported to SPSS 27, cleaned, and analysed. Ethical approval was obtained (UCD HREC Flynn-Blake-LS-19-90).

**Results**: Data on 586 students were analysed. Migraine prevalence rate was 20.4% (n=120). Migraine was more prevalent in females than males $x^2(1, 120) = 10.35$, $p=0.001$. Of those with migraine 30.8% (n=37) had been clinically diagnosed with a psychological condition. Migraine triggers included life stress (76.4%, n=91), under sleeping (74.2%, n=89) and academic stress (72.5%, n=87). Females reported more difficulty sleeping and attending college than males ($p<0.05$). Treatment included medication (49.2%, n=59), hydration (90.1%, n=108), and avoiding electronics (76.7%, n=92). The mean Headache Impact Test (HIT-6) score of 64(±9.1) indicates severe migraine impact.

**Conclusions**: Migraine is prevalent and burdensome in one Irish university. Comorbidities are prevalent and migraine demonstrates a negative impact on students' lives. Further investigation using qualitative methodologies to explore the lived experience of migraines in university students is warranted.

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## Abstract no.: 657

### A SYSTEMATIC REVIEW, META-ANALYSIS AND NARRATIVE REVIEW OF MIGRAINE PREVALENCE, TRIGGERS, TREATMENTS, SEVERITY, COMORBIDITIES, AND IMPACTS IN UNIVERSITY STUDENTS

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**Background and aims**: Migraine prevalence is increasing annually (Woldeamanuel et al, 2017) but an appreciation of the burden of migraine in university students is lacking. Whilst pooled prevalence has been previously demonstrated at 16% (Wang et al, 2016), triggers, treatments, severity, impacts and comorbidities have not been explored. Hence this review was undertaken.

**Methods**: The review was registered with PROSPERO (ID CRD42020167927). A multiphased approach was carried out in accordance with PRISMA guidelines**.** Cross-sectional studies in English, reporting migraine prevalence in university students, as described by the International Headache Society criteria were eligible. Peer-reviewed databases (n=8) were systematically searched (inception-August 2021) using keyword combinations. The risk of bias was assessed (Hoy et al, 2012). Data were analyzed using Meta and Metafor in R-studio with statistical significance set at $p<0.001$.

**Results**: From 16,964 references, 101 papers were included. Migraine pooled prevalence (n=67,531) was 19% (16-22%); females (n=36,663) demonstrated 23% (19-27%) and males (n=22,622) 12% (9-15%). Of the relevant studies, primary triggers were behavioral (n=30, 95%), environmental (n=26, 83%), and dietary (n=23, 74%). Students used migraine specific treatments (n=22, 81%) and self-management (n=12, 75%). Severity using a range of outcome measures was reported as moderate/severe pain (n=27, 79%). Impacts included college absenteeism and impaired academic performance. Migraine associated comorbidities included mood and stress disorders (n=17, 54%).

**Conclusions**: Migraine is prevalent in students. Prevalence rates have increased from those previously reported. As students will be progressing to the workplace upon graduation, migraine mitigation in the university years is warranted given the significant negative impact on their lives.

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## Abstract no.: 1059

### PSYCHO-EMOTIONAL PORTRAIT OF A PATIENT WITH MIGRAINE

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**Background and aims**: According to the new definition of pain, pain is an unpleasant sensory and emotional experience. Therefore, the assessment of psycho-emotional characteristics is a key aspect. Therefore, the study aimed to determine the psycho-emotional state of patients with migraine and evaluate its contribution to the course of migraine.

**Methods**: Prospective analysis of clinical cases and MRI of randomly selected 31 patients with migraine. Depression and anxiety levels were assessed with the HADS scale. EPQ was used to assess personality traits. The pain was assessed with VAS and DN4 scales. The influence of migraine on life was assessed with MIDAS scale.

**Results**: The average HADS-D score in migraine patients was 4.0 [2,0; 9,0], 29% of patients had depression. The average HADS-A score was 6.0 [3,0; 11,0], 38,7% of patients had anxiety. Patients with anxiety had an increased frequency of migraines and a higher probability of transition to chronic migraines. Depression and anxiety were more common in patients with migraines with aura. In people with melancholic temperament, the course of headache usually overlapped with depressive symptoms, in choleric-with anxiety. Headache with neuropathic pain characteristics had a tendency to develop among patients with longer pain anamnesis. In 25,8% of patients on MRI, single small foci of gliosis were found.

**Conclusions**: Depressive and anxiety symptoms are typical in the portrait of some patients with migraine, more often in migraine with aura. Taking into account individual psycho-emotional features of pain perception would help to optimize the treatment of patients with migraine.

# Definition and classification

## Abstract no.: 578

### CIRCADIAN DYNAMICS OF PAW WITHDRAWAL RESPONSES IN A MOUSE MODEL OF INFLAMMATORY INDUCED MECHANICAL HYPERSENSITIVITY

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**Background and aims**: In mammals, the internal molecular circadian systems generate its own oscillation and control the clock genes to keep the daily rhythm of various physiological and behaviour events operated functionally. Pain is a challenge in reducing sickness absence due to musculoskeletal disorders and withdrawal from work-life and understanding of the daily rhythmicity in nociception is important for preventive interventions at workplaces, as well as standardization of animal studies. Yet, few studies have investigated the daily rhythmicity in nociception.

**Methods**: To study this phenomenon, we performed the well-established intraplanar Complete Freund's Adjuvant (CFA) model of mechanical allodynia. Mice were housed in a 12:12 hour light-dark cycle and unilaterally injected with CFA in the hind-paw, and saline in the contralateral paw (control). Then, we performed a mechanical stimulation assay of the paw using von-Frey filaments and assayed withdrawal behaviours at specific time points after the onset of the light, described as *zeitgeber time* (ZT). In this experiment, the behaviour assays were carried out at three different timepoints: 4ZT- light phase, 12ZT- at the end of the light phase, and 20ZT- dark phase after days 3, 5 and 7 CFA injection.

**Results**: The mechanical threshold for withdrawal of the CFA-injected paw showed circadian oscillation. It reached the peak during the light phase while it remained lower in the dark phase. We also showed some circadian effects in the control paws.

**Conclusions**: The circadian influence on withdrawal behaviour was more evident in the acute phase of inflammation, day 3 after injection and less on day 5, 7.

## Abstract no.: 589

### FORCE-CODING PROPERTIES OF HUMAN ULTRAFAST NOCICEPTORS

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**Background and aims**: In humans, all cutaneous Aβ afferents are considered to exclusively signal discriminative touch, whereas Ad and C afferents signal pain. We recently identified Aβ high-threshold mechanoreceptors that encoded painful skin indentations and when selectively activated evoked painful percepts. We termed them "ultrafast nociceptors" (UFNs; Nagi et al. 2019, Sci Adv). In our original work, the indentation forces were delivered manually, and here we extend our earlier observations by testing the force-coding properties of UFNs using a robotic indenter with precise stimulus control.

**Methods**: We performed single-unit axonal recordings (microneurography) from the radial nerve of awake healthy participants under ultrasound guidance. Indentation forces were delivered using a high-precision mechanical stimulator (Aurora Scientific, Ireland). This equipment has been used in ex vivo skin-nerve rodent preparations and was successfully modified for use in microneurography recordings.

**Results**: The UFNs did not respond to soft brushing, displayed high mechanical thresholds (≥ 4 mN), encoded noxious indentation forces, and had conduction velocities similar to the Aβ touch neurons. Further, when one of the recorded UFNs was selectively activated using intraneural electrical stimulation a painful “sharp-stinging” percept was reported.

**Conclusions**: The capacity to encode noxious stimuli is a hallmark of a nociceptor and here we confirm and expand our original findings on the UFNs with the delivery of highly well-controlled skin indentations.

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### Abstract no.: 1037

### SENSORY DESCRIPTORS WHICH IDENTIFY NEUROPATHIC PAIN MECHANISMS IN LOW BACK PAIN: A SYSTEMATIC REVIEW

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**Background and aims**: Descriptors provided by patients with neuropathic low back pain (NLBP) with or without spinally referred leg pain are frequently used by clinicians to help to identify the predominant pain mechanisms. Indeed many neuropathic screening tools are primarily based on subjective descriptors to determine the presence of neuropathic pain. There is a need to systematically review and analyse the existing evidence to determine the validity of such descriptors in this cohort.

**Methods**: Ten databases were systematically searched. The review adhered to PRISMA and CRD guidelines, and included a risk of bias assessment using QUADAS-2. Studies were included if they contained symptom descriptors from a group of NLBP patients +/-leg pain. Studies had to include a reference test to identity neuropathic pain from other pain mechanisms.

**Results**: Eight studies of 3,099 NLBP patients were included. Allodynia was found to discriminate between NLBP and nociceptive LBP in 4 studies. Autonomic dysfunction was also found to discriminate between the groups but with only 2 studies examining it more research is needed. A greater proportion of studies found both dysesthesia (5 compared to 2 studies) and numbness (5studies compared to 1) were appropriate descriptors to identify NLBP. There were equivalent numbers of studies finding evidence for and against the descriptors thermal threshold pain, pain described as hot/burning cold, paroxysmal and sharp pain in people with NLBP.

**Conclusions**: Subjectively reported allodynia suggests a neuropathic pain mechanism in LBP. Autonomic dysfunction, Dysesthesia and Numbness raise the suspicion of NLBP. There is poor consensus on whether other descriptors can identify NLBP.

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# Education of pain care

### Abstract no.: 260

### MAPPING THE INCLUSION OF CANCER-RELATED PAIN KNOWLEDGE AND SKILLS WITHIN CANCER NURSING AND ALLIED HEALTH PROFESSIONALS KNOWLEDGE FRAMEWORKS

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**Background and aims**: Cancer-related pain is one of the most commonly reported symptoms following a cancer diagnosis, and has a significant impact on the quality of life of those affected. Cancer-related pain is complex and multifactorial and can continue long after treatment has ended. There is a need for healthcare professionals to have the knowledge skills to support those living with and beyond a cancer diagnosis.

This review aims to identify the inclusion of cancer-related pain within cancer care knowledge and skills frameworks.

**Methods**: A search of professional bodies associated with cancer nursing and allied health professionals was performed to identify cancer knowledge frameworks. The identified documents were searched for key terms of “pain”, “symptom control”, “palliative care” and “neuropathic”. This was then collated into a single document to map the items included.

**Results**: Seven frameworks were identified from RCN, UKONS, EONS, Macmillian Cancer Charity and ONS. There was no specific mention of cancer-related pain across all the documents. There were some mentions of palliative and symptom control however this was in relation to a variety of symptoms and not specific to cancer-related pain.

**Conclusions**: Despite the high prevalence of cancer-related there is a lack of inclusion within competency and knowledge frameworks. Although there are some mentions of symptom assessment in palliative care this does not acknowledge the variable and persistent nature of cancer-related pain. There is an urgent need to include cancer-related pain education and ensure individual access to skilled professionals who can support them in living well with their pain.

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## Abstract no.: 369

### DEVELOPMENT AND IMPACT OF AN EHEALTH INFORMATION AND SELF-MANAGEMENT RESOURCE FOR PEOPLE LIVING IN IRELAND WITH FIBROMYALGIA

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**Background and aims**: Fibromyalgia (FM), a complex condition characterised by chronic widespread pain, sleep disturbance, fatigue, psychological distress, cognitive symptoms and reduced quality of life (QOL), presents a difficult array of symptoms for patients to manage. International guidelines recommend patients receive illness specific information once diagnosed in order to reduce anxiety, promote self-management and improve health related QOL.

The research aim was to develop a fibromyalgia specific eHealth resource and test it for usability and effect.

**Methods**: An exploratory sequential mixed methods design was employed.

**Results**: Qualitative exploration using semi-structured interviews (n=8) identified illness representations and self-management strategies of Irish FM patients which informed the design, development and content of a tailored eHealth resource, called FibromyalgiaMatters (www.fibromyalgiamatters.ie).

The resource was quantitively tested for impact and usability. Analysis of pre and post intervention questionnaires (n=48) demonstrated a significant medium positive effect on participants pain self-efficacy after 4 weeks access ($p$ = .003, Cohens d = 0.46). No improvement in fibromyalgia impact or global impression of change was observed, though correlation analysis showed those with severe FM had significantly improved self-efficacy post intervention ($r$ = .43, $p$ = .002). Patients graded the resource highly giving it a System Usability Score (SUS) of 82.38 (Grade A).

**Conclusions**: The development of this novel fibromyalgia eHealth resource scored high on usability and had a positive effect on participants self-efficacy, known to be important in terms of chronic disease self-management. Future research should explore the benefits of this resource over time as part of a blended approach to fibromyalgia care in Ireland.

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## Abstract no.: 582

### ENHANCING HEALTHCARE OUTCOMES IN OPIOID-INDUCED CONSTIPATION (ECHO OIC) - AN EXPERT CONSENSUS GROUP’S RECOMMENDATIONS ON IMPROVING OPIOID PATIENTS’ OUTCOMES

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**Background and aims**: Although OIC is common in patients receiving long-term opioids, there is significant lack of awareness of this complication, particularly in non-specialist care settings. A European Steering Committee was formed to discuss ways of addressing these challenges across care settings - Enhancing Healthcare Outcomes in OIC management (ECHO OIC).

**Methods**: A series of Steering Committee meetings were organised to:
- Identify stakeholders and understand key issues that may limit effective management of
- OIC including monitoring, effective diagnosis, and rational PAMORA use
- Explore the transfer of care of patients on long-term opioids from secondary care to primary care
- Devise strategies that could address these issues for different stakeholders

**Results**: In primary care, lack of awareness of OIC and use of guidelines, workload and time pressures, and perception of constipation as a low-grade symptom all present challenges for OIC management. Also, the transfer of care of long-term opioid patients can contribute to a lack of continuity between initiation and monitoring. A reliance on inexpensive laxatives (prescription and over-the-counter) does not align with current guidance and reduces the use of targeted therapies, such as PAMORAs. The Steering Committee recommended development of clear, simple guidelines specifically designed for primary care physicians. Additionally, adopting the wider concept of 'opioid guardianship' creates a culture where simplified OIC guidelines could represent a road map to enhanced patient care.

**Conclusions**: Simpler guidelines and improved communication between specialists and non-specialists are essential in improving outcomes and quality of life for patients on long-term opioids, particularly those developing OIC.

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## Abstract no.: 595

### ENHANCING HEALTHCARE OUTCOMES IN OPIOID-INDUCED CONSTIPATION (ECHO OIC): DEVELOPING A SIMPLIFIED PATHWAY FOR PRIMARY CARE

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**Background and aims**: Current guidelines for opioid-induced constipation (OIC) are complicated and unfamiliar, especially among non-specialists. The ECHO OIC Steering Committee recommended that a simplified version of current guidelines should be proposed for use in non-specialist opioid-prescribing situations.

**Methods**: Simplified guidelines were proposed as a road map for OIC management:

| Step | Actions |
|---|---|
| 1 | **Opioid prescription (initiation or repeat)**<br><br>Inform patient of OIC risk – advise use of OTC laxatives in case of constipation. If repeat prescription, assess carefully for constipation and bowel function (not just bowel movement frequency) |
| 2 | **Patient develops constipation despite laxatives = OIC**<br><br>If there is an apparent cause for constipation, manage appropriately. If not, assume OIC and needs targeted treatment |
| 3 | **Prescribe PAMORA**<br><br>For interactions, contraindications etc. refer to summary of product characteristics. Consider stepping dose up and down, tapering laxatives after 1–2 weeks and potential side effects. Monitor response weekly at start. |
| 4 | **If treatment failure, refer to specialist** |

**Results**: Each step is based on published evidence in line with other OIC guidelines. They emphasise the importance of careful assessment of patients for all constipation symptoms and the potential risk of OIC. Advice is provided on targeted PAMORA treatment and when specialist referral is warranted.

**Conclusions**: By setting out a clear road map for assessment and management it is hoped it will help non-specialist clinicians better manage OIC for those patients on opioid therapy, as improved management of OIC can not only reduce the burden on healthcare services but can improve well-being and quality of life in patients with chronic pain.

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## Abstract no.: 612

### TOWARDS CONSENSUS IN PAIN-RELATED CONTENT IN THE UNDERGRADUATE PHYSIOTHERAPY PROGRAM IN THE NETHERLANDS: A DELPHI-STUDY

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**Background and aims**: Access to pain education for Health Care Professionals is one of the IASP key recommendations to improve pain care. Even though the importance of education in pain is widely recognized, a consented description of essential pain-related topics for the undergraduate curriculum of physiotherapy is lacking.

**Methods**: A modified Delphi study was conducted in four rounds, including a Delphi panel (n=22) consisting of experienced undergraduate physiotherapy lecturers in pain of nearly all Universities of Applied Sciences in the Netherlands and five validation panels: early-career physiotherapists/students, physiotherapists, undergraduate non-pain lecturers, postgraduate pain educators, and IASP/EFIC curriculum developers. Round 1: topics were provided by the Delphi Panel, postgraduate pain educators and a literature search. Round 2-4: the Delphi panel rated the topics using a 6-point Likert scale and commented. All topics were analyzed per round on importance and degree of consensus. Validation panels rated the outcome of round two.

**Results**: The Delphi panel rated 257, 146 and 90 topics in round 2, 3 and 4 respectively, resulting in 71 topics judged as not important, 97 as important and 88 as highly important. All topics rated as highly important by all panels (Delphi and validation panels) were presented as a consented list of 63 topics.

**Conclusions**: The consented list can serve as a foundation for developing a comprehensive competency-based physiotherapy curriculum on pain. Future studies should assess additional didactical directions, including on which competence level these topics should be taught and examined.

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## Abstract no.: 637

### DAILY NURSING HABITS IN POSTOPERATIVE PAIN MANAGEMENT AND THE NEED FOR CONTINUING EDUCATION TO INCREASE THE QUALITY OF NURSING CARE

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**Background and aims**: Acute pain like postoperative pain is a significant problem in post-operative conditions. The aim of the study was to evaluate the daily nursing habits about post-operative pain management at the General Hospital of Prizren.

**Methods**: The study approach was quantitative, statistical analysis was made of data from the evaluations, opinions, and attitudes of the participants and their generation of numerical values provided by their observation based on the previously prepared questionnaire. The target group was nurses from surgical wards with various experience in General Hospital “Prim. Dr. Daut Mustafa” Prizren.

**Results**: Assessment of pain is made only by objective data (68.97%) and it from oral reporting, they used no other data also they don’t have pain assessment tools. Nursing documentation of postoperative pain (58.62%) was lacking because there was no place to be recorded in the current lists of temperature except at the recovery room and nurses didn’t use assessment tools. Barriers to pain management are identified as the creation and use of protocols for pain management (41.38%), the assessment of pain inadequate from staff (44.83%), delayed reactions by staff in pain reported (20.69%), and the reluctance of nurses to administer analgesics (37.93%).

**Conclusions**: Communication between patients and nurses is lacking. In pain assessment, there is much room for improvement in assessment tools and documentation. Clinical protocols for postoperative pain management are lacking. It is necessary to profile nurses in the field of surgery and with specifics in pain management.

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## Abstract no.: 674

### UNDERSTANDING AND MANAGING PAIN: OPIOIDS AFTER SURGERY. AN INTERNATIONAL CO-PRODUCED PATIENT INFORMATION PROJECT

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**Background and aims**: Rising concerns exist that perioperative opioid use may inadvertently contribute to harm from persistent postoperative opioid use, opioid induced ventilatory insufficiency, and driving under the influence of postoperative opioids. Opioids remain an important element in pain management in many postoperative patients. It is necessary, therefore, to focus on opioid stewardship and promote deprescribing. This patient information project is intended to promote opioid stewardship and reduce the risk of opioid-related harm in adult surgical patients by educating patients about the risks and benefits of opioid medicine for acute postoperative pain.

**Methods**: Stimulated by the publication of the international consensus guidance on perioperative opioids [1], a number of organisations began to develop independent guidance for patients on postoperative opioids. Conversations on Twitter led to an international working party comprising two IASP chapters, professional bodies and service users to collaboratively produce single guidance.

Each section promotes action;

What can I do.... to reduce pain / recover well / reduce side-effects?

What is the safest way to take pain medicines?

What do I need to know to use opioids safely?

The document promotes harm prevention and also covers safe storage, disposal and driving. Part 2 will develop procedure specific postoperative analgesia guidance.

1. Levy, Quinlan, El-Boghdadly et al (2021) An international multidisciplinary consensus statement on the prevention of opioid-related harm in adult surgical patients. Anaesthesia, 76: 520-536.

**Results**: We look forward to launching our co-produced document at EFIC 2022.

**Conclusions**: Collaboration, co-production and design are important components when developing accessible and engaging patient information.

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## Abstract no.: 941

### THE USE OF SIMULATED LEARNING IN PAIN FELLOWSHIP TRAINING PROGRAMS

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**Background and aims**: The use of simulation is required by the American Council for Graduate Medical Education (ACGME) for pain medicine fellows. Despite a growing interest in simulated learning, little is known about its use within pain fellowship training programs. In this study, we aimed to characterize the simulation modalities and limitations of simulation use for US-based fellowship training in pain medicine.

**Methods**: An email was sent to the program contact listed on the ACGME pain fellowship website, inviting them to participate in a RedCap® electronic survey. The survey consisted of 27 questions. The questions obtained information regarding the content, frequency, and modalities of simulation offered at each facility. It also sought feedback regarding barriers to simulation content development.

**Results**: Of the 111 ACGME-accredited fellowship programs, 28% (n=31) participated in our survey. Common topics covered in simulation exercises included skills training, resuscitation, and complication management (58%, 52%, and 58%, respectively). A majority of programs utilized formal debriefs after simulation scenarios (n=24, 89%). Educators found simulation to be a worthwhile investment in pain fellow education (strongly agree, n=18, 60%; somewhat agree, n=9, 30%). Barriers to developing simulation further included clinical duties (n=21, 75%), funding (n=17, 61%), lack of equipment (n=17, 61%), and lack of experience (n=7, 25%).

**Conclusions**: Our results suggest there is variability in the use of and availability of simulation among pain medicine fellowship programs in the United States. Shared training materials, increased funding, and centralized oversight may enhance the reliability and feasibility of pain medicine simulation.

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## Abstract no.: 1077

### CHANGE IN PHYSIOTHERAPY STUDENT'S ATTITUDES & BELIEFS REGARDING THE MANAGEMENT OF CHRONIC LOW BACK PAIN AND OSTEOARTHRITIS: A 7-YEAR FOLLOW-UP STUDY

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**Background and aims**: In 2013, a study showed low guideline adherence regarding chronic low back pain (CLBP) in physiotherapy students concerning activity and work recommendations (47% and 16%). The aim of this study was to investigate if the 2020' physiotherapy students' attitudes and beliefs regarding CLBP and osteoarthritis (OA) and the guideline adherence have improved compared to the students in 2013, by using the same protocol.

**Methods**: In 2013 and 2020, physiotherapy students in their 2nd and 4th year of education were recruited from 6 Belgian and 2 Dutch institutions. Their attitudes and beliefs regarding CLBP and OA were measured using the Pain attitudes and beliefs scale (PABS), the Health Care Providers' Pain and Impairment Relationship Scale (HC-PAIRS) and a questionnaire regarding therapeutic exercise and knee OA. A clinical case vignette was used to measure the guideline adherence regarding CLBP.

**Results**: A total of 2738 students participated, 1624 in 2013 and 1114 in 2020. Compared to 2013, students in 2020 scored lower on the biomedical scale ($p<.001$) and higher on the psychosocial scale ($p<.001$) regarding CLBP and OA. Medium effect size (cohens'd=0.548) was found on the psychosocial orientation of the PABS; small effect sizes were observed regarding the other outcomes. In 2020, 54% provided clinical guidelines' consistent recommendations for activity and 28% for work, which is significantly better than students in 2013.

**Conclusions**: The results suggest that a positive shift occurred towards a more biopsychosocial approach between students of 2013 and 2020. Although improved, the guideline adherence concerning activity and work recommendations remains low.

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## Abstract no.: 1092

### DEVELOPMENT OF A PROGRAM FOR LEARNING PRIMARY CARE PHYSIOTHERAPISTS TO USE THE BIOPSYCHOSOCIAL MODEL IN WORKING WITH CHRONIC PAIN

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**Background and aims**: Despite the importance of a biopsychosocial approach in chronic pain, many physiotherapists still adhere to a biomedical framework. Designing a teaching program that supports obtaining adequate competencies in the participant's context is challenging. This study describes the development of a program for learning primary care physiotherapists to use the biopsychosocial model in chronic pain.

**Methods**: Participatory Action Research methodology, including experts in chronic pain, education and co-design as well as the target audience, was used. Information gathered from literature and curricula of EFIC and IASP was combined with interviews and focusgroups with stakeholders. Co-design methods structured by several design-sprints were used to create, iterate and pilot-test choices of content, and design- and educational solutions. Data were summarized in a Plan of Requirements.

**Results**: Based on the Plan of Requirements a three-month program was developed containing three days of face-to-face learning, online learning and facilitated learning in the workspace. The program challenges participants to move out of their comfort zone, with room for active personal learning and respect for the dynamic nature of skills needed for working with chronic pain.

**Conclusions**: The use of a broad range of stakeholders strengthens the consistency, content and validity of the program. Co-design as a method for development is, though rich, difficult to replicate and present in a transparent manner. Next a feasibility study is needed to evaluate the program.

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## Abstract no.: 1133

### EMPOWERING PATIENTS WITH PERSISTENT PAIN THROUGH HEALTH LITERACY - THE EFIC 'PLAIN TALKING' CAMPAIGN

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**Background and aims**: Inadequate health literacy (HL) affects health outcomes and is "closely-linked to patient empowerment" (Sørensen et al, 2015). The European Pain Federation (EFIC) President's 'Plain Talking' campaign, launched in March 2021, focuses on highlighting this issue and promoting effective and enhanced communication strategies between those living with pain and their clinician.

**Methods**: A survey developed by the EFIC Health Literacy working group (WG) in collaboration with the Pain Alliance Europe (PAE) was translated into 14 languages and disseminated across numerous platforms (EFIC website, social media, newsletters, EFIC councillors). To complement the survey, a focus group session encompassing the WG and people living with pain was undertaken. Ethics approval was obtained from HU University of Applied Sciences in Utrecht, Netherlands.

**Results**: In total, 505 responses were analysed; 95%(n=481) of respondents made suggestions for improving their knowledge about pain via website information, written information and having additional time during healthcare consultations. One third (33%, n= 168) of respondents didn't understand their clinicians' explanation of their pain due to: insufficient consultation time (38%, n=68), clinician couldn't diagnose their problem (37%, n=66) and ineffective communication (16%, n=29). Qualitative analysis of the focus group session found ineffective communication and insufficient time being the main issues reported by patient's living with pain.

**Conclusions**: Limited HL in patients with persistent pain represents an important challenge for clinicians. Identifying patients' HL needs is essential to empowering patients in understanding their pain and its treatment, improving clinician's communication, and quality of pain management.

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# Epidemiology

## Abstract no.: 176

### THE EFFECT OF PREOPERATIVE ANXIETY ON THE LENGTH OF HOSPITAL STAY OF PATIENTS UNDERGOING ELECTIVE SURGERY

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**Background and aims**: Preoperative anxiety may be related to length of hospital stay (LOS), because its relation with postoperative pain and complications.

This study aims to investigate whether patients with a high level of preoperative anxiety, after elective surgery have an increased LOS compared to patients with a low level of preoperative anxiety.

**Methods**: A prospective cohort study has been set up to compare a group of patients with a high level of preoperative anxiety to a group of patients with a low level of preoperative anxiety on the primary outcome measure LOS. Linear regression analyses were used to estimate the association between preoperative anxiety and LOS and the influence of potential confounders sex, age, BMI, postoperative pain.

**Results**: 83 of 297 (27.9%) patients had a high level of preoperative anxiety. Patients in the anxiety group stayed for 1.34 ($p<0.001$) days longer in the hospital compared to patients in the no-anxiety group. Corrected for the confounders sex, age, BMI and postoperative pain on day 1 the LOS in the anxiety group is still increased with 0.91 ($p=0.023$) days. Also patients experiencing pain on the first postoperative day had an increased LOS of 1.32 ($p<0.001$).

**Conclusions**: We concluded that preoperative anxiety and postoperative pain on day 1 both are associated with LOS. Reducing the patients' preoperative anxiety and postoperative pain on day 1, will improve the well-being of the patient and might also contribute to reduced LOS, which eventually leads to decreased healthcare costs.

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## Abstract no.: 397

### PAIN PREVALENCE AND CHARACTERISTICS DURING AND AFTER CANCER TREATMENT: A SYSTEMATIC REVIEW AND META-ANALYSIS

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**Background and aims**: Pain is a frequently reported, often long-lasting, symptom in cancer populations and is known to decrease quality of life. The current review aims to provide an extended overview on the prevalence of pain, pain mechanisms, pain characteristics and assessment methods in cancer populations.

**Methods**: A systematic research was conducted using Medline, Embase, Scopus, Web of Science and Cochrane looking at studies from 2014 to 2020. Studies had to report pain prevalence rates in cancer and were divided into two groups depending on survivorships status. The first group consisted of cancer patients reporting pain during or up to three months after curative cancer treatment. The second group consisted of cancer survivors who finished curative treatment at least three months ago. The reported prevalence rates of the individual studies were pooled within a two separate meta-analyses. Meta-regressions were performed to identify possible determinants of the pooled pain prevalence.

**Results**: Of the 9,052 studies, 12 studies with cancer patients and 38 studies with cancer survivors were included in the meta-analyses. The pooled pain prevalence for the cancer patient group was 40% (95%CI 0.29-0.51), with a heterogeneity of 96%. The pooled pain prevalence for the cancer survivor group was 47% (95%CI 39 - 55), with a heterogeneity of 98.99%.

**Conclusions**: Evidence with a low risk of bias suggests that 40% of cancer patients and nearly half of cancer survivors report pain. Both pooled pain prevalence rates were very heterogeneous which in term warrants cautious interpretation of these results but also emphasizes the need for further investigation.

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## Abstract no.: 434

### RELATIONSHIPS BETWEEN SLEEP, MOOD DISORDERS AND COGNITIVE FUNCTION IN TYPE-II DIABETIC PATIENTS WITH DIABETIC NEUROPATHIC PAIN USING STRUCTURAL EQUATIONS

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**Background and aims**: The aim was to know the relationships among mood disorders, sleep quality, and cognitive function in type-II diabetic (DM-II) patients with diabetic neuropathic pain (DNP).

**Methods**: Multicentric cross-sectional study in 91 DM-II patients with DNP in Primary Care centres. We collected information on sociodemographic and clinic data, including sleep quality (MOS index-9), cognitive function (TYM), and level of anxiety and depression (HADS) as indicators of the latent construct "mood disorders". The relationships among these constructs were analysed with Structural Equations in AMOS, showing the estimations of the regression weights (RW) for each path in each model.

**Results**: The mean score of HADS-A was 9.04 (SD=5.3), HADS-D, 9.12 (SD=5.4), MOS index-9, 47.99 (SD=22.8), and TYM, 41.46 (SD=6.7). The path analyses involving these constructs two-to-two revealed only significant relationships from sleep quality to mood disorders (RW=0.141,p<0.001) and vice versa (RW=3.605,p<0.001). When including the cognitive function as a mediator, no relevant changes in the aforementioned RW were observed, and no paths involving cognitive function were significant.

**Conclusions**: Our data do not support a complex relationship among cognitive function, sleep quality and mood disorders in diabetic patients with DNP. Only relationships between mood and sleep were found, without cognitive function playing a mediating role. Specifically, the poorer the quality of sleep, the worse the level of mood disorder and vice versa.

## Abstract no.: 1107

### PAIN DESCRIPTORS AND DETERMINANTS OF PAIN SENSITIVITY IN KNEE OSTEOARTHRITIS: A COMMUNITY-BASED CROSS-SECTIONAL STUDY

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**Background and aims**: Heightened pain sensitivity is implicated in the pain experiences of people with OA. However, epidemiological research investigating the extent and determinants of pain sensitivity in OA is scarce. This study aimed to explore pain characteristics in individuals with knee osteoarthritis (KOA), to compare pain sensitivity across individuals with KOA, chronic back pain (CBP) and individuals with no pain (NP), and to examine the relationship between clinical and pain characteristics with pain sensitivity in KOA.

**Methods**: Two datasets were combined comprising Dutch individuals of ≥ 40 years of age with KOA(N=445), CLP(N=504), or NP(N=256). Demographic and clinical characteristics, global health, physical activity/exercise, and pain characteristics including intensity, spreading, duration, quality(SF-MPQ), and sensitivity(PSQ) were assessed. Differences between (sub) groups were examined using analyses of variance or Chi-square tests. Regression analyses were performed to examine determinants of pain sensitivity in KOA.

**Results**: Quality of pain was most commonly described as aching, tender, and tiring-exhausting in KOA. Overall, the KOA group had higher levels of pain sensitivity compared to NP group, but lower levels than the CBP group (see Table).

| | KOA | CBP | NP | KOA vs CBP | KOA vs NP |
|---|---|---|---|---|---|
| | N=445 | N=504 | N=256 | Difference [95%CI], adj.for sex and age | Difference [95%CI], adj. for sex and age |
| PSQ-total, mean ((SD | 4.4 (1.5) | 4.7 (1.8) | 3.6 (1.4) | -0.23 [-0.49,0.03] | 0.68 [0.36,1.01] |
| PSQ-minor, mean ((SD | 3.2 (1.6) | 3.7 (2.0) | 2.4 (1.3) | -0.32 [-0.60,-0.05] | 0.70 [0.36,1.05] |

Pain intensity, its temporality and spreading, global health, exercise, and having comorbidities were weakly related to pain sensitivity (β's: 0.12-0.27). Symptom duration was not related to pain sensitivity. Older age, higher levels of continuous pain, lower levels of global health, and exercise uniquely contributed, albeit modest, to pain sensitivity($P$<0.05).

**Conclusions**: Continuous pain such as aching and tenderness in combination with decreased physical activity may be indicative for individuals at risk for widespread pain and, ultimately, poor treatment outcomes.

# Clinical diagnostics for the assessment of pain

## Abstract no.: 180

### ELECTROENCEPHALOGRAPHY SIGNATURES FOR CONDITIONED PAIN MODULATION AND PAIN PERCEPTION IN NON-SPECIFIC CHRONIC LOW BACK PAIN – AN EXPLORATORY STUDY

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**Background and aims**: Conditioned pain modulation (CPM) can discriminate between healthy and chronic pain patients. However, its relationship with neurophysiological pain mechanisms is poorly understood. Brain oscillations measured by electroencephalography (EEG) might help gain insight into this complex relationship.

Aim: To investigate the relationship between CPM response and self-reported pain intensity in non-specific chronic low back pain (NSCLBP) and explore respective EEG signatures associated to these mechanisms.

**Methods**: Design: Cross-sectional analysis.

Participants: Thirty NSCLBP patients participated.

Methods: Self-reported low back pain, questionnaires, mood scales, CPM (static and dynamic quantitative sensory tests), and resting surface EEG data were collected and analyzed. Linear regression models were used for statistical analysis.

**Results**: CPM was not significantly correlated with self-reported pain intensity scores. Relative power of EEG in the beta and high beta bands as recorded from the frontal, central, and parietal cortical areas were significantly associated with CPM. EEG relative power at delta and theta bands as recorded from the central area were significantly correlated with self-reported pain intensity scores while controlling for self-reported depression.

**Conclusions**: Faster EEG frequencies recorded from pain perception areas may provide a signature of a potential cortical compensation caused by chronic pain states . Slower EEG frequencies may have a critical role in abnormal pain processing.

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## Abstract no.: 365

### NOCICEPTIVE SPECIFICITY WITH INTRA-EPIDERMAL ELECTRICAL STIMULATION?

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**Background and aims**: Intra-epidermal electrical stimulation (IES) has been proposed as a promising method to selectively activate nociceptors. However, IES nociceptive specificity has been debated with contradictory results. Hence, the goal of this study was to further investigate the selective nociceptive stimulation using IES compared to transcutaneous electrical stimulation (TES), presumed to mainly activate large fibers. At low current, IES primarily depolarizes nociceptors, while fast-conducting large fibers of the skin are only recruited at higher intensities. Therefore, we expected an increased presence of short-latency somatosensory evoked potentials (SSEPs) when increasing the intensity of IES.

**Methods**: In 29 healthy subjects (16f, 13m, 26.6±3.4years) the comparison of IES and TES stimulating the superficial radial nerve was done based on pain ratings (psychophysics) and SSEPs were recorded over the primary somatosensory cortex. Stimulation intensities for both modalities varied based on individual detection thresholds (DT; 1.5x, 2x, 4x).

**Results**: A significant difference between IES and TES was found for pain ratings ($p<0.001$). While IES elicits already a noxious perception in lower intensities, TES only becomes noxious with higher stimulation intensities. Furthermore, the most pronounced difference in SSEP presence between IES (14.3%) and TES (60.7%) was found for 2xDT ($p<0.001$).

**Conclusions**: With increasing stimulation intensity, IES turns less nociceptive specific reflected in an increased likelihood of recorded SSEPs (concomitant large fiber activation). Based on our findings the application of IES with an intensity of 2xDT shows the best nociceptive specificity and might serve as a valid tool to assess alterations in nociceptive processing in a variety of pain patients.

## Abstract no.: 392

# SHOULD EXERCISES BE PAINFUL OR NOT? EFFECTS ON CLINICAL PAIN IN SUBJECTS WITH ROTATOR CUFF-RELATED SHOULDER PAIN

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**Background and aims**: There is conflicting evidence regarding the effect of exercise on clinical pain in chronic pain populations. It is also uncertain whether pain should be produced or avoided during exercise. The aim of this study was to compare the effect of painful versus non-painful isometric shoulder exercises on pain intensity after exercise in individuals with rotator cuff-related shoulder pain.

**Methods**: This was a randomized cross-over study including 35 subjects who on three separate days performed: painful isometric shoulder exercises (10 external rotation contractions of 15 sec, 20% above pain threshold), non-painful isometric shoulder exercises (10 external rotation contractions of 15 sec, 20% below pain threshold), and a quiet rest condition. Shoulder pain intensity was assessed on a Visual Analogue Scale (VAS) before, immediately after and 45 min after each of the three conditions.

Figure 1.Interventions and measurements procedure.

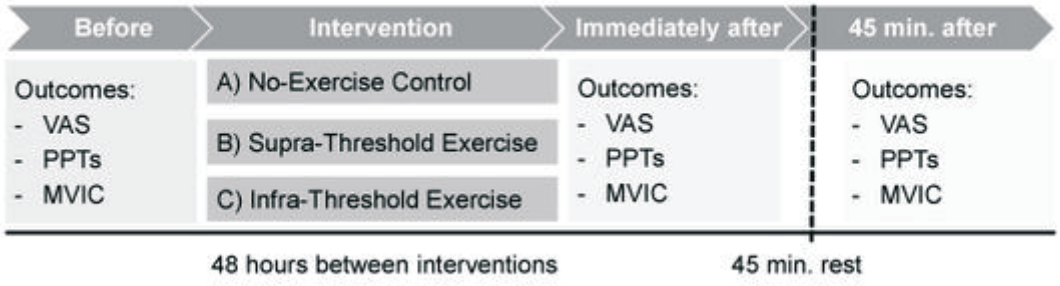
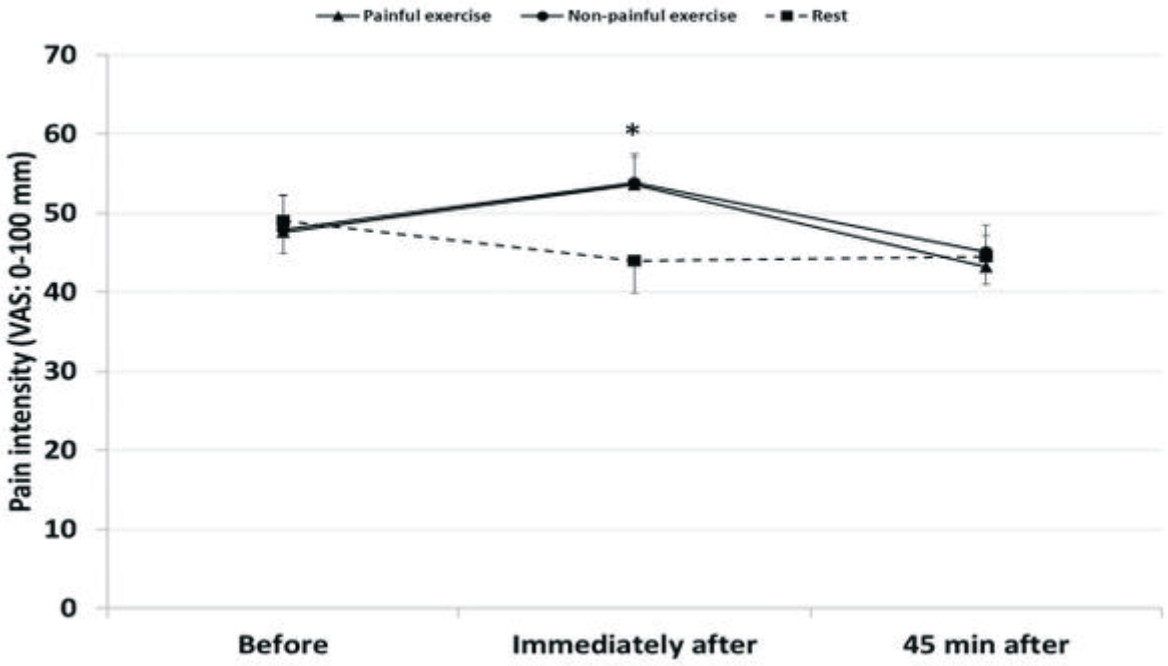



Figure 2. Procedure for the performance of painful and non-painful isometric external rotation exercises at the painful shoulder.

**Results**: Shoulder pain intensity increased immediately after both painful (ΔVAS: 6.0±26.7) and non-painful exercises (ΔVAS: 5.9±20.3) compared with quiet rest ($P$=0.047, partial $\eta^2$=0.07), but were similar to pre-exercise VAS scores ($P$=1.0) after 45 minutes. No significant difference in shoulder pain intensity was observed between painful and non-painful exercises.

Figure 3. Mean shoulder pain VAS scores before, immediately after and 45 min after painful exercises, non-painful exercises, and rest.




**Conclusions**: Painful and non-painful isometric external rotation exercises induced a moderate but short-lasting increase in shoulder pain intensity in individuals with rotator cuff-related shoulder pain.

## Abstract no.: 436

### ALTERED NOCICEPTIVE DETECTION THRESHOLDS AND EVOKED POTENTIALS IN MORBID OBESE PATIENTS WITH CHRONIC ARTHROGENIC PAIN COMPARED TO HEALTHY CONTROLS

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**Background and aims**: For improved observation of nociceptive dysfunction, we are developing a novel technique that measures the nociceptive detection threshold (NDT) in combination with brain evoked potentials (EP) in response to intra-epidermal electrical stimulation. We explored the feasibility of the NDT-EP method in pain-free patients with morbid obesity (MO) and MO patients with chronic arthrogenic pain (MOp). Subsequently, we compared the NDT-EP outcomes in MO and MOp with healthy controls (HC) at the various stimulus types used.

**Methods**: Seventeen pain-free MO patients (body mass index (BMI): 45.9 ± 4.6), ten MOp patients (BMI: 43.4 ± 2.8), and sixteen HC (BMI: 22.0 ± 2.0) were measured. Three stimulus types (i.e., single-and double-pulse stimuli with 10 and 40 ms inter-pulse interval) were repetitively applied to each subject during two measurements. Subsequently, NDT-EP outcomes related to stimulus types were calculated.

**Results**: Significantly higher NDTs were found for single-pulse stimuli in MO patients compared to HC (p=0.020), but for all stimulus types in MOp patients (p<0.001, p=0.020, p=0.011). Furthermore, the positive peak of the EP amplitude at 485 ms post-stimulus was significantly decreased by the interaction of both MO and MOp with the amplitude of a second pulse after 10 ms (p=0.031, p=0.024).

**Conclusions**: The NDT-EP method was feasible to use in both MO groups. Different NDT-EP outcomes were seen in MO and MOp patients compared to HC, which may indicate altered nociceptive function. Therefore, we need future research into clinical features, e.g., BMI, related to nociceptive dysfunction.

## Abstract no.: 438

### LONG-INTERVAL CORTICAL INHIBITION IN THE TIBIALIS REPRESENTATION AREA ON HEALTHY VOLUNTEERS

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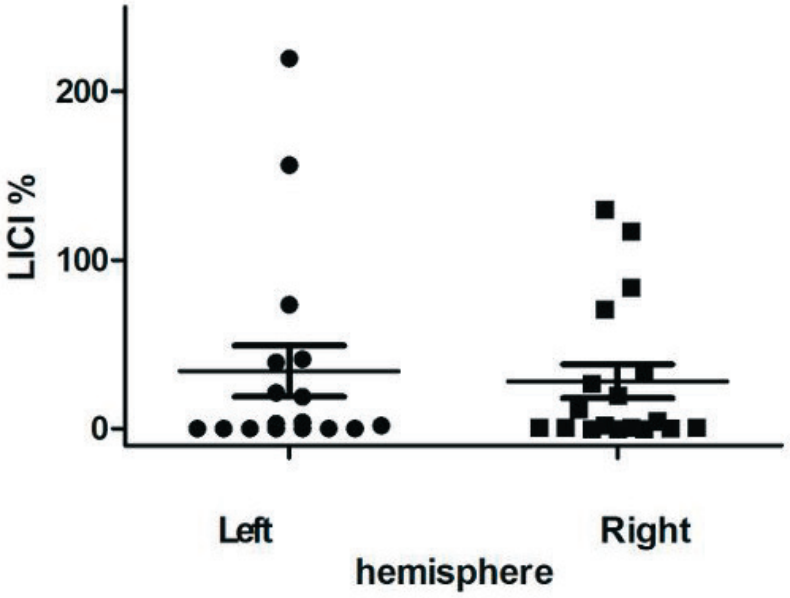
**Background and aims**: Transcranial magnetic stimulation (TMS) with paired pulse protocol can be used to assess cortical long-interval inhibition (LICI), a measure of cortical GABA-B -ergic inhibition which has been shown to be impaired in chronic pain (Burns et al, 2016). LICI has rarely been studied on lower limb representation area earlier.

**Methods**: We examined LICI on 22 healthy volunteers (7 females, age 35±11 years). TMS with electric-field navigation was targeted on the hotspot of tibialis muscle. Measurement was done on both hemispheres. Two suprathreshold (120% of rMT) pulses were given with 100 ms interstimulus interval. LICI was determined as second/first motor evoked potential (MEP) amplitude (%). LICI was assessed as present (0-10%), intermediate (10-100%) or missing (>100%). Hemispheric differences were studied at group level using paired t-test and intra-individually with Pearson correlation.

**Results**: The LICI could not be performed on three subjects due to high rMT. LICI was present in 10 subjects, intermediate in 5 and 6 subjects, in the left and right hemispheres respectively, and missing in 2 subjects (Figure). Asymmetry was not observed at group level ($p$=0.671). There was a strong correlation in LICI between the hemispheres (r=0.708, $p$=0.002).




**Conclusions**: There is variability in LICI, but it is usually present, similarly on both hemispheres, on healthy volunteers. This data will be later used in the study examining the neuroplasticity of knee osteoarthritis and the recovery from total knee arthroplasty, where preliminary results in patient data indicate impaired LICI at the baseline.

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## Abstract no.: 481

### FLUCTUATION-RELATED PAIN IN PARKINSON'S DISEASE:LINKING SUBJECTIVE RATINGS WITH OBJECTIVE MOTOR SCORES OBTAINED THROUGH WRIST-WORN SENSOR

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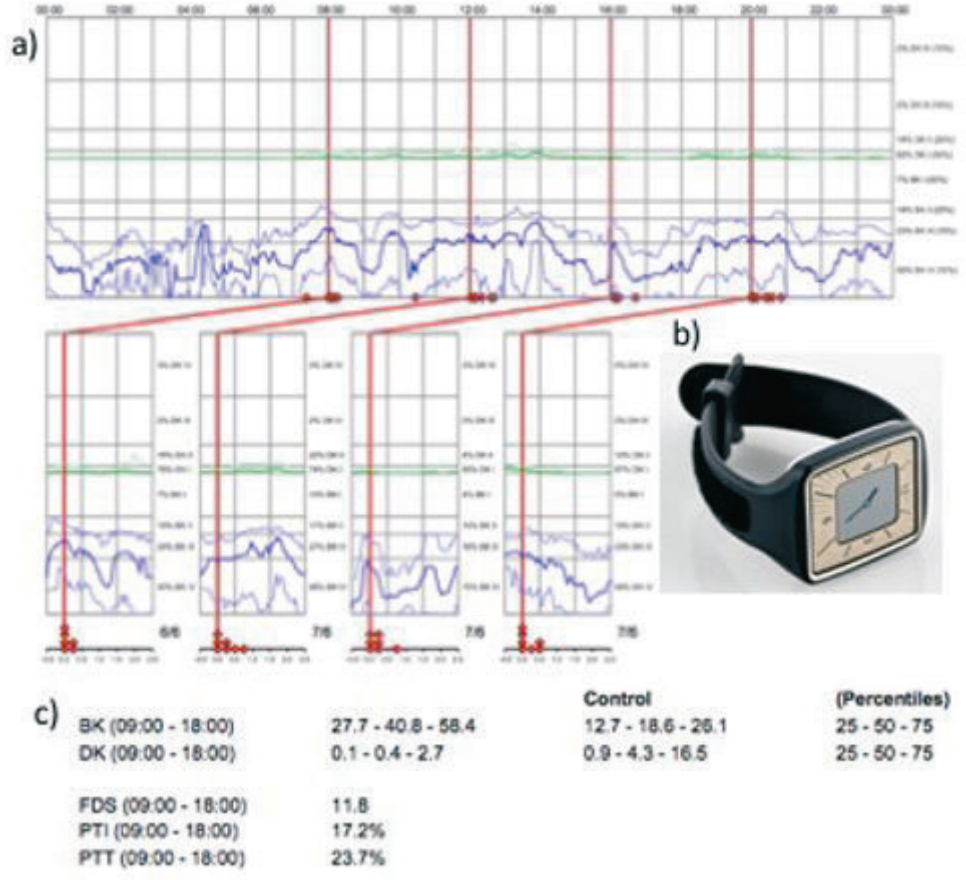
**Background and aims**: Chronic pain affects about 80% of People with Parkinson's disease (*PD, PwP*), with major impact on

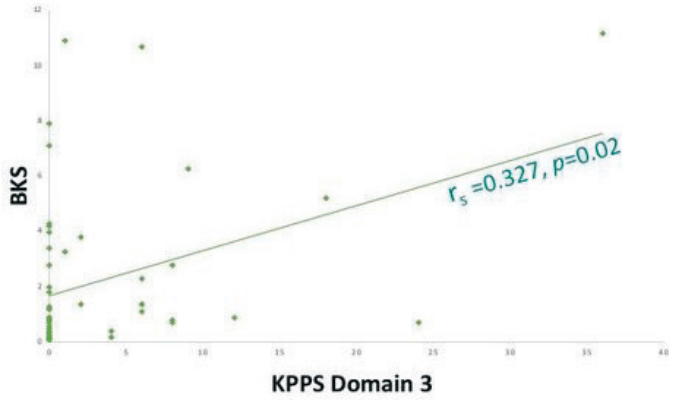
quality of life; yet often remains undeclared. Objective markers could aid its recognition and support clinical decision-making (such as adjusting dopaminergic medication to ameliorate fluctuation-related pain (FP)).

We explored whether scores obtained using the Parkinson's KinetiGraph™ (*PKG*, an accelerometer-based, wrist-worn device for continuous remote monitoring of motor symptoms, *Figure 1.*) could serve as a marker for FP.




**Methods**: An exploratory, cross-sectional analysis of two ongoing prospective, observational studies: "Non-motor International Longitudinal Study"(UK National Institute for Health Research Clinical Research Network (UKCRN)No.10084) and "PKGReg"(UKCRN No. 215965). Extracted data include: age, gender, disease duration, Levodopa Equivalent Daily Dose(LEDD), Hoehn and Yahr(HY) stage, King's Parkinson's Disease Pain Scale(KPPS) scores and PKG outcome measures: Bradykinesia Score (BKS), Dyskinesia Score(DKS), Fluctuation and Dyskinesia Score(FDS), Percentage of Time with Tremor(PTT) and Percentage of Time Immobile(PTI). Using Spearman's correlation, associations between subtypes of PD-related pain and PKG indices were examined (SPSS, Version 26).

**Results**: 52 PwP (48.1% female, mean age: 64.94±9.74yrs, median disease duration 3.5yrs(0 – 28), median HY II(I - IV), mean LEDD 606.93±503.12mg) were included in our analysis. DKS measured by the PKG correlated significantly with subjective FP ratings(KPPS, Domain 3; $r_s$=0.327, $p$=0.02). *Table 1., Figure 2.* No such correlation was found for any other tested parameter.




| | KPPS total | KPPS_D1 | KPPS_D2 | KPPS_D3 | KPPS_D4 | KPPS_D5 | KPPS_D6 | KPPS_D7 |
|---|---|---|---|---|---|---|---|---|
| **BKS** | $r_s$ = -0.177, $p$ = 0.21 | $r_s$ = -0.200, $p$ = 0.16 | $r_s$ = -0.105, $p$ = 0.46 | $r_s$ = -0.180, $p$ = 0.20 | $r_s$ = 0.030 $p$ = 0.83 | $r_s$ = 0.117, $p$ = 0.41 | $r_s$ = -0.007, $p$ = 0.96 | $r_s$ = 0.057, $p$ = 0.67 |
| **DKS** | $r_s$ =0.208, $p$ = 0.14 | $r_s$ = 0.179, $p$ = 0.20 | $r_s$ = 0.097, $p$ = 0.49 | $r_s$ = 0.327, $p$ = 0.02 | $r_s$ = 0.051 $p$ = 0.72 | $r_s$ = 0.004, $p$ = 0.98 | $r_s$ = 0.087, $p$ = 0.54 | $r_s$ = -0.244, $p$ = 0.08 |
| **FDS** | $r_s$ = 0.113, $p$ = 0.43 | $r_s$ = 0.058, $p$ = 0.68 | $r_s$ = 0.218, $p$ = 0.12 | $r_s$ = 0.231, $p$ = 0.1 | $r_s$ = -0.082, $p$ = 0.56 | $r_s$ = 0.184, $p$ = 0.19 | $r_s$ = 0.193, $p$ = 0.17 | $r_s$ = -0.092, $p$ = 0.52 |
| **PTI** | $r_s$ = 0.002, $p$ = 0.99 | $r_s$ = -0.079, $p$ = 0.58 | $r_s$ = 0.040, $p$ = 0.78 | $r_s$ = -0.118, $p$ = 0.41 | $r_s$ = -0.009, $p$ = 0.95 | $r_s$ = -0.070, $p$ = 0.62 | $r_s$ = 0.062, $p$ = 0.66 | $r_s$ = 0.193, $p$ = 0.17 |
| **PTT** | $r_s$ = -0.157, $p$ = 0.27 | $r_s$ = -0.118, $p$ = 0.41 | $r_s$ = -0.266, $p$ = 0.06 | $r_s$ = -0.028, $p$ = 0.84 | $r_s$ = -0.028, $p$ = 0.84 | $r_s$ = 0.081, $p$ = 0.57 | $r_s$ = 0.131, $p$ = 0.35 | $r_s$ = 0.120, $p$ = 0.37 |

**Conclusions**: Wearable sensor-based outcome measures may serve as useful objective markers to flag up the presence of FP, particularly in PwP with dyskinesia.

## Abstract no.: 563

### HISTAMINE-INDUCED AXON-FLARE RESPONSE IN PERSONS WITH AND WITHOUT TYPE 1 DIABETIC PERIPHERAL NEUROPATHY

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**Background and aims**: Small peripheral nerve fibers are believed to be affected in the initial development of diabetic peripheral neuropathy (DPN). Unfortunately, it remains difficult to assess the integrity of small peripheral nerve fibers and little is known about the interaction between small fiber neuropathy the microvasculature. The aim of the present study was therefore to assess the axon-flare response to epidermal histamine injections.

**Methods**: Eighty persons, aged 18-70 years, were included, and divided into four age and gender matched groups: (A) type 1 diabetes and neuropathic pain, (B) type 1 diabetes with non-painful DPN, (C) type 1 diabetes without DPN, and (D) persons without diabetes. A lanced was used for epidermal histamine injection to the dorsum of the foot and the axon-flare response was assessed by Full-field Laser Speckle Perfusion Imager at baseline and once every minute after injection for 15 minutes.

**Results**: The temporal development maximum flux was fitted to an inverse exponential decay function (mean R2=0.91 [IQR 0.84-0.96]). The maximum flux was significantly reduced in persons with diabetes and DPN (group A: 19.2 [7.5-27.0] perfusion units (PU) and group B: 17.2 [8.9-35.3] PU) compared with persons without clinical DPN (group C: 42.9 [26.5-50.3]

PU and group D: 55.5 [34.9-76.9] PU) and the maximum flux was reduced in persons with diabetes compared to healthy controls (Bonferroni-corrected pairwise Mann-Whitney U-tests p<0.001).

**Conclusions**: The histamine-induced flare-response was affected by type 1 diabetes even without clinical manifestation of DPN and may therefore be an early indicator for pathology of the neuro-vascular interaction.

## Abstract no.: 572

### PAIN BEHAVIOR TO ACOUSTIC AND LIGHT ENVIRONMENTAL CHANGES IN VERY PRETERM INFANTS

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**Background and aims**: Very preterm infants (VPI) integrated in neonatal intensive care units are exposed to a variety of environmental stressors, including auditory and light stimuli. They contribute to the instability of VPIs and can also have short term deleterious physiological effects, in particular on autonomic functions and sleep (Kuhn et al. 2012, Zores et al. 2018).

**Methods**: We aimed to assess whether the spontaneous auditory and luminous stimulations occurring in the incubators of VPIs can be source of discomfort or pain. We measured the behavioral responses to light variations and sound peaks of 26 VPI in different arousal states during a 10-hour daytime period using the Douleur Aigue du Nouveau-né" (DAN) scale.

**Results**: 591 sound peaks (SPs) and 278 light level variations (LLV) were analyzed. They significantly increased the maximum DAN scores compared to baseline. The occurrence of DAN score ≥ 3 (considered a threshold to provide the newborn with pain treatments) increased with both stressors, with a total of 16% of SPs and 8% of LLV leading to quantifiable pain behavior. We also observed a slightly higher impact of SPs than LLVs on pain behavior.

**Conclusions**: This study shows that VPIs are sensitive to SPs and LLV, with a slightly higher sensitivity to SPs. The mechanisms leading to pain behaviors induced by SPs and LLV should be evaluated further in the context of VPIs brain development. Our results provide further arguments to optimize the NICU sensory environment and to adapt it to the expectations and sensory abilities of VPIs.

## Abstract no.: 667

### PRACTICABILITY OF USING ACTIVITY TRACKERS POSTOPERATIVELY IN EVERYDAY CLINICAL PRACTICE

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**Background and aims**: Physical activity is known to have positive effects on health. Early mobilisation is particularly important after surgeries. However, measuring activity is a challenge. Subjective surveys currently account for many activity assessments, although objective measurements may be better. Therefore, we need valid and feasible alternatives that allow for objective assessments. We aimed to investigate the practicality of using activity trackers (AT) for postoperative activity measurement from day one in the clinical setting.

**Methods**: In the IMI-PainCare study, consenting patients received an AT to wear until post-op day 8. We looked at patients' willingness to participate - including reasons for refusal, the average wear time, and the return modalities and device losses.

**Results**: The study included 154 patients in the evaluation for willingness to participate. We could analyse data from 73 patients (47%). These wore the AT for an average of 4.6 valid days (≥ 18 hours/day) with an average wear time of 22.9 hours/day. Devices were reliably returned, mostly by mail. We recorded only one device loss.

**Conclusions**: Our results are promising. Based on our positive experiences, we can conclude that AT have the potential to complement subjective surveys in clinical practice even thought this setting is challenging. If population-specific conditions are taken into account, compliance can be positively influenced and results in reliable data.

## Abstract no.: 753

### REAL LIFE DATA OF THE COMPLEX CHRONIC PAIN PATIENT AND THE CHANCE ON SUCCESSFUL TREATMENT OUTCOME, COMPARED WITH THEIR NON-COMPLEX COUNTERPARTS: A DATAPAIN III STUDY

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**Background and aims**: A categorization of chronic pain (CP) patients was made in the database of the tertiary pain clinic at the Maastricht University Medical Centre+. In which CP patients with high pain severity, depression *or* anxiety *and* pain catastrophizing were identified as the complex group. Because this combination is assumed to have negative consequences on treatment outcome, deteriorate health states and quality of life.

**Methods**: The patient outcomes, treatment satisfaction on the Patient Global Impression of Change (PGIC), pain relief on the Numeric Rating Scale (NRS), pain interference on the Brief Pain Inventory (BPI) and quality of life indicator General Perceived Health (GPH) were evaluated. Cross-sectional and longitudinal data of 1737 CP patients were studied, of which 345(21.08%) were complex. Logistic regression analysed if belonging to the complex group modified the possibility of having a successful treatment on the PGIC or positive health status on the GPH. Linear regression observed if the complex group was statistically significant for a divergent reduction in pain relief and interference.

**Results**: The complex group had an odds ratio(OR) of 0.59(0.36-0.77) on the PGIC and an OR of 0.28(0.11-0.56) on the GPH. The BPI affective subscale had a statistically significant different change score (-0.509;P: 0.002). The change scores of pain relief and BPI active subscale were not statistically different

**Conclusions**: When treating complex patients, the desired treatment outcome(s) should be recognized by specialist and patient before initiating treatment, as these may be less likely to occur and thus may guide treatment decision.

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## Abstract no.: 805

### DIAGNOSTIC TREATMENT LEVEL DISCREPANCIES IN PATIENTS WITH LUMBAR RADICULAR PAIN AND LUMBAR SPINE ANOMALIES

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**Background and aims**: Lumbosacral transitional vertebra can result in an anomalous number of lumbar vertebrae associated with the wrong level treatment. The primary aim of this study was to characterize discrepancies between reported referring levels and levels from MRI reports with treated levels. The secondary aim was to analyse interobserver variability between a pain physician and a radiologist when determining levels and classifying lumbosacral transitional vertebrae.

**Methods**: Between February 2016 and October 2019, a retrospective case series of prospectively collected data of the affected levels mentioned in referrals, MRI reports, and treated levels was performed. The counting process, level determination, classification of lumbosacral transitional vertebrae, and a secondary control were carried out by independent researchers using a standard methodology.

**Results**: Of the 2443 referrals, 143 patients had an anomalous number of lumbar vertebrae; of these, 114 were included for analysis. The vertebral level noted in the patient's file, in the referral, and the reported level of treatment differed in 40% of these cases. The vertebral level between the MRI reports and treatment differed in 46% of cases. The interobserver reliability (radiologist versus pain physician) for classifying a transitional vertebra was fair (($\kappa = 0.40$) and was substantial ($\kappa = 0.70$) when counting the vertebrae.

**Conclusions**: In the presence of lumbar transitional vertebrae, we report a high prevalence of discrepancies between referral levels and MRI pathological findings with treatment levels. Further research is needed to better understand clinical implications.

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## Abstract no.: 930

### HYPOVITAMINOSIS D AND POSTOPERATIVE PAIN AFTER OPEN ABDOMINAL AND UROLOGICAL SURGERY

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**Background and aims**: This study hypothesized that moderate to mild (12.5-49 nmol/L) hypovitaminosis D is associated with worse postoperative pain outcomes and more opioid consumption after open abdominal and urological surgery.

**Methods**: Our cohort study includes 45 patients in ICU of UMHAT Alexadrovska who underwent open abdominal and urological surgery. All the patients were with cancer diagnosis. Preoperative fasting serum 25-OHD concentration was measured in all patients using mass spectrometry. Surgery was done under general anesthesia following the same protocol. In postoperative ICU pain insensitivity was measured at hourly intervals for the first 12 hours, at every 6 hours for up to 72 hours, using a numeric analogue scale (VAS) from 0 (no pain) to 10 (worst pain). Postoperative pain relief was with morphine s.c. and paracetamol i.v. The total morphine consumption was calculated.

**Results**: 19 patients were with moderate and mild vit. D hypovitaminosis (group A).The other 26 patients were with normal vit.D levels. (Group B).

In group A, VAS for the pain evaluation was 6.04 (SD +/-0.31) on the 2-nd postoperative hour and 3.55 (SD+/-0.27) on the 4th postoperative hour In group B VAS for the pain evaluation was 5.2 (SD +/-0.28) on the 2-nd postoperative hour and 2.8 (SD+/-0.32) on the 4th postoperative hour

The average Morphine consumption was 33.3 mg (SD+/-4.03) in group A and 22.95 mg (SD+/-3.12) in group B.

**Conclusions**: Hypovitaminosis D could be associated with higher pain intensity scores and more morphine consumption in the early postoperative period after open abdominal and urologic surgery.

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## Abstract no.: 974

### COMPARING CERVICAL RANGE OF MOTION, HEAD REPOSITIONING ACCURACY AND QUALITY OF MOVEMENT USING AN INERTIAL MEASUREMENT UNIT AND A 3D CAMRA SYSTEM

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**Background and aims**: Neck pain is a common musculoskeletal condition where many develop persistent symptoms. Studies have demonstrated sensory-motor disturbances e.g altered range of motion (ROM), head repositioning accuracy (HRA) and quality of movement (QOM) in neck pain populations. 3D camera systems can be used to quantify human movement accurately, but this may not be applicable in a clinical setting. This study aimed to compare MOTI, a small digital inertial measurement unit connected to a smartphone via Bluetooth, to 3D motion recordings during head rotations.

**Methods**: Thirty healthy participants were recruited. Participants were seated on a chair, fixed with a chest strap to the backrest. Participants were blindfolded, wore noise protection earmuffs and a headband with both MOTI and markers for 3D motion recordings. Participants were asked to rotate through full cervical rotation from a neutral head position before returning to this position again. Movements were done in triplets, bilaterally. ROM, HRA and QOM were extracted from both systems and analysed using Pearson's correlation coefficient, paired t-tests, and Bland-Altman plots.

**Results**: When comparing the two systems, excellent correlations were seen for ROM (r=0.99), HRA (r=0.77-0.82) and QOM (r=0.96-0.98). A systematic higher offset was seen for MOTI compared to 3D recordings when inspecting the Bland-Altman plots for both ROM (mean bias=-0.56±0.65°), HRA (mean bias=0.48±0.76°) and QOM (mean bias=-0.05±0.08 Log°/s$^3$).

**Conclusions**: The results showed that the inertial measurement unit, MOTI, could accurately assess ROM, HRA and QOM and may be a promising new tool in clinical practice.

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## Abstract no.: 1006

# ANALGESIA NOCICEPTION INDEX – AN INDICATOR OF ANALGESIA IN SHOULDER ARTHROSCOPIC SURGERY UNDER GENERAL ANESTHESIA WITH OR WITHOUT PLEXUS BRACHIALIS BLOCK

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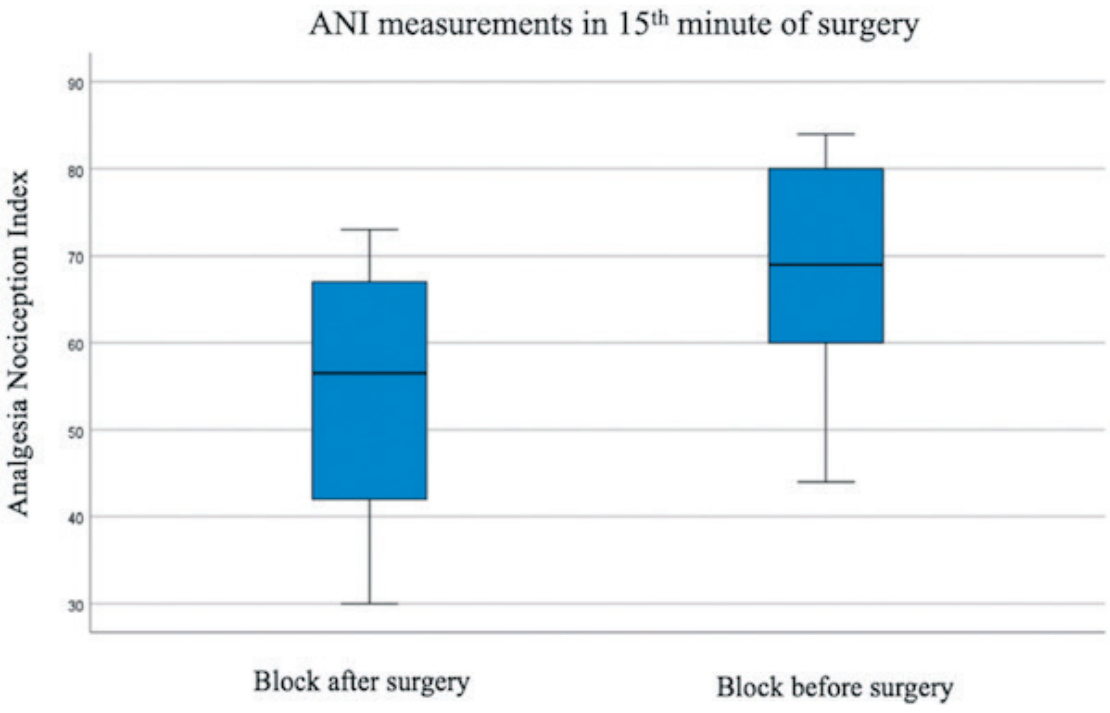
**Background and aims**: Analgesia Nociception Index (ANI) is a new method used to measure acute pain while the patient is unconscious. ANI detection principle is monitoring heart rate variability by using electrocardiography. Technology uses algorithms analyzing R-R complexes and breathing rate therefore assesses patient condition and his sympathetic and parasympathetic nervous systems activity. This innovative technology allows doctors to create an individual technique for dosing analgesic drugs to every patient.

This pilot study aimed to determine the usefulness of ANI for pain intensity during shoulder arthroscopic surgery. It was hypothesized that ANI may be useful for better acute pain detection.

**Methods**: The pilot study was conducted in "Hospital of Traumatology and Orthopaedics" after Ethics Committee approval on August 2021. All twelve patients were under general anesthesia and were divided into two groups – with and without plexus brachialis block. ANI was monitored all the surgery time - from ET intubation till extubation.

**Results**: In the control group "Block after surgery" the median of ANI values were lower (56.5) compared with a group "Block before surgery" (69) (Table nr.1.) which means opioid analgesia was poorer – and ANI effectively detected that. ANI values with block before surgery 95% CI [47,27-85,06]) and (95% CI [41,58-70,09]) block after surgery.




**Conclusions**: In the pilot study tendency is observed that ANI technology at pain detection works effectively and could be a potentially useful tool for measurement of acute pain. The study will continue because a much broader study is needed to get statistically significant results.

## Abstract no.: 1029

### MACHINE LEARNING AND PATHWAY ANALYSIS-BASED DISCOVERY OF METABOLOMICS MARKERS TO CHRONIC PAIN-PHENOTYPES

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**Background and aims**: Metabolomics has emerged as a new approach to further our understanding of the development of different medical conditions. Evidence of metabolomic alterations have emerged in relation to different chronic pain phenotypes, but co-occuring problems to chronic pain may complicate the picture.

**Methods**: In this study we collected 110 serum metabolomic markers in a cohort of 320 patients undergoing treatment at tertiary pain care. The objective was to identify with machine learning analysis the most informative markers between patients with relatively benign pain-phenotype (low pain and less interfering pain) and those with more severe pain-phenotype (high pain intensity, more interfering pain and co-occurring problems). In addition, we investigated altered metabolic pathways in relation to obesity and sleep problems in the cohort.

**Results**: Three metabolic markers (NAD, AMP, and cysteine) appeared across the results from the different analyses. Obesity associated with alterations in e.g. amino acid metabolism, while sleep problems associated with e.g. downregulated methionine metabolism. The results suggest that metabolomic alterations associating with co-occuring problems may have a considerable role in developing more severe pain. However, there may also be interacting effects between obesity and sleep problems on the metabolomics level.

**Conclusions**: The study suggests metabolomics as a viable way to provide new information on how co-occurring problems associate with more severe pain.

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## Abstract no.: 1046

### THE INTEGRATED ADAPTIVE PHYSIOLOGICAL SYSTEM FOR REGULATION OF PAIN

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**Background and aims**: The integrated adaptive physiological systems consist of a variety of advanced biological processes that have beneficial protective effects. Examples include endurance exercise, high altitude adaptation and pregnancy/pre-eclampsia. Here, the adaptive physiological system for pain regulation is studied in the different adaptation models mentioned above.

**Methods**: The adaptive alleles, gene expression levels , protein levels and/or activity , advanced biological process, and the protective effects on related clinical conditions were studied through the agreements between the different adaptation models.

**Results**: The adaptive alleles of genes that encode vasodilators like eNOS (Glu298 allele) and BDKRB2 (-9 allele) have increased gene expression, while vasoconstrictive genes like Ace (Insertion allele) has lower gene expression. Natural pain-relieving endogenous opioid system is stimulated; the mu opioid receptor gene is over- expressed, and related genes to the opioid system like COMT (Met158 allele) encodes a lower enzyme activity, adrenergic receptor ADRB2 (16Arg allele) has lower receptor density, and other related adaptive alleles and their biological effects.

**Conclusions**: The adaptive physiological system appears to adjust pain levels and sensitivity by stimulating analgesic effects and inhibiting the amplifying pain effects. The future of therapeutics would rely on building protective advanced integrated adaptive physiological systems for pain regulation by provoking the underlying biological mechanisms.

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# Complementary medicine

## Abstract no.: 403

### ANF THERAPY FOR PAIN MANAGEMENT. FEASIBILITY, SATISFACTION, PERCEIVED PAIN REDUCTION AND SIDE EFFECTS: A REAL-WORLD MULTISITE STUDY

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**Background and aims**: In the current situation where opioid abuse is an alarming problem, alternative therapies for pain that are non-invasive and drug free, such as the ANF Therapy®, are being developed. ANF Therapy® is the application of round ANF discs directly on a patient's skin. The discs are made of carbonized metal and they release electrical frequencies, that are transmitted through the nervous system, when activated by body heat. The aims of this study are to: 1) test perceived changes in pain intensity after ANF application, 2) record the frequency and severity of side effects, and 3) assess clinician and patient satisfaction.

**Methods**: Thirty-four therapists (healthcare professionals with >2 years' experience) from 30 countries applied ANF to N=301 patients (mean age=43 years, 54% women). Demographic data, pain intensity (NRS-11) before and after the procedure, clinician and patient satisfaction were collected. Side effects were recorded.

**Results**: The main pain complaint was most frequently: knee (15%), shoulder (14%) and neck (10%). Pain intensity significantly decreased from pre- (Mean=7.1, SD=2.3) to post-treatment (Mean=2.2, SD=1.8), t(300)=42.03, P>0.001 with a large effect size (Cohen's d=2.4). Average satisfaction with the treatment was 93/100 for both clinicians and patients (SD=14.3), with 93% of participants reporting a satisfaction level >70/100. 62% of patients experienced no side effects whereas 38% experienced mild side effects, most commonly: dry mouth, fatigue, dizziness, and headache.

**Conclusions**: The results regarding significant pain reduction, mild side effects and high satisfaction with ANF are very promising. A RCT is needed to test its efficacy.

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## Abstract no.: 424

### MILD WHOLE-BODY HYPERTHERMIA REDUCES PAIN INTENSITY IN PATIENTS WITH FIBROMYALGIA SYNDROME: A RANDOMISED SHAM-CONTROLLED TRIAL

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**Background and aims**: The majority of patients with fibromyalgia syndrome (FMS) use heat applications and rate them as an effective treatment strategy. Heat applications are also explicitly recommended as a self-management method in the German guidelines on FMS. No specific recommendation is made for outpatient whole-body hyperthermia due to the limited number of studies. This randomised sham-controlled trial evaluated the efficacy of mild water filtered infrared whole-body hyperthermia in FMS patients in an outpatient setting.

**Methods**: N=41 FMS patients were randomised into two groups: a whole-body hyperthermia group (intervention) and a whole-body sham hyperthermia group (control). Patients in both groups received hyperthermia or sham hyperthermia 2 times per week for 3 weeks. We present data for the primary outcome pain intensity as measured with the Brief Pain Inventory (BPI) (mean pain intensity in the last 24 hours) after the intervention was completed at week 4.

**Results**: N=21 patients were randomised to the intervention group (Age 54.62 ± 7.65; 90.5% female) and n=20 patients to the control group (56.40 ± 4.86; 100% female). After the intervention was completed at week 4, pain intensity was statistically significant lower in the intervention group (95% Confidence Interval [0.24-2.10]; $\eta^2$ = .146; $p$ = .015; table 1). Ten patients (47,6%) in the intervention group and four patients (20%) in the control group showed a clinically relevant reduction in pain intensity (>30%).

| | Baseline (week 0) | Post In-tervention (week 4) | Δ week - week ξ |
|---|---|---|---|
| Whole-body hyperthermia (n = 21) | 1,40 ± 5,53 | 1,64 ± 3,83 | -1,7 |
| Sham hypert-(hermia (n = 20 | 0,95 ± 5,26 | 1,92 ± 4,76 | -0,5 |

**Table 1.** Pain intensity at baseline and post intervention (mean ± standard deviation).

**Conclusions**: Mild whole body hyperthermia is effective in reducing pain intensity in patients with FMS.

**Study Registration:** clinical trials ID20079

## Abstract no.: 462

### MIGRAINE WITH AN EXISTING EXPANSIVE CEREBRAL PROCESS TREATED WITH ACUPUNCTURE: A CASE REPORT

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**Background and aims**: Previous studies have demonstrated that acupuncture is an effective treatment option for migraines. This case report illustrates the effect of acupuncture treatments on a migraine with a confirmed neurological condition. A 32 year old patient was admitted to the Emergency Room with a complaint of constant throbbing migraines with increasing intensity, VAS 9 at first examination. Following a detailed neurological and neurosurgical examination, a cerebral expansive process was discovered, located subcortically at the right frontal lobe, the length of the rectal gyrus. The specialist conclusion was that the tumour was most likely not the cause of the migraine. Otherwise the patient is in good health, with no other comorbidities. Migraine was treated with oral analgesics with a discreet therapeutic effect.

**Methods**: Three cycles of 10 acupuncture treatments were performed in succession over 5 weeks each, with a 4 week and 7 week gap between them, respectively. VAS scale changes and oral analgesic consumption were documented.

**Results**: The migraine was progressively reduced to the point of painlessness (VAS 9 to VAS 1), oral analgesic consumption reduced and the patients quality of life improved greatly. After each cycle the remission period lasted progressively longer. Currently the patient is still in remission.

**Conclusions**: This case report illustrates the effectiveness of acupuncture in treating and maintaining the analgesic effect on migraines, even with an existing neurological condition.

## Abstract no.: 581

### EFFICACY OF FENUGREEK WRAPS IN PRIMARY OSTEOARTHRITIS OF THE KNEE – A RANDOMIZED CONTROLLED TRIAL

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**Background and aims**: Fenugreek is supposed to have beneficial effects on osteoarthritis. This prospective monocentric randomized controlled 3-armed parallel group trial over 12 weeks evaluates the effects of fenugreek wraps for treating osteoarthritis.

**Methods**: Eighty-one patients with osteoarthritis of the knee were randomized to fenugreek wrap (n = 26), pain gel (n = 28) or waitlist (n = 27). Primary outcome was pain (VAS) at week4. Secondary outcomes included pain (VAS) at week 12, functional disability (WOMAC), quality of life (SF-36), self-efficacy (Arthritis Self-Efficacy Short Scale-D), symptoms and impairment (MYMOP 2), physical function and the 30 second Chair Stand Test, pressure pain sensitivity (PPT), and a patient diary. Clinicaltrials.gov ID: NCT03528824.

**Results**: 81 patients were randomized. After four weeks, there were no significant differences between the groups regarding pain ($p$ = .07). Significant group differences between fenugreek and waitlist were found for pain at week12 ($p$ = .02), WOMAC global score at week 4 and 12 ($p$ = .02/.01), WOMAC physical function at week 4 ($p$ = .03) and week 12 ($p$ =.01), WOMAC pain at week 4 ($p$ = .03), 30s chair stand test week 4 ($p$ = .02), and ppt Musculus Quadriceps at week 4 ($p$ = .03). Significant differences between fenugreek wrap and pain gel were evident regarding pressure pain threshold of the musculus quadriceps at week 4 ($p$ < .01).

**Conclusions**: Fenugreek wrap seems to improve functional disability in osteoarthritis compared to waitlist but not compared to pain gel. Hence, fenugreek wrap might be helpful for patients with osteoarthritis.

# Digitization in pain management

## Abstract no.: 144

### EVISUALISATION OF PHYSICAL ACTIVITY AND PAIN (EVIS) TO IMPROVE PHYSICAL HEALTH IN INTERDISCIPLINARY PAIN REHABILITATION PROGRAMS: STUDY PROTOCOL FOR A REGISTRY-BASED RANDOMIZED CONTROLLED CLINICAL TRIAL

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**Background and aims**: Interdisciplinary Pain Rehabilitation Programs (IPRPs) are considered to be superior to single-treatment measures in chronic pain treatment, but the effects are moderate. Physical activity is a central component in IPRP but many patients struggle to achieve and maintain recommended levels. An intervention, entitled eVISualisation of physical activity and pain (eVIS), has been systematically developed and designed to facilitate achieving and maintaining recommended physical activity levels. The aim of the present study protocol is to transparently report on the methodology, outcomes, and processes for an registry-based randomized controlled trial (R-RCT), which will evaluate the effectiveness of eVIS.

**Methods**: Participants (n= ~400) will be recruited and randomly allocated to either IPRP with an addition of eVIS, or to treatment as usual (IPRP) through 15 IPRP units. eVIS entails objectively measured physical activity and patient-reported outcomes of pain intensity, effect on daily activities and pharmaceutical consumption. Data is collected and visualized in a web application, PATRON. Pilot analyses evaluating the feasibility will be performed on data from initial 30 participants. Outcomes will be extracted from PATRON and from six national registries at 12-months IPRP follow up. Primary outcome is physical health, and secondary outcomes constitutes of health-related quality of life, physical function, pain characteristics, psycho-social consequences, pharmacological consumption and sick leave. Multivariate statistics and repeated measures analyses will be performed.

**Results**: Recruitment will be initiated in late 2021. ClinicalTrials.gov identifier: NCT05009459.

**Conclusions**: This study protocol describes a trial design that is expected to provide robust data on the feasibility and effectiveness of eVIS in IPRP.

## Abstract no.: 275

### VALIDATION OF THE EVISUALISATION OF PHYSICAL ACTIVITY AND PAIN (EVIS) INTERVENTION FOR PATIENTS IN INTERDISCIPLINARY PAIN REHABILITATION PROGRAMS - VALUABLE STEPS IN A SYSTEMATIC EVALUATION

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**Background and aims**: Low physical health is one consequence that chronic pain encompasses. To improve effectiveness of Interdisciplinary pain rehabilitation programs (IPRP) the eVISualisation of physical activity and pain (eVIS) intervention was developed. The purpose of this study was to evaluate eVIS validity by the aspects of content validity and clinical feasibility in IPRP-context.

**Methods**: This observational study was performed in 3 phases. Twenty-two field experts (patients, caregivers, researchers) participated, and provided quantitative scores and qualitative comments on eVIS and its included elements (data collection, visualization, communication). In phase 1, ratings on a four-point Likert scale of each element´s content validity (relevance, simplicity, safety) were collected through digital questionnaires. Three iterative assessment loops were completed, each followed by consensus panel protocol revisions. Item-level content validity index (I-CVI), average and overall CVI were calculated, and free-text comments were analyzed. In phase 2, ratings of content validity and elements' clinical feasibility categorized in 5 focus areas (acceptability, demand, implementation, limited efficacy, practicality), were collected from patients and caregivers after 2-3 weeks test trial. Phase 3 involved follow-up focus group interview with caregivers on specific ratings, as well as interviews with experts in clinical pain management pharmacology.

**Results**: CVI for relevance, simplicity and safety improved over time and were all rated above cut-off (0.78). Revisions were mainly made in the visualization element. In phase 2, participants rated eVIS as relevant and feasible to use in clinical IPRP-context.

**Conclusions**: Patients, caregivers, and researchers found eVIS valid in IPRP-context. Methodical validation was essential to ascertain eVIS' substantiality before clinical trial.

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## Abstract no.: 430

### BRIDGING THE GAP BETWEEN RESEARCH AND PRACTICE: IDENTIFYING BARRIERS AND FACILITATORS TO SUCCESSFULLY IMPLEMENT A DIGITAL INTERVENTION FOR CHRONIC PAIN: A STAKEHOLDER INTERVIEW STUDY

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**Background and aims**: Many academically-developed interventions are not used long-term in practice, leading to squandering of research resources. The purpose of the DAHLIA project is to increase access to evidence-based behavioral treatment in Sweden by developing, testing and implementing a digital intervention. Therefore, this study aims to (i) identify barriers and facilitators of implementation, and (ii) develop a business model, enabling sustainability of a digital behavioral treatment for chronic pain.

**Methods**: Based on the Consolidated Framework for Implementation Research (CFIR), qualitative interviews with stakeholders, i.e., therapists, developers/ IT designers, and health care managers, are conducted using a semi-structured interview guide. Snowball sampling is applied until data saturation is achieved. A minimum of eight interviews are planned. Conversations are recorded and transcribed. A qualitative thematic analysis is performed, grouping information to map emerging categories to the five domains of the CFIR. Furthermore, a business model canvas is proposed and discussed with stakeholders to create a set of success factors influencing sustainability and effectiveness.

**Results**: Preliminary results will be presented at the conference.

**Conclusions**: The present study will result in a business model as well as a set of implementation strategies. By considering, for instance, gatekeepers, influencing factors, and practical issues early in the process, the successful long-term use of a new treatment form can be promoted. Furthermore, involving inter-sectorial stakeholders will provide new insights into the outer setting, and create a feeling of ownership and engagement.

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## Abstract no.: 431

### PATIENT- AND THERAPIST-CENTERED DEVELOPMENT OF A DIGITAL BEHAVIORAL TREATMENT FOR CHRONIC PAIN: A FOCUS GROUP STUDY

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**Background and aims**: The utility of behavioral health interventions to increase functioning in people with chronic pain is well known. Access to such treatment is low, and digital delivery can improve availability. However, user needs and preferences regarding digital interventions are yet unclear. This study aims to identify patients' and therapists' needs and preferences regarding a digital behavioral health treatment.

**Methods**: Two patient-centered focus groups and one therapist-centered focus group are conducted, each group containing 6-8 participants. Patients are >18 years of age, report pain for >3 months, and have internet access at home. Therapists are trained in cognitive-behavioral therapy, with varying experience of digital treatment delivery. The focus groups follow a semi-structured guide, and are audio- and video-taped. Participants discuss the topic of health and individual needs, and reflect on: treatment design, structure, content, and feasibility (i.e., comprehension, relevance). Recordings are transcribed verbatim and data analyses performed by two independent researchers. Combined inductive and deductive content analyses are used to determine themes on how to live well with chronic pain (i.e., high levels of functioning), and aspects to improve the treatment.

**Results**: The study received ethical approval. Data collection takes place Dec. 2021-Feb. 2022. Preliminary results will be presented.

**Conclusions**: As part of the comprehensive DAHLIA project aiming at developing an evidence-based digital behavioral treatment for national dissemination, early user involvement will ensure that the treatment will meet the needs and preferences from both patients and treatment providers. Findings will lead to the treatment prototype 2.0, and further testing.

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## Abstract no.: 433

### USING 'PERSONAS' IN THE DEVELOPMENT OF DIGITAL INTERVENTIONS FOR CHRONIC PAIN: A SYSTEMATIC REVIEW AND CASE EXAMPLE

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**Background and aims**: During the development of digital interventions for chronic pain (CP), a user-centered approach ensures that the treatment meets user needs. Clinically-informed and evidence-based fictional characters, known as Personas, offer a possibility to identify target groups, facilitate discussions regarding specific and varying user needs, and guide development teams. This viewpoint (i) provides an overview of the use of Personas in the development process of digital interventions for people with CP, and (ii) describes the creation and utilization of Personas within the DAHLIA project.

**Methods**: Four online databases and two registers were systematically searched to identify digital interventions for people with CP. Included studies published in English and peer-reviewed journals are read in full-text. Information on the rational, procedure, and challenges of using Personas are narratively synthesized. Additionally, the DAHLIA project is presented as a case example. This ongoing project aims at developing and implementing an evidence-based digital behavioral treatment for CP and utilizes three Personas in the process.

**Results**: In total, 6.222 studies were identified. Two independent researchers are currently screening and synthesizing relevant articles. Furthermore, the utility of Personas in the DAHLIA project includes the Personas' origin and adaptations, identification of target groups, and decision-processes regarding the intervention. A template for patient Personas is in preparation.

**Conclusions**: In non-academic settings, using Personas is common. This viewpoint highlights the benefits of using Personas in the development process of novel interventions for people with chronic pain in academia. Considerations for Personas will be presented to inform future research.

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## Abstract no.: 542

### MHEALTH FOR PAIN, DISABILITY AND QUALITY OF LIFE IN CHRONIC PAIN: A SYSTEMATIC REVIEW

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**Background and aims**: Chronic pain (CP) is a problem which prevalence is constantly rising and is the main cause of both high individual and economic burden. mHealth systems could support the control of CP. We aim to identify the effectiveness of mHealth for the management and treatment of patients suffering CP.

**Methods**: PRISMA guidelines for systematic reviews of randomized controlled trials (RCT) was followed. The search strategy was based on the International Classification of Diseases (11th Revision). It was searched up in PubMed, Web of Science, Scopus, and Physiotherapy Evidence Database. PICOS framework was used for inclusion criteria: (P) adults suffering CP; (I) mHealth interventions, for patient intervention or monitoring; (C) conventional care or not treatment; and (O) outcomes related to pain intensity, disability, and quality of life. Only RCT study designs were included. The Cochrane Collaboration tool was used to assess the risk of bias.

**Results**: A total of 24 RCT were included, involving 2,928 subjects. The most frequent were chronic low back pain and osteoarthritis population. The systems for intervention were based on exercise programs, cognitive-behavioral therapies, and analgesic therapy; and those for monitoring on pain, physical activity, and healthy behaviors. Findings suggested that mHealth may provide benefits on pain intensity, disability, and quality of life.

**Conclusions**: mHealth is a promising complement in self-management of chronic pain patients, providing benefits in health-related outcomes. Nevertheless, the protocols are heterogeneous to provide strong evidences, but this systematic review offers the basis for further research.

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## Abstract no.: 546

### PROFILE OF PATIENTS WITH LOW BACK PAIN IN THE PAINREAPP PROJECT

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**Background and aims**: Physical exercise is one of the interventions with the most scientific evidence in the multimodal approach to chronic pain. In this study, we aim to know the profile of the patients with chronic low back pain (pwCLBP) participating in a project about the effectiveness of a mHealth system (PainReApp) of physical exercise.

**Methods**: 38 pwCLBP, attended in the Rehabilitation service of the Hospital Puerta del Mar (Cádiz, Spain), were randomly assigned into two groups to perform a physical activity (PA) program guided by PainReApp (experimental) or in paper format (control). During the first session, we collected sociodemographic data about pain intensity (NRS), self-perceived quality of life (SF-12v1), sleep quality (MOS sleep), anxiety and depression (HADS), social support (DSSI-DUKE), functionality (TUG, the arm curl test and the chair stand test), and PA level (IPAQ-SF). A descriptive analysis was carried out.

**Results**: 52.9% of the sample were women, aged 52.9 (DT=10.5) years old, with secondary education (55.3%), and had a low-medium socioeconomic level (39.5%). 57.9% referred to severe pain, 76.3% were under a treatment, and 15.8% were taking analgesics of the second step. The mean scores were HADS-A=7.31 (SD=4.44), HADS-D=5.39 (SD=3.08), MOS index-9=0.7 (SD=21.35), PCS-12 35.14 (SD=9.81) and MCS-12 47.31 (SD=12.19), DSS-DUKE=42.63 (SD=9.53), TUG=8.05 (SD=3.74), and IPAQ-SF=1188 (396-4518.75) (MET-min/week).

**Conclusions**: Results suggested that the physical, psychological, and social spheres of pwCLBP were affected. Thus, the PainReApp system based on PA could benefit them to improve the characteristics of their pain and quality of life.

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## Abstract no.: 547

### MINDFULNESS COMBINED WITH VIRTUAL EXERCISE ONLINE (MOVE) FOR ADULTS WITH CHRONIC PAIN: A QUALITATIVE STUDY OF PARTICIPANTS' PERCEPTIONS

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**Background and aims**: Online pain management programmes (PMP) have growing evidence as effective interventions for individuals with chronic pain (CP). There is evidence for the efficacy of both mindfulness and exercise in the management of CP, however studies combining these interventions are limited with none to date investigating a synchronous online format**.** The aim of this study was to explore the experiences of participants following an 8-week live online group-based mindfulness and exercise PMP.

**Methods**: A series of online focus groups were carried out by a team of researchers, with participants following completion of the PMP (n=20, female n=18, mean age 54±14 years, mean duration of symptoms 13±6 years). Interviews were recorded and transcribed verbatim. The data were analysed using thematic analysis.

**Results**: Four main themes emerged from the analysis (i) The live online format facilitated participation from individuals in remote locations, from participants with mobility impairments, and for continued participation during flareups (ii) Exercise facilitated enhanced physical activity in some participants, which was supported by the use of activity trackers, (iii) Participation in mindfulness in the live group setting provided a safe environment for engagement with practices (iv) Participants reported developing an altered relationship with their pain, including the emergence of a sense of acceptance.

**Conclusions**: The results highlight the benefits an online live PMP. Participants described important ways in which the programme facilitated their self-management of pain through enhanced engagement with physical activity and mindfulness practices, and the development of a new self-management strategies, and merits further investigation.

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## Abstract no.: 642

### PHENOMENOLOGICAL EXPLORATION OF PATIENTS' EXPERIENCES WITH A PARTLY DIGITIZED OR ON-SITE INTERDISCIPLINARY REHABILITATION PROGRAMME FOR MANAGING CHRONIC NON-MALIGNANT PAIN

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**Background and aims**: Due to social distancing and space constraints of health facilities, the covid-19 epidemic brought an opportunity to digitize interdisciplinary rehabilitation programmes (IRP) for chronic non-malignant pain (CP). The purpose of our phenomenological qualitative study was to explore experiences of CP patients that took part in an on-site and a partly digitized IRP.

**Methods**: We identified 8 patients that took part in an on-site IRP, as well as in partly digitized IRP in a tertiary outpatient rehabilitation service. 7 patients chose to participate, discussing their experiences in audio-recorded semi-structured interviews. The analysis process was aided by a qualitative data analysis software.

**Results**: Our findings found largely positive sentiment for both IRP formats. Patients preferred the partly digitized format due to better transfer of CP management skills to a home environment, as well as a generally more comfortable IRP experience due to less physical and cognitive demands and better time management. Patients largely identified the on-site IRP as offering better opportunities for interacting and forming relationships with therapists and co-patients. Minority of patients saw interaction and relationships depending on therapists and co-patients, not on IRP format. Unsuitable home conditions were pointed out as a major obstacle for taking part in a partly digitized IRP.

**Conclusions**: CP patients mainly prefered partly digitized IRP due to therapeutic and practical reasons, while pointing out the socializing advantages of on-site IRP. This insight enables IRP therapists to facilitate identified advantages of both formats, while understanding disadvantages provides an opportunity to mitigate them.

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## Abstract no.: 721

### FEASIBILITY AND PILOT TESTING OF THE DIGITAL PAIN EDUCATION AFTER CANCER (PECAN)-PROGRAM FOR BREAST CANCER SURVIVORS WITH PERSISTENT PAIN: A MIXED-METHOD STUDY

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**Background and aims**: Up to 40% of women experience persistent pain after finishing treatment for breast cancer, and this pain is often very disabling. Contemporary Pain Science Education (PSE) has emerged as a leading tool in the clinician's toolkit for managing pain. A new challenge now exists to translate these personalized, in-person protocols to digital mediums in order to reach a much larger population of breast cancer survivors living with pain. Therefore, a personalized digital PSE program was developed by a new international collaborative (Pain Education after CANcer; PECAN). The aim of this pilot study was to explore 1) the acceptability, comprehensibility and satisfaction with and 2) the efficacy of the digital PECAN program in a small group of breast cancer survivors with persistent pain after finishing primary cancer treatments.

**Methods**: After 6 weeks of engagement in the digital PSE program, acceptability, comprehensibility and satisfaction was measured quantitatively with a self-constructed questionnaire and described qualitatively using focus groups. A joint display was used to present the meta-interferences between data. Efficacy was estimated by modeling the evolution of self-reported outcome parameters over time (up to 3 months post-baseline) via a linear mixed model.

**Results**: Twenty-nine women with persistent pain after breast cancer surgery participated. Overall, the PSE program was well received. Efficacy estimates showed a significant improvement in pain-related functioning, physical functioning and quality of life.

**Conclusions**: A personalized digital PSE program seems valuable for persistent pain management after breast cancer surgery. A large clinical trial is needed to explore the effectiveness.

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## Abstract no.: 726

### ONLINE PSYCHOLOGICAL INTERVENTION TO PROMOTE HEALTHY ADJUSTMENT AND REDUCE THE RISK OF CHRONIC POST-SURGICAL PAIN FOLLOWING MAJOR SURGERY: EVALUATION OF ICANCOPE POSTOP SMARTPHONE APP

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**Background and aims**: 25% of adolescents undergoing surgery will develop chronic post-surgical pain. Unrelieved or poor managed post-surgical pain can lead to delayed re-mobilization, increased medication use and reduced health-related quality of life, e.g. sleep, anxiety, social, and school functioning. Smartphone devices with Internet capabilities may improve adolescent post-surgical pain self-management by improving health self-monitoring in everyday environments (e.g. home, school), promoting self-care (e.g. medication adherence, pain coping strategies) and minimizing barriers to pain treatment (e.g. lack of transportation to appointments, health care provider access). A recent review found that existing pain self-management apps for patients undergoing surgery lacked (i) goal-setting/social support functions; (ii) comprehensive pain self-management content; (iii) scientific evaluation; and (iv) consultation with end-users in app design. No apps were specifically designed for paediatric patients.

The existing *iCanCope* suite of smartphone applications have been successful in assisting with the self-management of different types of pain, e.g. chronic pain, sickle cell disease. The aim of the current study is to evaluate the effectiveness of the newly developed *iCanCope PostOp* smartphone application for improving post-surgical pain self-management, reducing

the impact of acute post-surgical pain and delivering improved physical and psychological outcomes for adolescents undergoing surgery for scoliosis or limb reconstruction.

**Methods**: A single-centre, parallel groups pilot RCT design will be conducted with 120 adolescents – 60 scoliosis patients, 60 limb reconstruction patients.

**Results**: This RCT is ongoing.

**Conclusions**: It is hoped that *iCanCope PostOp* will improve post-surgical pain self-management, reduce the impact of acute post-surgical pain and deliver improved physical and psychological outcomes for these adolescent populations.

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## Abstract no.: 733

### LONG-TERM EDUCATION OF PATIENTS WITH HIP OR KNEE REPLACEMENT BY A MOBILE APP AND EFFECTS OF COVID-19 PANDEMIC

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**Background and aims**: Hip or knee replacements are frequent surgeries for patients with arthrosis, a common joint disease affecting mobility and quality of life. Due to reduced hospital stays and the necessity of self-responsibility for the success of recovery, efficient education is necessary to support patients' self-management and digital technologies are effective possibilities. The app RECOVER-E was developed for education of patients with hip or knee replacements to be used for a perioperative period of 4 months.

**Methods**: A double-armed study was conducted and patients were surveyed at 5 time-points (4-6 weeks before surgery; day of admission; 1 day, 7 days and 3 months after surgery). The intervention included the use of the app RECOVER-E on a smartphone over the whole period. The recruitment persisted from January 2019 until March 2020.

**Results**: About 130 patients were recruited (60 control group (CG), 70 intervention group (IG)). Baseline data was collected from 49 CG and 50 IG. Due to a loss of follow-up and drop-out rates and stopped recruitment with beginning of the Pandemic, 20 persons of CG and 10 of IG were involved in the final data collection.

**Conclusions**: The app intends to support patients throughout treatment around a hip or knee replacement. Only a very small proportion of patients were retained in the project over a period of 4 months. Due to the beginning of the COVID-19 Pandemic, recruitment had to be stopped. It is unclear, whether the loss of patients stood in relation to the beginning of the Pandemic.

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## Abstract no.: 737

### CHRONIC PAIN SELF-MANAGEMENT IN OLDER ADULTS: A COLLECTIVE INTELLIGENCE APPROACH TO IDENTIFYING BARRIERS AND USER NEEDS IN EHEALTH INTERVENTIONS

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**Background and aims**: eHealth refers to health services and health information delivered or enhanced through the internet and related technologies. The number of eHealth interventions for chronic pain self-management is increasing. However, little evidence has been found for the overall efficacy of these interventions for older adults. The aim of the current study was to use a novel Collective Intelligence Scenario-Based Design approach to identify the barriers and specific user needs of older adults with chronic pain using eHealth for chronic pain self-management.

**Methods**: A workshop was conducted to gather views and perspectives of older adults in relation to eHealth use for the purposes of chronic pain self-management. Prior to attending the workshop a trigger question was sent to participants requesting the identification of five barriers to eHealth use for chronic pain self-management. These barriers were categorised and presented to the group along with barrier-related scenarios, resulting in the generation of a set of ranked barriers and a set of user needs.

**Results**: 78 barriers to eHealth technology for the self-management of chronic pain were identified. From these barriers, six categories emerged, Content, Support, Technological, Personal, Computer Literacy and Accessibility. Following a group reflection process, 97 user needs were identified.

**Conclusions**: This is the first study to use collective intelligence methods to investigate barriers to the use of eHealth technology and the specific user needs of older adults in the context of chronic pain self-management. The results of the current study provide a platform for the design and development of enhanced eHealth interventions for this population.

## Abstract no.: 889

### A FEASIBILITY STUDY INTO THE USE OF VIRTUAL REALITY WITH CHAIR YOGA

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**Background and aims**: The aim of this study is to investigate the feasibility of using Virtual Reality in a Hospital Pain Management Department. The COVID pandemic has prompted a rethink of service delivery within the Hospital Pain Management service. This now includes online classes such as chair yoga. Virtual Reality (VR) is actively being considered as a self management option, As a first step, a staff based feasibility study was conducted to explore the use and potential of VR.

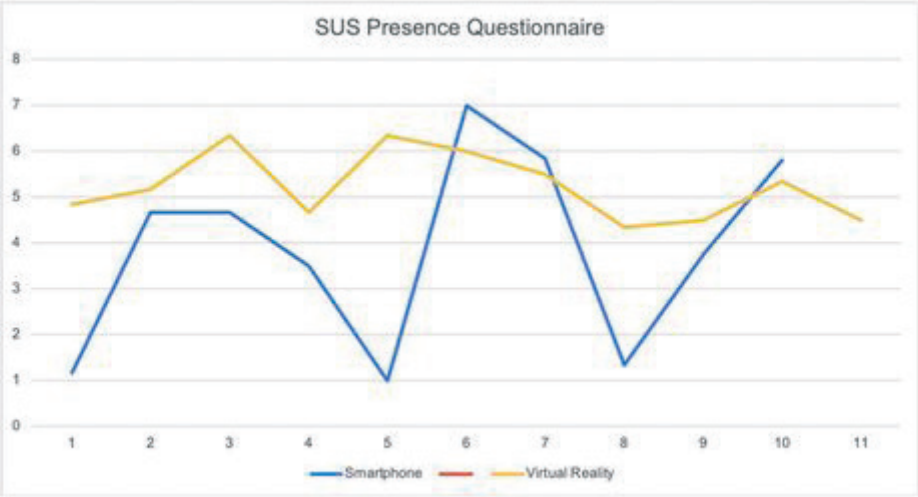
This study aims to establish a level of confidence in the use of VR within the clinical setting and answer the following questions:

1. How feasible is it to use Virtual Reality within the clinical setting and what are the logistics?
2. What are the risks of cybersickness?
3. Does wearing a VR headset affect the treatment outcomes?
4. What insights can be gained from this trial to inform future research?

**Methods**: VR chair yoga

A total of thirty two clinical staff participated in a chair yoga class. They were randomised into a VR headset group and a control group, which viewed the class using a smartphone.

**Results**: Participants demonstrated a greater effect size in the VR group, as measured by the SUS presence questionnaire cohens_d = 0.854, All of the participants would recommend VR as a treatment option so long as patients did not have neck problems. All of the participants described the process of using VR as easy or fairly easy. All cybersickness score




**Conclusions**: This trial supports the use of VR in a clinical setting.

## Abstract no.: 986

### EXPERIENCE AND USABILITY OF A DIGITAL PLATFORM CONTAINING RESEARCH-BASED KNOWLEDGE AND TOOLS FOR PAIN SELF-MANAGEMENT: A QUALITATIVE STUDY IN PEOPLE LIVING WITH HIGH-IMPACT CHRONIC PAIN

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**Background and aims**: An increasing proportion of people suffer from chronic pain and disability [1]. Due to limited resources, treatment at specialized pain units are not easily accessible. From daily practice with people with chronic pain and from previous literature, we know that patients demand factual knowledge, methods and tools so that they can actively achieve a greater degree of "self-management", and thus learn to live better with their pain condition [2]. In collaboration with a large patient and relatives advisory panel, the Pain Center at the University Hospital Odense in Denmark has recently developed Smerteinfo.dk (eng. Pain info), which is a freely available webpage that contains research-based and updated knowledge for people with chronic pain, written in lay language and with a focus on guidance and tools for self-management. The aim of this study was to explore the user experience and usability as well as challenges with the use of Smerteinfo.dk for people living with high-impact chronic pain.

**Methods**: Eleven patients (8 women) not familiar with Smerteinfo.dk participated in this qualitative study. Patients were observed while using Smerteinfo.dk, and subsequently interviewed about their experience and perceived usability of the web page. The data were thematically analyzed using open coding [3].

**Results**: The result of the analysis are not finished, but will be presented at the conference.

**Conclusions**: This study explored how patients living with high-impact chronic pain experienced and perceived the usability of a digital platform containing research-based knowledge and tools for pain self-management. The conclusion awaits the analysis.

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## Abstract no.: 991

### THE EFFECT OF A VIRTUAL REALITY TREATMENT ON QUALITY OF LIFE IN NON-SPECIFIC CHRONIC LOW-BACK PAIN PATIENTS

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**Background and aims**: Low back pain (LBP) is the leading cause of years lived with disability with large impact on quality of life. This study aimed to investigate the effect of a Virtual Reality (VR) treatment, focusing on pain education and management, on quality of life of patients with non-specific chronic LBP.

**Methods**: A pilot randomised controlled trial was conducted in adults with non-specific chronic LBP (NRS ≥4), waiting for pain treatment. The intervention group used a self-administered VR pain education and management application ≥10 min daily for four weeks. The control group received standard care.Primary outcome was quality of life (SF-12) at four weeks. Secondary outcomes were pain scores, pain coping strategies, activities of daily living, positive health and anxiety and depression. Questionnaires were filled out at baseline, four weeks and four months. Pain scores were registered daily by patients. Reasons to withdraw and adverse events were registered.

**Results**: 41 patients were included. One patient withdrew due to personal reasons. No significant treatment effect was found on the SF-12 physical score at four weeks ($p=0.096$) and over time ($p=0.544$). SF-12 mental score was not significantly different between groups over time ($p=0.561$). A significant treatment effect was seen on daily 'worst pain score' ($p<0.001$) and 'least pain score' ($p=0.002$). There was no treatment-time interaction. Secondary outcomes were comparable between groups. Three patients reported mild and temporary complaints of dizziness.

**Conclusions**: Self-administered VR pain education for chronic LBP does not contribute to quality of life. VR seemed to benefit daily pain experiences, albeit limited over time.

## Abstract no.: 993

### USER EXPERIENCE IN VIRTUAL REALITY PAIN INTERVENTION: VIRTUAL WALKING FOR NEUROPATHIC PAIN FOLLOWING SPINAL CORD INJURY

S. Venigalla[1], S. Bala[1], E. Reed[2], Z. Webster[2], C. Shum[3], R. Cowan[4], S. Gustin[5], S. Richards[4], E. Richardson[6], Z. Trost[2], R. Rathore[4]

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**Background and aims**: Chronic neuropathic pain after spinal cord injury (SCI-NP) is minimally responsive to available treatments, making effective interventions a priority. Allowing individuals to experience illusion of normal gait ("illusory walking") using mirrors or video has shown promise to relieve SCI-NP. Our recent work supports safety and feasibility of the first fully-immersive "embodied" VR walking interface, which allows participants with SCI-NP to observe their body from a first-person perspective and, critically, to control their virtual gait in a gamified virtual environment. In a recent study, the interactive VR condition was superior to passive observation of virtual walking (control condition) in alleviating SCI-NP. The current study aims to compare critical elements of VR user experience across the two conditions and examine their relationship to central study outcomes.

**Methods**: Twenty-seven individuals with complete paraplegia completed 20 sessions of the home-based virtual intervention. Participants completed measures of pain before and after each session and full intervention. Game experience metrics (ease-of-use, immersiveness, physical exertion, challenge, emotional response, attention to pain) were collected after each session.

**Results**: Participants in the interactive condition endorsed significantly greater immersiveness, challenge, and physical demand than control participants, as well as less awareness of pain during play. Both groups endorsed ease-of-use and positive emotional response to intervention. Greater immersion, greater challenge, and limited awareness of pain during play were associated with lower reported SCI-NP immediately after each session and following full intervention.

**Conclusions**: The current findings highlight important process factors and mechanisms of effectiveness during the virtual walking intervention and suggest lines of future inquiry.

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## Abstract no.: 996

### A PILOT ON VIRTUAL REALITY IN MANAGEMENT OF ADHESION-RELATED CHRONIC ABDOMINAL PAIN

M. Toneman[1], H. van Goor[1], M. de Vries[1], R. ten Broek[1]

*[1]Radboudumc, Nijmegen, Netherlands*

**Background and aims**: Adhesion-related chronic abdominal pain affects quality of life in 10% of patients following abdominal surgery. Many patients depend on conservative pain treatments. The aim of this pilot study is to assess feasibility, usability and efficacy of virtual reality (VR) in patients with chronic pain related to post-operative adhesions.

**Methods**: Patients with chronic abdominal pain and adhesions diagnosed by CineMRI received VR treatment (Reducept and relaxation modules) at home during 4. Questionnaires (e.g. Pain Disability Index (PDI) and Patient Health Questionnaire (PHQ-9)) were evaluated at baseline, 4 weeks (ending of therapy period) and 12 weeks.

**Results**: Eleven patients were included in this pilot, of which nine women (81%) with a mean age of 51 (range 39-74). The user experience was positive in six patients (55%), neutral in four (36%) and negative in one patient (9%) due to side effects. Vertigo or nausea occurred in two patients (18%), all self-limiting. The average pain numeric rating scale (NRS) score was 6.5 at baseline and 5.9 after the 4-week treatment period. PHQ-9 scores at baseline were on average 15.4 and lowered to 11.9, average PDI from 6.5 to 5.8. Four patients (36%) experienced technical difficulties with the Reducept module.

**Conclusions**: Based on this pilot, VR seems feasible and usable for patients with chronic abdominal pain after abdominal surgery. A trend towards reduction of pain experience, influence of pain on daily activity and positive effects on mental health were demonstrated.

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# Interventional blockade therapies

## Abstract no.: 230

### IMPACT OF OPIOID USE ON RESULTS OF LUMBAR FACET-JOINT MEDIAL BRANCH BLOCKS FOR BACK-PAIN MANAGEMENT ON PATIENTS WITH CHRONIC BACK PAIN

H. Heikkilä[1], A. Ristmägi[1]

[1]*Satasairaala, Pori, Finland*

**Background and aims**: Preoperative exposure to opiates has recently been associated with poor outcomes after elective major surgery, but little is known as to how pretreatment opioid use effect results of interventional back-pain management.

**Methods**: A single-center quality register analysis was performed on patients who underwent interventional pain management for chronic back pain as a part of conservative pain management program. Chronic opioid use was defined as having an opioid prescription concurrent with 90 days. A total of 798 patients underwent intervention during the study period 2019-2020. Pretreatment opioid use was present in 239 patients (30%).

**Results**: Facet-joint medial branch blocks resulted for significant improvement for both groups directly after the treatment as well as 2 hour-2 days follow-up. However, non-opiate group reported significant improvement at one- month follow up but opiate users reported nearly the same pain level as before treatments.

**Conclusions**: Pretreatment opioid use is associated with greater pain discomfort, impairment and reduced function ability, as well as poorer long-term effect of interventional back pain treatment at 1-month follow-up. In this study opiate users reported same positive effects of facet-joint nerve blocks directly after the treatment and still positive effect following 2 days after the treatment but significant lower effect at one month follow-up. This could indicate that opiate use may diminish effects of pain treatments by affecting relearning, behavioral changes and central pain modulation.

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## Abstract no.: 334

### INTERVENTIONAL PAIN TREATMENT: ULTRASOUND COMBINED WITH SIMULTANEOUS REAL TIME ENDOSCOPIC VISION. A NEW APPROACH

R. van Seventer[1]

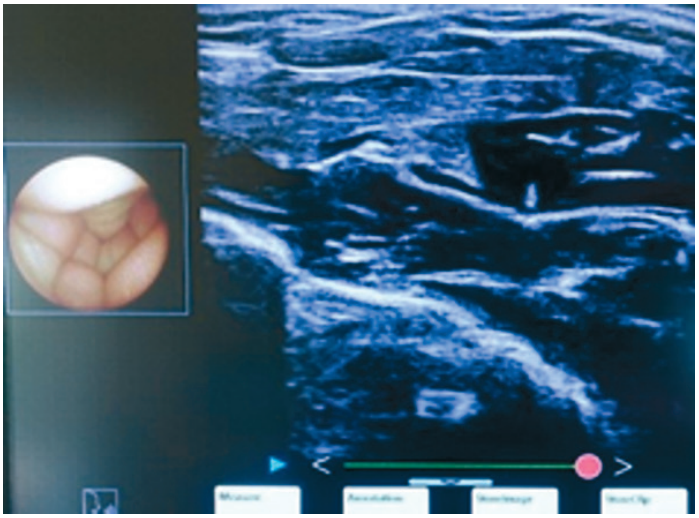
[1]*EMC, Rotterdam, Netherlands*

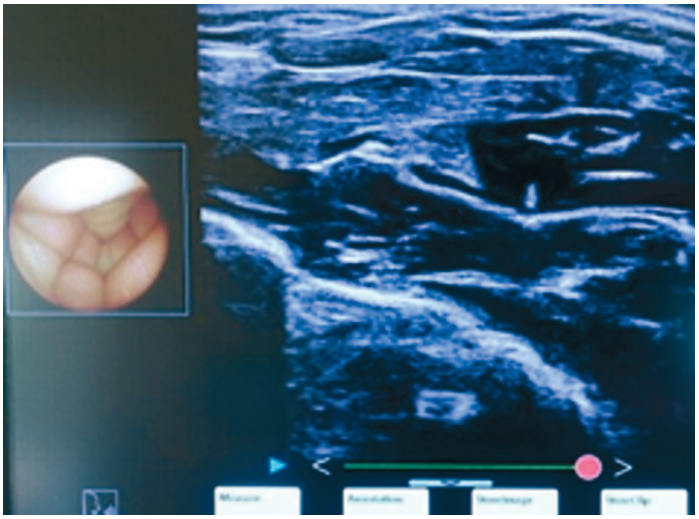
**Background and aims**: **From blind technique to direct vision**

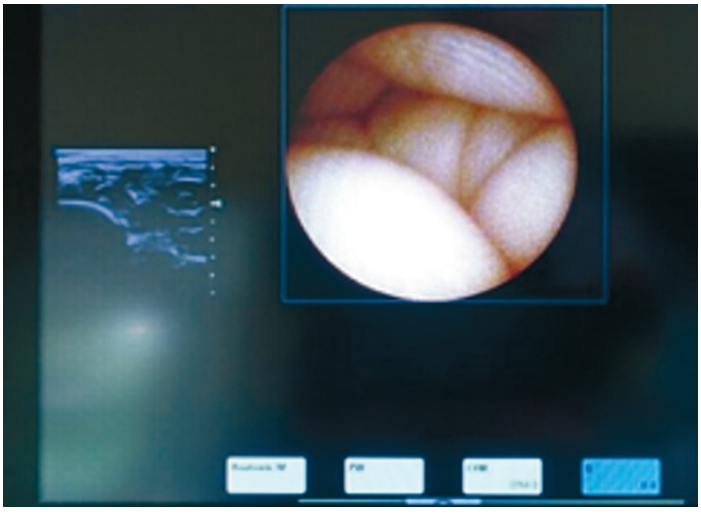
For years in the past century the approach to a nerve was based on blind techniques. However, several devices from electrical stimulators to fluoroscopy and todays use of ultrasound made the guidance somehow easier. A greater emphasis on pain management by the medical community and widespread clinical practice guidelines on pain, increased the demand for pain-control under direct vision with technical tools for treatment applications and spurred manufacturers to introduce products that are more effective and safer in pain treatment.

**Methods**: Interventional procedures are therapeutic options for managing pain. A variety of techniques, including dorsal rhizotomy, anterolateral cordotomy, Gasserian root ablation, sympathectomy, splanchnic/coeliac blocks and all peripheral nerve blocks with either RF, cryo or chemical substances, can be used to ablate or modify central and peripheral nociceptive pathways.

**Results**: A recent key procedural advance is the combined use of ultrasound with simultaneous real time direct endoscopic vision: A new and safe technique to approach the nerve for the treatment of pain.







**Conclusions**: This new technique opens a new horizon for diagnostic and therapeutic purposes in pain management, and hopefully results in better outcomes with less complications.

Some examples of beneficial pain treatments and techniques under direct vision will be presented and the visibility and use will be demonstrated.

## Abstract no.: 385

### REVIEW OF COELIAC PLEXUS BLOCKADE FOR THE MANAGEMENT OF CHRONIC PANCREATITIS PAIN AT TALLAGHT UNIVERSITY HOSPITAL

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*[1]Tallaght University Hospital, Dublin, Ireland, [2]Trinity College Dublin and Tallaght University Hospital, Dublin, Ireland*

**Background and aims**: Pain is a major problem for patients suffering from chronic pancreatitis. Medical therapy often fails to adequately control pain. Coeliac plexus block(CPB) is sometimes performed to treat intractable pain in patients with chronic pancreatitis. Our primary objective was to determine the effect of CPB for pain management in a cohort of patients with chronic pancreatitis. We also sought to quantify opioid use in patients with chronic pancreatitis.

**Methods**: We interviewed all patients who underwent CPB for chronic pancreatitis at TUH from January 2018-December 2020. Effect of the block, duration of pain-relief, analgesia requirements, complications and patient satisfaction were recorded.

**Results**: 62 inpatient referrals were made to the pain-service over a 3-year period regarding pain-management in chronic pancreatitis. 76% required regular long-term opioids. 11 of these patients underwent CPB over a 3-year period. Mean age of patients who underwent CPB was 44 years. Effective reduction in pain scores(>50% improvement) was achieved in 7/11 patients. The mean NRS pain-score decreased from 9.2(+/-0.9) to 4.4(+/-3.1). Mean duration of pain relief experienced was 69 days. Transient diarrhoea was reported by 1 patient. 4 patients reported a temporary decrease in analgesia requirement, while 3 patients reported a sustained decrease in analgesia requirement post-CPB.

**Conclusions**: High regular opioid consumption is common in patients with chronic pancreatitis. CPB can provide significant improvement in pain-control and quality of life in appropriately selected patients. CPB can assist with opioid reduction and containment. It is not effective in all cases and there is high inter-patient variability. The procedure has a good safety-profile.

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## Abstract no.: 496

### 1 / 23 EFFECTIVITY OF PLATELET RICH PLASMA INJECTION IN THE INTERVERTEBRAL DISC

M. Schepers[1], D. de Groot[1], H. Klopper[1], E. Kleinjan[1], H. Mylenbusch[1]

*[1]Rugpoli Twente, Delden, Netherlands*

**Background and aims**: Study question: Does autologous platelet-rich plasma (PRP) injection into a degenerative intervertebral disc without Modic changes on the MRI improve pain and function.

**Methods**: 98 patients were included. Provocation discography was performed to confirm that the suspected disc was the source of pain. Participants were randomized to receive 1.0cc intradiscal PRP (PRP+, n=49) or 1.0cc Saline with 0.2g Kefzol (PRP-, n=49). Data on pain (NRS), physical function (RMDQ), and participant satisfaction (SF-12) were collected at 1 week, 4 weeks, 2months, 6 months, and 1 year. A repeated measurement analysis (mixed models' approach) was used for statistical analysis. The Pearson Chi-Square was used. The T-test and Mann-Whitley U-test were used to compare variables in both groups.

**Results**: 89 of the initial 98 included patients were analyzed and distributed equally across the PRP+ (44) and PRP– (45) group. No statistical significant differences were found in baseline characteristics. After twelve months no statistical significant differences were found in the primary and secondary outcome measures between both groups (disability p=0.753, average pain p=0.244, worst pain p=0.724, best pain p=0.325 using the Pearson Chi2; physical health p=0.721 and mental health p=0.834).

**Conclusions**: **Conclusion:** Participants who received intradiscal PRP showed no significant improvement compared to the control group at 1 year follow up.

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## Abstract no.: 610

### EFFICACY OF STEPPED CARE TREATMENT FOR CHRONIC DISCOGENIC LOW BACK PAIN PATIENTS WITH MODIC I AND II CHANGES

H. Mylenbusch[1], H. Klopper[1], H. Tempelman[1], M. Schepers[1], E. Kleinjan[1]

*[1]Rugpoli Twente, Delden, Netherlands*

**Background and aims**: Patients identified by anamnestic signs of inflammation, NRS 6, mechanical assessment, and Modic changes I/II on the MRI, not responding to conservative treatment, were included to this observational clinical study, categorical data of Patient Related Outcome Measurements analysed.

Objectives: Do patients with Modic I or II changes respond to an anti-inflammatory based, stepped care treatment with 3 proven steps.

**Methods**: From January 2015 to May 2021, 782 consecutive, eligible patients were identified for the stepped care treatment model. 291 patients filled in all follow-up questionnaires at baseline and 12 months.

Treatment: 1st oral medication of NSAIDs, 2nd intradiscal injections with Dexamethason and Cefazoline, 3rd oral antibiotic treatment (3x1g Amoxicillin during 3 months).

Primary outcomes were pain (>50% pain relief) and/or >40% improvement in functionality measured by Roland Morris Questionnaire or Oswestry Disability Index. Secondary outcome measures were self-perceived health, drug use, return to work, use of other healthcare treatments.

**Results**: At one year follow-up out of 291 patients 155 (53.3%) reported improvement according to the responder criteria. 124 patients received NSAIDs, 77 responders (62.1%).77 patients received intradiscal injections, 43 (55.8%) improved. 90 patients received antibiotics; 35 (38.9%) improved. None of the patients reported complications, 13.1% of antibioticpatients stopped preterm due to side-effects.

**Conclusions**: The combination of proven effective treatment steps for inflammatory pain diseases showed clinically relevant positive effect on pain and functionality. This obviously safe treatment option is easily reproducible. Further studies including RCT analyses of subgroups may help to develop more patient-tailored approaches and avoidance of less effective treatments and costs.

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## Abstract no.: 651

### EPIDURAL PULSED RADIOFREQUENCY VERSUS EPIDURAL STEROIDS INJECTION FOR TREATMENT OF FAILED BACK SYNDROME: A PROSPECTIVE, RANDOMIZED, SINGLE-BLIND AND MULTICENTER STUDY

S. Martinez[1], A. Mendiola de la Osa[1], M. Herrero[1], J. Perez Cajaraville[2], J. Insausti[2]

*[1]Hospital Universitario de Puerta de Hierro, Majadahonda, Madrid, Spain, [2]HM Hospitales, Madrid, Spain*

**Background and aims**: Though the mechanism of PRF has not yet been fully established, findings suggest that the RF electric-field induces neuromodulatory effects in primary sensory neurons and dorsal horn that can reduce neuropathic hyperalgesia/allodynia.

Failed Back Surgery Syndrome (FBSS) refers to chronic back or leg pain disorders that are either caused or untreated by a previous back surgery and can be challenging to treat. Epidural steroids, PRF of the DRG and epidurolysis are common treatment use for this entity.

Our hypothesis is that epidural application of temperature controlled PRF proximal to the DRG in the epidural space can reduce more chronic lumbar and radicular pain following back surgery compared with epidural steroids injection.

**Methods**: Prospective, randomized, single-blind and multi-center study.

Controlled comparison between epidural application of temperature controlled PRF to the dorsal radicular filaments proximal to the DRG and dorsal nerve root in the epidural space using a guidable, radio-opaque, catheter electrode with 15-mm active tip and a temperature sensor (Cosman RCE-E401519-P) and epidural steroids injection.

Patients would be evaluated at 1, 2 4 and 6 months and filled VAS, ODI, SF-12, DN4 and PGI-I questionaries.

**Results**: The study population are Patients with chronic lumbar radicular pain following failed back surgery, and our sample size are 62 patients of each group (124 total).

**Conclusions**: Epidural application of temperature controlled PRF to the DRG and dorsal nerve root in the epidural space seems to be a useful tool in FBSS pain treatment.

## Abstract no.: 965

### THE USE OF RADIOPAQUE CONTRAST DURING NEUROAXIAL INTERVENTIONAL BLOCKS ENHANCES THEIR EFFICACY AND SECURITY: ABOUT A CASE

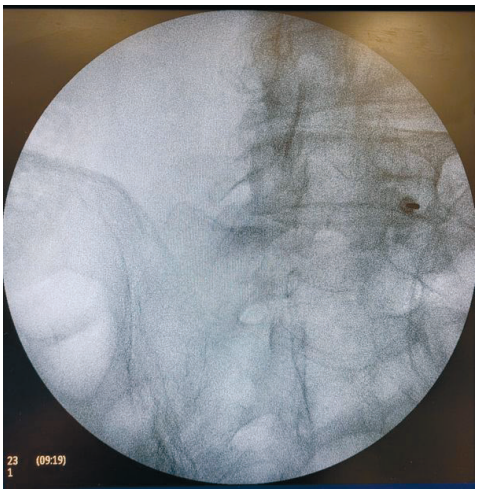
D. Salgado García[1], F. Hernández Zaballos[1], F.J. Sánchez Montero[1], J.C. Garzón Sánchez[1], L. San Norberto García[1], L. Alonso Guardo[1], D. Sánchez Poveda[1], M.V. Sánchez Hernández[1]

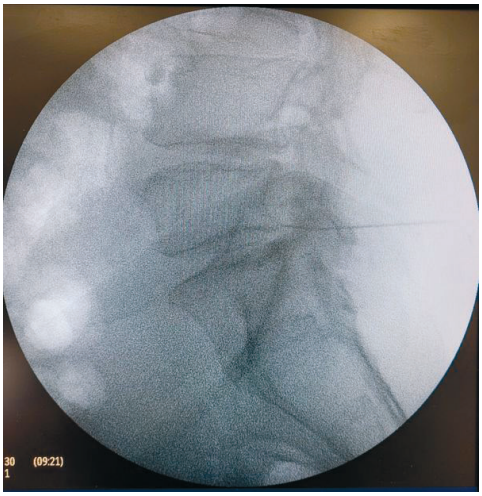
*[1]Salamanca Universitary Hospital, Salamanca, Spain*

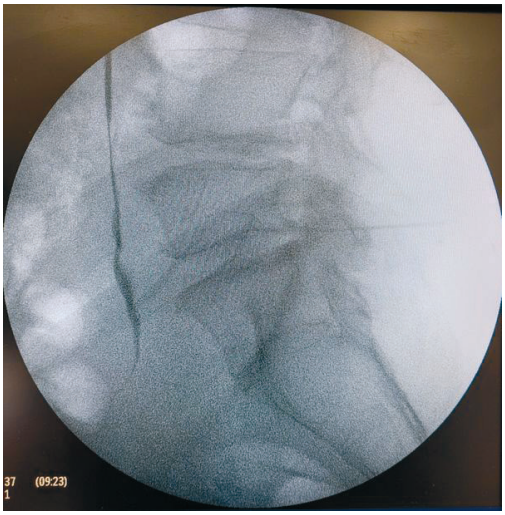
**Background and aims**: It is well known that syringe aspiration is not a reliable technique to identify an intravascular or intrathecal position of a needle. The goal of this communication is to remark the importance of using radiopaque contrast in order to enhance the security and efficacy of neuroaxial interventional blocks.

**Methods**: Our team rutinely uses ioded radiopaque contrast and X-ray scopia in all of our neuroaxial interventional blocks. The following scenario happened during the execution of a left L4-L5 foraminal block.

**Results**: Once the needle was placed into the foramen guided by X-ray scopia, and after negative syringe aspiration through the needle, we injected ioded radiopaque contrast prior to the administration of local anesthetic and corticoid. We found that the tip of the syringe was placed intravascular, inside a foraminal vein belonging to the paralumbar venous plexus, which drains into the Acigos vein system. Not having made this test, would have lead to the intravascular injection of the local anesthetic and corticoid; with the consequent absence of efficacy of the technique and the potential to harm our patient due to local anesthetic toxicity, in adition to the risk of vascular thrombosis if particulate corticoids are used.






**Conclusions**: The use of radiopaque contrast and X-ray scopia during neuroaxial interventional blocks is the only definitive method to know with precision where exactly the tip of a needle is placed. This warrants the efficacy of the technique while checking that it is placed next to our goal structure; while confirming that the drugs won't be intravascularly administered.

# Multidisciplinary programs

## Abstract no.: 299

### DEVELOPMENT OF AN INTERPROFESSIONAL E-LEARNING FOR THE PREVENTION AND TREATMENT OF CHRONIC PAIN IN BREAST CANCER SURVIVORS: AN INTERVENTION MAPPING APPROACH

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[1]*Ghent University, Ghent, Belgium*

**Background and aims**: After breast cancer treatment both physical and psychosocial disabilities are reported. One of these disabilities with a strong impact on quality of life is pain. Managing chronic pain requires a multimodal care plan provided by an interdisciplinary care team from a biopsychosocial perspective. However, the majority of breast cancer survivors with chronic pain are not monitored interdisciplinary. There is a lack of systematic, accessible, and coordinated aftercare for breast cancer survivors experiencing pain. This study is conducted to develop an interdisciplinary training for primary care and hospital-based healthcare providers aimed at the promotion of prevention and management of chronic pain in breast cancer survivors.

**Methods**: This study uses the intervention mapping protocol as a guide for the development of an e-learning training. Qualitative data from four focus groups with healthcare providers involved in cancer aftercare, four focus groups with breast cancer survivors, observations in a breast clinic and a scoping search of the literature are used to identify the gaps in implementing evidence-based prevention and pain management strategies in practice.

**Results**: A draft of an e-learning program for healthcare providers is developed to stimulate prevention and an interdisciplinary response in treating chronic pain among breast cancer survivors. Several change mechanisms are targeted, such as awareness/knowledge, beliefs, professional identity and confidence, outcome expectancies, perceived group norms and skills. The implementation and evaluation will be conducted in a next phase.

**Conclusions**: This study presents a systematic approach in developing an interdisciplinary online intervention to change professional attitudes and behavior in the domain of cancer aftercare.

## Abstract no.: 427

### THE INFLUENCE OF THE PILATES METHOD AND EDUCATIONAL APPROACHES TO PAIN IN THE TREATMENT OF ADULTS AND ELDERLY PEOPLE WITH CHRONIC NONSPECIFIC LOW BACK PAIN

M. Souza[1], G. Espósito[1], S. Alberto[1], O. Bianco[1], E. Neves[2], M. Pedroso[2], H. Carrer[3], M. Campos[1], K. Gramani-Say[1]

*[1]Laboratory for the Study of Pain and Functionality in Aging (LADORFE), Gerontology Academic Department, Federal University of São Carlos (UFSCar), São Carlos, Brazil, [2]Interdisciplinary Specialization in Pain, Gerontology Academic Department, Federal University of São Carlos (UFSCar), São Carlos, Brazil, [3]Physiotherapy Department, Federal University of São Carlos (UFSCar), São Carlos, Brazil*

**Background and aims**: Among the chronic diseases, Chronic Nonspecific Low Back Pain (CNSLBP) is the most prevalent and negatively influences the living conditions of adults and elderly people. Thus, this study aimed to evaluate Pain Neuroscience Education (PNE) and the Pilates Method protocol impact associated or not with new educational approaches to pain management, considering the catastrophic and kinesiophobia outcomes.

**Methods**: This is an experimental study, with a longitudinal design (4.901.344/2021). We evaluated 32 adults and 24 elderly people with CNSLBP for more than six months, with no depressive symptoms and cognitive deficit. Participants were randomly divided into three groups (Figure 1).

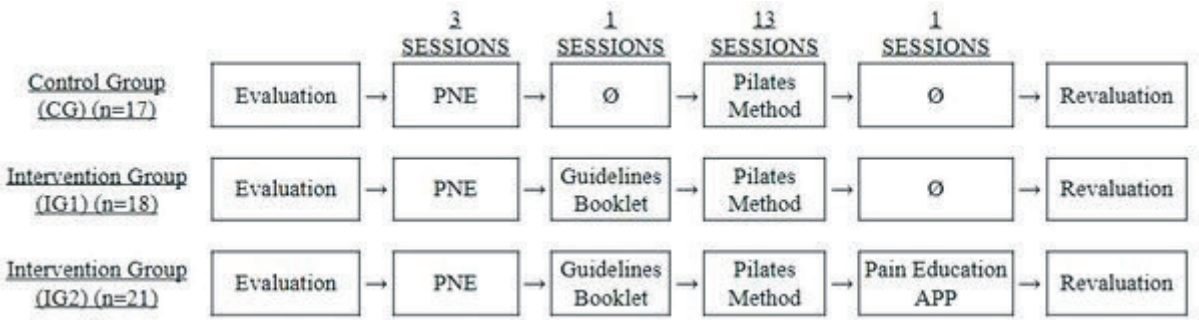


**Figure 1**. Allocation of volunteers in Control Group, Intervention Group 1, and Intervention Group 2.

To assess the chronic condition the Brief Pain Inventory, Tampa Scale for Kinesiophobia, and Pain-Related Catastrophizing Thoughts Scale were used. The Wilcoxon test was performed, considering the intragroup analysis ($p \leq 0,05$) (SPSS Statistics 22.0).

**Results**: All groups demonstrated significant differences after clinical intervention protocols through variables of pain perceived, kinesiophobia, and catastrophizing. However, the reporting of pain measurement in the interference of pain in general activity and sleep quality just the intervention groups showed differences between pre and post.

**Conclusions**: PNE associated with the Pilates Method could reduce the presence and interference of pain. Interventions proposed could also decrease the presence of catastrophic and kinesiophobia thoughts. However, when the present protocol tests were associated with new educational approaches the improvement could be enhanced.

Acknowledgments: Acknowledgment for research funding from the São Paulo Research Foundation (FAPESP).

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## Abstract no.: 470

### RADIUM-223 AS TREATMENT FOR PAIN METASTATIC CASTRATION-RESISTANT PROSTATE CANCER: A CASE REPORT

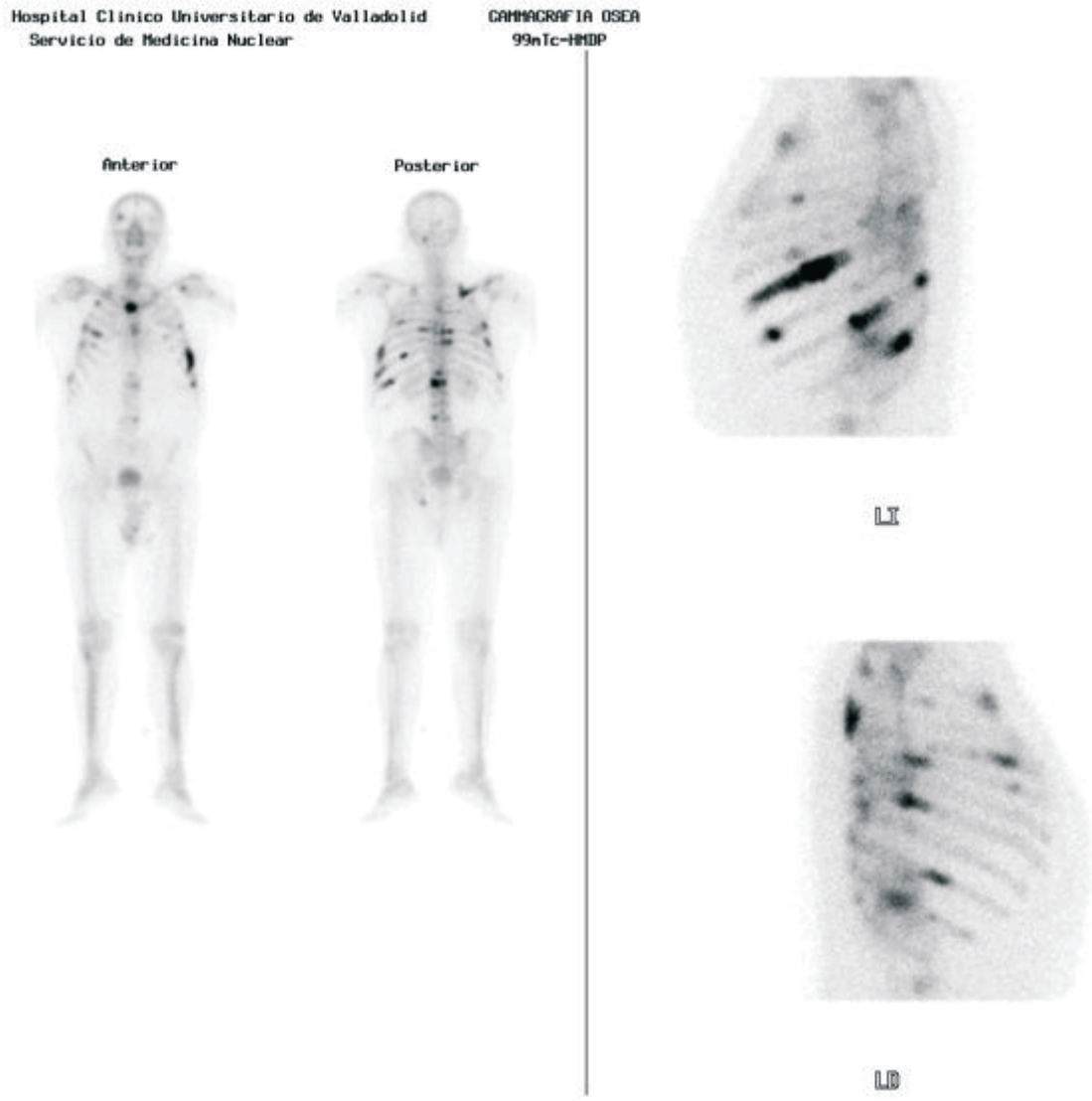
M. Herrera Román[1], P. Valencia Nieto[1], M. Sánchez Belda[1], P. Alonso Martínez[1], I. Solís Navarro[1], L. Cardoso Rubio[1], A. Casado Camacho[1], R. Jaraiz Díaz[1], J.F. Gutiérrez Cara[1], P. Diezhandino García[1]

*[1]Hospital Clínico Universitario de Valladolid, Valladolid, Spain*

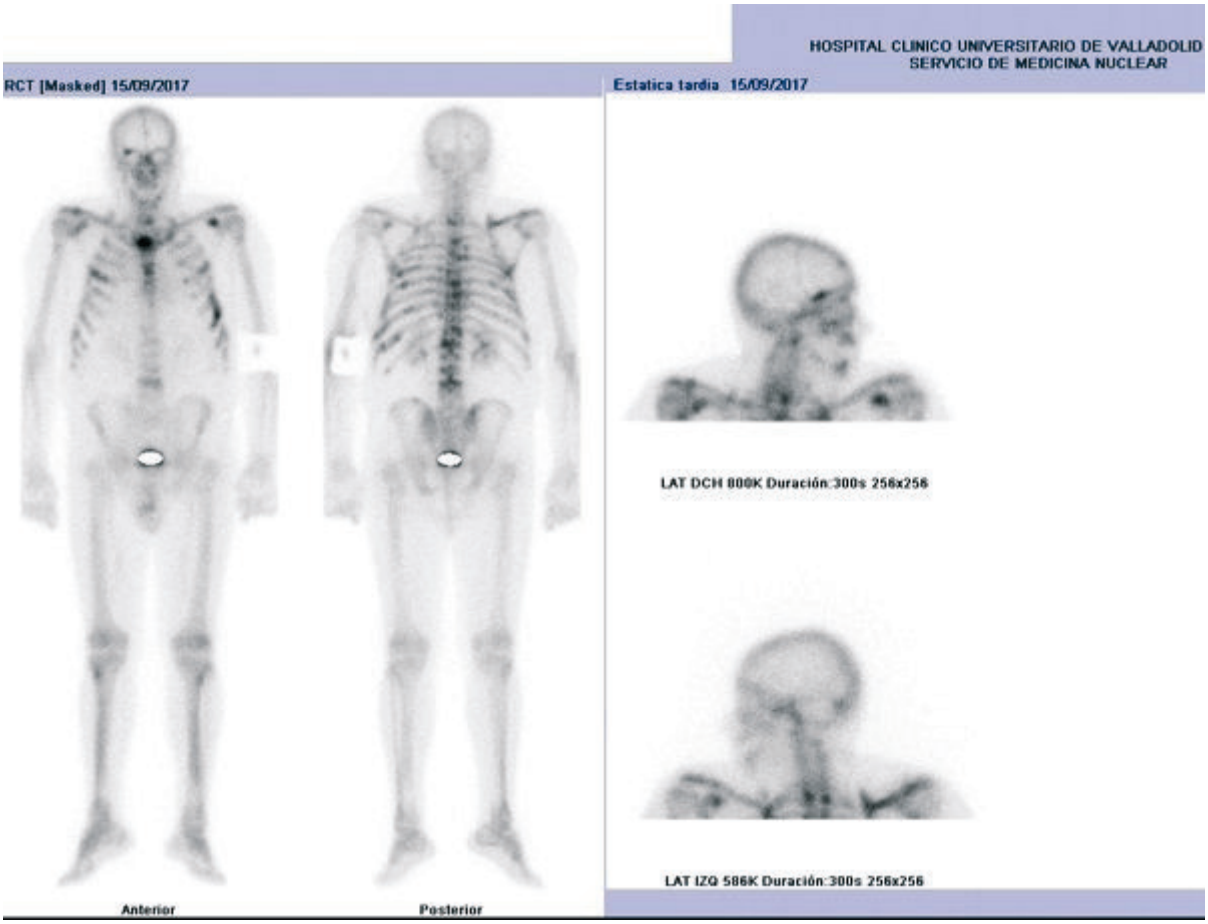
**Background and aims**: Radium-223 (Ra-223) is an α-particle emitting radiopharmaceutical that in symptomatic bone metastases castration-resistant prostate cancer exerts a direct cytotoxic effect.

It improves the quality of life in these patients, mainly on cancer pain, increasing the time to analgesic radiotherapy and reducing the risk of pathological fracture. It also reduces the appearance of new bone events and spinal cord compression and increases survival, with good tolerance and profile of adverse effects.

**Methods**: 79-year-old patient with no relevant history who was diagnosed in 2014 with adenocarcinoma of prostate treated with androgen blockade and radiotherapy. At 6 months, he was diagnosed with C3-C4 spinal cord compression receiving palliative radiotherapy, with pain relief. Since then he received various therapeutic lines with remote disease control until 2016, which coinciding with an elevated PSA, the patient reported disabling pain at the lumbar level, which did not subside with pharmacological treatment. Bone gammagraphy showed progression in the thoracolumbar spine and pelvis. Given the symptoms of pain and poor evolution of the disease treatment with Ra-223 was started.




**Results**: The patient presented significant clinical improvement, with pain control from the first dose and controled disease for almost a year. In a posterior control bone gammagraphy progression was evidenced, stopping treatment and starting a new line of hormonal treatment.




**Conclusions**: Ra-223 administration was associated with a meaningful pain response in this patient. Therefore, Radium-223 should be considered as a therapeutic option in this patient profile.

## Abstract no.: 501

### THE INDIVIDUAL PLACEMENT AND SUPPORT (IPS) IN PAIN TRIAL: A RANDOMIZED CONTROLLED TRIAL OF IPS FOR PATIENTS WITH CHRONIC PAIN CONDITIONS

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*[1]University of Oslo, Oslo, Norway, [2]NORCE Research, Bergen, Norway, [3]Oslo University Hospital, Oslo, Norway*

**Background and aims**: Although complex pain conditions require an interdisciplinary approach, employment services are rarely provided in pain centers. Individual Placement and Support (IPS) is an effective approach to increase work participation among patients with severe mental illness, and recent evidence suggests that this method may be successfully repurposed to new target groups.

We aimed to investigate the effectiveness of IPS integrated with interdisciplinary treatment as usual (TAU) for patients with chronic pain in a tertiary pain center.

**Methods**: A randomized controlled trial (RCT) comparing IPS integrated with TAU (n=38) with TAU alone (n=20) was conducted. Participants were patients with chronic pain; aged 18-65; currently on long-term sick leave, disability benefits, or unemployed. The primary outcome was employment within 12 months after enrollment, with additional long-term follow-up after 24 months. Secondary outcomes included health and quality of life, measured at baseline, 6 and 12 months.

**Results**: During 12-month follow-up 52.8% in the IPS group and 38.9% in the TAU group had attained employment. The difference increased during 24-month follow-up, but did not reach statistical significance. Findings on secondary outcomes were generally non-significant.

**Conclusions**: The IPS in Pain trial is the first study to evaluate the effect of IPS for patients with chronic pain conditions. It shows that IPS can be integrated into daily practice of interdisciplinary pain treatment with employment rates exceeding 50% in one year, and a clear trend in favor of the IPS group. Results did however not reach significance. Larger RCTs are needed to draw clear conclusions about effectiveness.

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## Abstract no.: 537

### THE DESCENDING PAIN MODULATION SYSTEM PREDICTS SHORT TERM EFFICACY OF MULTIMODAL PAIN THERAPY

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**Background and aims**: Treating chronic pain patients with multimodal pain therapy (MMPT) alters perception, awareness and processing of pain. Clinical observations suggest that effects of therapy may go beyond the sum of each level of therapy and may be due to a central descending inhibitory effect measurable by conditioned pain modulation (CPM). We investigated if CPM is able to identify a group of patients which benefits particularly from MMPT.

**Methods**: Patients were hospitalized on a pain medicine ward with specially trained staff for 10 days. The patients were questioned and had investigations before and shortly after MMPT and were followed-up on 3 months post discharge. Before and after treatment, subjects were investigated via CPM and quantitative sensory testing (QST) as well as questionnaires.

**Results**: 224 chronic pain patients were recruited. 51% of patients completed the study period. There was an improvement overall groups regarding all domains assessed, lasting beyond the end of the intervention. Patients with a sufficient CPM effect, defined as a reduction of pain during the conditioning stimulus, at baseline did show a more pronounced reduction in mean pain ratings than those without. This was not the case three months after therapy. Furthermore, sufficient CPM was identified as a predictor for pain reduction using a linear regression model.

**Conclusions**: This study shows, that while a heterogeneous group of patients with chronic pain disorders does sustainably benefit from MMPT in general, patients with a sufficient CPM effect do show a more pronounced decrease in pain ratings directly after therapy in comparison to those without.

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## Abstract no.: 585

### THE ACCEPTABILITY OF A REMOTELY DELIVERED PAIN MANAGEMENT PROGRAMME FOR PEOPLE WITH PERSISTENT MUSCULOSKELETAL PAIN: A QUALITATIVE EVALUATION

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**Background and aims**: Due to COVID-19 restrictions, a remotely delivered live interactive pain management programme (PMP) was developed for people with persistent musculoskeletal pain and implemented at the Royal National Orthopaedic Hospital. This is a new method of delivering PMPs at this institution. There is a lack of evidence on the acceptability of remote PMPs. This evaluation aimed to explore patient's acceptability of the remotely delivered PMP.

**Methods**: A qualitative approach was employed for this service evaluation. Data was collected using focus groups with participants who had previously attended the remote PMP. The focus groups explored participant's experiences of the programme, the benefits and challenges of the programme and how acceptable it is to them beyond the pandemic. Data was analysed using thematic analysis.

**Results**: Three focus groups were conducted with a total of 13 participants. Thematic analysis resulted in the identification of factors that lead to both the programme being acceptable and not acceptable. The factors leading to the programme being acceptable include 'outcomes from the programme', 'quality of care', 'ability to attend', 'COVID-19', 'peer support' and 'technology'. Factors leading to the programme not being acceptable include 'home environment', 'communication', 'technology' and 'quality of care'.

**Conclusions**: Remotely delivered PMPs are acceptable to some, but not all patients with persistent musculoskeletal pain. This evaluation highlights a number of factors that lead to the programme being both acceptable and not acceptable to patients. These factors relate both to the intervention being delivered and to the individual patient's situation.

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## Abstract no.: 632

### COMPARISON OF IN-PERSON AND VIRTUAL PAIN MANAGEMENT PROGRAMME ON PAIN-RELATED OUTCOME MEASURES

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**Background and aims**: Pain management programmes (PMPs) form part of a package of care for chronic pain, aimed at helping people better manage their pain and daily activities. PMPs are typically delivered as an outpatient group intervention by a multidisciplinary team with specialist training in pain medicine, including physicians, nurses, clinical psychologist, physiotherapists, and occupational therapists.

The COVID-19 pandemic resulted in our PMP being moved to a virtual format, delivered remotely via *Zoom*. We sought to compare the outcomes for patients who participated in virtual PMPs compared to a similar group who participated in in-person PMPs prior to the pandemic.

**Methods**: Patients who participated in in-person PMPs in 2019 were compared to those who participated in virtual PMPs in 2020 and 2021. Baseline information was collected prior to the PMP. Patients were followed 6 months following the PMP, and information on a number of pain-related outcomes was collected: Brief Pain Inventory (BPI), Pain Self-Efficacy Questionnaire (PSEQ), Pain Catastrophizing Scale (PCS), Beliefs about Pain Questionnaire (BPCQ), Hospital Anxiety and Depression Scale (HADS), and sit/stand time in 60 seconds.

**Results**: Fifty patients were included in the analysis: 25 attended the in-person PMP, and 25 attended the virtual PMP. Both group demonstrated similar improvements in BPI, PSEQ, PCS, and functional capacity at 6 month follow-up.

**Conclusions**: Outcomes were similar for both in-person and virtual PMPs. A virtual or hybrid platform may be a promising method for delivering PMPs in the future.

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## Abstract no.: 779

### IMPLEMENTATION OF A NURSE-LED FOREST THERAPY MODULE INTO AN INTERDISCIPLINARY MULTIMODAL PAIN MANAGEMENT PROGRAM: FEASIBILITY OF CONCEPT AND RECOMMENDATIONS FOR PRACTICE

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**Background and aims**: There is well known evidence of human health and well-being benefits of spending time in forests (Oh et al., 2017), particularly in stress-related and mental health (Grilli & Sacchelli, 2020). Even therapeutic effects of forest exposure is measured in CBT-programs for depression (Lee et al., 2017). There are only few studies exploring the effects of forest therapy in patients with chronic pain (Kang et al., 2015; Han et al., 2016), but the therapeutic potential for this population has been recognized (6). We developed and implemented successful a nurse-led forest therapy module into an interdisciplinary multimodal pain management program for chronic pain patients in an acute hospital setting.

**Methods**: Following steps of development and implementation have been performed:
1. Development of criteria for selection of appropriate forest settings for patients with chronic pain and their special needs.
2. Conception of the module content based on nursing interventions.
3. Implementation and report of first experiences in practice.

**Results**: To implement forest therapy in chronic pain treatment facilities different aspects have to be considered, particularly criteria to ensure patient safety. Nursing interventions like "basal stimulation" are appropriate methods in this therapeutic context.

Most patients evaluate the forest module as beneficial as well as the pain nurses consider their interventions in the forest setting as enrichment of the multimodal pain management program.

**Conclusions**: Implementing a nurse-led forest therapy module into an interdisciplinary multimodal pain management program can be highly recommended when considering different precautions and criteria. Further research is needed to estimate the clinical evidence of this forest module.

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## Abstract no.: 791

### EFFECTIVENESS OF A MULTICOMPONENT TREATMENT BASED ON PAIN NEUROSCIENCE EDUCATION, THERAPEUTIC EXERCISE, COGNITIVE BEHAVIOURAL THERAPY, AND MINDFULNESS IN PATIENTS WITH FIBROMYALGIA (FIBROWALK STUDY)

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**Background and aims**: Multicomponent treatments are increasingly being recommended to manage the wide range of fibromyalgia (FM) symptoms. However, although the literature suggests that multicomponent treatments are the gold standard for FM management, there is still no consensus about which combination of therapeutic ingredients to be used. The main aim of this work was to evaluate the effectiveness of a 12-week multicomponent treatment based on pain neuroscience education, therapeutic exercise, cognitive behavioural therapy and mindfulness, in addition to treatment as usual, compared to treatment as usual only in patients with fibromyalgia (FM).

**Methods**: 272 patients with FM were randomly assigned to either the multicomponent treatment ($n$ = 135) or treatment as usual ($n$ = 137). The multicomponent treatment (2h weekly sessions) was delivered in groups of 20 participants. Data on functional impairment (as primary outcome) were collected, as well as for pain, fatigue, kinesiophobia, physical function, anxiety, and depressive symptoms at baseline, at 12 weeks and, for the multicomponent group only, at 6 and 9 months.

**Results**: At post-treatment, significant between-group differences with a large effect size ($d$ > 0.80) in favour of the multicomponent treatment were found in functional impairment, pain, kinesiophobia, and physical function, whilst differences with a moderate size effect ($d$ > 0.50 and < 0.80) were found in fatigue, anxiety, and depressive symptoms. Non-responders scored higher on depressive symptoms than responders at baseline.

**Conclusions**: Compared to usual care, there was evidence of short-term positive effects of the multicomponent treatment for FM. Nevertheless, some methodological shortcomings preclude robust conclusions regarding our multicomponent intervention.

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## Abstract no.: 1026

### ACHING TO NOT ACHE: LEUKEMIA PATIENT GOES FROM PAIN AND ADDICTION TO RECOVERY AND RECONNECTION

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**Background and aims**: Treatment of acute myeloid leukemia (AML) can lead to chemotherapy induced neuropathic pain. A woman with PTSD and borderline personality disorder was prescribed escalating amounts of immediate acting oral fentanyl to 25 doses a day of 200mcg (5000 mcg/day) for chronic pain. Her pain was not relieved, but she did develop opioid use disorder and opioid induced hyperalgesia. By creating a multidisciplinary team, we aimed to help the patient successfully learn to manage her pain and addiction and begin a life in recovery.

**Methods**: Just as our first wave of COVID-19 was peaking in Israel, combined in-person and zoom meetings took place between 10 individuals from 4 different disciplines working at 3 different organizations located in different parts of the country. A partnership between pain management, two different medication assisted treatment (MAT) programs, oncology and psychiatry departments was created to oversee stopping the fentanyl and starting the patient in a MAT program.

**Results**: Initially, the patient was treated with methadone, but she overdosed. Then, she was successfully stabilized on buprenorphine/naloxone. For the first time in four years, she received AML treatment without taking fentanyl, only buprenorphine/naloxone. Her pain became manageable with over the counter medications. The patient lived more than a year without suffering from pain and addiction, before succumbing to AML.

**Conclusions**: 1. Pain and addiction can effectively be treated in those who suffer from AML.
2. Methadone or buprenorphine/naloxone should be selected as MAT while considering pain management and safety.
3. Multidisciplinary teams can successfully manage chronic pain, addiction, psychiatric illness and active cancer.

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## Abstract no.: 1054

### DEVELOPMENT OF AN INFORMATION EXCHANGE INTERFACE BETWEEN CARE AND REINTEGRATION SECTOR: A CASE STUDY

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**Background and aims**: Occupational rehabilitation is a major goal of multidisciplinary pain centers (MPC) for chronic pain patients. Effectiveness is often hampered by a catastrophising attitude towards own capacities, and by external factors including societal stigmatisation andlabour regulations.

In alignment with Europe, Belgian governments and policy organisations take initiatives to facilitate socio-professional reintegration (SPR) for chronic patients. In SPR, interprofessional collaboration and communication between healthcare, welfare and healthinsurance organisations is essential. The International Classification of Functioning, Disability and Health (ICF) can support this collaboration by using by using the same bio-psycho-social framework of functioning and its common language.

**Methods**: In Flanders, the Northern region of Belgium, specialized teams ( GTB) offer a workcoach to collaborate in a project, funded by the European Social Fund, with major healthcare institutions, in particular the MPC . In the University Hospital Ghent (UHG), the workcoaches are actively integrated in multidisciplinary MPC team. However, they are not qualified healthcare professionals and lack an official therapeutic relationship, so not entitled to access patient's healthrecords. Nevertheless, relevant information on patient's functioning is crucial in facilitating SPR. Therefore we decided to implement the ICF core set "Work" in the hospital electronic patient record. To safeguard the data, we created a secured tunnel, only accessible to the team members involved with the patient and, restricting access for GTB-officers to relevant data, excluding unwanted transgression to other patient records.

**Results**: We present this implementation, focusing on the ICF core set as a safe and efficient information exchange tool in interprofessional collaboration in SPR.

**Conclusions**: Implemented

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## Abstract no.: 1097

### THE ROLE OF TREATMENT SETTING ON THE OUTCOME OF AN INTERDISCIPLINARY MULTIMODAL PAIN TREATMENT FOR CHRONIC BACK PAIN PATIENTS

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**Background and aims**: Interdisciplinary multimodal pain therapy (IMPT) is an effective treatment for otherwise change-resistant chronic pain states. Although effective, it is relatively expensive. Day-hospital treatment represents a potentially less costly alternative to inpatient treatment. However, little is known about the impact of treatment setting on its effectiveness. The aim of this study was to evaluate the effect of setting (day-hospital vs. inpatient treatment) on changes in pain.

**Methods**: We conducted a prospective longitudinal observational study of chronic back pain patients (n=142), who followed an IMPT, either as inpatient or day-hospital patient, at the back pain center in Essen, Germany. Data were collected at admission (T0), at discharge (T1), and 3 (T2), 6 (T3), and 12 (T4) months after discharge. Primary outcomes were pain intensity and disability. Exploratively, we tested for a possible relationship with pain-related self-efficacy.We used linear mixed models to analyze the impact of setting on primary and exploratory outcome measures.

**Results**: Preliminary analyses reveal a significant decrease in pain intensity, with a greater benefit for day-hospital patients at T2 ($p=0.02$). For disability, this benefit was even more pronounced and persistent over time ($p=0.01$). Furthermore, day-hospital patients showed greater improvements in self-efficacy ($p<0.001$).

**Conclusions**: Since day-hospital patients showed a greater benefit from IMPT, this could be a cost-effective alternative to inpatient treatment. Possibly, day-hospital treatment fosters greater self-efficacy, thereby promoting greater transfer to the domestic setting. Further research needs to investigate the underlying factors and generalizability of this advantage of day-hospital settings.

## Abstract no.: 1130

### THE ROLE OF AUTOGENIC TRAINING AND PHYSICAL EXERCISE PRACTICEIN THE IMPROVEMENT OF KEY SYMPTOMS OF FIBROMYALGIA

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**Background and aims**: Autogenic Training (AT) it is a technique that allows the regulation of the Autonomic Nervous System and it can be integrated into group cognitive-behavioural treatment programs. Likewise, physical exercise (PhE) has demonstrated its effectiveness in the treatment of fibromyalgia. The objective was to determine if the frequency of performing EA and PhE was related to clinical improvement.

**Methods**: Participants: 123 consecutive patients diagnosed with Fibromyalgia (American College of Rheumatology criteria) who completed a multidisciplinary treatment. Mean age 52.6 years (±8.7). 95.2%women, 4.8% men.

Instruments: Fibromyalgia Impact Questionnaire (Pain Intensity and Functionality), Hospital Anxiety and Depression Scale (Psychological Distress), Fatigue Impact Scale (Fatigue) and MOS Sleep Scale (Sleep Duration and Sleep Problems). The frequency in which the patients practiced the exercises was determined by means of a Likert-type scale of 5 values, whose extremes were 1: daily or almost daily and 5: once a month or even less.

**Results**: Previously to treatment, the groups were homogeneous in demographic and clinical data. Comparing pre-post-treatment, in group 1 there was improvement in all variables. In group 2, only sleep duration and sleep problems improved. In group 3 all variables improved except pain intensity. Finally, in group 4 only functionality and sleep problems improved (see table).

| | **GROUP 1 AT= 1 & PhE = 1** (n= 35) | | | **GROUP 2 AT => 2 & PhE = 1** (n=13) | | | **GROUP 3 AT =1 & PhE >= 2** (n= 46) | | | **GROUP 4 AT = > 2 & PhE => 2** (n = 29) | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **VARIABLES** | **pre** | **post** | **p** | **pre** | **post** | **p** | **pre** | **post** | **p** | **pre** | **post** | **p** |
| **Pain intensity** | 7.4 (±1.6) | 6.2 (±2.2) | .002 | 7.6 (±3.0) | 6.6 (±2.7) | N.S. | 7.7 (±1.8) | 7.3 (±2.1) | N.S. | 7.3 (±2.0) | 7.0 (±1.9) | N.S. |
| **Functionality** | 72.4 (±15.8) | 56.0 (±20.1) | .001 | 73.6 (±17.0) | 64.3 (5.0) | N.S. | 75.8 (±12.8) | 63.0 (±18.2) | .001 | 72.0 (±15.7) | 61.9 (±18.3) | .001 |
| **Psychological distress** | 23.7 (±8.3) | 19.3 (±8.2) | .004 | 26.0 (±6.0) | 24.0 (± 8.0) | N.S | 24.2 (±7.1) | 19.2 (±7.9) | .001 | 22.9 (±6.6) | 21.0 (±8.1) | N.S. |
| **Fatigue** | 25.4 (±5.6) | 19.8 (±7.4) | .001 | 27.5 (±2.9) | 23.9 (±4.6) | N.S. | 25.7 (±4.4) | 20.8 (±7.0) | .001 | 26.1 (±5.3) | 23.0 (±6.1) | N.S. |
| **Sleep Duration** | 5 (±1.4) | 6 (±1.5) | .001 | 5.8 (±1.2) | 6.4 (±1.4) | .014 | 6 (±1.9) | 6.3 (±1.4) | .023 | 5.5 (±1.1) | 6.0 (±1.1) | N.S. |
| **Sleep Problems *** | 23.6 (±6.7) | 33.6 (±7.9) | .001 | 25.8 (±6.9) | 31.7 (±9.1) | .008 | 24.1 (±7.9) | 33.5 (±8.1) | .001 | 26.6 (±6.6) | 31.1 (±6.3) | .001 |

**Notes.*** Sleep problems result is interpreted inversely. The higher the value, the fewer sleep problems.Results are expressed in means and standard deviation. AT: Autogenic Trainning; AT1:Daily or almost daily; AT=> Less than 3 times/week; PhE: Physical Exercice;PhE1: Daily or almost daily; PhE=> 2: Less than 3 times/week.

**Conclusions**: 1) The frequency in the practice of AT is a relevant factor in the improving of most of the key symptoms of fibromyalgia. 2) The practice of PhE seems to be significant in the improvement of sleep problems and functionality.

## Abstract no.: 1172

# EFFECTS OF MULTIDISCIPLINARY PERSISTENT PAIN MANAGEMENT PROGRAMS ON OUTCOME MEASURES IN A PRIMARY CARE SETTING – A SYSTEMATIC REVIEW

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**Background and aims**: Persistent pain management should aim at improving an individual's quality of life and functioning. Accessible to everyone, primary care could provide an ideal environment to take a holistic treatment responsibility of a majority of patients with persistent pain. The aim of the current review was to examine effects of existing multidisciplinary persistent pain management programs on multiple outcome measures in a primary care setting.

**Methods**: A systematic review was performed according to the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) guidelines. Data sources PubMed, Ovid MEDLINE, Scopus, CINAHL and PsycINFO were searched from inception to October 2021. English-language full-text studies were included. The inclusion criteria were defined as follows: age ≥ 18 years, noncancer pain over three months, utilizing multidisciplinary interventions, a primary care setting (unselected general population).

**Results**: Both interventions contents and durations, study settings and outcome variables emerged as heterogeneous. In the majority of 15 included studies the aim was to examine whether pre-defined therapeutic sessions had an effect on pre-defined outcomes. Work-related, economical and psychological aspects as outcome measures were examined the most. None of the studies reported statistically significant deterioration in the considered parameters.Table 1 illustrates the overview of the results in terms of primary and secondary outcome measures.

| **Analyzed outcome** | **Tool of assessment (scale/measure)** | **Results**(statistically significant improvement p<0.05) |
|---|---|---|
| **Quality of Life (5/15 studies)**<br>Angeles et al. 2013<br>Calner et al. 2017<br>Dobscha et al. 2009<br>Eklund et al. 2021<br>Pietilä-Holmner et al. 2020 | EuroQol-5D (EQ-5D)<br>Life Satisfaction Questionnaire (Li-Sat)<br>Short Form Health Survey Questionnaire (SF-36) | **Improvement in 2/5 studies**<br>(Eklund et al., Pietilä-Holmner et al.) |
| **Pain intensity (5/15 studies)**<br>Calner et al. 2017<br>Nordin et al. 2016<br>Dobscha et al. 2009<br>Mårtensson et al. 1999<br>Stein et al. 2013 | Chronic Pain Grade Scale (CPG)<br>Numeric Rating Scale (NRS)<br>Visual Analogue Scale (VAS) | **Improvement in 2/5 studies**<br>(Dobscha et al., Mårtensson et al. (1999)) |
| **Pain disability (4/15 studies)**<br>Calner et al. 2017<br>Dobscha et al. 2009<br>Gustavsson et al. 2018<br>Pietilä-Holmner et al. 2020 | Functional Rating Index (FRI)<br>Multidimensional Pain Inventory (MPI)<br>Pain Disability Index (PDI)<br>Roland Morris Disability Questionnaire (RMDQ) | **Improvement in 2/4 studies**<br>(Dobscha et al., Pietilä-Holmner et al.) |
| **Psychological factors (6/15 studies)**<br>Clare et al. 2019<br>Gustavsson et al. 2018<br>Joypaul et al. 2019<br>Nordin et at. 2016<br>Pietilä-Holmner et al. 2020 | Arthritis Self-Efficacy Scale (ASES)<br>Brief Pain Inventory (BPI)<br>Chronic Pain Acceptance Questionnaire (CPAQ)<br>Coping Strategies Questionnaire (CSQ)<br>The general Self-Efficacy Scale (GSE)<br>Pain Catastrophizing Scale (PCS)<br>Pain Self-Efficacy Questionnaire (PSEQ) | **Improvement in 3/6 studies**<br>(Clare et al., Joypaul et al., Pietilä-Holmner et al.) |
| **(Depression (5/15 studies**<br>Clare et al. 2019<br>Dobscha et al. 2009<br>Gustavsson et al. 2018<br>Pietilä-Holmner et al. 2020<br>Stein et al. 2013 | Beck Depression Inventory (BDI)<br>Hospital Anxiety and Depression Scale (HADS)<br>Patient Health Questionnaire (PHQ-9) | **Improvement in 4/5 studies**<br>(Clare et al., Dobscha et al., Pietilä-Holmner et al., Stein et al.) |

| | | |
|---|---|---|
| **Work-related aspects (7/15 studies)**<br>Calner et al. 2017<br>Eklund et al. 2021<br>Gustavsson et al. 2018<br>Mårtensson et al 2004<br>Pietilä-Holmner et al. 2020<br>Sennehed et al. 2020<br>Stein et al. 2013 | Sickness absence<br>Working Ability Index WAI | **Decrease in sickness absence in 5/7 studies**<br>(Eklund et al., Gustavsson et al., Mårtensson et al. (2004) Pietilä-Holmner et al., Stein et al.) |
| **Opioid consumption (4/15 studies)**<br>Arden et al. 2019<br>Joypaul et al. 2019<br>Seal et al. 2020<br>Stein et al. 2013 | Mean opioid dose<br>Number of prescriptions | **Decrease in 2/4 studies**<br>(Arden et al., Seal et al.) |
| **Physical functioning (2/15 studies)**<br>Clare et al. 2019<br>Gustavsson et al. 2018 | Number of sit-to-stands in one minute<br>Tampa Scale of Kinesiophobia (TSK) | **Improvement in 1/2 studies**<br>(Clare et al.) |
| **Economical aspects (6/15 studies)**<br>Angeles et al. 2013<br>Clare et al. 2019<br>Eklund et al. 2021<br>Gustavsson et al. 2018<br>Mårtensson et al. 2004<br>Stein et al. 2013 | Cost-effectiveness<br>Number of clinic visits | **Positive results in cost-utility analyses in 2/6 studies**<br>(Eklund et al., Gustavsson et al.)<br>**Decrease in clinic visits in 3/6 studies**<br>(Angeles et al., Clare et al., Mårtensson et al.) |

**Conclusions**: In the included studies of the present review, multiple outcome variables were considered. Multidisciplinary pain management may have effects on various separate outcomes. However, it is difficult to determine which outcome parameters should be emphasized when evaluating intervention effectiveness.

# Thursday, 27 April 2022

## 11:30-12:15

# COVID-19 associated pain

### Abstract no.: 1101

### STUDY OF PREVALENCE AND IMPACT OF PAIN IN LONGCOVID PATIENTS

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**Background and aims**: About 11% and 24% of COVID-19 cases have persistent symptoms 3 months later.

Objectives determine the prevalence of pain in patients diagnosed and admitted for COVID-19: 3-6 months prior versus > 3 months and differences by gender.

**Methods**: Epidemiological, cross-sectional, multicenter study. Demographic data, admission EQ5, HADS, catastrophizing scale, and WPAI were analysed in patients with and without pain. In patients with pain the location, DN4, BPI.

**Results**: 450 patients were included, we present the analysis of the preliminary 166, the data from the total sample will be presented at the congress. Age 62±13.49 years, 58.68% men. Admission time (mean 17.98 days) BMI 28.01 (28.76 in pain vs 26.78 without pain, $p<0.05$). Pain in 60.8% (73.9% in women vs 51.5% men, $p<0.05$). Post-COVID de novo pain in 38.8% (47.8% in women vs 32.3% in men, $p=0.052$). VAS= 5.8. DN4 positive: 37%.

Increased incidence of pain: ICU stay, high flows and mechanical ventilation. Time since infection had no influence (43.14% between 3-6 months, 56.85% >6 months). The prevalence of catastrophism, anxiety and depression and repercussion at work is higher in patients with pain (P<0.05).

Asthenia: 59.8% (74.51% in patients with pain vs. 36.92% without pain, P<0.05). Insomnia: 41.92% (69.60% in pain vs 24.61% without pain). EQ5D mean value of 63.09 in patients with pain vs 76.06 in patients without pain (p<0.05).

**Conclusions**: Pain is a relevant problem in patients after SARS infection. Fatigue, insomnia and pain is prevalent in these patients and has an impact on all spheres of their lives.

# Acute pain

## Abstract no.: 1119

### RISK FACTORS OF POOR POSTOPERATIVE PAIN OUTCOMES VARIED BY SURGERY.A COHORT STUDY OF PAIN-OUT REGISTRY OF TOTAL KNEE REPLACEMENT, CHOLECYSTECTOMY AND FRACTURE REDUCTION

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**Background and aims**: The PAIN-OUT registry allows the analysis of large numbers of patients on the first postoperative day. This study evaluates the risk factors of belonging to the poor postoperative outcomes group in the three most frequent surgeries in the Spanish sample.

**Methods**: The sample includes 2678 patients collected using the PAIN-OUT methodology. Information on structure, process of care and outcomes on the first postoperative day were collected. The identification of the poor outcome group was based on two parameters of the International Pain Outcome Questionnaire: the desire for more analgesic treatment and the pain outcomes summarized as factor scores: pain intensity-interference, adverse effects and perception of care. Multivariate logistic regression analysis was performed using a forward-backward stepwise procedure. To maximize the overall explanatory power, the final predictive models were chosen based on the highest value of Nagelkerke's pseudo-R2 and AUC.

**Results**: Outcome scores in intensity and interference had a mean difference of 18.1 (bad outcomes (BO) 38.8 vs good outcomes (GO) 20.7, p< 0.001), in adverse events (F2) of 3.0 (BO 8.9 vs GO 5.9, p<0.001) and in perception of care (F3) of -4.5 (BO 10.5 vs GO 15.0, p < 0.001) (Figure 1).

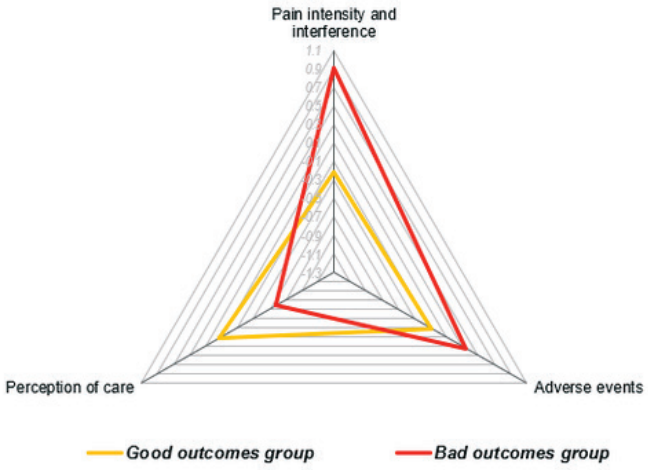


*Figure 1. The triangular figure is a radar chart (z-standardized mean values) of the IPO factors by outcome group.*

Predictors of poor postoperative outcomes varied by type of surgery and explained between 24% and 36% of the variance of the regression line (Table 1)

***Table 1.*** *Predictive multivariate regression analyses*

| **Model for: belonging to cluster 3 in Knee joint replacement** | | *B* | *SE* | *p* | *OR* | *95%CI (OR)* | | *H-L* | *R²* | *AUC* |
|---|---|---|---|---|---|---|---|---|---|---|
| *Knee joint replacement (81.54-81.55)* | | | | | | | | 0.646 | 0.258 | 0.792 |
| Multimodal analgesia | AA, NSAIDs and PNB | | | 0.100 | | | | | | |
| | AA, Opioids and PNB | 1.607 | 0.587 | **0.006*** | 4.990 | 1.578 | 15.782 | | | |
| | AA, NSAIDs, Opioids and PNB | 1.146 | 0.507 | **0.024*** | 3.144 | 1.164 | 8.497 | | | |
| | AA and PNB | 0.042 | 0.650 | 0.949 | 1.043 | 0.292 | 3.727 | | | |
| | AA, NSAIDs and Opioids | 2.099 | 0.836 | **0.012*** | 8.161 | 1.586 | 41.996 | | | |
| | AA and Opioids | 2.440 | 0.894 | **0.006*** | 11.478 | 1.992 | 66.143 | | | |
| | AA, NSAIDs, Opioids, Gabapentin and WI | 1.411 | 0.989 | 0.154 | 4.099 | 0.590 | 28.463 | | | |
| | AA, NSAIDs, Opioids, Gabapentin and WI | 1.671 | 1.107 | 0.131 | 5.316 | 0.607 | 46.576 | | | |
| | Others | 1.534 | 0.581 | **0.008*** | 4.637 | 1.485 | 14.482 | | | |
| Institution | Others | | | **<0.001*** | | | | | | |
| | H1 | -1.205 | 0.517 | **0.020*** | 0.300 | 0.109 | 0.825 | | | |
| | H3 | 0.981 | 0.511 | 0.055 | 2.666 | 0.980 | 7.251 | | | |
| | H8 | -1.487 | 0.607 | **0.014*** | 0.226 | 0.069 | 0.743 | | | |
| | H11 | 1.444 | 0.592 | **0.015*** | 4.236 | 1.328 | 13.510 | | | |
| Gender (0=women; 1=men) | | 0.528 | 0.332 | 0.112 | 1.696 | 0.884 | 3.252 | | | |
| Addictive disorders (0= no; 1= yes) | | -0.673 | 0.746 | 0.367 | 0.510 | 0.118 | 2.200 | | | |
| Opioids before surgery (0= no; 1= yes) | | 0.827 | 0.446 | 0.064 | 2.286 | 0.954 | 5.479 | | | |
| Sedatives (pre-medication) (0= no; 1= yes) | | 1.523 | 0.486 | **0.002*** | 4.585 | 1.770 | 11.879 | | | |
| Non-opioids (pre-medication) (0= no; 1= yes) | | -2.343 | 1.092 | **0.032*** | 0.096 | 0.011 | 0.816 | | | |
| # of Recovery and Ward Peripheral Block | None | | | 0.065 | | | | | | |
| | One | 0.228 | 0.628 | 0.717 | 1.256 | 0.367 | 4.298 | | | |
| | Two | -0.184 | 0.461 | 0.689 | 0.832 | 0.337 | 2.053 | | | |
| | Three | 1.546 | 0.789 | **0.050** | 4.692 | 1.000 | 22.017 | | | |
| Age (years) | | -0.028 | 0.017 | 0.102 | 0.973 | 0.941 | 1.006 | | | |
| Constant | | -2.102 | 1.420 | 0.139 | 0.122 | | | | | |
| **Model for: belonging to cluster 3 in Cholecystectomy** | | *B* | *SE* | *p* | *OR* | *95%CI (OR)* | | *H-L* | *R²* | *AUC* |
| *Cholecystectomy (ICD 9 51.2, 51.21, 51.22, 51.23, 51.24)* | | | | | | | | 0.933 | 0.36 | 0.828 |
| Remifentanil IV (intraoperative) | | -1.817 | 0.966 | 0.060 | 0.162 | 0.024 | 1.079 | | | |
| Morphine equivalents (Recovery) | | 0.067 | 0.019 | **<0.001*** | 1.070 | 1.031 | 1.110 | | | |
| Morphine equivalents (Pre-operative) | | 0.055 | 0.027 | **0.041*** | 1.056 | 1.002 | 1.113 | | | |
| Perioperative dexketoprofen IV dose | | 0.005 | 0.002 | **0.020*** | 1.005 | 1.001 | 1.009 | | | |
| Institution | Others | | | **0.002*** | | | | | | |
| | H1 | -0.761 | 1.005 | 0.449 | 0.467 | 0.065 | 3.349 | | | |
| | H5 | 0.217 | 0.947 | 0.819 | 1.242 | 0.194 | 7.941 | | | |
| | H8 | 1.554 | 1.040 | 0.135 | 4.731 | 0.617 | 36.293 | | | |
| | H13 | 3.075 | 1.072 | **0.004*** | 21.658 | 2.652 | 176.89 | | | |
| Gender (0=women; 1=men) | | -1.641 | 0.567 | **0.004*** | 0.194 | 0.064 | 0.588 | | | |
| Non-opioids (pre-medication) (0= no; 1= yes) | | 1.322 | 0.828 | 0.110 | 3.750 | 0.740 | 18.994 | | | |
| Constant | | -2.624 | 0.871 | **0.003*** | 0.072 | | | | | |
| **Model for: belonging to cluster 3 in Fracture procedures** | | *B* | *SE* | *p* | *OR* | *95%CI (OR)* | | *H-L* | *R²* | *AUC* |
| *Fracture (ICD9 79)* | | | | | | | | 0.792 | 0.242 | 0.742 |
| Psychiatric disorders (0 = no;1 = yes) | | 1.782 | 0.594 | **0.003*** | 5.944 | 1.855 | 19.048 | | | |
| Age (Years) | | -.037 | 0.010 | **<0.001*** | 0.964 | 0.946 | 0.982 | | | |
| Morphine equivalents (Recovery) | | .044 | 0.019 | **0.021*** | 1.045 | 1.007 | 1.084 | | | |
| Constant | | .616 | 0.535 | 0.249 | 1.852 | | | | | |

H-L: Hosmer-Lemeshow test (*p*). $R^2$: Nagelkerke's pseudo-R. AUC: Area under ROC curve.

*Bold: significant parameter (.05 level).

**Conclusions**: The study suggests that procedure-specific risk scales are more convenient when looking for strategies to improve postoperative outcomes, especially at this time where optimization of pain management is a prerequisite for enhanced recovery.

# Clinical diagnostics for the assessment of pain

## Abstract no.: 198

### PRE-EXISTING CHRONIC PAIN, OPIOIDS AND CHRONIC POSTSURGICAL PAIN ONE YEAR AFTER SURGERY

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**Background and aims**: Existence of pre-existing chronic pain (PEX-pain) influences diagnosis and treatment of chronic postsurgical pain (CPSP). The new ICD-11 definition of CPSP requires an increase in pain conpared to PEX-pain, however, this has rarely been addressed in the past.

**Methods**: Ethics approval for analysis of anonymised data from the PAIN OUT registry. Based on pain intensity and pain-related physical/affective interference, patients were allocated to the group *No CPSP*, *Mixed* (mild symptoms), or *CPSP*. PEX-pain and opioid medication before, during and 12 months after surgery were assessed. Endpoint: CPSP-rates in the subgroups with/without PEX-pain and opioid medication.

**Results**: Of 2319 patients, 8.7% had elevated composite pain scores and pain-related functional interference. In order to meet the requirement of an increase in pain intensity at the surgical site compared to the preoperative status, only 3.3% could be allocated to CPSP. Of 1357 patients without PEX-pain, 23.7% reported pain at 12 months; 4.1% had CPSP. In patients with PEX-pain (959), CPSPF rates were significantly higher; 22.2% in patients with PEX-pain at the surgical site and elsewhere. In the majority of patients with PEX-pain, pain intensity declined at 12 months; 50.5% were completely pain-free.

Opioids before surgery were taken by 5.6% of patients, with highest rates in the *CPSPF* group ($p<0.001$). CPSP patients more often had received opioids intra- and postoperatively ($p<0.001$). At twelve months, opioids were taken more frequently in the *CPSPF* group (23.4% vs. 1.1%; $p<0.001$).

**Conclusions**: CPSP rates have frequently been overestimated, as PEX-pain was not considered. A more detailed preoperative assessment is necessary.

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## Abstract no.: 574

### WHAT PREDICTS PAINFUL POLYNEUROPATHY? AN ANALYSIS OF SYMPTOMS AND SIGNS IN PATIENTS WITH PAINFUL AND PAINLESS NEUROPATHY

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**Background and aims**: It is still unclear why some patients develop painful and others painless polyneuropathy. The aim was thus to identify risk factors for a painful polyneuropathy.

**Methods**: 1181 patients of the multi-center DOLORISK-database with painful (probable or definite NeuP) or painless (unlikely NeuP) probable or confirmed neuropathy were investigated clinically, with questionnaires and QST. Multivariate logistic regression (MLR) with MICE including all potential variables (age, gender, BMI, family history of chronic pain, PROMIS anxiety, depression, fatigue and sleep T-Scores, previous traumatic events and hospital stays, TIPI subscores for extraversion, agreeableness, conscientiousness, emotional stability, openness, IPIP score, Pain castrophizing scale (PCS) total score, Toronto total score, etiology of neuropathy, years of education, QST Cluster as well as smoking and alcohol habits) and machine learning was used for the risk estimation of painful neuropathy.

**Results**: MLR demonstrated that severity (Toronto total score, sensory loss) and idiopathic etiology, life-style (current or history of alcohol abuse), presence of pain in family as well as emotional variables (PROMIS Fatigue T-Score, PROMIS Depression T-Score) and PCS total score are important for the presence of pain in neuropathy. Machine learning revealed almost the same variables: The decision tree revealed almost 80% accuracy in deciding about painful or painless neuropathy when including PCS, Toronto total score, etiology of neuropathy, pain in family and smoking habits.

**Conclusions**: This is the first multi-center analysis that considers personality, emotional well-being, life-style and clinical phenotype for risk assessment of painful neuropathy. Results can help to identify patients at risk of the development of painful neuropathy.

# Low back pain and lumboradicular pain

## Abstract no.: 395

### EVIDENCE FOR A SEXUALLY-DIMORPHIC RELATIONSHIP BETWEEN PAIN, NEGATIVE AFFECT AND CIRCULATING ENDOCANNABINOIDS/ N-ACYLETHANOLAMINES IN PATIENTS WITH CHRONIC LOW BACK PAIN

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**Background and aims**: Chronic low back pain (CLBP) is a major unmet clinical need with significant socioeconomic impact, and a large contributor to disability. Research has revealed significant genetic alterations in the endocannabinoid system in patients with acute and chronic LBP vs healthy individuals. Our aim was to investigate the relationship between circulating endocannabinoids, pain, somatosensory measures, comorbidities, and lifestyle factors in CLBP patients vs healthy controls (HCs).

**Methods**: 135 CLBP patients and 88 HCs were recruited and consented to approved procedures. Blood samples and QST scores were taken, while BMI, smoking and alcohol use were recorded. Pain Detect (PD), Pain Catastrophising Scale (PCS) and S-LANSS were administered to the patient cohort, while Beck Depression Inventory-II (BDI-II), Patient Health Questionnaire-9 (PHQ-9), Fatigue Severity Scale (FSS), Visual Analogue Fatigue Scale (VAFS) scores were taken for all participants. Plasma endocannabinoids (2-AG, anandamide [AEA]) and *N*-acylethanolamines (OEA, PEA) were quantified using LC-MS/MS.

**Results**: CLBP patients had higher BMI scores than HCs. Levels of 2-AG were higher in CLBP patients. BMI scores were positively correlated with circulating 2-AG levels in both cohorts and both sexes. However, AEA levels were positively correlated with BMI scores only in CLBP patients. BDI-II, PHQ-9, FSS and VAFS scores were significantly higher in CLBP patients than HCs. AEA and OEA levels in female CLBP patients, but not males, were positively correlated with higher PCS scores. Additionally, circulating PEA levels were negatively correlated with PD scores in male CLBP patients only.

**Conclusions**: Correlations reveal a sexually-dimorphic relationship between pain, negative affect and circulating endocannabinoids/N-acylethanolamines in CLBP.

## Abstract no.: 444

### PAIN AND ITS ASSOCIATIONS WITH ANXIETY, DEPRESSION AND PESSIMISTIC EXPECTATIONS OF THE PATIENTS WITH LOW BACK PAIN AFTER MICRODISCECTOMY

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**Background and aims**: After lumbar microdiscectomy, various factors can influence the persistence of continuous back pain and / or leg pain, and among them are various psychological factors such as anxiety, depression and personal expectations in relation to the persistence or cessation of the pain. The aim of the study was to determine the relationship between pain and the mentioned psychological factors.

**Methods**: The examinations were performed after microdiscectomy on 198 patients (95 men and 103 women) with an average age of 50.20 ± 10.26 years. The following questionnaires were used for the tests: visual analogue scale (VAS); Spielberger Anxiety Inventory-State - STAI-S Y-2; Spielberger Anxiety Inventory-Trait - STAI-T Y-2; Beck Depression Inventory II; and a questionnaire for assessing expectations (pessimistic / optimistic). The examinations were performed after

microdiscectomy in specific time periods: immediately before and after rehabilitation treatment, and then 3 and 6 months after microdiscectomy.

**Results**: Patients with a high degree of current and general anxiety and with clinically pronounced depression had pain of greater intensity. Significantly lower pain intensity, if the pain was present, was in patients who were not anxious or depressed and who were optimistically oriented. The mentioned differences in pain intensities, in all periods of the examination, were statistically highly significant ($p < 0.01$).

**Conclusions**: Increased pain intensity in people with low back pain, after microdiscectomy, is significantly associated with the presence of higher degrees of current and general anxiety, with depression and pessimistic attitudes towards treatment results, and therefore these psychological factors need to be registered.

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## Abstract no.: 482

### CONSERVATIVE TREATMENT EFFECTS ON POSTURAL ADJUSTMENTS IN LOW BACK PAIN PATIENTS: A SYSTEMATIC REVIEW

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**Background and aims**: Anticipatory and compensatory postural adjustments (APA and CPA) are feedforward and feedback motor control strategies to maintain balance after respectively expected and unexpected perturbations. Research has demonstrated delayed APA and CPA onsets of the trunk muscles in non-specific low back pain (LBP) patients compared to healthy pain-free controls. Despite increasing research on spinal motor control rehabilitation, a summary of evidence for its effect on postural adjustments is currently lacking.

**Methods**: Studies examining conservative treatment effects on APA and CPA in LBP patients were identified by searching five databases. Methodological quality was evaluated using the Cochrane Risk of Bias tool 2.0. Level of evidence and level of conclusion (LOC) was assigned following the EBRO method.

**Results**: Sixteen articles examined treatment effects on APA onset. Only two studies also examined treatment effects on CPA onset. Conflicting evidence was found for improvement in APA and CPA onset following general exercise therapy (LOC=3). Transversus abdominis (TrA) and internal oblique APA onset significantly improved following sensorimotor control training (LOC=2). However, improvement did not differ significantly from control interventions. Repetitive peripheral magnetic stimulation in combination with sensorimotor control training is likely to improve APA TrA onset (LOC=1). The effect of kinesiotaping in combination with physical therapy demonstrated a significant improvement in APA TrA onset compared to sham tape and physical therapy (LOC=3).

**Conclusions**: Sensorimotor control training and kinesiotaping combined with physical therapy are likely to improve APA onsets. However, low methodological quality of current research and different interpretations of motor control rehabilitation need to be addressed.

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## Abstract no.: 504

### THE INFLUENCE OF ATTENTION ON MOVEMENT-RELATED OUTCOMES IN NON-SPECIFIC LOW BACK PAIN: A SYSTEMATIC REVIEW

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**Background and aims**: Cognitive-affective factors such as attention might influence movement performance in non-specific low back pain (NSLBP), but no overview exists regarding the specific influence of such factors on movement. Therefore, the objective of this study is to review current knowledge concerning the effects of 'attention' on movement-related outcomes in NSLBP.

**Methods**: A systematic search of 5 electronic databases was performed and reported following the PRISMA-guidelines. Risk-of-bias (ROB) was evaluated using the adjusted Newcastle-Ottawa Scale. Levels of evidence/conclusion were assigned according to the Dutch Institute for Healthcare Improvement guidelines.

**Results**: Twenty-two articles were included (ROB 18.2%-72.7%), the majority (77%) performed in chronic LBP. Fifteen studies used dual-tasks, 5 studies used experimental manipulation and 3 studies used correlational analysis to manipulate/measure attention. Limited evidence indicated attentional suppression (measured with coping strategy questionnaire) to be negatively associated with activity of the trunk muscles in acute NSLBP. Furthermore, limited evidence indicated that when attention is divided over tasks (i.e. dual-tasks) this results in lower variability of postural strategies in recurrent NSLBP. Finally, there was limited evidence for lower and delayed anticipatory trunk muscle activation when introducing dual-tasks in chronic NSLBP.

**Conclusions**: This systematic review is the first to summarize/specify the influence of attention on movement performance in NSLBP. In acute NSLBP, ignoring pain sensations is negatively associated with trunk muscle activity. When attention is divided over tasks (i.e. dual-tasks), individuals with recurrent/chronic NSLBP are less capable to control their trunk muscles, as evidenced by altered movement preparation and postural strategy variability.

## Abstract no.: 587

### PREDICTIVE VALIDITY OF START BACK SCREENING TOOL IN OLDER ADULTS WITH BACK PAIN

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**Background and aims**: The STarT Back Screening Tool (SBT) stratifies people with back pain into low-, medium and high-risk groups based on prognostic factors for persistent disabling back pain. The aim of this study was to assess the predictive validity of the SBT in older adults with back pain in primary care.

**Methods**: This prospective cohort study included 452 patients ≥55 years seeking Norwegian primary care (GP, physiotherapist, or chiropractor) with a new episode of back pain. Persistent disabling back pain was defined as a score of ≥7/24 on Roland-Morris Disability Questionnaire (RMDQ) at 6 months. Predictive validity of the SBT risk groups measured at baseline was assessed with logistic regression presented as risk ratios (RR), sensitivity and specificity.

**Results**: The SBT classified 67%, 27% and 6% of the patients as low-, medium- and high-risk. The proportion (95% confidence interval (CI)) of persistent disabling back pain at follow-up was 24% (19-30%) in the low-risk group, 57% (46-67%) in the medium-risk group, and 65% (41-85%) in the high-risk group. The SBT was a significant predictor of persistent disabling back pain. The RR (95% CI) was 2.36 (1.77-3.17) for the medium-risk group, and 2.70 (1.82-4.01) for the high-risk group, compared to the low-risk group. Sensitivity and specificity were 0.53 and 0.80 for the low- versus medium-/high-risk groups, and 0.11 and 0.97 for the high- versus low-/medium-risk groups.

**Conclusions**: The SBT showed slightly less accuracy in stratifying older adults into different risk levels for persistent disabling back pain, when compared to previous studies (Figure).

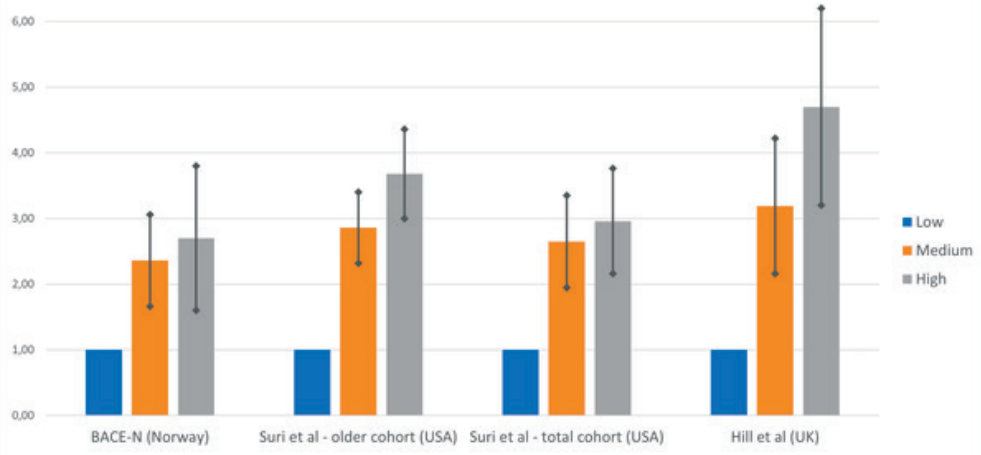


**Figure:** Relative risk ratios for persistent disabling back pain for the different STarT Back Screening tool risk groups in BACE-N and previous studies. Vertical lines represent 95% confidence intervals. BACE-N: Back Complaints in the Elders - Norway.

## Abstract no.: 649

### LOW BACK PAIN WITH PERSISTENT RADICULOPATHY: THE CLINICAL ROLE OF GENETIC VARIANTS IN THE GENES SOX5, CCDC26/GSDMC AND DCC

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**Background and aims**: In a recently published genome-wide association study (GWAS) chronic back pain was associated with three loci; *SOX5, CCDC26*/*GSDMC* and *DCC*. This GWAS was based on a heterogeneous sample of back pain disorders, and it is unknown whether these loci are of clinical relevance for low back pain (LBP) with persistent radiculopathy. Thus, we aimed to examine if LBP with radiculopathy 12 months after hospitalization for acute LBP with radiculopathy is associated with the selected single nucleotide polymorphisms (SNPs); *SOX5* rs34616559, *CCDC26*/*GSDMC* rs7833174 and *DCC* rs4384683.

**Methods**: In this prospective one-year cohort study, 436 patients admitted to hospital due to an acute episode of LBP with radiculopathy were genotyped. The outcome measures back pain, leg pain, and Oswestry Disability Index (ODI) were reported 12 months after admission (n = 338). Associations between SNPs and the three outcome measures were investigated with Kruskal-Wallis H test.

**Results**: We found no associations between *SOX5* rs34616559 and back pain (p=0.182), leg pain (p=0.679) or ODI (p=0.706), or between *CCDC26*/*GSDMC* rs7833174 and back pain (p=0.997), leg pain (p=0.351) or ODI (p=0.920), or between *DCC* rs4384683 and back pain (p=0.633), leg pain (p=0.125) or ODI (p=0.397) 12 months after hospital admission.

**Conclusions**: The outcome measures for persistent LBP with radiculopathy were not associated with *SOX5* rs34616559, *CCDC26*/*GSDMC* rs7833174 and *DCC* rs4384683. This absent or weak association suggests that the SNPs previously associated with chronic back pain are not useful as prognostic biomarkers for LBP with persistent radiculopathy for patients hospitalized for acute LBP with radiculopathy.

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## Abstract no.: 705

### CORTICAL EXCITABILITY AND CONDITIONED PAIN MODULATION IN NON-SPECIFIC LOW-BACK PAIN AND OTHER LOW-BACK PAIN CONDITIONS, A DOUBLE-CONTROL STUDY

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**Background and aims**: Patients with non-specific low-back pain (ns-LBP) have altered motor cortex excitability (CE) affecting GABA and glutamate-dependent local cortical networks. It remains undetermined whether these changes are specific for ns-LBP or if they are also present in other LBP-associated conditions as failed-back surgery syndrome (FBSS) and sciatica (Sc). We compared CE, conditioned pain modulation (CPM) and patients' clinical characteristics with ns-LBP, FBSS and Sc.

**Methods**: CE, sociodemographic, pain intensity (brief pain inventory-BPI), pain dimensions (McGill pain questionnaire), catastrophism, mood (anxiety and depression scale-HADS), and neuropathic pain symptoms (neuropathic pain symptoms inventory-NPSI) were assessed in the three groups, as well as measurements of deep pain pressure thresholds and CPM.

**Results**: In general, ns-LBP patients had less intense pain (4.9±1.5), mood (2.7±2.5), catastrophizing (17.4±10.7) and neuropathic symptoms (1.0±0.9), PPTs (4.06±0.9) compared to Sc and FBSS ($p<0.05$). However, even though three groups had patients with major abnormalities in CE compared to healthy controls (being altered in >60% of individuals), for most CE parameters, no intergroup differences were found. Similarly, CPM were globally reduced in the three groups, but were significantly less affected in ns-LBP group (-25.4±16.6) compared to FBSS and Sc ($p<0.05$).

**Conclusions**: LBP is a heterogenous condition, including patients with less severe clinical and pain modulatory profiles (ns-LBP) and those with more severe abnormalities such as Sc and FBSS. CE is abnormal in majority of these patients, but it was not different between groups, which suggests it may not be driving higher pain and related factors in Sc and FBSS.

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## Abstract no.: 1066

### "THERE'S DEFINITELY SOMETHING WRONG BUT WE JUST DON'T KNOW WHAT IT IS": A QUALITATIVE STUDY EXPLORING ROWERS' UNDERSTANDING OF LOW BACK PAIN

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**Background and aims**: Low back pain (LBP) is highly prevalent in rowing and can be associated with significant disability and premature retirement. A previous qualitative study in rowers revealed a culture of concealment of pain and injury due to fear of judgement by coaches or teammates. The aim of this study was to explore rowers' perspectives in relation to diagnosis, contributory factors, and management of LBP.

**Methods**: We conducted a qualitative secondary analysis of interview data previously collected from 25 rowers (12 in Australia and 13 in Ireland). A reflexive thematic analysis approach was used.

**Results**: We identified three themes: *1) Rowers attribute LBP to structural/physical factors*. Most rowers referred to structural pathologies or physical impairments when asked about their LBP diagnosis. Some participants were reassured if imaging results helped to explain their LBP, but others were frustrated if findings on imaging did not correlate with their symptoms.*2) Rowing is viewed as a risky sport for LBP*. Risk factors proposed by the rowers to contribute to LBP were primarily physical and included ergometer training, individual technique, and repetitive loading. 3) *Rowers focus on physical strategies for the management and prevention of their LBP.* In particular, rowers considered stretching and core-strengthening exercise to be important components of treatment.

**Conclusions**: Rowers' understanding of the cause and management of LBP was predominantly biomedical and focused on physical impairments. Further education of rowers, coaches and healthcare professionals in relation to the contribution of psychosocial factors may be helpful for rowers experiencing LBP.

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## Abstract no.: 1067

### ALTERED MORPHOLOGY OF THE THORACOLUMBAR FASCIA IN THOSE WITH LOWER BACK PAIN: AN ULTRASOUND STUDY

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**Background and aims**: Lower back pain (LBP) is the leading cause of worldwide disability-adjusted life years with an estimated prevalence of 84%. Adaptations of the thoracolumbar fascia, measured using ultrasound imaging (USI), have been associated with lower back pain [1]. Further studies of the thoracolumbar have found USI to be a reliable method to analyse morphology [2]. Whilst USI is a valid method to determine thoracolumbar fascia the current study aimed to evaluate thoracolumbar adaptations in those with LBP and efficacy of USI as a diagnostic tool.

**Methods**: This study was approved by the University of Kent's School of Sport and Exercise Sciences Research Ethics Advisory Group. Cohort size N: 33 (17 male, 16 female), aged 18-70 (Average 39.4), 17 with LBP. USI of thoracolumbar fascia (longitudinal view, 2cm lateral of L2-L3 spinal level) were taken at a frequency of 18 MHz, depth of 3cm. Analysis of thickness and echogenicity was performed using a customised MATLAB grey-scale script and IBM SPSS statistics.

**Results**: Thoracolumbar fascia in the LBP group was 32% thicker (ANOVA, $p<0.040$) compared to no-LBP group. Echogenicity was found to be 45% lower (ANOVA, $p<0.001$) in the LBP group compared to no-LBP group.

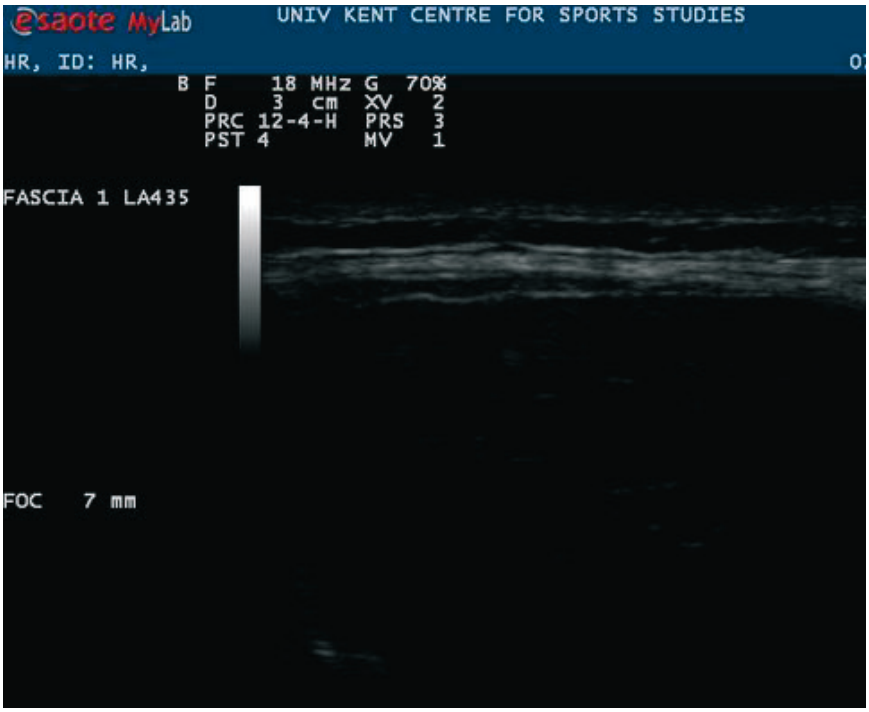


Figure 1: Thoracolumbar fascia with no LBP

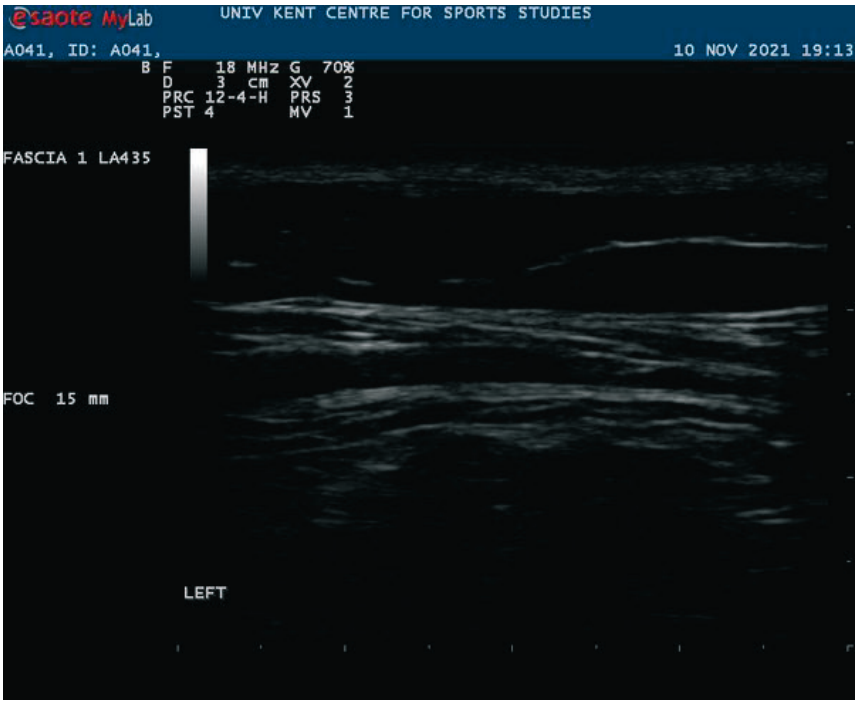


Figure 2: Thoracolumbar fascia with LBP

**Conclusions**: This study found significant adaptations of the thoracolumbar fascia in people with LBP, as measured by USI. The thoracolumbar fascia has a potential role in the pathophysiology of LBP. Further research is needed to ascertain whether these adaptations are the cause or effect of LBP.

# Orofacial pain

## Abstract no.: 423

### NATURAL HISTORY OF TRIGEMINAL NEURALGIA: REMISSION PERIODS AND CHANGES IN PAIN CHARACTERISTICS

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**Background and aims**: Uniquely in neuropathic pain syndromes, Trigeminal Neuralgia (TN) presents periods of remissions and exacerbations, but little is known about their features. In this study we aim to define the natural history of TN and changes in pain characteristics during disease, in patients who never underwent surgical procedures, subgrouping them according to TN aetiology.

**Methods**: 51 subjects with definite diagnosis of TN according to the ICOP 2020 Criteria filled in a structured questionnaire detailing specific pain features and response to treatment, with emphasis to their changes over time.

**Results**: Out of the 51 patients, 33 had Classical TN, 10 had Secondary TN and 8 had Idiopathic TN. Mean duration of disease was 8.0 year (95% CI 1.0-21.0). Preliminary analysis showed that only in patients with classical TN, the first remission period appears to be significantly longer (median duration 6.0 months, 95% CI 3.0-18.0) that the average duration of the following ones (median duration 3.5 months, 95% CI 3.0-7.0) ($p<0.05$); moreover, these patients reported that at onset pain was significantly less severe than during the following disease course ($p<0.05$). In secondary TN, remission periods were less frequent then in the other aetiologies. 20% of patients reported sensory disturbances which preceded the first electric shock-like pain in the same area, so called “pre-trigeminal neuralgia”. No change in response to medical therapy was detected.

**Conclusions**: Preliminary data show that natural history of TN may be different depending on its aetiology. These data may be relevant for a better comprehension of the pathophysiological mechanisms underlying pain in TN.

## Abstract no.: 488

### TIME COURSE OF PAINFUL POST-TRAUMATIC TRIGEMINAL NEUROPATHY

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**Background and aims**: Several neuropathic pain conditions (NP) follow a circadian rhythm. Little is known regarding oral NP specifically, except for Burning Mouth Syndrome in which pain is also often alleviated by eating. Interestingly, some patients with painful traumatic trigeminal neuropathy (PTTN) report a similar experience. The aim of this study was therefore to 1) explore the specific time course of pain in PTTN, 2) to investigate the impact of eating on pain intensity in PTTN.

**Methods**: Data were collected from the TRIGTOX study (NCT03555916). Adult patients with PTTN diagnosed using the ICHD-3 criteria were recruited between 2019 and 2021 in the Pitié-Salpêtrière Hospital in Paris. The primary outcome measure was an hourly self-declared quantitative assessment of pain intensity using an 11-point numerical scale (NS, 0-10) for 7 consecutive days. Impact of food intake on pain intensity was daily assessed using a three-choice questionnaire (increase/decrease/no effect). Data are presented as mean±SEM with Kruskal-Wallis test.

**Results**: 21 patients (7 males; 14 females) were included (age: 48 ± 14.y.o.). Mean pain intensity (3.87±0,30) increased progressively and significantly during the day, from 1.42±0.42 to 4.96±0.32 (p<0,001). During eating, pain intensity was increased in 3 patients (2,35± 0,76), decreased in 4 (4.10±0,45) and unchanged in 14 (4.34±0,36).

**Conclusions**: In conclusion, PTTN patients reported a linear, circadian, increase in self-reported pain intensity throughout the day. Pain modifications during eating could serve to identify clinical subgroups of PTTN patients. These results might be of interest for personalized pharmacological treatment at specific time points during the day.

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## Abstract no.: 535

### THE ROLE OF RESOLVINS IN CHRONIC PAIN

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**Background and aims**: Recent studies show that resolvins can alleviate pain symptoms in pre-clinical models, demonstrating their therapeutic potential in chronic pain. Since resolvins are naturally occurring and produced endogenously, they may cause fewer adverse side effects, and may help to address the unmet clinical need for effective and safe pain medications. Therefore, this study aimed to explore the role of resolvins in chronic pain, and how they interact to reduce inflammation and pain.

**Methods**: Dental caries can lead to inflammation in the tooth pulp and spontaneous pain, but not all patients with carious teeth report symptoms of pain. By comparing resolvin receptor expression in human tooth pulp tissues from patients with and without pain via immunohistochemistry, we hope to identify resolvin receptors that may be relevant to pain.

**Results**: The specificity of antibodies we used was first evaluated using human umbilical vein endothelial cells via a series of qPCR, western blot, and immunocytochemistry assays. After validating the specificity of BLT1 and GPR32 antibody, the correlation between resolvin receptor expression and inflammation and pain in human tooth pulp tissues was then explored.

BLT1 expression in tooth pulp tissues was examined in detail, and was found in blood vessels and nerve fibres. Further studies quantifying BLT1 expression in different groups of tooth pulp tissues show that BLT1 expression in tissues from the carious painful group was significantly higher than that from the carious non-painful group.

**Conclusions**: BLT1 expression was upregulated in tissues from carious painful group, which suggest that BLT1 could have a role in inflammatory pain.

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## Abstract no.: 720

### SOMATOSENSORY ALTERATIONS TO DYNAMIC QUANTITATIVE SENSORY TESTS IN PATIENTS WITH CHRONIC TEMPOROMANDIBULAR MYALGIA: A SYSTEMATIC REVIEW OF OBSERVATIONAL STUDIES WITH META-ANALYSES

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**Background and aims**: There is conflicting results regarding the somatosensory profiles of patients with temporomandibular myalgia (TMDm). The objective of this review was to identify trigeminal and extra-trigeminal somatosensory alterations to dynamic quantitative sensory tests in adults with TMDm.

**Methods**: We searched EMBASE, PUBMED, PSYCHINFO, SCOPUS and CINAHL from January 1992 to September 2021 for studies on dynamic quantitative sensory test in adults with chronic TMDm. We excluded studies without healthy controls or in which TMDm were associated with non-musculoskeletal orofacial disorders, neuropathic pain, cancer-related pain, or recent orthodontic/dental intervention. Risk of bias was assessed using the SIGN checklist for case-control studies. Findings

were structured around dynamic quantitative sensory tests and their localization. When possible, we pooled data with meta-analyses.

**Results**: We found 1976 potential studies for review, and we extracted data from 23 studies including a total of 1284 adults with chronic TMDm and 2791 healthy controls. Mechanical temporal summation, which was the most studied phenomenon (14 studies), may be increased in the upper limb of patients with TMDm (SMD = .43; 95% CI: .11 to .75). Little to no differences were identified with thermal temporal summation (five studies), conditioned pain modulation (seven studies), exercise-induced hypoalgesia (two studies), placebo analgesia (two studies), stress-induced hypoalgesia (one study) and offset analgesia (one study).

**Conclusions**: A major limitation was the high risk of bias of included studies. Future studies could benefit from following guidelines for quantitative sensory tests and consideration of confounders.

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## Abstract no.: 1121

### SENSORY PHENOTYPING IN TRIGEMINAL NEURALGIA WITH AND WITHOUT CONCOMITANT CONTINUOUS PAIN: INSIGHTS INTO PATHOGENETIC MECHANISM

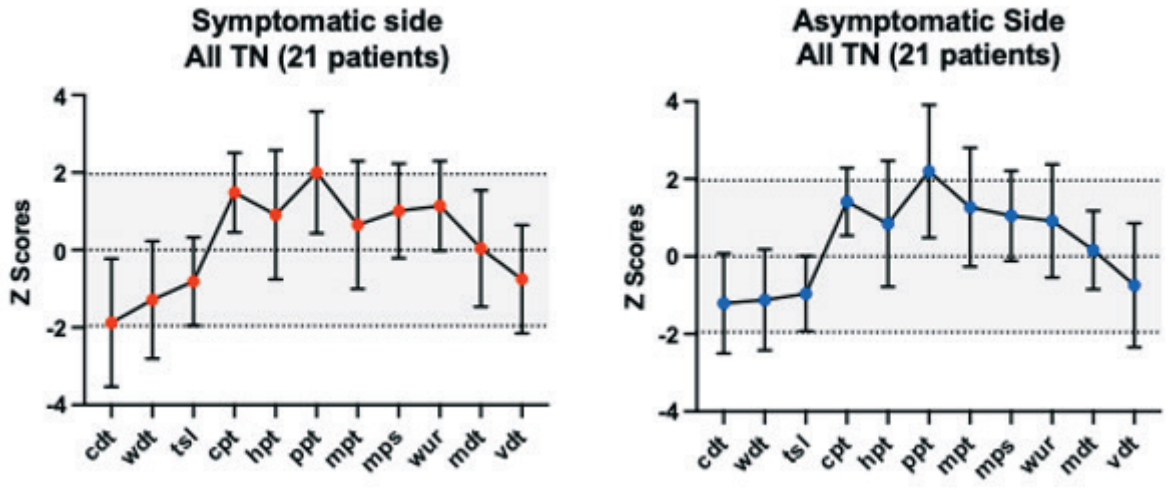
G. De Stefano[1,2,3], D. Litewczuk[1], A. Truini[1], F. O'Neill[2], B. Frank[2,3], G. Di Stefano[1]

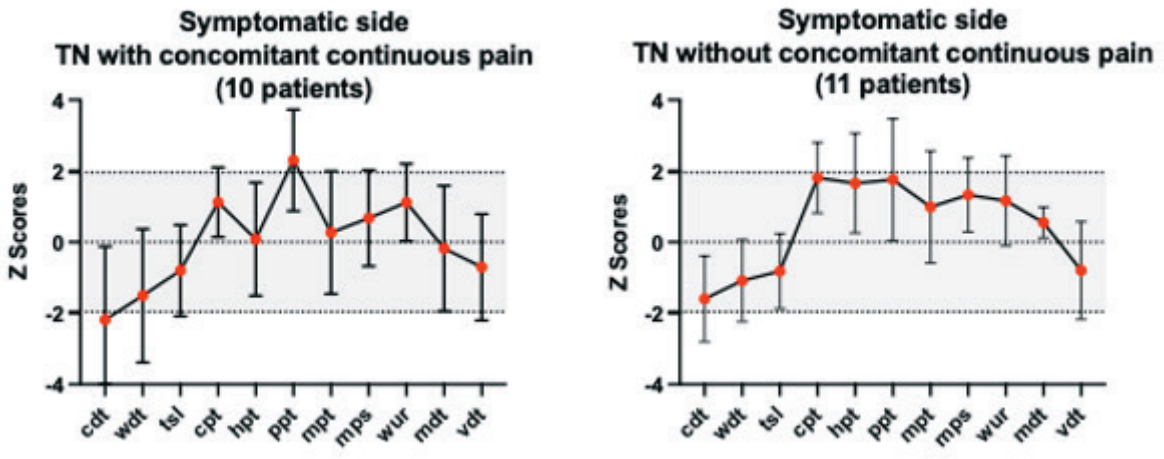
*[1]Sapienza University of Rome, Department of Human Neuroscience, Rome, Italy, [2]Pain Research Institute, University of Liverpool, Liverpool, United Kingdom, [3]The Walton Centre NHS Foundation Trust, Liverpool, United Kingdom*

**Background and aims**: Trigeminal Neuralgia is characterized by recurrent paroxysms of unilateral facial pain. Beside this characteristic paroxysmal pain, up to 50% of patients experiences a concomitant continuous pain.The aim of the present study is to investigate the sensory phenotype that characterize the presence of concomitant continuous pain in trigeminal neuralgia.

**Methods**: We enrolled 21 patients with clinically defined TN, 10 (47.6%) with concomitant continuous pain and 11 (52.4%) with purely paroxysmal pain. All of them underwent a Quantitative Sensory Testing following the standardized protocol of the German Research Network on Neuropathic Pain, on both sides of the face. In all patients, we compared sensory phenotyping between affected and not affected side. Finally, we compared sensory phenotyping in the affected side between patients with and without concomitant continuous pain.

**Results**: In the preliminary analysis of 21 patients, a trend towards loss of function was found in thermal sensibility bilaterally, but more pronounced in the affected side (CDT -1.88±1.65 vs -1.21±1.29; WDT -1.29±1.52 vs -1.12±1.30, Fig.1). These trends were more pronounced in the group with concomitant continuous pain (CDT -2.18±2.06 vs -1.59±1.21; WDT -1.51± 1.87 vs -1.09±1.16, Fig.2). These differences were not statistically significant possibly due to a low population numerosity.






**Conclusions**: The observation that objective sensory abnormalities caused by axonal loss occurred more frequently in TN patients with concomitant continuous pain than in those with purely paroxysmal pain potentially gives support to the hypothesis that small fibre axonal loss may underly the pathophysiological mechanism of concomitant continuous pain.

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## Abstract no.: 1159

### HEALTHCARE PRIOROTIES IN PATIENTS WITH CHRONIC FACIAL PAIN OF TEMPROMANDIBULAR DISORDERS (TMD): A SERIES OF ONLINE FOCUS GROUPS

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**Background and aims**: To identify the important aspects of healthcare for patients with TMD and to explore their clinical journey while seeking management for their symptoms.

**Methods**: Semi-structured interviews were used to elicit data from the participants. They were directed using a topic guide covering a range of subjects, such as initial visits in primary care, referrals to secondary care centres, and effect on symptoms along the way. The discussions were audiotaped and transcribed verbatim. Thematic analysis was utilised to identify the common themes.

**Results**: 15 participants engaged in three focus groups. Eight themes were identified: “frequent engagement in healthcare services”, “access to appropriate care”, “organised and coordinated care”, “receiving a diagnosis and enough information”, “interaction with the clinical staff”, “treatment strategies and having an ‘action plan’”, “communication”, and “support and social networks”.

**Conclusions**: The participants gave accounts of the difficulties encountered in healthcare in both general terms and also specific to TMD patients. Most notable was the struggle to receive a diagnosis and to be understood. Our findings suggest that delays in delivering appointments with people of expertise may have caused worsening of symptoms. However, when a pleasant experience was encountered, access to care was fast, and communication with the clinical team was good. These provided positive experiences, appreciated by the participants.

It may be worthwhile for future research to explore the effect of the different facets of healthcare on patient outcomes and to determine the most influential aspects in order to prioritise these if improvements are planned.

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# Osteoarthritis, Rheumatoid Arthritis

## Abstract no.: 353

### IMPAIRED PAIN MODULATION IN CHRONIC INFLAMMATORY RHEUMATISMS. A CASE-CONTROLLED STUDY DEMONSTRATING DECREASE NOXIOUS INHIBITORY CONTROLS

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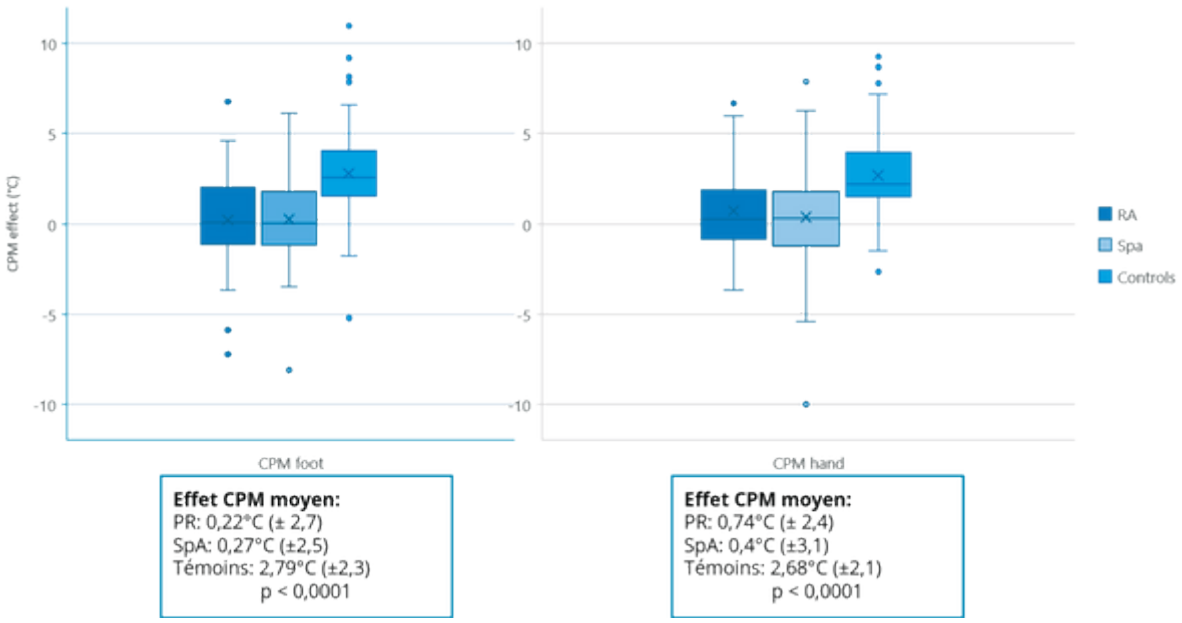
*[1]Université de Paris / Cochin Hospital - Pain Management Department, Paris, France, [2]INSERM U987, Boulogne Billancourt, France, [3]Cochin Hospital - Pain Management Department, Paris, France, [4]Cochin Hospital - Unité de Biostatistique et d'Epidémiologie, Paris, France, [5]Ambroise Paré Hospital - Pain Management Department, Paris, France*

**Background and aims**: In rheumatoid arthritis (RA) and spondyloarthropathies (Spa), persisting pain remains a challenge. Suggested mechanism is central pain sensitization, measured by quantitative sensory testing (QST) and conditioned pain modulation (CPM) showing a reduction of descending pain controls. We analyzed QST and CPM in a cohort of active disease RA and Spa patients compared to healthy controls.

**Methods**: 50 RA and 50 Spa patients were included with 100 age-sex matched controls. All participants were assessed by various psychological questionnaires. All participants underwent QST with heat and cold pain thresholds (HPT-CPT) and CPM. In CPM, conditioning stimulus was applied to foot and non-dominant hand in a randomised sequence. Descending pain controls are measured as the difference between HPT (in °C) after and before the conditioning stimulus: the higher the CPM effect, the more efficient are the inhibitory controls.

**Results**: There was no significant difference in HPT and CPT between patients and controls. Patients had significantly reduced CPM effect (see Figure). Respectively for patient and controls mean CPM effect 0.25°C (±2,57) and 2.79°C (±2,31) (p<0.0001) (conditioning on the foot); mean CPM effect 0.57°C (±2,74) and 2.68°C (±2,12) (p<0.0001) (conditioning on the hand). For patients, reduced CPM effect was associated with high pain intensity. For all participants, reduced CPM effect was associated with high central sensitization inventory score, depression, sleep disturbance and pain catastrophizing.




**Conclusions**: In active chronic inflammatory rheumatisms, diffuse noxious inhibitory controls are reduced compared to healthy subjects, supporting the hypothesis of central sensitization.

## Abstract no.: 371

### OSTEOARTHRITIC PAIN AND MOOD ALTERATIONS IN ADULT AND OLD MICE: THE ROLE OF NEUROINFLAMMATION

G. Amodeo[1], S. Franchi[1], B. Verduci[1], S. D'Agnelli[2], M. Baciarello[2], E.G. Bignami[2], P. Sacerdote[1]

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**Background and aims**: Elderly population is more susceptible to develop chronic pain and frailty. Different chronic pain syndromes are associated with comorbidities, including depression, anxiety, sleep disturbances, and neurocognitive changes. Chronic pain, frailty and mood disorders share common biological substrates like inflammation and neuroinflammation.

The aim of this study was to evaluate in adult and old mice the correlation among chronic pain, frailty and mood disorders focusing on neuroinflammation, and to assess the effect of pain treatment on these parameters.

**Methods**: Osteoarthritis-(OA) was induced in adult and old mice (3 and 20 months old) by MIA-intrarticular injection (1mg). Morphine treatment (2.5mg/kg qd for 1week) started 7 days after MIA. Hypersensitivity was evaluated during the entire experimental protocol, while mood alterations and frailty were assessed 2 weeks after OA-induction. Mice were sacrificed and brain areas (prefrontal cortex, hypothalamus and hippocampus) were collected to analyze pro-/anti-inflammatory cytokines, glial and cellular damage markers (mRNA and protein).

**Results**: Our results indicate that hypersensitivity similarly developed in adult and old OA mice and both exhibited significant mood alterations. *Naive* old mice were already characterized by depressive-like behavior and this condition was not aggravated by OA-pain, whereas in adult mice chronic pain induced a depressive condition. Anxiety similarly developed in both adult and old OA-mice. In OA-mice pain and mood disorders were related to brain neuroinflammation that was however greater in old mice. An increase in frailty index was evident in both adult and old OA-mice.

**Conclusions**: Appropriate pain treatment with morphine mitigated pain, neuroinflammation and mood disorders also improving frailty condition.

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## Abstract no.: 386

### IDENTIFICATION OF METABOLIC FACTORS AND INFLAMMATORY MARKERS PREDICTIVE OF POOR OUTCOME AFTER TOTAL KNEE ARTHROPLASTY IN PATIENTS WITH KNEE OSTEOARTHRITIS: A SYSTEMATIC REVIEW

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**Background and aims**: A better understanding of how metabolic factors and inflammatory markers are related to postsurgical total knee arthroplasty (TKA) outcome might help to gain more insight into the timing of surgery, patient expectations and patient-surgeon shared decisions. Therefore, the aim of this systematic review is to review and critically appraise the current existing evidence related to metabolic factors and inflammatory markers predictive of pain, functional abilities, quality of life and patient satisfaction after TKA in patients with knee osteoarthritis (OA).

**Methods**: A systematic search of existing literature was performed using the electronic databases PubMed, Web Of Science and Embase until the 23th of November 2020. Studies that evaluated the influence of metabolic or inflammatory markers (I) on postsurgical outcome (O) in end-stage knee OA patients awaiting primary TKA (P) were included in this review.

**Results**: In total, 43 studies were included. Risk of bias of the included studies was low for one study, moderate for 10 studies and high for the remaining 32 studies. Conflicting evidence was found for the influence of body mass index, diabetes, cytokine levels and comorbidities on pain, function, satisfaction and quality of life at more than 6 months after TKA.

**Conclusions**: Several limitations such as not considering known confounding factors, the use of many different outcome measures and a widely varying follow-up period made it hard to draw firm conclusions and clinical implications. Therefore, more high-quality research that accounts for the above-mentioned limitations is needed to reach consensus on the role of these putative influencing factors for TKA outcome.

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## Abstract no.: 440

### EXPLORING THE GENETIC BASIS FOR THE ASSOCATION OF THE SPECIALISED PRO-RESOLVING MEDIATOR PRE-CURSOR, 17-HDHA, WITH PAIN IN PEOPLE WITH OSTEOARTHRITIS

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**Background and aims**: Chronic osteoarthritis (OA) pain is a considerable burden for individuals and society. Endogenous specialised pro-resolving mediators (SPMs) curtail both inflammation and pain. Lower circulating levels of the SPM pre-cursor, 17-hydroxy-Docosahexaenoic Acid (17-HDHA), is associated with increased OA pain. The aim of this study was to probe the potential genetic basis for the association between levels of 17-HDHA and OA pain.

**Methods**: Blood samples were collected from 30 people with OA (iBEAT-OA (NCT03545048) cohort, Research Ethics Committee [ref:18/EM/0154] and the Health Research Authority [No:18021]). Plasma levels of 17-HDHA were measured by LC-MS/MS and pain scores (numerical rating scale (NRS)) were measured (**Table 1**). Intermediate (CD14++/CD16+/CD66b-/HLA-DR+) monocytes were sorted by fluorescence-activated cell sorting (FACS), RNA was extracted for next-generation RNA sequencing and differentially expressed genes (DEGs) were identified using DESeq2.

**Table 1: Clinical characteristics of the 4 groups used in this study. Data presented as mean±SEM. BMI = Body mass index (kg/m²), K/L = Kellgren- Lawrence radiographic grade, NRS = Numerical Rating Scale.**

| Group Name | Group Size | Age | Sex (%F) | BMI | K/L | Pain (NRS) | 17-HDHA (nM) |
|---|---|---|---|---|---|---|---|
| Low Pain, Low 17-HDHA | 9 | 61.22±2.2 | 56% | 33.2±2.3 | 1.8±0.3 | 3.7±0.5 | 0.03±0.23 |
| Low Pain, High 17-HDHA | 8 | 66.2±3 | 62.5% | 28.1±2.5 | 2±0.3 | 3.7±0.6 | 0.04±0.6 |
| High Pain, Low 17-HDHA | 8 | 61±2.6 | 62.5% | 27.9±1.3 | 2±0.4 | 7.1±0.2 | 0.04±0.33 |
| High Pain, High 17-HDHA | 5 | 64±2.3 | 60% | 31.1±1.7 | 1.8±0.2 | 6.8±0.4 | 0.05±0.68 |

**Results**: Participants were stratified into 4 groups based on pain scores and 17-HDHA levels (**Table 1**). RNA sequencing of the intermediate monocytes identified a large number of mRNAs which were differentially expressed between the 4 groups. Univariate analysis identified 3353 genes significantly associated with levels of 17-HDHA across all participants. Ingenuity pathway analysis (IPA) identified 180 canonical biological pathways significantly ($p<0.05$) associated with these genes. The top three pathways (**Table 2**) included EIF2 (eukaryotic initiation factor 2) signalling, which has already been implicated in peripheral nociceptive processing.

| Pathway | -Log(p-value) | Ratio |
|---|---|---|
| EIF2 Signalling | 17.1 | 0.353 |
| Sirtuin Signalling Pathway | 14.6 | 0.305 |
| Mitochondrial Dysfunction | 13.6 | 0.357 |

**Conclusions**: These data provide new insight into the biological pathways which may contribute to the association between 17-HDHA and chronic OA pain, and may provide novel analgesic strategies.

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## Abstract no.: 458

### A GAP ANALYSIS ON PAIN MANAGEMENT IN CHRONIC PAIN OF OSTEOARTHRITIS

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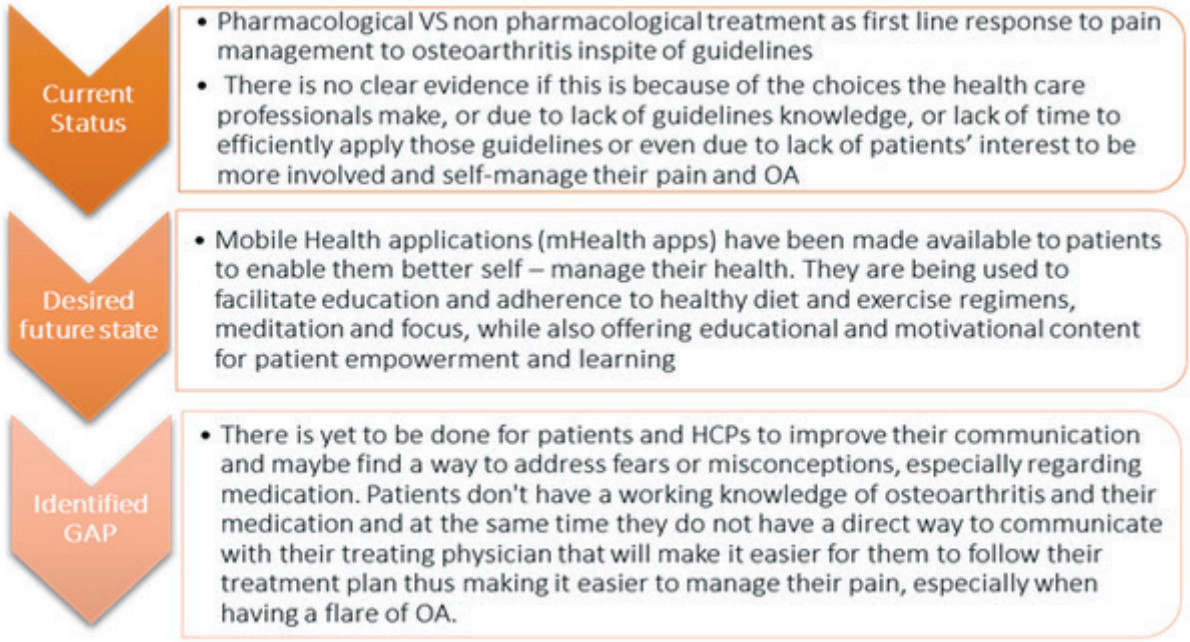
**Background and aims**: There are several treatment options for pain in osteoarthritis (OA) aiming to reduce or help patients manage their pain efficiently. Non-pharmacological therapies are considered to be the first treatment option for patients dealing with none to mild pain and low functional difficulties. Pharmacological therapies are considered to be the second line therapies. Aim of this gap analysis was to determine whether this is how healthcare professionals (HCPs) and patients manage chronic pain in OA and to present both perspectives on chronic pain management.

**Methods**: A mixed methods research design was used. Quantitative and qualitative data were collected and analyzed. The objective was to identify the current state on osteoarthritis chronic pain management in Greece, Malta and Cyprus. Online surveys were filled by 113 participants, HCPs and patients, from Greece and Malta. Meanwhile 13 interviews with HCPs and patients from Greece, Malta and Cyprus were carried out online due to COVID-19 restrictions (via Skype or Viber) from March till May 2021.

**Results**: The most prominent answer on how pain is managed in OA (in Greece and Malta) was pharmacological with physiotherapy (non-pharmacological) being the second choice. This was also a main theme that both HCPs and patients pointed out in their interviews.




**Conclusions**: Apart from the major gap using mainly non-pharmacological options instead of all available options in managing chronic pain of OA this analysis having the unique perspective of both HCPs and patients discussed that there is a need for better and easier communication perhaps using mHealth applications and training of everyone involved.

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## Abstract no.: 634

### PHARMACOLOGICAL EFFECTS OF A NOVEL HYALURONIC ACID-BASED HYDROGEL ON PAIN-RELATED BEHAVIOURS IN THE RAT SODIUM MONOIODOACETATE MODEL OF OSTEOARTHRITIS

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**Background and aims**: Chronic pain related to knee osteoarthritis (OA) is a leading cause of disability worldwide. The current treatments (e.g. analgesics, steroid injectables) are inadequate, providing partial pain relief with significant side effects. In this study, we examined the effects of a novel hyaluronic acid (HA)-based hydrogel containing nerve blocking functional moieties attached as side chains on chronic pain-related behaviours in the rat sodium monoiodoacetate (MIA) model of OA.

**Methods**: Male Sprague-Dawley rats (170-190 g, n=10/group, Envigo) were used in this study. Under brief anaesthesia, rats received an intra-articular (i.a.) injection of MIA or saline into the left knee joint (Day 0). On Day 14, treatments (vehicle/HA/HA-hydrogel) were administered intra-articularly into the MIA-injected joint. The animals were assessed for dynamic weight bearing asymmetry and hind paw mechanical hypersensitivity on Days 10, 14 (30 min post-injection), 15, 21, and 28.

**Results**: MIA-injected rats showed weight bearing asymmetry and reduced paw withdrawal threshold (mechanical hypersensitivity) on the ipsilateral side on Day 10 compared to saline counterparts, confirming their chronic pain phenotype. Overall, HA (10 mg/ml) lowered weight bearing asymmetry but did not affect mechanical hypersensitivity in MIA rats. HA-hydrogel (10 mg/ml) tended to decrease MIA-induced weight bearing asymmetry on Day 15. HA-hydrogel significantly reduced mechanical hypersensitivity in MIA rats on Day 28 compared to vehicle-treated counterparts.

**Conclusions**: These results indicate that this modified HA-hydrogel exhibits potential in relieving both primary and secondary pain hypersensitivities in a rat model of OA and, thus, could represent an avenue to develop novel analgesics for treating chronic pain.

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## Abstract no.: 950

### THE EFFECT OF DULOXETINE ON MECHANISTIC PAIN PROFILES, COGNITIVE FACTORS AND CLINICAL PAIN IN PATIENTS WITH PAINFUL KNEE OSTEOARTHRITIS – A RANDOMIZED, DOUBLE-BLIND, PLACEBO-CONTROLLED, CROSSOVER STUDY

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**Background and aims**: Duloxetine is recommended in the management of pain in osteoarthritis. Duloxetine might modulate cognitive factors and central pain mechanisms, and these factors are likely associated with the analgesic effect. This proof-of-concept, randomized, placebo-controlled, crossover, double-blinded trial assessed the effect of duloxetine on quantitative sensory testing (QST), cognitive factors, and clinical pain features in patients with painful knee osteoarthritis.

**Methods**: Twenty-five patients completed the study with randomization to either 18-weeks duloxetine (maximum 60 mg/daily) followed by placebo or vice-versa. Pressure pain detection and tolerance thresholds, temporal summation of pain, and conditioned pain modulation were assessed using cuff algometry. The Hospital Anxiety and Depression Scale and the Pain Catastrophizing Scale evaluated cognitive factors. Clinical pain was assessed using Brief Pain Inventory and Western Ontario and McMaster Universities Osteoarthritis Index. Linear regression models were used to predict the analgesic effect of duloxetine from pre-treatment parameters.

**Results**: No significant changes were found for QST, cognitive factors, or clinical pain on a group level when comparing duloxetine to placebo. Depending on the cut-off criteria, 40-68% of patients were classified as responders to duloxetine. Linear regression models predicted the analgesic effect (predictive value of 47.0-75.4% depending on clinical pain outcome parameter) using a combination of QST parameters, cognitive factors, and clinical pain.

**Conclusions**: Duloxetine did not modulate QST, cognitive factors, or clinical pain intensity when compared with placebo on a group level. However, a combination of pre-treatment QST parameters, cognitive factors, and clinical pain was able to predict the analgesic response of duloxetine.

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## Abstract no.: 961

### GOLD MICRO-PARTICLES FOR KNEE OSTEOARTHRITIS

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**Background and aims**: Patients with knee osteoarthritis (KOA) may display signs of low-grade inflammation. No human studies have investigated the effect of intraarticular gold micro particle implants for the treatment of pain and inflammation in KOA. The present open, exploratory study investigated whether gold ions can act as a KOA treatment option through modulation of inflammatory mediators, pain sensitivity, and central pain mechanisms.

**Methods**: Thirty patients with moderate KOA were included. Intraarticular injections with 20 mg gold microparticles (72.000 particles, 20-40 µm in diameter) using the patient's synovial fluid (SF) as carrier were performed. Western Ontario and McMaster Universities Osteoarthritis Index (WOMAC) subscores for pain, stiffness, and function were assessed at inclusion, 8 weeks and 2 years. The PainDetect questionnaire, pain pressure threshold (PPT), temporal summation (TS), and conditioned pain modulation (CPM), and pain diary were assessed at inclusion and 8 weeks. Proteome analysis was performed on SF and blood samples before and after 8 weeks of treatment.

**Results**: At 8 weeks and 2 years follow-up compared to baseline there was a decrease in WOMAC scores and PainDetect ($P < 0.05$). In SF, 28 different proteins were downregulated and 11 upregulated ($P < 0.05$) mainly associated immune response. Similarly, 31 proteins were downregulated and 1 upregulated in serum ($P < 0.05$) reflecting key immune response and anatomical structure development processes. No adverse effects related to the treatment were recorded.

**Conclusions**: Gold microparticles injected intra-articular in KOA joints may provide pain relief and an inflammatory modulatory effect based on proteome changes found in SF and serum.

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## Abstract no.: 964

### DETERMINANTS OF EFFECT AFTER GOLD MICRO PARTICLES FOR KNEE OSTEOARTHITIS

S. Rasmussen[1,2], K.K. Petersen[1], M.K. Kristiansen[1], J. Skallerup[1], C. Aboo[1], M.E. Thomsen[1], E. Skjoldemose[1], N.K. Jørgensen[1], A. Stensballe[1], L. Arendt-Nielsen[1]

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**Background and aims**: Gold microparticles injected intra-articular in knee osteoarthritic joints (KOA) using the patient's synovial fluid (SF) as the carrier may provide pain relief and an inflammatory modulatory effect. The present open, exploratory study investigated whether the use of hyaluronic acid as the carrier, neuropathic pain, BMI, and degree of osteoarthritis determine the effect.

**Methods**: This study included thirty patients with moderate KOA who received intraarticular injections with 20 mg gold microparticles (72.000 particles, 20-40 µm in diameter) using the patient's synovial fluid (SF) as the carrier, and 136 patients with mild to severe KOA who received 20 mg gold microparticles using hyaluronic acid (HA). We included in the analysis PainDetect, Western Ontario and McMaster Universities Osteoarthritis Index (WOMAC) subscores for pain, stiffness, and function at inclusion and two years. We included in the analysis the use of HA, Body Mass Index (BMI) and Kellgren Lawrence score at inclusion, and the Global Rating of Change Scale at two years.

**Results**: The three WOMAC subscores and PainDetect all improved at two years of follow-up. The use of HA did not determine the effect at two years follow-ups when corrected for the other selected determinants ($P = 0.21$). PainDetect > 14 ($P = 0.0027$), BMI > 30 ($P = 0.031$) and Kellgren-Lawrence grade 4 ($P = 0.0064$) at inclusion reduced the effect. WOMAC subscores at inclusion did not determine the effect ($P > 0.5$).

**Conclusions**: Neuropathic pain, obesity and severe osteoarthritis hamper the effect of gold for KOA.

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## Abstract no.: 1073

### ARE THE HISTORY OF TRAUMATIC EXPERIENCES AND PAIN-RELATED COGNITIONS AND EMOTIONS ASSOCIATED WITH PAIN AND DISABILITY BEFORE AND AFTER TOTAL HIP ARTHROPLASTY? A PRELIMINARY ANALYSIS

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**Background and aims**: The aim of this study was to investigate whether traumatic experiences and preoperative pain-related cognitions and emotions are related to pain and disability before and after total hip arthroplasty (THA).

**Methods**: Ten patients with hip osteoarthritis (mean age: 59.60±13.70) were included in the preliminary analysis of a larger prospective study(N=200). Traumatic experiences were assessed preoperatively with the Traumatic Experiences Checklist and the Childhood Trauma Questionnaire. Pain-related cognitions and emotions were assessed preoperatively with the Fear-Avoidance Component Scale and the Injustice Experience Questionnaire. The Hip Disability and Osteoarthritis Outcome

Score was used to assess pain and disability before and three months after THA. Spearman correlation coefficients were calculated.

**Results**: Preoperative fear-avoidance showed a high positive correlation with pre-and postoperative pain and disability (.729 and .867, respectively). The presence of childhood trauma or perceived injustice was not significantly correlated with preoperative pain and disability, but showed significant positive correlations with postoperative pain and disability (.722 and .646, respectively). No significant correlation was found between the Traumatic Experiences Checklist and pre-or postoperative pain and disability.

**Conclusions**: Preoperative fear-avoidance showed a high positive correlation with pre-and postoperative pain and disability in persons with hip osteoarthritis/after THA. While no association was found preoperatively, childhood trauma and perceived injustice were positively correlated with postoperative pain and disability. Given the small sample size, these preliminary results should be interpreted cautiously. Future research will investigate the above associations, and the prognostic value of traumatic experiences and pain-related cognitions and emotions for pain and disability after THA in a larger sample size.

# Peripheral neuropathic pain

## Abstract no.: 442

### CANCER-RELATED NEUROPATHIC PAIN (CRNP): IMPACT OF HEALTH CARE PROFESSIONAL (HCP) - PATIENT RELATIONSHIP ON PAIN CARE

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**Background and aims**: Up to 40% of cancer patients are affected by **neuropathic pain as a consequence of cancer or its treatment**. Cancer patients from 13 European countries reported on their experiences regarding CRNP diagnosis and management.

**Methods**: A 15 min **quantitative online survey** was designed with the support of a group of patient representatives, clinicians and nurses. The survey was conducted in 2021. Adults consenting to participate and diagnosed with cancer were screened for neuropathic pain symptoms. Respondents who met minimally three DN4 criteria were enrolled and answered questions about their pain diagnosis and management.

**Results**: **549 participants** met the inclusion criteria and completed the survey, thereof 89% fulfilled ≥4 DN4 criteria and **76% had severe or moderate pain on a daily basis**. 43% had received a formal diagnosis of CRNP and in addition 17% were diagnosed with non-painful cancer-related peripheral neuropathy. Oncologists and Pain specialists are most often offering CRNP treatments. 29% of patients felt that their HCP (irrespective of speciality) do not spend enough time on discussing CRNP with them, however proportionally oncologists spent the most time and 26% reported that no action was taken the discussion with the health care professional. When the patient recalled the pre-warned about CRNP given by the HCP, this led to a better HCP-patient relationship and better treatment satisfaction.

**Conclusions**: Diagnosis of cancer-related neuropathic pain remains a challenge. Appropriate upfront information from the HCP about CRPN contributes to a higher patient satisfaction and will lead to better management of CRNP.

# Education of pain care

## Abstract no.: 912

### ARE PHYSIOTHERAPY WEBSITES CONSISTENT WITH LOW BACK PAIN GUIDELINES AND THE BIOPSYCHOSOCIAL MODEL?

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**Background and aims**: Low back pain (LBP) is the leading cause of disability in the world. Among many first-linehealthcare providers, patients seek help from a physiotherapist. Increasing numbers of physiotherapy practices have information about LBP on their website. At this moment, in the Netherlands, the quality of this information is unknown. Therefore, this study investigatedto what extent the information on physiotherapy websites about LBP is conform LBP guidelines, and the biopsychosocial model.

**Methods**: Cross sectional study design; the content of all existing physiotherapy websites within the Netherlands were studied. Predetermined criteria for content analysis were developed according guidelines and biopsychosocial model. A biomedical score was given with 0 psychosocial factors, limited biopsychosocial with 1-2 psychosocial factors, or fairly biopsychosocialwhen 3 or morepsychosocial factors were mentioned. Descriptive statistics were applied.

**Results**: Eight thousand six hundred and seven entries were identified. After removal of duplicates and entries without information, 834 physiotherapy websites remained. Of these websites 449 websites contained information about LBP. Most websites, 63.9% described a biomedical explanation regarding the causes of LBP, 27.7% limited biopsychosocial and 8.5% gave a fairly biopsychosocial explanation.

**Conclusions**: The minority of the physiotherapy websites within the Netherlands contained information about LBP. Of the websites with information, the majority of the information did not met current guidelines or lack in biopsychosocial explanations. Therefore, the provided information on a physiotherapy practice website is mostly not according the current state of evidence.

# Epidemiology

## Abstract no.: 1050

### CHRONIC PAIN, ANALGESIC DRUGS AND PROGNOSTIC VARIABILITY IN COVID-19. RESULTS OF A MULTICENTRE STUDY IN 15 SPANISH HOSPITALS

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**Background and aims**: During the first wave of the pandemic, little was known about the prognostic factors associated with SARS-COV-2 infection. This study aimed to assess whether previous diagnostic of chronic pain (CP) and analgesic drugs treatments had any impact on the severity of COVID-19.

**Methods**: From February to June 2021, 1446 patients diagnosed with SARS-COV-2 infection admitted for more than 24 h in 13 Spanish tertiary hospitals were included. Preadmission variables studied were previous pathological comorbidity, specific diagnosis of CP and analgesic drugs on electronic medical prescription (EMP). In hospital follow up included inflammation biomarkers, anti-viral drugs use, inspired O2 fraction (FiO2), non-invasive (NIMV) and invasive mechanical ventilation (IMV) requirements, and mortality. Univariate and multivariate analysis were performed.

**Results**: Mean age 66,7y (18-101). M/F (56,7-43,3%). Prevalence of CP was 25,8% (M 21,3- F 31,6%). Higher O2 requirements were needed in patients with CP. Mortality between CP patients was 22,5% vs 15,7% without CP (p<0,003). Concerning analgesic drugs on EMP: Metamizole (4.85% patients) showed an OR of 2,6 for NIVM but was not associated with a greater mortality, Paracetamol (22.89% patients) OR of 1,6 for death, antiepileptic drugs (8.9% of patients but not necessarily prescribed for neuropathic pain) reduced the risk of NIMV or admission to the ICU by 62%, antidepressants used for CP and opioids were not associated with worse outcomes.

**Conclusions**: The age and high prevalence of comorbid pathology may have influence outcome more than the presence of CP or analgesic drugs but we think these results deserve to be studied more in depth.

# Organisation of clinical pain care

## Abstract no.: 426

### CLINICAL PRIORITIZATION VIA TELEPHONE ASSESSMENT IN A TERTIARY CHRONIC PAIN MEDICINE SERVICE DURING THE COVID-19 PANDEMIC – AN AUDIT OF OUTCOMES

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**Background and aims**: In an effort to address an impasse on outpatient services in the face of COVID-19 related restrictions, we piloted a telemedicine based clinical prioritization service for new referrals. We aimed to expedite assessment/treatment whilst reducing face-to-face hospital attendances. We present an audit of this activity.

**Methods**: The 100 longest waiters of new patient referrals were identified. They were contacted over a nine-month period via telephone and underwent an initial consultation/assessment. Treatment plans were put in place and documented. Documented outcomes included: Discharged to referrer (primary care/other specialist); Referred for diagnostics/imaging; Pharmacological management; Referred for intervention; Referred for further MDT assessment/treatment (Physiotherapy/ Psychology); Referred for inclusion in Pain Management Programme (PMP); Referred for further specialist assessment; Pain OPD follow up (Psychology/Physiotherapy/Medical/Nursing); Uncontactable (DNA); Deceased. Patients could have more than one documented outcome.

**Results**: The majority of patients were female (68%). Mean age was 58.9 years. Mean time spent on waiting list for initial assessment/consultation was 35.37 months. Following consultation, 40% were discharged with advice to their referrer (34% primary care); 8% were referred for further diagnostics/imaging; 32% were offered pharmacological management; 30% were scheduled for interventional management; 9% were referred for further chronic pain MDT assessment/treatment; 4% were referred to a PMP; 6% were referred to other specialists; 9% were brought in for face to face; 2% were uncontactable (DNA); 1% had died.

**Conclusions**: Telemedicine is a viable modality for patient assessment in the setting of COVID-19 related restrictions. Future studies should be directed at assessing efficacy of treatment plans, cost effectiveness and patient satisfaction.

## Abstract no.: 492

### ACUTE PAIN SERVICE: A 6 YEAR EXPERIENCE AND REORGANIZATION IN THE TIME OF COVID-19 ERA

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**Background and aims**: Due to uneven treatment of perioperative pain and inadequate pain control, in 2015 we established Acute pain service (APS) at the University Hospital Center Sestre milosrdnice in Zagreb, Croatia. The goal of this study was

to asses the efficiency of acute pain service, with special regard to organisational issues and methods we used to overcom barriers in the COVID-19 era.

**Methods**: Using available practice guidelines from NICE and pain associations we formed protocol for perioperative pain management, adapted to our organisational and financial opportunities. Two crucial elements were detailed therapeutic list using time scheduled multimodal analgesia and additional member of specialised anaesthesia nurse (APS nurse), who did regular pain assessment and consequently alterations of therapy, in consultations with on-call anaesthesiologist who performed regional anesthesia techniques. More problematic cases were handled through specialised Pain clinic. When goals of better care were reached, APS service was conducted to all surgical departments.

**Results**: There was a satisfactory reduction of pain in more than 70% of all surgical patients, faster recovery, less opioid misuse with decreased opioid exposure and reduction of side effects.Due to COVID-19 pandemic, there was a rise in postoperative pain, which we curbed with both technological and personal modifications. There was no stoppage with therapeutic lists, but pain assessment suffered the most. Significant part was taken over by telemedicine mostly by phone or video.

**Conclusions**: Acute pain service is adjustable, patient centred protocol, which achieves satisfactory results in postoperative pain control, provides a safer and more effective approach with great impact on postoperative recovery.

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## Abstract no.: 562

### PRESCRIBED OPIOIDS AND THE ROLE OF COMMUNITY PHARMACY IN THE UK: A PRELIMINARY ANALYSIS OF PHARMACIST INTERVIEWS

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**Background and aims**: UK increases in opioid prescribing and the associated risks of harm are well documented. Research in this area to date centres on primary care where most opioid prescriptions are issued. Supporting the safe and effective use of medicines is central to the community pharmacist role, however little is known about how this relates to prescribed opioids in current practice. At present there are no UK community pharmacy services with a pain or opioid medicine focus, and the potential contribution of the sector in this area is unknown.

This research forms part of a larger study which aims to gain a better understanding of the role of community pharmacists in relation to prescribed opioids, and how they could further support patients and reduce the risks of harm. This stage involves a preliminary analysis of the first wave of community pharmacist interviews.

**Methods**: 5 semi-structured interviews with community pharmacists conducted in March 2021 via MS Teams, video-recorded and transcribed verbatim. Transcripts analysed using inductive coding and preliminary thematic analysis.

**Results**: Pharmacists reported variable prescribing trends and the inconsistent nature of patient interactions to support opioid use. Pharmacists frequently approached patients for additional prescribing information and drew comparisons between advice for ‘over the counter’ opioids versus prescribed opioids. Long-term prescribing created a burden for pharmacies in managing potential overuse and patient anxiety related to obtaining repeat supplies.

**Conclusions**: Community pharmacists are significantly involved in issues surrounding opioid prescribing. Standardisation of practice, and improved clinical information, is needed to maximise the impact of care in this setting.

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## Abstract no.: 757

### COLLABORATIVE WORKING: PROVIDING PAIN MANAGEMENT SERVICES ACROSS MULTIPLE SITES DURING A PANDEMIC

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**Background and aims**: The Covid 19 Pandemic brought unprecedented challenges in delivery of care across the NHS. Collaborative working between clinical teams became a cornerstone in the rapid transformation and adaptation of cancer services. Cancer Hubs were created to enable delivery of essential cancer treatments.

Pain management is pivotal to recovery from surgery. The need for acute pain management provision and adaptation to multiple hospital sites was recognised. Networks, alliances and partnerships established prior to the pandemic became invaluable in service provisions with the aim of supporting ongoing surgical cancer services during the pandemic.

**Methods**: Collaborative working and recognition of individual competencies were utilised to set up rapid training programmers and support for clinical staff and ensure rapid transformation of clinical governance to support the change in clinical practice at all hospital sites.

**Results**:

- Rapid up skilling of staff on all hospital sites in response to changes in patient populations, pathways and pain management modalities previously not used in ward areas.
- Rapid urgent review and adaptation of policies across all sites - the need for training and policy reviews were identified in conjunction with staff from within each institution.
- A jointly agreed process amongst all parties developed to resolve any deficits in skills and governance across all sites.

**Conclusions**: Collaborative working resulted in a rapid adaptation of service provision for both our teams at a time where all NHS staff and its services worked under immense pressures. The outcome has been positive and has strengthened the alliance between our teams and will encourage future collaborations.

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## Abstract no.: 943

### ON-LINE RATINGS OF PAIN PHYSICIANS IN A REGIONAL POPULATION: WHAT MATTERS?

T. Purvis[1], S. Holzman[2], D.K. Hess[3], S. Levin[3], D. Maher[3]

*[1]Massachusetts General Hospital, Boston, United States, [2]Division of Infectious Diseases, Department of Internal Medicine, Johns Hopkins School of Medicine, Baltimore, United States, [3]Division of Chronic Pain Management, Department of Anesthesiology and Critical Care Medicine, Johns Hopkins School of Medicine, Baltimore, United States*

**Background and aims**: Our objective is to identify both modifiable and nonmodifiable factors associated with favorable ratings on free public physician rating website (PRW) forums for pain physicians practicing in a single major United States metro area utilizing publicly available Internet data.

**Methods**: PRW data were gathered from several websites including Yelp, Facebook, Google, Vitals, WebMD, Zocdoc, Caredash, RateMDs, and Healthgrades.

**Results**: Of the 171 physicians analyzed, 164 (95.9%) had been reviewed on at least one PRW. The median overall rating (interquartile range [IQR]) was 4.32 out of 5 (3.69–4.62). There were no observed differences in the number of years in practice or in the ratio of male to female physicians associated with different ratings. Additionally, there were no observed differences in the types of medical school degrees, the physician's primary training, completion of a pain fellowship, previous or current affiliation with a top five medical school, current affiliation with a medical school or other academic institution, or affiliation with a surgical practice or practice size associated with different PRW ratings.

**Conclusions**: Ultimately, PRW scores and other publicly available rating tools are being exploited essentially as marketing tools for patients. Whether this is correlated to better patient care, health outcomes, financial returns, or just a more superficial appearance of these factors has not been firmly established. In spite of physicians' willingness to share much about their training, practice, and background online, it appears that much of that does not change the results of online ratings.

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## Abstract no.: 988

### QUALITY OF CARE IN PAIN CLINICS USING THE ISO 9001 - 2015 METHODOLOGY (INTERNATIONAL ORGANIZATION FOR STANDARDIZATION)

E. Catala[1], L. Petriz[1], M. Melo[1], T. Santeularia[1], I. Muñoz[1], M. Revuelta[1]

*[1]University Hospital Santa Creu i Sant Pau, Barcelona, Spain*

**Background and aims**: It was not until 2019 that chronic pain (CP) was recognised by the WHO as a disease. The lack of both visibility and treatment of CP still arethe reason for the lack of recognition of the Pain Clinics (PC).

The HSCSP PC proposes access to ISO / IQNET certification in order to empower specialized centers in pain and to obtain a clinical management system according to its necessities.

**Methods**: From 2015 to 2017 all items of the ISO Standard were treated to acquire such certification (table1)

Table 1. - Standards ISO Items applied in Clinical Paint of HSCSP

| **Standards ISO Items** | **Clinical Paint of HSCSP Elaboration / development** |
|---|---|
| Customer focused (patient) | Quality plan & Pain Clinic (PC) process map (fig1)<br>Patient satisfaction survey |
| Leadership | Hospital management involved: Strategic plan, functional structure, involved Head PC |
| Staff participation | Information / training ISO regulation. Continuing pain training program.<br>Research areas |
| Process-based approach | Procedures Flowcharts<br>Written procedures and manuals (book) |
| Materials | Inventory and control of:<br>- material (consumables, expired drugs …)<br>- Equipment (X-rays, ultrasound, wedge cleaner…) |
| Improvements | Monitoring with “Plan-Do-Check-Act” (PDCA) cycle |
| Risk-based thinking and opportunities | Adverse effects / Planned Changes / Incidents system |
| Decision making | Service objectives / Indicators / Continues improvement / Use of computerized administrative and clinical data |

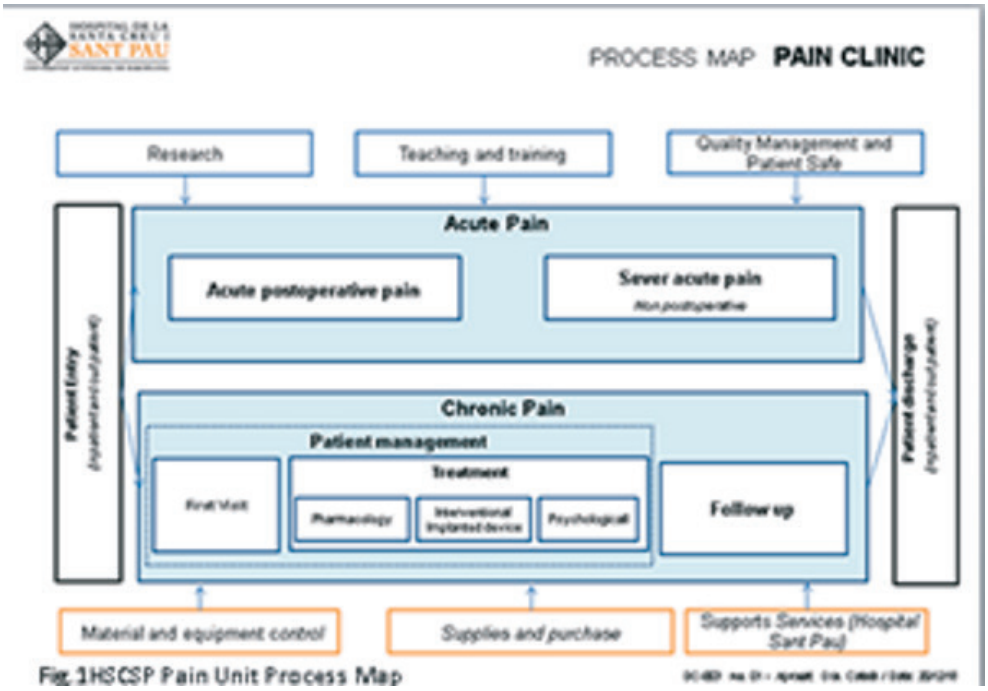


Fig. 1HSCSP Pain Unit Process Map

**Results**: The main issues identified and achieved were:

- Improvement objectives (service activity, continuous improvement…)-Development of control indicators (definition of waiting list priorities: delayed emergency care, preferential and regular visits for access to PC and procedures; intensity pain inpatient; patient satisfaction and complaints).-Risks and opportunities: according to the Joint Commission scale.Registration and resolution of incidents.

- Material control

- Follow-up of continuous training programme and maintenance of therapeutic protocols (Pain Treatment Manual Book Ed.2020).

The result has been the achievement of the ISO/IQNET Certification:

*"The provision of Diagnostic and Treatment services (pharmacological, interventional, psychological) of acute and chronic pain"* (Fig.2)


Fig 2 –ISO/IQNET Certification: Pain Clinic HSCSP

**Conclusions**: The ISO / IQNET certification guarantees that the management and care provided to the CP is offered with quality criteria and clinical best practices. It is an efficient management model and demonstrates the ability to meet the needs of patients and their own activity. Obtaining this certification is a good recognition for the PC, both from an academic and employment point of view.

**Acknowledgements:** Gabriel Andres translation

## Abstract no.: 1143

### SUICIDAL IDEATION, SUICIDE PLANS ATTEMPTS IN PATIENTS WITH CHRONIC PAIN:A PROSPECTIVE QUALITATIVE RESEARCH

E. Guertzenstein[1]

[1]*Universidade de Sao Paulo, Sao Paulo, Brazil*

**Background and aims**: The association between suicidal ideation and pain has not drawn as much attention as association between suicidal ideation and psychiatric disorder. The suicide act, either fatal or non-fatal, is preceded by a plan, which is in turn preceded by suicidal ideation.

**Methods**: The patients were initially examined through unstructured interviews that were repeated throughout the survey: AMDP – Association for a Methodological and Documentation on Psychiatry (Portuguese language version); HDRS-17 Hamilton Depression Rating Scale, 17 item version; HAMS Hamilton Anxiety Rating Scale; Mini Mental State – Qualitative Measurement of Cognitive Reduction; CGI Clinical Global Impressions – CGI-S Clinical Global Impression Severity of Illness and CGI-I Clinical Global Impression of Improvement; Numeric Rating Scale (pain intensity) used only for the diagnosis.

Patients were submitted to treatments for pain or pain and psychiatric disorders.

**Results**: The aim of this prospective study was to establish whether suicidal ideas evolve into plans and whether suicidal plans evolve into attempts in patients with chronic pain associated or not to psychiatric disorders.

- No patients attempted suicide.

- Suicide is committed when a person feels unable to master an unbearable situation, when all courses of action fail

- These 325 patients believed they could overcome the unbearable situation they experienced.

**Conclusions**: As a result, the authors concluded that suicide is not necessarily an expression of chronic pain associated or not to psychopathological behaviour.

# Organisation of research in pain

## Abstract no.: 883

### LIPID PROFILE IN RHEUMATOID ARTHRITIS PATIENTS AND ITS RELATION TO DISEASE ACTIVITY

A. Saraf[1]

[1]*Teerthanker Mahavir University, Moradabad, India*

**Background and aims**: Cardiovascular morbidity and mortality are enhanced in Rheumatoid Arthritis (RA), which may be attributable to dyslipidemia. The dyslipidemia observed in RA appears to be dependent on disease activity. In this study we prospectively assessed the correlation of lipid profile with the disease activity.

**Methods**: A total of 60 patients who fulfilled the “Revised Criteria for the Classification of Rheumatoid Arthritis 1987” were included. The serum was collected from rheumatoid arthritis patients for the determination of lipid values which are triglycerides (TG), total cholesterol (TC), high density lipoprotein (HDL), low density lipoprotein (LDL). Disease activity was assessed by using DAS 28 ESR score. Disease activity was then correlated to the lipid profile of the patients using co-efficient of correlation.

**Results**: Out of 60 patients, 42 (70%) patients had very active disease activity at the time of presentation. 16 (26.7%) patients had moderately active and 2 (3.3%) had inactive disease. Patients with very active disease were found to have low levels of LDL, HDL and TC as compared to patients with inactive disease. However the reduction in HDL levels was significantly higher than TC levels. Levels of TG were found to be higher in patients with very active disease.

**Conclusions**: By causing greater reductions in HDL, RA does increases cardiovascular mortality and morbidity. In patients with RA it is more important tomeasure both total cholesterol and HDL and to use their ratio for the calculation of absolute cardiovascular disease risk. HDL, LDL, TC can be used as corroborating markers of disease activity in RA.

## Abstract no.: 1169

### THE LINK BETWEEN MALLEABILITY OF ATTENTIONAL BIAS FOR PAIN INFORMATION AND POOR PAIN OUTCOMES: AN EXPRIMENTAL INVESTIGATION

J. Mac Goris[1], D. Van Ryckeghem[2], J. Todd[3]

[1]*University of Luxembourg, Luxembourg, Luxembourg,* [2]*Maastricht University, Maastricht, Netherlands,* [3]*University of Sydney, Sydney, Australia*

**Background and aims**: Attentional processing of pain has been theorized to play a key role in the magnitude of pain and associated disability[3,4]. The idea that attentional bias towards pain information results in poor pain outcomes has been highly investigated[3]. Yet, findings are inconsistent. More recently, this has resulted the idea that it is the readiness to acquire an attentional bias[1,2] rather than the training of attention away from pain information that may predict poor pain outcomes.

**Methods**: To investigate this, we conducted two studies. Study 1 consisted of a lab study with 55 healthy participants who performed an attention malleability paradigm, followed by an experimental heat pain test probing pain experience and task interference by pain. Study 2 consisted of an online study with 71 people suffering chronic pain who completed an attention malleability paradigm and questionnaires probing pain-related outcomes.

**Results**: Results of study 1 show that, in contrast to our hypotheses, there was no relationship between attention bias malleability and experimental pain outcomes. Results of study 2, however, indicated that in chronic pain patients higher levels of attention bias malleability were related to higher levels of pain experience ($r(71)=.332$, $p < .01$) and disability ($r(71) = .312$, $p < .01$).

**Conclusions**: Overall, the current findings provide initial support for the link between attention bias malleability and poor pain outcomes in chronic pain patients. Future research is needed to interrogate potential reasons for the inconsistent results in healthy volunteers and address the causal relationship between attention bias malleability and poor pain outcomes.

# Instruments for the assessment of pain

## Abstract no.: 201

### LACK OF CONSISTENCY IN PROTOCOLS TO DETERMINE TEMPORAL SUMMATION OF PAIN: A SCOPING REVIEW

S. Kielstra[1], R. Reezigt[1], D. Yarnitsky[2], L. Arendt-Nielsen[3], M. Coppieters[1], G. Scholten-Peeters[1]

*[1]Faculty of Behavioural and Movement Sciences, Vrije Universiteit Amsterdam, Amsterdam Movement Sciences, Department of Human Movement Sciences, Amsterdam, Netherlands, [2]Rambam Health Care Campus, Technion Faculty of Medicine, Department of Neurology, Haifa, Israel, [3]Center for Neuroplasticity and Pain (CNAP), SMI®, Department of Health Science and Technology, Aalborg University, Aalborg, Denmark*

**Background and aims**: Temporal summation of pain (TSP) measurements are used to investigate facilitatory pain mechanisms. However, different studies used different modalities, instruments, methods, and calculations. The objective of this scoping review was to systematically identify and map the key characteristics (Modality, Instrument, Method, Calculation, and Test location) of TSP measurements in healthy people and people with musculoskeletal pain.

**Methods**: A literature search in PubMed, Embase, and CINAHL was performed from inception to May 2020. The references of all identified articles were searched for relevant articles. Eligible studies included original studies which measured TSP in healthy adults or people with musculoskeletal pain. Two independent reviewers screened titles and abstracts, screened full-text articles, which were included if four out of five key characteristics of TSP were reported. The results were visually synthesized by Sankey diagrams.

**Results**: Out of the 314 eligible articles, 289 met the selection criteria and were included in the scoping review. Four modalities are being used to assess TSP (mechanical, thermal, electrical, and chemical). A total of 38 different instruments, 41 different frequencies, 19 different train lengths, 54 different calculations, and 15 different outcome measurements have been used to assess TSP.

**Conclusions**: Large heterogeneity in key characteristics of measuring TSP in healthy people and people with musculoskeletal pain exists, limiting the possibilities of comparing results in studies of TSP. Measurement recommendations are advised to create more uniformity and allow for comparison between studies.

## Abstract no.: 292

### CLASSIFY ELDERLY PAIN SEVERITY FROM AUTOMATICALLY VIDEO CLIP FACIAL ACTION UNITS ANALYSIS IN THE TELEHEALTH PLATFORM

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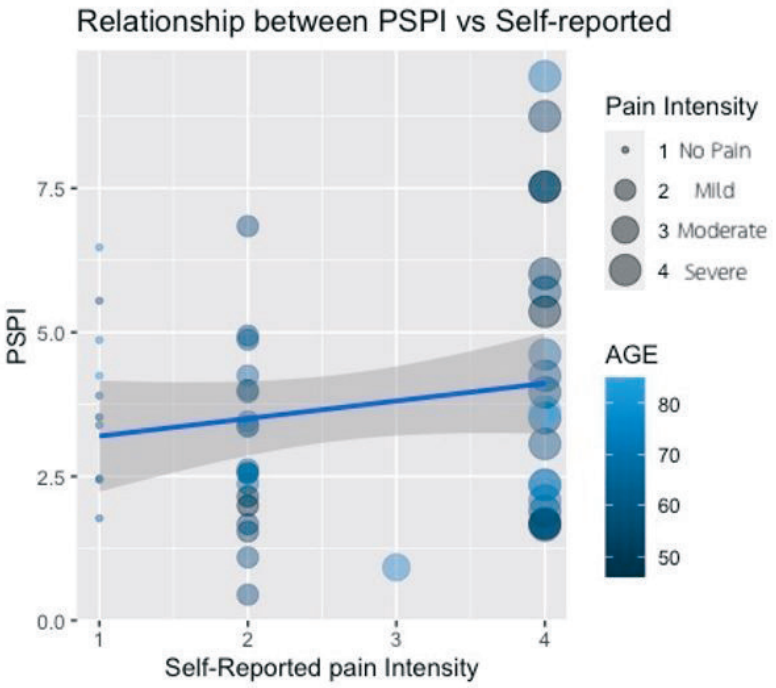
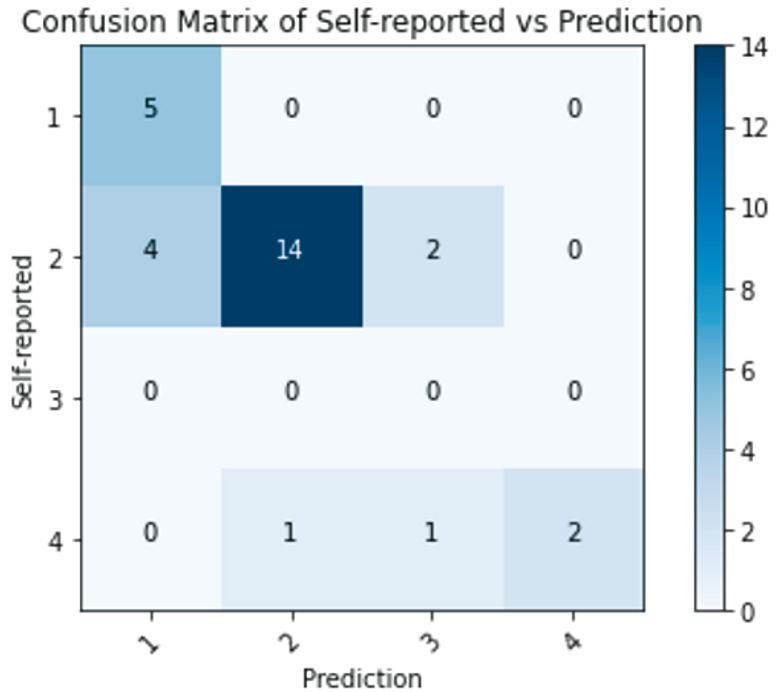
**Background and aims**: This experiment field study aim to test whether automated pain severity classification from videoclip enhance the accuracy of self pain rating and whether it is feasible to integrate in the tele-pain platform.

**Methods**: The 30 Thai elders with chronic pain were enrolled from the palliative care clinic, pain clinic, orthopedic clinic, and rehabilitation clinic of the Chiang Mai Medical school hospital. Their family caregivers were assigned to use the telehealth platform for 3 months. The telehealth platform (https://www.carelivery.me/) comprised of web-based self pain evaluation

which incorporated automated camera recorded faces for about 10 seconds and scheduled video teleconsultation afterward. The video clips were analyzed by the machine learning algorithm into the Facial action unit based on - Prkachin Solomon Pain Index (PSPI) score and then classified pain severity. The correlation and accuracy of the automated classifying algorithm were evaluated by comparing to the gold standard self-assessment. The benefit of integrating the automated classifying algorithm to the telehealth platform was evaluated by qualitative interview.

**Results**: The correlation of the automated classify algorithm PSPI score and 0 to 10 visual analog scale (VAS) and the matching of classification was shown in Figures 1 and 2. Overall the accuracy of classification no (1), mild(2), moderate(3), severe(4) is 58%. The benefits and challenges of integrating Videoclip analysis to telehealth from users and health care providers were described.




**Conclusions**: The automated classifying elder pain has moderate accuracy. The integration of automated pain classification may enhance an objective pain monitoring.

## Abstract no.: 315

### COMPREHENSIVE ASSESSMENT OF GENDER AND SENSITIZING EFFECTS OF SLEEP DEPRIVATION USING A NOCICEPTIVE TEST BATTERY IN HEALTHY VOLUNTEERS

H. Hijma[1,2], I. Koopmans[1,2], E. Klaassen[1], R.J. Doll[1], R. Zuiker[1], G.J. Groeneveld[1,2]

*[1]Centre for Human Drug Research (CHDR), Leiden, Netherlands, [2]Leiden University Medical Centre (LUMC), Leiden, Netherlands*

**Background and aims**: PainCart, our validated nociceptive test battery, is used in early-phase clinical drug studies to investigate the effects of (novel) analgesics. This study comprehensively assessed the (central) sensitization due to sleep deprivation and its suitability as a model for drug development.

**Methods**: This was a randomized, cross-over study in healthy males (part 1, n=24) and females (part 2, n=24). Subjects were randomized 1:1 per part to two visits in alternating order: one to measure pain thresholds in the morning and afternoon in well-rested state; another following 24 h of sleep deprivation. Pain detection and -tolerance thresholds (PDT, PTT) were evaluated for the electrical burst and -stair, pressure- and cold pressor test and conditioned pain modulation (CPM) response, and heat PDT. Data were analysed using a mixed model analysis of variance.

**Results**: Mean age was 26.1±2.6 years. In the combined group (males and females), significant effects of sleep deprivation were observed for cold pressor (p<.01), CPM (p=.04), and pressure PTT (p<.01) and for heat PDT (p=.02) compared to the well-rested morning state. Separately, cold pressor- (p<.001) and pressure PTT (p<.01) were significantly reduced in females, heat PDT (p=.01) in males when the sleep-deprived state was compared to the well-rested morning state (Figure 1-3). A significant effect of gender was observed for cold pressor PDT (p=0.03).

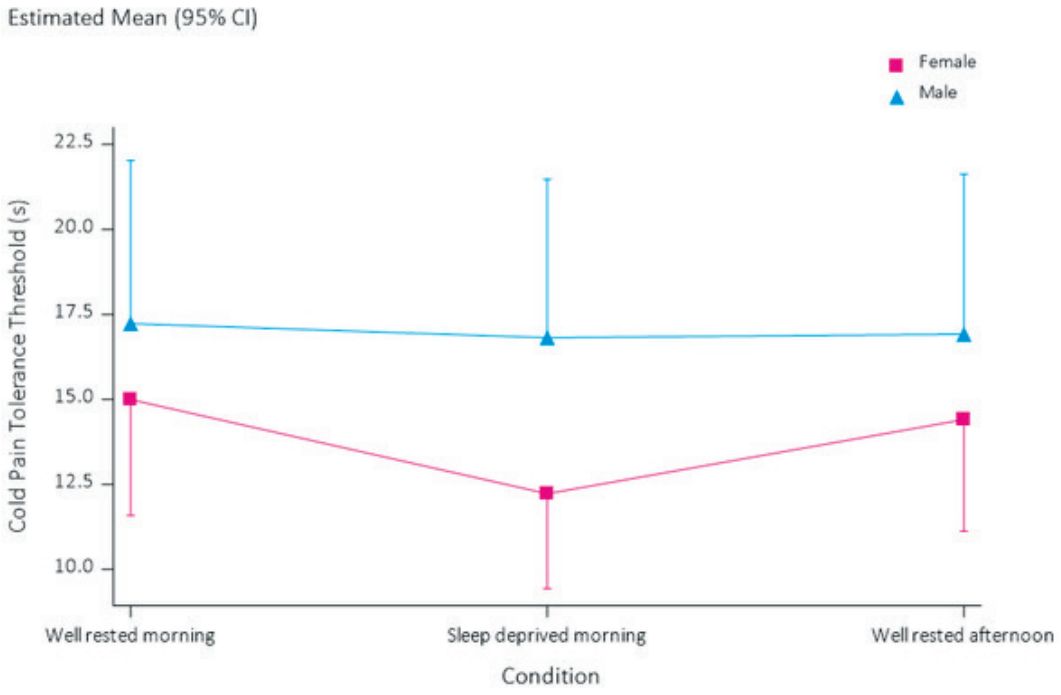



Figure 1: Cold pressor PTT (seconds)

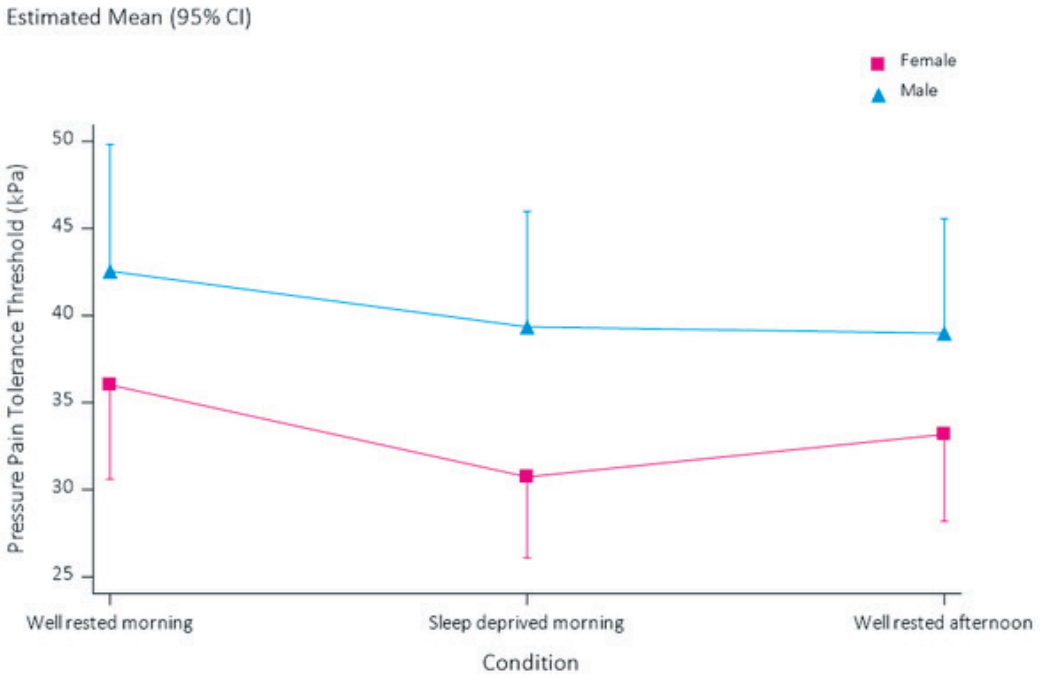



Figure 2: Pressure PTT (kPa)

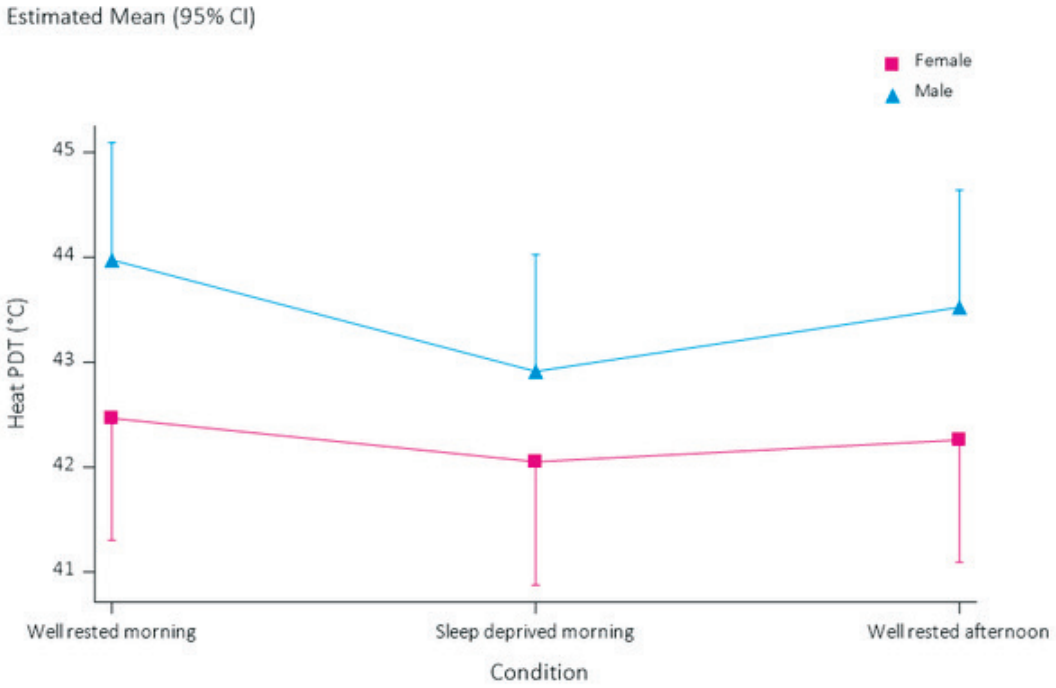



Figure 3: Heat PDT (°C)

**Conclusions**: We found that the sleep deprivation model is suitable for studying (central) sensitization in healthy volunteers.

## Abstract no.: 358

### PROBABLE PAIN ON THE PAIN ASSESSMENT IN IMPAIRED COGNITION (PAIC15) INSTRUMENT: ASSESSING SENSITIVITY AND SPECIFICITY OF CUT-OFFS AGAINST THREE STANDARDS

W. Achterberg[1], M. De Waal[1], J.T van der Steen[1]

*[1]Leiden University Medical Center, Leiden, Netherlands*

**Background and aims**: Observational pain scales can help to identify pain in persons with dementia who may have difficulty expressing pain verbally. The Pain Assessment in Impaired Cognition-15 (PAIC15) covers 15 items that indicate pain, but it is unclear how probable pain is, for each summed score (range 0-45).

**Methods**: We aimed to determine sensitivity and specificity of cut-offs for probable pain on the PAIC15 against three standards:

(1) self-report when able,

(2) the established Pain Assessment in Advanced Dementia (PAINAD) cut-off of 2, and

(3) observer's overall estimate based on a series of systematic observations.

We used data of 238 nursing home residents with dementia who were observed by their physician in training or nursing staff in the context of an evidence-based medicine (EBM) training study, with re-assessment after 2 months in 137 residents.

**Results**: The area under the ROC curve was excellent against the PAINAD cut-off (≥0.8) but acceptable or less than acceptable for the other two standards. Across standards and criteria for optimal sensitivity and specificity, PAIC15 scores of 3 and higher represent possible pain for screening in practice, with sensitivity and specificity against self-report in the 0.5 to 0.7 range.

**Conclusions**: While sensitivity for screening with PAIC15 in practice may be too low, a cut-off of 4 is reasonable to indicate probable pain in research.

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## Abstract no.: 383

### ENHANCING THE PERCEPTION OF PAIN USING VIRTUAL REALITY: A FEASIBILITY STUDY

I. Koopmans[1,2], F. de Graaf[1], R.-J. Doll[1], G.J. Groeneveld[2,1]

*[1]Centre for Human Drug Research, Leiden, Netherlands, [2]Leiden University Medical Center, Leiden, Netherlands*

**Background and aims**: The perception of pain is difficult to assess as it is a complex combination of various components related to nociception, experience, and cognition. With Virtual Reality (VR), it may be possible to modulate a person's pain experience and assess what adding an affective component to a nociceptive stimulus changes to pain perception. In this study, we assess the effect of VR on the electrical pain detection and tolerance threshold.

**Methods**: 24 healthy male participants were included in this feasibility study. The pain detection threshold (PDT) and pain tolerance threshold (PTT) to electrical stimuli were recorded outside and inside VR. The VR mimicked the lab, including equipment and furniture, as present in the real world. Prior to each VR assessment, participants were primed by interacting with the VR environment. There were two VR conditions: (1) VR-Wound: a burn-wound, smoke, and electrical sparks become visible and audible with increasing stimulus intensity, and (2) VR-neutral: no additional aspects (Figure 1). VAS-Questionnaires were used to assess the affective pain component (e.g. unpleasantness and fear).

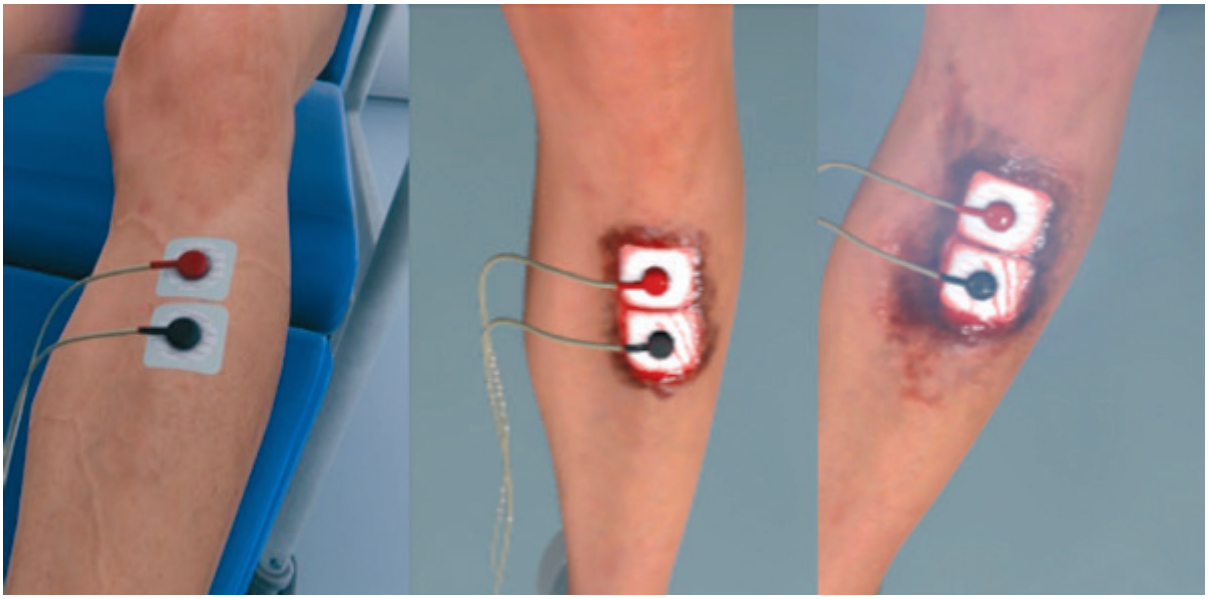

Figure 1 VR illustration

**Results**: Preliminary results suggest an increase in the subjective pain experience related to the VR-wound simulation and modulation of the PDT by both VR-experiences. Final analysis needs to confirm the findings.

**Conclusions**: VR enhanced the experience of pain, thereby providing new insights into the affective component of pain. Further validation of our model is warranted by performing a clinical study that evaluates drug effects on the affective component of pain (by e.g. administering NK1 receptor antagonists).

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## Abstract no.: 391

### SCREENING FOR NEUROPATHIC PAIN IN PATIENTS WITH POSSIBLE POLYNEUROPATHY – A VALIDATION STUDY OF THREE DIFFERENT QUESTIONNAIRES

Ø. Dunker[1], M. Grotle[2], M. Bu Kvaløy[3], M. Uglem[4], S. Løseth[5], I.E. Hjelland[6], I.P. Kleggetveit[1], R. Munk Killingmo[2], T. Sand[4], K.B. Nilsen[1]

*[1]Oslo University Hospital, Oslo, Norway, [2]Oslo Metropolitan University, Oslo, Norway, [3]Stavanger University Hospital, Stavanger, Norway, [4]St. Olavs Hospital, Trondheim, Norway, [5]University Hospital of North Norway, Tromsø, Norway, [6]Haukeland University Hospital, Bergen, Norway*

**Background and aims**: Pain is a common symptom in patients referred for polyneuropathy assessment. Examination and treatment are dependent on whether the pain is likely to be principally neuropathic or not, and thus there is a need for accurate screening tools. We aimed to translate and validate three questionnaires commonly used to differentiate between neuropathic and non-neuropathic pain.

**Methods**: We performed a cross-sectional study with translation to Norwegian, and analyses of the diagnostic accuracy and internal consistency of painDETECT, Self-completed Leeds Assessment of Neuropathic Symptoms and Signs (S-LANSS) and Douleur Neuropathique 4 (DN4). We included patients with bilateral distal lower extremity pain, referred to neurophysiological testing for possible polyneuropathy. The NeuPSIG criteria for neuropathic pain were treated as the gold standard.

**Results**: 637 patients were included. The prevalence of neuropathic pain was 60% following the NeuPSIG criteria, while 59% were diagnosed with polyneuropathy according to the Tesfaye criteria.

| | painDETECT | S-LANSS | DN4 |
|---|---|---|---|
| Sensitivity | 0.46 | 0.58 | 0.88 |
| Specificity | 0.65 | 0.54 | 0.50 |
| Positive predictive value | 0.67 | 0.66 | 0.71 |
| Negative predictive value | 0.44 | 0.45 | 0.74 |
| (Cohen's Alpha (α | 0.77 | 0.61 | 0.57 |
| Mean item-total correlation | 0.29 | 0.21 | 0.12 |

**Conclusions**: Questionnaire specificity was rather low in the present study while sensitivity varied more, being acceptable for DN4. PainDETECT, S-LANSS and DN4 should accordingly be used cautiously as screening tools for neuropathic pain in patients with possible polyneuropathy. Their final utility will depend on the purpose of screening and the pretest probability in the tested population.

## Abstract no.: 407

### CAPTURING THE CHRONIC PAIN PATIENT EXPERIENCE USING A NOVEL DIGITAL HEALTH ECOSYSTEM

S. Thomson[1], B. Hershey[2], K. Lechleiter[2], R. Woon[2], D. Huynh[2], M. McDonald[2]

*[1]Mid and South Essex University Hospitals NHSFT, Basildon, United Kingdom, [2]Boston Scientific, Valencia, United States*

**Background and aims**: Chronic pain has multiple dimensions, not just self-reported pain intensity. Digital tools using subjective and objective measures both between and at clinic visits can support research and therapy optimization. Here, we describe a novel digital ecosystem that captures the daily patient experience.

**Methods**: Subjects from the ENVISION study, a multi-site, observational study of SCS patients with chronic pain, used a digital study platform (MyStudyPartner+, Boston Scientific, Valencia, CA) at home. The platform consists of 3 major elements including the following: Subject-Focused Elements: iOS/Android phone-app connected to the subject's SCS stimulator and smartwatch; Researcher-Focused Elements: study management web-portal to design study questionnaires and check compliance; and Infrastructure-Focused Elements: cloud-based server that manages study data and questionnaire delivery. Subjects completed twice-daily, weekly, and monthly questionnaires using the app.

**Results**: To date, 263 subjects have answered 6383±4908 (mean ± std) questions each over 16±6 months. Thus far, all-time ENVISION study compliance is 74.0±12.8% (Figure #1). Two-hundred and fifty subjects wore the study watch for 11±6 months, providing 83.9±85.6 GB of accelerometry data each. Subjects provided 52±41 SCS data uploads over 16±6 months of participation.

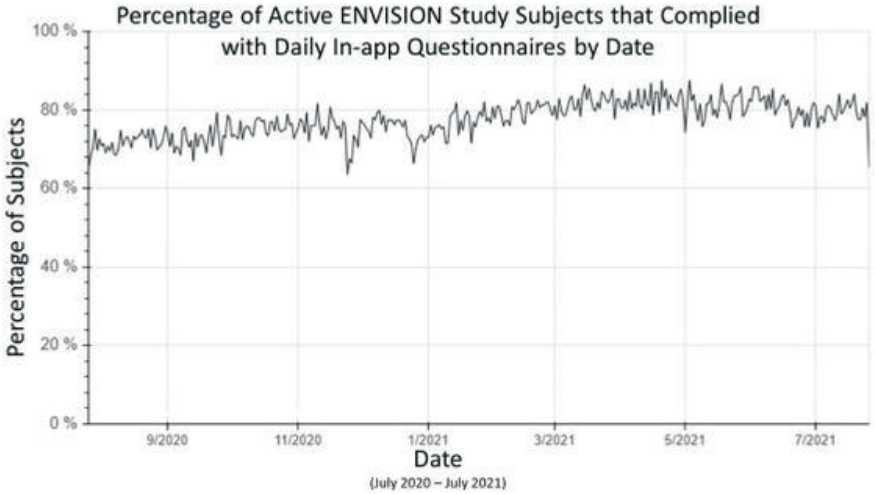


*Figure 1. Percentage of Active ENVISION Study Subjects that Complied with Daily In-app Questionnaires by Date (between Jul 2020 and Jul 2021)*

**Conclusions**: Digital platforms enable frequent, holistic patient data collection. The platform is well tolerated and encourages compliance. As outcome objectives evolve this approach is likely to drive further patient satisfaction and improved research assay sensitivity.

## Abstract no.: 445

### UNCOVERING A GENETIC POLYMORPHISM AS MODULATOR OF CENTRAL PAIN SIGNALING PATHWAYS

Y. Gloor[1], A. Matthey[1], K. Sobo[1], C. Cedraschi[1], G. Pickering[2], E. Kosek[3], G. Ehret[1], J. Desmeules[1]

*[1]Geneva University Hospitals (HUG), Geneva, Switzerland, [2]University of Clermont Auvergne, Clermont-Ferrand, France, [3]Karolinska University Hospital, Stockholm, Sweden*

**Background and aims**: Central sensitization is thought to be one of the key mechanisms underlying fibromyalgia syndromes (FMS) and can be assessed using the Nociceptive Flexion Reflex (NFR) threshold. Isolation of genetic determinants of FMS has proven difficult. The current project was designed to identify genetic determinants contributing to central sensitization.

**Methods**: Genotyping was performed with a customized Infinium CoreExome-24 BeadChip from Illumina. Following QC procedures, 258'756 polymorphisms in 284 participants (FMS patients and controls) were validated for the bioinformatics analysis. We used multiple linear regression analysis to identify genetic determinants associated with lowered NFR thresholds using FMS diagnosis, age, gender and cohort of origin as co-variates.

**Results**: Our primary candidate is a single nucleotide polymorphism resulting in a K4R mutation in the Hap1 gene (p =4.78E-06). Hap1 is enriched in neurons, associates with microtubule dependent transporter and has been involved in BDNF internalization and catecholamine release. Presence of co-medication and FMS diagnosis are the only other significant variable of the model.

**Conclusions**: Our GWAS identified the $Hap1^{K4R}$ mutation as a potential new genetic determinant of central sensitization. Further investigations are required to determine the functional significance of this polymorphism for the Hap1 protein and its role in pain signaling transduction. In parallel, our international collaborations will allow us to replicate our results in independent cohorts.

## Abstract no.: 468

### OPIORPHIN BIOMARKER AND OROFACIAL CONDITIONS: A META-ANALYSIS

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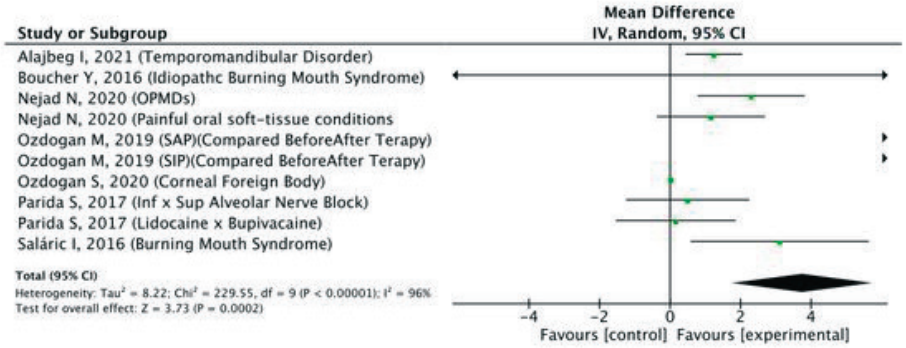
**Background and aims**: Orofacial pain diagnosis and management would benefit from the development of biomarkers, such as opiorphin, a pentapeptide isolated from saliva, which can inhibit endorphin degrading enzymes, and also a potent anti-inflammatory, anti-depressant and antitumor activity. The aim of this meta-analysis was to answer the following question: "Which are the different concentrations of opiorphins in orofacial conditions compared to control?"

**Methods**: Two reviewers searched for observational studies that evaluate the effect of Opiorphin in orofacial conditions, published on seven main databases and three from grey literature, without sex, time of publication, or language restrictions. Differences in concentration of opiorphin in saliva expressed in ng/ml were analyzed.

**Results**: Of the 443 articles obtained, 07 met the inclusion criteria for quantitative analyses. Studies englobed different orofacial conditions as: Temporomandibular Disorder (TMD), Burning Mouth Syndrome (BMS), Painful Oral Soft-tissue Conditions (POSC), Oral Potentially Malignant Disorders (OPMD), Symptomatic Irreversible Pulpitis (SIP), Symptomatic Apical Periodontitis (SAP), Corneal Foreign Body (CFB), and Local Anesthesia after Tooth Extraction (LA). To minimize bias, a mean difference effect and a random model were chosen for meta-analysis, based on a high heterogeneity between the studies (I2: 92%). Meta-analysis found that orofacial conditions showed 3.76 ng/ml [1.78, 5.73] more absolute concentration of opiorfhines in salive than controls (figure 1).

**Figure 1 -** Forest plot for overall different concentration of opiorfhines in salive (ng/ml) on Orofacial Pain conditions compared to controls. Graphs generated with Review Manager 5.3 (RevMan 5.3, The Nordic Cochrane Centre, Copenhagen, Denmark).




Legend: CI: Confidence Interval; OPMDs: Oral Potentially Malignant Disorders; SAP: Symptomatic Apical Periodontitis; SIP: Symptomatic Irreversible Pulpitis; SD: Standard Deviation.

**Conclusions**: Based on the available evidence, the conclusions of this meta-analysis were that:

• In general, statistically higher level of opiorphin was observed in orofacial conditions;

• Individually TMD, SIP, SAP, CFB presented higher concentrations of Opiorphins than control; and no differences in BMS, POSC, OPMD and LA.

## Abstract no.: 497

### PAIN-AUTONOMIC INTERACTION: A PROXY OF NOCICEPTIVE SENSITIZATION IN COMPLEX REGIONAL PAIN SYNDROME

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**Background and aims**: Sensitization of the nociceptive system is a key contributing factor to pain hypersensitivities, such as mechanical hyperalgesia, in individuals with complex regional pain syndrome (CRPS). To date, objective markers of sensitization processes are still lacking. The aim of the present study was to investigate the use of pain-autonomic readouts to objectively detect sensitization of the nociceptive system.

**Methods**: Twenty individuals with chronic CRPS were recruited for the study alongside 16 age- and sex-matched healthy controls (HC). We performed quantitative sensory testing including thermal and mechanical detection and pain thresholds. Moreover, sympathetic skin responses (SSR) were recorded in response to 15 noxious heat and 15 pinprick stimuli of the affected (CRPS hand/foot) and a control area (contralateral shoulder/hand).

**Results**: Individuals with CRPS showed increased mechanical pain sensitivity and higher SSR amplitudes compared to HC in response to pinprick and heat stimulation of the affected ($p<.001$), but not the control area ($p>.05$). SSR habituation to pinprick stimulation was absent (i.e., no reduction in amplitudes) in the affected area, but normal in the control area (significant amplitude reduction, $p<.001$), in CRPS. HCs showed normal habituation. Habituation of SSR in response to heat stimuli did not differ between groups.

**Conclusions**: Our findings provide compelling evidence that autonomic responses can detect nociceptive sensitization in individuals with signs of mechanical hyperalgesia. Pain-autonomic readouts may serve as valuable, complementary tools to objectively quantify sensitization processes, that can occur along the nociceptive neuraxis in individuals with chronic pain.

## Abstract no.: 534

### THE INFLUENCE OF ATTENTION AND EXPECTATIONS ON THE EFFICACY OF CONDITIONED PAIN MODULATION IN HUMAN ADULTS: A SYSTEMATIC REVIEW

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**Background and aims**: Conditioned pain modulation (CPM) is an experimental paradigm to examine the endogenous pain-inhibits-pain phenomenon in humans. Within this paradigm, one noxious stimulus (the conditioning stimulus (CS)) can reduce the pain perception from another stimulus (the test stimulus (TS)), and the magnitude of this response can be quantified. Cognitive processes such as expectations and attention are known to influence pain perception, and some researchers have argued that these processes might be part of the underlying mechanism of the CPM effect. This study synthesized the existing scientific literature addressing the influence of attention and expectations on CPM.

**Methods**: A systematic review was conducted following the PRISMA-guidelines. Four electronic databases were searched to identify relevant literature. Risk-of-bias was assessed according to the modified Newcastle-Ottawa Scales (NOS) for cross-sectional and case-control studies. Level of evidence (LOE) was determined using the GRADE-method.

**Results**: Twenty-three articles were synthesized (NOS mean score 68%), of which 11 studied the role of expectations and 12 studied attentional influence on CPM. Results showed that expectations of pain relief lead to a greater CPM effect (LOE very low). Furthermore, a larger CPM effect was obtained when directing attention towards the CS compared to the TS or when CPM assessment was combined with a distraction task (LOE low).

**Conclusions**: Expectations and attention appear to have an influence on the CPM effect, yet evidence is low because a gold standard to measure the CPM effect is lacking. A standardized study setting is needed to obtain firm conclusions on the role of cognitive processes on CPM efficacy.

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## Abstract no.: 554

### COMPREHENSIVE ASSESSMENT OF TOPICAL ALLYL ISOTHIOCYANATE (AITC) IN HEALTHY SUBJECTS AS MODEL FOR EARLY-PHASE DRUG DEVELOPMENT

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**Background and aims**: Allyl isothiocyanate (AITC), also known as mustard oil, can be topically applied to humans to induce pain, sensitization and neurogenic inflammation through activation of Transient Receptor Potential Cation Channel Subfamily A Member 1 (TRPA1). This study will comprehensively assess the effects of AITC on the skin and pain perception in healthy volunteers. Results will inform on the suitability of AITC as a challenge model for early-phase (analgesic) drug development.

**Methods**: This is an open-label, two-period study in 12 healthy male subjects (18-65 years, inclusive). On Day 1, 25 µL of GMP-grade 15% AITC dissolved in mineral oil will be applied within an O-ring on the volar forearm for 30 seconds. Arm will be randomized per subject. Skin changes will be assessed by thermography, colorimetry, multispectral- and laser speckle contrast imaging. The other arm serves as control. Subsequently on Day 1, the AITC will be applied on a 3x3cm area on the upper back for 30 seconds to allow for assessment of Pain Detection Thresholds (PDTs) for cold pain, heat pain and mechanical pressure pain. Untreated skin on the back serves as control. AITC application on the back and subsequent pain tests are repeated after at least seven days (i.e., period 2). Data will be analysed using mixed-model ANOVA.

**Results**: Will be available at the time of EFIC

**Conclusions**: Will be available at the time of EFIC

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## Abstract no.: 594

### HIGH FREQUENCY STIMULATION INDUCED MODALITY-SPECIFIC CHANGES IN NRS SCALE USE

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**Background and aims**: High Frequency Stimulation (HFS) is a pain model known to induce long-term sensitization of Aδ- and Aß-fiber mediated somatosensory functions. The aim of this study was to replicate the HFS effect in our lab, to enable future validation of new technology and methods for observing altered nociceptive function.

**Methods**: Subjective responses to mechanical pinprick and electrical stimuli before and after HFS provided to the test electrode were compared to responses on a control electrode. In contrast to earlier research, in an attempt to better capture the effect induced by HFS, we asked subjects to rate the stimulus intensity rather than to rate the pain intensity.

**Results**: Post-HFS, the subjective responses to both mechanical and electrical stimuli were significantly higher around the test electrode as compared to the control electrode, indicative of successful induction of homotopic and heterotopic sensitization. In contrast to earlier studies, instead of a post-HFS increased subjective response to electrical stimuli at the test electrode, here we found a statistically significant decrease around the control electrode was observed post-HFS.

**Conclusions**: Based on these results we hypothesize that, in addition to homotopic and heterotopic sensitization, HFS can induce changes in NRS scale use. This observation could be dependent on the instructions, and on the modality of the test- and conditioning stimuli. The findings in this study provide insights into the dynamics of scale formation during pain sensitivity measurements. Further research is necessary to fully understand the implications of (changes in) scale formation for pain sensitivity measurements in a research- and clinical setting.

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## Abstract no.: 596

### USING THE PAIN SELF-EFFICACY QUESTIONNAIRE (PSEQ) TO PREDICT LIKELY OUTCOMES OF PAIN MANAGEMENT INTERVENTIONS

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**Background and aims**: Within chronic pain services across the UK, interventions are commonly used to help diagnose and treat chronic pain conditions. It is often observed that outcomes can vary considerably despite adherence to a standardised, best practice approach and a careful selection of appropriately diagnosed conditions. The following poster was aimed at assessing whether the PSEQ could help predict outcomes of pain interventions.

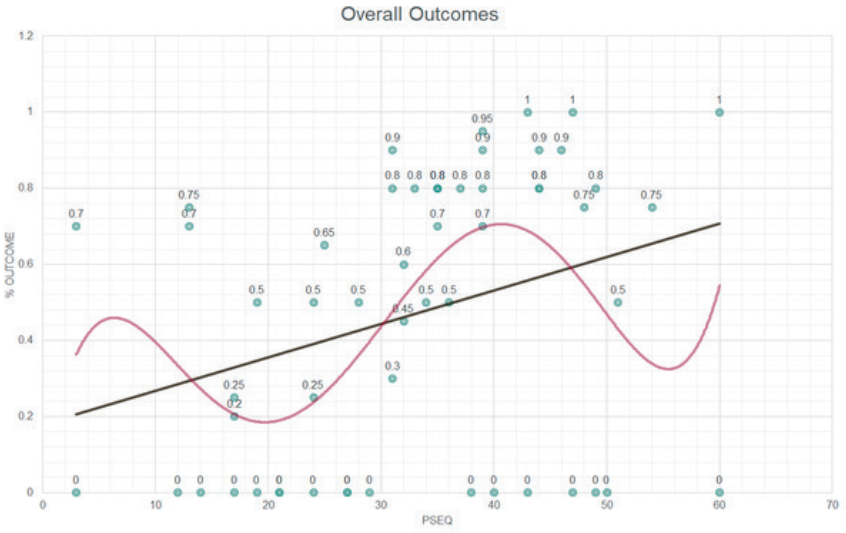
**Methods**: • PSEQ taken pre intervention and the patient was followed up post intervention with perceived outcome of procedure.

• Pre education was provided prior to the intervention along with an assessment.

• Patients were followed up at 6 to 12 weeks.

• Perceived improvement was measured on a self reported scale of 0-100%. 100% relating to complete resolution of symptoms. A measurement of 50% relief was deemed a positive outcome.

**Results**:




| Intervention | Number |
|---|---|
| Lumbar RF | 22 |
| Cervical Facet Joints | 7 |
| Epidurals | 7 |
| SIJ RF | 6 |
| Others | 14 |

| Percentage of likely outcomes from PSEQ scores | Positive | Negative |
|---|---|---|
| 30+ | 27 = 75% | 9 = 25% |
| 30- | 7 = 35% | 13 = 65% |

There was a total of 56 interventions over a 6 month period.

There appears to be an apparent correlation between higher PSEQ scores and perceived improvement. 75% of patients having higher than 30 PSEQ had a positive outcome from the interventions. This is in comparison to those scoring 30 or less who had a 35% of having a positive outcome.

**Conclusions**: It would seem that there is a relationship between self-efficacy using the PSEQ and perceived outcome of various interventions for patients with persistent pain. It would seem that patients who score more than 30 on the PSEQ are more likely to have a positive outcome whereas patients who score below 30 are more likely to have a negative outcome.

## Abstract no.: 606

### COLD-EVOKED POTENTIALS IN CLINICAL PRACTICE:A HEAD-TO-HEAD CONTRAST WITH LASER-EVOKED RESPONSES

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**Background and aims**: It is now accepted that cold-evoked potentials (CEPs) can assess the integrity of thinly myelinated Aδ fibers and the spinothalamic tract, promising noninvasive electrophysiological tools for the detection of specific small-fibers function loss and neuropathic pain. The aim of our study was to estimate the possible additional clinical value of CEPs by comparing them with the 'gold-standard' LEPs in a head-to-head fashion.

**Methods**: Sixty consecutive patients (26 men, mean age: 48,3 ± 12,4 years) with suspected neuropathic pain on face, upper or lower limbs were enrolled in this study. They underwent electrodiagnosis procedures in response to two different modalities of stimulation : (a) infrared laser pulses delivered by a Nd:YAP laser and (b) transient cold stimuli delivered using a contact cold stimulator able to develop a high-speed cooling at 300 °C/sec (TCS II; QST.Lab, Strasbourg, France).

**Results**: Painless cold stimulations were very well tolerated by all the patients and evoked clear cortical potentials. A significant association existed between the diagnostic classification (normal vs. abnormal) of LEPs and CEPs (chi 2= 16,83) with concordance in 78% of patients and discrepancy in 22%. CEPs and LEPs were significantly correlated in latencies and amplitude for face, upper limbs and trunk, but not for distal lower limbs, where CEPs proved less reliable.

**Conclusions**: CEPs are feasible in clinical routine, and may complement LEPs in the diagnosis of neuropathic pain, in particular for upper limbs and face, while their clinical use is not yet warranted in case of stimulation of the feet.

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## Abstract no.: 656

### APPLICATION OF A MODALITY-SPECIFIC TEST PROTOCOL IN POLYNEUROPATHY PATIENTS

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**Background and aims**: Whereas laser-evoked and somatosensory-evoked potentials are already established in routine clinical diagnostics, others, such as touch or cold-evoked potentials, are only used for research purposes.

The aim of our project is to record specific somatosensory modalities electrophysiologically in patients with polyneuropathy in order to identify dysfunctions of individual nerve fibre subclasses using specific evoked potentials.

**Methods**: 25 polyneuropathy patients and 21 healthy subjects are recruited and compared with each other. Presence of polyneuropathy is verified by means of quantitative sensory testing (QST), which also serves as gold standard for somatosensory profiling. Repetitive touch, vibration, cold and heat stimuli are applied to the hand and foot dorsum. Latencies and amplitudes of individual patients are compared with the 95% confidence interval of the healthy cohort. Latencies above the 95% confidence interval are defined as pathological. If there is at least a 50% reduction in amplitude compared to the mean value of normal subjects, the amplitude is also considered pathological.

**Results**: The control group measurement is completed. Patient recruitment is still ongoing. First patient data show typical abnormalities in small and large fibre range. Matching the QST, latency prolongations or decreased potentials could be detected in these patients.

**Conclusions**: Our preliminary results show that nerve fibre damage of the somatosensory system can be detected by means of specific evoked potentials. In the future, diseases of the nervous system could be assigned on the basis of a specific neurophysiological profile and possibly lead to individualized treatment.

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## Abstract no.: 702

### DEVELOPMENT OF THE EMBODIED INTEROCEPTION QUESTIONNAIRE FOR PAIN PATIENTS

A.M. Fernandes[1], V. Deniz[1], C. Campos[1], S. Curcino[1], V. Silva[1], L. Iulli[1], R. Galhardoni[2], M.J. Teixeira[1], A.F. Baptista[3], D. Ciampi de Andrade[1,4]

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**Background and aims**: Interoception is the perception of internal bodily sensations. The majority of questionnaires developed to assess interoception are based on psychological aspects rather than body-derived information. The aim of investigation is to construct a questionnaire about embodied interoceptive experiences based on: the correlation of the self-reported interoceptive experiences, the perception of an interoceptive stimulus in an experimental psychophysics setting, and the quantification of quantitative measurements during interoceptive tests.

**Methods**: This study had 5 phases: 1) Development of questionnaire: literature review; selection of items, and face and content validity by expert board; 2) Test-retest reliability; 3) Internal consistency; 4) Experimental tests: healthy volunteers were exposed to stimuli which provoke interoceptive sensations. The intensity of perception evoked by the experience and its unpleasantness were registered by a visual analog scale; 5) Embodied interoceptive questionnaire validation in chronic pain patients.

**Results**: Phase 1: Seventeen interoceptive sensations were included: pressure pain, visceral pain, heartbeat, respiratory frequency, hunger, thirst, cold, heat, itch, dyspnea, nausea, sleep, muscle fatigue, anguish, gastric fullness, bladder fullness

and muscle pain. Phase 2: 63 healthy volunteers underwent test-retest reliability. The Intraclass Correlation Coefficient (ICC) mean was 0.84; Phase 3: Cronbach's alpha of 0.92. Phase 4: 271 healthy volunteers answered the questionnaire; Phase 5: 185 patients with chronic pain participated in the study.

**Conclusions**: The questionnaire had a good validity analysis with a great reliability and internal consistency. The final version of embodied interoceptive questionnaire will be composed of the interoceptive channels that present good correlation between the three axes.

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## Abstract no.: 754

### OBJECTIVELY ASSESS NOCICEPTION RESPONSE FROM DIFFERENCE SENSOR PLACEMENT DURING THE EXACT SAME NOCICEPTIVE STIMULI: INITIAL EXPERIENCES

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**Background and aims**: Today elderly and patients with complex diseases undergo anesthesia which were before impossible. These patients often require vasopressors which influences somatic interpretation for pain response. Today it is possible to measure nociception response using monitor e.g. Medasense -PMD-200, nociception pain level index (NoL) (1,2).

The aim of this study is to investigate whether bilaterally placed NoL sensors on a patient hands measures nociceptive stimulus equal in patients undergoing general anesthesia.

**Methods**: A quantitative non-experimental observational study of nociceptive response using NoL were conducted. Pre chosen nociceptive stimulus was observed e.g. jaw-thrust, oral intubation, skin incision, insertion of urinary catheter, nasogastric tube and insertion of arterial line. NoL-index sampled from left and right hand.

**Results**: Eight patients were included (table 1). NoL-index differed in and between individuals. NoL-index showed frequent differences (table 2,3). The difference in mean between right and left NoL-index was highest during insertion of an arterial line and the lowest during skin incision (table 2).

Table 1. Demographic

| Demographic data | Number (n=8) | |
|---|---|---|
| Sex<br><br>n= | Female<br><br>4 | Male<br><br>4 |
| Age/year, md +- | 55 | 17-73 |
| Procedure<br><br>=n | Intervention neuro<br><br>3 | Intervention abdominal<br><br>5 |

Table 2. Different nociceptive stimuli during general anaesthesia.

| Patient/ Intervention *neuro or abdominal* | jaw-thrust left/right NoI* | oral intubation left/right NoI* | skin incision left/right NoI* | insertion of urinary catheter left/right NoI* | nasogastric tube left/right NoI* | insertion of arterial line left/right NoI* |
|---|---|---|---|---|---|---|
| n/1 | 10/11 | 12/14 | 82/78 | **N/A | 12/11 | **N/A |
| n/2 | 24/21 | 41/34 | 1/2 | 2/17 | 50/34 | 6/21 |
| n/3 | 14/1 | 8/16 | 3/3 | 9/14 | **N/A | 1/15 |
| a/4 | 8/5 | 15/15 | 6/5 | 2/2 | **N/A | **N/A |
| a/5 | 15/15 | 18/18 | 15/7 | 9/1 | **N/A | **N/A |
| a/6 | 20/19 | 45/45 | 17/12 | 3/3 | **N/A | 57/43 |
| a/7 | 40/29 | 37/32 | 4/5 | 0/0 | 48/59 | 59/51 |
| a/8 | 34/24 | 44/39 | 6/8 | 18/14 | **N/A | 10/7 |

*NoL index (0-100, 0=min, 100= max), **Did not receive.

Table 3. NoL index differences e.g. nociceptivestimuli, group level mean ±SD

| jaw-thrust | oral intubation | skin incision | insertion of urinary catheter | nasogastric tube | insertion of arterial line |
|---|---|---|---|---|---|
| 5.57 | 6.71 | 2.86 | 5.33 | 3.13 | 10.8 |

**Conclusions**: NoL index differ between sensor placement during exact time of identical nociceptive stimuli in individuals and at group level. This is a pilot study only and further studies requires.

## Abstract no.: 939

### TEMPORAL PROPERTIES OF PAIN CONTRAST ENHANCEMENT USING REPETITIVE STIMULATION

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**Background and aims**: Offset analgesia (OA) is characterized by a disproportionately large reduction in pain following a small decrease in noxious stimulation and is based on temporal pain contrast enhancement (TPCE). The underlying mechanisms of this phenomenon are still poorly understood. This study is aiming to investigate whether TPCE can also be induced by repetitive stimulation, i.e., by stimuli clearly separated in time.

**Methods**: A repetitive TPCE paradigm was induced in healthy, pain-free subjects (n = 33) using heat stimuli. Three different interstimulus intervals (ISIs) were used: 5, 15, and 25 seconds. All paradigms were contrasted with a control paradigm without temperature change. Participants continuously rated perceived pain intensity. In addition, electrodermal activity (EDA) was recorded as a surrogate measure of autonomic arousal.

**Results**: Temporal pain contrast enhancement was confirmed for ISI 5 seconds ($p < 0.001$) and ISI 15 seconds ($p = 0.005$) but not for ISI 25 seconds ($p = 0.07$), however, the magnitude of TPCE did not differ between ISIs ($p = 0.11$). A TPCE-like effect was also detected with increased EDA values.

**Conclusions**: TPCE can be induced by repetitive stimulation. Paradoxically, the analgesic effect is captured by enhanced EDA response. This finding may be explained by a combination of the underlying mechanisms of OA and facilitated pain habituation.

## Abstract no.: 982

### TOOTHACHE – SPECIAL PAIN REQUIRES SPECIAL EVALUTION – QUIPS PAIN REGISTRY UNDERWAY TO IDENTIFY IMPROVEMENT POTENTIAL

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**Background and aims**: Toothache is a special kind of pain – as most of us probably remember. So far, no registry has collected patient-reported data on dental pain prior to, during and after the treatment process. The QUIPS pain registry project aimed to address this lack of knowledge by evaluating both the patient´s perspective as well as clinical data given by the treating dentist.

**Methods**: Five German outpatient dental centers invited their patients to join the study. Each treatment was evaluated by two questionnaires: One filled in by the patient and one by the dentist. We used revised versions of the outcome (patient) and process (dentist) questionnaires of the QUIPS pain registry. Data were collected between March and September 2021. Patients included were aged 18 years and older. Results presented are descriptive.

**Results**: In total, 145 patients consented to participate. 98 outcome and 145 process data questionnaires were sent back for evaluation. Patients underwent oral surgery or endodontic, prosthetic, periodontal or caries treatment. Prior to, during and after treatment the relative amount of patients reporting severe pain (Numeric rating scale, NRS ≥7) was 8, 3 and 6%, respectively. Moderate pain (NRS ≥4≤6) was reported by 11 (prior), 14 (during) and 18% (after) of patients. 2% of patients wished for more pain treatment than received.

**Conclusions**: Although a small but relevant part of the patients experienced moderate to severe pain, almost all patients were satisfied with their pain therapy. The subgroup of patients with increased pain should be studied further.

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## Abstract no.: 1016

### PAIN SEVERITY LEVELS IMPACTS LIFE QUALITY AMONGST INDIVIDUALS WITH SELF-REPORTED CHRONIC PAIN: A POPULATION-BASED RETROSPECTIVE COHORT STUDY

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**Background and aims**: Chronic pain is a heterogenous condition with a range of underlying causes and varying degree of severity. Self-reported pain characteristics may be important indicators to identify subpopulations for better targeted disease management. The aim was to describe quality of life by pain severity levels.

**Methods**: A Norwegian retrospective study based on a matched control cohort design using population-based data during 2004-2016. Responders to a chronic pain question in the sixth wave of the Tromsø Study (Tromsø6), were included in the analyses if they reported chronic pain and pain severity level (1-10 [worst possible pain] scale, categorized by mild [1-3], moderate [4-7], and severe [8-10] pain).

**Results**: Of the 12,981 individuals included in Tromsø6, 3,218 (25%) reported chronic pain and pain severity level. The mean EQ5D-3L index score was 0.69, and decreased with higher pain severity levels: 0.77, 0.70 and 0.58 for mild, moderate, and severe pain, respectively. Almost all (92%) reported problems in the subdimension pain/discomfort. More patients with higher levels of pain severity reported problems, a pattern that could be seen in all subdimensions. E.g., 40% in the group with severe pain had problems with daily activities (18% in mild pain group) and 30% had problems walking (14% in mild pain group).

**Conclusions**: Among individuals with self-reported chronic pain, a higher level of pain severity is associated with lower self-reported quality of life. When attempting to standardize the approach to this heterogenous population, it is vital to recognize the difference among groups with distinct pain characteristics to offer efficient disease management.

## Abstract no.: 1020

### PAIN PHENOTYPING USING BAYESIAN STATISTICS: A RELIABILITY STUDY

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*[1]University of Manchester, Manchester, United Kingdom, [2]University of Cambridge, Cambridge, United Kingdom, [3]University of Liverpool, Liverpool, United Kingdom, [4]University of Leeds, Leeds, United Kingdom*

**Background and aims**: Variability in pain behaviour and treatment response make decision making about individual treatment problematic. All pain experience is informed by a combination of previous experience and current (including nociceptive) information. We propose that Bayesian modelling could be a way to phenotype patients according to how they integrate these two types of information.

**Methods**: In our study we asked 30 healthy participants to rate pain after being shown a cue (psychological/cognitive) and receiving electrical stimulation (somatic/physical). This procedure was repeated two weeks after. We then used the pain ratings, the cue and stimulation information, to model the data using a Bayesian statistical approach. This facilitated the extraction the weight each individual placed on the cognitive (expectation) and somatic dimension (stimulation). Furthermore, we tested whether the extracted parameters were stable in time.

**Results**: Our results showed temporal stability in the weight each individual placed on the different dimensions of pain (ICC values between 0.56 and 0.82; $p<0.05$), with the weight placed on the somatic account being the most stable (ICC = 0.82; $p<0.05$).

**Conclusions**: This shows that a Bayesian modelling approach is a promising phenotyping tool that could be used to assess what dimension each patient's pain has the most influence and potentially to predict response particularly to cognitive and related therapies.

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## Abstract no.: 1045

### PAIN EVALUATION IN OUTPATIENTS WITH ADVANCED CANCER AT THE FIRST VISIT IN HOSPITAL PALLIATIVE CARE UNIT

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**Background and aims**: Pain is one of the most frequent symptoms in patients with advanced cancer and must be adequately alleviated at all levels of healthcare. We made initial pain assessment with Edmonton Symptom Assessment Scale (ESAS) in outpatients coming to the first visit in hospital palliative care unit (PCU).

**Methods**: Pain and other symptoms were evaluated in 60 randomly selected outpatients with advanced cancer during the first visit in hospital PCU. Pain evaluation is complex process bur for immediate orientation the ESAS is usually used. Typical symptoms were categorically assessed by numerical rating scale (NRS) from not present (0) to worst possible (10). We examined the incidence of pain and pain intensity in four categories: not present (NRS 0), mild (NRS 1-3), moderate (NRS 4-6), severe (NRS 7-10).

**Results**: 35 men and 25 women in the age between 55 and 89 years (average 70,7 years) fulfilled ESAS. Pain was the third most present symptom of ten observed and present in 85% of patients. Almost three quarters of patients with advanced cancer had not adequate pain relief: 16,6% had mild, 18,4% had moderate and 50% had severe pain.

**Conclusions**: Our results present that pain in patients who need palliative care due to advanced cancer is not adequately managed in primary healthcare and dictate the need to improve the situation through better education and better collaboration with mobile palliative care teams.

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## Abstract no.: 1068

### EXTERNAL VALIDATION OF MACHINE LEARNING AND EEG FOR PAIN INTENSITY CLASSIFICATION IN HEALTHY INDIVIDUALS

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**Background and aims**: Machine learning (ML) and electroencephalography (EEG) to classify pain intensity has significant potential for clinical applications. However, previous research has failed to assess model performance on novel data (e.g., external validation), hindering the interpretation of the method's potential clinical utility. This study aimed to be the first to externally validate ML for pain intensity classification (low versus high pain) using EEG features.

**Methods**: We conducted two independent experiments and used study one (n = 25) for cross-validation and study two (n = 15) for external validation, respectively. In both paradigms, pain sensations were experimentally induced using a pneumatic pressure stimulator (delivered to the fingernail bed) whilst EEG was recorded simultaneously. We calculated ML features from frontal, central and parietal regions using single-trial EEG epochs, which were used to train several established ML algorithms.

**Results**: The results showed that all algorithms performed than chance on both the cross-validation and external validation assessments. Moreover, the random forest (RF) model demonstrated the best performance, achieving accuracies of approximately 73 and 68% for cross-validation and external validation, respectively.

**Conclusions**: Overall, this study is the first to externally validate ML and EEG for the classification of pain intensity. These models successfully generalised to both new populations and experimental paradigms, demonstrating the robustness of the results. Therefore, this study addresses one of the most significant limitations within the field and provides the best estimates of the clinical potential of ML and EEG for pain classification.

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## Abstract no.: 1074

### QST THERMOSENSORY ANALYSIS IN NEUROPATHIC PATIENTS PRE-NEUROMODULATION INTERVENTION

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**Background and aims**: Spinal Cord Stimulation (SCS) is an advanced therapy for patients with neuropathic pain (NP). Quantitative Sensory Testing (QST) is a psychophysiological technique used to assess somatosensory profiles of small and large sensory nerve fibres, which may reflect function of the chronic pain pathway. We examined baseline QST thermosensory profiles prior to providing SCS therapy.

**Methods**: Using standardised QST protocols pain detection, pain threshold (hot and cold stimuli) and thermal sensory limen were undertaken at multiple sites on individuals awaiting SCS implantation. This technique allows the characterisation of sensory gain and/or loss within each dermatome. Z-scores were developed for each metric by comparison with normative data from the German research network on neuropathic pain (DFNS) and Medoc software.

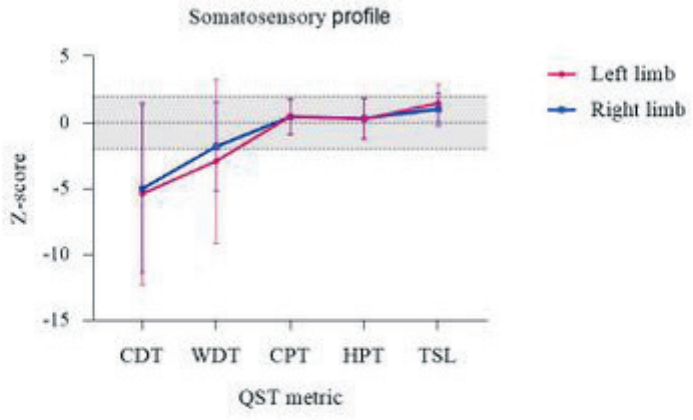


**Figure 1. Somatosensory profile.** Computed Z-scores for each QST metric. Grey shaded region denotes ±1.96SD of normative data. A Z-score ±2 is indicative of sensory loss/gain. CDT = cold detection threshold, WDT = warm detection threshold, CPT =cold pain threshold, HPT = hot pain threshold, TSL = thermal sensory limen.

**Results**: The somatosensory profile (n=25, 20 females, 51.9 ±15.2yrs) demonstrates significant bilateral hypoesthesia to cold and warm stimuli (CDT/WDT), indicative of aberrant Aδ and C-fibre function (Figure 1).

**Conclusions**: The abnormal mode-specific somatosensory dysfunction in NP patients prior to SCS supports the hypothesis of peripheral sensitisation. Comparing the same assessment 6 months post SCS implant could be clinically useful to (1) determine high-efficacy responders to SCS and (2) to develop individualised pain management programmes.

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## Abstract no.: 1109

### THE ASSESSMENT AND CLASSIFICATION OF UPPER AND LOWER LIMB (PERIPHERAL PAIN) IN ATHLETES - SCOPING REVIEW

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**Background and aims**: Sports injury research tends to focus on time loss injury leading to a lack of understanding of the impact pain has on athletic performance and quality of life.[1] Little is understood regarding how upper and lower limb (peripheral) pain is assessed and classified in clinical and research settings. The aim of this study is to establish how and in what context peripheral pain is assessed and classified in athletes and to map current practice against the International Olympic Committee (IOC)Athlete Pain Framework.[2]

**Methods**: A comprehensive search of relevant databases using a suitable population, concept and context search string was conducted. In future work, title, abstract and full text screening will be completed by two independent reviewers. Data charting will be carried out using a standardised charting tool. Descriptive results and frequencies will be reported. Pain measures identified in the studies will be mapped against the IOC Athlete Pain Framework alongside a narrative summary.

**Results**: Initial search identified 3296 papers, of which 466 fulfilled the criteria and are currently being charted following a full text review by 3 reviewers. 139 self-reported and objective assessment and classification tools are being mapped to the IOC Athlete Pain Framework domains; Neurophysiological, Biomechanical, Affective, Cognitive and Socioenvironmental.[3]

**Conclusions**: This research displays the range of pain assessment tools used in research and practice under 5 key assessment domains. This review will inform researchers and clinicians working with athletes in pain how pain assessment and classification is currently conducted and positioned against the IOC Athlete Pain Framework.

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## Abstract no.: 1165

### IMPLEMENTING PAIN ASSESSMENT DIGITAL TECHNOLOGY DURING COVID-19 PANDEMIC: THE PAINCHEK® LEARNINGS FROM AGED CARE SETTING

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**Background and aims**: The COVID-19 pandemic has posed significant challenges to the residential aged care sector. Protecting residents and staff from the virus, whilst endeavoring to deliver to the best possible care to vulnerable populations such as people living with dementia has stressed the sector to its capacity. It is in this challenging environment that we have aimed to implement the digitally enabled pain assessment solution PainChek® and ensure pain assessment was delivered seamlessly and without interruption.

**Methods**: The PainChek® pain assessment system, includes a point-of-care application which uses a hybrid approach (artificial intelligence couple with smart automation) to assesses pain in a multidimensional fashion. In the face of the COVID-19 pandemic we focused on identifying and addressing key implementation obstacles, whilst leverage advantages that the digital health solutions offer.

**Results**: Limited access to residential aged care facilities (RACFs), especially during periods of COVID-19 lockdowns, compounded by site priorities focused around implementation of various COVID-19 related protective measures and staff shortages posed the greatest obstacles. These were addressed by utilizing the following PainChek® pain assessment system advantages: remote online training, social distancing during assessments, and digital documentation and communication of results, removing the need for paper-handling. From less than 100 RACFs in which PainChek® was implemented up to just before the pandemic, the system is now implemented in approximately 800 RACFs, mainly in Australia.

**Conclusions**: Even in the face of COVID-19, we have shown that it is possible to successfully implement a digital health solution, PainChek®, into aged care to support best practice care.

# Measurement of psychosocial aspects of pain

## Abstract no.: 183

### THE RELATIONSHIP OF CATASTROPHIZATION, PAIN INTENSITY AND HEART RATE VARIABILITY IN ACUTE PAIN: A PILOT STUDY

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**Background and aims**: Reduction in heart rate variability (HRV) can strongly and independently predict adverse health outcomes. A wide variety of chronic pain conditions are highly correlated with reduced HRV, suggesting that HRV may be

used as a biomarker for chronic pain. Pain intensity and catastrophization have also been associated with chronic pain but these phenomena have been less investigated in more acute pain conditions.

**Methods**: Fourteen subjects from two facilities participated. Data from two participants had to be excluded. HRV was collected while seated and taking the iPad survey. Raw interbeat interval (IBI) data was analyzed with Kubios software.

**Results**: Multiple regression analyses were non-significant. The strongest correlations were between high frequency power (HFP) and current pain, r(10) = .617, p=.052 and low frequency power (LFP) and current pain, r(10) = .568, p=.069, although neither was statistically significant. RMSSD (35.05, sd = 19.98), LFP (1598.49, sd = 17.97), HFP (488.46, sd = 633.79), LF/HF ratio (3.22, sd = 1.31) and total PCS scores (10.33, sd = 10.89) demonstrated wide variance, unlike current (2.83, sd = 1.99) or worst pain intensity (7.25, sd = 1.55).

**Conclusions**: Despite the lack of statistical significance, the wide variance of HRV and PCS scores yet similar pain intensity in this small population might suggest a subset of individuals that demonstrate decreased HRV in earlier stages of pain. Future research may focus on broadening the size and diversity of the sample and exploring additional psychosocial variables influencing HRV in acute pain.

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## Abstract no.: 399

### DIAGNOSTIC AND PREDICTIVE CAPACITY OF THE SPANISH VERSIONS OF THE OPIOID RISK TOOL AND THE SCREENER AND OPIOID ASSESSMENT FOR PATIENTS WITH PAIN-REVISED

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**Background and aims**: Accurate assessment of the risk of opioid abuse and misuse in people with noncancer chronic pain is crucial for their prevention. The aim of this study was to provide preliminary evidence of the diagnostic and predictive capacity of the Spanish version of the Opioid Risk Tool (ORT) and the Screener and Opioid Assessment for Patients with Pain-Revised (SOAPP-R).

**Methods**: We used the Current Opioid Misuse Measure (COMM) as criterion measure to assess the capacity of each tool to identify patients misusing opioids at the time of the assessment. Eighteen months later, we used the COMM and the Drug Abuse Screening Test-10 (DAST-10) to assess their predictive capacity. In total, 147 patients participated in the diagnostic study and 42 in the predictive study.

**Results**: The Receiver Operating Curve analysis showed that the SOAPP-R had excellent capacity to identify participants who were misusing opioids at the time of assessment (Area Under the Curve [AUC] = .827). The discriminant capacity of the ORT was close to acceptable (AUC = .649 - .669), whereas its predictive capacity was poor (AUC = .522 - .554). The predictive capacity of the SOAPP-R was close to acceptable regarding misuse (AUC = .672) and poor regarding abuse (AUC = .423).

**Conclusions**: In the setting of Spanish-speaking communities, clinicians should be cautious when using these instruments to make decisions on opioid administration. Further research is needed on the discriminant and predictive capacity of the Spanish versions of both instruments.

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## Abstract no.: 402

### INTERACTION EFFECT OF PTSD SEVERITY, DISTRESS INTOLERANCE, AND PAIN CATASTROPHIZING ON PRESCRIBED OPIOID MISUSE IN CHRONIC NONCANCER PAIN PATIENTS

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**Background and aims**: There is an ongoing debate on the use of long-term high-dose medically prescribed opioid analgesics for patients with chronic noncancer pain. Such use is elevated when there is comorbid pain and PTSD, which is quite prevalent. Therefore, it is relevant to investigate the psychological variables that may explain opioid misuse in this population. The purpose of this study was to examine the interaction effect of PTSD severity, distress intolerance, and pain catastrophizing on prescribed opioid misuse in chronic noncancer pain patients.

**Methods**: A total of 168 participants (mean age = 60 years, 74% women) were assessed regarding opioid medication, pain intensity, traumatic psychological events, PTSD, distress intolerance, pain catastrophizing, and current opioid misuse.

**Results**: Groups were formed according to the level of PTSD severity (no symptoms, moderate symptoms, and severe symptoms). Significant differences were found between the groups in pain intensity, catastrophizing, distress intolerance, and opioid misuse. The severe-symptoms group had the highest scores on all variables. There were no between-group differences in the prescribed medication. Mediation analysis showed that the relationship between PTSD severity and opioid misuse was completely and independently mediated by distress intolerance and pain catastrophizing.

**Conclusions**: Distress intolerance and pain catastrophizing may be theoretically and clinically relevant constructs in understanding the motivation for opioid misuse in people with concurrent chronic noncancer pain and PTSD.

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## Abstract no.: 490

### HOW PSYCHOSOCIAL ASPECTS INFLUENCE SHOULDER PAIN AND FUNCTION IN INDIVIDUALS WITH CHRONIC SHOULDER PAIN?

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**Background and aims**: Psychosocial aspects may play an important role in the symptoms, prognosis and clinical conditions of individuals with chronic shoulder pain. This study aimed to identify the relationship between psychosocial aspects and pain intensity and shoulder disability, and how psychosocial aspects are related to each other in individuals with chronic shoulder pain.

**Methods**: Individuals with chronic shoulder pain were evaluated. We assessed pain intensity during any shoulder movement (Numerical Pain Rating Scale), shoulder disability (Shoulder Pain and Disability Index), self-efficacy (Self-efficacy Scale for Chronic Pain), pain catastrophizing (Pain Catastrophizing Scale) and kinesiophobia (Tampa Scale Kinesiophobia). Shapiro-Wilk test was used to verify data normality. Pearson and Spearman tests were used to identify the relationship between the variables. The relationship was considered statistically significant when $p < 0.05$. This study was approved by the Ethics Committee (CAAE 08180919.0.0000.5504).

**Results**: Pain intensity showed a positive and low correlation with pain catastrophizing and positive and moderate correlation with kinesiophobia. Shoulder disability showed a positive and low correlation with kinesiophobia, negative and low correlation with self-efficacy and positive and moderate correlation with pain catastrophizing. Among psychosocial aspects, kinesiophobia and pain catastrophizing were positive and moderately correlated to each other, and self-efficacy was negative and weakly correlated with kinesiophobia and negative and moderately correlated with pain catastrophizing.

**Conclusions**: There is a significant and positive relationship between psychosocial aspects and pain intensity and shoulder disability in individuals with chronic shoulder pain. However, pain intensity is more related to kinesiophobia while shoulder disability is more related to catastrophic thoughts and low self-efficacy.

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## Abstract no.: 580

### ILLNESS PERCEPTIONS RELATED TO JOINT PAIN IN ADULT PEOPLE WITH HEMOPHILIA

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**Background and aims**: Previous studies in chronic musculoskeletal conditions showed that unhelpful beliefs could influence the experienced pain intensity, pain behavior and treatment outcomes. Studies examining illness perceptions about pain in people with hemophilia (PwH) are lacking, although the high prevalence of joint pain. Especially in older PwH, as they could not benefit from modern treatment in childhood, we expect more unhelpful beliefs. The aim of this study is to register PwH's illness perceptions about joint pain and to investigate associations with age.

**Methods**: 91 males (37.4±13.5 years) with moderate/severe hemophilia A/B completed the Brief Illness Perception Questionnaire (Brief IPQ). The Brief IPQ was modified by changing 'my illness' to 'my hemophilia-related joint pain'. An open question collected specific causal attributions to their joint pain. Descriptive statistics and Spearman correlations were used to analyse associations between illness perceptions and age.

**Results**: PwH are concerned and convinced their joint pain will be long lasting. They expect treatment to be effective, but believe less in their personal control. They indicate to have a good understanding and frequently attribute the cause of their joint pain to hemarthrosis and physical activity. Age was significantly, but weakly correlated with the experience of symptoms, concerns and understanding.

| B-IPQ dimension | (N=91) Mean ± SD |
|---|---|
| Consequences | 4.81 ± 2.91 |
| Timeline | 8.51 ± 2.73 |
| Personal control | 5.40 ± 2.51 |
| Treatment control | 7.30 ± 2.90 |
| Identity | 4.77 ± 2.86 |
| Concern | 5.77 ± 3.29 |
| Comprehensibility | 7.91 ± 2.33 |
| Emotional response | 4.26 ± 2.92 |

**Table 1.** Scores B-IPQ of people with hemophilia (N=91). Abbreviations: B-IPQ, Brief Illness Perceptions Questionnaire (possible range between 10-0); SD, Standard Deviation.

| B-IPQ dimension | Age of PwH (N=91) |
|---|---|
| Consequences | ρ=0.125 (p=0.162) |
| Timeline | ρ=0.182 (p=0.085) |
| Personal control | ρ=0.082 (p=0.443) |
| Treatment control | ρ=0.075- (p=0.482) |
| Identity | ρ=0.250 (p=0.017)* |
| Concern | ρ=0.328 (p=0.002)** |
| Comprehensibility | ρ=0.215 (p=0.041)* |
| Emotional response | ρ=0.018 (p=0.864) |

**Table 2.** Spearman correlation between the B-IPQ and age of PwH (N=91). *p<0.05; **p<-2) 0.01tailed). Abbreviations: PwH, People with Hemophilia; B-IPQ, Brief Illness Perceptions Questionnaire.

**Conclusions**: PwH are convinced their joint pain will be long lasting and believe they cannot control their pain. An older age seemed associated with the experience of symptoms and concerns. Since unhelpful beliefs are associated with worse treatment outcomes in other populations, the need to focus on illness perceptions in PwH increases.

## Abstract no.: 627

## DUTCH AND GERMAN VERSIONS OF THE PAIN ATTITUDES AND BELIEFS QUESTIONNAIRE FOR PHYSIOTHERAPISTS MANAGING ROTATOR CUFF RELATED SHOULDER PAIN: A VALIDATION STUDY

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**Background and aims**: Physiotherapists' pain attitudes and beliefs towards rotator cuff related shoulder pain (RCRSP) may influence their treatment approach and management. Despite the growing body of evidence that RCRSP is a multidimensional disorder, the management of these patients seem to be predominantly biomedically driven. The pain attitudes and beliefs questionnaire for physiotherapists (PABS-PT) for rotator cuff related shoulder pain targets to explore a clinician's biomedical versus biopsychosocial orientation. This study aims to validate the modified (Dutch) and translated (German) versions of the PABS-PT-RC (rotator cuff).

**Methods**: Modification of the original Dutch Version of the PABS-PT into PABS-PT-RC. Translation through the TRAPD method (Translation, Review, Adjudication, Pretest, Documentation) into German. Construct validity testing will be done,

using the Health Care Providers' Pain and Impairment Relationship Scale (HCPAIRS) to test the biomedical subscale and the Neurophysiology of Pain Questionnaire to test the biopsychosocial subscale. Exploratory factor analysis (EFA) will test the loading of the items and the underlying constructs of the two subscales. A total of 383 Belgian physiotherapists participated for the modification process into Dutch language. Data collection for the translated German version is still open (target 360).

**Results**: Estimated results in March 2022. Hypothetically the questionnaire's subscales correlate moderately or more (r>0.61) with the HC-PAIRS and NPQ. EFA will demonstrate sufficient loading of the items for the biomedical and biopsychosocial subscales.

**Conclusions**: Intention is to investigate strengths and weaknesses of the PABS-PT-RC Dutch and German. Further, to explore the attitudes and beliefs of the current physiotherapy practice towards RCRSP.

Acknowledgment of Master Students Antwerp.

## Abstract no.: 711

### PSYCHIATRIC COMORBIDITIES AND HYPERALGESIA IN CHRONIC PANCREATITIS PATIENTS WITH AND WITHOUT PAIN: PRIOR PAIN EXPERIENCE MATTERS

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**Background and aims**: Patients with painful chronic pancreatitis (CP) frequently exhibit hyperalgesia and psychiatric comorbidities. Our aim was to describe these phenomena in the 10-15% of CP patients with painless disease.

**Methods**: In this cross-sectional multicenter study of adults with CP, patients were divided into three categories: current pancreatic pain, no current (but prior) pancreatic pain, and painless (no prior or current pancreatic pain). Anxiety and depression symptoms were screened. All patients underwent pancreatic quantitative sensory testing using previously published methods to assess hyperalgesia.

**Results**: In total 235 patients (133 males, mean age 53.9 ± 14.0 years) were included: 185 (79%) current pain, 27 (11%) no current pain, and 23 (10%) painless CP (Table 1). Observed prevalence of hyperalgesia was: patients with current pain (54%), no current pain (56%), painless (22%) (Fig 1). Compared to painless CP patients, those with current or prior pain were more likely to have hyperalgesia (OR, 3.67; 95% CI, 1.27–10.60; *P* = 0.016 and OR, 4.62; 95% CI, 1.29–16.49; *P* = 0.019). Odds of patients with no current pain having anxiety (OR, 0.72; 95% CI, 0.18–2.88; *P* = 0.649) or depression (OR, 1.19; 95% CI, 0.19–7.55; *P* = 0.856) were more similar to patterns observed for painless CP patients than those with current pain (Table 2).

**Table 1.** Demographic and clinical characteristics of the study cohort

| | All patients *n=235* | Painful CP | | Painless CP *n=23* | P-value* |
|---|---|---|---|---|---|
| | | *Current pain n=185* | *Prior pain n=27* | | |
| Age, mean years (SD) | 53.9 (14.0) | 51.7 (13.2) | 53.4 (15.9) | 66.9 (10.1) | <0.001 |
| Aetiologies, n (%) | | | | | |
| Alcohol | 96 (41) | 75 (41) | 12 (44) | 9 (39) | 0.49 |
| Genetic | 52 (22) | 42 (23) | 5 (19) | 5 (22) | |
| Obstructive | 9 (4) | 6 (3) | 3 (11) | 0 (0) | |
| Others | 3 (1) | 2 (1) | 1 (4) | 0 (0) | |
| Idiopathic | 75 (32) | 60 (32) | 6 (22) | 9 (39) | |
| Smoking, n (%) | | | | | |
| Never smoker | 90 (38) | 64 (35) | 10 (37) | 16 (70) | 0.003 |
| Past or current smoker | 145 (62) | 121 (65) | 17 (63) | 7 (30) | |
| Endoscopic pancreatic duct decompression, n (%) | 125 (53) | 96 (52) | 18 (67) | 3 (13)[a] | <0.001 |
| Opioid use, n (%) | 103 (44) | 94 (51) | 7 (26) | 2 (9)[b] | <0.001 |

*Painful vs. painless chronic pancreatitis (CP)

[a] All patients underwent pancreatic duct compression for a pancreatic stone located in the pancreatic head in an attempt to restore pancreatic exocrine function

[b] One patient was treated intermittently with opioids due headaches and one patient was maintained on suboxone for a history of opioid use disorder

Figure 1.

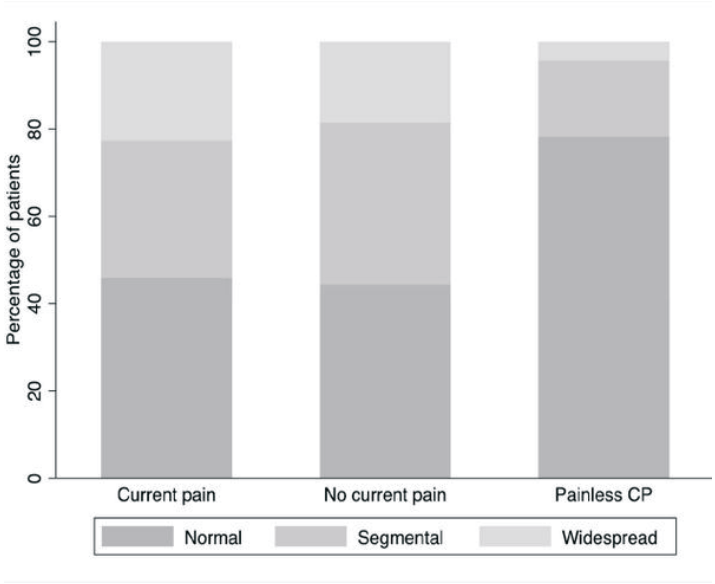


**Table 2.** Multivariate analysis of hyperalgesia as assessed by P-QST and psychiatric comorbidities across chronic pancreatitis subgroups

| | | Current pain | | No current pain | |
|---|---|---|---|---|---|
| | | Odds ratio (95% CI) | *P* | Odds ratio (95% CI) | *P* |
| Hyperalgesia | Unadjusted | 4.24 (1.51 – 11.89) | 0.006 | 4.50 (1.29 - 15.68) | 0.018 |
| | Adjusted* | 3.29 (1.11 – 9.74) | 0.032 | 4.06 (1.11 – 14.86) | 0.034 |
| Anxiety | Unadjusted | 3.97 (1.40 - 11.21) | 0.009 | 1.19 (0.32 - 4.44) | 0.796 |
| | Adjusted# | 2.19 (0.70 – 6.89) | 0.178 | 0.75 (0.18 – 3.10) | 0.695 |
| Depression | Unadjusted | 9.36 (2.13 – 41.22) | 0.003 | 1.74 (0.29 – 10.52) | 0.547 |
| | Adjusted# | 6.15 (1.28 – 29.41) | 0.023 | 1.24 (0.19 – 8.26) | 0.824 |

The painless CP group was set as the reference.

* smoking, past endoscopic treatment and opioid use adjusted
# age, sex, smoking, past endoscopic treatment, opioid and antidepressant use adjusted

**Conclusions**: Total absence of pain in CP is associated with lower risk of hyperalgesia, anxiety, and depression; patients with prior pain experience appear to experience persistent hyperalgesia even as pain and psychiatric morbidities resolve.

## Abstract no.: 891

### CHRONIC PAIN AND SUICIDAL IDEATION: THE POSSIBLE CONTRIBUTION OF MEANING IN LIFE

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**Background and aims**: Chronic pain is associated with an elevated risk of suicidal ideation (SI). Meaning in Life (Mil) and its constructs, presence and search, were explored as a resiliency factor possibly modulating the suicidal ideation in patients with chronic pain.

**Methods**: We recruited 70 patients referred to the Multidisciplinary Pain Centre of the Geneva University Hospitals and who answered positively to the question of the Beck Depression Inventory investigating SI. Patients who were included filled out the meaning in life questionnaire (MiLQ), as well as a semi-structured scale to assess the characteristics and severity of SI, the Suicidal Ideation Scale (SSI). Our objectives were to examine whether the presence or the search for MiL, were associated with less SI and to explore whether MiL profiles emerge in our cohort.

**Results**: The results showed that the presence of MiL is a potential protective factor against the severity of suicidal ideation,

while the search for MiL is also a possible resiliency factor, although to a lesser extent than the presence. The profile “low presence and low search” of MiL represented the vast majority of the patients.

**Conclusions**: The results of this study point to MiL as a concept of interest when it comes to devising psychotherapeutic interventions for patients suffering from chronic pain in order to reduce the suicidal risk and better listen to the patients’ suffering.

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## Abstract no.: 1038

### THE SOCIAL BENEFIT STRESS TASK: INDUCING SOCIAL STRESS RESPONSE IN EHLERS-DANLOS SYNDROME AND HYPERMOBILITY SPECTRUM DISORDER PATIENTS

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**Background and aims**: Maladaptive stress response may play a role in chronic pain maintenance and deserves further investigations using experimental clinical models. Yet existing stress induction paradigms, such as the well-validated Trier Social Stress Task (TSST) are not fully relevant for patients suffering from severe, incapacitating chronic pain: the scenario requires to undergo a job interview.

This motivated the development and validation of a new task: the Social Benefits Stress Task (SBST). The SBST is modelled on the TSST, but the job interview is replaced by a simulation of an interview with a medical expert deciding on patients work incapacity for benefits allocation.

**Methods**: Forty women with chronic widespread pain in hypermobility spectrum disorders context were invited to participate, as their pain is often refractory to treatment, and incapacitating. After a 30min baseline, patients had to justify for 5 minutes their inability to work, facing the “sceptical expert”. After a recovery period, they were fully debriefed. The psychophysiological stress response was captured using repeated self-reported stress ratings and continuous physiological monitoring.

**Results**: Pilot data revealed a moderate stress response (significant transient increases in self-reported stress ratings). Additionally, qualitative data from patient interviews shed light on the emotional impact of interactions with judging doctors. The effect of SBST on perceived stress, pain and heart rate variability will be presented for the full sample.

**Conclusions**: SBST will allow to explore the impact of the multiple hurdles patients with chronic pain must face to obtain financial support and better address the relationship between stress and chronic pain more generally.

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## Abstract no.: 1094

### IMPACT OF THE COVID-19 PANDEMIC ON PATIENTS WITH CHRONIC PAIN IN GERMANY: PATIENTS’ EXPECTATIONS, CONTROL BELIEFS, AND WISHES

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**Background and aims**: Due to the biopsychosocial nature of pain, it seems likely that people suffering from chronic pain are particularly affected by the consequences of the COVID-19 pandemic. To better understand how patients experienced their symptoms during the pandemic and what support they would have wished for we conducted telephone interviews with chronic pain patients.

**Methods**: In this observational study, we interviewed 196 patients with chronic pain and assessed how they perceived the consequences of the pandemic on various aspects of their pain and everyday life. The initial interviews were conducted between April and May 2020 and were followed up by a second interview between August and December 2020.

**Results**: Many patients (39% at interview 1 and 32% at interview 2) reported an increase in pain intensity due to the pandemic. Exploratory analyses revealed that patients who already suffered from greater pain and who experienced greater restrictions due to the pandemic were more likely to express a pain worsening. Psychological factors Negative expectations about their pain development and a high external locus of control were also associated with increases in pain. Most frequently, patients wished for more personal contact (58.6%), more social inclusion (46.2%), and more information (36.6%).

**Conclusions**: These findings illustrate the complexity of chronic pain, suggesting that not only the impact of the pandemic on various areas of life but also the severity of the pain symptoms themselves and psychological factors influence the course of patients' symptoms during the pandemic. Avoiding social isolation might be important, too.

## Abstract no.: 1096

### IS CENTRAL SENSITIZATION LINKED TO LOW SELF-EFFICACY? AN OBSERVATIONAL STUDY

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**Background and aims**: Pain self-efficacy is a cognitive factor used in measuring one's perceived ability to cope with chronic pain. Low self-efficacy has been linked to higher levels of pain but no studies have evaluated its relationship with central sensitization. The goal of this study was to identify a potential correlation between self-efficacy and central sensitization.

**Methods**: We conducted a transversal observational study in the French general population with participants recruited from June to December 2021 through a one-time online self-administered questionnaire. We included participants over 18 with or without current pain. We excluded people with cancer, psychiatric conditions and inflammatory rheumatologic conditions. We used the Central Sensitization Inventory (CSI) and the Pain Self-Efficacy Questionnaire (PSEQ) to assess central sensitization and self-efficacy. Association between central senstization and self-efficacy was evaluated with linear regression analysis and Chi2 test.

**Results**: 232 responses were collected (153 women; mean age=35.6). In our population, 147 (63%) participants presented pain when filling out the questionnaire. A negative slope was identified between self-efficacy and central sensitization. There was four times less central sensitization in those high in self efficacy ($r<0$; $p<0,01$).

**Conclusions**: Applying the biopsychosocial model is considered the best practice in treating chronic pain. While neurobiological aspects of central sensitization have been largely explored, psychological aspects remain secondary. Considering that low self-efficacy may mediate pain chronicization and central sensitization, including this notion in a clinical setting toward patient-centered care and autonomization may be relevant in treating chronic pain.

## Abstract no.: 1156

### VALIDATION OF THE MULTIDIMENSIONAL PSYCHOLOGICAL FLEXIBILITY INVENTORY (MPFI) IN A CHRONIC PAIN SAMPLE

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**Background and aims**: Psychological flexibility (PF) is a model of well-being and successful functioning that has been applied to chronic pain, and is the model behind Acceptance and Commitment Therapy (ACT). Research on PF in chronic pain has been hampered by the lack of a single measure that captures all facets. The Multidimensional Psychological Flexibility Inventory (MPFI), a 60-item self-report measure, assesses all facets of PF and psychological inflexibility (PI) but has not been validated within a chronic pain population. This study examines the psychometric properties of the MPFI in a chronic pain sample.

**Methods**: Swedish speaking adult participants with chronic pain were recruited online and completed an assessment battery including MPFI, other validated measures of PF/PI, measures of pain, work-and social adjustment, and depression, at two time points. The factor structure of the MPFI was analyzed using confirmatory factor analysis (CFA). Reliability, convergent- and incremental validity were also examined.

**Results**: Mean participant age was 47.75 years (SD = 13.02), and most were women (93.8 %). The most common pain conditions were fibromyalgia (28.7 %), persistent low-back pain (21.0 %), and endometriosis (20.0 %). CFA results demonstrated a good model fit for the proposed factor-and subscale structure. Correlations between MPFI and theoretically similar measures were moderate to strong, and showed small to large correlations to pain intensity, pain interference, work- and social adjustment, and depression.

**Conclusions**: In this first validation study of the MPFI within a chronic pain population, we found its validity and reliability. The instrument is recommended where comprehensive assessment of PF or PI is needed.

# Complementary medicine

## Abstract no.: 664

### MECHANISMS OF MUSIC INDUCED ANALGESIA, CONTRIBUTIONS OF MUSIC REWARD AND EXPECTATION

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**Background and aims**: Music can provide pain relief through mechanisms yet unknown. We aim to disentangle the roles of expectation and reward processed in music-induced analgesia, and to elucidate the neurochemical systems underpinning these effects. In this non-pharmacological pilot study, we established a paradigm to manipulate expectations to music's analgesic effects (via a video aiming to eliminate inherent expectations for low or high arousal music's effects on sensory experiences) and collect conjunctive measures of reward and pain.

**Methods**: 129 participants completed an online study to validate the effectiveness of the expectation manipulation. 32 healthy participants completed in-person testing involving listening to self-selected high (HA) and low (LA) arousal music and brown noise clips (3 of each, expectations manipulated for one music type), with 4 heat pain trials per clip. Main outcome measures: musical enjoyment and pain intensity (VAS 0-100), effects assessed with ANOVA (online study) and mixed models.

**Results**: Compared to brown noise, both HA and LA music reduced pain ratings ($F_{2,1063}$=8.331,p<.000; means(SE): HA: 41.201(4.427), LA: 43.168(4.434), noise: 49.660(4.465), HA < noise (β=-8.458, p<.000), LA < noise (β=-6.492, p=0.003). Reward moderated the analgesic effect ($F_{1,1062}$=7.131, p=0.008; mean reward ratings (SE): HA = 43.476 (4.389), LA = 45.165 (4.377), N = 45.380 (4.630)). While analgesia expectations were successfully manipulated in the online study, this did not replicate in in-person participants ($F_{1,18}$=1.608, p=0.221).

**Conclusions**: Music successfully induced an analgesic effect as compared to noise, and reward was a moderator of this effect to greater degree than expectation. Pharmacological manipulations are the next step.

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# Neuromodulative therapies

## Abstract no.: 231

### THE EFFICACY OF PULSED RADIOFREQUENCY STIMULATION OF THE GLENOHUMERAL JOINT AND SUPRASCAPULAR NERVE FOR CHRONIC SHOULDER PAIN AND FUNCTION COMPARED TO PHYSIOTHERAPY AND EXERCISE PROGRAM

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**Background and aims**: Degenerative tendon diseases are primarily treated conservatively in primary health care and the most important treatment modality is physiotherapy-guided therapeutic rehabilitation.The aim of this observational study was to compare whether pRF treatment of both glenohumeral joint and suprascapular nerve provided additional clinical benefits compared to for physiotherapy only.

**Methods**: In this prospective observational study, we investigated the effect of two different treatment approaches in patients with chronic shoulder pain. Physiotherapy-guided treatment was compared to interventional pain treatment with radiofrequency nerve stimulation (pRF) before exercise therapy. The primary outcomes were active shoulder mobility and shoulder function assessed by SPADI questionnaire at two and 6-month controls.

**Results**: The results of this study show that pRF treatment combined to physiotherapy seem to effect shoulder function more than physiotherapy alone. With regard to patients with chronic pain and decreased shoulder mobility (65%), pRF treatment showed a significant greater effect in relieving pain and increasing functional outcome assessed by SPADI. Also short-term pain and impairment reduction for 8-12 weeks occurred in patients with chronic rotator cuff lesions. A direct comparison between the rehabilitation programs strengthened the assumption that effective pain management could be necessary to obtain optimal effect of physiotherapy and physical training in patients with chronic (> 3 months) shoulder pain.

**Conclusions**: PRF can be performed in an outpatient department and provides the clinician with an alternative or additional approach to oral drug treatment and intra-articular injection. Further, it may prove to be a useful treatment for patients who are unfit or unwilling to consider surgical intervention.

## Abstract no.: 347

### UTILIZATION OF FAST-ACTING SUB-PERCEPTION THERAPY (FAST) IN SCS-IMPLANTED PATIENTS FOR MIXED NOCICEPTIVE AND NEUROPATHIC PAIN

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**Background and aims**: Patients implanted with Spinal Cord Stimulation (SCS) devices can be frequently observed to exhibit mixed pain, but may present as challenging cases given the potentially heterogenous manifestation of their symptoms of chronic pain. A recent study reported discovery and use of a novel SCS methodology (FAST) capable of delivering therapeutic neurostimulation using a biphasic-symmetric waveform based on active recharge, sub-perception SCS that is capable of inducing analgesia within minutes. We surmised that this new neurostimulative approach may help to possibly improve outcomes in a population of SCS-implanted patients with mixed pain and report real-world preliminary experience in an observational, case-series.

**Methods**: This is a single-center, retrospective, observational case-series of patients demonstrating symptoms of mixed pain who were implanted with a Boston Scientific manufactured SCS device (or are converted to a new SCS system) capable of multiple independent current control (MICC) and fast-acting sub-perception therapy (FAST), as described previously. Clinical assessments as collected per standard of care prior to implant and at follow-up out to 6-months post-implant, include the following: painDETECT score, pain intensity.

**Results**: Analysis of collected data from this recently launched study is currently on-going. Determined clinical outcomes will be presented.

**Conclusions**: Novel neurostimulative methods may mediate analgesic responses via mechanisms that differ from traditional approaches, thus presenting potential for expanding the array of indications for which SCS may be successfully used (e.g. nociceptive pain syndromes). This initial, single-center evaluation seeks to determine if SCS-based FAST can effectively treat or improve outcomes inpatients reporting complex symptom complaint characteristic of mixed pain.

## Abstract no.: 348

### PAIN RELIEF OUTCOMES USING PERIPHERAL NERVE/FIELD STIMULATION (PNFS) COMBINED WITH SPINAL CORD STIMULATION

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**Background and aims**: Peripheral Nerve Field Stimulation (PNFS) and Spinal Cord Stimulation (SCS) are treatment options for patients with chronic pain. Combining localized stimulation using PFNS along with SCS may have potential to treat areas of pain not previously covered with SCS alone. To address this question, we undertook an observational study of patients using PNFS together with SCS implanted with a device that allows for precise customized programming of therapeutic neurostimulation parameters and settings.

**Methods**: This is a single-center, observational case-series of patients implanted with a neuromodulation system (Precision, Precision Spectra, Spectra WaveWriter, Boston Scientific) conducted as part of an on-going retrospective chart review evaluation of real-world outcomes for chronic pain (Clinicaltrials.gov: NCT01550575). Patients were diagnosed with chronic neuropathic pain and treated with PNFS as an “add-on” therapy to SCS. Assessments collected include baseline characteristics (demographics, medical history, pain diagnosis) and pre- and post-implant outcomes (NRS pain score).

**Results**: To date, a total of 10 patients (5 Female, mean age 61 ± 9.5 years) who received both SCS and PNFS for the treatment of their pain were analyzed. At baseline, a mean score of 7.6 ± 1.4 (NRS) was reported which reduced to 2.7 ±1.3 (Δ = 4.9) at last follow-up (median 516 days). Data collection and analysis is still ongoing, and updated, new results will be presented.

**Conclusions**: Neuromodulation systems capable of providing various stimulation waveforms, parameters, and programming settings that can be used in a selective, individual manner by patients utilizing PNFS and SCS in combination can elicit effective analgesic outcomes. Additional study is needed.

## Abstract no.: 364

### PULSED RADIOFREQUENCY APPLICATION ON SACRAL NERVE ROOTS FOR PUDENDAL NEURALGIA: A TECHNICAL OVERVIEW WITH TWO CASE REPORTS

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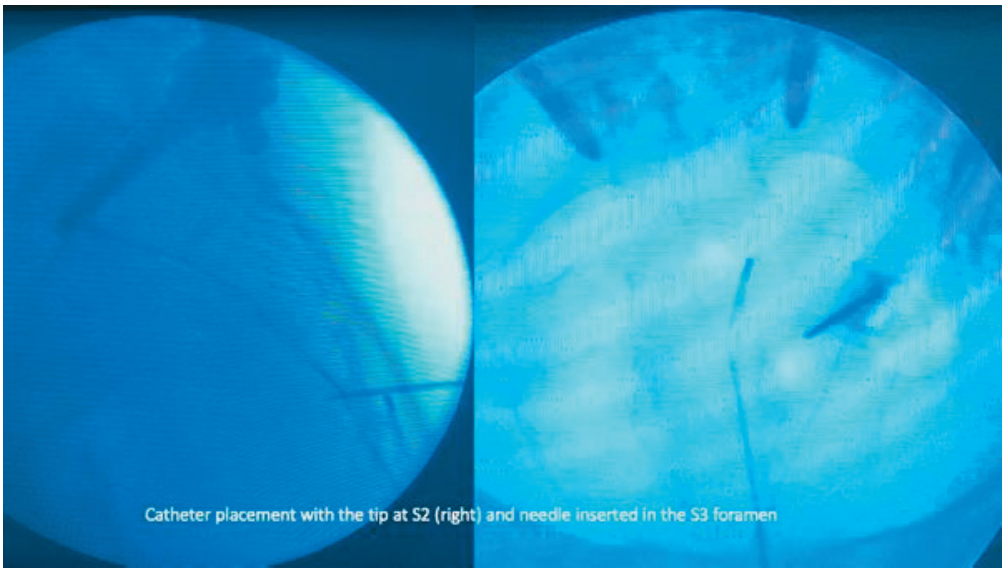
**Background and aims**: Pudendal neuralgia is a known cause of pelvic pain,often poorly responsive to conservative treatments.

Pulsed radiofrequency (PRF) application on the pudendal nerve has been described both under fluoroscopic or ultrasound guidance,intercepting the nerve between the sacrospinous and sacrotuberous ligaments.Since locating the nerve at this level can be difficult,we propose an alternative approach targeting the sacral nerve roots which originate the nerve



Catheter placement with the tip at S2 (right) and needle inserted in the S3 foramen

**Methods**: Two women with chronic pelvic pain and a positive EMG for pudendal neuralgia, not responsive to conservative treatment were treated. A PRF catheter was inserted in the epidural space with a caudal approach,reaching S2,and a needle in the S3 foramen in order to create a selective bipolar electrical field around the fibers of the sacral plexus.Paresthesias were elicited with a 50Hz stimulation at 0.4V in the genital and pelvic area.Three cycles of PRF at 42°C, 45V lasting 120 seconds each were performed.

**Results**: After the procedure the patients have been pain free for three months,at six months follow-up they reported mild pain with an NRS of 3,both have resumed most of their daily activities.

**Conclusions**: Combining a caudal and intraforaminal approach for PRF on sacral roots results in a localized electrical field recruiting fibers that originate the pudendal nerve,fluoroscopic guidance allows easy positioning of the catheter with a caudal approach and the trasforaminal insertion of the second needle in the S3 foramen.This technique could be a less invasive option for treating pelvic pain due to pudendal neuralgia compared to sacral stimulation and peripheral stimulation of the pudendal nerve.

## Abstract no.: 368

# COOLED RADIOFREQUENCY DENERVATION OF THE AXILLARY, SUPRASCAPULAR AND LATERAL PECTORAL NERVES IN CHRONIC SHOULDER PAIN: A RETROSPECTIVE STUDY

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**Background and aims**: Shoulder pain affects about 20% of the general population. Radiofrequency (RF) denervation of the suprascapular (SN) nerve reported a significant decrease in pain scores in 50-85% of patients, but with short follow-ups;cadaveric studies suggested targeting the SN at the spinogleinoid notch in order to selectively ablate sensory fibers and adding the axillary (AN) and lateral pectoral (LPN) nerves as completing possible targets.We retrospectively analyzed cooled RF application on the sensitive branches of the three nerves in chronic shoulder pain patients.

**Methods**: Cooled RF at 60°C for 150 seconds on AN, SN,and LPN was performed in 16 patients, treated from January 1st 2019, until March 1st 2021. A 17G, 2 mm active tip Cooled RF probe was used, under fluoroscopic guidance,(Fig.1). Local ethical committee approved the study protocol.

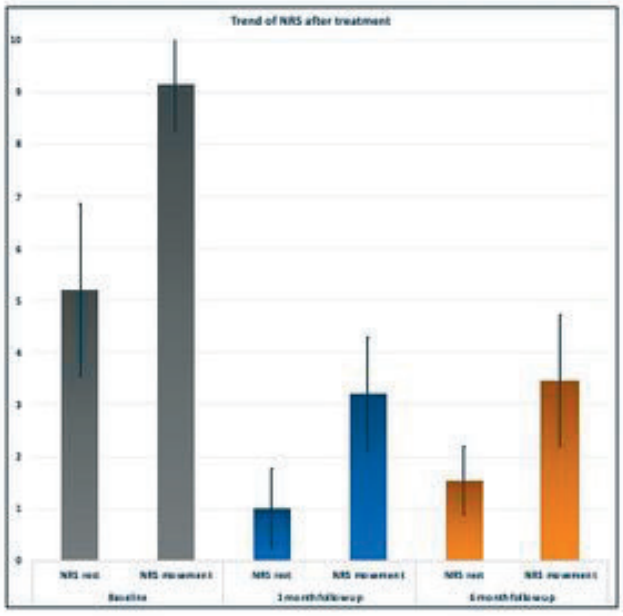


Fig.1: Pain score (NRS) at 1 and 6 months follow-up

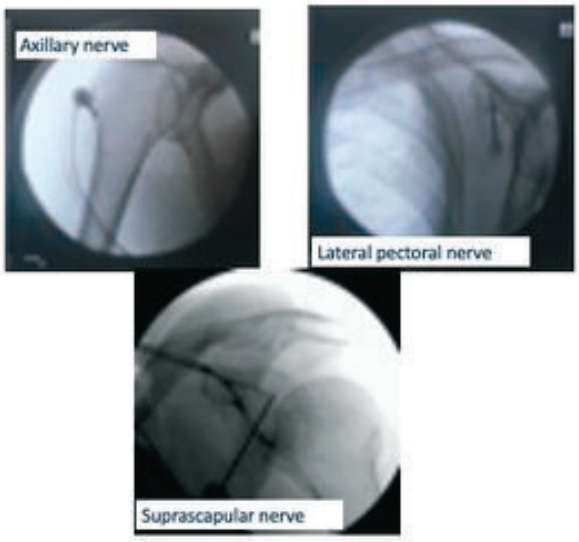


Fig.2: Fluoroscopic targets for RF denervation

**Results**: Follow-up at 1 and 6 months has been completed for all patients. 87,5% of patients (14 out of 16) had a successful outcome (pain relief of >50% from baseline) at both 1 and 6 months, both at rest and after movement (Fig.2). Disability, measured with Oxford Shoulder Score (baseline median 14∓6), improved at all follow-ups with a median of 40∓11 and 40∓10 at 1 and 6 months respectively.No adverse events were reported.

**Conclusions**: The inclusion of LPN and AN, in addition to the SN, could improve results achieving a more complete and sustained denervation of the joint. Cooled RF denervation of articular branches of the LPN, AN and SN was successful both in terms of pain reduction and disability improvement.

## Abstract no.: 515

### EFFECTS OF STIMULATION INTENSITY ON CORTICAL ACTIVATION CHANGES DURING EXTERNAL PERIPHERAL NERVE STIMULATION IN HUMANS

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**Background and aims**: External low-frequency peripheral nerve stimulation (LFS) has been proposed as a novel method for achieving pain relief in neuropathic pain patients. Previous studies have reported that LFS elicits long-term depression-like effects on human pain perception when delivered at noxious intensities, while lower intensities may be ineffective. To shed light on cortical regions mediating the effects of LFS, we investigated changes in somatosensory-evoked potentials (SEPs) during four LFS intensities.

**Methods**: LFS was applied to the radial nerve (600 pulses, 1 Hz) of twenty-four healthy participants at four intensities: perception (1× detection threshold), low (5× detection threshold), medium (10× detection threshold) and high (15× detection threshold). SEPs were collected during LFS, and averaged SEPs in 10 one-minute epochs were analysed using source dipole modelling. Repeated-measures analyses of variance were computed to assess changes in source activity over the duration of LFS and between LFS intensities.

**Results**: SEPs were modelled by four equivalent current dipoles located in contralateral sensorimotor cortex, bilateral operculo-insular cortex, and midcingulate cortex. Source activity in the midcingulate cortex decreased linearly during LFS, with greater attenuation at increasing LFS intensities. Source activity in ipsilateral operculo-insular cortex decreased linearly during the two lowest LFS stimulus intensities. Contralateral primary sensorimotor cortex source activity increased during LFS, with greater increases at high stimulation intensities.

**Conclusions**: Suppression of cortical activity during LFS in the midcingulate and ipsilateral operculo-insular cortex suggests a potential inhibition of nociceptive processing. In contrast, increased strength of activation in contralateral sensorimotor cortex points towards a potential masking of nociceptive processing by ongoing LFS.

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## Abstract no.: 559

### EFFECTS OF VARYING INTENSITIES OF BURST AND TONIC SPINAL CORD STIMULATION ON CORTICAL OSCILLATORY CHANGES DURING BRUSHING IN NEUROPATHIC PAIN PATIENTS

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**Background and aims**: Spinal cord stimulation (SCS) is a palliative treatment for neuropathic pain. One mechanism underlying pain relief during SCS may be inhibition of somatosensory processing by concurrent impulses in the dorsal column. However, the mechanisms underlying burst SCS and the effect of SCS intensity are poorly understood. We investigated the effect of varying intensities of burst and tonic SCS on cortical oscillatory responses to brushing.

**Methods**: Twenty patients using SCS (11 burst, 9 tonic) for unilateral neuropathic leg pain participated. Brushing was applied to the leg during 4 SCS intensities: 'Therapeutic' (100%), 'Medium' (66%), 'Low' (33%) and 'Off'. EEG recordings were acquired continuously during brushing. Changes in spectral power during brushing were calculated in alpha (8-13 Hz), beta (16-24 Hz) and theta (4-7 Hz) frequency bands. Repeated-measures ANOVAs assessed changes in spectral power between SCS intensities and between burst and tonic SCS.

**Results**: Brushing was associated with decreased power in 4-24 Hz range, known as event-related desynchronization (ERD), which indicates cortical activation. Tonic SCS was associated with reduced ERD in theta and alpha bands compared to burst. Stronger intensities of burst and tonic SCS were associated with reduced ERD in theta and alpha bands in parietal electrodes, and the beta band in central electrodes, with the strongest suppression at medium intensity.

**Conclusions**: Results suggest that burst and tonic SCS are mediated by both different and shared mechanisms, with tonic SCS involving gating from the dorsal column. Reduced ERD at stronger intensities points towards a graded effect of burst and tonic SCS on somatosensory processing.

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## Abstract no.: 683

### REPETITIVE TRANSCRANIAL MAGNETIC STIMULATION OF THE PRECENTRAL-GYRUS IN THE RELIEF OF FIBROMYALGIA PAIN: REPORT OF AN INTERNATIONAL MULTICENTER CONTROLLED ADAPTIVE STUDY PROTOCOL

V. A. Silva[1], A. Baptista[2], N. Attal[3], D. Bouhassira[3], K. Hosomi[4], C. C. Lins[1], A. S. Fonseca[1], K. M. Silva[5], E. C. Daquer[6], P. Carrilho[7], C. Tanaka[1], A.M. B. L. Fernandes[1], A. R. Brunoni[1], J. P. Lefaucheur[8], M. J. Teixeira[1], D. Ciampi de Andrade[9]

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**Background and aims**: Fibromyalgia (FM) affects up to 1.5% of the general population and negatively affects quality of life. Non-pharmacological approaches are the mainstream of treatment: among them, repetitive transcranial magnetic stimulation (rTMS) has shown positive short-time effects.

To evaluate the long-term analgesic properties of motor cortex stimulation by rTMS in fibromyalgia.

**Methods**: This is the study protocol for an internationally controlled multicentric adaptive trial with two phases. In phase 1 patients will be randomly divided into two arms: normal dose (3000 pulses) and sham stimulation. Induction sessions to the left precentral gyrus at 10Hz will be carried for 10 consecutive days, followed by maintenance stimulations administered every week for 8 weeks. Long term post-treatment (3,6,12 months). In phase 2: active rTMS at 3000 pulses dosage will be compared to active rTMS delivered in 1500 pulses, and data will be imputed from phase 1 according to adaptive trial methodology. Forty women will be included in each phase and safety measurements will include standardized adverse events check lists.

**Results**: Results from phase 1 are expected for end-March 2022, and phase 2 to December 2022.

**Conclusions**: This will be the first multicentric rTMS trial on FM, with adaptive methodology, assessing long-term effects of treatment and and exploring dosage. NCT03658694.

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## Abstract no.: 715

### FEASIBILITY AND LONG-TERM SAFETY OF POSTERIOR SUPERIOR INSULA DEEP BRAIN STIMULATION FOR PERIPHERAL NEUROPATHIC PAIN

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**Background and aims**: The posterior-superior insula (PSI) has been show to alleviate pain in peripheral neuropathic pain (PNP) during repetitive transcranial magnetic stimulation (rTMS). However, effects are short-lived. This has led to the proposal to target the PSI chronically via deep brain stimulation (DBS). Here we report the safety and feasibility of such an approach.

**Methods**: Ten patients previously known to be responsive (>50% pain intensity reduction) to PSI-rTMS (but not to sham stimulation) with unilateral PNP were operated on and received unilateral DBS to the PSI contralateral to the side of pain (NCT04279548). Patients were followed by three months in either the "on" or "off" stimulation condition and then were switched to the corresponding condition for more three months. Then, participants underwent another three-month single-blind condition, followed by six months of open stimulation when stimulation was turned "on". Data on safety, side-effects and feasibility are presented here.

**Results**: Ten patients (44.5±10.0 years) were included (n=8 had brachial plexus avulsion, and two had postherpetic neuralgia). All underwent PSI-DBS and all participated in the entire 15-month follow-up. There were no deaths during surgery or the follow-up period. All surgeries were successful, with no significant bleedings or intraoperative incidents. During follow-

up, there were no complications such as seizure, hemorrhage, infection, mood or behavioral abnormalities, or significant pain aggravation. One patient had moderate chest pain related to implanted pulse generator, lasting for 7 days.

**Conclusions**: Preliminary data based a small size sample suggest PSI-DBS is safe and has few side effects.

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## Abstract no.: 855

### LUMBAR SYMPATHIC SYSTEM RADIOFREQUENCY

M.d.R. Fernandez Fernandez[1], M. Alvarez Rodriguez[1], M.J. Garcia Menendez[1]

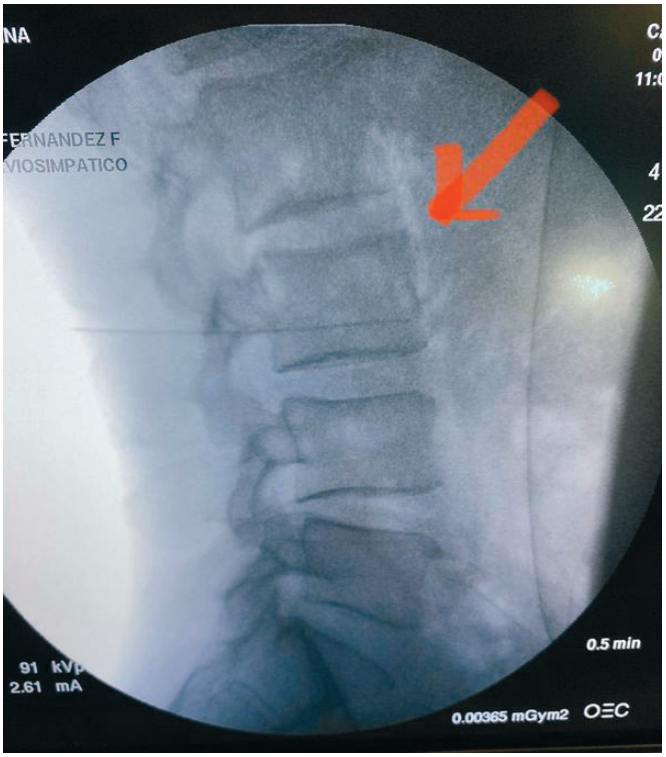
[1]*Hospital de Cabueñes, Gijon, Spain*

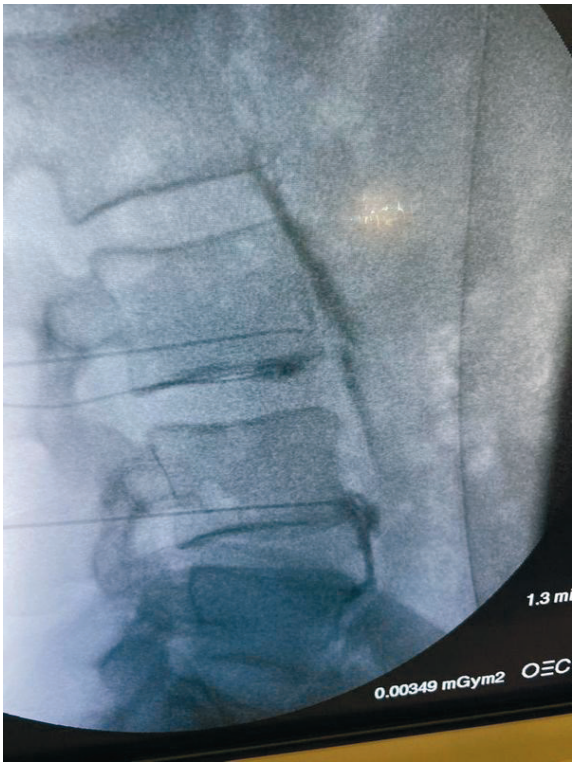
**Background and aims**: Complex Regional Pain Syndrome (CRPS) is defined as a painful process classified into two types depending on whether there is an absence of nerve injury (type I) or that nerve injury is present (type II).

**Methods**:

We present the case of a 51-year-old man with type II CRPS in the left Achilles tendon as a result of a traumatic section. He had very poor pain control despite taking 4 oral drugs (tapentadol, pregabalin, amitriptyline and paracetamol/ tramadol). After being explored by the Pain Unit, ultrasound-guided popliteal blackages were initially performed, alongside with adjustment of oral treatment and Capsaicin patch. However, given the poor tolerance of treatment due to increased drowsiness, it was decided to execute an ultrasound-guided lumbar sympathetic blockage with 20ml 0,25% Ropivacaine and 4mgDexamethasone, confirming with fluoroscopy a clear improvement one month after performing the technique, reaching a VAS 1 -2.

After new deterioration occuring four months later, it was decided to apply lumbar (L3-L4) sympathetic pulsed radiofrequency. The technique was performed without incidents.






**Results**: Despite the worsening of this initial procedure, as time passes, the patient refers to a great improvement, reaching a baseline situation very similar to the one he had before the accident.

**Conclusions**: CRPS requires multidisciplinary approach based on pain control and functional recovery of the affected limb. Many treatments have been postulated based on the pathophysiological mechanisms of the syndrome, although there are few reliable and controlled studies that have demonstrated their usefulness. However, one of the most effective treatments is radiofrequency.

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## Abstract no.: 951

### A RETROSPECTIVE REVIEW OF OUTCOMES AFTER AT LEAST TWO YEARS POST COMBINED SPINAL CORD STIMULATION AND DORSAL ROOT GANGLION STIMULATION

C.F. Mullins[1], J. Palumbo[1], J. Royds[1], S. Harris[1], O. Al-Kaisy[1], S. Wesley[1], D. Pang[1], S. Palmisani[1], T. Yearwood[1], T. Smith[1], A. Al-Kaisy[1]

[1]*Guys and St. Thomas's Hospital, London, United Kingdom*

**Background and aims**: Spinal Cord Stimulation (SCS) and Dorsal Root Ganglion (DRG-S) stimulation may afford an enhanced ability to target specific painful regions that cannot be covered with SCS and offer a safety net for anatomical coverage. This study investigated the feasibility of combining these modalities.

**Methods**: This retrospective study examined patients who underwent combined stimulation between 2016 and 2019. We investigated the level of pain relief and the perceived global impression of change during the trial and after a minimum of two years follow-up. We also investigated optimal lead configuration and waveform at baseline and at follow-up and complications.

**Results**: 26 patients underwent a trial of combined stimulation. Twenty (76.9%) had a successful trial and proceeded to full implantation. The average follow-up time was 3.1 years (IQR 2.7-3.5). The mean pain reduction at trial was 76% (IQR 65-89%) (n=19). After at least two year's follow-up, the mean pain reduction was 68% (IQR 60-90%). Sixteen of the available 19 patients (84.2%) continued to report a PGIC of 7 or 8. The most popular lead choice during the trial (n=15) and at two year's follow up was a combination of both leads (46.7% and 53% respectively). 58% had changed lead at follow-up, with 57.1% changing to a combination programme. Two reported loss of efficacy at follow-up; three required re-operation for pocket pain and one turned off the device due to unwanted stimulation.

| Successful Trial Patients (n=15*) | Percentage of total (n) | Average Pain Reduction | Median PGIC |
|---|---|---|---|
| Combined SCS+DRG-S | 47% (7) | 73% | 8 |
| DRG-S alone | 27% (4) | 83% | 8 |
| SCS alone | 27% (4) | 74% | 8 |
| SCS, spinal cord stimulation; DRG-S, dorsal root ganglion stimulation; PGIC, patient global impression of change; *missing data n=5 | | | |

| Most recent follow-up (n=17*) | Percentage of total (n) | Average Follow Up Time (Years) | Average Pain Reduction | Median PGIC |
|---|---|---|---|---|
| Combined SCS + DRG-S | 53% (9) | 3.25 | 62%** | 7 |
| DRG-S alone | 29% (5) | 2.98 | 84%** | 8 |
| SCS alone | 18% (3) | 2.55 | 48%** | 8 |
| SCS, spinal cord stimulation; DRG-S, dorsal root ganglion stimulation; PGIC, patient global impression of change; *missing data n=3; **no significant difference between the modalities in pain reduction at follow-up | | | | |

**Conclusions**: This retrospective single centre study demonstrates the feasibility of combining these modalities with sustained positive outcomes after an average of 3-years follow-up.

## Abstract no.: 1125

### DTM™ SPINAL CORD STIMULATION (SCS) THERAPY: 12-MONTH RESULTS OF A RANDOMIZED CONTROLLED CLINICAL TRIAL

M. Fishman[1], H. Cordner[2], R. Justiz[3], D. Provenzano[4], B. Shah[5], C. Merrell[6], J. Naranjo[7], P.S. Kim[1], A. Calodney[8], R. Bundschu[9], M. Sanapati[10], V. Mangal[11], F. Riillo[12], R. Vallejo[13], D.L. Cedeño[14]

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**Background and aims**: Decades of basic science research established that glial cells as well as neuroglial interactions play crucial roles in chronic pain development and persistence. DTM™ Spinal Cord Stimulation (SCS) therapy was intentionally developed and has been demonstrated to modulate glial and neuronal gene expression back toward the non-pain state. DTM™ SCS provided significant back pain relief in a feasibility trial. We present the DTM™ SCS outcomes compared to traditional SCS in a large randomized controlled trial (RCT).

**Methods**: A prospective, multicenter, post-market, RCT (NCT03606187) compared DTM™ SCS to traditional SCS in patients with chronic, intractable low back pain (LBP) with moderate to severe leg pain. Primary endpoint assessed non-inferiority of LBP responder rate (≥50% relief) between treatment groups at 3-month. Over the study period of 1 year, analysis of demographics and secondary outcomes of the LBP profound responder sub-population (≥80% back pain relief) were conducted.

**Results**: The study met the primary endpoint as DTM™ SCS therapy demonstrated non-inferiority to traditional SCS at 3-month (80% and 51%, respectively [$p < 0.0001$]). Furthermore, DTM™ SCS superiority to traditional SCS was established both at 3-month ($p = 0.0010$) and 12-month ($p = 0.005$). Profound LBP responder rate at 12-month was 69% with DTM™ SCS and 35% with traditional SCS. At 12-month, DTM™ SCS significantly improved disability and quality of life, and elicited high subject satisfaction ratings (see Table).

| | All DTM SCS subjects | DTM SCS Profound Responders |
|---|---|---|
| Patients reporting minimal to moderate disability at 12-month | 76% | 88% |
| Patients reporting very good to fair global health at 12-month | 88% | 96% |
| Patients reporting “very satisfied” or “satisfied” with the therapy | 83% | 89% |

**Conclusions**: DTM™ SCS and traditional SCS can offer LBP relief, however DTM™ SCS provided superior LBP responder rate and significant benefits in other clinically meaningful outcomes.

## Abstract no.: 1129

### ULTRASOUND-GUIDED PERCUTANEOUS RADIOFREQUENCY OF THE PERICAPSULAR NERVE GROUP (PENG) FOR CHRONIC HIP PAIN RELIEF IN OSTEOARTHRITIS

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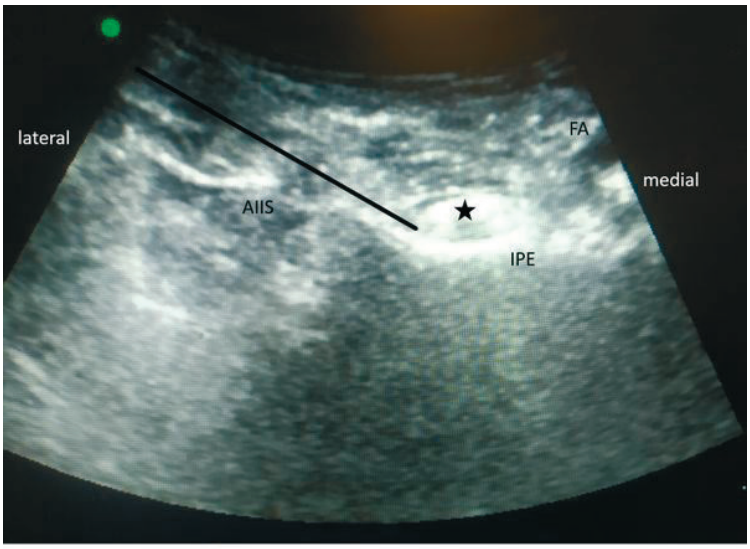
**Background and aims**: Osteoarthritis (OA) is the most common cause of chronic hip pain (CHP) and has a great psychological and functional impact, affecting patients’ quality of life. The PENG block’s success in perioperative setting encouraged the use of this technique for radiofrequency (RF) in CHP. This study aims to evaluate the effectiveness of this technique as a minimally invasive treatment for CHP.




Ultrassound of the pretended site. The line represents the needle trajectory, the star represents psoas tendon. FA: Femoral Artery; AIIS: Anterior Inferior Iliac Spine; IPE: Iliopubic Eminence.

**Methods**: We selected patients with OA and CHP refractory to conservative treatment and we applied Pulsed RF using PENG block technique. We used ultrasound guidance to insert a straight sharp 20-gauge 100mm 5mm active tip needle from lateral to medial in an “in-plane” approach targeting the place between the psoas tendon and the pubic ramus. Sensory and motor stimulation were tested and Pulsed RF was performed for six minutes. We applied Brief Pain Inventory and Lequesne questionnaires and performed a physical evaluation before the procedure and the aim is to reassess them at three months after.

**Results**: We included 14 patients, with a mean age of 74,36 and a median of 76,50 years (from 48 to 89) and 12 were women. At the initial evaluation, the mean intensity of pain was described as moderate to severe by all patients, with 7 choosing a “5” on the numerical pain scale. The pain interfered more with general activity, walking and ability to work.

**Conclusions**: Due to the prospective nature of the study, definitive results and conclusions will be ready after patients' reassessment.

## Abstract no.: 1131

### INTRATHECAL DRUG DELIVERY USING ZICONOTIDE FOR HEAD AND NECK REFRACTORY CANCER PAIN: A MONOCENTRIC RETROSPECTIVE STUDY

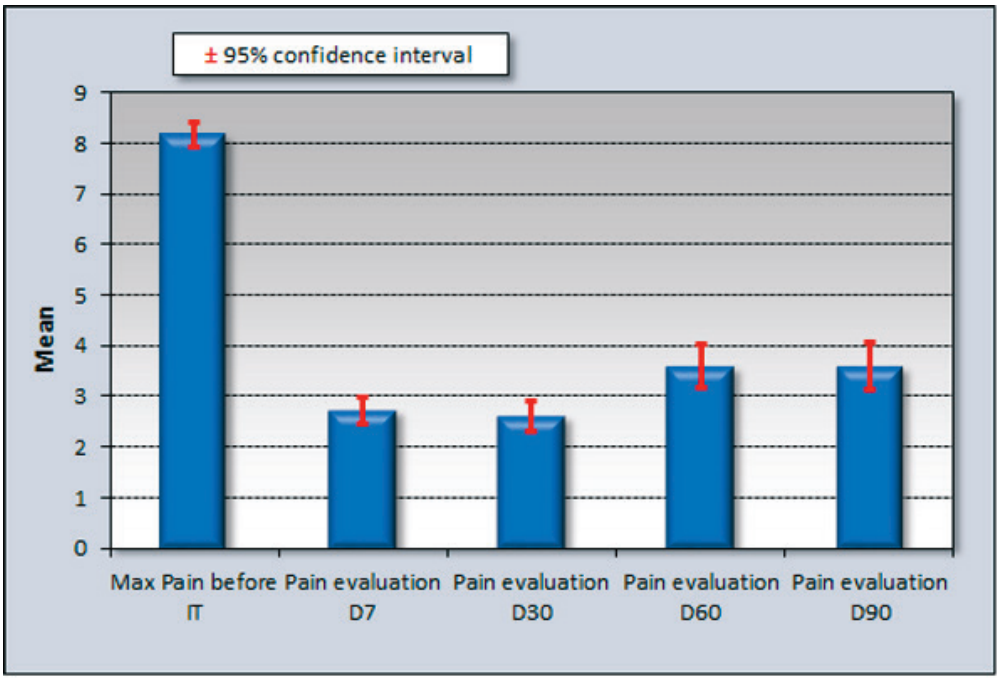
D. Dupoiron[1], N. Lebrec[1], V. Seegers[1], F. Bienfait[1], v. Jaoul[1], E. Bures[1], F. Bore[1], Y.-M. Pluchon[2], S. Jubier-Hamon[1]

*[1]Institut de Cancerologie de L'Ouest, Angers, France, [2]Centre Hospitalier de Vendée, La Roche sur Yon, France*

**Background and aims**: The prevalence of Head and neck cancer (HNC) pain remain one of the highest among cancer types in recent literature reviews. In this context, Intrathecal drug delivery system (IDDS) is an effective option for patients suffering Refractory cancer pain. Nonetheless, IDDS was poorly described to treat HNC pain.CERVical and Head Intrathecal Treatment (CERVHIT) study is a retrospective observational study designed to evaluate outcomes of IDDS for HNC painat the Institut de Cancérologie de L'Ouest.

**Methods**: Institutional ethics committee approval was granted (N° 2022-012). All IDDS-treated patients from January 2010 to December 2021 were prescribed a combined intrathecal analgesics regimen (combining morphine, local anesthetic and ziconotide) through a catheter lying in the cervical position. Systemic opioids were discontinued after implantation. Pain assessment was determined using a numeric rating scale (NRS); Pain reported on electronic records scores were compared using the Wilcoxon's signed rank test.

**Results**: Before implantation,patients suffered high level of pain NRS 8.16±0.23) despite a mean 577.8 +/- 142.7 mg oral morphine equivalent daily dose. Mean therapy duration was 204+/- 65 days for 77 patients included with Internal pumps and 67+/- 53 days for 8 patients with external pumps. Mean daily dose of IT Ziconotide was 1.88 µg/d, IT Morphine 8.7 mg/d, Ropivacaine 22 mg/d . A significant decrease was observed on pain scores after 1 week (2.7+/- 0.25) 1 month (2.6 +/- 0.29) and 3 months (3.4 +/- 0.45). No implantation failures was observed.




**Conclusions**: IDDS appears an effective option to manage HNC refractory pain.

## Abstract no.: 1134

### MANAGEMENT OF CANCER-RELATED PAIN WITH INTRATHECAL DRUG DELIVERY: A SYSTEMATIC REVIEW AND META-ANALYSIS OF CLINICAL STUDIES

C. Perruchoud[1], D. Dupoiron[2], B. Papi[3], R. Buschman[4], A. Calabrese[5], S.E. Brogan[6]

*[1]Pain Clinic, Hôpital de la Tour, Meyrin, Switzerland, [2]Anesthesiology and Pain Department, Institut de Cancérologie de l'Ouest, Paul Papin, Angers Cedex, France, [3]Medtronic, Neuromodulation Clinical Department, Maastricht, Netherlands, [4]Medtronic, Neuromodulation Clinical Department, Eindhoven, Netherlands, [5]Medtronic, Neuromodulation Clinical Department, Tolochenaz, Switzerland, [6]University of Utah School of Medicine, Department of Anesthesiology, Salt Lake City, United States*

**Background and aims**: Despite increased attention paid to assessment and management, pain continues to be a prevalent and undertreated symptom in patients with cancer. Intrathecal drug delivery (IDD) is a therapeutic option that allows targeted delivery of analgesics to the intrathecal space. The aim of this review was to examine the efficacy of managing cancer-related pain with IDD. Secondary objectives included the effects of IDD on systemic opioid use and infection rates.

**Methods**: A systematic search of the literature published between 1990 and 2019 was performed to identify studies evaluating the efficacy and/or safety of IDD with external or implanted pumps in patients with cancer-related pain. Data were extracted and meta-analyses performed to determine the mean changes in pain levels at short-, mid-, and long-term intervals; changes in opioid (oral morphine equivalent [OME]) daily dose; and infection rates. Changes were assessed compared with baseline.

**Results**: Pain levels were decreased from baseline: On a 0 to 10 scale, mean differences were −4.34 (95% CI [−4.93 to −3.75], p<0.001) at 4 to 5 weeks; −4.34 (95% CI [−5.07 to −3.62], p<0.001) at 6 to 12 weeks; and −3.32 (95% CI [−4.60 to −2.04], p<0.001) at >6 months. Weighted mean OME consumption was reduced by 308.24 (SE = 22.72) mg/d. Weighted mean infection rates were ~3% for external and implanted pumps.

**Conclusions**: Meta-analyses show a statistically significant and sustained decrease in cancer pain with IDD, compared with baseline. Systemic opioid consumption was reduced on average by >50% after IDD. Infection rates were comparable with other indications.

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## Abstract no.: 1163

### A MODIFIED ENERGY DTM™ SCS DERIVATIVE THERAPY: PRIMARY ENDPOINT AND 3-MONTH OUTCOMES OF A PROSPECTIVE, MULTI-CENTER STUDY ON PATIENTS WITH CHRONIC BACK AND LEG PAIN

J. Peacock[1], D. Provenzano[2], M. Fishman[3], K. Amirdelfan[4], K. Gatzinsky[5], J.W. Kallewaard[6], C. Cain[7], A. Cleland[7], F. Riillo[7], E. Thies[7]

*[1]Novant Spine Specialists, Winston-Salem, United States, [2]Pain Diagnostics and Interventional Care, Sewickley, United States, [3]Center for Interventional Pain and Spine, Lancaster, United States, [4]IPM Medical Group, Walnut Creek, United States, [5]Sahlgrenska University Hospital, Gothenburg, Sweden, [6]Rijnstate Hospital, Arnhem, Netherlands, [7]Medtronic, Minneapolis, United States*

**Background and aims**: Electrical neuromodulation of the spinal cord (SCS) is an established treatment indicated as an aid in the management of chronic, intractable pain of the trunk and/or limbs. DTM™ SCS is a proprietary therapy supported by preclinical and clinical research.[1,2] In a recent RCT, DTM™ SCS has shown superior back pain relief to traditional SCS.[2] To further tailor therapy delivery, DTM SCS derivatives with reduced energy profiles are being investigated.

**Methods**: The DTM-LE SCS Study (NCT04601454) is an ongoing prospective, multi-center, open-label, post-market study to evaluate the efficacy of a DTM™ SCS derivative therapy. Primary inclusion criteria were patients indicated for SCS and overall pain Visual Analog Score (VAS) of ≥6 with moderate to severe back and leg pain. Subjects with a successful SCS trial will be followed up until 12 months post therapy activation. Primary study outcomes from the 3-month follow-up are presented.

**Results**: Fifty-seven subjects (57.9% female) were enrolled at 12 US sites. Forty-three completed a trial period, of which 38 had a successful trial (88.4%) and 35 received a neurostimulator. At 3-month (n=32), the mean (%) change in overall VAS from baseline was -3.9 (-50.4%) and 75% of subjects reported satisfaction with the therapy. Furthermore, 68.8% of subjects improved to a less disabled category (Oswestry Disability Index) and 77.4% of subjects were in a better health state (EQ-5D).

**Conclusions**: Clinically meaningful pain relief, high degree of therapy satisfaction and improved function and quality of life were reported in this DTM™ SCS derivative study by patients with chronic back and leg pain.

### Abstract no.: 1173

## MRI COMPATIBILITY OF SPINAL CORD STIMULATOR SYSTEMS AT FOLLOW-UP FOR MRI-CONDITIONAL DEVICES

C.F. Mullins[1], S. Harris[1], D. Pang[1]

[1]*Guys and St. Thomas's Hospital, London, United Kingdom*

**Background and aims**: Magnetic Resonance Imaging (MRI) in patients with Spinal Cord Stimulators (SCS) can result in complications including heating and device malfunction. Approximately 82-84% of patients with SCS are predicted to require an MRI within 5 years after implantation[1]. Newer devices have been created which permit MRI under specific conditions and are called "MRI conditional". One of these conditions is a fully intact system with normal impedances of the lead electrodes. The purpose of this study was to examine the lead impedances of MRI-conditional systems at follow-up to determine if they remained MRI-compatible.

**Methods**: We retrospectively examined the follow-up clinic notes for MRI-conditional devices implanted in a single centre at least one year ago to determine if the lead impedances remained within range.

**Results**: 218 MRI-conditional devices were examined. 115 were excluded due to no documentation or the follow up time was too short. The remaining 103 devices had an average follow-up time of 2.89 years (IQR 2.11-3.98), including 69 devices from Company A and 34 from Company B. Overall, 15 (15%) had impedances that were out of range. The average time to first lead impedance malfunction was 2.78 years (range 0.94-4.72). There was a significant difference between manufacturers in lead impedance malfunction rates with 5% from Company A (5/69) compared to 29% from Company B (10/34) (p-value=.002709).

**Conclusions**: We report a loss of MRI compatibility from MRI-conditional SCS systems at a rate of 15% at 2.89 years. There is a need to develop SCS systems which are MRI-safe and not lose compatibility over time.

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# Palliative care

### Abstract no.: 437

## PALLIATIVE CARE A SOLUTION TO PAIN FOR GERIATRIC PATIENTS IN UGANDA

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[1]*Geriatric Respite Care Foundation Uganda, Kampala, Uganda*

**Background and aims**: Information on older persons experiencing pain in Uganda is sparse due a few studies carried out on gerontology and geriatric which hinder careers to have skills and knowledge to evaluate and treat pain during service provision to the ageing population.

**Methods**: In a focus group discussion, where Geriatric Respite Care Foundation was a co-investigator a study of **"older men and women's experience in the three Sub–Saharan Cities"** commissioned by WHO, Department of Ageing and Life course (ALC). Findings showed that two parents can look after 8-10 children but the 8 can›t take care of the them during old age and yet this is when many start experiencing physical, financial and social losses, in addition to living far from health centers where diseases are managed. It's difficult to line up in long queues waiting for treatment which they even rarely get. Drugs for old-age related diseases are expensive and are not readily available and above all the negative attitude of health workers towards geriatric patients, leading many to resists care due to the PAIN they go through. (Aboderin. L. 2015).

**Results**: In response to this study, Geriatric Respite Care Foundation trained Community Palliative Health Advocates pain management techniques with the aim of reducing and controlling pain older persons have experienced over a long time.

**Conclusions**: Since there is insufficient staff providing appropriate pain skills to handle ageing population, there is great need for palliative care specialists to treat a wide range of pain problems among older persons in Uganda's Communities.

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## Abstract no.: 469

### ROLE OF RADIOTHERAPY IN THE MULTIDISCIPLINARY MANAGEMENT OF CANCER PAIN

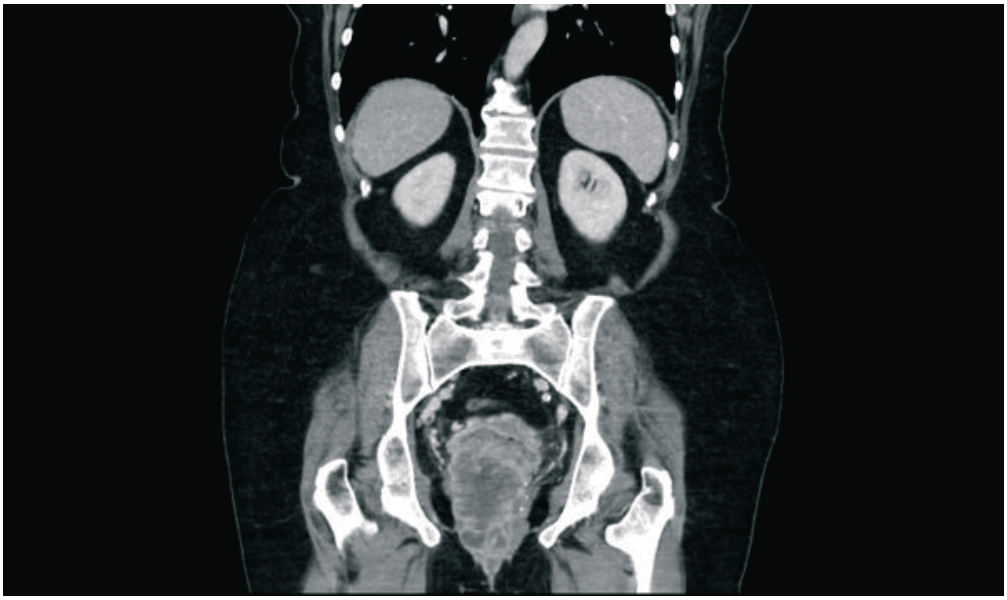
M. Herrera Román[1], P. Valencia Nieto[1], M. Sánchez Belda[1], P. Alonso Martínez[1], L. Cardoso Rubio[1], A. Casado Camacho[1], R. Jaraiz Díaz[1], M.I. Garavís Vicente[1], D. Rodríguez Domínguez[1], P. Diezhandino García[1]

[1]*Hospital Clínico Universitario de Valladolid, Valladolid, Spain*

**Background and aims**: Radiotherapy is an effective treatment for cancer pain. In bleeding gynecological tumors it also has an important role as a hemostatic agent. Pain control is fundamental in the quality of life of terminal patients. Multimodal treatment is the best strategy in pain control. We show the results of a patient with a vaginal carcinoma who has required multidisciplinary management.

**Methods**: 71-year-old patient with vulvar lichen who consulted because of 4-months of vaginal pain and foul-smelling leukorea. Gynecological examination revealed a bloody lesion close to the introitus. Vaginal tumor was excised, with the pathological result of infiltrating-squamous-cell-carcinoma with poorly differentiated areas. 1 month later control-MRI revealed a voluminous 12cm vaginal tumor, infiltrating rectal mucosa. CT-scan showed pulmonary metastases. A rectal biopsy was performed with a result of infiltration by poorly differentiated squamous-cell-carcinoma, with areas of sarcomatoid transformation. The patient reported a baseline Visual Analog Scale (EVA) 8 pain, EVA 10 after depositioning, which did not subside with regular analgesia.

Transdermal Fentanyl was prescribed, reaching doses of 100mcg/72h and rescue-doses with sublingual 100mcg and palliative external radiotherapy was administrated to vaginal lesion, dose of 30Gy.



**Results**: Radiotherapy showed a significant response on tumor volume and bleeding, controlling pain with multidisciplinary management.

**Conclusions**: Radiotherapy is an effective treatment in control of pain in cancer patients, being able to achieve pain control with exclusive treatment or in combination with other treatments. The presented case is an example of the good response to multidisciplinary treatment in a patient with severe cancer pain.

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## Abstract no.: 474

### RADIATION THERAPY IN CANCER PAIN: IS REIRRADIATION OF THE SPINE SAFE?

M. Herrera Román[1], P. Valencia Nieto[1], M. Sánchez Belda[1], M.I. Garavís Vicente[1], J.M. de Frutos Baraja[1], L. Cardoso Rubio[1], A. Casado Camacho[1], R. Jaraiz Díaz[1], I. Solís Navarro[1], P. Diezhandino García[1]

[1]*Hospital Clínico Universitario de Valladolid, Valladolid, Spain*

**Background and aims**: The objective in this review is to analyze the risk of post-radiotherapy myelitis in patients with spine reirradiation treatment due to cancer pain.

**Methods**: A series of articles related to the risk of myelitis due to spinal reirradiation in patients with painful bone metastases was reviewed in available literature. Keywords as “reirradiation”, “spinal cord” and “myelopathy” have been used in the search, obtaining a total of 75 articles. It has been made a selection of English language written articles published in the last fifteen years. It has been studied a total of 259 patients with good analgesic response in a first irradiation sesion who have been irradiated again later. The received dose in each irradiation, the cumulative biological equivalent dose (BED), the response to pain and the associated neurological toxicity have been analyzed.

**Results**: Of all patients, pain response was good in more than 90%, without myelitis in any case. The maximum BED was 120Gy. The average interval was 14months.

**Conclusions**: Radiation therapy is a highly relevant analgesic treatment in painful bone metastases, obtaining a rapid, effective and sustained response in most patients. Reirradiation is effective and safe as long as it is carried out with caution evaluating the dose received in each treatment, the cumulative BED and the time interval between each irradiation. The authors consider a low risk of myelopathy if it is administered more than 6 months apart, with a total dose of less than 98Gy and a cumulative BED of less than 120Gy.

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## Abstract no.: 513

### OPIOID PRESCRIBING ATTITUDES OF PALLIATIVE CARE PHYSICIANS VERSUS OTHER SPECIALISTS: A QUESTIONNAIRE-BASED SURVEY

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*[1]Medical University of Warsaw, Warsaw, Poland, [2]Jagiellonian University Medical College, Krakow, Poland*

**Background and aims**: While opioid overuse is a public health crisis in the USA, opioid analgesics are used suboptimally in Central and Eastern Europe, causing many pain cases to remain untreated or undertreated. This study aimed to identify the prevalent prescribing patterns and attitudes and the possible internal impediments to optimal opioid use among palliative care physicians (PCPs) and other specialists (non-PCPs).

**Methods**: A questionnaire-based survey was conducted involving PCPs and non-PCPs in 2016–2018 from all parts of Poland.

**Results**: Eighty-one PCPs and 86 non-PCPs were included. Tramadol was the most commonly preferred opioid. While PCPs used various strong opioids, other physicians (non-PCPs) prescribed mostly buprenorphine, accessible with standard prescription forms. Neither internal prejudices and beliefs nor administrative regulations impede prescribing opioids by PCPs. On the contrary, on-PCPs reported that special prescription forms for psychoactive medications, fear of drug addiction of their patients, and penalties for possible errors on prescriptions affect the optimal prescribing. They also revealed significant gaps in the working knowledge of prescribing opioids and would take part in additional reminder training. PCPs appeared optimally prepared for cancer pain management and report fewer internal barriers than other specialists.

**Conclusions**: PCPs appeared optimally prepared for cancer pain management and report fewer internal barriers than other specialists. Continuous postgraduate medical education on cancer pain treatment should be provided to all specialists to ensure optimal opioid pharmacotherapy and avoid overprescribing or underprescribing opioids. Administrative restrictions are the main barrier to optimal pain treatment.

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## Abstract no.: 576

### CANCER PAIN MANAGEMENT IN AFRICA: ASSESSMENT OF THE CURRENT SITUATION AND RESEARCH INTO FACTORS LIMITING TREATMENT AND ACCESS TO ANALGESIC DRUGS

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**Background and aims**: This research protocol outlines an approach to investigate cancer pain in French-speaking African countries. The protocol also intends to determine and describe the treatment and management of cancer pain in these selected countries, as well as the barriers and challenges to treating cancer pain. Finally, the results will be used to make a series of recommendations on policy positions, regulatory frameworks and protocols for treating and managing cancer pain in these countries.

**Methods**: An expert group will guide the research and facilitate access to the countries selected for the research. A series of qualitative semi-structured interviews will be undertaken to determine the main trends and barriers to cancer pain treatment in Africa. From this qualitative research two surveys will be administered: one to determine the policy and regulatory context, and the other to determine experts and healthcare professionals experience and perceptions of cancer pain.

**Results**: The results will be analysed using quantitative and qualitative methods to determine themes and perceptions of cancer pain and treatment from the policy level, to the health professional. Evaluation of the results will lead to recommendations for a comprehensive framework for cancer pain treatment in Africa.

**Conclusions**: The results will be analysed using quantitative and qualitative methods to determine themes and perceptions of cancer pain and treatment from the policy level, to the health professional. Evaluation of the results will lead to recommendations for a comprehensive framework for cancer pain treatment in Africa.

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## Abstract no.: 630

### ADVANTAGES OF SUBCUTANEOUS INFUSION OF MORPHINE FOR PAIN CONTROL IN PALLIATIVE CANCER PATIENTS

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**Background and aims**: In palliative patients, pain is often the leading symptom and pain control is one of the most important tasks of quality palliative care. As the disease progresses, the pain intensifies and becomes increasingly difficult to control, patients find it increasingly difficult to take oral therapy.

The application of subcutaneous infusion of morphine via an elastomeric pump is an important method of pain control at home. For the patients with cancer pain, at the end of life is important pain control and possibility to be at home.

**Methods**: The study comprises 15 home-based palliative patients from University hospital, whom were prescribed morphine pump to treat chronic cancer pain.

Pain intensity was assessed with VAS, and ESAS questionnaire was used to assess severity for nine common symptoms of advanced cancer. Data were collected in two points in time, before the morphine pump was implanted and 2$^{nd}$ measurement after three weeks of treatment.

**Results**: Results have shown significant decrees in pain intensity and significant reduction in symptoms severity. After three weeks, patients reported improved sleep, better appetite, and more mobility. Psychologically, they reported less symptoms of depression and anxiety.

**Conclusions**: Better pain control with a morphine pump may also have significant implications for other symptoms in the palliative patient; sleep, depression, appetite, which improves overall quality of life of palliative patients. Morphine pump allows palliative patients to be at home, to keep their social and family connectedness at the end of their life.

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## Abstract no.: 970

### ATTITUDES OF PHYSICIANS DEALING WITH PALLIATIVE CARE RELATED TO CONDUCTING AND MODIFYING ANALGESIC THERAPY

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**Background and aims**: Pain accompanying the cancer disease is one of the most important and frequent symptom reported by patients. One of the most important factors influencing the well control of pain are knowledge and skills of palliative care physicians.

The aim of the study was to learn the attitudes of physicians dealing with palliative care to conducting and modifying analgesic therapies, including difficulties in conducting therapy, identifying perceived advantages and disadvantages of drugs and factors influencing the choice of the drug.

**Methods**: In the study 92 physicians working in the palliative care units took part. The participants were asked to fulfill the standarised questionnaire during the focus group interviews (FGI) organised in 13 main cities across Poland.

**Results**: When choosing the specific analgesic and form of the drug most of the palliative care physicians are focusing on clinical, psychological and social factors of the individual cases. 49% of newly addmitted patients needed the change or modification of analgesic therapy. Most of the patients is receiving the strong opioids (oral). Half of the patients is using the immediate release opioids for episodic pain.

**Conclusions**: From the doctors' perspective most of the pain conditions could be controlled due to proper tirtration and chosing the right drug in the best formulary. In some cases whatsoever it is immpossibble to control the pain: mostly due to adverse events of the drugs, wrong diagnosis of the pain syndromes and non-clinical situations (financial burden,drugs accessibility, lack of therapy control in palliative home care, opioiphobia of patients, families and medical staff).

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## Abstract no.: 1036

### CANCER PAIN MANAGEMENT

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**Background and aims**: Pain is a complex cancer symptom that affects the patient's life at multiple levels. Thus, pain doctors should use all available tools to control pain in patients.

Pain can be initially treated in cancer patients with non-opioid and opioid analgesics. If the condition worsens and metastasis occurs, this treatment may not be sufficient to reduce the pain and nonpharmacologic methods should be used. Current interventional strategies are nondestructive and are performed using needles.

**Methods**: A 63 year old woman with transverse colon adenocarcinoma with metastasis in lungs and bones had a pain level 9 in VAS. Pain was initially treated with oral drugs (Gabapentin 1500mg/24h, amitriptyline 25mg/24h and morphine) and 75 mcg transdermal fentanyl followed by a left lumbar sympathetic block (17 ml 0,25% Levobupivacaine +8mg dexamethasone). A final treatment with an epidural catheter was applied (6ml/h 0.2% Ropivacaine + Fentanyl).

**Results**: Before any treatment, the patient presented a pain of 9 in VAS. The initial pain treatment adjustment at hospital produced no improvements in the patient's level of pain and therefore the left lumbar sympathetic block was applied as subsequent treatment. This, however, showed no improvement in the patient's pain level (VAS 9). The epidural catheter allowed applying local anesthetic and opoioid, which achieved a great response reducing the pain to VAS 4-5. The patient could be then discharged from the hospital.

**Conclusions**: Results show that taking a multidisciplinary approach to address pain in severe cancer cases allows to reduce acute pain in patients, improving their overall quality life.

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## Abstract no.: 1087

### SUCCESSFUL USE OF SUMATRIPTAN TO EASE MIGRAINE TYPE HEADACHES INDUCED BY NIRAPARIB USED TO TREAT ADVANCED OVARIAN CANCER

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**Background and aims**: A 45 years old lady was diagnosed 4 years ago with high grade bilateral ovarian carcinoma and treated with surgery and chemotherapy until 2021 when the disease progressed. As she has a strong wish of further treatment she was started on Niraparib. Niraparib is a PARP inhibitor that blocks an enzyme involved in repairing damaged DNA. By blocking this enzyme, DNA inside the cancerous cells may be less likely to be repaired, leading to cell death and possibly a slow-down or stoppage of tumour growth.

**Methods**: This case report describes how palliative care can be provided in a life-threatening progressive cancer. It reveals how sustained continuity of care can help the patient and family to cope with a complex disease and transform on this journey.

**Results**: Since Niraparib was started 200 mg nocte she developed severe early morning headaches which with nausea and vomiting. Classical medication like paracetamol and NSAIDs combined with antiemetics did not relief the pain. The oncologist proposed to hold the treatment. But the patient was very adamant that she did not want to interrupt the treatment fearing further progression of the ovarian cancer. Sumatriptan was used first PO at a dose of 50 mg in combination with 10 mg of metoclopramide. Because of vomiting Sumatriptan 10 mg as nasal spray was introduced with success.

**Conclusions**: The patient can now tolerate for more than a month the immunotherapy with Niraparib 200 mg while using Sumatriptan PRN early in the morning twice weekly either 50 mg orally or 10 mg intranasally.

# Pharmacological therapies

## Abstract no.: 195

### LONG-TERM EFFECTIVENESS AND SAFETY DATA OF PATIENTS TREATED WITH MEDICAL CANNABIS VIA THE METERED-DOSE SYQE® INHALER

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**Background and aims**: When medical cannabis (MC) treatment is administered by smoking or vaporizing, large and inaccurate amounts are consumed. Preliminary clinical studies of MC treatment via the novel metered-dose MC Syqe inhaler showed short-term effectiveness and safety of very-low amounts of MC. The aim of this study is to assess the long-term effectiveness and safety of the treatment.

**Methods**: Patients licensed and prescribed Syqe inhaler MC treatment, were monitored by registered nurses of Syqe's patients support program, and completed pre-defined pain intensity –related questionnaires at baseline and 7, 14, 21, 30, 60, 90 and 120 days following initiation of Syqe Inhaler treatment,. Adverse effects (AEs) were followed-up continuously for 15 months. Generalized linear mixed-effect regression models utilized to assess pain reduction.

**Results**: 143 patients (age 62±17 years; 77 males), most of which (68%) diagnosed with chronic neuropathic pain, completed dose titration in 26±10 days. Data on 143 patients at baseline and 77 patients at 120 days was available for analysis. The stable daily dose was 1,500±688mcg aerosolized (-)-$\Delta^9$-trans-tetrahydrocannabinol ($\Delta^9$-THC) as a dosage marker for the full-spectrum MC. Significant pain reduction (-25.4%) was observed at 120 days ($p<0.001$). AEs were reported mostly during titration (34% of patients), and declined to 4% or less at 3-15 months. Only a minority (7%) reported psychoactive AEs (anxiety and restlessness).

**Conclusions**: These findings indicate long-term effective and safe treatment with MC via the Syqe inhaler at very low doses. Further follow-up is suggested to substantiate these findings.

## Abstract no.: 298

### EFFECT OF ANTIHISTAMINERGIC CREAM DOXEPIN ON ITCH INDUCED BY HISTAMINE, BAM8-22, AND COWHAGE

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**Background and aims**: Chronic itch is a clinical problem without effective treatments. Three models are used to study itch: histamine, cowhage, and BAM8-22. Histamine activates histamine receptors and histaminergic itch is transmitted by a subgroup of mechanoinsensitive C-fibers. Non-histaminergic itch is transmitted by a subgroup of polymodal C-fibers after the binding to protease-activated receptors (PAR2) activated by cowhage or to Mas related G protein-coupled receptors activated by BAM8-22. This study aims to assess the effect of topical application of doxepin cream, a tricyclic antidepressant drug with strong antihistaminergic properties, on histaminergic and non-histaminergic itch.

**Methods**: 22 healthy subjects were recruited. In session 1, histamine, cowhage, BAM8-22, and vehicle were applied on 4 areas on the forearms. After the application, itch intensity and duration were assessed with a visual analogue scale for 9 minutes, followed by the measurement of superficial blood perfusion by full-field laser perfusion imaging. In the second

session (after 7 days), doxepin was applied on the 4 areas for 1½ hour followed by a repetition of session 1.

**Results**: Histamine, Cowhage, and BAM8-22 induced itch compared to vehicle (p<0.001). After the application of doxepin, itch induced by histamine almost disappeared (p<0.001), while itch induced by BAM8-22 and cowhage was just decreased (p<0.01). SBP of histamine was higher than the other substances (p<0.001). Doxepin reduced SBP of the 3 pruritogens (p<0.05).

**Conclusions**: Doxepin cream abolished as expected histaminergic itch and neurogenic inflammation. The mechanism by which Doxepin diminished itch induced by cowhage and BAM8-22 is unknown.

## Abstract no.: 340

### EFFICACY AND SAFETY OF CO-CRYSTAL OF TRAMADOL-CELECOXIB VERSUS TRAMADOL AND PLACEBO IN MODERATE-TO-SEVERE ACUTE POST-SURGICAL ORAL PAIN: A MULTICENTRE, RANDOMISED, DOUBLE-BLIND, PHASE 3 TRIAL (STARDOM1)

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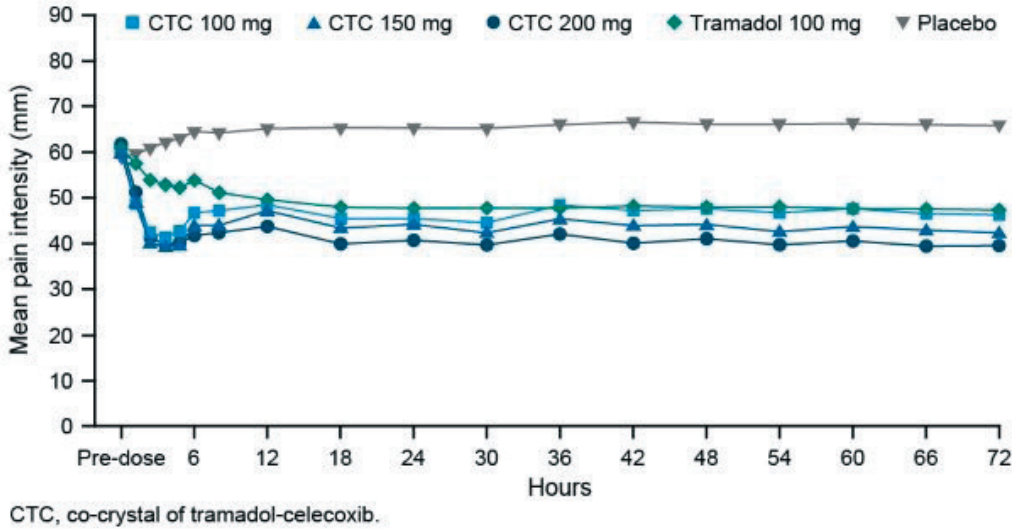
**Background and aims**: Co-crystal of tramadol-celecoxib (CTC) is a first-in-class co-crystal containing racemic tramadol and celecoxib bound in a supramolecular crystal network that provides CTC with unique physicochemical properties and thereby optimised pharmacokinetics. The Phase 3 STARDOM1 trial (EudraCT 2016-000592-24) evaluated the efficacy and safety of CTC for acute pain following oral surgery.

**Methods**: Patients experiencing acute moderate-to-severe pain (≥45 mm on a 100-mm pain intensity visual analogue scale) following extraction of ≥2 impacted third molars requiring bone removal, were randomised 2:2:2:2:1 to oral CTC 100 mg (44 mg tramadol/56 mg celecoxib) BID, 150 mg (66/84 mg) BID, or 200 mg (88/112 mg) BID; immediate-release tramadol 100 mg QID; or placebo, for 72 hours. The primary endpoint was the sum of pain intensity differences over 0–4 hours ($SPID_{0–4}$). Secondary outcomes included 50% response rate at 4 hours and safety/tolerability. Ethics committee approval was granted at participating centres.

**Results**: 726 patients were randomised and included in the full analysis set and safety population. All CTC doses led to a rapid decrease in pain intensity (**Figure 1**) that was superior versus tramadol and placebo for $SPID_{0–4}$ (P<0.001; **Table 1**). 50% response rate at 4 hours was significantly higher for all CTC doses versus tramadol (P<0.05) or placebo (P<0.001; **Table 1**). All CTC doses led to clearly fewer adverse events (AEs) and AEs leading to discontinuation than tramadol (**Table 2**).

**Figure 1.** Mean pain intensity visual analogue scores over time (full analysis set, last observation carried forward)




CTC, co-crystal of tramadol-celecoxib.

| **Table 1.** Key Efficacy Results (Full Analysis Set) | | | | | |
|---|---|---|---|---|---|
| **Sum of pain intensity differences over 0–4 hours ($SPID_{0-4}$)** | **CTC 100 mg (N=164; n=163)** | **CTC 150 mg (N=160; n=160)** | **CTC 200 mg (N=160; n=160)** | **Tramadol 100 mg (N=159; n=158)** | **Placebo (N=83; n=83)** |
| **Least-squares mean (95% CI), mm** | 66.0 (46.8, 85.2) | 69.1 (50.4, 87.7) | 70.6 (89.6 ,51.6) | 28.9 (9.8, 48.1) | -1.3 (-24.3, 21.6) |
| **Difference vs placebo (95% CI), mm [P-value]** | -67.4 (-90.9, -43.8) [<0.001][a] | -70.4 (-94.0, -46.9) [<0.001][a] | -72.0 (-95.6, -48.4) [<0.001][a] | -30.3 (-53.9, -6.7) [0.012][b] | – |
| **Difference vs tramadol (95% CI), mm [P-value]** | -37.1 (-56.5, -17.6) [<0.001][a] | -40.2 (-59.7, -20.6) [<0.001][a] | -41.7 (-22.2 ,-61.2) [a][0.001>] | – | – |
| **Responder rate at 4 hours** | | | | | |
| **50% reduction[c], n (%)** | 54 (33.1) | 54 (33.8) | 65 (40.6) | 32 (20.3) | 6 (7.2) |
| **OR vs placebo (95% CI) [P-value][d]** | 7.00 (2.83, 17.3) [<0.001] | 7.11 (2.88, 17.6) [<0.001] | 10.2 (4.13, 25.1) [<0.001] | 3.65 (1.44, 9.23) [0.006] | – |
| **OR vs tramadol (95% CI) [P-value][d]** | 1.92 (1.14, 3.22) [0.014] | 1.95 (1.16, 3.27) [0.012] | 2.79 (1.67, 4.64) [<0.001] | – | – |

CI, confidence interval; CTC, co-crystal of tramadol-celecoxib; OR, odds ratio.
N=number of patients in population; n=number of patients used for analysis.
$SPID_{0-4}$ data were analysed using an analysis of covariance model with treatment and qualifying pain intensity at randomisation (moderate, severe) as fixed effects, pooled centre as a random effect, and pre-dose (0 hours) pain intensity as a covariate. [a]P-value from one-sided test of superiority for testing the null hypothesis that the difference of means is ≥0 mm/h. [b]P-value from two-sided test of no difference for testing the null hypothesis that the difference of means is zero. [c]50% reduction from baseline in pain intensity visual analogue scale. [d]P-value from two-sided test of no difference for testing the null hypothesis that the OR=1.

| **Table 2.** Summary of AEs (Safety Population). | | | | | |
|---|---|---|---|---|---|
| | **CTC 100 mg (N=164)** | **CTC 150 mg (N=159)** | **CTC 200 mg (N=160)** | **Tramadol 100 mg (N=160)** | **Placebo (N=83)** |
| **AEs** | 120 (73.2) | 119 (74.8) | 132 (82.5) | 137 (85.6) | 49 (59.0) |
| **Treatment-related AEs** | 98 (59.8) | 106 (66.7) | 120 (74.4) | 132 (82.5) | 30 (36.1) |
| **Severe AEs** | 19 (11.6) | 16 (10.1) | 28 (17.5) | 57 (35.6) | 9 (10.8) |
| **AEs leading to discontinuation** | 1 (0.6) | 1 (0.6) | 1 (0.6) | 12 (7.5) | 0 |
| **Serious AEs** | 0 | 0 | 0 | 1 (0.6) | 0 |
| **Deaths** | 0 | 0 | 0 | 0 | 0 |
| **Most frequent AEs** | | | | | |
| Somnolence | 75 (45.7) | 83 (52.2) | 105 (65.6) | 101 (63.1) | 31 (37.3) |
| Fatigue | 54 (32.9) | 54 (34.0) | 66 (41.3) | 72 (45.0) | 26 (31.3) |
| Dizziness | 46 (28.0) | 48 (30.2) | 61 (38.1) | 90 (56.3) | 12 (14.5) |
| Nausea | 48 (29.3) | 47 (29.6) | 50 (31.3) | 90 (56.3) | 15 (18.1) |
| Vomiting | 40 (24.4) | 32 (20.1) | 36 (22.5) | 88 (55.0) | 9 (10.8) |
| Disturbance in attention | 27 (16.5) | 25 (15.7) | 39 (24.4) | 51 (31.9) | 16 (19.3) |

AE, adverse event; CTC, co-crystal of tramadol-celecoxib.
Data are presented as n (%).

**Conclusions**: Following oral surgery, CTC provided superior pain relief versus tramadol or placebo, associated with a better safety/tolerability profile than tramadol.

## Abstract no.: 343

## CO-CRYSTAL OF TRAMADOL-CELECOXIB SAFETY, TOLERABILITY, AND DIFFERENTIAL PHARMACOKINETICS: A SUMMARY OF FIVE PHASE 1 RANDOMISED CLINICAL TRIALS

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**Background and aims**: First-in-class co-crystal of tramadol-celecoxib (CTC) contains racemic tramadol and celecoxib. Phase 1 pharmacokinetics (PK) and safety are summarised.

**Methods**: Of five randomised, open-label studies (**Table 1**);[1–5] three evaluated single[1,2,5] and multidose[2] CTC 200 mg (88 mg tramadol/112 mg celecoxib) versus individual or concomitant EU/US reference products (immediaterelease tramadol 100 mg and celecoxib 100 mg). One study assessed CTC bioavailability under fed/fasting conditions;[3] another compared PK in Japanese and white participants.[4]

**Table 1**. Summary of Phase 1 studies of CTC

| Study reference | Study design | Cohort(s) | Treatments | Primary study objective |
|---|---|---|---|---|
| **Videla et al[1]** | 4-period, 4-sequence, randomised, open-label, crossover, single-dose (fasted) | Healthy adults (N=36) | CTC 200 mg (88 mg tramadol/112 mg celecoxib)<br>Tramadol 100 mg<br>Celecoxib 100 mg<br>Tramadol 100 mg + celecoxib 100 mg | Compare single-dose PK vs individual EU-marketed reference products (alone or concomitant) |
| **Videla et al[2]** | 4-period, 4-sequence, randomised, open-label, crossover, single- and multi-dose (fasted) | Healthy adults (N=32) | CTC 200 mg (88 mg tramadol/112 mg celecoxib)<br>Tramadol 100 mg<br>Celecoxib 100 mg<br>Tramadol 100 mg + celecoxib 100 mg | Compare single- and multi-dose PK vs individual EU-marketed reference products (alone or concomitant) |
| **Encina et al[3]** | 2-period, 2-sequence, randomised, openlabel, crossover, single-dose, food effect | Healthy adults (N=36) | CTC 200 mg (fed)<br>CTC 200 mg (fasting) | Compare single-dose bioavailability under fed and fasting conditions |
| **Dooner et al[4]** | 2-cohort, 3-period, randomised, open-label, crossover, singledose, in Japanese and white participants (fasted) | Healthy adults (N=60)<br>White (n=30)<br>Japanese (n=30) | CTC 100 mg (44 mg tramadol/56 mg celecoxib)<br>CTC 150 mg (66 mg tramadol/84 mg celecoxib)<br>CTC 200 mg (88 mg tramadol/112 mg celecoxib) | Compare PK in Japanese and white participants |
| **Cebrecos et al[5]** | 4-period, 4-sequence, randomised, open-label, crossover, comparative bioavailability, single-dose (fasted) | Healthy adults (N=36) | CTC 200 mg (88 mg tramadol/112 mg celecoxib)<br>Tramadol 100 mg<br>Celecoxib 100 mg<br>Tramadol 100 mg + celecoxib 100 mg | Compare single-dose PK vs individual US-marketed reference products (alone or concomitant) |

CTC, co-crystal of tramadol-celecoxib; EU, European Union; PK, pharmacokinetics, US, United States.
[1]Videla S et al. Br J Clin Pharmacol 2017;83:2718–28; [2]Videla S et al. Br J Clin Pharmacol. 2018;84:64–78; [3]Encina G et al. Clin Drug Investig 2018;38:819–27; [4]Dooner H et al. Eur J Drug Metab Pharmacokinet 2019;44:63–75; [5]Cebrecos J et al. Clin Ther 2021;43:1051–65

**Results**: For tramadol, $C_{max}$ was lower, $AUC_{0–T}$ similar, and $T_{max}$ longer, with CTC versus tramadol alone or concomitantly with celecoxib. For celecoxib, $C_{max}$ and $AUC_{0–T}$ were reduced and $T_{max}$ shorter with CTC versus celecoxib alone. Higher $C_{max}$, shorter $T_{max}$, and similar $AUC_{0–T}$ were observed with CTC compared with concomitant tramadol and celecoxib (**Tables 2** and **3**). As for the reference product, food increased celecoxib bioavailability from CTC; tramadol was unaffected. Differences were not suggestive of requirements for dose adjustment/recommendations related to meal times. Differences between Japanese and white participants were also not suggestive of a need for dose adjustment. Safety was consistent with that of reference products, with similar types of adverse events and no serious adverse events or deaths.

**Table 2.** Summary of single-dose PK parameters for CTC versus individual reference products[1,2,5]

| Parameter | | CTC 200 mg | Tramadol 100 mg | Celecoxib 100 mg | Tramadol 100 mg + celecoxib 100 mg |
|---|---|---|---|---|---|
| **Tramadol** | $C_{max}$, ng/mL | [a]214 (29), [b]220 (25), [c]232 (20) | [a]305 (23), [b]330 (16), [c]346 (23) | – | [a]312 (22), [b]331 (21), [c]349 (24) |
| | $AUC_{0–T}$, ng·h/mL | [b]1767 (27), [a]2507 (36), [c]2675 (30) | [b]2220 (25), [a]2709 (34), [c]2979 (32) | – | [b]2300 (24), [a]2888 (34), [c]3119 (28) |
| | $T_{max}$, h | [c]2.7 (1.0–6.0), [a]3.0 (1.25–8.0), [b]3.0 (1.0–6.0) | [b]1.8 (1.0–4.0), [c]1.8 (1.0–4.0), [a]2.0 (0.75–3.0) | – | [c]1.8 (0.8–2.7), [a]1.9 (1.0–6.0), [b]2.0 (1.0–3.0) |
| **Celecoxib** | $C_{max}$, ng/mL | [b]276 (37), [a]259 (34), [c]351 (29) | – | [a]318 (47), [b]358 (37), [c]449 (33) | [a]165 (46), [b]202 (37), [c]284 (43) |
| | $AUC_{0–T}$, ng·h/mL | [b]1436 (32), [a]1930 (41), [c]2445 (24) | – | [b]1929 (35), [a]2348 (40), [c]3093 (23) | [b]1256 (30), [a]1929 (38), [c]2856 (27) |
| | $T_{max}$, h | [a]1.5 (0.75–6.0), [c]1.5 (1.0–5.0), [b]2.0 (0.5–6.0) | – | [c]2.3 (1.0–5.0), [b]3.0 (1.5–8.0), [a]3.0 (1.25–8.0) | [a]2.5 (1.0–12.0), [c]3.0 (1.0–12.0), [b]4.0 (1.0–12.0) |

–, not applicable; $AUC_{0–T,}$ cumulative area under the plasma concentration-time curve; $C_{max}$, maximum plasma concentration; CTC, co-crystal of tramadol-celecoxib; PK, pharmacokinetics; $T_{max}$, time to $C_{max}$.
$C_{max}$ and $AUC_{0–T}$ values are arithmetic mean (% coefficient of variation), $T_{max}$ values are median (min–max). Single-dose PK from [a]Cebrecos et al. 2021,[5] [b]Videla et al. 2018,[2] and [c]Videla et al. 2017[1] studies. See Table 1 for reference citations.

**Table 3.** Summary of multi-dose PK parameters for CTC versus individual reference products[2]

| Parameter | | CTC 200 mg | Tramadol 100 mg | Celecoxib 100 mg | Tramadol 100 mg + celecoxib 100 mg |
|---|---|---|---|---|---|
| **Tramadol** | $C_{max,ss}$, ng/mL | 484 (22) | 632 (24) | – | 661 (25) |
| | $AUC_{0–T,ss}$, ng·h/mL | 4201 (32) | 4990 (30) | – | 5284 (32) |
| | $T_{max,ss}$, h | 3.0 (1.0–6.0) | 2.0 (1.0–4.0) | – | 2.0 (1.0–4.0) |
| **Celecoxib** | $C_{max,ss}$, ng/mL | 487 (29) | – | 536 (33) | 396 (34) |
| | $AUC_{0–T,ss}$, ng·h/mL | 3089 (29) | – | 3366 (27) | 2897 (31) |
| | $T_{max,ss}$, h | 2.0 (0.5–4.0) | – | 2.0 (1.5–4.0) | 3.0 (0.5–6.0) |

–, not applicable; $AUC_{0–T,ss}$, cumulative area under the plasma concentration-time curve at steady state; $C_{max,ss}$, maximum plasma concentration at steady state; CTC, co-crystal of tramadol-celecoxib; PK, pharmacokinetics; $T_{max,ss}$, time to steady-state $C_{max}$.
$C_{max,ss}$ and $AUC_{0–T,ss}$ values are arithmetic mean (% coefficient of variation); $T_{max,ss}$ values are median (min–max). See Table 1 for reference citation.

**Conclusions**: PK improved with CTC versus tramadol and celecoxib alone or concomitantly. The clear interaction between concomitant tramadol and celecoxib, resulting in reduced celecoxib absorption, was minimised with CTC. Overall, results were consistent across Phase 1 studies and indicate that CTC has differential PK, showing that CTC is not substitutable by concomitant EU/US tramadol and celecoxib.

## Abstract no.: 404

### OPIOID PAIN MEDICATION PRESCRIPTION FOR NON-CANCER CHRONIC PAIN: BEYOND PAIN INTENSITY

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**Background and aims**: Psychological factors of patients may influence physicians' decisions on prescribing opioid analgesics. Few studies have sought to identify these factors. The present study had a double objective:

(1) To identify the individual factors that differentiate patients who had been prescribed opioids for the management of chronic back pain from those who had not been prescribed opioids and

(2) to determine which factors make significant and independent contributions to the prediction of opioid prescribing.

**Methods**: A total of 675 patients from four primary care centers were included in the sample. Variables included sex, age, pain intensity, depressive symptoms, pain catastrophizing, and pain acceptance.

**Results**: Although no differences were found between men and women, participants with chronic noncancer pain who were prescribed opioids were older, reported higher levels of pain intensity and depressive symptoms, and reported lower levels of pain-acceptance. An independent association was found between pain intensity and depressive symptoms and opioid prescribing.

**Conclusions**: The findings suggest that, beyond pain intensity, patient factors influence physicians' decisions on prescribing opioids. It may be useful for primary care physicians to be aware of the potential of these factors to bias their treatment decisions.

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## Abstract no.: 425

### USE AND MISUSE OF PRESCRIPTION OPIOIDS AND OTHER PSYCHOACTIVE MEDICINES IN THE LISBON REGION OF PORTUGAL - THE MISUMEDPT PROJECT

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**Background and aims**: Prescription drug misuse is a known problem in some countries worldwide. Analgesic opioids are often misused, as other psychoactive medicines. We aimed at characterising prescription, dispensing and misuse of prescription opioids, benzodiazepines, antidepressants and antiepileptics in the Lisbon and Tagus Valley region of Portugal (ARSLVT).

**Methods**: Retrospective cross-sectional study of psychoactive medicines dispensing in ARSLVT community pharmacies in 2017, covering all patients dispensed at least one package of any of 19 prescription-only medicines. Patients and prescribers' characteristics, dispensed medicines ranking, patients' diagnoses, as well as doctor shopping and non-medical use, were analysed.

**Results**: Use of psychoactive medicines is twice as prevalent among ARSLVT females than in males (26% vs 13%). Prevalence of opioid use was 6.1% and of weak opioids 5.6%. Total number of opioid users was 218,562, 71% of the association tramadol + paracetamol. Strong opioids account for 24% of total opioid consumption (mean 0.4 DDD/user/day). Top consumed medicines were sertraline, alprazolam and lorazepam, with > 1 DDD/user/day for sertraline (2.1) and lorazepam (1.1). Buprenorphine users are older and diazepam users are younger (71.8 vs. 57.6 years). Cancer diagnosis was present for 35% of morphine, 30% of fentanyl and 15% of tapentadol users. Regarding non-medical use, 33% of all packages were initially dispensed without medical prescription (especially paracetamol + codeine: 54%). Doctor shopping indicators were calculated: 5.6% for analgesic opioids (especially fentanyl and morphine), 4.3% for antiepileptics (clonazepam and pregabalin) and 3.0% for benzodiazepines.

**Conclusions**: Possible non-medical use and doctor shopping of some psychoactive medicines were observed in ARSLVT, warranting further investigation.

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## Abstract no.: 435

# CELECOXIB-TRAMADOL CO-CRYSTAL IN PATIENTS WITH MODERATE-TO-SEVERE PAIN FOLLOWING BUNIONECTOMY WITH OSTEOTOMY: SECONDARY ANALYSES OF A PHASE 3, RANDOMISED, DOUBLE-BLIND, FACTORIAL, ACTIVE- AND PLACEBO-CONTROLLED TRIAL

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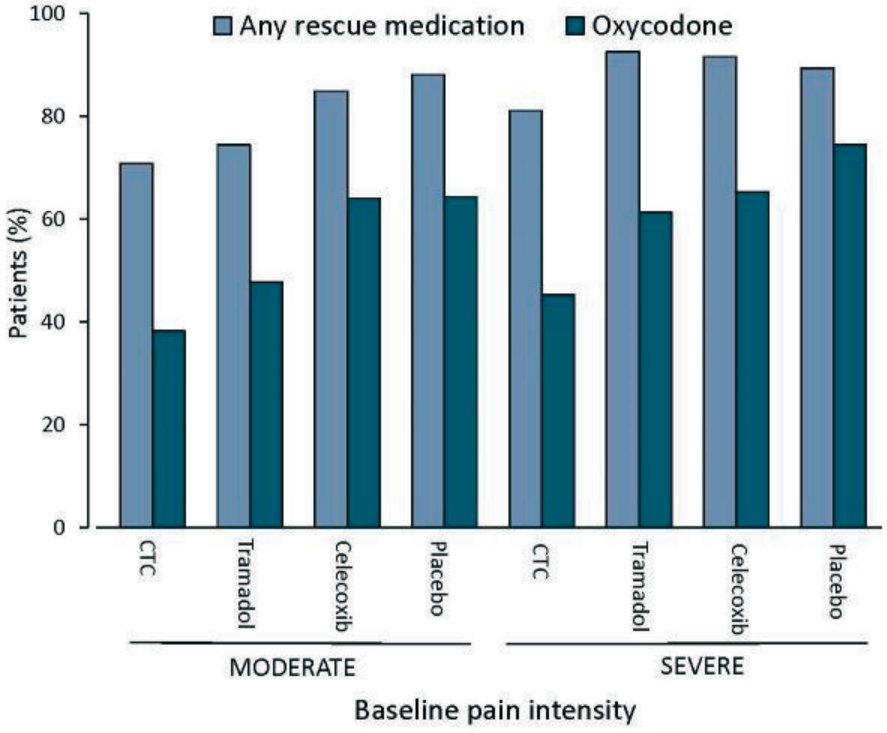
**Background and aims**: First-in-class celecoxib-tramadol co-crystal (CTC) provided greater analgesia than comparable doses of tramadol or celecoxib in the Phase 3 SUSA-301 trial (NCT03108482).[1] Here, we present post-hoc secondary analyses.

**Methods**: SUSA-301 was a randomised, double-blind, factorial trial conducted at 6 US clinical research centres. Adults with acute moderate-to-severe pain following bunionectomy with osteotomy were randomised to oral CTC (200 mg [88 mg tramadol/112 mg celecoxib] every 12h [q12h]; n=184), tramadol (50 mg q6h; n=183), celecoxib (100 mg q12h; n=181), or placebo (n=89) for 48h. Rescue medication use was analysed via 2-sided Pearson chi-square test.

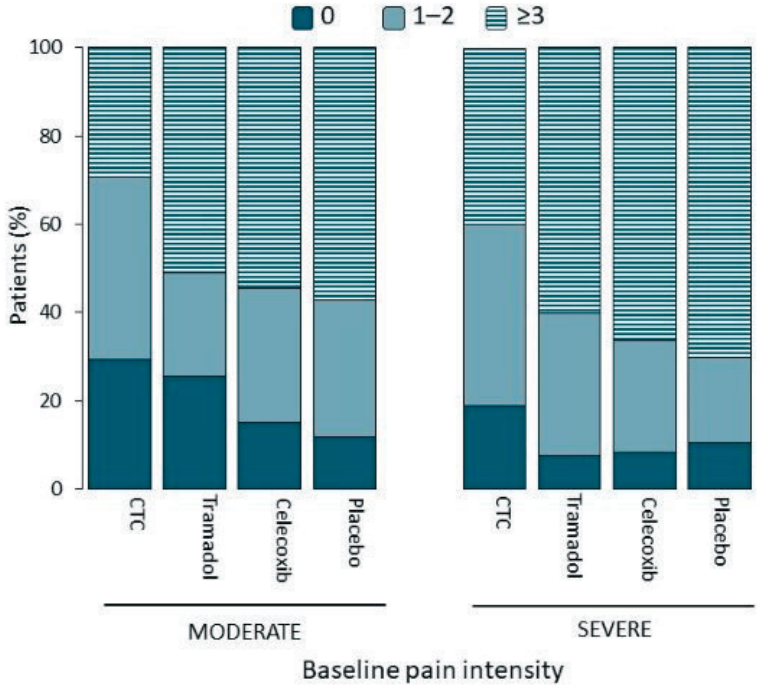
**Results**: Significantly lower proportions of patients in the CTC group, versus other groups, used rescue pain medication within 4h post-dose (CTC: 91 [49.5%]; tramadol: 113 [61.7%]; celecoxib: 118 [65.2%]; placebo: 67 [75.3%]; P=0.0178, P=0.0024, and P=0.0001 vs tramadol, celecoxib, and placebo, respectively), including oxycodone (CTC: 27 [14.7%]; tramadol: 48 [26.2%]; celecoxib: 61 [33.7%]; placebo: 31 [34.8%]; P=0.0061, P<0.0001, and P=0.0001 vs tramadol, celecoxib, and placebo, respectively). A similar pattern occurred within 48h, irrespective of baseline pain intensity (**Figure 1**). Among patients who used rescue medication, fewer in the CTC group required ≥3 doses, irrespective of baseline pain intensity (**Figure 2**). Adverse-event incidence by age (<65 vs ≥65 years) differed between groups (**Table 1**) and was generally unaffected by use of rescue/antiemetic medication.

**Figure 1.** Percentage of patients in each treatment group who used any rescue pain medication, or rescue oxycodone, at any time up to 48h post-dose, stratified by baseline pain intensity.




*First-line rescue medication:* 1 g intravenous paracetamol, every 4–6h as needed, up to 4 g in 24h.
*Second-line rescue medication:* 5 mg immediate-release oral oxycodone, every 4–6h as needed, up to 30 mg in 24h.
CTC, celecoxib-tramadol co-crystal.

**Figure 2.** Number of doses of rescue pain medication (0, 1–2, or ≥3) among all users of rescue pain medication at any time up to 48h post-dose, stratified by baseline pain intensity.




CTC, celecoxib-tramadol co-crystal.

**Table 1.** Incidence of AEs in each treatment group, stratified by age

| | <65 years | | | | ≥65 years | | | |
|---|---|---|---|---|---|---|---|---|
| **n (%)** | **CTC (n=172)** | **Tramadol (n=159)** | **Celecoxib (n=166)** | **Placebo (n=82)** | **CTC (n=11)** | **Tramadol (n=24)** | **Celecoxib (n=16)** | **Placebo (n=7)** |
| **All AEs** | 123 (71.5) | 115 (72.3) | 107 (64.5) | 56 (68.3) | 8 (72.7) | 21 (87.5) | 8 (50.0) | 5 (71.4) |
| **All TEAEs** | 109 (63.4) | 100 (62.9) | 89 (53.6) | 47 (57.3) | 7 (63.6) | 16 (66.7) | 6 (37.5) | 4 (57.1) |
| **Serious TEAEs** | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| **TEAEs related to study drug** | 65 (37.8) | 76 (47.8) | 38 (22.9) | 21 (25.6) | 4 (36.4) | 13 (54.2) | 2 (12.5) | 1 (14.3) |
| **TEAEs leading to discontinuation of study drug** | 3 (1.7) | 2 (1.3) | 0 | 0 | 0 | 1 (4.2) | 0 | 0 |
| **TEAEs of special interest** | 82 (47.7) | 85 (53.5) | 56 (33.7) | 30 (36.6) | 5 (45.5) | 16 (66.7) | 4 (25.0) | 1 (14.3) |

n = Number of patients with ≥1 AE in that category.
TEAEs of special interest were defined as confusion, constipation, difficulty with urination, dizziness, dry mouth, fatigue, headache, inability to concentrate, itching, nausea, somnolence, vertigo, and vomiting.
AE, adverse event; CTC, celecoxib-tramadol co-crystal; TEAE, treatment-emergent adverse event.

**Conclusions**: CTC is associated with less rescue medication use than tramadol or celecoxib alone in acute moderate-to-severe pain, and is well tolerated by adults under and over 65 years.

Reference: 1. Viscusi E.R. et al. IASP 2021, Poster 103824

## Abstract no.: 451

### PROSPECTIVE REAL-WORLD EVALUATION OF TREATMENT SATISFACTION FOR TOPICAL DICLOFENAC DIETHYLAMINE 1.16% AND 2.32% IN SWEDEN

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**Background and aims**: Prospective studies evaluating the use of topical diclofenac formulations when purchased for self-care are limited. Aim of this study was to evaluate patient satisfaction and impact on quality of life with diclofenac diethylamine (DDEA) 1.16% and 2.32% gel.

**Methods**: This prospective, observational study involved consumers who purchased DDEA 1.16% and 2.32% gel for pain treatment via online pharmacy in Sweden. A leaflet (study information, QR code, URL) was provided with DDEA gel. Participants completed three (baseline, Week 4 and Week 12) electronic surveys via personalized URL.

**Results**: Of the 264 participants at baseline, 96.2% (N=254) completed Week 4 survey and 93.9% (N=248) completed Week 12 survey. DDEA gel was purchased to treat sports injuries by 68.6% of participants, while 31.4% purchased it for treating other types of pain. Participants with medical history of cardiovascular disease (31.4%) and gastro-intestinal disorders (6.1%) selected DDEA gel. Treatment satisfaction was reported by 78.3% (n= 199) participants at Week 4 and by 87.1% (n=216) participants at Week 12. At Week 4, 89.4% (n=178) participants and at Week 12, 91.2% (n=197) participants reported to maintain their social independence. Compared to baseline, 60.2% and 68.1% of participants had an improvement in pain score ≥ 1 point on NRS-11 pain scale at Week 4 and Week 12, respectively.

**Conclusions**: Preference of topical diclofenac gel by participants is mostly based on their indication and medical history. Participants reported treatment satisfaction, social independence and pain relief indicating improvement in quality of life with use of DDEA gel.

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## Abstract no.: 454

### THE ANTI-PRURITIC EFFECT OF TPRM8-AGONIST L-MENTHOL ON HISTAMINERGIC AND NON-HISTAMINERGIC ITCH

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**Background and aims**: For centuries, cooling has been used to ease itch and pain but the exact mechanisms still remain unclear. Recently, transient receptor potential melastatin-8 (TRPM8) subfamily has been associated with the perception of itch. Hence, this study aimed to evaluate the interaction between TRPM8 receptor and itch by studying the anti-pruritic effect of TPRM8-agonist L-menthol on histamine-, cowhage- and papain-induced itch.

**Methods**: Each forearm of 20 healthy subjects were divided into four squared areas, and exposed to vehicle, histamine, cowhage, and papain by skin-prick test lancets or heat-inactivated cowhage spicules. One arm was randomly pretreated with L-menthol for 7 minutes. Following each exposure, itch was monitored, and the intensity and area under the curve (AUC) were analyzed. Afterwards thermal sensitivity was tested.

**Results**: Cowhage-induced peak itch was increased compared to histamine ($p<0.01$), papain, and vehicle ($p<0.001$). Histamine-induced itch was higher than papain ($p<0.05$) and vehicle ($p<0.01$). Same results were found for AUC of itch with the exception of cowhage and histamine not statistically different.

No alterations were found in warm detection thresholds (0.346), while menthol increased the heat pain threshold after histamine ($p<0.001$), and decreased it after papain ($p<0.05$). An overall significant difference was found for suprathreshold heat stimuli ($p<0.026$).

Cold detection thresholds in the areas of vehicle+menthol and histamine+menthol was significantly increased compared to vehicle ($p<0.001$), moreover menthol increased Cold pain thresholds ($p<0.015$).

**Conclusions**: L-menthol did not have an anti-pruritic effect. As expected, L-menthol had an effect on cold sensitivity by increasing both detection and pain thresholds.

## Abstract no.: 460

# EFFICACY AND SAFETY OF CO-CRYSTAL OF TRAMADOL-CELECOXIB IN ACUTE MODERATE-TO-SEVERE PAIN AFTER ABDOMINAL HYSTERECTOMY: A RANDOMISED, DOUBLE-BLIND, PHASE 3 TRIAL (STARDOM2)

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**Background and aims**: First-in-class co-crystal of tramadol-celecoxib (CTC) comprises racemic tramadol and celecoxib in a supramolecular network that optimises the pharmacokinetics of each. The Phase 3 STARDOM2 trial (NCT03062644; EudraCT:2016-000593-38) evaluated CTC in acute postoperative pain.

**Methods**: Patients with moderate-to-severe pain following abdominal hysterectomy were randomised 2:2:2:2:2:1 to oral CTC 100 mg (44 mg tramadol/56 mg celecoxib) BID, 150 mg (66/84 mg) BID, or 200 mg (88/112 mg) BID; immediate-release tramadol 100 mg QID; celecoxib 100 mg BID; or placebo, for 5 days. The primary endpoint was the sum of pain intensity differences over 0–4h ($SPID_{0–4}$). Key secondary endpoints were 50% response rate at 4h, rescue medication use within 4h, and safety/tolerability.

**Results**: 1138 patients were randomised and 1136 treated. In the SPID0–4 prespecified gatekeeping analysis (via ANCOVA), CTC 200 mg was superior to placebo (P<0.05) and non-inferior (P<0.001), but not superior, to tramadol (**Figure 1**). In logistic regression analyses, CTC 150 mg and 200 mg were superior to placebo for 4-h rescue medication use. CTC 200 mg was superior to placebo for 4-h 50% response rate (**Table 1**). Treatment-emergent adverse-event rates were lower for CTC 200 mg versus tramadol (**Table 2**). Cumulative 5-day tramadol administration was 880 mg for CTC 200 mg versus 2,000 mg for tramadol alone.

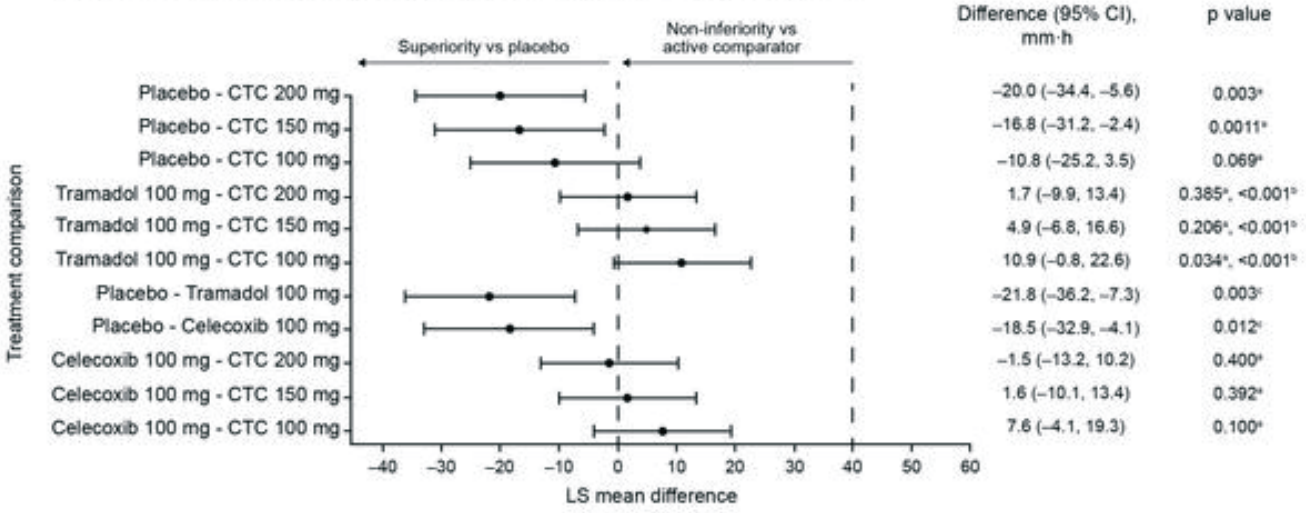
**Table 1.** Summary of secondary efficacy endpoints. Logistic regression; full analysis set

| | CTC 100 mg (n=207) | CTC 150 mg (n=207) | CTC 200 mg (n=208) | Tramadol 100 mg (n=208) | Celecoxib 100 mg (n=206) | Placebo (n=102) |
|---|---|---|---|---|---|---|
| **50% responder rate at 4h,[a] n (%)** | 48 (23.2) | 51 (24.6) | 64 (30.8) | 64 (30.8) | 49 (23.9) | 18 (17.6) |
| **OR vs placebo (95% CI) [P-value]** | 1.31 (0.68, 2.52) [0.423] | 1.79 (0.93, 3.43) [0.081] | 2.18 (1.15, 4.14) [0.017] | 1.79 (0.94, 3.42) [0.075] | 1.51 (0.78, 2.91) [0.217] | – |
| **OR vs tramadol (95% CI) [P-value]** | 0.73 (0.45, 1.18) [0.200] | 1.00 (0.62, 1.61) [0.987] | 1.22 (0.77, 1.93) [0.41] | – | – | – |
| **OR vs celecoxib (95% CI) [P-value]** | 0.87 (0.53, 1.43) [0.57] | 1.18 (0.72, 1.94) [0.505] | 1.44 (0.90, 2.33) [0.132] | – | – | – |
| **Rescue medication use within 4h, n (%)** | 43 (20.9) | 33 (16.0) | 35 (17.0) | 38 (18.4) | 41 (20.0) | 28 (27.7) |
| **OR vs placebo (95% CI) [P-value]** | 0.64 (0.36, 1.15) [0.139] | 0.42 (0.23, 0.78) [0.006] | 0.49 (0.27, 0.89) [0.019] | 0.56 (0.31, 1.02) [0.057] | 0.60 (0.34, 1.08) [0.091] | – |
| **OR vs tramadol (CI 95%) [P-value]** | 1.15 (0.69, 1.92) [0.594] | 0.76 (0.44, 1.29) [0.306] | 0.87 (0.51, 1.48) [0.600] | – | – | – |
| **OR vs celecoxib (95% CI) [P-value]** | 1.07 (0.65, 1.77) [0.794] | 0.70 (0.41, 1.20) [0.193] | 0.81 (1.36 ,0.48) [0.423] | – | – | – |

.[a]50% reduction from baseline in pain intensity on the visual analogue scale
.CI, confidence interval; CTC, co-crystal of tramadol-celecoxib; OR, odds ratio

| Table 2. Summary of TEAEs (safety population) | | | | | | |
|---|---|---|---|---|---|---|
| **Event, n (%)** | **CTC 100 mg (n=207)** | **CTC 150 mg (n=205)** | **CTC 200 mg (n=208)** | **Tramadol 100 mg (n=208)** | **Celecoxib 100 mg (n=206)** | **Placebo (n=102)** |
| **TEAEs** | 63 (30.4) | 60 (29.3) | 62 (29.8) | 82 (39.4) | 67 (32.5) | 30 (29.4) |
| **Study drug-related TEAEs** | 30 (14.5) | 20 (9.8) | 30 (14.4) | 49 (23.6) | 36 (17.5) | 12 (11.8) |
| **Severe TEAEs** | 1 (0.5) | 2 (1.0) | 1 (0.5) | 4 (1.9) | 3 (1.5) | 1 (1.0) |
| **Study drug-related severe TEAEs** | 0 | 1 (0.5) | 0 | 1 (0.5) | 1 (0.5) | 0 |
| **Serious TEAEs** | 2 (1.0) | 3 (1.5) | 0 | 3 (1.4) | 3 (1.5) | 0 |
| **Study drug-related serious TEAEs** | 0 | 1 (0.5) | 0 | 1 (0.5) | 1 (0.5) | 0 |
| **TEAEs leading to death** | 0 | 0 | 0 | 0 | 0 | 0 |
| .n = Number of patients with ≥1 TEAE in that category<br>.CTC, co-crystal of tramadol-celecoxib; TEAE, treatment-emergent adverse event | | | | | | |

**Figure 1.** Sum of pain intensity differences over 0–4h (ANCOVA; full analysis set)




CTC 100 mg, n=207; CTC 150 mg, n=207; CTC 200 mg, n=208; tramadol, n=208; celecoxib, n=206; placebo, n=102.
[a]p value from one-sided test of superiority for testing the null hypothesis that the difference of means is ≥0 mm·h; [b]p value from one-sided test of non-inferiority for testing the null hypothesis that the differences of means is ≥40 mm·h; [c]p value from two-sided test of no difference for testing the null hypothesis that the differences of means is zero
ANCOVA, analysis of covariance; CI, confidence interval; CTC, co-crystal of tramadol-celecoxib; LS, least squares.

**Conclusions**: At the proposed clinical dose (200 mg), CTC was non-inferior to tramadol, despite lower cumulative opioid exposure, and better tolerated. While superiority over tramadol was not reached, results suggest the benefit/risk profile of CTC 200 mg is improved versus tramadol.

## Abstract no.: 471

## CARDIOVASCULAR RISKS ASSOCIATED WITH DICLOFENAC INITIATION: A NATIONWIDE POPULATION-BASED TARGET TRIAL

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**Background and aims**: The aim was to examine dose-related cardiovascular risks of diclofenac as this is unknown.

**Methods**: A series of emulated 'trials' (n=276), each with one-month enrollment period was applied. Data were obtained from Danish National Registries. Between 1996 and 2018, 3,177,484 diclofenac initiators were enrolled. Low dose was defined

as pill doses ≤50mg (proxy for daily dose≤150 mg) and high dose from pill doses >50mg (proxy for daily dose>150mg). Cox proportional-hazards regression computed intention-to-treat hazard ratio, as measure of the incidence rate ratio (IRR), of Major Adverse Cardiac and Cerebrovascular Events (MACCE) within 30 days from drug initiation. Data don't allow to separate the low dose group into lower pill doses like 12.5mg or 25.0mg. Hence the low dose group could not be divided into daily doses of ≤75mg, >75 and ≤150mg and >150mg.

**Results**: A 70% increased rate of MACCE when comparing diclofenac initiators vs. non-initiators. Increased IRR was observed for MACCE components (1.66 for myocardial infarction, 1.32 for ischemic stroke, and 1.69 for cardiac death). The magnitude of effect for MACCE did not differ between doses. Comparing high- and low-dose pills of diclofenac initiators head-to-head, no differences were found in the IRR for MACCE, ischemic stroke, and cardiac death. Results were independent of sex, age, and baseline cardiovascular risk.

**Conclusions**: Initiation of diclofenac in estimated daily doses of ≤150mg and >150mg doses had similarly increased cardiovascular risk within 30 days from drug initiation but data did not allow to separate into lower doses of less then estimated daily dose of ≤150mg.

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## Abstract no.: 485

### PANITUMUMAB FOR THE TREATMENT OF NEUROPATHIC CANCER PAIN: PROTOCOL FOR AN ENRICHED ENROLLMENT RANDOMIZED PLACEBO-CONTROLLED DOUBLE-BLIND MULTICENTER TRIAL

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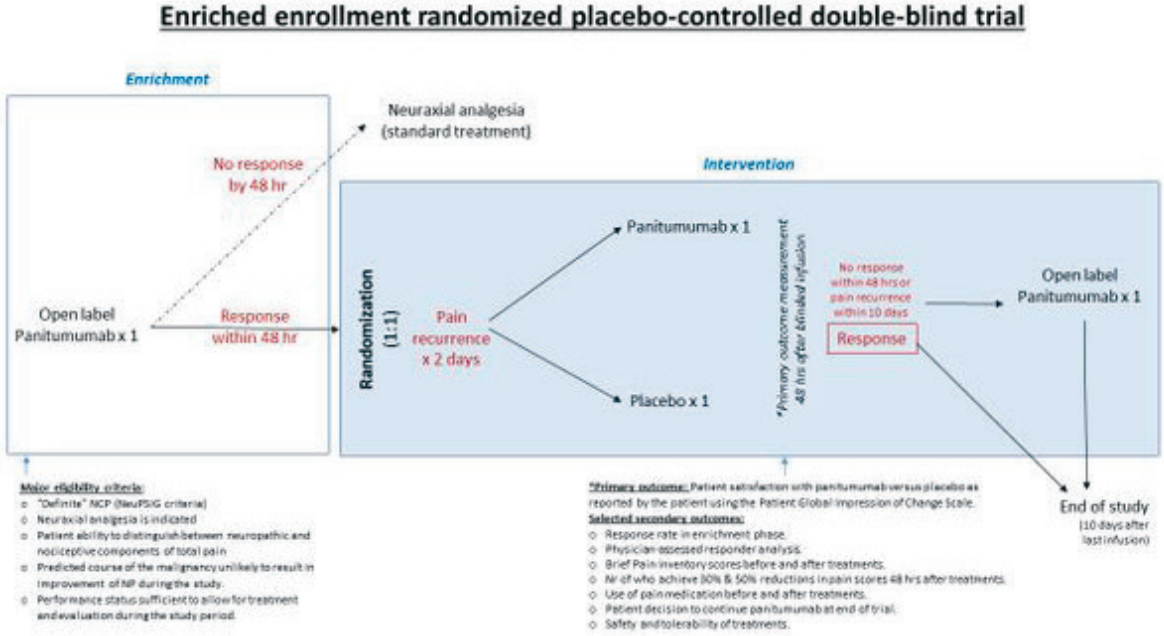
**Background and aims**: Neuropathic cancer pain (NCP) is present in up to 40% of patients with cancer pain, and inadequately controlled in 30% of these. The epidermal growth factor receptor (EGFR) is a target for oncologic treatment. There are promising reports of rapid relief of intractable NCP in patients treated with EGFR-inhibitors despite progressive nerve invasion, indicating a mechanism other than tumoricidal effect. A randomized proof-of-concept study and rodent experiments support these clinical observations. Symptom research in patients with advanced cancer is challenging, hampering feasibility of drug-trials. Flexibility and innovative research methods are warranted.

**Methods**: An explorative observational study of NCP patients receiving EGFR-Is tested feasibility of a variety of patient and physician assessed pain evaluation tools based on what was ethical, feasible and clinically relevant in 20 patients. Difficulty implementing repeated patient reported outcomes reinforced the need for innovative drug trial endpoints and designs in this setting.

**Results**: We propose a trial to overcome challenges in this specific context (figure 1). In the enrichment phase all patients will receive one dose of panitumumab. Responders will be randomized to either a single dose of blinded panitumumab or placebo, administered once pain has been re-established. Non-responders and patients whose pain returns within 10 days of the blinded infusion will be given a single open-label panitumumab infusion.



**Conclusions**: We hypothesize that panitumumab is superior to placebo for treatment of NCP. This multicenter trial protocol will test the hypothesis in 24 patients (post-enrichment) with 90% power and alpha 0.05, using dichotomous responder analysis.

## Abstract no.: 571

### PRIMARY CARE OPIOID PRESCRIBING AND SOCIAL DEPRIVATION AMONG CHRONIC NON-CANCER PAIN PATIENTS IN LIVERPOOL

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**Background and aims**: Demographic and psychosocial profiles of Chronic Non-Cancer Pain (CNCP) patients indicate that the majority receiving long-term high dose opioid treatment are more likely to be female, aged over 60 years, and living in areas of higher social deprivation. UK national and regional retrospective studies show a North/South divide in opioid prescribing, with higher prescribing in the North, thought to be driven partly by the higher prevalence of chronic pain in individuals with lower social economic status (SES). Less is known about opioid prescribing and deprivation at a local level. This study aimed to investigate high dose prescribing in primary care practices across Liverpool Clinical Commissioning Group (CCG).

**Methods**: Anonymised patient and practice opioid prescribing data were extracted from LCCG EMIS web between 2016-2018. Data was cleaned in Excel and analysed in SPSS. Opioid prescriptions were converted into Morphine Equivalent Doses (MED) and aggregated for each patient to account for multiple prescriptions. GP postcodes and recent Indices of Multiple Deprivation (IMD) were used to investigate links between prescribing and social deprivation.

**Results**: 93,236 prescriptions for 30,474 patients were analysed. A significant but small proportion (3.5%, n=1069) of these patients were prescribed opioids exceeding 120mg MED/day. Practices in the North of Liverpool, where communities had the lowest deprivation decile, prescribed the highest number of opioids above 120mg MED.

**Conclusions**: There are clear prescribing disparities associated with level of deprivation at a local level. Investigating why such differences occur could identify areas of greatest need and allow best practice to be shared across the region.

## Abstract no.: 593

### SAFETY OUTCOMES OF A LONGITUDINAL PROSPECTIVE FOLLOW-UP PROGRAM FOR PATIENTS USING MEDICINAL CANNABIS OIL EXTRACT FOR THE MANAGEMENT OF CHRONIC PAIN AND OTHER CONDITIONS

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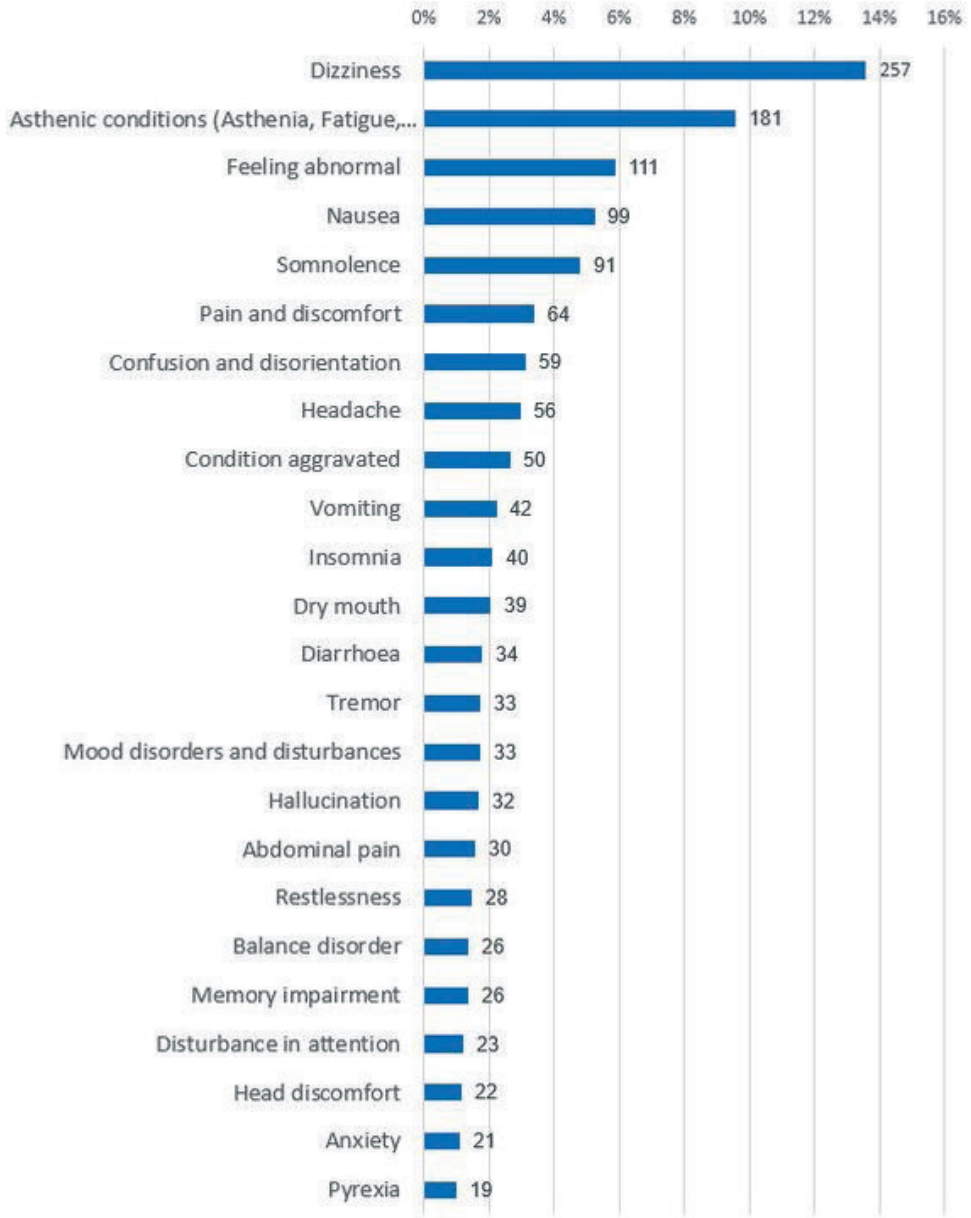
**Background and aims**: There are limited safety data on medical cannabis administered via non-smoking route. Study objective was to collect real-world patient-reported adverse events (AEs) following the sublingual use of a medical grade cannabis oil extract with known concentrations of tetrahydrocannabinol/cannabidiol (THC/CBD) (Axiban®).

**Methods**: From May 2018 to Aug 2020, an observational registry prospectively collected patient-reported outcomes following the use of the study product, which was obtained from a pharmacy after physician recommendation and Israeli Ministry of Health license. Patients were contacted by a nurse at baseline, and subsequently 2-6 times over 1-6 months to collect data on AEs.

**Results**: 1990 patients were enrolled to this cohort; 1890 were included in the analysis. The mean±SD age was 66±16 years; 64% were female (Table1). Most common indications for study product were chronic pain (38%), cancer (28%), and fibromyalgia (19%). Mean daily dose at follow-up was 18.6±16.5 mg THC and 17.7±20.4 mg CBD. Overall, 856 patients (45.3%) reported AEs during 1,408 calls, with frequencies summarized in Figure1. Female patients reported higher frequency of AEs overall compared to males, 52% vs 48% in ≥80 yo, 57% vs 41% in 65-79 yo, and 45% vs 30% in 18-64 yo. Serious AEs were reported by 7.7% of patients (Figure 2), only ~23% of them were assessed as possibly related to the study product.

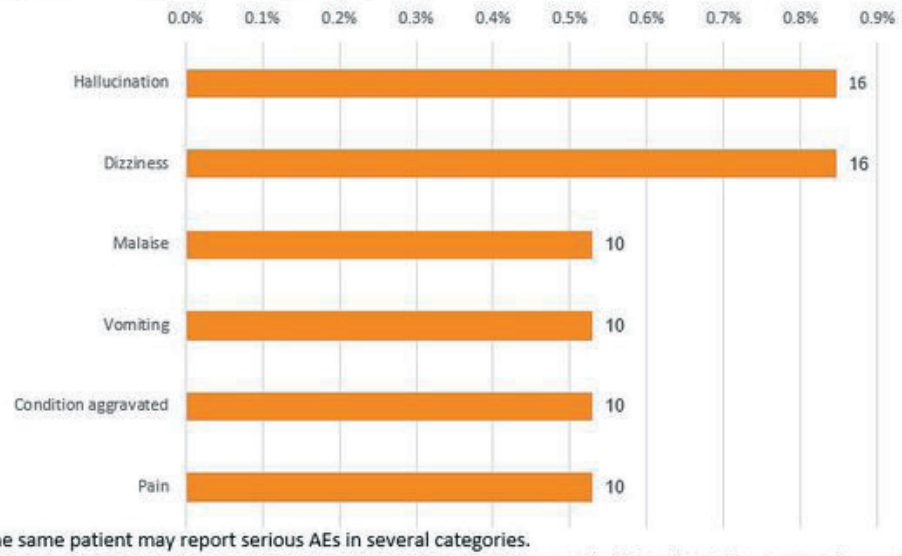
| Table 1. Age and sex distribution of the study population | | | |
|---|---|---|---|
| **Age** | **Female** | **Male** | **Total** |
| **18-64** | 494 (26%) | 233 (12%) | **727** |
| **65-79** | 418 (22%) | 259 (14%) | **677** |
| **≥80** | 221 (12%) | 145 (8%) | **366** |
| **Missing** | 81 (4%) | 39 (2%) | **120** |
| **Total** | **1214 (64%)** | **676 (36%)** | **1890** |

Figure 1. Percentage of patients reporting adverse events (≥1%) with medical cannabis oil extract*




* The same patient may report AEs in several categories.
Gender analysis of the results will be presented in the poster.

Figure 2. Percentage of patients (≥0.5%) reporting serious adverse events with medical cannabis oil extract*




* The same patient may report serious AEs in several categories.
** Overall, 47 deaths were reported in the study cohort and are not included in the Table. Among these, 40 were cancer patients, and 5 patients had other life-threatening conditions prior to THC/CBD initiation. No information on the cause of death was provided for the remaining 2 patients. None of the deaths was attributed by the study team or a family member to the THC/CBD product.

**Conclusions**: The study provides a comprehensive prospective review of AEs in patients prescribed sublingual medical grade cannabis oil extract under real world conditions.

## Abstract no.: 629

### USE OF DEXMEDETOMIDINE FOR US-GUIDED SUPRACLAVICULAR BRACHIAL PLEXUS NERVE BLOCK OPTIMIZATION IN POST-OPERATIVE PAIN CONTROL: A CASE REPORT

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**Background and aims**: Bone Fracture Reduction Surgery is burdened with post-operative pain of moderate-severe intensity. Regional anesthesia can be used to optimize its management. The purpose of this case report is to describe the care of intense, postsurgical pain patient with history of forearm's traumatic fracture by US-guided Supraclavicular Brachial Plexus Nerve Block (SBPB) using as adjuvants Dexamethasone and Dexmedetomidine.

**Methods**: In June 2020 a 43 year old male patient, weighing 62 kg and 175 cm tall, without any diseases, underwent reduction of a traumatic fracture of radius and ulna with implantation of external fixator which was removed in October 2020. Subsequently he developed a pseudoarthrosis on plurifragmentary fracture for which in May 2021 the surgical team of our university hospital planned an autologous cortico-spongy transplant after plate and screw osteosynthesis. Due to the long operative time a balanced general anesthesia was carried out and after the induction was performed a US-guided SBPB with Levobupivacaine 0.75% 20 ml, Dexamethasone 4 mg and Dexmedetomidine 60 mcg.

**Results**: The vital signs remained stable for all 7 hours of surgery. The patient was awakened in the operating room without complications. After 30 minutes of observation he was sent to ward. the NRS was evaluated every 3 hours from the end of the operation, kept < 4 for about 18 hours and it was not necessary to use opioids for pain control.

**Conclusions**: The use of Dexmedetomidine and Dexamethasone in SBPB ensures an exceptionally long block duration and opioid sparing for pain control.

## Abstract no.: 631

### SEX-DEPENDANT MODULATION OF NOCICEPTIVE BEHAVIOUR IN A RAT MODEL OF NEUROPATHIC PAIN FOLLOWING INHIBITION OF FATTY ACID AMIDE HYDROLASE AND MONOACYLGLYCEROL LIPASE

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**Background and aims**: Pharmacological activation of the endocannabinoid system in the periaqueductal grey (PAG) disinhibits the descending inhibitory pain pathway, inducing antinociception. In this study, we investigated the sex-dependent effects of pharmacological inhibition of the anandamide (AEA)-catabolizing enzyme fatty acid amide hydrolase (FAAH) and the 2-arachidonylglycerol (2-AG)-catabolizing enzyme monoacylglycerol lipase (MGL) following peripheral nerve injury.

**Methods**: Adult male and female Sprague-Dawley rats were exposed to Sham or Spared Nerve Injury (SNI) surgery. Daily administration of URB597 (FAAH inhibitor; 0.3mg/kg; i.p.) or MJN110 (MGL inhibitor; 1mg/kg; i.p.) started on post-surgery day (PSD) 7 until PSD22. Von Frey and acetone drop tests evaluated mechanical and cold hypersensitivity, respectively, on PSD7,12,17 and 22. PAG endocannabinoid (AEA, 2-AG) and related *N*-acylethanolamine (PEA, OEA) levels were measured using liquid chromatography tandem mass spectrometry. FAAH, MGL, $CB_1$-, and $CB_2$-receptor mRNA levels in the PAG were measured using RT-qPCR.

**Results**: SNI induced mechanical and cold hypersensitivity in both sexes, with females exhibiting greater nociceptive sensitivity. URB597 administration reduced mechanical and cold hypersensitivity of female-SNI but not male-SNI rats. MJN110 had no significant effect on SNI-induced hypersensitivity. URB597 administration significantly increased PEA and OEA levels in both sexes, but not AEA. Increased levels of 2-AG were observed in MJN110-treated animals. No significant alterations were detected in mRNA levels of $CB_1$, $CB_2$, FAAH or MGL.

**Conclusions**: These data provide evidence for sexual dimorphism in the antinociceptive effect of FAAH inhibition; however, these effects were not associated with concomitant sex-dependent alterations in components of the ECS in the PAG.

Acknowledgements: Irish Research Council. Laureate Award (IRCLA/2017/78).

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## Abstract no.: 639

### OXIDATIVE STRESS MEDIATES THALIDOMIDE-INDUCED PAIN BY TARGETING PERIPHERAL TRPA1 AND CENTRAL TRPV4

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**Background and aims**: The mechanism underlying the pain symptoms associated with (CIPN) is poorly understood. TRPA1, TRPV4, TRPV1 and oxidative stress have been implicated in several rodent models of CIPN-evoked allodynia. The pathway responsible for such proalgesic response has not yet been investigated in animal models.

**Methods**: C57BL/6, *Trpa1*$^{+/+}$ or *Trpa1*$^{-/-}$ and *Trpv4*$^{+/+}$ or *Trpv4*$^{-/-}$ mice were exposed to a single dose administration of thalidomide (50 mg/kg, i.p.) and its vehicle (4% dimethyl sulfoxide, DMSO and 4% Tween80 in 0.9% NaCl). Intraplantar, i.pl., 20 µl/site and intrathecal (i.th., 5 µl/site) HC-030031 (100 µg), HC-067047 (100 µg) and the antioxidant (PBN, 100 µg) were administered at day 7 after thalidomide. Mechanical allodynia was measured by using the up-and-down paradigm. Cold allodynia was assessed by the acetone test. Oxidative stress was measured by immunofluorescence.

**Results**: A single systemic administration of thalidomide and its derivatives, lenalidomide and pomalidomide, elicits prolonged mechanical and cold hypersensitivity in C57BL/6J mouse hind paw. Systemic treatment with an antioxidant attenuated the increase in mechanical and cold allodynia and oxidative stress in hind paw, sciatic nerve and lumbar spinal cord produced by thalidomide. Intrathecal or intraplantar treatments with channel antagonists or an antioxidant revealed that oxidative stress-dependent activation of peripheral TRPA1 mediates cold allodynia and part of mechanical allodynia. Oxidative stress-induced activation of central TRPV4 mediated the residual TRPA1-resistant component of mechanical allodynia.

**Conclusions**: The present results indicate the need of peripheral acting TRPA1 antagonists and blood brain barrier-penetrating TRPV4 antagonists to treat the pain symptoms associated to CIPN evoked by thalidomide and related drugs.

## Abstract no.: 732

### CHARACTERIZING ACUTE POST-OPERATIVE USE OF OPIOID-ANALGESICS IN NORWAY

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**Background and aims**: Postoperative opioid analgesic use is associated with an increased risk of prolonged and/or problematic opioid use. We investigate acute post-operative use of opioid analgesics at home in a restrictive opioid prescription context.

**Methods**: In an open-label, observational quality control study, 238 relatively healthy individuals (136 female) undergoing day surgery at a Norwegian hospital rated their pain and mood pre- and post-surgery. The post-surgical at-home pain management plan included non-steroidal anti-inflammatory drugs and a limited number of per-oral opioids (max. 6 pills of 5mg oxycodone). Importantly, patients were instructed to only take opioid analgesics if necessary. Data was collected over 5 time-points: weeks (T1) and 30min before surgery (T2), on the operating table (T3), via phone interview 24-48 hours after surgery (T4) and via follow-up state/trait questionnaires (T5, currently ongoing).

**Results**: The 64 (32.5%) of patients who reported having taken at least one opioid analgesic at the time of the post-surgery interview reported overall significantly higher pain and pain interference, lower self-reported ability to cope with pain and lower reports of 'feeling good' after surgery as well as higher nervousness in the weeks before surgery (independent t-tests). So far, we have collected follow-up questionnaire data (e.g. history of trauma, socio-economic background, pain catastrophizing) from 53% of all patients, analyses on the finalized data set will be included in the poster.

**Conclusions**: In conclusion, our data suggests that pain, negative affect before and pain coping abilities after surgery, could be valuable indicators of acute post-operative opioid use and thereby inform clinical practice.

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## Abstract no.: 780

### PREVENTIVE ANTINOCICEPTIVE EFFECT OF TRAMADOL WITH MAGNESIUM SULFATE IN AN INFLAMMATORY MODEL OF PAIN IN RATS

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*[1]Faculty of Medicine, University of Belgrade, Department of Pharmacology, Clinical Pharmacology and Toxicology, Belgrade, Serbia*

**Background and aims**: Tramadol is one of the most frequently used opioid analgesics Magnesium was shown antinociceptive activity in some models of pain. This study aimed to assess the antinocicpetive effects of tramadol injected with / without the magnesium sulfate in a rat model of somatic inflammatory pain.

**Methods**: Carrageenan (0.5%, 0.1 ml/paw) was administered intraplantarlly to the rat hind paw for induction of inflammation. Paw withdrawal threshold to mechanical stimuli was assessed with von Frey analgesiometer. The tested drugs were administered systemically before carrageenan.

**Results**: Tramadol (1.25–10 mg/kg, intraperitoneally) at a dose-dependent manner reduced a carrageenan-induced mechanical hyperalgesia in male Wistar rats. Maximal antihyperalgesic effect is about 40–100%. Administration of a fixed dose of tramadol (1.25 mg/kg) with magnesium (5 or 30 mg/kg, subcutaneously) before induction of inflammation cause a dose-dependent enhancement and prolongation of the analgesic effect of tramadol.

**Conclusions**: Systemic administration of low doses of tramadol and magnesium sulfate given in combination is a potent and effective therapeutic option for prevention somatic inflammatory pain. Magnesium sulfate the best effect achives at a dose that is equivalent to the average human recommended daily dose.

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## Abstract no.: 792

### MAGNESIUM IMPROVES THE ANALGESIC EFFECT OF THE AGONIST OF CB2 RECEPTOR (AM1241) IN THE FORMALIN TEST IN RATS

K. Savic Vujovic[1], B. Medic Brkic[1], D. Srebro[1], A. Vujovic[2], S. Vuckovic[1]

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**Background and aims**: AM1241 is anaminoalkylindole compound that acts as a selective agonist for the cannabinoid receptor $CB_2$. It demonstrates the potential for treatment of various pain modalities while avoiding adverse effects on brain tissue. Magnesium is NMDA receptor antagonist that blocks the ion channel in a dose-dependent manner. It has been shown that magnesium enhances the action of opioid analgesics, as well as some general and local anesthetics. The aim of this study was to evaluate the analgesic effect of AM1241 and magnesium in the formalin test in rats.

**Methods**: Experiments were performed on male Wistar albino rats (200-250 g). Antinociception was tested in the formalin test in rats. Animals were divided into seven groups, one being the control group. Animals in the experimental groups received AM1241 (1, 5, 10 mg/kg) alone and in combination with magnesium (5mg/kg).

**Results**: *AM1241* (1, 5, 10 mg/kg) exhibited an analgesic effect in the formalin test in rats. The antinociceptive effect was achieved in the first (acute) phase of pain (0-10 min after application of formalin) and partly during the second phase of pain (10-45 min after formalin administration) ($p<0.05$). AM1241 with a fixed dose of magnesium (5mg/kg) exhibited an analgesic effect and there was statistically significant difference in comparison to the groups that received AM1241 alone.

**Conclusions**: Our results show that AM1241 exhibits an analgesic effect in the inflammatory pain model in rats; magnesium increases the antinociceptive effect of this substance.

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## Abstract no.: 911

### SPINE SURGERY INTENSITY DOES NOT ALWAYS PREDICT EXTENT OF OPIOID USE AFTER SURGERY

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**Background and aims**: Many factors influence the individual pain experience. It is unknown whether severity of spine surgery procedures influences post-surgical opioid use. The purpose of this study was to compare opioid use based on surgery intensity (low or high).

**Methods**: Individuals undergoing spine surgery in a large hospital. Procedures were categorized as low intensity (e.g., microdiscectomy, laminectomy) and high intensity (e.g. fusion and arthroplasty). We compared opioid use after surgery between groups.

**Results**: 428 individuals met criteria, mean age 44.9 years (SD 11.7), 32.2% female. Of these, 281 (65.7%) received a low and 147 (34.3%) a high-intensity procedure. Mean opioid prescription fills were greater in the high versus low-intensity group (11.2 vs 6.6;$p<0.001$), as were mean total days' supply (211.5 vs 123.2;$p=0.002$). However, median daily morphine milligram equivalents (MME) were higher in the low-intensity group (43.2 95CI 40.4,40.6 vs 38.0 95CI 34.9,41.0; $p=0.014$). In those with prior opioid use, lower intensity procedures were associated with a greater mean minimum daily MME and filling of opioid prescriptions further out from surgery than the high-intensity group (mean 275 vs 204 days; $p=0.049$).

**Conclusions**: Surgery intensity influenced opioid use, with higher intensity procedures leading to higher overall days' supply and mean unique fills. However, lower intensity procedures had significantly higher median daily MMEs and individuals filled their last prescriptions significantly later than high-intensity procedures. Opioid use was not consistently lower in patients with lower intensity procedures, highlighting the complexity of post-surgical pain management.

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## Abstract no.: 942

### USE OF SUBLINGUAL BUPRENORPHINE WITH RAPID MICRODOSING INDUCTION: A PAIN MANAGEMENT CASE STUDY

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**Background and aims**: We report a case in which sublingual buprenorphine was used to help transition a patient off of intravenous opioids after multiple abdominal procedures. We present this case to highlight how sublingual buprenorphine can be a useful agent for acute pain management, especially when conventional strategies provide suboptimal responses.

**Methods**: In this patient, we used sublingual buprenorphine to provide pain relief in conjunction with oral and IV opioid analgesics and to later transition her off IV opioid medications with a microdosing induction of buprenorphine. The patient was started on sublingual buprenorphine/naloxone on hospitalization day 7 with a modified microdosing titration schedule until a planned daily dose of 8 mg buprenorphine was reached, and then was maintained on this dose for 10 days with steadily improved pain relief and decreased IV morphine use.

**Results**: In our case, we used buprenorphine concurrently with IV morphine with a targeted daily total buprenorphine dose of 8 mg. This is consistent with current strategy in managing buprenorphine in the perioperative period. We observed improved pain relief as the buprenorphine dose was up-titrated; the patient was able to significantly reduce and eventually completely stop the use of on demand IV morphine once the target daily dose of buprenorphine was reached.

**Conclusions**: Our case suggests that concurrent use of buprenorphine and opioid analgesics for acute pain management is feasible and that buprenorphine can be used to transition patients off opioid full agonists. This application is particularly valuable in patients with complex gastrointestinal conditions who are unable to use oral pain medications.

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## Abstract no.: 962

### LONG-TERM OPIOID THERAPY AND SIGNS OF OPIOID USE DISORDER IN A CHRONIC NON-CANCER PAIN POPULATION AT A TERTIARY PAIN CLINIC IN SWEDEN, A CROSS-SECTIONAL STUDY

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**Background and aims**: **Background:**

Long-term opioid therapy (LTOT) for chronic non-cancer pain is common despite questionable evidence regarding efficacy and safety. The global use of opioids has increased substantially over the last decades and so has opioid use disorder (OUD). There are limited studies investigating OUD in a Swedish chronic pain population with LTOT (>3 months).

**Aims:**

The aim of this study was to investigate the use of LTOT and signs of OUD in patients with chronic non-cancer pain, assessed at a tertiary pain clinic in Sweden. Furthermore, to study demographic data and self-reports regarding pain and physical- and mental health in relation to LTOT and OUD.

**Methods**: The population was patients assessed at a tertiary pain clinic in Sweden 2018- 2020. Data from a 360-day period prior to consultation were extracted from the Swedish Quality Registry for Pain Rehabilitation (SQRP) and Swedish Prescribed Drug Register (SPDR). Additionally, information on opioid therapy and OUD were collected, in a subset, through a questionnaire by physician at the time of assessment.

**Results**: A total of 1604 patients were included in the analysis out of which LTOT were found in n=366 patients (23 %) . In a subset of 288 patients with LTOT, n=44 patients (15%) were classified as showing signs of OUD.

OUD was associated with higher doses of opioids and longer duration of therapy.

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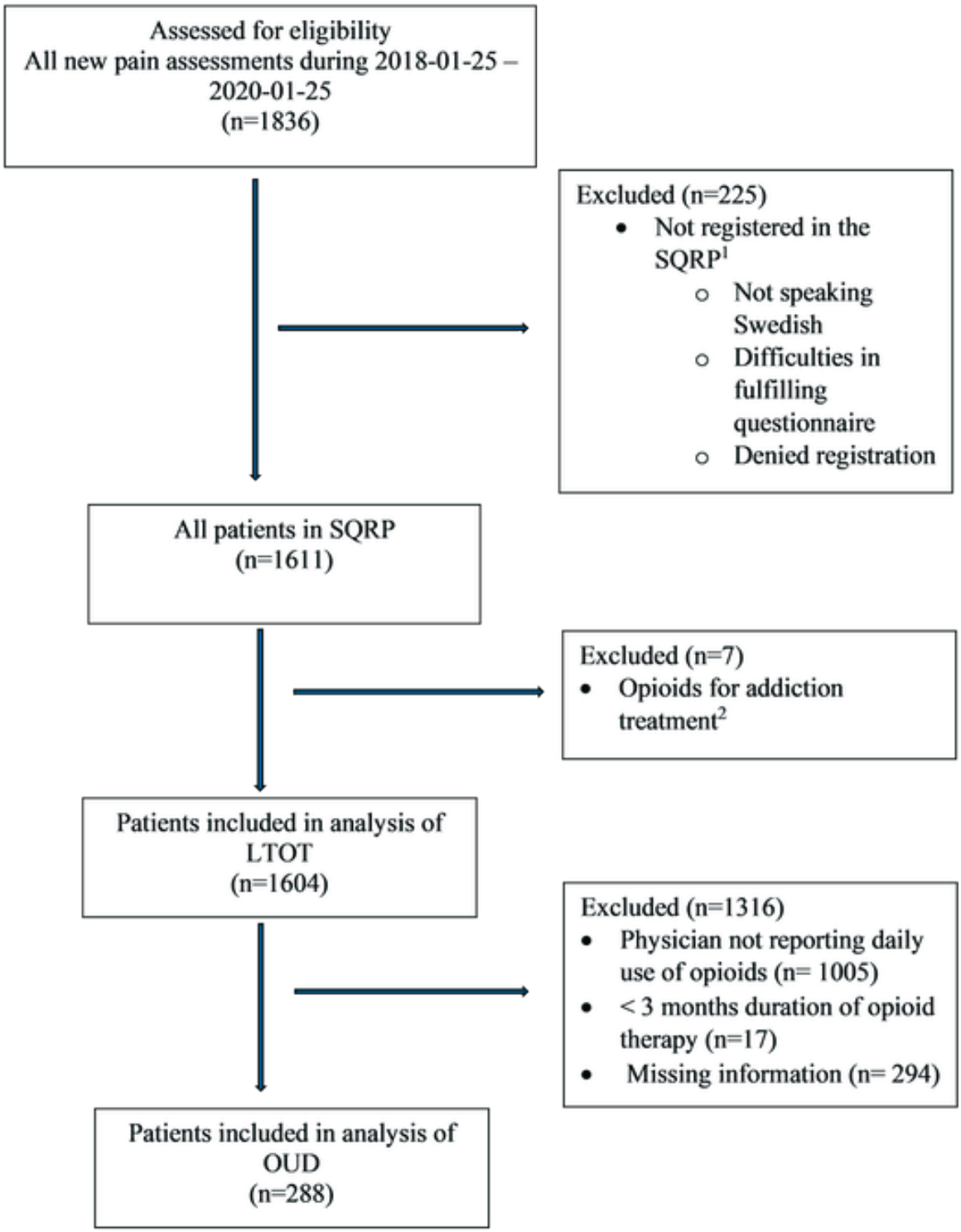
**Figure 1.** Participants with chronic non-cancer pain assessed for eligibility at a tertiary pain clinic in Sweden 2018-2020.




[1] SQRP= Swedish Quality Registry for Pain Rehabilitation.
[2] Buprenorphine and Methadone reported by physician at time for pain assessment.

**Table 1.** Background variables in a chronic non-cancer pain assessed in a tertiary pain clinic in relation to long-term opioid exposure (LTOT). Data based on based on Swedish drug register of the National board of Health and Welfare together with patients' self-report and physician´s assessment in Swedish Quality Registry for Pain Rehabilitation.

| **Background variables** | | **All patients** (n= 1604) | **No LTOT** (n=1238) | **LTOT** (n=366) |
|---|---|---|---|---|
| **Sex,** n (%) | *Female* | 1184 (73,8) | 946 (76) | 238 (65) |
| **Age,** mean (SD) | | 45 (12) | 44 (12) | 47 (12) |
| **BMI** mean (SD) | | 27 (6) | 27 (6) | 27 (6) |
| **Referral unit,** n (%) | *Primary care*<br>*Specialist care*<br>*Other* | 1209 (75)<br>264 (16)<br>129 (8) | 966 (78)<br>190 (15)<br>82 (7) | 243 (66)<br>74 (20)<br>47 (13) |
| **Country of birth,** n (%) | *Sweden*<br>*Scandinavia*<br>*Europe*<br>*Other* | 1161 (72)<br>29 (2)<br>165 (10)<br>244 (15) | 872 (70)<br>24 (2)<br>137 (11)<br>202 (16) | 289 (79)<br>5 (1)<br>28 (8)<br>42 (12) |
| **Level of education,** n (%) | *Less than university*<br>*University* | 1031(64)<br>497 (31) | 779 (63)<br>399 (32) | 252 (69)<br>98 (27) |
| **Seeking health care last year,** n (%) | *0-1 times*<br>*2-3 times*<br>*>4 times* | 115 (7)<br>367 (23)<br>1092 (68) | 93 (8)<br>304 (25)<br>819 (66) | 22 (6)<br>63 (17)<br>273 (75) |
| **Diagnose at time of assessment,** n (%) | Abdominal pain<br>Headache<br>Musculoskeletal<br>Neuropathic<br>Other<br>Post-traumatic<br>Widespread pain and Fibromyalgia | 35 (2)<br>18 (1)<br>514 (32)<br>43 (3)<br>31 (2)<br>21 (1)<br>940 (59) | 14 (1)<br>15 (1)<br>381 (31)<br>28 (2)<br>24 (2)<br>16 (1)<br>758 (61) | 21 (6)<br>3 (1)<br>133 (36)<br>15 (4)<br>7 (2)<br>5 (1)<br>182 (50) |
| **Psychiatric co-morbidity,** n (%) | Yes/no | 359 (22) | 268 (22) | 91 (25) |
| **Days with chronic pain,** median (IQR) | | 1498 (609-3288) | 1432 (594-3101) | 1669 (687-3697) |
| **NPRS**[1], median (IQR) | | 7 (6-8) | 7 (6-8) | 8(7-9) |
| **HADS**[2], median (IQR) | *Anxiety*<br>*Depression* | 10 (6-14)<br>10 (7-13) | 10 (6-14)<br>9 (6-13) | 11 (6-14)<br>11 (7-14) |
| **CPAQ-8**[3], median (IQR) | | 18 (12-23) | 19 (13-24) | 15 (9-20) |
| **TSK**[4], median (IQR) | | 41 (35-48) | 41 (35-48) | 42 (35-49) |
| **EQ-5D**[5]**, index,** median (IQR) | | 0.088 (-0.016-0.52) | 0.099 (-0.16-0.62) | 0.055 (-0.077-0.57) |
| **PCS**[6], median (IQR) | | 31 (22-39) | 30 (22-39) | 32 (23-40) |
| **RAND-36, physical function,** median (IQR) | | 45 (25-65) | 45 (30-65) | 37 (20-55) |
| **ISI**[7], median (IQR) | | 18 (13-23) | 18 (12-23) | 19 (14-23) |
| **Referred to multimodal pain rehabilitation program,** n (%) | | 356 (22) | 305 (24) | 51 (14) |

[1] NPRS = Numeric Pain Rating Scale
[2] HADS = Hospital Anxiety and Depression Scale
[3] CPAQ-8 = Chronic Pain Acceptance Questionnaire
[4] TSK = Tampa-scale for kinesophobia
[5] EQ-5D = European Quality of Life Instrument
[6] PCS = Pain Catastrophizing Scale
[7] ISI = Insomnia Severity Index

**Missing values**: BMI = 160, Referral unit n=2, Level of education n=76, Seeking health care last year n=30, Diagnose n=2, Days with chronic pain n=389, NPRS n=25, Number of pain sites n=7, HADS anxiety n=10, HADS depression n=8, CPAQ8 n=166, TSK n=113, EQ5D-index n=111, PCS n=49, RAND-36, physical function n=25, ISI n= 133, Referred to multimodal pain rehabilitation program n=1

**Table 2.** Signs of opioid use disorder (OUD) for prescribed opioid use according to DSM-V reported by a physician in a subset of patients with LTOT in routine care and clinical trial with tapering from opioids.

| | | **All on Daily opioids** (n=288) | **No signs of OUD reported** (n=208) | **Signs of OUD reported** (n=44) | p-value |
|---|---|---|---|---|---|
| Duration of opioid treatment expressed in months (n=276), n (%) | *4-11* | 60 (21) | 60 (29) | - | - |
| | *12-23* | 54 (19) | 37 (18) | 6 (14) | 0.506 |
| | *24-59* | 78 (27) | 58 (28) | 12 (27) | 0.934 |
| | *60-119* | 33 (12) | 24 (12) | 4 (9) | 0.436[3] |
| | *≥120* | 51 (18) | 26 (13) | 22 (50) | **0.000** |
| Category of opioid dose in milligram morphine equivalent daily dose(n=283), n (%) | *>0<20* | 110 (38) | 91 (44) | 2 (5) | **0.000** |
| | *≥20<50* | 100 (35) | 77 (37) | 13 (30) | 0.347 |
| | *≥50<90* | 24 (8) | 16 (8) | 7 (16) | 0.082[3] |
| | *≥90* | 49 (17) | 23 (11) | 22 (50) | **0.000** |
| Opioid dose in milligram morphine equivalent daily dose (n=283), median (IQR) | | 52 (81) | 20 (12-45) | 85 (30-162) | **0.000**[2] |
| Assessment[1] in clinical trial and offered support for tapering of opioid(n=288), n (%) | | 66 (23) | 29 (14) | 37 (84) | **0.000** |

Signs of OUD defined with three criteria: 1) continuous use >one year, 2) prescription of opioids has exceeded intended duration or exceeded to higher doses than intended and 3) failed attempts to cut-down doses or control consumption.
Chi-2 test performed for differences in distribution or else noted with footnote.
[1] Patients recruited after referral to the unit or after pain assessment. Physician or patient calling for tapering of opioids. Assessment included one hour consultation regarding opioid use in relation to chronic pain and aberrant behaviours according to DSM-V in relation to opioid use including drug-screening.
[2] Distribution highly skewed and therefore presented as median and intra quartile range (IQR) and Mann Whitney U-test.
[3] Fisher's exact test due to small sample.

**Conclusions**: Our study demonstrates that LTOT, and signs of OUD, are common in patients seeking tertiary care in Sweden and might be linked to higher opioid doses and longer duration of therapy.

## Abstract no.: 1000

### ANALGESIC AND ANTIPRURITIC EFFECT OF SALICORNIA EXTRACT-INFUSED CREAM ON HEALTHY PARTICIPANTS

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**Background and aims**: Halophyte plants acclimated for growth in saline soils such as along coastal areas and marshes. Within the halophytes, Salicornia species have been for long time used as both food and medicine due to their high levels of bioactive compounds with supposed anti-inflammatory and antioxidative effects. However, the properties of Salicornia bioactive extracts on pain and itch remain still to be investigated.

**Methods**: In this study, 30 healthy volunteers were randomized to treatments with 10% *Salicornia*-based cream or placebo cream for 24 or 48 hours. On day 0, and 24 or 48 hours post cream application quantitative sensory tests were assessed. The test included cold/heat detection and pain thresholds, mechanical pain thresholds and sensitivity, trans-epidermal water loss, histamine and cowhage evoked itch, and micro-vascular reactivity (neurogenic inflammation), to evaluate the analgesic, anti-pruritogenic and vasomotor effects of *Salicornia* cream.

**Results**: Skin permeability was reduced in the *Salicornia* treated area for 48-hours compared to 24-hours application (p-value <0.05). After 48-hours of application a decrease in mechanical evoked itch (hyperkinesis) (p-value <0.05) and increased warm detection and heat pain thresholds (p-value <0.05) were found compared to 24 hours treatment. Histamine induced neurogenic inflammation showed a significant reduction in the 48-hour creams treated areas compared to 24-hour (p-value <0.05).

**Conclusions**: The results of this study indicate an overall inhibitory effect of *Salicornia* cream on hyperkinesis (mechanical evoked itch), analgesic effect on warmth and heat sensations, and modulation of the skin barrier architecture. Further studies are needed for the assessment of the long-term effects.

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## Abstract no.: 1007

### A QUALITATIVE STUDY TO ASSESS DRUG-RELATED PROBLEMS ORTHOPAEDIC PATIENTS EXPERIENCE DURING SIX WEEKS POST DISCHARGE

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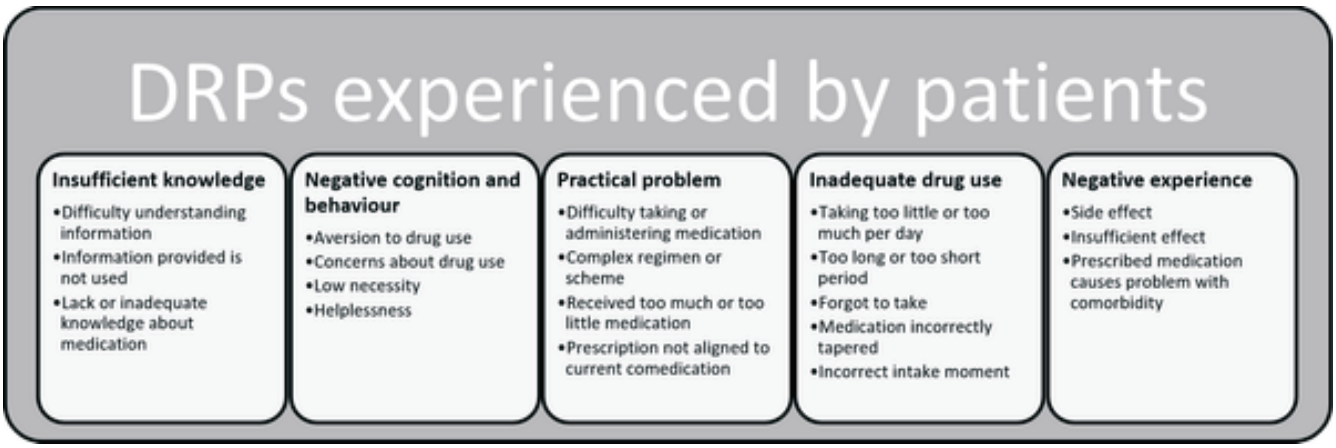
**Background and aims**: Drug therapy is important to enhance recovery and prevent complications (e.g. development of chronic pain, periprosthetic joint infections, thrombosis) after orthopaedic surgery. However, effective and safe medication use by patients can be hampered by drug-related problems (DRPs). In-depth studies investigating DRPs in patients after surgery are limited. This study aims to describe categories of DRPs orthopaedic patients experience during six weeks post discharge and how these change over time.

**Methods**: This qualitative study was conducted among orthopaedic patients (>18 years) after discharge from the Sint Maartenskliniek Nijmegen in the Netherlands. Purposive sampling was used to enrich data variation. Patients were enrolled until data saturation occurred. DRPs were assessed by semi-structured interviews one week and six weeks post discharge. Interviews were analysed using a thematic content analysis.

**Results**: Fifteen patients participated (mean [SD] 67.9 [9.8] years, 53.3% female); of which 14 experienced at least one DRP. Five categories of DPRs were identified and described in the figure.



Many patients had an aversion to opioid analgesics and were reluctant or refused to take them. Almost all patients experienced side effects, especially antibiotic use was experienced as very burdensome. By week six, patients were more concerned about their medication use and its potentially negative effects on their body.

**Conclusions**: Almost all patients experienced one or more DRPs. Aversion to opioid analgesics and severe side effects of antibiotics were evident problems. Concerns about medication use increased over time. The findings in this study provide good starting points to support patients with their medication use after orthopaedic surgery.

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## Abstract no.: 1132

### LONG-TERM POSTOPERATIVE OPIOID USE IN ORTHOPAEDIC PATIENTS

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**Background and aims**: Short-term use of opioids is highly effective for treating acute postoperative pain; however, it can unintentionally progress to long-term use. Growing awareness of the adverse effects and tolerance to analgesic effects associated with long-term opioid use has resulted in a more restrictive prescribing policy. Yet, the number of patients with persistent opioid use after orthopaedic surgery is currently unknown. This study aims to assess the incidence of long-term opioid use after orthopaedic surgery.

**Methods**: This qualitative prospective study was conducted among patients (>18 years) who underwent any type of orthopaedic surgery (excluding those without anesthesiologic involvement) in June or July 2021 in the Sint Maartenskliniek, the Netherlands. Six months after surgery patients were invited to complete an online survey on current analgesic use, including opioids, and a pain score (0-10) in the operated area. If opioid use was reported, patients were asked whether they wanted to taper or stop and whether professional help was desirable.

**Results**: These are preliminary data. A total of 889 patients were invited of which 415 (mean [SD] 60.7 [13.4] years, 63.4% female) completed the survey. Forty-eight patients (11.6%) used opioids of which 41 (85.4%) wanted to taper or stop and 24 patients preferred professional guidance. The median daily dose morphine equivalents was 30mg (IQR = 70).

**Conclusions**: Almost 12% of the patients continued opioid use six months after orthopaedic surgery; the majority wanted to stop and requested professional help with this. Healthcare professionals should pay attention to long-term postoperative opioid use and discuss tapering options with the patient.

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## Abstract no.: 1149

### PAIN THERAPY IN PATIENTS WITH MYASTHENIA GRAVIS

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**Background and aims**: Neuromuscular disorders, in particular myasthenia gravis (MG) make it difficult to prescribe pain therapy and correction of pain associated with any causes. However, these patients have back pain, dental interventions, injuries and operations occur. Irrational therapy may exacerbate MG, leading to an urgent condition. Our common aim is to form a drug and non-drug strategy for pain treatment, taking into account the effect on neuromuscular transmission.

**Methods**: A review of the literature data on the effect of medications on neuromuscular transmission is carried out.

**Results**: Anticonvulsants, benzodiazepines used for any purpose, neuromuscular blocking agents used in the perioperative period - definitely complicate neuromuscular transmission. Esters as local anesthetics should not be chosen.

**Conclusions**: General practitioners, dentists, anaesthesiologists should be wary and avoid the use of provocative drugs in patients with MG.

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### Abstract no.: 1152

## TITRATING OPIOIDS IN CHRONIC PAIN PATIENTS - A NURSE-LED TELEPHONE FOLLOW-UP INTERVENTION

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**Background and aims**: Opioids in chronic non-cancer pain are debated but remain a part of the pain treatment for selected patients. Research is scarce on the relieving and adverse effects of opioids, and how to deliver opioid treatment, in this patient group. This study's purpose was to evaluate a nurse-led telephone follow-up program for titrating or tapering opioids, including a pilot study of the intervention outcomes.

**Methods**: A process evaluation and feasibility assessment of the intervention was performed in accordance to the UK Medical Research Council (MRC) framework for evaluating complex interventions. We used a retrospective, descriptive, and longitudinal approach, and analyzed 32 reports from patients who titrated or tapered opioids.Information on demography, sleep satisfaction, health status, pain intensity/bothersomeness, opioid doses, and side effects was derived from the Oslo Pain Registry. Descriptive statistics, t-tests, and chi-square tests were used to analyze registry data.

**Results**: The process evaluation shows that the intervention is feasible, effective, and user-centered. Statistical tests showed no between groups differences for demographical-, clinical-, and pain characteristics, except those who tapered opioids were significantly younger than patients titrating opioids ($p$=0.010). All patients reported poor health and adverse side effects at baseline. Titrating opioids was associated with significant increase in adverse effects ($p$=0.038) and considerably lower pain intensity at rest ($p$=0.081). Those who tapered opioids had a significant reduction in opioid use ($p$=0.004).

**Conclusions**: Nurse-led telephone follow-up of patients titrating or tapering opioids appears to be a safe and effective intervention that leads patients to achieve treatment goals.

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# Physical/occupational therapies

### Abstract no.: 422

## HIT THE PAIN AWAY: ACUTE EFFECTS OF HIGH INTENSITY TRAINING ON PAIN PROCESSING AND INFLAMMATION IN CHRONIC LOW BACK PAIN

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**Background and aims**: High intensity training improves pain in chronic low back pain (CLBP)[1] but underlying mechanisms for this effect are unknown. Exercise induced hypoalgesia (EIH) has been associated with long-term exercise programs[1] and it might be influenced by psychological factors and inflammation[2,3]. This exploratory study aims to 1) evaluate differences in EIH after either high intensity interval training (HIIT) or moderate intensity continuous training (MICT), and 2) investigate effects of psychological factors and inflammatory biomarkers on EIH, in CLBP.

**Methods**: Twenty persons with CLBP will participate in a cross-sectional assessment of two cardiorespiratory exercise protocols (i.e. HIIT and MICT) with a randomized cross-over design (Figure 1). EIH is assessed using cuff algometry pain detection thresholds (cPDTs) before (PRE) and directly after (POST) exercise. Questionnaires related to depression-anxiety-stress, fear-avoidance behaviour, and sleep quality are inventoried and venous blood samples are taken.

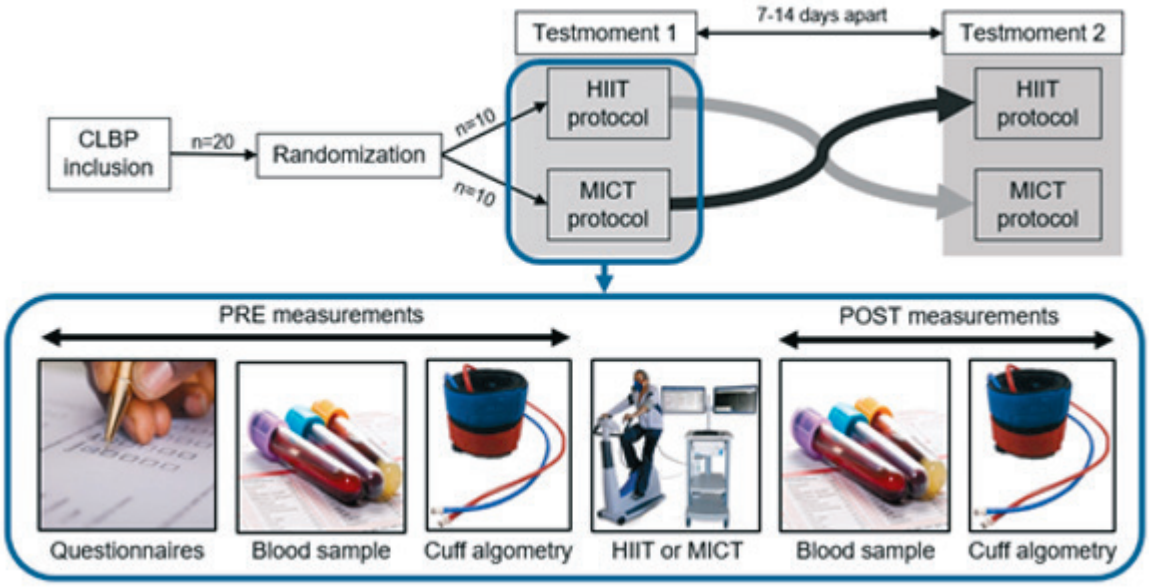


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Figure 1: Protocol methodology

**Results**: This study is ongoing. Currently, 10 persons (6 females, age=45.0y) have been evaluated. cPDTs did not increase after the protocols, which indicates EIH impairment. POST cPDTs were not different between the protocols. Moderate correlations were found between cPDTs and patient reported outcomes, However, these were all non-significant. Inflammatory markers have not been evaluated yet.

**Conclusions**: This preliminary sample reports impaired EIH in patients with CLBP. Higher power is needed to correctly evaluate if psychological factors are associated with (impaired) EIH response. Additional participants and analyses of correlations between PRE-POST cPDTs and psychological factors and inflammation are planned.

## Abstract no.: 494

### EFFECT AND MODERATORS OF PAIN NEUROSCIENCE EDUCATION AFTER SURGERY FOR BREAST CANCER: A DOUBLE-BLINDED RANDOMIZED CONTROLLED TRIAL (EDUCAN TRIAL)

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**Background and aims**: Educational interventions may optimize current physiotherapy modalities to prevent or improve pain after breast cancer surgery. Pain neuroscience education (PNE) explains pain not only from a biomedical perspective, but also the psychological and social factors that contribute to it. This double-blinded randomized controlled trial investigated if PNE, in addition to the best evidence physiotherapy modalities after breast cancer surgery, was more effective on pain-related, physical and psychosocial functioning, than providing biomedical pain education.

**Methods**: Three educational sessions were given in addition to a four-month physiotherapy program starting immediately postoperative. The content of the educational interventions differed between the intervention (PNE, n=92) and control group (biomedical pain education, n=92). Additional educational and physiotherapy sessions were provided at six, eight and twelve months postoperatively. The primary outcome was the change in pain-related disability (Pain Disability Index) after twelve months. Secondary outcomes were pain intensity, upper limb function, physical activity level, psychological and social functioning. All outcomes were evaluated pre-and postoperatively, and at six, eight, twelve and eighteen months. Pre- and postoperative moderators of the change in pain-related disability were also explored.

**Results**: Change in pain-related disability from baseline to twelve months postoperatively did not differ between groups (p=0.525). Secondary outcomes yielded similar results.

**Conclusions**: Adding six sessions of PNE to physiotherapy after breast cancer surgery did not result in a better course of functioning up to eighteen months postoperatively as compared to biomedical pain education. Future research should determine when and to whom PNE should be given after breast cancer surgery to maximize its effectiveness.

## Abstract no.: 552

### PSYCHOMETRIC TESTING OF THE MINI-BALANCE EVALUATION TEST (MINI-BESTEST) IN INDIVIDUALS WITH CHRONIC PAIN

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**Background and aims**: Chronic pain is associated with impaired balance and incorporation of balance assessment in pain rehabilitation has been advocated. However, a precondition for this is psychometric sound clinical balance measurements. In this study we evaluated the psychometric properties for the balance assessment scale Mini-BESTest.

**Methods**: Two hundred participants with chronic pain (>90 days) were consecutively recruited among individuals referred to the Multidisciplinary Pain Center at Uppsala University hospital, Sweden. For structural validity of the Mini-BESTest a confirmatory factor analysis (CFA) was performed. Convergent validity was evaluated using Spearman's correlation coefficient. Floor and ceiling effects were interpreted as present if the proportion of participants with the highest or lowest score were 15 % or more. Internal consistency was evaluated using Cronbach's alpha. The study was following the COnsensus-based Standards for the selection of health Measurement INstruments (COSMIN).

**Results**: Data analysis is ongoing. Preliminary results support the original one-factor model reflecting dynamic balance.

**Conclusions**: Preliminary results support the use of the Mini-BESTest to assess dynamic balance in a chronic pain population.

## Abstract no.: 621

### IMPLEMENTATION OF A STRESS MANAGEMENT PROGRAM IN CHRONIC PAIN PATIENTS (PRELIMINARY RESULTS)

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**Background and aims**: Chronic pain is a multi-factor disease that requires a multidisciplinary therapy. Stress is directly connected to pain and so, by reducing stress we can improve pain and quality of life. We can measure stress hormones in chronic pain patients. By reducing stress we can reduce pain. Yoga is an evidence based stress management method. The purpose of the study is to examine whether yoga can reduce stress and pain.

**Methods**: Twenty five chronic pain patients were included in the study. Saliva and hair cortisol were measured before and after the program. Three patients dropped out of the program. Two more patients could not be conducted due to covid restrictions. All patients completed questionnaires (PSQI, PSS, HLPCQ, NRS, VAS) before and after the program. The program lasted two months. Participants were separated in groups of five. The program consisted of 8 weekly sessions that lasted approximately 60 minutes.

**Results**: All patients' self-identified themselves as "less stressed" according to all questionnaires. After the program, eighty percent of the patients shown a statistically significant change on both salivary and hair cortisol measurements. All of the patients noticed that pain was reduced at, at least, thirty five percent compared to their original answer.

**Conclusions**: Stress management program based on Yoga principles has shown to be beneficial for chronic pain patients. Stress is reduced and patients describe less VAS pain. It is important that we have a multi disciplinary team in pain clinics.

## Abstract no.: 857

### AN EARLY COGNITIVE BEHAVIOURAL INTERVENTION POST BACK SURGERY: A RANDOMIZED CONTROLLED TRIAL

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**Background and aims**: Patients with chronic low back pain (CLBP) undergoing lumbar spinal fusion (LSF) are physically inactive and thereby at risk of poor health. Barriers to being physically active need to be acknowledged in post-surgical rehabilitation. The primary objective of this randomized controlled trial (RCT) was to examine the effect of an early intervention consisting of graded activity and pain education (GAPE) on sedentary behaviour in patients undergoing LSF. The secondary objectives was to examine the effect of GAPE on, respectively, disability, pain, fear of movement, self-efficacy for exercise and health-related quality of life.

**Methods**: Design: Parallel-group, observer blinded RCT with a primary endpoint three months after surgery.

Participants: 144 participants going through an LSF for CLBP at Rigshospitalet, Denmark.

Intervention: All participants received usual care consisting of a pre-surgery back seminar and post-surgery consultations with nurses. The intervention group further received 9 sessions of GAPE based on the principles of operant conditioning.

**Results**: After three months, there was no group difference in the change in time spent in sedentary behaviour (MD: 19.7 minutes/day (95%CI -7.1 to 46.4)). Both groups improved in the secondary outcomes, but only a statistically significant difference between groups in favour of GAPE in HRQoL assessed by visual analogue scale of the EQ-5D (MD -11.7 mm (95%CI -19.9 to -3.50)).

**Conclusions**: Compared to usual care GAPE had no effect on sedentary behaviour, disability, pain level, kinesiophobia and self-efficacy three months after LSF. The behavioural intervention was however safe to perform and may have a potential effect on HRQoL.

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## Abstract no.: 928

### PAIN INHIBITION BY C-TACTILE TARGETED TOUCH

A.M. Maallo[1], F. McGlone[2], F. Bariguian Revel[3], M. Savallampi[1], H. Olausson[1], R. Böhme[1]

*[1]Linköping University, Linköping, Sweden, [2]Liverpool John Moores University, Liverpool, United Kingdom, [3]GlaxoSmithKline, Nyon, Switzerland*

**Background and aims**: Unmyelinated low-threshold mechanoreceptors (C-tactile, CT) in the human skin are important for signalling hedonic aspects of touch. We have previously demonstrated that CT-targeted brush stroking reduces experimental pain. To improve the ecological validity of the tactile stimulation we have developed a set of standardized human-human touch gestures for signalling attention and calming.

**Methods**: Here, we used two types of gestures applied to the forearm; attention (tapping of the skin, ineffective in activating CT-afferents) and calming (slow stroking of the skin, effective in activating CT-afferents). For pain we used an MR compatible device for individually calibrated high-precision mechanical stimulation of the thenar region. In a 2 x 2 fMRI design (n = 20 healthy participants) touch (stroking or tapping) was applied for 30 s followed by pain (low or high) for 5 s. In total 24 touch and pain stimuli were applied for each subject. Pain was assessed on a visual analogue scale (no pain, high pain) following each stimulation.

**Results**: When the stroking gesture preceded pain, it was rated as less intense; an evaluation that involved the insular cortex. When the tapping gesture preceded the pain, it was rated as more intense; an evaluation that did not involve the insular cortex. Thus, stroking touch reduced the perceived pain intensity and directed pain evaluation to the insular cortex.

**Conclusions**: We propose that human-human gentle skin stroking induces a pain-resilient emotional state through mechanisms that involve CT-afferents and the insular cortex.

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## Abstract no.: 980

### THE EFFECTS OF JOINT AND NERVE MOBILISATION ON NEUROIMMUNE RESPONSES IN ANIMALS AND HUMANS WITH NEUROMUSCULOSKELETAL CONDITIONS: A SYSTEMATIC REVIEW AND META-ANALYSIS

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**Background and aims**: Several animal and human studies revealed that joint and nerve mobilisations positively influence neuroimmune responses in neuromusculoskeletal conditions. However, no systematic review and meta-analysis has been performed. Therefore, this study aimed to synthesize the effects of joint and nerve mobilisation compared with sham or no intervention on neuroimmune responses in animals and humans with neuromusculoskeletal conditions.

**Methods**: Four electronic databases were searched for controlled trials. Two reviewers independently selected studies, extracted data, assessed the risk of bias, and graded the certainty of the evidence. Where possible, meta-analyses using random effects models were used to pool the results.

**Results**: Preliminary evidence from 13 animal studies report neuroimmune responses after joint and nerve mobilisations. In neuropathic pain models, meta-analysis revealed decreased spinal cord levels of glial fibrillary acidic protein, dorsal root ganglion levels of interleukin-1b, number of dorsal root ganglion nonneuronal cells, and increased spinal cord interleukin-10 levels. The 5 included human studies showed mixed effects of spinal manipulation on salivary/ serum cortisol levels in people with spinal pain, and no significant effects on serum b-endorphin or interleukin-1b levels in people with spinal pain.

**Conclusions**: There is evidence that joint and nerve mobilisations positively influence various neuroimmune responses. However, as most findings are based on single studies, the certainty of the evidence is low to very low. Further studies are needed.

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## Abstract no.: 985

### FEASIBILITY AND ACCEPTABILITY OF SOMATOCOGNITIVE THERAPY IN THE TREATMENT OF WOMEN WITH PROVOKED VESTIBULODYNIA - PROLOVE FEASIBILITY STUDY

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**Background and aims**: **Background:** Provoked vestibulodynia (PVD) is a prevalent gynecological pain condition adversely affecting a woman's sexual life, relation to her partner and her psychological health. There is an urgent need for well-designed randomized clinical trials (RCTs) to identify the most effective PVD interventions.

**Aims:** Primary aim: To assess the feasibility of undertaking a full-scale RCT of somatocognitive therapy (SCT), a multimodal physiotherapy intervention, for women with PVD.

Secondary aim: To evaluate implementation and acceptability of SCT and its potential treatment effectiveness in PVD.

**Methods**: A multimethod study with a single arm before-after trial and qualitative interviews. Ten women with PVD, aged 18-33, were recruited from the Vulva Clinic, Oslo University Hospital. The intervention took place at Oslo Metropolitan University. Tampon tests and self-report questionnaires were undertaken at baseline, post-treatment and 8 months. The main feasibility outcomes were evaluation of recruitment rate, adherence to assessment tools and follow-up rate. Experiences with the tampon test and SCT were explored with semi-structured interviews.

**Results**: Ten out of 18 eligible patients were recruited, with none lost to follow-up. Adherence ranged from excellent (self-report questionnaires), good (tampon tests and reporting of treatments) to poor (14-day diary). No adverse events were reported. The tampon test was a suboptimal primary outcome. SCT was found to be an acceptable treatment.

**Conclusions**: The findings suggest that it is feasible to deliver a full-scale RCT of SCT for women with PVD. Some changes are suggested, such as increasing recruitment sites, change of primary outcome measure and adding a booster session.

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## Abstract no.: 1082

### DRY NEEDLING IMPROVES ALLODYNIA IN A MODEL OF NEUROPATHY INDUCED BY PACLITAXEL VIA CNS PATHWAY

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**Background and aims**: We aim to evaluate the effectiveness of Dry Needling (DN) in the management of neuropathy produced by paclitaxel administration in an animal model and study which could be the physiologic effect behind this technique.

**Methods**: Adult male and female Wistar rats aged 2 months were used. Neuropathy was developed by administration of paclitaxel for 4 days on alternate days (2mg/kg/day).Once neuropathy was established, treatment was carried out daily from day 15 to day 29. For the application of the treatments, the animals were anaesthetised via inhalation with isoflurane (5mL/L). The stainless steel needle was inserted into the biceps femoris of the rat with 15 repeated insertions, partially removing the needle and inserting it continuously. For the placebo control, the same procedure was performed through the skin, but without reaching the muscle. Allodynia measurements were performed every 3 days and were carried out before and one hour after the intervention.

**Results**: In male rats, we observed significant improvement in the allodynia in both hind feet since the first intervention (Ipsi: 9.015g±1.968 p=0.001) (Contralateral: 5.889g±1.611 p=0.0044). When female rats were evaluated, a significant improvement was observed in the ipsi hind paw (4.563g±1.569 p=0.0156), however we did not find significant differences in the contralateral hind paw (-0.3958g±0.4287 p=0.3776).

**Conclusions**: These results suggest that DN could produce an improvement in the allodynia induce by paclitaxel. The difference between male and female rats are in line with previous studies suggesting a possible activation of the diffuse noxious inhibitory system by the DN.

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## Abstract no.: 1084

### MOVILIZATION AND NEURODYNAMIA PRODUCE EQUIVALENT ANTIALLODYNIC EFFECTS IN A MODEL OF NEUROPATHY INDUCED BY PACLITAXEL

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**Background and aims**: We aim to evaluate whether neurodynamia is an effective treatment for the management of neuropathic pain secondary to paclitaxel (PTX) in an animal model and to study the pathways rendering its effectiveness.

**Methods**: Adult male Wistar rats aged 2 months were used. Neuropathy was developed by administration of PTX for 4 alternate days (2mg/kg/day). Once neuropathy was established, treatment was carried out daily from day 15 to day 29. For the application of the treatments, animals were anaesthetized via inhalation with isoflurane (5mL/L). The right knee joint was positioned in maximum extension and the hip joint was flexed between 70-80º. At this position, 5 sets of dorsiflexion/ plantar flexion were performed for approximately 20 swings per minute for 2 min with a 25 sec pulse between sets, rendering a stretch of the sciatic nerve. For the placebo control, the same procedure was performed without stressing the nerve. Allodynia measurements were performed every 3 days and were carried out before and one hour after the intervention.

**Results**: Neurodynamia seems to be a good approach in the acute treatment of neuropathic pain, effect that seems accumulative having an effect in the ipsi paw (Ipsi: 5.911g±1.357 p=0.0014) and in the contralateral paw (Contralateral: 3.899g±1.067 p=0.0044). Nevertheless, sham animals also seem to show improvement as the treatment goes by (Ipsi: 5.890g±1.245 p=0.0008) (Contralateral: 4.440g±1.398 p=0.0099).

**Conclusions**: These results suggest that the sole movement produces an improvement of the allodynia in an independent manner to whether the nerve is stretched or not.

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## Abstract no.: 1091

### PHYSIOTHERAPISTS USING THE BIOPSYCHOSOCIAL MODEL: BARRIERS AND FACILITATORS. A SCOPING REVIEW

H. van Dijk[1], S. Elbers[1], A. Köke[2], R. Smeets[2,3], H. Wittink[1]

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**Background and aims**: Despite the importance of a biopsychosocial approach in chronic pain, many physiotherapists still adhere to a biomedical framework. To facilitate the adoption of a biopsychosocial view, more insight into barriers and facilitators for using this approach is required. The aim for this study is to map these barriers and facilitators.

**Methods**: A scoping review was performed. Eligible studies present data on barriers and facilitators, chronic pain, primary care physiotherapy and a biopsychosocial perspective. Extracted data on barriers and facilitators was discussed and sub grouped in themes following a qualitative content analysis approach, using the Theoretical Domains Framework and a micro-meso-macro layout to organise and map the different themes.

**Results**: Twenty-three studies were included. Although analyses are ongoing preliminary results show that on a micro-level barriers and facilitators concern the therapist (knowledge, skills, attitudes, confidence, role clarity, patient perception, etc.), the patient (expectations, etc.) and the patient-therapist relationship. On a meso-level barriers relating to the environmental context (time, treatment-fee, etc.) were identified.

**Conclusions**: It appears that a level of saturation was reached, suggesting a complete picture of known barriers and facilitators. There is, however, a large variety in used terminology and unclarity of what a biopsychosocial model entails. The presented overview can be used to inform professionals, researchers and policy-makers when designing strategies for implementation.

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## Abstract no.: 1160

### THE OUTCOME TREATMENT OF PATIENT WITH NEUROPATHIC PAIN

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**Background and aims**: Peripheral neuropathy presents damage of peripheral nerve system, which can cause a variety of symptoms (such as neurophatic pain, muscle weakness, paresthesia etc.) Determining the outcome treatment of patient with neuropathic pain after electrophoresis benfotiamine compared to other physical procedures.

**Methods**: The study was conducted as a prospective study and included 56 patients. The experimental group consisted of 26 patients, 12 were females and 14 males (mean age 52.3 years). The control group consisted of 30 patients, 21 were females and 9 males (mean age 51.2 years). Data were obtained from medical records, using a questionnaire DN4, VAS and PainDETECT.

**Results**: Differences between all of the data obtained in patients who received benfotiamine electrophoresis were significant better. Compared to other physical procedures that were used in the control group, electrophoresis benfotiamine had a better effect in the tested areas, but this difference was not significant between all data.

**Conclusions**: There have been significant improvement in the patient after electrophoresis benfotiamine. Compared to the control group, the results show that there has been a faster and better recovery after treatment with benfotiamine.

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# Friday, 29 April 2022

## 11:30-12:15

# Cancer pain

### Abstract no.: 597

### PERIPHERAL NERVE RESIDENT MACROPHAGES AND SCHWANN CELL M-CSF AND TRPA1 SUSTAIN CANCER PAIN

F. De Logu[1]

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**Background and aims**: While macrophages (MΦs) have a central role in neuropathic pain, their contribution to cancer pain has not been established. Herein, we report that depletion of sciatic nerve resident MΦs (rMΦs) attenuates mechanical/cold hypersensitivity and spontaneous nociception (pain-like behaviors) in mice evoked by intraplantar injection of melanoma or lung carcinoma cells. MΦ-colony stimulating factor (M-CSF) was upregulated in sciatic nerve trunk and mediated cancer-evoked mechanical allodynia *via* rMΦ expansion, transient receptor potential ankyrin 1 (TRPA1) activation, and oxidative stress. Targeted deletion of *Trpa1* revealed a key role for Schwann cell TRPA1 in sciatic nerve rMΦ expansion and pain-like behaviors. Depletion of rMΦs in a medial portion of the sciatic nerve prevented pain-like behaviors. We identified a M-CSF-, rMΦ-, oxidative stress- and Schwann cell/TRPA1-dependent feed-forward pathway shared by two murine tumors that operates throughout the nerve trunk to signal cancer-evoked pain-like behaviors.

**Methods**: Cancer cell inoculation, Sciatic nerve explant culture, H2O2 assay, ELISA assays, Immunofluorescence, Real-Time PCR.

**Results**: We investigated the role of Schwann cell TRPA1 in the MΦ-dependent pain-like behaviors. Results obtained after B16-F10 melanoma cell inoculation revealed the role of Schwann cell TRPA1 to release M-CSF, which sustains rMΦ expansion, and to generate the oxidative stress that targets the neuronal TRPA1 to signal pain.

**Conclusions**: Although neuronal TRPA1 is the final target of the proalgesic signaling pathway, the feed-forward mechanism that encompasses M-CSF, rMΦs oxidative stress, and Schwann cell/TRPA1 is needed to chronically sustain mechanical/cold hypersensitivity and spontaneous nociception.

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# Pain in children

### Abstract no.: 360

### ADULTS CONSTRUCT THEIR REPRESENTATION OF PAIN IN BABIES CRIES WITH EXPERIENCE

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**Background and aims**: Understanding babies' signals is essential in pediatric care. Currently, clinical scales are mainly based on babies' behavior and facial expressions. Recent work suggests that crying also provides useful information, on the baby's identity and its pain, accessible to both parents and non-parents. However, how adults become familiar to one baby's cries remains unclear.

**Methods**: Twenty-two 3-month old babies (12 girls) were recorded during their bath (mild discomfort situation) and during routine vaccination (painful situation). One hundred fifty adults were recruited online: parents (P), non-parents (NP) with and without experience at caring for babies.

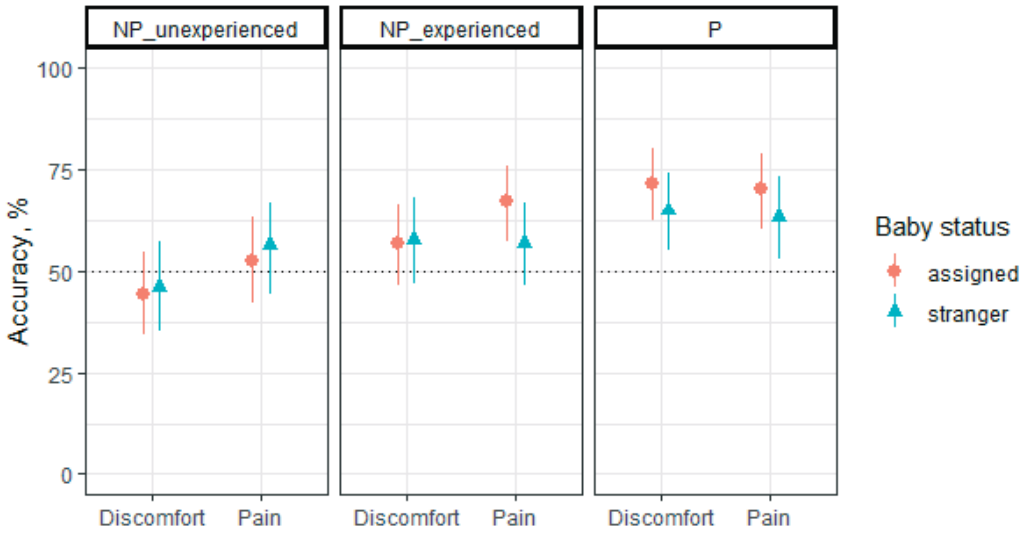
Each participant was assigned to one baby and were engaged in:

1) learning session: listening of bath cries from their 'assigned baby';

2) test session: listening of mild-discomfort and pain cries, 4 from their 'assigned baby' and 4 from a stranger one. Their task was to determine the cry emission context: mild-discomfort or pain.

We fitted a Bayesian linear model to success as a function of baby's status, cry emission context and participant's experience.

Figure1. Cry context recognition evolves with the listener's experience




**Results**: Non-parents with experience and parents were respectively 9.5% (P(δ>0)=99.7%) and 17.4% (P(δ>0)=100%) better than chance at recognizing the cry emission context, non-parents without experience were not (0.03% 95%CI[-6.9,6.6]). Pain cries were 7.0% more successfully recognized by non-parents, compared to mild-discomfort ones. There was no robust difference between familiar and stranger babies' cry recognition (2.9% [-3.0,8.7]).

**Conclusions**: Recognizing pain in babies' cries is not innate, and requires experience at caring for babies. To complete this picture, we are currently recruiting super-experienced non-parents.

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## Abstract no.: 512

## ARE HEALTH COMPLAINTS IN ADOLESCENCE ASSOCIATED WITH FUTURE PERSISTENT MUSCULOSKELETAL PAIN? PROSPECTIVE ANALYSES FROM THE POPULATION-BASED FIT FUTURES STUDY

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**Background and aims**: There is limited knowledge on risk factors for musculoskeletal pain in adolescents. The aim was to investigate whether specific health complaints and an accumulation of health complaints in first year of high-school, were associated with the incidence of persistent musculoskeletal pain 2 years later.

**Methods**: We used longitudinal data from 549 pain-free first-year high-school students in the Fit Futures Study in Norway. The outcome was persistent musculoskeletal pain two years after inclusion. Specific health complaints investigated (exposures) were asthma, allergic rhinitis, eczema, headache, abdominal pain and psychological distress. An accumulation of health complaints was expressed using a continuous variable and reflected the number of any health complaint at baseline. Logistic regression analyses, adjusted for sex and socioeconomic status, were conducted, providing odds ratios (ORs) with 95% confidence intervals (CIs).

**Results**: After two years, 13.8% reported persistent musculoskeletal pain. The odds of persistent musculoskeletal pain at two years increased with each additional health complaint at baseline (OR 1.32, 95% CI 1.05, 1.65). For specific health

complaints, abdominal pain increased the odds for persistent musculoskeletal pain (OR 2.45, 95% CI 1.37, 4.40), while asthma, allergic rhinitis, eczema, headache, and psychological distress were not statistically significantly associated with persistent musculoskeletal pain.

**Conclusions**: Abdominal pain and an accumulation of health complaints the first year of high-school were associated with the incidence of persistent musculoskeletal pain 2 years later. Health care providers consulting adolescents need to take preventive actions in those with abdominal pain and multiple health complaints to avoid development of persistent pain conditions.

# Pain in general

## Abstract no.: 478

### EVIDENCE FOR DECREASED THRESHOLD AND INCREASED TEMPORAL SUMMATION OF THE NOCICEPTIVE FLEXION REFLEX IN PATIENTS WITH CHRONIC MUSCULOSKELETAL PAIN: A SYSTEMATIC REVIEW AND META-ANALYSIS

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**Background and aims**: The nociceptive flexion reflex (NFR) is a spinal withdrawal reflex induced by painful stimulation and can be experimentally elicited and assessed. It is an objective measure of spinal hyperexcitability, a key measure of central sensitization. Central sensitization contributes to nociplastic pain, a feature of chronic musculoskeletal pain (MSKP). Yet, a quantitative synthesis of the current evidence for the presence of impaired pain modulation objectified by alterations in the NFR in chronic MSKP patients is lacking.

**Methods**: This systematic review and meta-analysis was performed following the PRISMA guidelines. Studies examining NFR threshold and temporal summation of NFR threshold in chronic MSKP patients compared to healthy controls were identified by searching four electronic databases. (Standard) mean differences ((S)MD) and 95% confidence intervals (95%CI) were calculated using a random-effects model for each outcome. Quality of evidence was assessed following the GRADE method.

**Results**: Seventeen studies were included in the systematic review and fifteen in the meta-analysis. Low quality evidence demonstrated a small SMD (-2.02 [-2.89,-1.14]) indicating lower NFR threshold values in MSKP patients (n=814) compared to controls (n=1209). Very low quality evidence demonstrated a small MD (2.52 [-3.60,-1.44]) indicating facilitated temporal summation of NFR threshold in patients (n=149) compared to controls (n=679).

**Conclusions**: Heightened spinal excitability as evidenced by lowered NFR threshold values and temporal summation of the NFR, is present in patients with chronic MSKP. Future research is needed to address the gap in research on temporal summation of NFR threshold and to address the poor methodological quality in the current body of NFR research.

## Abstract no.: 553

### ELECTROPHYSIOLOGICAL RESPONSES TO PAIN-RELATED VISUAL STIMULI BETWEEN FIBROMYALGIA AND CHRONIC LOW BACK PAIN WOMEN

T. Paolucci[1], C. Lai[2], C. Ciacchella[2], G.R. Pellicano[2], D. Altavilla[3], D. Sambucini[2], P. Aceto[4], Manuela Di Franco, Maria Laura Sorgi, Raoul Saggini

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**Background and aims**: Fibromyalgia is a chronic pain syndrome which occurs in the absence of an organic damage, whom causes is still unclear.

Aims of this pilot study were to investigate the neural correlates of fibromyalgia in response to pain-related visual stimuli and explore the psychological differences among fibromyalgia, chronic low back pain (CLBP) and healthy conditions.

**Methods**: After a clinical assessment, electrophysiological responses to pain-related visual stimuli were recorded using a 256- Hydrocel Geodesic-Sensor-Net. Event-related potentials (ERPs), standardised low-resolution electromagnetic tomography (sLORETA), and psychological (Symptom Checklist-90-Revised) data were analysed for a total sample of 23 women (5 healthy volunteers, 12 fibromyalgia patients, 6 CLBP patients).

**Results**: The main finding was that fibromyalgia women reported a different brain response to pain-related visual stimuli on the frontal montage compared to women with CLBP (p=.028). Moreover, fibromyalgia women showed an increased activity mainly on the hippocampus (p=.003) and the posterior cingulate cortex (p≤.001) in response to algic stimuli compared to not algic ones. Lastly, these women presented higher scores on the somatization (p=.002), obsession-compulsion (p=.045), depression (p=.043) and positive symptom distress (p=.023) dimensions compared to the healthy women.

**Conclusions**: These preliminary results suggest that although the painful symptoms are similar, the central elaboration of pain could be different between women with fibromyalgia and those with CLBP. Moreover, these findings provide preliminary evidences about the great alert and the central sensitivity to pain-related information regarding fibromyalgia patients.

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## Abstract no.: 567

### IDENTIFICATION AND CHARACTERISATION OF TRAJECTORIES OF SICKNESS ABSENCE AND DISABILITY PENSION DUE TO MUSCULOSKELETAL PAIN: A 1 YEAR-POPULATION-BASED STUDY

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**Background and aims**: Musculoskeletal pain is a leading cause of sickness absence (SA) and disability pension (DP). We aimed at identifying trajectories of SA/DP in workers on sick leave due to musculoskeletal pain over 1 year. Thereafter, we examined the association between these trajectories and established prognostic factors for SA/DP.

**Methods**: A prospective cohort study of 549 workers (56% women, aged 18-67) on sick leave due to musculoskeletal pain was conducted in Norway in 2018-2019. SA/DP data was collected from the Norwegian sick leave registry and prognostic factors via self-reported baseline questionnaires. We used group-based trajectory modelling to define the different trajectories of SA/DP. Multivariable multinomial logistic regression was used to estimate odds ratios (ORs) and 95% confidence intervals (CIs) for prognostic factors associated with the identified trajectory groups.

**Results**: We identified six distinct trajectories of SA/DP over 1 year: 'fast decrease' (27% of the cohort), 'moderate decrease' (23%), 'slow decrease' (12%), 'u-shape' (7%), 'moderate persisting' (13%) and 'high persisting' (18%). Individuals with high persisting SA/DP were associated with low workability (OR = 1.46, 95% CI 1.23-1.72), expectation of SA duration >10 months (OR = 1.39, 95% CI 1.22-1.58), and SA/DP days prior year (OR = 1.02 for each day, 95% CI 1.01-1.03). Different prognostic factors varied widely across the six trajectories.

**Conclusions**: Almost one-third of the cohort had persistent SA/DP over 1-year follow-up. Our findings highlight different patterns of returning to work and the complex range of prognostic factors associated with different trajectories of SA/DP in workers on sick leave due to musculoskeletal pain.

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## Abstract no.: 666

### PAIN CONDITIONING IN HUMANS – A BEHAVIOURAL STUDY IN IMMERSIVE VIRTUAL REALITY

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**Background and aims**: This study aims to investigate how a contextually induced aversive stimulus (painful and non-painful) can modulate the perception of its associated environment. We constructed a contextual aversive conditioning/extinction protocol by means of an "ecological" environment modelled in immersive Virtual Reality (VR). The environment was a three-room apartment composed of a kitchen, a living-room and a bathroom, each associated to a specific stimulus: either painful,

an electrical tonic stimulation induced on the left-hand; non-painful, a set of aversive noises; or no stimulation, serving as control.

**Methods**: Forty-two healthy volunteers have undergone the conditioning protocol: immersed subjects entered ten times each room in random order, during which the different stimuli were induced in their attributed context. The conditioning phase was followed by an extinction protocol for which participants were sub-divided in three groups: i) both pain and aversive-sounds extinction ii) pain extinction only and iii) aversive-sounds extinction only. Assessment of the environment's perception was focused on valence attribution to each room using the self-assessment manikin scale in five different stages: pre-conditioning, post-conditioning and post-extinction at day one; the next day and two weeks after.

**Results**: Preliminary behavioural results revealed that both aversive conditionings resulted in a decrease of the environment's valence, in particular for the pain conditioning. This effect subsides post-extinction all groups confounded, only to reappear significant at long-term (next day and two weeks after).

**Conclusions**: This suggests that overall aversiveness, specifically physical pain, can modulate at long-term the remembered perception of the context in which it was induced.

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## Abstract no.: 675

### FUNCTIONAL POSTERIOR INSULAR CONNECTIVITY AND SUBJECTIVE PERCEPTION OF PAIN - AN INTRACEREBRAL STUDY IN HUMANS

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**Background and aims**: While the cerebral network processing nociception is relatively well known,the one underlying the transition to conscious pain remains poorly described.

We used intracranial EEG in humans to characterize the relation between functional connectivity both before and after a noxious stimulus and the subjective perception reports to nociceptive laser stimuli delivered at a constant intensity set at nociceptive threshold.

**Methods**: Patients had to rate the intensity of each laser stimulus delivered on the dorsum of the hand on a visual analogue scale (VAS). According to the patients' subjective perception,two perceptual conditions were isolated: "painful" (4≤VAS≤10) and "non-painful" (4<VAS). The EEG was analyzed during five second before and after the stimulation by performing spectral-phase coherence to study functional connectivity between the posterior insula (PI) and 10 brain regions grouped in three networks (i.e. sensory, emotional, and late-integrative).

**Results**: Functional connectivity between PI and the sensory network did not differ either before and after the stimulus regardless on whether the stimulus was perceived as painful or not. In contrast, phase-coherence level between PI and the emotional network and between PI and the late-integrative network both decreased after a stimulation felt as painful.

**Conclusions**: These results suggest that the functional connectivity between the PI and the sensory network may not be involved in the modulation of subjective pain perception for near-threshold stimuli. Conversely, the emergence of a painful sensation at these intensity levels may depend on a decreased connectivity of the sensory PI with the emotional and late-integrative network after the onset of the stimulation.

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## Abstract no.: 1144

### LESSONS LEARNED FROM ESTABLISHING A PRACTICE-BASED RESEARCH NETWORK OF PHYSIOTHERAPISTS TO SUPPORT CO-PRODUCED RESEARCH

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*University, Orange, Australia, [10]Newcastle Performance Physiotherapy, Newcastle, Australia, [11]Mid North Coast Local Health District, Coffs Harbour, Australia*

**Background and aims**: **Background:** There is a disconnect between research and clinical practice, which hampers pain research translation. A lack of information to guide researchers and clinicians on how to best collaborate means this disconnect will persist unless addressed.

**Objective:** To describe key learnings from establishing a practice-based research network of physiotherapists in the Hunter region of NSW, Australia.

**Methods**: **Methods:** We used program logic and theory of change to design activities. We did a formative evaluation, consisting of online survey and focus groups. We performed establishment activities to form a governance model. We held a problem mapping workshop with local stakeholders and an online poll to prioritise research areas.

**Results**: What we learnt through establishing a network:

a) We generated a vision and mission statement from formative evaluation focus group data, which was key to harness physiotherapists' motivations and sustain collaboration;

b) we ensured network activities were pragmatic and 'time crunched' (Table 1);

c) a joint governance group ensured meaningful co-production (Figure 1);

d) our prioritisation process ensured the network tackles clinically relevant problems with the potential for significant change in practice and patient outcomes (Table 2).

Table 1: Formative evaluation yielded physiotherapists' views on what would enable a successful network

| **Enablers** | **Example quote** |
|---|---|
| *Time crunched*<br>Network demands must fit around a busy clinical schedule | *"It needs to be time crunched."*<br>*"I think if a clinician is really interested, they have to be interested in engaging with research, then they have to actually take time out of their clinical schedule to do that."* |
| *Research infrastructure support*<br>Personnel support or funding support to cover lost clinic time necessary for research activities | *"From a research perspective, you need some soldiers, like some research soldiers."*<br>*"Where's the money gunna [going to] come from? It's not just money is it – it's resources and time."* |
| *Motivation and commitment*<br>Motivation to be involved initially, and a long-term commitment to the network to enable a successful network. | *"We need some really motivated individuals."*<br>*"And we, as being interested parties, are motivated to make a difference in this area, work with that person."*<br>*"And a commitment, I suppose, as well. Behaviour change amongst clinicians is as important as patients."* |

*Table 2:*Problem mapping and prioritisation results

| **Problem areas resulting from workshop** | **Criteria used to prioritise problems** | **Final research priorities** |
|---|---|---|
| Public and patients' perception of musculoskeletal conditions and what is effective to manage it<br>Poor quality of care that patients with musculoskeletal conditions receive<br>Lack of preventive focus from the health system<br>Issues with funding model<br>Patient compliance to care<br>Resource availability | Impact on the patient (4/8 responses (50%)<br>Ease of tackling/"low hanging fruit" (4/8 responses (50%))<br>Impact on therapist (2/8 responses (25%))<br>Frequency of problem occurring (1/8 (12.5%))<br>Burden of the problem on health system (1/8 responses (12.5%)) | 1) Public and patients' perception of musculoskeletal conditions and what is effective to manage it<br>2) Poor quality of care that patients with musculoskeletal conditions receive<br>3) Lack of preventive focus from the health system |

*Figure 1:*

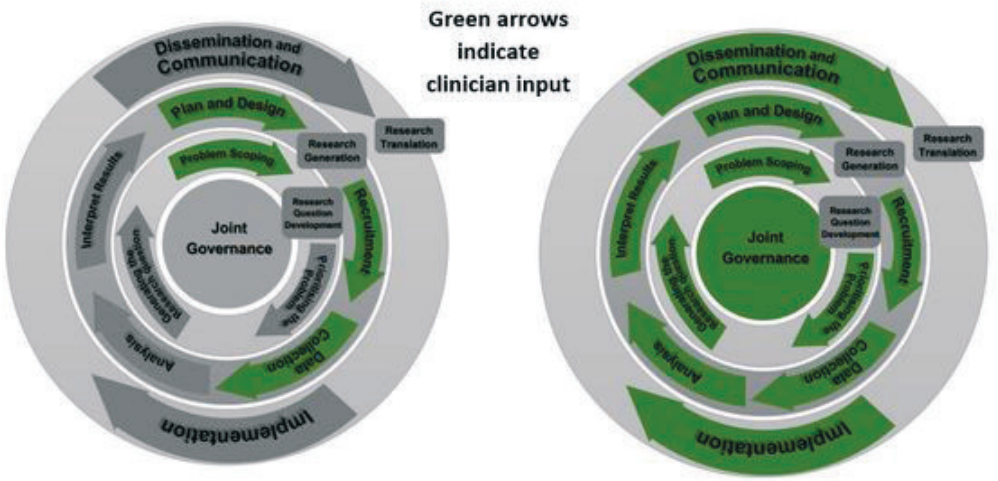


***Figure 1a***: 'Tokenistic' co-production.

***Figure 1b:*** Meaningful co-production across the entire cycle of translating research into practice, from research question development, research generation, and research translation.

**Conclusions**: This description and reflection of network establishment is a resource for those who want to optimise pain research translation through collaborating with clinicians. More work is needed to adapt our learnings and models to other contexts.

# Pain in the elderly

## Abstract no.: 499

### LACK OF TECHNOLOGY ACCESS CAUSED UNTOLD PAIN, FEAR, SUFFERING AND DARKNESS TO OLDER UGANDANS DURING COVID-19 PANDEMIC

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**Background and aims**: Internet and other digital technologies have become a window to the world COVID-19 lockdown and curfew, enabling us to connect with family, friends and communities. However, for Uganda's ageing population were left in dark and the few with access to digital lacked necessary skills to fully exploit them in addition to the low internet connectivity.

**Methods**: The recent 2016/17 Uganda National Household Survey (UNHS) shows low levels of technology in the country. 3.3% of households with a member that owned a computer accessible at home and 2.6% of households with a member that had access to a computer they could use at home (for example a laptop from their job that they could use at home). The figure rhymes with the 3% of households that indicated owning a computer at home.

**Results**: To reduce this technology and pain gap, Geriatric Respite Care Foundation is in negotiations with TELCOM Companies for provision of gargets and internet to introduce technology training for older Ugandans as they have largely been left to figure it out on their own during this COVID-19 era. The training is to help individuals own gargets and also be introduced to the use of technology in public places like bank, airport, bill payment and we will show them how to connect with their doctors, family members living on the other side of the globe using Skype, Zoom, webinar among other medias.

**Conclusions**: Introduction of technology training is a key to reduce agony as we foster healthy ageing for future global challenges.

## Abstract no.: 523

### ENHANCED ATTENTIONAL CAPTURE BY NOCICEPTIVE STIMULI IN OLD COMPARED TO YOUNG ADULTS

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**Background and aims**: Previous studies have shown that the analgesic effect of a distraction task is reduced in the elderly compared to young adults. This study aims at better understanding the causes of this reduction in aging and to determine whether it could be explained by decreased attentional resources.

**Methods**: Nineteen young and 22 old subjects performed a 1- and a 2-Back working memory task resulting in low or high cognitive load, respectively. Subjects received infrequent brief hot nociceptive and cold non-nociceptive stimulations (involving the same peripheral Adelta fibers type) while performing the tasks. We recorded contact heat and cold evoked potentials. At the end of each task, subjects rated the overall intensity of thermal stimulations on a verbal numeric scale. N-Back tasks and thermal stimuli were also presented individually, to obtain a baseline of performance and intensity ratings.

**Results**: Performing a working memory task reduced the perceived intensity of both nociceptive and cold stimuli in all subjects. In elderly subjects however, in the 2-Back condition, response times to trials following nociceptive stimulation were longer compared to trials following cold stimulations. Moreover, the amplitude of the P2 component elicited by nociceptive stimuli did not decrease during working memory tasks in elderly, unlike in young subjects.

**Conclusions**: These results suggest that under conditions of high cognitive load, elderly subjects have greater difficulty inhibiting nociceptive stimuli. This is likely explained by decreased attentional resources with aging resulting in a competition between pain and the distraction task.

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## Abstract no.: 760

### IMPLICATION OF LOCAL SKIN BLOOD FLOW IN PAIN TOLERANCE IN THE ELDERLY

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**Background and aims**: A decrease in pain tolerance is observed in aging, especially when tested with prolonged warm nociceptive stimuli. This type of stimuli implies a response of the cutaneous vasomotor system to ensure local thermal regulation. However, in the elderly, alterations in cutaneous vasodilation in response to local warming have been observed. We can therefore hypothesize that an alteration in local skin blood flow may participate in the decrease of pain tolerance with age.

**Methods**: 20 young and 20 old participants performed a pain resistance test. They were asked to place their hand in an airtight box with the air temperature regulated at 65°C and hold it until the pain became unbearable. The maximum duration of the test was 15 minutes.

We continuously measured the skin temperature and local blood flow of the hand in the box. Participants were also asked to continuously estimate pain intensity using a visual analog scale.

**Results**: The results showed that the elderly have a decreased blood flow compared to the young. We also observed that pain tolerance is impaired in the elderly as 85% of the young subjects resisted pain until the end of the test, while this proportion is 50% in the elderly. In the elderly who did not resist until the end of the test, the results showed that blood flow correlated with pain judgment, whereas no correlation was observed in the other participants.

**Conclusions**: Our results suggest that altered local skin blood flow may influence thermal pain tolerance in aging.

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# Pain in the neck and cervicoradicular pain

## Abstract no.: 762

### PROLONGED EXPERIMENTAL NECK PAIN IMPAIR EFFICACY OF EXERCISE-INDUCED HYPOALGESIA IN HEALTHY PARTICIPANTS

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**Background and aims**: Neck pain is one of the most prevalent musculoskeletal problems. Those suffering from persistent neck pain may have a reduced exercise-induced hypoalgesic (EIH) or even a hyperalgesic response, opposite to what is seen in healthy populations.

The aim of this study was to investigate EIH in a healthy population following the onset of prolonged experimental neck pain.

**Methods**: Forty healthy participants were randomized to receive 0.5ml injections with Nerve Growth Factor (NFG) (5 µg) or isotonic saline (0.9%) into the right splenius capitis muscle on days 0 and 2. Disability due to neck pain was assessed using the Neck Disability Index (NDI). Pressure Pain Thresholds (PPTs) were recorded bilaterally over splenius capitis (neck), temporalis (head) and tibialis anterior (leg) muscles. This was done before and after a progressive exercise protocol using an arm crank ergometer on days 0, 4 and 15. EIH was expressed as the pre-exercise PPT subtracted from the post-exercise PPT.

**Results**: The NGF group displayed higher NDI scores on day 2 and 4 compared the control group ($P<0.01$).

For the neck site the control group had a greater EIH compared to the NGF group ($P<0.01$). For both the head and leg site the control group showed increased EIH at day 4 and 15 ($P<0.05$) compared to the NGF group.

**Conclusions**: The results indicate that even a few days with neck pain can impact EIH response. These results may help explain why some neck pain patients experience exacerbation of their symptoms during exercise.

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## Abstract no.: 945

### EFFECT OF NON-SPECIFIC NECK PAIN ON THE FUNCTIONAL CHARACTERISTICS OF THE NECK

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**Background and aims**: Non-specific neck pain is highly common among office workers. Neck pain has been used as an outcome measure, however, flipped models investigating pain as an independent variable, have been used less. The aim of this study was ~~is~~ to investigate the influence of recent neck pain on the functional characteristics of the neck.

**Methods**: A total of 120 office workers (81.7% female, age 20-60 years) participated with 54.2% experiencing non-specific neck pain during the past 7 days. Active range of motion (ROM) of the neck, neck muscle strength, and joint position error was measured. For statistical analysis, 12 multivariate linear regression models were used, with functional characteristics as the dependent variables, correcting for age, sex, body mass index, daily screentime, and in the case of muscle force measurements, sport-related physical activity.

**Results**: Neck pain during the past 7 days was associated ($p<0.05$)with reduced ROM for left lateral flexion and bilateral rotation. The reduction in ROM for right lateral flexion was borderline significant ($p=0.057$). There were no significant associations concerning the effect of neck pain with other measured functional characteristics.

**Conclusions**: Recent non-specific neck pain can reduce the lateral active range of motion of the neck since the most common sites of neck pain are the posterolateral soft tissues. The force generation ability and joint position error were not associated with non-specific pain, which indicates differences in pain-related mechanisms between non-specific and traumatic neck pain.

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# Pain in vulnerable groups

## Abstract no.: 412

### YOUNG PATIENTS WITH CEREBRAL PALSY EXIBIT AN ABBERANT SOMATOSENSORY PROFILE AND EXAGGERATED EXPERIMENTALY INDUCED HYPERALGESIA SUGGESTING A CENTRAL SENSITIZATION SUBTYPE OF NEUROPATHIC PAIN

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**Background and aims**: Cerebral palsy (CP) is the most frequent neurological CNS pathology in children and young adults. Still, very little is known about aberrant patterns of somatosensory processing. We have tackled this by comprehensive quantitative sensory testing (QST) and experimental hyperalgesia modelling.

**Methods**: We studied 21 CP patients and 21 gender matched healthy teen and young adult controls. Comprehensive QST employed the DFNS profile technique adding sustained heat and pressure stimulation and localisation tasks. Motor performance was checked by the “hot wire” fun game. Primary and secondary hyperalgesia were induced by repetitive painful heat stimulation (20x 41°C for 6s).

**Results**: In CP patients, motor performance was only marginally affected in the preferred (dominant) arm ($p=0.052$), but substantially worse in the non-preferred arm ($p<0.001$). Precision of stimulus localization was reduced ($p<0.02$). In the QST profile, CP patients exhibited significantly reduced cold, warmth and tactile detection (all $p<0.001$) and increased cold, pressure and pinprick pain sensitivity (all $p<0.01$), but no significant difference in heat pain sensitivity, pain summation or in conditioned pain modulation. Sustained pressure and pinprick stimuli were twice as painful in normal skin ($p=0.051$ and $p<0.01$, respectively). After sustained heat conditioning, CP patients developed stronger hyperalgesia to tonic pressure (160 vs. 124% of control site, $p<0.02$) and to pinprick stimuli (216 vs. 157% of control site, $p=0.11$).

**Conclusions**: CP patients presented with substantial sensory loss and modality-specific facilitation of mechanical pain sensitivity. Experimentally induced mechanical hyperalgesia was significantly increased. In aggregate, these findings suggest a central sensitization subtype of neuropathic pain in CP patients.

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## Abstract no.: 539

### PAIN IN INDIVIDUALS WITH AUTISM SPECTRUM DISORDER: IMPACT OF PAIN BASED ON A CAREGIVER REPORT

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**Background and aims**: Examining pain in individuals with Autism Spectrum Disorder (ASD) is largely un-explored. To date, there is no research examining the impact of pain among individuals with ASD/ID in Ireland. Due to the communication difficulties that exist within this population, most often pain goes unrecognised and untreated. The aim of this study was to examine the impact of pain among individuals with ASD with or without Intellectual Disability(ID).This study examined 7 key areas on the impact of pain; demographic information, presentation and frequency of pain, challenging behaviour and pain, locations of pain, health problems, daily functioning and health related decision making.

**Methods**: This research consisted of a cross sectional study (caregiver report) that examined the impact of pain in individuals with ASD and ID from children aged 5 years and above and adults aged 18 years and above who required caregiver support in Ireland.

**Results**: Abdomen pain was reported the most common location of pain. Challenging behaviour increased significantly during painful episodes. The results also reported that 68% never reported pain independently and over 74% was not involved in treatment received.

**Conclusions**: The results from this study demonstrate that pain has a significant impact on individuals with ASD/ID who experience pain. It is critical that individuals with ASD/ID who experience pain must be taught the skill of communicating pain in order for pain to be recognised and treated.

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## Abstract no.: 573

### SENSORY AND AFFECTIVE PAIN RESPONDING IN A PRECLINICAL RAT MODEL OF AUTISM: EFFECT OF SEX AND ASSOCIATED ALTERATIONS IN GENE EXPRESSION

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**Background and aims**: Up to 95% of autistic individuals exhibit sensory abnormalities, including altered pain responding, however the underlying neurobiology remains poorly understood. Hence, this study aimed to examine sensory and affective pain responding in a preclinical rat model of autism, the effect of sex, and associated alterations in gene expression.

**Methods**: Male and female adolescent rats, prenatally exposed to saline or the antiepileptic valproic acid (VPA), were assessed for mechanical (von Frey) and thermal (hot plate/Hargreaves test) sensory responding prior to, and following, intraplantar administration of complete Freund's adjuvant (CFA). Social, anxiety and affective pain responding was also assessed. Expression of *c-fos*, mu opioid receptor (*oprm1)* and proopiomelanocortin (*pomc)* were assessed in the anterior cingulate cortex (ACC) using qRT-PCR.

**Results**: VPA-exposed male and female rats displayed tactile hyposensitivity compared to saline-treated counterparts. Intraplantar-CFA resulted in mechanical, cold and heat hypersensitivity in all animals, the time-course and magnitude of which was reduced and shortened by prenatal VPA-exposure, in a sex-dependent manner. There were no changes in social or anxiety-like behaviour post-CFA. However, VPA-exposed male rats exhibited reduced negative affect in the place escape/avoidance paradigm, an effect associated with decreased *c-fos* and *pomc* expression in the contralateral ACC.

**Conclusions**: VPA-exposed rats exhibit mechanical and heat hyposensitivity and altered development of sensory and affective inflammatory pain responding, effects which are sex-dependent. The data also highlights a possible role for neurobiological changes in the ACC in mediating altered pain responding in this autism model.

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## Abstract no.: 590

### PEA-OXA IMPROVES PSYCHOPHYSICAL AND METABOLIC ASPECTS ASSOCIATED WITH SOCIAL ISOLATION IN MALE MICE: AN IN VIVO AND IN VITRO STUDY

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**Background and aims**: Chronic social isolation generates a persistent state of stress associated with obesity along with some neuro-endocrine disorders and central behavioral sequelae (eg anxiety, depression, aggression, and allodynia).

In this study, we evaluated the effect of social isolation on weight gain, depressive- and anxious-aggressive-like behavior, as well as on phenotypic changes of adipocytes from visceral adipose tissue of control (group-housed) or socially isolated (single-housed) male mice. The effect of treatment with pentadecyl-2-oxazoline (PEA-OXA), a natural α-2 antagonist and histamine H3 protean partial agonist, on these pathological alterations was also evaluated.

**Methods**: Behavioral sequelae were evaluated by different tests such as von Frey test for allodynia, tail suspension test for depression, hole bard test for anxiety and resident intruder test for aggressiveness. Furthermore, mesenchymal stromal cells (MSCs) from white adipose tissue of each group of mice were collected and we evaluated cell proliferation, senescence, apoptosis and ROS levels. Elisa tests were conducted for analyzing IL-17, IL-6, IL-1β, IL-10, and TNF-α levels.

**Results**: Single housed mice developed a weight gain, depression- and anxiety-like behavior, and aggressiveness. Single housed mice receiving PEA-OXA showed a general resolution of both, physical-metabolic and behavioral alterations associated with social isolation.

**Conclusions**: Single housed mice developed a weight gain, depression- and anxiety-like behavior, and aggressiveness. Single housed mice receiving PEA-OXA showed a general resolution of both, physical-metabolic and behavioral alterations associated with social isolation.

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## Abstract no.: 659

### PAIN PREVALENCE IN IRISH UNIVERSITY STUDENTS

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**Background and aims**: Chronic pain has a high prevalence in university students with prevalence rates reported at 54% and especially high among women (Grasdalsmoen et al, 2020). To date, pain prevalence has not been comprehensively explored in an Irish university context. The aim of this study was to determine pain prevalence in students attending University College Dublin.

**Methods**: A cross-sectional anonymous online survey was made available (Survey Monkey). Participant demographics, regional pain location (7 regions) and severity were collected using a Numerical Rating Scale (NRS). The responses were imported to SPSS-27 and analysed. Ethical approval was obtained: UCD HREC Flynn-Blake – LS-19-90

**Results**: In total 586 students were analyzed. The majority were 18-30 years old (88%, n=520), undergraduate (72%, n=422), female (72%, n=426) and Health Science students (47%, n=278). In total, 83.4% (n=489) students reported pain. Of those who responded pain locations included mid/low back (80.4%,n=423), neck (79.8%, n=420), face/head (69.4%, n=365), and knee pain (47.5%, n= 250). Females reported more face/head, neck and mid/low back pain than males ($p<0.05$). Pain severity scores (NRS, mean ±sd) were highest in the head/face (4.56±3.137), neck/shoulders (4.76 ±2.839) and mid/low back (4.44±2.647). There was no difference between genders ($p>0.05$). Pain most affected students' ability to participate in sport (n=42.5%, n=249), to sleep (41.3%, n=242) and attend college (22.7%, n=133).

**Conclusions**: Musculoskeletal pain is prevalent and burdensome in one Irish university. Given the high pain prevalence in this cohort, it is important to rapidly address pain in students to prevent chronicity, given the impact pain has on their lives.

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## Abstract no.: 700

### CHRONIC AND EXPERIMENTAL PAIN IN PATIENTS RECEIVING OPIOID MAINTENANCE TREATMENT FOR OPIOID ADDICTION: A META-ANALYTIC OVERVIEW

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**Background and aims**: Despite the analgesic properties of opioids, many patients receiving opioid maintenance treatment (OMT) for opioid addiction report chronic pain symptoms and heightened pain sensitivity. Here we use meta-analysis to create a quantitative overview of pain in OMT.

**Methods**: We conducted two separate meta-analyses: One of chronic pain prevalence in OMT and one of Cold Pressor Test (CPT) pain perception in OMT compared to healthy controls (HC). Studies were located through searches in Web of Science and by examining the reference lists of eligible records. We averaged results across studies using random-effect models.

**Results**: The first meta-analysis included 26 studies ($n$=7061). Average prevalence estimates of chronic pain in OMT ranged from 36% (3 studies, $n$=434) to 68% (9 studies, $n$=2287) depending on the definition. Based on the ICD-11 definition (minimum 3 months duration), chronic pain prevalence was 51% (6 studies, $n$=2110). Nine studies ($n$=635) were included in the second meta-analysis. Compared to HC, OMT patients had 2 seconds lower pain threshold (4 studies, $n$=111) and 27 seconds lower pain tolerance (9 studies, $n$=635). Pain intensity did not differ significantly (1/100 points) between OMT and HC (1 study, $n$=20) in the CPT.

**Conclusions**: Approximately half of patients in OMT experience chronic pain. Although patients exhibit comparable pain threshold to HC, their pain tolerance is considerably lower in the CPT. Knowledge about pain in OMT is important for evaluating how prolonged opioid receptor blockade affects pain in patients trying out extended-release naltrexone as an alternative treatment to methadone and buprenorphine.

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# Peripheral neuropathic pain

## Abstract no.: 310

### CHRONIC OCULAR SURFACE PAIN: CAPTURING THE PATIENT JOURNEY

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**Background and aims**: Patient advocacy is crucial to support disease awareness and unmet medical need, particularly when signs do not always match symptoms. Chronic ocular surface pain (COSP) is a persistent corneal- or conjunctival-induced pain lasting more than 3 months, which can diminish quality of life (QoL). Testimonials provide an insight into the patient's journey with their disease.

**Methods**: Interviews were designed to cover the patient's experience; including symptoms, diagnosis, management and effect on QoL. Eye Care Professionals located in the UK, Austria, Germany and Australia were approached to recommend patients; and following consents, video testimonials were created.

**Results**: Seven patients (5 females and 2 males with mean age 48.1 years; range 20-68) with a range of underlying ocular conditions recorded their story, describing delayed diagnoses; often many years, and multiple treatments. Various descriptors were used to describe symptoms, including "pain", "discomfort", "dryness" and "burning/stinging", with frequency and severity changing daily. Many were treated for dry eye disease, while others suffered from COSP following refractive surgery or medications. Patients reflected on their decrease in work productivity, social engagements and mental wellbeing, and demonstrated their use of treatments.

**Conclusions**: COSP is a complex multifactorial condition associated with several underlying diseases and currently, no standard of care exists. Patients are often referred multiple times, even to non-ophthalmological experts, to obtain management but even so, treatment may not be sufficient to ease their symptoms. These video testimonials highlight the incredible burden of COSP on patients, with substantial implications on QoL.

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## Abstract no.: 394

### CANCER-RELATED NEUROPATHIC PAIN (CRNP): LISTENING TO THE VOICE OF THE PATIENTS

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**Background and aims**: Prevalence of cancer is high and frequently results in unwanted complications such as neuropathic pain due to the cancer or its treatment.

**Cancer patients from 13 European countries** were asked to provide insights about their experiences living with CRNP.

**Methods**: **A quantitative online survey** was conducted with the support of a multi-disciplinary expert team. Adults consenting to participate and diagnosed with cancer were screened for symptoms of neuropathic pain and enrolled when fulfilling the criteria. Detailed information regarding the impact of CRNP on patient´s lives and the management of their pain were collected.

**Results**: **549 persons** met the inclusion criteria and completed the survey, thereof 62% females and 88% ≤ 65 years old. Most of the CRNP patients experienced **severe (32%) or moderate (44%) pain on a daily basis**. CRNP had an important impact on their sleep patterns, mental health and ability to exercise; 30% had to retire/stop working. 59% were satisfied with the recommended treatments/interventions for CRNP. Less than half of respondents expected to keep the pain at a bearable level. 26% reported that nothing was done after discussing CRNP with their doctor. Fears of wasting HCP's time (25%) and not being taken seriously (25%) were preventing patients from talking to their HCP. 86% of respondents had little, if any, knowledge around CRNP.

**Conclusions**: Cancer-related neuropathic pain has a significant impact of patient´s daily lives. Patients have low treatment expectations and could benefit from better education about CRNP and its consequences.

## Abstract no.: 473

### THE "CUFF" MODEL OF SCIATIC NERVE COMPRESSION INDUCES CHRONIC HYPERSENSITIVITY BUT NOT ANXIODEPRESSIVE-LIKE SYMPTOMS IN SPRAGUE-DAWLEY RATS

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**Background and aims**: With approximatively 20% of the population suffering from chronic pain, this condition is a leading cause of disability and disease burden of this century. Although pain syndromes result from different underlying mechanisms, they share common comorbidities such as neurocognitive changes, sleep disturbances and in 50% of the chronic pain patients, mood alterations associated with anxiety and depression. Our aim was to identify the mechanism underlying the development of the anxiodepressive consequences of pain in a rat model of sciatic nerve compression.

**Methods**: We implanted a polyethylene tube ("cuff") around the main branch of the right sciatic nerve of Sprague-Dawley rats to induce chronic pain. Calibrated forceps were used to assess the mechanical sensitivity of both hind paws and behavioral tests evaluating anxious- and depressive-like symptoms were done at different time points after the surgery.

**Results**: The nerve compression induced a chronic mechanical hypersensitivity, similar to previous results obtained in mice. While this hypersensitivity was accompanied by time-dependent anxiodepressive-like symptoms in mice, the rats showed surprisingly neither anxiety nor depression-related behaviors.

**Conclusions**: These results suggest that anxiodepressive-like behaviors may not be a necessary consequence of chronic pain, and they provide a model to potentially help studying the basis of resilience vs susceptibility to this pain comorbidity.
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## Abstract no.: 540

### DIFFERENCES IN PLASMA LIPOPROTEIN PROFILES BETWEEN CHRONIC PERIPHERAL NEUROPATHIC PAIN AND HEALTHY CONTROLS - AN EXPLORATORY PILOT STUDY

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**Background and aims**: Little is still known about the underlying mechanisms that drive and maintain neuropathic pain (NeuP). Recently lipids have been implicated as endogenous pro-algesic ligands affecting onset and maintenance of pain, however in the case of NeuP the relationship is largely unexplored. The aim of this study was to investigate the lipoprotein signature in patients with chronic peripheral NeuP compared to healthy controls.

**Methods**: The concentrations of 112 lipoprotein fractions in plasma from NeuP patients (n=16) and healthy controls (n=13) were analyzed using $^{1}$H NMR spectroscopy. A multiplex-immunoassay based on an electrochemiluminescent detection method was used to measure the concentration of cytokines, chemokines, and growth factors in plasma from NeuP patients (n=10) and healthy controls (n=11). Multivariate data analysis was used to identify patterns of protein intercorrelations and proteins significant for group discrimination.

**Results**: We found 23 lipoproteins that were significantly up regulated in NeuP patients compared to healthy controls (mostly fractions of VLDL). When the influence of inflammatory substances was included, 30 proteins were found to be significantly up- or down regulated in NeuP patients (8 cytokines, 20 fractions of LDL and 2 fractions of HDL). BMI did not affect lipoprotein profiles in either group. A significant relationship between age and lipoprotein profile was seen among healthy controls but not NeuP patients.

**Conclusions**: NeuP patients presented a lipoprotein profile consistent with systemic low-grade inflammation, like autoimmune, cardiometabolic, and neuro-progressive diseases. These preliminary results emphasize the importance of chronic low-grade inflammation in NeuP and warrant further lipidomic studies.

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## Abstract no.: 560

### THE PHENOTYPIC FINGERPRINT OF HEREDITARY TRANSTHYRETIN AMYLOIDOSIS WITH POLYNEUROPATHY

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**Background and aims**: Hereditary transthyretin (ATTRv) amyloidosis is a progressive, systemic disease. Besides cardiac dysfunction, it is mainly characterized by a length-dependent sensorimotor and autonomic polyneuropathy. This study aims at identifying symptoms and signs characteristic of ATTRv amyloidosis that can be used for early diagnosis and differentiation from other diseases like chronic inflammatory demyelinating polyradiculoneuropathy (CIDP).

**Methods**: So far, eight ATTRv amyloidosis patients and 12 CIDP patients were phenotypically characterized by quantitative sensory testing (QST), heart-rate-variability, tilt table test, and sudomotor function test. QST was performed on the dorsum of one hand and the lower limb, in the most proximal area that was still clinically affected. Questionnaires were used to assess pain quality (NPSI, PainPREDICT, PainDETECT), autonomic symptoms (CADT), and quality of life (SF-36).

**Results**: The majority of ATTRv amyloidosis patients suffered from at least one sensorimotor symptom at the lower extremity (92%). Symptoms at the upper extremity were more frequent in CIDP patients. Autonomic symptoms were more common in ATTRv amyloidosis, i.e. 63% vs 8% reported at least two autonomic symptoms, especially orthostatic dizziness, urinary and gastrointestinal complaints. Compared with CIDP, ATTRv amyloidosis patients were characterized by a more pronounced thermal hypoesthesia combined with pressure pain hyperalgesia and dynamic mechanical allodynia at the lower extremity.

**Conclusions**: Autonomic symptoms combined with impaired warm detection, pressure pain hyperalgesia and dynamic mechanical allodynia at the lower extremity seem to be characteristic features that might be used for early diagnosis of ATTRv amyloidosis.

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## Abstract no.: 586

### CHRONIC NEUROPATHIC C8 DISTRIBUTION PAIN MANAGEMENT SECONDARY TO POSTERIOR CERVICAL DECOMPRESSION AND FUSION WITH IATROGENIC INJURY

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**Background and aims**: Cervical Radiculopathy, right UE pain and weakness of C6-T1 distributions. Primary complaints of a 69-year old male with comorbidities of DM-II and RA. Primary concerns were unilateral right scapular stabbing pains, migrating to axilla. Significant right sided biceps pain and weakness.

**Methods**: Treatment: physical therapy, electrical stimulation modalities and exercise. Pain pharmacologically treated initially with OTC agents.

Neurosurgery consult resulted in posterior cervical decompression and fusion, C6-T1. Surgical procedure deemed successful! However, in recovery, patient complained of numbness, tingling and stabbing pain along the C8 distribution in bilateral fifth digits and hands. The surgeon determined an unknown etiology and recommended a physiatry consultation.

A physiatry consultation was pursued with other post-operative treatments: physical therapy, occupational therapy, pharmacological intervention and pain consultation. A provisional diagnosis of Complex Regional Pain Syndrome was noted.

Pain consultation pursued. Initial treatment plan of Gabapentin 800-mg, tid with slight abatement and reduction of edge intensity wearing off at about five hours.

**Results**: Pain continued with numbness, tingling, and burning in bilateral fifth digits with intermittent and irregular stabbing pains. Patient demonstrated hyperalgesia bilateral fifth digits, central sensitization and allodynia. Hypersensitivity in a variety of areas of the body also appeared evident.

**Conclusions**: Long-term, high-dose Gabapentin appears to have no published adverse effects. Long-term effects of pharmacologic agents and neuropathic pain must be studied.
Gaps exist in care coordination between providers' management of symptoms despite proliferation of EHR. Provider collaboration is needed. Neuropathic pain is an illnesses of "hidden" symptoms, "silent" external characteristics and requires provid-.ers' added efforts to resolve

## Abstract no.: 591

### FINDING NOVEL TARGETS LINKED WITH NEUROPATHIC PAIN FROM HUMAN LINGUAL NERVE NEUROMAS USING SPATIAL TRANSCRIPTOMICS

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**Background and aims**: Lingual nerve neuromas form due to nerve injury, whereby the regenerating axons of peripheral neurons fail to reach their targets due to scarring and Schwann cells proliferation, causing symptoms ranging from anaesthesia to neuropathic pain. Neuromas can be surgically removed and the nerve ends rejoined, which promotes functional recovery. In the lab, we collect the neuromas from patients with and without neuropathic pain linked with clinical information. The comparison between the two patient groups allows the identification of molecular changes which reflect the severity of pain rather than the pathological changes linked with nerve injury.

Our aim is to identify novel pain-relevant targets in human lingual nerve neuromas using spatial transcriptomics.

**Methods**: Spatial transcriptomics is a high-throughput technique that allows the quantification of several transcripts across a tissue section while retaining their spatial localisation. This allows identification of the gene expression profile linked to morphological features, adding another level of information to transcriptomics data.

This technology was used on 4 human lingual neuromas with varying pain severity to detect a panel of 18,000 genes. The results will be validated using in situ hybridization and immunohistochemistry.

**Results**: Preliminary results indicate that the spatial transcriptomics assay will be successful. Analysis of the sequencing libraries with Agilent 2100 Bioanalyser indicates that sequencing will yield good quality results. The samples have now been shipped to be sequenced and the results will be available shortly.

**Conclusions**: Spatial transcriptomics has great potential to further the understanding of pain mechanisms and find new targets to treat it.

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## Abstract no.: 601

### THALIDOMIDE INSTIGATE PERIPHERAL NEUROPATHY VIA TRPA1 AND TRPV4 TARGETED OXIDATIVE STRESS

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**Background and aims**: CIPN is a painful condition caused by a series of anticancer drugs, including thalidomide, supposedly via the generation of reactive oxygen species. There is evidence that TRPA1, TRPV4 contribute to oxidative-stress-mediated mouse models of CIPN, evoked by bortezomib, oxaliplatin (TRPA1), paclitaxel (TRPA1, TRPV4).As thalidomide is known to generate ROS after treatment in rodents and humans, we hypothesized that its ability to cause hypersensitivity implicates the activation of the TRPA1 channel.

**Methods**: C57BL/6, Trpa1+/+, Trpa1-/-, Trpv4+/+, Trpv4-/- mice were exposed to a single-dose administration of thalidomide (50mg/kg) and its vehicle.HC-030031 (100mg/kg) or its vehicle, HC-067047(10mg/kg) or its vehicle and α-lipoic acid (100mg/kg) or its vehicle (0.5%,CMC) were administered at day-7 after thalidomide.

**Results**: Antagonism(HC-030031) or genetic-deletion(Trpa1-/- mice) of TRPA1 provided full-protection against cold-hypersensitivity.However, showed only partial-inhibition of mechanical-allodynia.Similarly, Trpv4-/- mice or mice treated with the TRPV4-antagonist(HC-067047), provided a partial-reduction of thalidomide-evoked mechanical-allodynia.Only the simultaneous blockade of both the TRPA1 and the TRPV4 fully attenuated thalidomide-evoked mechanical-allodynia.We also observed that administration of the antioxidant(α-lipoic acid) abated mechanical-allodynia and cold-hypersensitivity.Exposure of HEK293 cells transfected with human TRPV4(hTRPV4-HEK293) to H2O2 produced a concentration-dependent calcium response, that was attenuated by HC-067047 and was absent in naïve-HEK293 cells.

**Conclusions**: CIPN induced by a single administration of thalidomide while cold-hypersensitivity was exclusively mediated by TRPA1, both TRPA1 and TRPV4 are implicated in mechanical-allodynia. These results derive from either pharmacological study, using selective TRPA1 and TRPV4 antagonists, or by using TRPA1 and TRPV4-deficient-mice. The observation that TRPV4 can be activated by elevated H2O2 concentration supports the hypothesis that thalidomide, generates sufficient ROS to promote both TRPA1 and TRPV4 activation.

## Abstract no.: 602

### MOUSE MODEL OF COMPLEX REGIONAL PAIN SYNDROME TYPE I (CRPS-I)

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**Background and aims**: CRPS-I is a medical condition characterized by pain and vasomotor dysfunction of an extremity with unsatisfactory treatment.The transient receptor potential ankyrin 1 (TRPA1) channel is sensitive to oxidants generated at sites of tissue damage or inflammation. We have investigated the cellular and biochemical mediators that contribute to the TRPA1-dependent mechanisms that, evoked by I/R of the rodent hind limb, initiate and sustain mechanical and cold allodynia.

**Methods**: *Trpa1*$^{+/+}$ and *Trpa1*$^{-/-}$ mice were used. Also mice with the monocyte/macrophage population depleted (MaFIA) and mice harboring a selective deletion of TRPA1 in Schwann cells were necessary. Chronic post ischemia pain was used as an animal model of CRPS-I and was performed by hind paw transient I/R. Both mechanical and cold allodynia were assessed, the first using the von Frey filament assay of increasing stiffness applied to the plantar surface of the mouse hind paw, the second one by measuring the acute nociceptive response to acetone-evoked evaporative cooling.

**Results**: Mechanical and cold allodynia and neuroinflammation induced by prolonged I/R are mediated by Schwann cell TRPA1. TRPA1 genetic deletion provided permanent protection against allodynia in CPIP. TRPA1 antagonism during and after I/R application was able to attenuate pain and neuroinflammation. Mechanical and cold allodynia was reversed by the intragastric administration of the TRPA1 antagonists.

**Conclusions**: Macrophage accumulation is essential to evoke I/R-evoked mechanical and cold allodynia. We found that both macrophages invading the endoneural space and Schwann cell TRPA1 are essential for promoting and maintaining allodynia.

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## Abstract no.: 605

### SCHWANN CELLS AND TRPA1 ORCHESTRATE ETHANOL-EVOKED NEUROPATHIC PAIN IN MICE

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**Background and aims**: Alcohol abuse/dependence are among the major healthcare problems in the world also inducing neuropathic pain. Alcohol dehydrogenase (ADH) converts ethanol into the reactive and toxic product acetaldehyde, which is rapidly metabolized to acetic acid by the mitochondrial aldehyde dehydrogenase-2 (ALDH2). Acetaldehyde is considered as the major contributor of the detrimental effects produced by acute and chronic alcohol consumption. The TRPA1 channel, can be activated by acetaldehyde generated by ADH in the liver and other tissues. However, the pathways by which acetaldehyde causes ethanol-evoked pain are poorly understood.

**Methods**: Periorbital mechanical allodynia was assessed with the von Frey filaments after acute and chronic ethanol ingestion in C57BL/6 and in TRPA1 knockout. The presence of ADH was assessed in neuronal tissue and Schwann cells by immunofluorescence. The content of by-products of oxidative stress was determined by immunofluorescence and colorimetric assay.

**Results**: Acute and chronic ethanol ingestion caused delayed periorbital mechanical allodynia in mice. Inhibition of ADH or deletion of TRPA1 prevented allodynia. Acetaldehyde generated by ADH in both liver and Schwann cells surrounding nociceptors was required for TRPA1-induced nociception. Schwann cell specific deletion of TRPA1 revealed that channel activation by acetaldehyde results in NOX-1-dependent production of $H_2O_2$ and 4-HNE, which sustain allodynia by paracrine targeting of TRPA1. Human Schwann cells express ADH/TRPA1/NOX1 and recapitulate the proalgesic functions of mouse Schwann cells.

**Conclusions**: The presence of ADH in Schwann cells expressing TRPA1/NOX1 and their ability of generating oxidative stress identifies an autocrine pathway that we propose as a major contributing mechanism in alcoholic painful neuropathy.

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## Abstract no.: 879

### NERVE PATHOLOGY AND NEUROPATHIC PAIN AFTER WHIPLASH: A SYSTEMATIC REVIEW AND META-ANALYSIS

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**Background and aims**: There is no clear understanding of the mechanisms causing persistent pain in patients with whiplash associated disorder (WAD). The aim of this systematic review was to assess the evidence for nerve pathology and neuropathic pain in patients with WAD.

**Methods**: EMBASE, PubMed, CINAHL (EBSCO), and MEDLINE were searched from inception to 1st September 2020. Study quality and risk of bias were assessed using the Newcastle-Ottawa Quality Assessment Scales.

**Results**: Fifty-four studies reporting on 390,644 patients and 918 controls were included. Clinical questionnaires suggested symptoms of predominant neuropathic characteristic in 34% of patients (range 25-75%). Mean prevalence of nerve pathology detected with neurological examination was 13% (0-100%) and 32% (10-100%) with electrodiagnostic testing. Patients independent of WAD severity (Quebec Task Force grades I-IV) demonstrated significantly impaired sensory detection thresholds of the index finger compared to controls, including mechanical (SMD 0.65 [0.30;1.00] p< 0.005), current (SMD 0.82 [0.25;1.39] p=0.0165), cold (SMD -0.43 [-0.73;-0.13] p=0.0204) and warm detection (SMD 0.84 [0.25;1.42] p=0.0200). Patients with WAD had significantly heightened nerve mechanosensitivity compared to controls upon median nerve pressure pain thresholds (SMD -1.10 [-1.50;-0.70], p<0.0001) and neurodynamic tests (SMD 1.68 [0.92;2.44], p=0.0004). Similar sensory dysfunction and nerve mechanosensitivity was seen in WAD grade II, which contradicts its traditional definition of absent nerve involvement.

**Conclusions**: Our findings strongly suggest a subset of patients with WAD demonstrate signs of peripheral nerve pathology and neuropathic pain. Although there was heterogeneity among some studies, typical WAD classifications may need to be reconsidered and include detailed clinical assessments for nerve integrity.

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## Abstract no.: 1098

### OBTURATOR NEURALGIA TREATMENT WITH A SINGLE SHOT OBTURATOR NERVE BLOCK

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**Background and aims**: Obturator neuralgia is a rare pain condition. In this a case report study we used a single shot obtura-.tor nerve block to treat obturator neuralgia

**Methods**: A 61-years old man presented to the pain clinic complaining for severe pain in the inner thigh of the right leg. He was walking with a cane while the leg was in internal rotation. The patient suffered pain measured at a rate 8/10 on the visual analogical scale during standing or moving.The patient had an accidental fall three years earlier with an acetabular fracture which was treated conservative. On clinical evaluation the patient had obturator neuralgia due to his previous trauma. We performed ultrasound obturator nerve block using ropivacaine 2mg/ml , 10 ml for the anterior division and 10 ml for the poste-.rior one. Thirty minutes later the patient was pain free

.**Results**: In the three months followed period the patient had no pain 0/10 during standing or moving 2/10

.**Conclusions**: Single shot nerve blocks can have good results in certain pain conditions

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## Abstract no.: 1164

### NEUROPATHIC PAIN INDUCES NEUROPLASTIC CHANGES IN THE RAT LOCUS COERULEUS BY AN EXCITATORY-INHIBITORY SHIFT AND INCREASING CLEAVED CASPASE-3 EXPRESSION IN GLIAL CELLS

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**Background and aims**: Neuropathic pain, caused by damage in the somatosensory nervous system, is currently considered as a precipitating factor for suffering anxio-depressive disorders. Nevertheless, the neurobiological mechanisms underlying this situation remain unknown. Recently, several authors have proposed that cellular and molecular plasticity of key brain structures are involved in the pathophysiology of this comorbidity. The noradrenergic locus coeruleus (LC) plays a pivotal role due to its strategic location, projecting to corticolimbic areas and to the spinal cord. Hence, we propose that neuropathic pain alters the excitatory-inhibitory balance in the LC and subsequently causing damage to the noradrenergic neurons after neuropathic pain induction.

**Methods**: Thus, we analyse the expression of the vesicular GABA transporter (VGAT), vesicular glutamate transporters 1 or 2 (VGLUT1 or VGLUT2) and the cleaved caspase-3 (CC3) in the LC by immunofluorescence, exploring two different time points of neuropathic pain induced by chronic constriction injury (CCI) in Sprague-Dawley rats; 7 days (CCI-7d) and 28 days (CCI-28d) after nerve injury.

**Results**: We found an increase in the VGLUT2/VGAT ratio at CCI-7d, while was significantly reduced at CCI-28d, due to less VGLUT2 expression. At CCI28-d, we observed a different distribution of soma size of the noradrenergic LC neurons and an augmentation of the apoptotic marker CC3 in glial cells, which temporally coincides with the onset of the anxiodepressive-like phenotype.

**Conclusions**: These findings suggest that short-term nerve injury induces neuroplastic changes in the LC due to an increase in excitability that is lost in long-term pain. Moreover, long-term pain might activate apoptosis related mechanisms.

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## Abstract no.: 1170

### TIME-DEPENDENT CHANGES IN THE PATTERN OF ACTIVATION OF THE NORADRENERGIC LOCUS COERULEUS AFTER NERVE INJURY IN RATS

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**Background and aims**: The noradrenergic-locus coeruleus (LC) is a key brain area related with pain plasticity.

**Methods**: To advance in the mechanisms involved in the transition from acute to chronic pain, the expression of cFos and cFos+FG (Fluoro-Gold) were explored in the LC of TH:Cre male Long-Evans rats submitted to chronic constriction injury (CCI) at 2 (ST) and 30 days (LT) after nerve injury. DREADDs were used to evaluate ongoing pain.

**Results**: Higher and lateralized cFos expression in Sham-ST and CCI-ST compared with Naïve animals were found. Sham-LT behaved as Naïve and CCI-LT showed also higher levels of cFos being similar in both LCs. After nociceptive stimuli application, cFos increased in all groups excepting in CCI-LT animals. LC→spinal cord projection evaluation showed cFos-positive cells in the LCipsilateral in basal CCI-ST and after nociceptive stimuli in Sham-ST and CCI-ST. None LT-group (Sham-LT/CCI-LT) showed cFos-positive cells. LC→anterior cingulate cortex (ACC) projection showed a higher lateralized activation in basal CCI-ST and in stimulated-nociceptive conditions in Sham-ST and CCI-ST. CCI-LT showed similar higher levels of expression in both LCs in basal and stimulated conditions. Behaviorally, global blockade of the ST-CCI-LCipsi system, but not LCcontra, increased spontaneous pain while the activation relieved it. Chemogenetic blockade of the LCipsi→spinal cord, but not LCcontra, projection increased pain in the short-term and decreased it when activated. Chemogenetic inactivation of ST-LCipsi-ACC or LT-LCbilateral-ACC or the intra-rACC antagonism of alpha1- and alpha2-adrenoreceptors reduced pain.

**Conclusions**: The activation pattern of the LC changes along neuropathy. Specific LC modules promotes analgesia but also nociception.

# Visceral pain

## Abstract no.: 796

### ABDOMINAL PAIN AND IRRITABLE BOWEL SYNDROME-LIKE SYMPTOMS WHILE INFLAMMATORY BOWEL DISEASE IS IN REMISSION – AN INVESTIGATION OF WHAT ONLINE RESOURCES TELL US

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**Background and aims**: Around 40% of patients with inflammatory bowel disease (IBD) continue to experience abdominal pain and/or irritable bowel syndrome-like (IBS) symptoms when in remission. A recent qualitative study suggested that patients seldom received adequate explanations for these from health professionals. Many patients consult online resources, but little is known about the extend and type of content available on this topic. The aim of this study was to explore publicly available online information specific to abdominal pain and/or IBS-like symptoms during remission.

**Methods**: Bing, Google, and Yahoo were searched for websites that provided medical information to lay people about IBD. Two types of searches and analyses were performed: (1) inductive thematic analysis (TA) explored themes around IBD in remission and co-existent IBS in IBD and (2) deductive content analysis (CA) quantified available explanations.

**Results**: A total of 30 websites were included. Most websites described remission as a period of no - or limited – symptoms. Some websites mentioned that abdominal pain might be present during remission, with only a very limited number relaying how common that was or providing an explanation. IBS was frequently mentioned as an explanation for ongoing symptoms during remission, but how it links to IBD was rarely explained.

**Conclusions**: Emphasising that remission means symptom free may cause unnecessary worry about ongoing symptoms and fails to explain how and why many patients experience symptoms even when the disease is controlled. More work is needed to provide biopsychosocial explanations of symptoms during remission enabling integrated online information.

# Widespread pain

## Abstract no.: 270

### AFTER-SENSATIONS FOLLOWING NON-NOXIOUS STIMULI IN FIBROMYALGIA SYNDROME

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**Background and aims**: Fibromyalgia syndrome (FMS) is a chronic widespread pain condition with mixed peripheral and central contributions. Patients display hypersensitivities to a spectrum of stimuli, both noxious and innocuous. Patients' pressure pain thresholds are reduced, and patients may display allodynia to brushstroke. After-sensations following these innocuous stimuli have not been reported, however.

**Methods**: Setting out to examine the perception of pleasant touch in FMS, patients were interviewed and completed standard psychometric pain questionnaires. Sensitivity to blunt pressure was recorded and slow and fast brushstroke pleasantness perceptions were examined on a numerical rating scale (-5 to +5).

**Results**: We recruited 51 FMS patients and 10 pain-free controls at a UK Pain Management Centre. Forty-four patients completed the after-sensation protocol. Most patients reported pain after innocuous mechanical pressure; median arm thresholds were 167kPa (95% CI:147–180kPa) and leg thresholds 233kPa (95% CI:217–267kPa). Eighty-four percent

(31/37) of patients reported lingering pain following pressure examination one day after testing, and 49% (18/37) at five days. After-sensations following brushstroke were common in the FMS group, reported by 77% (34/44) compared to 33% (3/10) of HCs. Many patients, but no HCs, perceived after-sensations as uncomfortable (15/44, 34%). For patients who experienced uncomfortable after-sensations, brushstroke-pleasantness ratings were reduced, and skin was more frequently reported as the site of worst pain (47%, 7/15; p<0.05) (Figure 1).

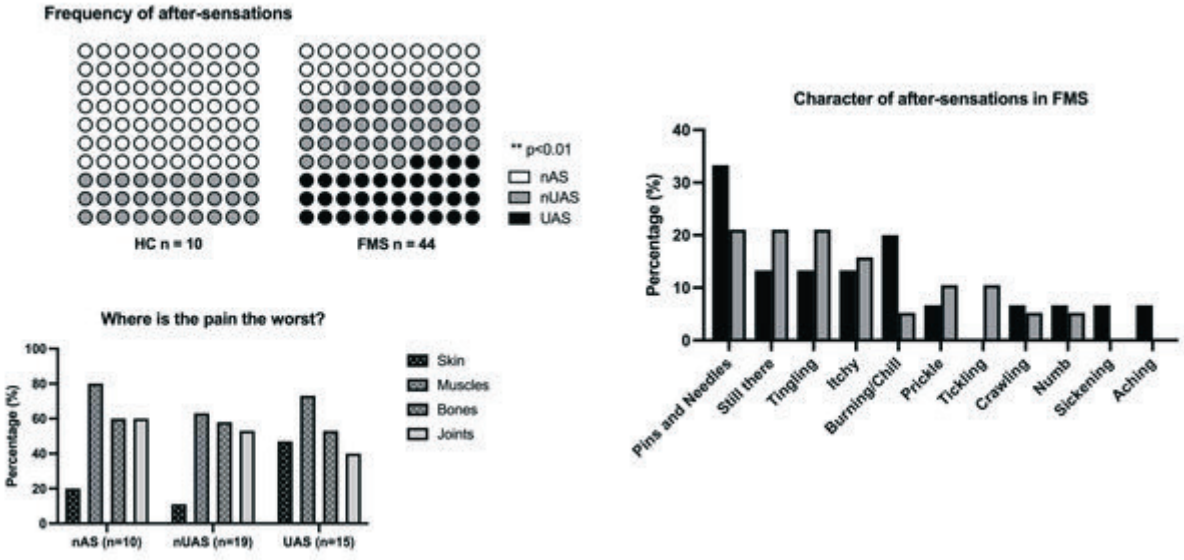


Figure 1

**Conclusions**: After-sensations following brushstroke stimulation is a previously unreported, but common, phenomenon in FMS. They are associated with tactile anhedonia (loss of pleasant touch) and may identify a clinically distinct subgroup warranting further investigation.

## Abstract no.: 557

### MUSCULOSKELETAL COMORBIDITIES IN CHRONIC WIDESPREAD PAIN

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**Background and aims**: Chronic widespread pain (CWP) suppose a challenge for healthcare professionals due to the lack of effective treatments and associated comorbidities, such as musculoskeletal (ME), which could worsen the prognosis. This study aims to show the percentage of patients with CWP that may present ME comorbidities as well as their effect on pain, fatigue, functionality and polypharmacy.

**Methods**: We have carried out an observational retrospective study of patients from a multidisciplinary treatment unit in Barcelona, between 2016-2020. We collected data from 770 patients with CWP (with or without fibromyalgia criteria), such as pain and fatigue VAS, FIQ and drugs they were consuming.

**Results**: 94% were females. Mean age was 48.6 years. The most frequent comorbidities were spinal disorders 67.1%, osteoarthritis 29.6%, shoulder tendinopathy 14.2%, myofascial pain 11.4%, trochanteritis 8%.

We grouped patients into 4 groups: Group 1 (1990 and 2010 fibromyalgia (FM) criteria): 535 patients; Group 2 (2010 FM criteria): 33 patients; Group 3 (1990 FM criteria): 85 patients and Group 4 (CWP with no FM criteria): 120 patients.

The prevalence of musculoskeletal comorbidities in these groups (G) were: G1 81.2%, G2 78.8%, G3 83.5% and G4 87.5%

The results we found were:

| Comorbidities | Age | Pain VAS | Fatigue VAS | FIQ | Patients consuming ≥2 drugs |
|---|---|---|---|---|---|
| No ME Comorbidities:<br>- Fibromyalgia (FM)<br>- No FM | <br>44.6<br>50.4 | <br>5.8<br>4.4 | <br>6.2<br>5.2 | <br>65.1<br>52.1 | 87 |
| 1 Comorbidity<br>- FM<br>- No FM | <br>47.0<br>44.9 | <br>7.0<br>6.6 | <br>6.9<br>6.4 | <br>70.8<br>63.5 | 90 |
| ≥2 Comorbidities<br>- FM<br>- No FM | <br>50.4<br>50.5 | <br>7.2<br>6.2 | <br>7.4<br>6.1 | <br>72.0<br>64.0 | 330 |

**Conclusions**: Loads of CWP patients suffer from musculoskeletal comorbidities and the prevalence and numer of them increase with age. They worsen pain, fatigue and FIQ scores and drug use, specially if patients meet criteria for fibromyalgia. Early diagnosis and treatment could improve the prognosis and management of these patients in daily clinical practice.

## Abstract no.: 615

### GENETIC AND EPIGENETIC CHANGES IN PEOPLE WITH FIBROMYALGIA AND CHRONIC FATIGUE SYNDROME (FM/CFS): AN EXPLORATIVE STUDY

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**Background and aims**: Understanding Fibromyalgia and Chronic Fatigue Syndrome (FM/CFS) from an epigenetic viewpoint might provide insight on its pathophysiology. Alterations in the central nervous system, as well as in the dopaminergic and opioid systems likely contribute to the complex clinical presentation seen in these patients. We aimed to explore the genetic and epigenetic mechanisms regulating those systems as they might represent core mechanisms, potentially targetable by future therapies.

**Methods**: We designed a cross-sectional, repeated-measures design and enrolled 28 patients with FM/CFS and 26 matched healthy controls. Subjects underwent a comprehensive assessment, including clinical questionnaires, pain thresholds, and blood test. We explored 5 polymorphisms and DNA methylation levels in three genes regulating different functions: brain-derived neurotrophic factor (BDNF), Cathecol-O-methyltransferase (COMT), and Opioid receptor mu-1 (OPRM1). To assess temporal stability of DNA methylation, subjects underwent the same assessment twice within four days. DNA methylation was measured using Pyrosequencing technology in BDNF promoters I, IV, and IX, in COMT MB- and S- promoters), and in the OPRM1 promoter region.

**Results**: Repeated measures mixed linear models were performed for between-group analysis, controlling for within-group variability of the measures and showed that BDNF is hypo-methylated in promoter IX in people with FM/CFS ($F=4.987$; $p=.03$), whereas MB-COMT and OPRM1 are hypermethylated ($F=6.799$; $p=.01$ and $F=5.574$; $p=.02$). COMT haplotype predicted symptoms, measured using the Chronic Fatigue Syndrome Symptoms List ($F=7.523$; $p=.007$).

**Conclusions**: DNA methylation in genes related to synaptic plasticity and sensitisation, and to catecholamines and opioid regulation might be contributing to the pathophysiology of complex conditions such as FM/CFS.

## Abstract no.: 669

### DIFFICULTY TIMES FOR FIBROMYALGIA PATIENTS DURING COVID-19 PANDEMIC: A CROSS-SECTIONAL STUDY

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**Background and aims**: Fibromyalgia (FM) is a chronic disease that is affected by stressing factors. COVID-19 pandemic represents a source of mental illnesses and emotional stress. The objective of this study was to evaluate the impacts of COVID-19 pandemic on FM patients, in special in their symptoms and access to treatments and health services.

**Methods**: Cross-sectional clinical study carried out between October 2020 and January 2021 including adult patients assisted by an University based specialized pain clinic. Patients with another chronic pain and cognitive disorder were excluded. The interviews of patients were carried out by telephone calls.

**Results**: A total of 87 individuals were included - mostly female (94.3%), self-reported Caucasian (67.8%) and married (51.72%). Despite the low prevalence of SARS-CoV-2 infection among patients (6.9%), 60.92% reported some degree of worsening of FM symptoms during the pandemic, with a “great worsening” reported by 32.2%. More than 70% of patients reported direct impact on pain management and access to health care (great impact for 48.3%), medical appointments (87.4%), physical therapy (50.6%), physical activities (69.0%), access to medication and psychotherapy (44.9%). More than 20% of patients discontinued some medication, mostly for lack of access to public free-pharmacies (72.2%). Also, the pandemic worsened their concerns (90.8%), their anxiety (75.9%), depression (72.4%), mood (70.1%) and their sleep (52.9%).

**Conclusions**: The COVID-19 pandemic impact in the health of FM patients is not restricted to those infected by the virus. It also interferes with mental health and access to treatments and health services by patients.

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## Abstract no.: 748

### PSYCHOLOGICALLY INFORMED PREHABILITATION PROGRAMME FOR PHYSICAL ACTIVITY IN WOMEN WITH FIBROMYALGIA SYNDROME: A FEASIBILITY STUDY

F. Estévez López[1], C. Hughes[2], N. Adams[3], B. Fullen[4], G. Davison[2], A. Montgomery[5], F. Cramp[6], C. Maestre-Cascales[7], D. Martin[8], J. McVeigh[9]

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**Background and aims**: Fibromyalgia is a common chronic pain syndrome that has a significant impact on quality of life. Guidelines recommend physical activity for this population, however, patients find exercise challenging.

This feasibility study aimed to develop and pilot a 4-week prehabilitation intervention in combination with a 6-week walking programme in women with fibromyalgia.

**Methods**: The prehabilitation intervention consisted of one meeting per week for four weeks. Using the principles of Acceptance and Commitment Therapy, participants identified a ‘committed action’ and were taught how to set values-based goals. Education topics included fibromyalgia, pain and pain management, mindfulness, benefits of physical activity, stress management and sleep hygiene. Following the prehabilitation programme, participants engaged in a 6-week walking programme (with telephone support).

Success of the intervention was determined by: (i) number of sessions attended, (ii) number of drop-outs (iii) number of questionnaires completed and returned. Secondary outcomes included measures to demonstrate proof of principle (e.g., pain, fatigue, sleep quality) and daily activity and sedentary time.

**Results**: Eleven participants were recruited. Nine (80%) attended at least three education sessions. Two participants dropped out. Six participants (55%) completed all questionnaires at all the time points. Most participants engaged in the walking programme. The Treatment Acceptability and Credibility Questionnaire indicated that prehabilitation intervention was acceptable and credible. Participants would recommend this intervention to a friend.

**Conclusions**: This feasibility study demonstrated that a prehabilitation intervention is acceptable to patients with fibromyalgia. However, a choice of alternative physical activities may encourage greater engagement with physical activity.

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# Other

## Abstract no.: 316

### PAIN PHENOMENON LIPOEDEMA

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**Background and aims**: Lipoedema is a little-known condition that is often misdiagnosed. Lipoedema presents with nodular to swollen areas that can lead to induration, nodular, uneven skin, as well as dimpling and skin flap formation, most commonly on the lower extremities, more rarely on the upper extremities The accumulation of adipose tissue results in characteristic symmetrical swelling of the extremities, ending above the ankles or wrists (cuff-sign). Primary pain phenomena include localized pain, tenderness, painful tightness, and pain on touch and pressure during activities.

To get an insight in necessary self-management of pain and symptoms, a narrative review was conducted to identify requirement of self-management for coping with phenomena of pain in lipoedema and associated comorbidities.

**Methods**: The narrative literature review includes international medical and guideline databases, as well as social media reports from affected persons. Analysis was performed using the content analysis method. Requirements of self-management, coping behaviour as well as individual case descriptions were searched.

**Results**: 48 publications were identified. Guidelines and publications on guidelines accounted for a large proportion. Presentation of results outlines the range of requirements to manage pain with a bio-psycho-social pattern in the synthesis. Limiting spontaneous and pressure pain and secondary pain phenomena such as joint pain and mobility limitations are described. The prevention of chronification of pain in association with lipoedema has not yet been a direct aim in the therapeutic strategy.

**Conclusions**: A knowledge gap regarding the incidence of pain syndrome and chronification shows major deficits of self-management strategies and implies further research needs.

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## Abstract no.: 363

### AUTONOMIC FUNCTION AND CENTRAL PAIN PROCESSING IN FROZEN SHOULDER: A CASE-CONTROL STUDY

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**Background and aims**: The pathophysiology of frozen shoulder (FS) is thought to be chronic inflammation. Chronic inflammation seems to be associated with the functioning of autonomic and central nervous system. The debilitating pain because of inflammation might result in inappropriate thoughts about pain and be a precursor for pain-related fear. Self-reported measures of symptoms might be an alternative way of assessing central nervous system functioning. The aim was to determine the level of self-reported symptoms of autonomic nervous system function and central pain processing (CPP) and determine the presence of the psychological variables catastrophizing and hypervigilance and self-reported associated symptoms of altered CPP in patients with FS.

**Methods**: Participants filled in the Composite Autonomic Symptom Score (autonomic function) and underwent sensory testing (CPP measurements) to assess tactile sensitivity (allodynia), pressure pain thresholds (hyperalgesia), temporal summation and conditioned pain modulation. The presence of psychological variables was determined with the Pain Catastrophizing Scale and the Pain Vigilance and Awareness Questionnaire and self-reported symptoms of CPP were determined with the Central Sensitization Inventory.

**Results**: Thirty-five patients with FS and 35 healthy controls were compared. Differences in autonomic nervous system function, tactile sensitivity, pressure pain threshold and pain catastrophizing, pain hypervigilance and self-reported symptoms of CPP were found.

**Conclusions**: No obvious altered CPP is present in patients with FS, because not all differences are clinically relevant. However, altered CPP might be present in subgroups of FS patients due to larger variability in measurements. Severity of self-reported autonomic symptoms and associated symptoms of CPP might be used to tailor treatment strategies.

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## Abstract no.: 447

### ANTI-SATELLITE GLIA CELL ANTIBODIES ARE ELEVATED IN FIBROMYALGIA AND ARE ASSOCIATED WITH MORE SEVERE DISEASE

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**Background and aims**: IgG antibodies from fibromyalgia (FM) patients induce pain-like behaviour in mice and bind human and mouse satellite glia cells (SGCs), but how frequently FM patients have anti-SGC antibodies remains unclear. The current study investigates the frequency of anti-SGC antibodies and antibody association with disease severity in FM patients.

**Methods**: Serum (Karolinska Institutet, Sweden; n=30/group) and plasma (McGill University, Canada; n=35/group) were collected from FM and control participants. Participant characteristics and IgG titres were evaluated. Samples incubated with murine SGC-enriched cell cultures or human dorsal root ganglia (hDRG) tissue sections, and anti-SGC antibodies levels were evaluated with indirect immunofluorescence.

**Results**: Anti-SGC antibodies were elevated in FM serum and plasma compared to controls. Anti-SGC antibody levels were not associated with age, BMI, total IgG titres or fibromyalgia duration. However, anti-SGC antibody levels were positively correlated with pain intensity in both cohorts. Pressure pain thresholds and fibromyalgia impact questionnaire scores were assessed in the Karolinska cohort, and they positively correlated with anti-SGC antibody levels. The Karolinska cohort was clustered into FM severe and mild groups. The FM severe group had elevated levels of anti-SGC antibodies compared to the mild and control groups, whereas the mild group was not different from the control. Elevated levels of FM anti-SGC antibodies detected in cell culture were verified in hDRG sections.

**Conclusions**: Anti-SGC antibody levels are elevated in a subset of FM patients and are associated with more severe pain. These findings suggest that autoimmunity underlies a subset of FM and opens the door to antibody-based diagnostics.

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## Abstract no.: 509

### EXTENDED WORK SHIFTS ELEVATE SUBJECTIVE PAIN COMPLAINTS IN FLIGHT ATTENDANTS, BUT NOT IN AIRLINE PILOTS OR HEALTHCARE WORKERS

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**Background and aims**: Prospective studies have found that shift work may increase the risk of subjective pain complaints. There are few published studies regarding pain as a short-term effect. The present study aimed to determine whether four consecutive extended work shifts among healthcare workers, flight attendants and airline pilots are associated with an increased risk of subjective pain complaints.

**Methods**: Forty-three healthcare workers, 41 flight attendants and 18 airline pilots participated in the study. All workers were followed through four consecutive 10-14 hour day shifts. Subjective pain complaints during the 1st and 4th workday were rated on a Likert-type scale with four categories (not troubled, a little troubled, somewhat troubled, very troubled), and was dichotomized between not/a little troubled vs. somewhat/very troubled. Complaints were rated for four regions: head, neck/shoulder/upper back, arms/wrists/hands, and low-back.

**Results**: After extended work hours, there was an increased risk of pain in at least one of the four regions in flight attendants (p=0.002), but not in healthcare workers (p=0.777) or in airline pilots (p=0.563). A similar picture was seen when each pain region was analyzed separately.

**Conclusions**: The present data does not generally support the hypothesis that extended work shifts *per se* is a risk factor for subjective pain complaints.

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## Abstract no.: 603

### FINDING JOINT SOLUTIONS: MANAGING DISTRESS AND PERSISTENT PAIN IN PRIMARY CARE CONSULTATIONS: A QUALITATIVE STUDY

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**Background and aims**: The consultation is the cornerstone of general practice, 'a meeting between experts'. People with persistent musculoskeletal pain may be distressed and this may be labeled as 'depression'. This study aims to understand how pain-related distress is conceptualized and managed by people with pain and general practitioners (GPs), to inform patient-centered interventions for people with pain and distress.

**Methods**: Qualitative methods with semi-structured interviews with people with pain and GPs, conducted via telephone or using virtual software. Interviews were digitally recorded, transcribed with consent, and analyzed thematically using constant comparison techniques. A patient advisory group and a GP stakeholder group contributed to the study design and data analysis.

**Results**: People with persistent pain described feelings of frustration, helplessness, and despair. GPs considered pain-related distress as different from low mood or depression, using impact on function and temporal factors to distinguish between distress and depression. GP narratives suggested 'therapeutic nihilism' about the management of persistent pain, made more challenging in the face of distress.

All interview participants described the need to navigate these uncertainties in the primary care consultation. People with pain reported that creating a new identity as a person 'living in pain', and being optimistic about the future, had been helpful. GPs recognized that identification of such optimism offered a way to move forward, and away from an over-reliance on medication.

**Conclusions**: Our findings reveal strategies that people with persistent pain use to manage their pain and mood which can be drawn upon within the primary care consultation.

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## Abstract no.: 620

### NEUROMUSCULAR ADAPTATIONS TO EXPERIMENTALLY INDUCED PAIN IN THE LUMBAR REGION: SYSTEMATIC REVIEW WITH META-ANALYSIS

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**Background and aims**: To limit the impact of potential confounders and the interindividual variability encountered in people with low back pain, experimental pain models are used to investigate the influence of nociception on movement. Here, we systematically reviewed the effects of pain experimentally induced in the lumbar region on muscle activity and spine kinematics.

**Methods**: Databases and grey literature were searched from inception to August 2021. Exogenous experimental pain models applied in the lumbar region of healthy individuals represented the interventions and population of interest. Two independent reviewers completed eligibility screening, data extraction, and risk of bias assessment. We synthesized data of within-subject comparisons per outcome domain and task evaluated. The strength of evidence was rated using the Grading of Recommendations, Assessment, Development and Evaluation guidelines (GRADE).

**Results**: 26 studies using hypertonic saline injection (n=19), heat stimulation (n=3), electrical stimulation (n=3), and capsaicin (n=1) were included. Low quality of evidence revealed increased superficial back muscle activity during locomotion and trunk movements. The activity of erector spinae, deep multifidus, and transversus abdominis was reduced during postural control tasks. Reduced range of motion of the lumbar spine was supported by low quality of evidence, whereas inconsistent findings were seen for trunk variability. When present, heterogeneity across studies was explained by the experimental pain model adopted.

**Conclusions**: Experimentally induced pain in the lumbar region induced changes in motor strategies which were dependent on the performed task and pain model adopted. Several of the changes observed have also been reported in people with clinical LBP.

## Abstract no.: 714

### THE INFLUENCE OF COVID-19 PANDEMIC-ASSOCIATED RESTRICTIONS ON PAIN, MOOD, AND EVERYDAY LIFE OF PATIENTS WITH PAINFUL POLYNEUROPATHY

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**Background and aims**: The pandemic was expected to influence pain, mood and quality of life of chronic pain patients negatively (biopsychosocial model). We have shown that during the first strict lockdown in Germany, a cohort of patients with chronic neuropathic pain was rather “distracted” by the acute threat of the pandemic. Only a subgroup practicing social distancing perceived a worsening of pain and quality of life. According to the phases of disaster response, it was presumed that after this “heroic/honeymoon” phase of coping, a worsening of the measured parameters was to be expected in the following .months (“disillusionment”). We hereby report the follow-up examinations we have conducted from April to December 2020

**Methods**: From April to December 2020, 63 patients with painful polyneuropathy received validated questionnaires on pain, .mood, sleep and quality of life in 12 assessments (t1-t12). A specific pandemic-related questionnaire was sent along

**Results**: The comparison of t1 to t6 showed a worsening of pain in the summer (p=0.04). Patients with a worsening of their sleep reported a higher PROMIS sleep disturbance score at t6 (p=0.007). Patients who experienced medical disadvantages reported lower quality of life upon EQ5D (p= 0.018). Patients experiencing medical disadvantages were significantly more .(worried about their health (p<0.001

**Conclusions**: In terms of pain, our cohort underwent the predicted disaster response phases and displayed “disillusionment” by a significant pain worsening. Ensuring a continued pain management during the pandemic seems key as medical disad- .vantages were associated to lower quality of life

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## Abstract no.: 745

### PROLONGED NOCICEPTION DISRUPTS HOMEOSTATIC PLASTICITY AND IS NOT RESTORED BY IMMEDIATE PAIN RELIEF

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**Background and aims**: Cortical homeostatic plasticity (HP) mechanisms regulate the induction of long-term potentiation and long-term depression. Moreover, chronic pain patients exhibit impaired HP regulation. This study investigated the effect of prolonged capsaicin-induced pain on HP induced by transcranial direct current stimulation (tDCS).

**Methods**: 24 healthy participants were randomized into an ice group (4f; 26.2±4.6 years) or control group (4f; 25.2±2 years) and participated in four sessions (two consecutive days; two weeks apart). After baseline measures, a capsaicin or placebo patch was applied to the right hand. Pain was assessed on a numeric rating scale (NRS). Thirty mins after, primary motor cortex HP was induced by 7-3-5 mins of cathodal tDCS-no stimulation-cathodal tDCS, respectively. HP changes, reflected by motor-evoked potentials (MEPs), were assessed every 15 mins up to 45 mins after. Ice was then applied on the patch for five mins (ice group), or participants waited for five mins (control group). HP was induced, and MEP changes were collected again after and 24 hrs after.

**Results**: Placebo patches yielded NRS=0, while capsaicin patches induced prolonged pain up to 24 hrs after application. This disrupted HP (p>0.05; all time points), while the placebo patch did not (p<0.05, 15 to 30 mins). The ice application reduced capsaicin pain (p<0.027), but did not affect HP. No alteration of HP was evident 24 hrs after.

**Conclusions**: This study provides novel evidence that capsaicin-pain disrupted MEPs 15-30 mins after HP induction, and was not affected by pain relief. HP was restored 24 hrs after capsaicin-induced pain.

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## Abstract no.: 756

### THE IMPACT OF CONDITIONED PAIN MODULATION ON THE DEVELOPMENT OF SECONDARY HYPERALGESIA

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**Background and aims**: Conditioned Pain modulation (CPM) is the proposed human equivalent of diffuse noxious inhibitory controls, a spinal event that underlies the 'pain inhibits pain' phenomenon. Secondary hyperalgesia, mechanistically underpinned by central sensitisation, is also reported to be a spinal event. Thus, our aim is to investigate the impact of CPM on the development of secondary hyperalgesia as it would provide mechanistic credence to their spinal origin.

**Methods**: In healthy human volunteers, to elicit secondary hyperalgesia we applied noxious high frequency electro-cutaneous stimulation (HFS) to the volar forearm. A modified version of the DFNS Mechanical Pain Sensitivity test was used to assess sensory changes, while a 10g von Frey filament was used to assess spread. Following, and in a separate session, to elicit CPM, we applied (concurrent to the HFS) conditioning pressure at 70% the individual's pain tolerance using a cuff algometer.

**Results**: Initial pilot data (N = 5) revealed no significant difference in either hyperalgesia intensity or area of secondary hyperalgesia, suggesting that CPM does not act to inhibit the spinal events that underlie its development/progression. Following further protocol refinements, formal testing is now underway and recruitment is ongoing.

**Conclusions**: Pain perception, unique and non-linear, is influenced by multiple physiological and psychological factors. Understanding the mechanisms that underlie pain modulatory processes is vital if novel pharmacotherapeutic strategies are to be identified. Spinal events take centre stage in the transition from acute to chronic pain and understanding how spinal manifestations of the pain state interact is crucial.

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## Abstract no.: 764

### CHARACTERISING THE TEST-RETEST RELIABILITY OF THE HIGH FREQUENCY ELECTROCUTANEOUS STIMULATION MODEL OF CENTRAL SENSITISATION: A BEHAVIOURAL PILOT

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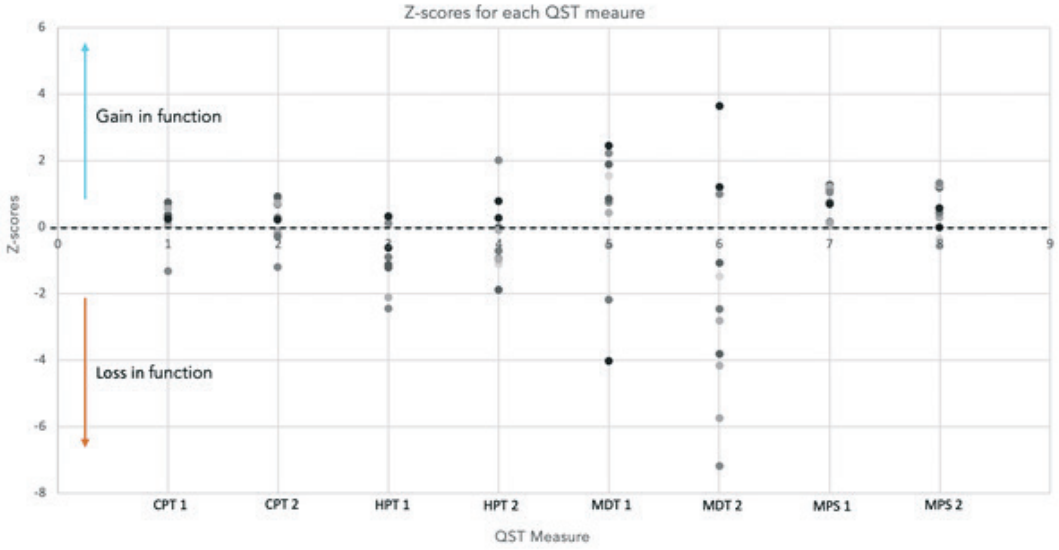
**Background and aims**: Central sensitisation is thought to be one of the key mechanisms underpinning the development of chronic pain states. It can manifest as hypersensitivity to pain at the area surrounding injury, (i.e., secondary hyperalgesia), and pain in response to previously innocuous stimuli (i.e., allodynia). Cutaneous high frequency electrical stimulation (HFS) can be used experimentally to induce LTP-like pain amplification in the spinal cord which mimics the features of central sensitisation. Quantitative Sensory Testing (QST) is a psychophysical battery of tests that can be used to assess somatosensory changes in human pain models (e.g., the presence of secondary hyperalgesia and allodynia). However, the reliability of these changes in the HFS model are poorly understood.

This pilot study aimed to examine the test re-test reliability of the HFS model.

**Methods**: 11 participants attended two identical sessions a week apart where they received QST to their forearm before and after HFS delivery.

**Results**: The preliminary results suggest a gain in function after HFS for cold pain threshold (CPT) and stimulus-response function (MPS) across both sessions. A loss in function is shown for heat pain threshold (HPT) across both sessions. Mixed results were found for mechanical detection threshold (MDT). Intraclass correlation coefficient reliability estimates (ICC) showed excellent consistency between sessions for CDT and MPS.




| QST Test | Group Average Z-score (mean) | Standard Deviation | ICC |
|---|---|---|---|
| CPT Session 1 | 0.198 | 0.575 | 0.842 |
| CPT Session 2 | 0.128 | 0.645 | |
| HPT Session 1 | -0.766 | 1.010 | 0.361 |
| HPT Session 2 | 0.436 | 1.159 | |
| MDT Session 1 | 0.315 | 2.069 | 0.154 |
| MDT Session 2 | -2.099 | 3.190 | |
| MPS Session 1 | 0.640 | 0.479 | 0.926 |
| MPS Session 2 | 0.578 | 0.694 | |

**Conclusions**: These results indicate that HFS can elicit consistent secondary hyperalgesia across sessions. Establishing reliability in the HFS model demonstrates its potential as an experimental model that may be exploited in the development of novel therapeutics, both pharmacological and non-pharmacological, for chronic painful conditions.

## Abstract no.: 1044

### MANAGEMENT OF CHRONIC MODERATE-SEVERE PRE-SURGICAL PAIN IN PATIENTS WHO ARE CANDIDATES FOR SHOULDER OR LUMBAR SPINE SURGERY: DESIGN OF THE IMPROVE PROGRAM

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**Background and aims**: Adequate management of chronic pre-surgical pain could help improve the outcome of orthopedic surgery, but consensus recommendations are lacking. The aim of the IMPROVE program is to stablish protocols on the management of chronic moderate-severe pre-surgical pain in patients who are candidates for shoulder or lumbar spine surgery.

**Methods**: A systematic literature search was conducted in Medline, Embase and Cochrane, regarding the impact of the management of chronic moderate-severe pre-surgical pain on the outcome of shoulder or lumbar spine surgery. Eligible articles were meta-analysis, systematic reviews, prospective studies, randomized controlled clinical trials and cohort studies, published over the last 10 years, and including assessments of pain, functionality and pain-related psychological aspects. Twenty seven articles on shoulder and 41 on lumbar spine were finally included for review. Based on the contents of these articles and the clinical experience, recommendations were proposed (shoulder: 49; lumbar spine: 57) in 5 categories: 1) Diagnosis and qualitative/quantitative assessment of pre-surgical pain; 2) Assessment of function and psychosocial aspects;

3) Therapeutic goals for pre-surgical pain; 4) Therapeutic options; 5) Follow-up of patients and referral. Two parallel Delphi studies (shoulder and lumbar spine), involving two panels of 30 expert surgeons, are currently being performed to validate the recommendations. Protocols for the management of chronic moderate-severe pre-surgical pain in each anatomical area will be developed from the results.

**Results**: Estimated February 2022 (Delphi studies).

**Conclusions**: The IMPROVE program will provide evidence- and expert-based guidance for surgeons on the management of chronic pre-surgical pain.

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## Abstract no.: 1106

### CHARACTERISATION OF CHRONIC PAIN-RELATED AND ANXIETY-RELATED BEHAVIOUR IN A PRECLINICAL INCISIONAL MODEL OF DORSUM WOUND HEALING

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**Background and aims**: Chronic wound-associated pain (CWAP) is a significant burden on individuals with lived experience of chronic wounds. Research indicates a high prevalence of comorbid anxiety in individuals with CWAP. The aim of the study was to investigate the potential of the rat back hairy skin incision model as a translationally relevant model for the study of CWAP.

**Methods**: Male and female Sprague-Dawley rats (150-200g, n=4-5/group) underwent back incision or sham surgery. Mechanical hypersensitivity was assessed at baseline and post-surgery days (PSD) 1,3,7,9,14,16,20,22,27,29 and 33 in the dorsum and paw. Anxiety-related behaviour was assessed via the Elevated Plus Maze (EPM) on PSD 6 and 26.

**Results**: Male back incision rats showed incision-related mechanical hypersensitivity at 1cm ipsilateral to the dorsum incision on PSD 1, 3 and 7 vs male sham ($p<0.05$). Male back incision rats displayed reduced paw withdrawal threshold (PWT) in the ipsilateral paw on PSD 1, 3, 20 and 22 vs male sham ($p<0.05$). There was no difference in dorsum mechanical withdrawal threshold at 1cm ipsilateral or PWT between female back incision rats and female sham. Male ($p<0.01$) and female ($p<0.05$) back incision rats spent less time in the open arms of the EPM versus sham counterparts on PSD 6, and this effect persisted to PSD 26 in females ($p<0.05$).

**Conclusions**: These results suggest that while only male rats show primary and secondary mechanical hypersensitivity following dorsum incision, both sexes exhibit anxiety-related behaviour. The back incision model may be suitable for studying sexual dimorphism in CWAP and associated comorbidities.

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## Abstract no.: 1137

### PROFILING PELVIC ORGAN PROLAPSE AND PAIN: A SYSTEMATIC REVIEW

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**Background and aims**: Pelvic organ prolapse (POP) represents a worldwide public health issue. The estimated cumulative lifetime risk of requiring surgery for POP is 11%[1]. This review investigates how pain as a component of a biopsychosocial profile of women with POP is established in published research.

**Methods**: Electronic searches of Pubmed, Web of Science, EMBASE, CINAHL, Cochrane and PEDro (inception to November 2021) were undertaken using a search string and in line with PRISMA protocol.

English language articles (randomised controlled trials, cohort studies, case-control studies, qualitative research) investigating female POP using validated questionnaires and an objective measurement of POP were included.

Two reviewers independently screened titles, abstracts and full articles for eligibility. Data extraction included participant characteristics, POP grading and outcome measures. Risk of bias was assessed (Johanna Briggs Tool).

**Results**: Of 6347 articles identified, 19 were included; n=1838 women, age range 38.5-66.8 years, parity 0-13. POP was graded using two scales: Pelvic Organ Prolapse Quantification measurement or the Baden-Walker Halfway System. Thirteen questionnaires were utilised; four were POP-specific, the remainder were pelvic health or general health questionnaires. Eleven included a pain or discomfort subscale, 8 reported subdomain scores.

**Conclusions**: Pain subdomains are included in most questionnaires reporting biopsychosocial profiles in women with POP. More consistent reporting of subdomains would allow detailed pain profiling in this cohort.

References: 1. Chen Y, Cao Q, Ding J, Hu C, Feng W, Hua K. Midterm prospective comparison of vaginal repair with mesh vs Prolift system devices for prolapse. European Journal of Obstetrics & Gynecology and Reproductive Biology. 2012;164(2):221-226.

# Psychology

## Abstract no.: 381

### FAMILIAR-LOOKING FACES INDUCE ANALGESIA

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**Background and aims**: Previous studies showed that the presence of affectively familiar individuals (i.e., significant figures such as parents, romantic partners or friends) has a pain-attenuating effect. The present study aimed to extend this literature by investigating whether strangers with different levels of non-affective familiarity may modulate pain perception as well.

**Methods**: To this end, 46 participants were presented with already seen faces (episodic group) or novel faces (non-episodic group), differing in intrinsic familiarity level (high vs. low), during a cold pressor test. Pain perception was measured on a numeric rating scale of 1–10 (where 1=no pain and 10= the worst possible pain).

**Results**: We found a significant interaction between group and intrinsic familiarity. Participants in the episodic group reported less pain intensity in the low condition compared to the high condition, while participants in the non-episodic group reported less pain intensity in the high intrinsic familiarity condition rather than the low condition.

**Conclusions**: Consistent with the idea that familiarity may signal safety, these results reveal that the presence of non-affectively familiar individuals seems to be enough to induce a reduction in pain perception, supporting the idea that humans can take advantage of episodic (based on previous encounters) or intrinsic (based on physical traits resembling known individuals) familiarity to reduce threat- or distress-related responses in their presence.

## Abstract no.: 406

### DISTRESS INTOLERANCE AND PAIN CATASTROPHIZING AS MEDIATING VARIABLES IN THE COMORBIDITY BETWEEN PTSD AND CHRONIC PAIN

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**Background and aims**: Several studies have shown comorbidity between posttraumatic stress disorder (PTSD) and chronic pain. However, there is a lack of research on the psychological variables that might explain the co-occurrence between these two disorders. The aim of this study was to examine the interaction effect of PTSD severity, distress intolerance, pain catastrophizing, and perceived pain intensity. With this purpose a moderated mediation model was tested.

**Methods**: The sample consisted of 114 patients with chronic non-oncological pain (90 women and 24 men) with a mean age of 60.04 (SD = 9.76).

**Results**: Moderated mediation analysis showed a significant effect of catastrophizing on PTSD. In addition, distress intolerance mediated the relationship of PTSD and pain.

**Conclusions**: The findings of this study provide new insights into psychological variables that may explain the comorbidity between PTSD and chronic pain.

## Abstract no.: 441

### THE RELATIONSHIP BETWEEN CHILD PAIN-RELATED INJUSTICE APPRAISALS AND PAIN-RELATED ATTENTION, ANGER, SADNESS, AND MATERNAL (NON-)PAIN-ATTENDING BEHAVIOR: A PRELIMINARY INVESTIGATION

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**Background and aims**: Research among adult and child samples, both with and without chronic pain, indicates that pain-related injustice appraisals are associated with adverse pain-related functioning. Research among adults has suggested a number of potential underlying mechanisms that could account for the negative impact of pain-related injustice appraisals. This study extends this field of research to children and the interpersonal domain, examining the relationship between pain-related injustice appraisals and child feelings of anger, sadness, pain-related attention bias, and maternal pain-attending behavior.

**Methods**: Participants comprised 41 healthy mother-child dyads. Children underwent a painful cold pressor task (CPT) while their mother observed. Next, children completed a pain-related attention bias task. In addition, they rated pain-related injustice appraisals prior to and feelings of anger and sadness after CPT completion. Finally, maternal pain-attending behavior was recorded after CPT completion.

**Results**: Kendall partial correlation analyses, conditioned on child sex, age, and pain catastrophizing, indicated a positive association between child pain-related injustice appraisals and child sadness and child anger. No associations were found with child pain-related attention bias or maternal pain-attending behavior.

**Conclusions**: This study adds to the emerging literature on child pain-related injustice appraisals by indicating child sadness and anger as potential underlying mechanisms. Additionally, concrete suggestions are given to guide future research in this domain.

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## Abstract no.: 525

### THE FEAR-AVOIDANCE-ENDURANCE MODEL OF VULVODYNIA: DEVELOPMENT AND VALIDATION

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**Background and aims**: Recurrent and idiopathic vulvovaginal pain in the form of vulvodynia is common and has devastating effects for those affected. Psychological factors have been highlighted as important for the development and maintenance of vulvodynia. Specifically, pain-related behaviors such as pain catastrophizing, avoidance, and endurance (i.e., persistence with painful intercourse) characterizes the condition. However, knowledge on the motivations behind such pain-related behaviors and how they are interconnected is lacking.

In this study, a new theoretical model will be proposed, entailing two main pathways: one of avoidance behavior and one of endurance behavior, with interpersonal factors as a contextual surrounding framework. The aim of the study is to explore and validate the Fear-avoidance-endurance model of vulvodynia through assessing the links between pain-related behavior, catastrophizing and motivation.

**Methods**: The current study uses self-report baseline data from an ongoing RCT examining the effect of cognitive behavioral therapy on vulvodynia ($N$ = 80). Motivational goals are measured with the Approach Avoidance Sexual Goals Questionnaire (AASQ), catastrophizing is measured with the Vaginal Penetration Cognitions Questionnaire (VPCQ), and avoidance and endurance behavior is measured with the CHAMP Sexual Pain Coping Scale (CSPCS).

**Results**: Data analysis is in progress and will be completed early 2022. Results of the study will be presented and discussed at the conference.

**Conclusions**: The Fear-avoidance-endurance model was developed to enhance the theoretical understanding of vulvodynia. Validation of the model will result in a deepening of current knowledge and serve as a theoretical basis for future treatment development.

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## Abstract no.: 549

### DYSFUNCTIONAL NEURONAL PAIN MODULATION THROUGH EXPERIENCED CONTROL IN FIBROMYALGIA PATIENTS

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**Background and aims**: The perceived lack of control during repetitive pain attacks is one of the most considerable causes of the impaired life quality reported by chronic pain patients. The way perceived control affects subjective pain, as well as the underlying neural mechanisms, are not yet fully known in pain patients and have thus far mainly been investigated in healthy control subjects (HC). Our study aimed to explore the modulation of experimental pain stimuli with regard to the experience of control in patients with fibromyalgia (FM) and HC.

**Methods**: Functional magnetic resonance imaging (fMRI) was used to compare the neural correlates of self-controlled and externally-controlled heat stimuli that were physically identical regarding their intensity and duration.

**Results**: In line with previous investigations on HC, our control group displayed activations in a number of specific brain areas, that appear to play an important role in the modulation of pain. These were primarily the anterolateral (alPFC) and right dorsolateral prefrontal cortex (DLPFC) as well as the dorsal part of the anterior cingulate cortex (dACC). Interestingly, we were not able to find similar activations in our patient group.

**Conclusions**: This may serve as evidence for dysfunctional neural pain modulation in FM patients, and illustrates a limitation to their cognitive resources in dealing with acute pain.

Acknowledgements: This study was founded by a grant from the Deutsche Forschungsgemeinschaft DI1553/5.

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## Abstract no.: 569

### THE LIVED EXPERIENCE OF LOSS IN CHRONIC PAIN: RECOGNISING GRIEF AND STRENGTH THROUGH PATIENT-LED ACTION RESEARCH

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**Background and aims**: Many live with severe, disabling levels of chronic pain, accumulating pervasive life losses. Despite growing evidence that non-finite losses can lead to grief, scant literature connects chronic pain loss with expected grief trajectories. Little specific vocabulary exists to describe the experience of losses in living with chronic pain. Few therapeutic interventions create awareness or support those in pain recognising and understanding their response to these losses.

**Methods**: Based in an Irish acute hospital Pain Management Programme, a patient-initiated collaborative project team created a narrative-based action research study, with focus groups and personal writing to explore themes of loss, grief and strength in living with chronic pain. Due to COVID-19 restrictions, the hospital-based clinical study has not yet progressed to implementation. Meanwhile, the patient-researcher used project methodology to review the literature and to analyse autoethnographic longitudinal data (i.e., email, WhatsApp).

**Results**: Through reflextive thematic analysis, patterns of grief characteristics were recognised throughout the data. Themes included a battle to face living with loss, the ensuing grief, and a need to tell about it. Themes strongly correspond to grief models, grief assessments and the chronic pain literature. This correlation indicates that for the author, the lived experience of loss in chronic pain has resulted in an ongoing grief experience including strength, specifically resilience and post-traumatic growth.

**Conclusions**: Significant overlap of the data with grief models and chronic pain literature suggests that others may also experience grief and strength in response to loss in living with chronic pain, warranting further research in this area.

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## Abstract no.: 604

### ADAPTIVE CODING OF PAIN PREDICTION ERROR IN THE ANTERIOR INSULA

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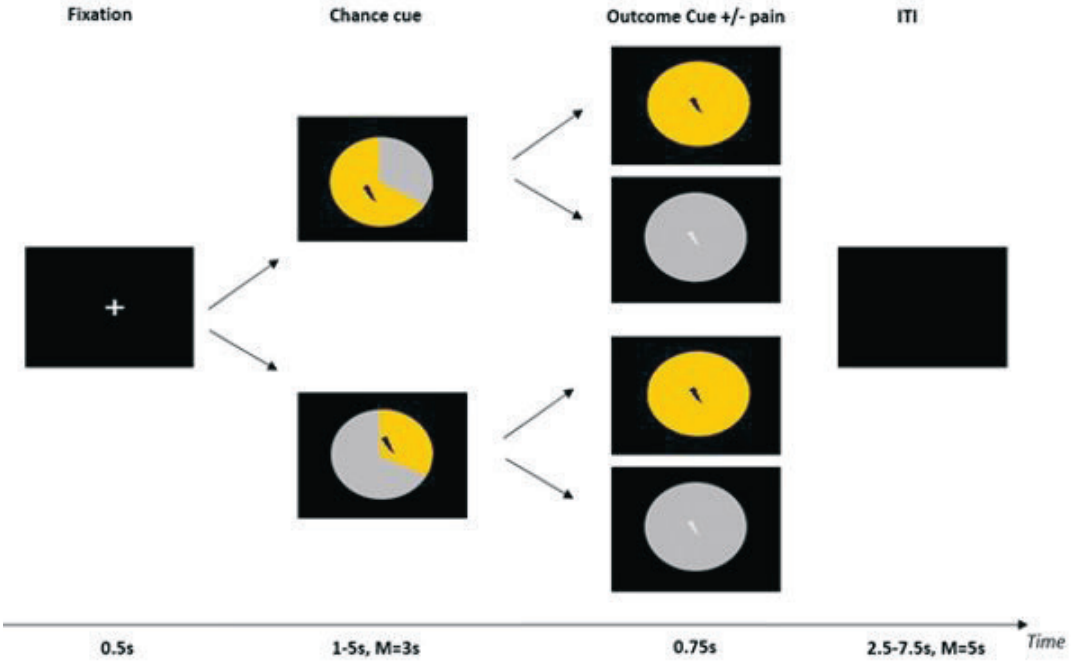
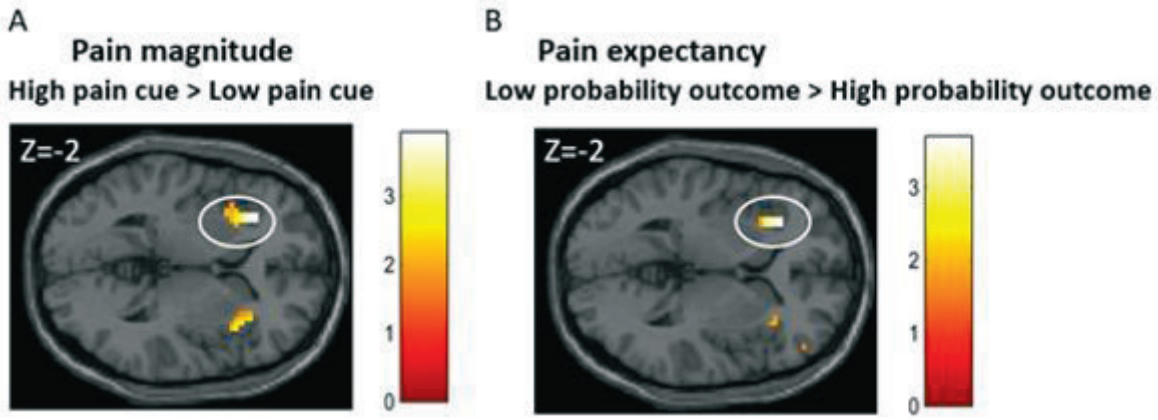
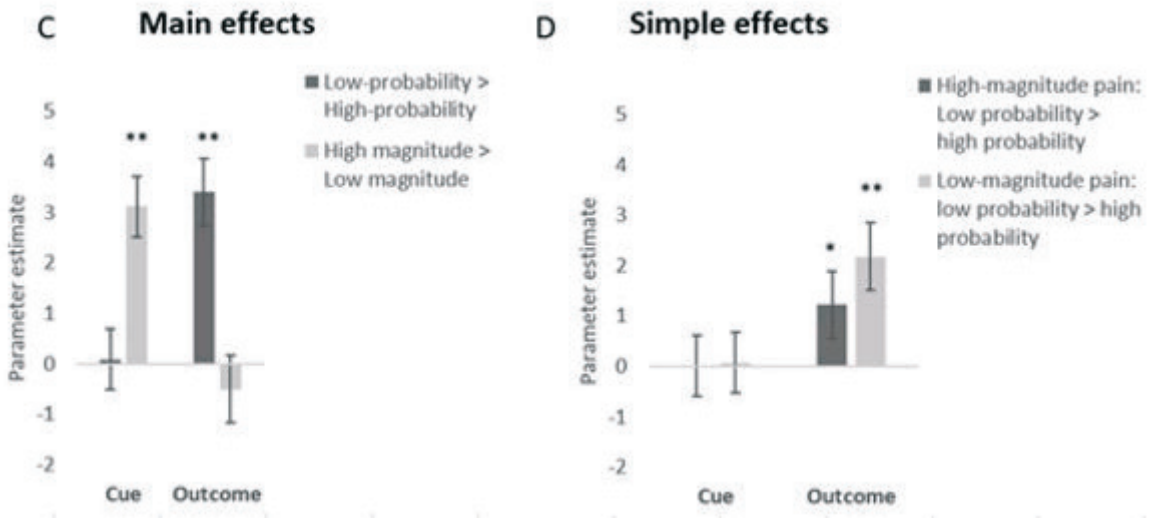
**Background and aims**: To reduce the computational demands of the task of determining values, the brain is thought to engage in 'adaptive coding', where the sensitivity of some neurons to value is modulated by contextual information. There is good behavioural evidence that pain is coded adaptively, but controversy regarding the underlying neural mechanism. Additionally, there is evidence that reward prediction errors are coded adaptively, but no parallel evidence regarding pain prediction errors.

**Methods**: We tested the hypothesis that pain prediction errors are coded adaptively by scanning 19 healthy adults with fMRI while they performed a cued pain task. Our analysis followed an axiomatic approach (Caplin & Dean, 2008; Rutledge et al., 2010).




**Results**: The analysis identified peaks in the posterior insula bilaterally corresponding to greater activation to high vs low pain. The left anterior insula was the only region which was sensitive both to predicted pain magnitudes and the unexpectedness of pain delivery, but not to the magnitude of delivered pain.






**Conclusions**: Upon cue presentation, the left anterior insula responded more to the anticipation of high than low pain. Upon pain delivery, it responded more to low-probability compared to high-probability pain. Crucially, despite its sensitivity to pain magnitude when it was only predicted, and pain probability when it was actually delivered, it insensitive to the magnitude of pain during delivery. This pattern suggests that the left anterior insula is part of a neural mechanism that serves the adaptive prediction error of pain.

## Abstract no.: 654

### THEORETICALLY INFORMED RECOMMENDATIONS FOR AN OPIOID WEANING INTERVENTION TARGETING CHRONIC NON-CANCER PAIN PATIENTS IN PRIMARY CARE

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**Background and aims**: Primary care is a key point of contact and source of opioid prescribing for managing Chronic Non-Cancer Pain (CNCP), making it an ideal place to deliver an opioid weaning intervention. There are no formal guidelines and limited evidence on effective approaches to weaning CNCP patients safely and effectively. Intervention development is improved when it is theoretically informed and has Patient and Public Involvement (PPI). This study used the Behaviour Change Wheel (BCW) to provide a framework for developing an intervention to support opioid weaning in that would be feasible and acceptable for use in primary care.

**Methods**: Using the BCW, qualitative findings from interviews with Health Care Professional (HCPs) and CNCP patients alongside existing literature informed functions and relevant behaviour change techniques for the opioid weaning intervention. Follow-up focus groups with 8 HCPs and 3 CNCP participants presenting recommendations for the intervention, were carried out to establish the acceptability and feasibility of the recommendations.

**Results**: Participants responded positively to the intervention content and agreed it is important to engage and sustain patients' adherence to weaning plans. Targeting and reducing patients' fear and anxiety through improving information and support may help with this. Six intervention functions and 24 unique behavioural change techniques are recommended to help deliver this change.

**Conclusions**: Managing opioid weaning in the community presents a significant challenge for both GPs and patients. HCPs and patients accepted the recommendations proposed and a pilot study has been set up to establish the acceptability and success in primary care practice.

## Abstract no.: 736

### EXPLORING THE LIVED EXPERIENCE OF ADOLESCENT IDIOPATHIC SCOLIOSIS BEFORE AND AFTER SPINAL FUSION SURGERY: A LONGITUDINAL INTERPRETATIVE PHENOMENOLOGICAL ANALYSIS

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**Background and aims**: 35% of adolescents with scoliosis report pain before surgery, with 15%-25% suffering from recurrent post-surgical pain. Scoliosis can negatively affect a person's sense of self and body image, leading to distortions in how a person sees him or herself. Friendships and social relationships can also become strained due to adolescents not being allowed to participate in sports or being temporarily inactive in their social circle. Existing qualitative research exploring the impact of scoliosis on the lives of adolescents has done so either before or after surgery. To date, no qualitative research has been carried out exploring this experience longitudinally. Using a longitudinal Interpretative Phenomenological Analysis design, the current study aims to explore the lived experience of adolescents with adolescent idiopathic scoliosis before and after spinal fusion surgery, broadly exploring the impact that adolescent idiopathic scoliosis can have on pain, body image and personal relationships.

**Methods**: Semi-structured interviews will be conducted with 4 – 12 adolescents with adolescent idiopathic scoliosis at 4 time points – (i) 2 – 12 weeks before surgery; (ii) 8 – 12 weeks after surgery; (iii) 6 months after surgery; and (iv) 1 year after surgery.

**Results**: This study is ongoing.

**Conclusions**: The current study will provide a unique perspective on the lives of adolescents with scoliosis before and after surgery. By using a longitudinal Interpretative Phenomenological Analysis design to explore these experiences, this study will be able to follow adolescents through their scoliosis journey and provide a unique insight into these experiences throughout this journey.

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## Abstract no.: 749

### EXPLORING THE EFFECT OF BACKGROUND SOCIAL CONTEXT ON THE RECOGNITION OF FACIAL EXPRESSIONS OF PAIN

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**Background and aims**: Background environment affects the recognition of objects, including facial expressions. Since it is unclear whether this effect also occurs for pain, this study aimed to determine whether background social environment affects the recognition of facial expressions of pain. A secondary aim was to consider the gender context, comparing recognition rates for men and women.

**Methods**: Following ethical committee approval, 135 adults (93 female; 42 male) viewed images of men and women displaying pain or a neutral facial expression on a computer monitor. The images were embedded within two types of neutral background scene: one comprising social images with people, the other was non-social. Facial expression images and background scenes were derived from validated stimuli sets. Participants were instructed to indicate whether the image depicted a pain expression or not.

**Results**: Analysis was conducted on mean correct response times. Main effects were found for Scene (nonsocial = 1528 msec; social = 1710 msec, $F(1,133)=301.49$, $p<.001$) and Expression Type (neutral = 1645 msec; pain = 1592 msec, $F(1,133)=13.38$, $p<.001$). A Gender and Expression Type effect ($F(1,133)=7.05$, $p<.01$) found men were slower at detecting pain compared to neutral expressions; women were equally fast. A Scene and Expression Type interaction ($F(1,133)=12.08$, $p<.001$) found detection was faster for pain than neutral expressions in non-social scenes, but not in social scenes

**Conclusions**: The social and gender context can separately affect pain expression recognition. This offers a new approach to exploring nonverbal pain communication where background environment is incorporated to reflect naturalistic settings.

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## Abstract no.: 782

### COLORS OF PAIN. THE ROLE OF PAIN MODALITY IN THE EFFECT OF COLORS ON PAIN PERCEPTION

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**Background and aims**: Colors are an important part of people's lives and have been proven to have an effect on pain perception. Yet, little is known about factors affecting that influence. The aim of this study was to investigate whether the type of pain modality affects the impact of colors on pain intensity perception.

**Methods**: In this experimental study, 74 participants were divided into 2 groups. Both groups underwent the same procedure, which consisted of calibration, main task and follow-up questionnaire. Depending on the group, a different type of painful stimulus was used, thermal or electrocutaneous. In the main task, pain stimuli of the same intensity were preceded by slides of different colors. Participants rated pain intensity after each pain stimulus was applied. Additionally, expected pain intensity related to each color was rated at the beginning and at the end of the main task.

**Results**: Statistical analysis revealed a significant effect of color ($p < 0.001$) on pain intensity ratings. The perceived pain after red was the highest in both groups, whereas the lowest ratings were after control color (black) and white. Moreover, pain was perceived as more intense after red compared to both green and blue.

**Conclusions**: The study replicated previous findings on the effect of colors on pain perception. It seems that the effect of colors themselves is more important than the type of pain felt. Therefore the influence of colors on pain is the aspect which should be carefully considered while designing future experiments and pain therapies.

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## Abstract no.: 790

### PLACEBO HYPOALGESIA AND NOCEBO HYPERALGESIA INDUCED BY OBSERVATIONAL LEARNING: A SYSTEMATIC REVIEW

M. Wasylewski[1], E.A. Bajcar[1], S.H. Meeuwis[1], H. Bieniek[1], W.M. Adamczyk[1,2], S. Honcharova[1], M. Di Nardo[3], G. Mazzoni[3], P. Bąbel[1]

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**Background and aims**: Observational learning (OL), the process of learning behaviors by observing other people, is one of the mechanisms underlying placebo/nocebo effects, yet no systematic review has summarized placebo/nocebo effects induced by OL. Our review aims to qualitatively and quantitatively assess the available data on OL as a mechanism of placebo hypoalgesia and nocebo hyperalgesia in healthy volunteers and patients with pain.

**Methods**: Eight databases were searched as well as references of included studies. Studies were included if (1) they enrolled healthy volunteers or patients with any pain condition; (2) OL was used to induce placebo/nocebo effects in pain. No restrictions regarding publication date were applied. Studies were screened for eligibility and assessed by two independent assessors. Data regarding study and participant characteristics, mean pain intensity, expectancy, and unpleasantness, as well as empathy were extracted from included studies. Risk of bias was assessed using modified Downs and Black checklist. Results of comparable studies were pooled together; studies that were insufficiently similar were assessed qualitatively.

**Results**: Twenty one trials were included in the review. In studies featuring parallel groups design, placebo/nocebo effects were stronger in the experimental compared to noobservation control groups. The observer's empathy showed a weak positive correlation with placebo/nocebo effects magnitude.

**Conclusions**: Our review offers new insights into how various types of OL shape placebo and nocebo effects and the role that expectancy and empathy may have in this process. The potential practical implications for clinical practice of the review findings are discussed.

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## Abstract no.: 954

### EFFECT OF VERBAL SUGGESTION ON TEMPORAL PAIN CONTRAST ENHANCEMENT IN HEALTHY VOLUNTEERS

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*[1]Universität zu Lübeck, Lübeck, Germany, [2]Academy of Physical Education, Katowice, Poland*

**Background and aims**: A frequently used paradigm to quantify endogenous pain modulation is offset analgesia (OA), which is defined as a disproportionately large reduction in pain following a small decrease in a heat stimulus. The aim of this study was to determine whether verbal and visual suggestions would influence the magnitude of offset analgesia in healthy participants.

**Methods**: A total of 102 participants were randomized into three groups (hypoalgesia group, no-change group, control group). All participants received four heat stimuli (two constant trials and two offset trials) to the volar, non-dominant forearm while they were asked to simultaneously rate their perceived pain using a computerized visual analog scale. Furthermore, the electrodermal activity (EDA) was measured during each heat stimulus. Participants in both intervention groups were given a visual and verbal suggestion about the expected pain response biased either towards hypoalgesia or towards hyperalgesia. The control group received no suggestions.

**Results**: In all groups, a significant OA response was observed in pain ratings ($p<0.001$) and in EDA signals ($p<0.01$). A significant group difference for OA was found between the three groups [$F(2,94)=4.808$, $p=0.010$]. Participants in the hyperalgesia group perceived significantly more pain than in the hypoalgesia group ($p=0.031$) and in the control group ($p=0.022$). However, the EDA data did not replicate this trend ($p>0.05$).

**Conclusions**: The results of this study indicate that verbal and visual suggestions can be effective to reduce but not increase endogenous pain modulation in healthy participants for subjective but not for objective pain assessment.

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## Abstract no.: 984

### HOW DO HETEROSEXUAL COUPLES EXPERIENCE LIVING WITH VULVODYNIA, AND HOW DO THEY COMMUNICATE ABOUT THE DISORDER?

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**Background and aims**: Vulvodynia is a chronic genital pain disorder with a high lifetime prevalence among women. It has a significant negative impact on both the women and their partners, often increasing psychological distress. While there is a growing body of literature on the experiences of women with vulvodynia, there is scarce research on the effects it has on partners and romantic relationships. The following study aims at exploring the experiences of both patients and partners, in particular how it affects and is dealt with by heterosexual couples.

**Methods**: Eight Norwegian women diagnosed with vulvodynia by gynecologists were recruited with their partners (couples aged 19-32 years). Data was collected with individual semi-structured interviews and analyzed with inductive thematic analysis.

**Results**: Both relationship and pain duration ranged from one to more than ten years. The results of the data material were structured into three main themes: 1) Mysterious disorder, 2) Social exclusion, and 3) Sexual expectations. The results show that the couples struggle with understanding the pain, as well as navigating their social and sexual lives.

**Conclusions**: Lack of understanding of vulvodynia in the health care system and in the general public, makes it difficult for couples to communicate openly with each other, with health care workers, and with their social network. Communication difficulties increases feelings of helplessness and loneliness, while social expectations of male and female sexuality give rise to guilt and shame for both men and women when they face sexual problems due to vulvodynia.

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## Abstract no.: 994

### SOCIAL INTEGRATION OF ADOLESCENTS WITH CHRONIC PAIN: A SOCIAL NETWORK ANALYSIS

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*[1]Ghent University, Ghent, Belgium, [2]Rijksuniversiteit Groningen, Groningen, Netherlands, [3]Örebro University, Örebro, Sweden, [4]University of Ottawa, Ottawa, Canada*

**Background and aims**: Adolescents with chronic pain (ACPs) often experience deficiencies in their social functioning. Little is known about the consequences of these deficiencies on ACPs' peer relationships. The current study applied social network analysis to examine whether adolescents with more pain problems are less popular (RQ1), whether adolescents with similar pain problems name each other more often as being part of the same peer group (RQ2), whether dyads with an adolescent having more pain problems report less positive (e.g., support) and more negative (e.g., conflict) friendship quality (RQ3), and whether positive and negative friendship quality moderate the relationship between pain and emotional distress (RQ4).

**Methods**: The current study utilized data from the first wave of a Swedish longitudinal study (N= 2767). For RQ1-3 Multiple Regression Quadratic Assignment Procedure was applied. For RQ4 standard multilevel models were estimated.

**Results**: Results showed that ACPs were not less popular than adolescents without chronic pain. Second, ACPs nominated each other more often as being part of the same peer group. Third, results regarding friendship quality showed that adolescents with more pain problems perceived the relationship with their friends as less positive and more negative than adolescents with less pain problems. Finally, positive and negative friendship quality moderated the relationship between pain and emotional distress.

**Conclusions**: In conclusion, ACPs appeared to be as popular as those without pain and tended to befriend each other when pain similarly impacts their lives. The need for qualitative friendships must be acknowledged as friendship quality buffered the impact of pain on emotional distress.

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## Abstract no.: 1002

### THE EXPLORATION-EXPLOITATION DILEMMA IN PAIN: DO REWARDS MATTER?

M. Alves[1], G. Crombez[2], A. Krypotos[3], J. Vlaeyen[1]

*[1]KU Leuven, Leuven, Belgium, [2]UGhent, Ghent, Belgium, [3]Utrecht University, Utrecht, Netherlands*

**Background and aims**: The Exploration-Exploitation Dilemma (EED) arises when individuals choose between a familiar option with known outcomes (i.e., exploitation) and a new option with unknown outcomes (i.e., exploration). According to previous evidence, when trying to solve the EED with potentially aversive (i.e., pain) and appetitive (i.e., reward) outcomes, individuals tend to exploit options associated with low chances of receiving pain and high chances of a reward. Here, we attempted to extend these findings by testing if participants start exploring more when the probabilities of a reward drop, leading participants to choose alternative options despite those options being linked to higher chances of a painful stimulus.

**Methods**: We used a 4-armed bandit task with four squares being on the edges of a computer screen. At each trial, participants performed a movement towards one of the squares using a joystick. Each square was associated with a complementary probability of receiving an electrocutaneous stimulus and a monetary reward. Halfway through the experiment, the probabilities of rewards were dropped to 10% for the four options.

**Results**: At first, participants mostly exploited the option with the lowest probability of pain and the highest probability of reward. After the contingency change, participants increased their exploration but mostly selected the options having the lowest probabilities of pain.

**Conclusions**: When solving the EED in presence of pain, participants were most interested in the reward, however, after contingencies' changes, they re-evaluated the situation and adjusted their choices by exploiting the most advantageous options.

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## Abstract no.: 1063

### DO YOU REALLY NEED SENSITIZATION TO ELICIT AN ALLODYNIC RESPONSE?

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**Background and aims**: Allodynia is present when a non-noxious stimulus leads to pain perception. It occurs after tissue damage which leads to peripheral and central sensitization. Hence, allodynia has been mostly viewed from a merely physiological perspective. However, some preliminary data suggest that allodynia can be a result of learning mechanisms such as classical conditioning.

**Methods**: Healthy volunteers were randomly assigned to one of the four groups: classical conditioning, verbal suggestion, conditioning combined with verbal suggestion or control group. In the conditioning group, subjects received painful stimulation together with conditioned stimulus presentation (CS+) and non-painful stimulation during control cue presentation (CS-). In a group exposed to conditioning combined with verbal suggestion, participants were additionally informed about contingencies used in the study. Namely, CS+ is associated with pain. In the group with suggestion alone, no conditioning was used. In the control group, neither suggestion nor conditioning took place. Behavioural (pain) and physiological (EEG) data were collected.

**Results**: Descriptive data show that neither conditioning nor suggestion alone leads to robust perceptual allodynic effects, but there is a trend for a large effect in group with combined conditioning and verbal suggestion. Inferential statistics for pain and EEG will be presented during the conference.

**Conclusions**: Based on previous studies on the role of learning mechanisms in pain it might be suggested that allodynia, under some circumstances, can be a centrally driven mechanism. Data from this project will contribute to the existing literature by showing whether conditioning or suggestion alone can lead to allodynia.

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## Abstract no.: 1095

### ON THE MODERATING INFLUENCE OF COMPETENCE ON PLACEBOHYPOALGESIA

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**Background and aims**: Placebo effects rely on positive treatment expectations and the actual learning experience successful pain reduction. However, the role of critical contextual factors such as the perceived competence of the health care professional - or the experimenter - are yet not well understood. To this end, we performed a “classical” placebo cream paradigm and asked participants how effective they believed the introduced analgesic ointment might be and let them rate how competent they experienced the performance of the experimenter.

**Methods**: Participants first underwent a placebo conditioning procedure, during which a placebo cream was paired with moderately painful heat pain stimuli, while highly painful stimuli were administered on skin patches, treated beforehand with a control cream. In the subsequent test phase, the procedure was repeated, however this time identical pain stimuli were administered on placebo and control patches. The placebo effect was determined as the difference in pain intensity and pain unpleasantness ratings. Treatment expectation and experimenter competence were captured with rating scales.

**Results**: Preliminary data analyses indicate successful placebohypoalgesia for pain intensity and pain unpleasantness ratings. Furthermore, the a priori estimated effectiveness of the cream was positively correlated with experimenter competence.

**Conclusions**: The present findings suggest that treatment expectancy, which is the crucial driver of the placebo effect, is associated with the perception of the competence of the person providing the treatment.

**Acknowledgement:** This work was funded by the intramural research funding program of the Medical Faculty of the University of Augsburg.

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# Societal impact

## Abstract no.: 319

### WORK CHARACTERISTICS IN FIBROMYALGIA PATIENTS - COMPARATIVE STUDY WITH OTHER PATIENTS WITH CHRONIC PAIN

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**Background and aims**: To acknowledge the differences in the workplace characteristics between patients with Fibromyalgia and patients with other disabling chronic pain syndromes.

**Methods**: 720 patients with Fibromyalgia (FM) and 235 patients with other chronic pain syndromes (Non-FM) were consecutively assessed by means of an occupational evaluation including a structured interview, in order to compare the workplace characteristics between groups.

**Results**: 95% of FM patients were female versus 71% in the Non-FM Group (p<0.01). Non-significant differences were observed in marital status or educational level. The duration of pain (96 (82) months in FM vs. 67 (74) months in Non-FM), the intensity of pain and fatigue, the number of tender points, and both depression and anxiety were significantly higher (p<0.0001) in FM patients. Non-significant differences between groups were observed in the age of onset of the first job, the type of profession, the type of activity, the effort level, the type of positions sustained during the working day, the ergonomic use of tools and materials, the type of kinetic chain, the degree of repetition, the effort and duration of the tasks at work, and the presence of occupational stress. At assessment, the percentage of patients in sick leave was similar (58% in FM vs. 67% in Non-FM). Patients with FM showed a lower History of Sick Leave (21% FM vs. 37% in Non-FM; p<0.001) and a lower degree of Dissatisfaction with job (10% FM vs. 18% Non-FM, p=0.007).

**Conclusions**: The workplace conditions of FM patients are similar to those observed in patients with other chronic pain syndromes.

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## Abstract no.: 1014

### THE COST OF CHRONIC PAIN - ESTIMATES FROM A MATCHED CASE-CONTROL STUDY

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**Background and aims**: Despite the high prevalence of chronic pain, there are only limited data on the actual costs for the society. Knowing the economic burden of a disease is important to make logical allocations of resources and to accurately prioritize research. The aim of the current study was to estimate the economic burden of chronic pain by describing incremental annual healthcare (direct) costs and work absence (indirect) costs for individuals with chronic pain compared to matched individuals without chronic pain.

**Methods**: A retrospective study based on a matched control cohort design using population-based data during 2004-2016. Two Norwegian health studies, the third wave of the Health Study in North-Trøndelag (HUNT3) and the sixth wave of the Tromsø Study (Tromsø6) were used to identify individuals with chronic pain (cases) and linked to four national register databases on healthcare resource use and work absence. Cases were matched to controls 1:1 by birth year (±1 year) and sex.

**Results**: In total,22,949 cases with matching controls were included (mean age 56 years; 59% females). The average direct cost per case was 4,510 € (CI: 4,375-4,644) compared to 3,021 € (CI: 2,915-3,127) among controls, thus, the difference in direct cost was 1,489 € in 2016 [4,510-3,021] (p <0.001). For those in working age (18-66 years, 74.4%), the indirect cost difference between individuals with and without chronic pain was 11,247 € in 2016 (CI: 10,549-11,945).

**Conclusions**: Chronic pain poses a great economic burden for the society, yet very little resources and funding are specifically allocated for the treatment and research of chronic pain.

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# Somatosensory system

## Abstract no.: 291

### INVOLVEMENT OF CD4+ AND CD8+ T-LYMPHOCYTES IN THE MODULATION OF NOCICEPTIVE PROCESSING EVOKED BY CCL4 IN MICE

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**Background and aims**: CCL4 is a chemokine involved in hypernociception associated to experimental conditions (neuropathy, inflammation). It has been showed that systemic administration of CCL4 induce either hyperalgesia or analgesia in a dose-dependent manner and that immune cells participate by releasing hyperalgesic or analgesic mediators. In particular, analgesia is mediated by endogenous opioids and hyperalgesia is related to increased IL-16 plasma levels. We explore the potential mechanisms involved in the transition of analgesia in hyperalgesia after CCL4 administration to mice.

**Methods**: Unilateral hot plate was used to assess thermal nociception. Selective antibodies were used to deplete $CD3^+$, $CD4^+$ and $CD8^+$ lymphocytes. CCR5 and IL-16 expression in $CD4^+$ and $CD8^+$ T-cells was studied by flow cytometry and IL-16 blood levels were measured by ELISA.

**Results**: Depletion of $CD3^+$ or $CD4^+$ lymphocytes by selective antibodies reverted CCL4-induced hyperalgesia. This anti-hyperalgesic effect was transformed into analgesia after CD4 receptor blockade or prevention of CCR5 receptor desensitization by A-770041. The resulting analgesia was opioid-related as the reversion by naloxone, naltrindole or an anti-met-enkephalin demonstrated. Similarly, $CD8^+$ depletion also transformed CCL4-induced hyperalgesia into analgesia. Flow cytometry experiments revealed that, CCL4 administration evoked IL-16 release from $CD8^+$ lymphocytes and accordingly, CCL4-evoked increase of IL-16 blood concentration was prevented after $CD8^+$ lymphocyte depletion.

**Conclusions**: CCL4-evoked hyperalgesia seems related to the release of IL-16 from CD8+ lymphocytes and the subsequent CD4-mediated desensitization of CCR5 in CD4+ T-cells.

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## Abstract no.: 326

### CEREBRAL PROCESSING OF NOCICEPTIVE STIMULI PREDICTS SLEEP DISRUPTION

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**Background and aims**: The probability for a phasic noxious stimulus to induce an arousal is modulated by the prestimulus phase-coherence between sensory and higher-level cortical areas, and the post-stimulus occurrence of a 'cognitive' wave ("P3") reflecting the activation of a widespread cortical network. The aim of this study, performed with intra-cerebral electrophysiological signals, was to characterize the post stimulus cortical network underlying sleep disruption.

**Methods**: Data were obtained in 17 epileptic patients receiving thermo-nociceptive stimulations during all-night sleep. Evoked responses and phase-coherence of the signal between sensory (posterior insula) and multi- or supramodal associative areas were compared according to presence or absence of a stimulus-elicited arousal during sleep N2 and paradoxical sleep (PS). Analyses were performed in two time-windows, 100-400 and 400-700 ms after the stimulus.

**Results**: Immediately before an arousal, the area under the evoked response was significantly enhanced, as compared to non arousing instances. This occurred in all sensori-motor and multimodal associative areas during N2 sleep, but only in multimodal associative areas during PS. In case of arousal there was also an increase in phase-coherence between the sensory posterior insula and higher-order brain areas, which was observed in the two time-windows during PS, but not during N2 sleep.

**Conclusions**: Indices of increased neuronal activity preceding immediately arousal reactions were global in N2 sleep, and concerned only multimodal associative areas in PS, perhaps because sensori-motor areas were already pre-activated during this sleep stage. Enhanced activation and functional connectivity between sensory and association areas may facilitate information transfer leading to arousal and conscious perception.

## Abstract no.: 450

# DIFFERENTIATING CORTICAL SOMATOSENSORY MAPS OF THE BACK WITH A NOVEL VIBROTACTILE STIMULATION DEVICE: "PNEUVID"

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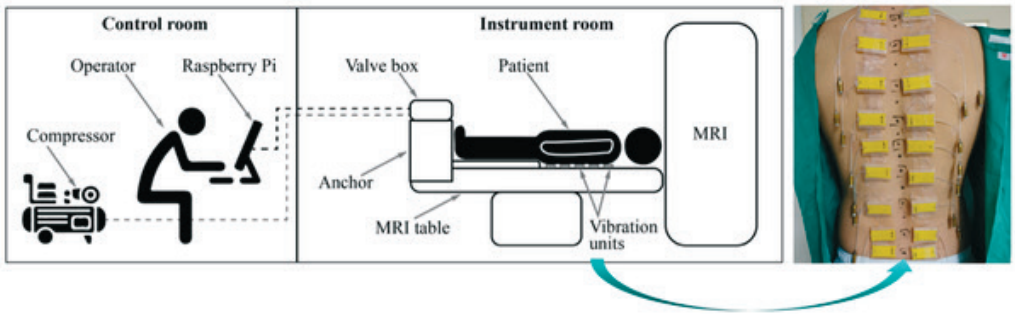
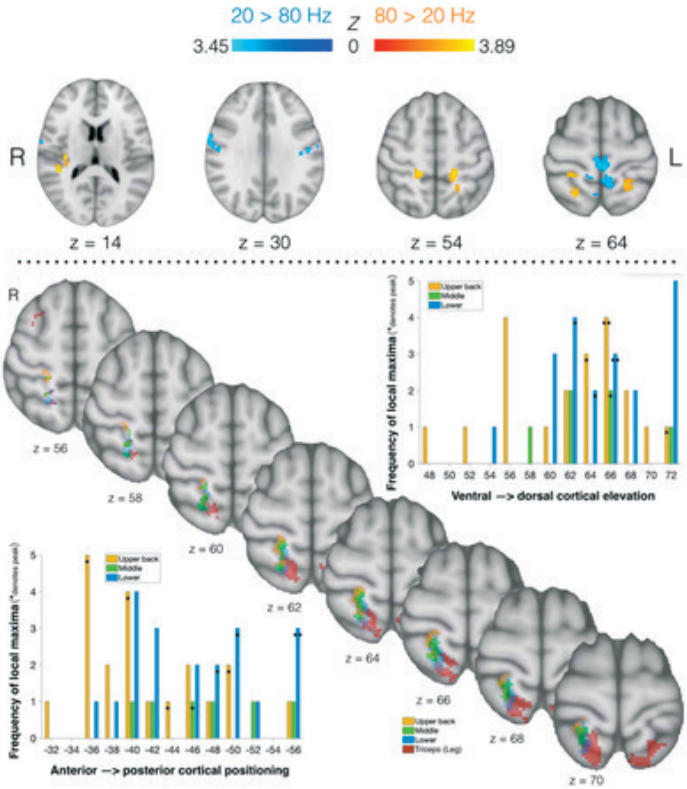
**Background and aims**: Persistent pain alters brain-body representations. However, cortical topographical changes of paraspinal afferent inputs in low back pain (LBP) remain to be systematically studied. We developed a novel method of mapping neural representations of tactile and proprioceptive afferents of the back, using vibrotactile stimulation at varying frequencies and paraspinal locations, in conjunction with brain functional magnetic resonance imaging (fMRI).

**Methods**: In a healthy volunteer (N=15) validation study, we hypothesised that low (20Hz) versus high (80Hz) frequency stimulation using "pneuVID", a novel fMRI-compatible vibrotactile stimulator (Fig.1), would be associated with neuronal activity in distinct primary somatosensory (S1) and motor (M1) cortical targets of tactile and proprioceptive afferents. Additionally, we expected neural representations to vary spatially along the thoracolumbar axis. The presented fMRI analyses were rigorously controlled for participant motion and non-neuronal physiological noise.




**Results**: We found significant differences between neural representations of low and high frequency stimulation and between representations of thoracic and lumbar paraspinal locations, in a number of bilateral sensorimotor cortical regions (Fig.2). Proprioceptive (80Hz) stimulation preferentially activated sub-regions S1[3a] and M1[4p], while tactile (20Hz) stimulation was more encoded in S1[3b] and M1[4a]. Moreover, in S1, lower back proprioceptive stimulation activated dorsal-posterior representations, compared to ventral-anterior upper back representations.



**Conclusions**: In line with our hypotheses, we found distinct sensorimotor cortical tactile and proprioceptive representations, with the latter displaying clear topographic differences between the upper and lower back. Future clinical investigations of detailed cortical maps will be of major importance in elucidating the role of neuronal reorganization in the pathophysiology of persistent LBP.

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## Abstract no.: 463

### PRESSURE PAIN THRESHOLDS ARE POSITIVELY CORRELATED WITH CIRCULATING ENDOCANNABINOIDS AND N-ACYLETHANOLAMINES

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**Background and aims**: The pain experience is due to complex central processing of ascending (incoming) signals (resulting from peripheral and central processing) and shaped by descending modulatory pathways. Individual differences in pain sensitivity are determined by the contribution of each of these systems. These differences can be quantified via quantitative sensory testing (QST). The rapidly changing landscape of cannabis legislation has led to many claims of cannabis as an analgesic. Yet, the role of the endocannabinoid (eCB) system in human pain remains unknown. Our lack of understanding of the role of the eCB system in pain limits our ability to develop effective analgesics targeting the eCB system. Here, we aim to address this gap by exploring the relationship between eCBs and static and dynamic QST.

**Methods**: Fifteen participants provided informed consent. They provided a blood sample that was processed to quantify plasma eCB (*N*-arachidonoylethanolamine–AEA; 2-arachidonoylglycerol–2-AG) and related *N*-acylethanolamines (*N*-palmitoylethanolamide–PEA; and *N*-oleoylethanolamide–OEA) using liquid chromatography-tandem mass spectrometry. They then underwent QST, including pressure pain thresholds (PPT), cold pressor test (CPT), conditioned pain modulation (CPM), and temporal summation of pain (TSP).

**Results**: We found that only PPT was significantly and positively correlated with plasma PEA, OEA and AEA concentrations (all $r>0.52$, $p<0.05$). These relationships were stronger when we performed partial correlations controlling for sex (all $r>0.58$, $p<0.05$). There were no correlations with 2-AG, or any of the other QST measures.

**Conclusions**: In sum, we present novel data that eCB and N-acylethanolamines are correlated with individual differences in pressure pain sensitivity.

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## Abstract no.: 618

### MODULATION OF ATTENTION TO PAIN BY REWARDING GOAL-DIRECTED ACTION

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**Background and aims**: Current affective-motivational models of pain processing suggest that pain-related attending is influenced by current goal pursuit. Surprisingly, although movements are often associated with pain, little is known about pain-related attending during goal-directed movements. The aim of this study was to investigate whether motor actions paired with reward would attenuate pain-related attending as a result of goal-shielding.

**Methods**: Healthy volunteers (N=19) performed a robotic arm conditioning task in which three motor actions were differently associated with conflicting (pain & reward), negative (pain), and neutral (no consequence) outcomes. During action execution, Somatosensory Evoked Potentials (SEPs) were obtained in response to innocuous tactile stimuli administered on a body location proximal or distal from painful electrical stimuli. We hypothesized that executing conflicting movements would reduce somatosensory attending (as compared to neutral and negative actions) in the pain-location.

**Results**: The 3 (movement type) by 2 (stimulus location) Repeated Measures ANOVA showed a main effect of stimulus location for the N120 component, with significantly larger amplitude in the pain-location compared to the safe-location, suggesting heightened somatosensory processing in the threatened body part. However, the hypothesis that this effect would be smaller for conflicting movements was not supported. Against expectations, the P200 component showed a main effect of movement type with significantly larger SEPs for conflicting compared to neutral movements, indicating that rewarded

actions did not induce goal-shielding effects, but rather induced an unspecific enhancement of somatosensory processing irrespective of the body location.

**Conclusions**: These preliminary results suggest that somatosensory attention is susceptible to the ongoing goal.

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## Abstract no.: 638

### LIPID RAFT MODIFICATIONS - A NOVEL METHOD IN PAIN RELIEF

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**Background and aims**: Transient Receptor Potential Vanilloid 1 and Ankyrin 1 (TRPV1, TRPA1) cation channels are expressed in nociceptive primary sensory neurons, and regulate nociceptor and inflammatory functions. TRPV1 can be activated by capsaicin (CAPS), resiniferatoxin (RTX), low pH and noxious heat. Allyl-isothiocyanate (AITC) and formaldehyde activate TRPA1. Lipid rafts are plasma membrane microdomains rich in cholesterol, sphingomyelin and gangliosides, form functional complexes with TRP channels. Sphingomyelinase (SMase), myriocin (Myr), or synthetic products, as our carboxamido-steroid (C1) and methyl-βcyclodextrin (MCD) are useful tool to disrupt rafts and significantly inhibited TRP channel opening. Our aim was to prove antinociceptive effect of lipid raft disruption in *in vivo* mouse models based on our earlier *in vitro* results.

**Methods**: Capsaicin-evoked acute nocifensive (“eye-wiping”) test, formaldehyde-evoked hyperalgesia, and RTX induced thermal allodynia and mechanical hyperalgesia model were performed to investigate the effects of SMase, Myr, C1 and MCD.

**Results**: C1, SMase and Myr decreased the CAPS-evoked “eye-wiping” movements, and Myr has a prolonged effect in this model. SMase and C1 significantly diminished the formaldehyde-induced nociceptive behavior time in the second phase. In the RTX-model SMase and Myr reduced the thermal allodynia, and SMase and C1 compound reduced the mechanical hyperalgesia.

**Conclusions**: Our in vitro and in vivo findings suggest that the hydrofobic interactions between the TRP channel and lipid raft interfaces modulate the opening properties of these channels. Targeting this interaction might be a tool for drug developmental purposes.

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## Abstract no.: 640

### INVESTIGATING THE IMPACT OF SPATIAL CONFLICT ON THE CROSSED-HANDS ANALGESIA PHENOMENON

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**Background and aims**: Considering the posture of a body in pain is crucial to defend it against the threatening stimulus responsible for the pain. Accordingly, nociceptive inputs are mapped according to both somatotopic and spatiotopic frames of reference, respectively taking into account the location of the stimulus on the body surface and the position of the painful body part in the external space. This co-mapping has been evidenced, among others, by applying nociceptive stimuli on the hands crossed over the body midline. This posture creates a misalignment between the two reference frames, and consequently, a conflict between the output responses (“my left hand is in my right side of space”, and vice-and-versa). Hence, this phenomenon is associated with a decreased perceived intensity of the nociceptive stimuli applied. To explain this effect, we tested the hypothesis following which the conflict encountered is resolved by realigning the two cortical maps. This process requires a cognitive effort, leaving out less resources available to process other stimulus features, such as its intensity.

**Methods**: Healthy volunteers were asked to rate their intensity perception of nociceptive radiant heat stimuli applied alternatively on both hands dorsa. Intensity ratings were compared between a crossed vs. uncrossed hands posture. In addition, predictability regarding location of the stimulus was manipulated by applying stimuli on a single hand (predictable condition) or variably between the two hands (unpredictable condition).

**Results**: We did not observe any crossed-hands analgesia effect.

**Conclusions**: We therefore failed to replicate previous findings according to which crossing the hand affects intensity perception.

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## Abstract no.: 680

### INVESTIGATING THE SOMATOSENSORY PHENOTYPE OF PEOPLE WITH PARKINSON'S DISEASE

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**Background and aims**: Up to 80% of people with Parkinson's (PwP) experience chronic pain. A lack of adequate treatment for this major non-motor symptom is due to equivocal knowledge regarding the underlying mechanisms responsible for its initiation and maintenance. Previous clinical studies have produced conflicting results regarding central manifestations of dysfunctionality in PwP. Thus, the current study aims to apply psychophysics to distinct cohorts of PwP to create sensory profiles .that inform on the body's natural ability to sense and modulate pain

**Methods**: We will recruit 45 PwP with chronic pain and 45 PwP without chronic pain from the Parkinson's Foundation Centre of Excellence at Kings College London. Everyone will undergo quantitative sensory testing (QST), temporal summation of pain (TSP) and conditioned pain modulation (CPM), whereupon psychophysics read outs will be linked to the Kings Parkinson's Pain Scale (KPPS) and quiz (KPPQ) data. Personalised 'sensitivity profiles' will be generated and compared with 45 .healthy age and sex matched controls

**Results**: Recruitment for this study will begin in November 2021. We anticipate stratifying patients according to their QST .(profile and spinal mechanisms of pain facilitation/inhibition (with TSP and CPM respectively

**Conclusions**: If central pain processing abnormalities are revealed only in the PwP with chronic pain group, a mechanism underlying the pain phenotype will be intimated. Meanwhile, if central pain processing abnormalities are revealed in all PwP, regardless of the presence of chronic pain, a mechanism underlying Parkinson's itself will be interpreted. Future studies will .be borne according to the results collected

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## Abstract no.: 709

### FUNCTIONAL CONNECTIVITY OF SALIENCE AND SENSORIMOTOR NETWORKS PREDICTS RESPONSES TO MIND-BODY THERAPIES IN PATIENTS WITH FIBROMYALGIA: THE EUDAIMON PROJECT

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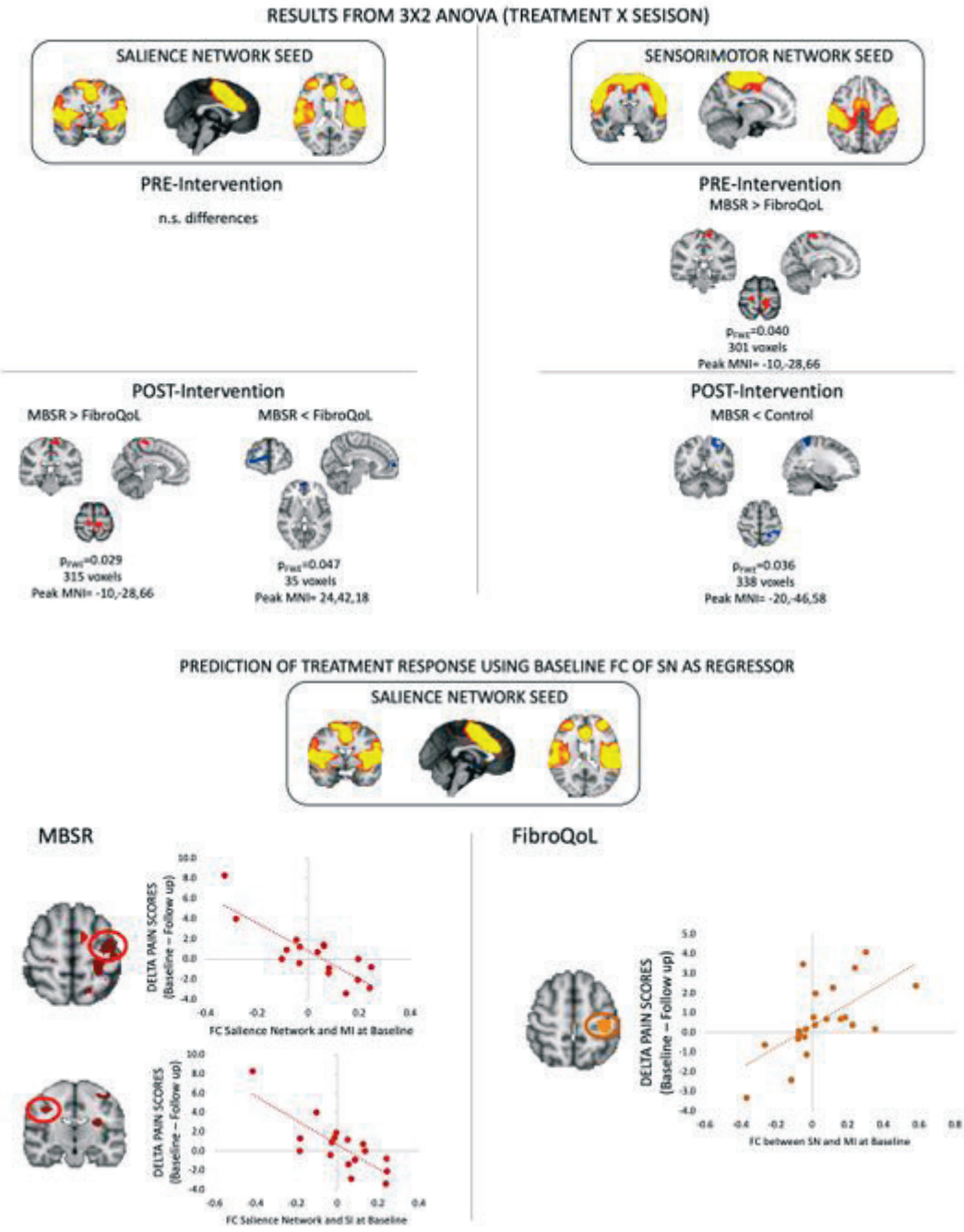
**Background and aims**: Reliable biomarkers and predictors for response to non-pharmacological treatments in Fibromyalgia are still unknown. We employed resting state blood oxygen level dependent (rsBOLD) functional magnetic resonance imaging (fMRI) to examine changes in brain functional connectivity (FC) networks due to treatment and how they relate to pain symptoms.

**Methods**: We recruited patients with Fibromyalgia undergoing either mindfulness-based stress reduction training (MBSR, n=17) or a psychoeducational programme (FibroQoL, n=22), and a control FMS group with no add-on treatment (n=17). We acquired fMRI and self-report measures both at baseline and following interventions to examine treatment-related changes in FC across groups via a mixed ANOVA. We performed regression analyses to assess whether baseline FC predicted treatment outcome, focusing on the salience network (SN) and sensorimotor networks (SMN).

**Results**:




Following treatment, FC of SN increased with primary somatosensory cortex (SI) but diminished with the dorsolateral prefrontal cortex in the MBSR, compared to the FibroQoL group. Baseline FC of SI with the rest of the SMN was stronger in the MBSR group than in the other treatment arms, but became significantly lower than in the control group at follow up. Finally, FC between the SN and the SMN at baseline was negatively correlated with pain reductions after MBSR, but positively correlated with pain reductions in the FibroQoL group.

**Conclusions**: Our results indicate that different mind-body treatments are underpinned by discrete brain networks. We provide preliminary evidence that functional integrity between SN and SMN has potential as a novel predictor of treatment response in patients with Fibromyalgia.

## Abstract no.: 742

### DECREASES IN THE DEFAULT MODE NETWORK CONNECTIVITY FOLLOWING 24 HOURS OF CAPSAICIN-INDUCED PAIN WERE INDEPENDENT OF CHANGES IN PAIN INTENSITY: PRELIMINARY ANALYSIS

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**Background and aims**: Experimental models of prolonged pain can shed more light on the cortical mechanisms underlying the transition from acute to chronic pain such as changes in resting state functional connectivity (rsFC). This study determined the effects of 24-hour-capsaicin application on the rsFC of the default mode network (DMN), a prominent network in the dynamic pain connectome.

**Methods**: Electroencephalographic (EEG) rsFC measured by Granger causality was acquired from 7 healthy right-handed volunteers (3 females) at baseline, 1-hour, and 24-hour following the initial patch application (placebo or capsaicin). Pain was induced using a topical capsaicin patch (or placebo as control) on the right forearm and intensity was reported on a 0-10 numerical rating scale (NRS). At 24 hours, the patch was cooled down then heated up to assess rsFC changes in response to pain relief and facilitation.

**Results**: The preliminary results show that capsaicin-induced pain NRS scores were 5.3±0.5 and 3.1±0.5 at 1-hour and 24-hour capsaicin application, respectively. Decreased rsFC at alpha oscillations was found at 1hour and 24hours for 3 DMN connections: medial prefrontal cortex (mPFC)-posterior cingulate cortex (PCC) (1h;P=0.036, 24h;P=0.03), right angular gyrus (AG)-PCC (1h;P=0.027, 24h;P=0.017), and right AG-mPFC (1h;P=0.03, 24h;P=0.004). At 24 hours, pain intensity was reduced by cooling (0.3±0.2, P<0.004) and rekindled by heating (3.5±0.8). Cooling/heating did not change rsFC for the three connections.

**Conclusions**: This preliminary analysis shows that 24-hour cutaneous pain can induce robust and lasting changes in rsFC of the DMN independent of pain relief and facilitation, which may reflect mechanisms contributing to persistent pain.

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## Abstract no.: 759

### MODIFICATION OF COLD PERCEPTION WITH AGE: A QST AND EVOKED POTENTIAL STUDY

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**Background and aims**: In humans, cold sensations are usually explored by applying a negative temperature gradient, starting from skin temperature (i.e. 32°C on average). However, studies in animals have shown that Aδ fibers, which underlie cold sensations, have an activation range beyond skin temperature, up to 42°C. The aim of this study is to evaluate the cold sensations conveyed by Aδ fibers over the temperature range 0-40°C in elderly people to better understand the alteration of thermal perception with age.

**Methods**: Two experiments were performed in young adults and healthy seniors. In experiment 1, participants' cold detection threshold was measured with an adaptive staircase method (baseline temperature 40°C). In experiment 2, 10 stimuli between 36 and 0°C (4°C steps, baseline temperature 40°C) were presented 15 times each. We recorded the rate of cold detection and the associated evoked potentials.

**Results**: Experiment 1 results' showed that, starting from 40°C, younger subjects have an average cold detection threshold higher than elderly subject (i.e. 35°C vs 34°C).

Experiment 2 showed that between 24-36°C, cold discrimination was higher in younger subject than elderly, but no differences were observed between both groups below 24°C. Finally, for each stimulus, the latency of N2P2 component would correspond to the conduction velocity of Aδ fibers.

**Conclusions**: All participants, regardless of age, perceive cold above skin temperature and this sensation is supported by Aδ fibers' activation. In contrast, cold discrimination is poorer in older subjects in the 24-36°C range, opening new perspectives for assessing changes in cold-sensitive Aδ fibers with age.

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## Abstract no.: 772

### THE EFFECT OF HFS-INDUCED CENTRAL SENSITIZATION ON RESTING STATE EEG

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**Background and aims**: We aimed to understand the relationship between resting state EEG before and after High Frequency Stimulation (HFS) of volar forearm and the long-lasting increase in pain senstivity in both stimulated and surrounding area. For this purpose, we focused on the modulation of the spectrum of the resting state EEG before and after HFS.

**Methods**: HFS (5 trains of 100 Hz electrical pulses lasting 1 sec each and delivered with a 10 s inter-train interval) was delivered to the right volar forearm of 32 healthy participants.We evaluated subjects' sensitivity to pinprick stimulation before and 30 minutes after HFS.

Resting state EEG (60 sec eyes closed, 64 channels EEG) was recorded before HFS and 30 minutes after.

The spectral content was analyzed offline using Fast Fourier Transform (FFT) on half-overlapping 5 seconds segments.

Four different frequency bands were analyzed after averaging the signal from central electrodes C3 and C4 : delta (0–4 Hz), theta (4–8 Hz), alpha (8–12 Hz) and beta (12–30 Hz). Paired-t tests were used to test for differences in power spectrum before versus after HFS within each bandwidth.

**Results**: 30 minutes after HFS, a significant increase in alpha power (p=0.012) was observed in central electrodes. The power of other frequency bands was not significantly changed after HFS.

**Conclusions**: We were able to replicate previous results showing an increase in alpha power 30 minutes after applying HFS. We were not able to understand the functional significance of theses changes and their link with HFS induced changes in pain sensitivity.

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## Abstract no.: 775

### INFLUENCE OF TAPENTADOL AND OXYCODONE ON SPINAL CORD AND BRAIN: A RANDOMIZED, PLACEBO-CONTROLLED STUDY IN HEALTHY VOLUNTEERS

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**Background and aims**: The nociceptive withdrawal reflex (NWR) and sensory evoked potential (SEP) can be used to objectively assess drug-induced effects on nociceptive processing. The aims were to investigate tapentadol and oxycodone's ability to elicit the NWR and simultaneous brain response to experimental pain.

**Methods**: Twenty-one healthy volunteers completed a randomized cross-over trial with oxycodone (10 mg), tapentadol (50 mg), or placebo BID for 14 days. Subjects received electrical stimulations on the plantar side of the foot to evoke an NWR at baseline and post-interventions. EMG and EEG were recorded for analysis.

**Results**: Tapentadol decreased the odds ratio of eliciting NWRs by -0.89 (p=0.001; 95% CI [-1.5, -0.3]), whereas oxycodone increased the latency of the N1 component of the SEP at the vertex by 12.5 ms (p=0.003; 95% CI [3.4, 21.7 ms]). Inverse modeling revealed that the anterior cingulate component moved caudally for all three interventions (all p<0.02), and the insula components moved caudally in both the oxycodone and tapentadol arms (all p<0.03).

**Conclusions**: A decrease in the number of NWR was observed during tapentadol treatment, possibly relating to the brainstem's modulatory effects on the spinal cord. Both oxycodone and tapentadol affected cortical measures evident in the inverse modeling, with the strongest effect being mediated by oxycodone. These findings support the dual effect analgesic mechanisms of tapentadol in humans as previously shown in preclinical studies.

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## Abstract no.: 778

### INFLUENCE OF TAPENTADOL AND OXYCODONE ON THE SPINAL CORD AND BRAIN: A RANDOMIZED, PLACEBO-CONTROLLED STUDY IN HEALTHY VOLUNTEERS

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**Background and aims**: Somatosensory evoked potentials (SEPs) is a reliable response for following upstream activity from the periphery to the spinal cord, brainstem, and cortex. The aim was to investigate how tapentadol and oxycodone modulate spinal and supraspinal sensory processing.

**Methods**: Twenty-one healthy volunteers completed a cross-over trial with oxycodone (10 mg), tapentadol (50 mg), or placebo BID for 14 days. Subjects received electrical stimulations of the right medial nerve at motor threshold. Peripheral data were recorded at Erb's point (P9-N11) on the right side of the body and at the location of Cv7 (P11-N14). Cortical potentials were recorded using a 62 channel EEG cap. The channels Oz (P14-N18), CP5 (N20-P25) and C1 (N60-80,P100-120) were analysed.

**Results**: In the peripheral measures, there were no differences in the latencies ($p>0.08$) or amplitudes ($p>0.2$) at Erb's point and C7. In the cortical measures, the latencies of the evoked potentials differed between tapentadol and oxycodone by 2.4 ms ($p=0.05$). The post hoc analysis revealed a difference in the C1 electrode where tapentadol decreased the latency by 4 ms. compared to oxycodone ($p=0.05$; 95% CI [-8, -0.05]). There were no differences in amplitudes between any treatments ($p>0.6$).

**Conclusions**: The latency of the N60-80 analyzed at the C1 electrode contralateral to the stimulation differed between tapentadol and oxycodone. This change implies differences in cortical processing between tapentadol and oxycodone treatments. The N60-80 latency has been reported previously to change as a result of opioid treatment.

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## Abstract no.: 901

### SENSORIMOTOR PEAK ALPHA FREQUENCY SLOWED DURING LONG-LASTING MOVEMENT-RELATED PAIN BUT GENERALLY FASTER IN MORE PAIN-SENSITIVE INDIVIDUALS

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**Background and aims**: Musculoskeletal pain is characterized by muscle hyperalgesia and movement-related pain. Although peak alpha frequency (PAF) of electroencephalography reduces during cutaneous pain, no studies have investigated PAF adaptations during movement-related muscle pain. Further, whether high-pain sensitive (HPS) individuals exhibit a different PAF response to pain than low-pain sensitive (LPS) individuals is unclear.

**Methods**: Twenty-four healthy participants received nerve growth factor injections into a wrist extensor muscle on Day0, Day2, and Day4. On Day 4, twelve individuals performed eccentric wrist exercises to cause additional muscle soreness. Pain numerical rating scale (NRS) scores and electroencephalography were measured on Day0, Day4, and Day6 for 3 minutes during eyes closed with wrist at rest (resting-state) and wrist extension (contraction-state). Individuals were categorized into HPS (NRS-scores>2) and LPS groups (NRS-scores≤2) based on the average pain NRS scores recorded in the contraction-state across days. PAF was calculated by frequency decomposition of electroencephalographic recordings.

**Results**: Contraction NRS-scores only increased in the HPS-group on Day4 and Day6 compared with Day0 ($P<0.05$). However, PAF in the contraction-state decreased in both groups at Day6 compared with Day0 ($P<0.05$). Across all days, the HPS-group had higher PAF than the LPS-group during resting-state and contraction-state ($P<0.05$).

**Conclusions**: PAF slowed in both groups during long-term movement-related muscle pain, indicating a shift in cortical excitability independent of subjective pain perception. Furthermore, HPS individuals exhibited faster sensorimotor PAF during muscle pain than LPS participants, which may indicate a different cognitive or emotional response to muscle pain across individuals.

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## Abstract no.: 927

### SECONDARY HYPERALGESIA INCREASES THE LATE POSITIVE AMPLITUDE OF THE EVOKED POTENTIALS ELICITED BY 512 MN ROBOT-CONTROLLED MECHANICAL PINPRICK STIMULI

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**Background and aims**: Secondary hyperalgesia (SH) is the result of the increased responsiveness of nociceptive neurons in the central nervous system (CNS). To measure CNS responses related to SH, a previous study recorded brain responses elicited by graded intensities of mechanical pinprick stimuli (16, 32, 64, 128, 256 and 512 mN) applied manually onto the skin. Pinprick stimulation within the area of SH elicited an increase in the late positive amplitude of the pinprick-evoked brain potential (PEP) that was maximal and only significant for the 64 mN. The aim was to investigate if SH is associated with a significant increase in the late positive amplitude elicited by 512 mN pinprick stimuli when these stimuli are delivered to the skin via a robot-controlled mechanical pinprick stimulator that may, compared to manual application, reduce across-trial variations in the latencies of the elicited brain responses.

**Methods**: In twenty volunteers, high-frequency electrical stimulation (HFS) was applied to the skin of the right volar forearm to induce SH. Forty robot-controlled mechanical pinprick stimuli (512 mN) were delivered before and twenty minutes after HFS to the skin surrounding the area onto which HFS was applied (area of SH). During pinprick stimulation the electro-encephalogram was recorded, and the quality of perception and perceived intensity were collected.

**Results**: After HFS, the 512 mN pinprick stimuli elicited a significant increase of the late positive amplitude ($p=0.0117$).

**Conclusions**: Our results suggests that the increase in late positive amplitude associated with SH is dependent on the mode of application (manually vs. robot-controlled).

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## Abstract no.: 1032

### PERIODIC NOXIOUS HEAT, INNOCUOUS COLD AND INNOCUOUS VIBROTACTILE STIMULATION INDUCE SIMILAR MODULATIONS OF THETA, ALPHA AND BETA BAND EEG OSCILLATIONS

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**Background and aims**: Using frequency tagging, Colon *et al.* (2017) found that periodic noxious heat stimuli elicits periodic modulations of the magnitude of ongoing EEG oscillations in theta, alpha and beta frequency bands. Our study aimed to assess whether these responses are specific for heat pain by comparing heat-evoked responses to the responses elicited by innocuous cold and mechanical vibrations.

**Methods**: Twenty subjects participated to two experimental sessions, one for foot dorsum and one for volar forearm stimulation. Stimuli consisted in fifteen 200ms pulses delivered at 0.25Hz. Fourteen stimuli of each modality were delivered *per* session. Thermal stimuli were delivered using a contact thermode. Target temperatures were 10°C and 60°C for cold and hot stimulation, respectively. Vibrotactile stimulation (200Hz) were delivered using a round-tipped piezo-electric actuator.

The EEG was recorded at 1024Hz using 66 electrodes. Hilbert transforms were used to assess the envelope of theta-, alpha- and beta-band oscillations. Frequency tagging was used to reconstruct the amplitude of the periodic response. Cluster based permutation tests were used to assess whether these amplitudes were larger than 0.

**Results**: Periodic modulations of the theta, alpha and beta bands were observed for all modalities and limbs. For a given limb, the topographies of these modulations were similar for all modalities and modulations observed during upper limb stimulation had similar topographies to those reported by Colon *et al.*

**Conclusions**: Periodic noxious heat, innocuous cold and innocuous vibrations all induce similar periodic modulations of theta, alpha and beta band oscillations.

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## Abstract no.: 1043

### OXYTOCIN RECEPTOR EXPRESSION IN THE TRIGEMINAL GANGLION NEURONS OF AN ANIMAL MODEL OF OROFACIAL PAIN

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**Background and aims**: Oxytocin, a hypothalamic neuropeptide presumably exerts an antinociceptive effect by binding to its receptor in primary sensory neurons. This study was designed to investigate the oxytocin receptor (OTR) expression in the trigeminal ganglion (TG) neurons in an animal model of inflammation-induced orofacial pain.

**Methods**: We injected 100 µl carrageenan (2% w/v) to induce inflammation unilaterally in the vibrissal pad of adult, female Wistar rats. RT-PCR was performed to analyse the expression of OTR, calcitonin gene-related peptide (CGRP) and c-fos mRNA levels in the TGs.

**Results**: One day after carrageenan administration, in the ipsilateral TGs the mRNA level of c-fos had a 4.3-fold increase in relative gene expression compared to either naïve control TGs or the contralateral TGs of treated animals, where the latter two did not differ in relative gene expression. In addition, mRNA expression of CGRP also elevated 3.8-fold, and OTR mRNA expression showed a slight, 1.3-fold elevation in relative gene expression, presumably in the cells of TGs' V2 area that give peripheral endings to the vibrissal pads.

**Conclusions**: The rise in CGRP and c-fos mRNA expression presumes that the peptidergic neurons in TG become activated by the tissue inflammatory process. Furthermore, we assume that OTR with its upregulation and axonal transport in central projections can modulate the nociceptive neurons at their presynaptic attack points, thereby influencing the degree of pain induced by inflammation.

These characteristic alterations observed in the animal model are similar to those in humans, thus it may help to explore further options in pain therapy targeting the OTRs.

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## Abstract no.: 1055

### INVESTIGATION OF MENINGEAL PEPTIDERGIC SENSORY INNERVATION FOLLOWING EXPERIMENTAL SUBARACHNOID HEMORRHAGE

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**Background and aims**: Cerebral vasospasm (CV) is a serious complication of subarachnoid hemorrhage (SAH), the bleeding between brain covering layers, the meninges. Prolonged constriction of intracranial blood vessels results from the imbalance of intracranial vasoactive mechanisms. A high proportion of meningeal sensory nerves possess vasodilator function due to the release of the vasoactive mediator calcitonin-gene related peptide (CGRP). We investigated how experimentally evoked SAH affects integrity of meningeal sensory afferents and CGRP-content of primary sensory neurons.

**Methods**: SAH was evoked by intracisternal injection of autologous blood in male Wistar rats. The animals were transcardially perfused 72 hours after the injection. The density of CGRP-containing nerves in the dura mater encephali was determined by immunohistochemical technique. The region of the trigeminal ganglion (TG) which innervates the middle meningeal artery was defined by retrograde labeling technique. The tracer True Blue was applied onto the parietal dura mater and labeled neurons were localized. Focusing on the assigned region, the number of CGRP-immunopositive cells was determined. Furthermore, the mRNA expression level of CGRP in TG was measured by RT-PCR following SAH.

**Results**: Our immunohistochemical findings showed a relative decrease in density of CGRP-positive afferents in the dura mater. However, the number of CGRP-immunopositive neurons was retained with moderately increased expression of CGRP mRNAin TG.

**Conclusions**: Decreased CGRP-content in dural afferents signs that meningeal sensory nerves are affected in SAH. However, retained CGRP synthesis does not support the assumption that the diminished meningeal sensory functions underlie the prolonged constriction of cerebral vessels.

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## Abstract no.: 1062

### SPATIAL TUNING IN NOCICEPTIVE PROCESSING IS DRIVEN BY ATTENTION

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**Background and aims**: When the source of nociception expands, one can observe an increase in pain. This effect is called spatial summation of pain (SSP) and has been a subject of several investigations. However, still, mechanisms shaping the magnitude of SSP are largely unknown. The purpose of this study was to investigate how spatial attention modulates SSP.

**Methods**: Following the training phase, volunteers (N=40) took part in two sessions based on three different hand immersions in the cold water (Cold Pressor Task) with the constant temperature set at 5°C. Participants were asked to either immerse the ulnar side (A), radial side (B) or both sides (A+B, whole hand) and provide overall pain ratings they experienced. In case of immersions of merged sides (A+B) they were also asked to provide a divided-attention rating(s), i.e., first pain in A and then in B (or B then A) and directed- attention ratings (pain only in A or in B).

**Results**: A significant SSP effect was observed. ($p< 0.001$). Data also confirmed that spatial tuning was altered as SSP was fully abolished when participants provided two ratings in a divided fashion ($p< 0.001$). The pain was significantly lowered when attention was directed only to one side (A or B) during immersion of A+B ($p< 0.001$).

**Conclusions**: We conclude that the SSP is an attentionally driven phenomenon, and thus mechanisms of this effect must have a central component. SSP can be fully abolished when pain is rated in a divided fashion or when attention is attracted to smaller painful areas.

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## Abstract no.: 1136

### TEMPORAL SUMMATION OF SECOND PAIN IS AFFECTED BY SUPRASPINAL ATTENTIONAL MECHANISMS: INTERACTION BETWEEN PAIN AND COGNITION

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**Background and aims**: Although cognitive load can alter perceived pain, little is known about how it affects plastic processes of central sensitization. In this study we attempted to clarify the interaction of cognitive processes and pain sensitization during a paradigm of temporal summation of second pain (TSSP).

**Methods**: We analyzed pain ratings and EEG activity obtained from 22 healthy participants during the presentation of four experimental conditions that differed in the manipulation of attention to painful stimuli or working-memory load (attention to pain, 0-back during pain, 2-back during pain, and 2-back without concomitant pain).

**Results**: We found that the temporal summation effect was reduced as the cognitive load increased, and this reduction was accompanied by higher midfrontal theta activity and lower posterior alpha and central beta activity. The performance of the cognitive tasks was not affected by pain, but the amplitude of attentional ERP components evoked by standard (but not target) stimuli were reduced during pain.

**Conclusions**: Although it is well established that TSSP is a phenomenon that occurs at the spinal level, here we show that it is affected by supraspinal attentional mechanisms. Our results suggest that the interpretations made on the increase of temporal summation in patients with chronic pain should consider that this phenomenon depends on attentional and cognitive aspects, also suggest that interventions addressing these aspects may modify central sensitization processes.

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# Structural and functional imaging in pain

## Abstract no.: 188

### IMAGES OF PAIN AND THEIR CONCEPTUAL CONTRIBUTION

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**Background and aims**: Coming from a background in visual studies, I noticed the amount of visual aids and methods that are put to use in the area of pain medicine and research. Due to pain's singularly difficult phenomenology, we are fundamentally dependent on these visual methods to show, see and understand pain in one way or another. It turns out, however, that the ubiquity of visualisations and images of pain within medical practices and research stands in stark contrast to the sparsity of reflection and actual understanding of these visual methods. By analysing several particularly prevalent methods and images in today's pain medicine, I want to show the immense impact these images have on our understanding and handling of pain and to underline the importance of their full understanding and conscious use.

**Methods**: By analysing the appearance and design and by searching for the respective origins and history of central images and visual methods of pain medicine I can unfold their conceptual heritance as well as their entanglement with specific understandings of the body and physical pain.

**Results**: My findings not only underline the profound dependence on images and visual methods in all aspects of medical and scientific work on physical pain. They show how the historic entanglement of images and concepts shape our understanding of pain to this day.

**Conclusions**: The dependence on these methods together with their profound impact on central concepts show the importance of understanding these images fully as images to enable a more conscious and effective use and practice.

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## Abstract no.: 584

### LATE ADOLESCENCE IS A CRITICAL PHASE FOR FUNCTIONAL REORGANIZATION OF CORTICO-BASAL LOOPS ASSOCIATED WITH PAIN COMPLAINTS. A LONGITUDINAL RESTING-STATE-ANALYSIS OF THE IMAGEN-DATASET

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**Background and aims**: Pain conditions are a major health problem. While brain correlates of (chronic) pain in adulthood has been described, epidemiological studies spanning adolescence to adulthood and thus the transition of pain are rare. The aim of this study was to examine the link of functional brain (re)organization to pain complaints from late adolescence into early adulthood.

**Methods**: We used individual resting-state fMRI-data (age: 19 and 23) from the IMAGEN project to build individual functional connectomes of cortical nodes and basal ganglia structures known to be involved in pain processing for each timepoint. Brain reorganization was operationalized as the difference between functional connectomes at age 23 and 19. The Children's Somatization Inventory was used as measure of pain complaints. We then calculated the association of every connectivity of the functional connectomes on pain complaints.

**Results**: At age 19 we did not find significant associations of functional connectomes with pain complaints. However, we found multiple significant associations at age 23, most prominent negative associations of connectivities of the subthalamic nucleus to cortical networks, and positive associations for connectivities between multiple cortical nodes. These associations were even more pronounced for the difference between functional connectomes at age 19 and 23.

**Conclusions**: These data indicate a significant transition in brain-pain associations from late adolescence into early adulthood, with cortico-basal loops as the main brain correlates, and underscores adolescence as a sensitive period not only for the development of mental, but also somatic disorders.

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## Abstract no.: 976

### EEG-BASED SENSORY TESTING REVEALS ALTERED PAIN PROCESSING IN ELITE ENDURANCE ATHLETES

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**Background and aims**: Common techniques for pain assessment rely on the patient's subjective response. The electroencephalogram (EEG) provides an objective readout of the somatosensory pain processing. All studies on the pain perception of elite endurance athletes, based on subjective feedback, displayed heterogenous, partly contradicting results. We analyzed the differences in pain processing of young elite endurance athletes using EEG recordings after standardized noxious stimuli compared to normally active controls.

**Methods**: We analyzed the event-related EEG response to standardized noxious mechanical, thermal, and electrical stimuli in athletes (n=26) versus controls (n=26), with Figure 1 showing an EEG readout. We also recorded the subjective pain ratings using a visual analogue scale (VAS) and assessed the endogenous pain inhibitory system via conditioned pain modulation (CPM) with pin-prick stimulation as test stimulus.

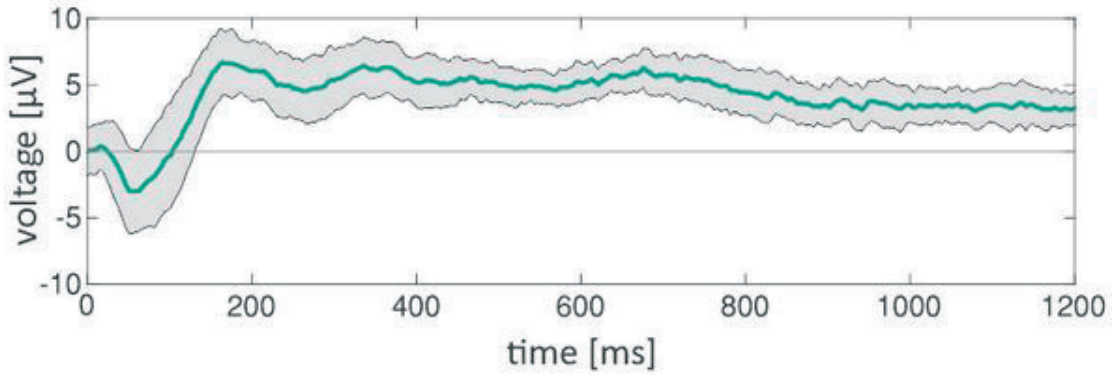


Figure 1: Raw event-related EEG of athletes after noxious mechanical stimulation

**Results**: The young elite endurance athletes had higher activations in the respective EEG frequencies as a response to all three types of noxious stimuli and showed a significant inhibition of their mechanical pain signatures in the EEG in our CPM model compared to the normally active controls. There were no significant differences in the subjective pain ratings between both groups.

**Conclusions**: Young athletes show signs of hypersensitivity to noxious stimuli in the EEG which are not represented in their subjective pain ratings, indicating an additional benefit of event-related EEG analysis for a better understanding of pain mechanisms. Future studies integrating the EEG into their pain testing paradigm could paint a broader picture of relevant pain states.

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## Abstract no.: 979

### CHANGES IN BRAIN VOLUMES AS A POTENTIAL TOOL FOR OBJECTIFICATION OF PAIN IN PATIENTS WITH MULTIPLE SCLEROSIS

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**Background and aims**: Multiple sclerosis(MS) is a demyelinating degenerative disease that is also accompanied by progressive brain atrophy. Chronic pain syndromes are common in MS and are potentially associated with changes in brain structures volumes. So we aimed to analyze the relationship between changes in brain structures volumes in patients with MS with the characteristics of pain syndromes.

**Methods**: Seventeen patients with a confirmed diagnosis of multiple sclerosis were examined at the Lviv Regional Multiple Sclerosis Center. Characteristics of pain syndromes were evaluated using Pain Detect, VAS, SF-MPQ-2 questionnaires. MRI scans were performed, followed by processing with the VolBrain algorithm with further analysis of brain structures volumes.

**Results**: MS patients had various pain syndromes. The most common pain syndromes were headache with different characteristics and ongoing extremity pain. 41,18% of patients had more than one pain syndrome. We found a statistically significant correlation (r = -0.519, p = 0.037) of asymmetry between the right and left thalamuses and the neuropathic component of pain (Pain Detect score). There were also statistically significant relationships between an increase in right and left thalamic volumes and an increase in average pain intensity(VAS score) and the neuropathic pain component (SF-MPQ-2 score). Higher average pain intensity and the neuropathic component of pain are associated with less right and left thalamuses atrophy in MS patients.

**Conclusions**: Our findings and further studies of changes in brain structures volumes can help create an affordable tool for objectifying pain characteristics in patients with MS.

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## Abstract no.: 1065

### NEURAL SIGNATURE OF FACIAL ENCODING OF PAIN

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**Background and aims**: The experience of pain is typically accompanied by facial expressions of pain. However, that does not mean that pain is always, at all times encoded in the face. Even when the nociceptive input or the self-report of pain stays stable, there is great intra- and inter-individual variations in facial expressions of pain. Here, we investigate which brain mechanisms underlie the intra-individual regulation of facial expressions of pain.

**Methods**: Facial responses, pain ratings and brain activity (BOLD-fMRI) to experimental, tonic heat pain (2 minutes) were recorded in 22 healthy participants. We analysed facial expressions of pain using the Facial Action Coding System (FACS) and separated the painful heat stimulation into phases with and without the occurrence of facial expressions of pain.

**Results**: The display of facial expressions of pain was coupled with primary motor activity in the face area and in areas involved in pain processing; especially primary somatosensory cortex, anterior cingulate cortex and insula. In contrast, prefrontal structures (ventrolateraland medial prefrontal) were more strongly activated in the absence of facial expressions of pain, consistent with a role in down-regulating facial displays.

**Conclusions**: These results indicate that spontaneous pain expression reflects activity within nociceptive pathways while stoicism may reflect an active suppression of expression, possible due to learned display rules governing the level of expressiveness.

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## Abstract no.: 1088

### PARENTAL EXPERIENCE INFLUENCES ASSESSMENT AND BRAIN RESPONSES TO BABIES' PAIN CRIES

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**Background and aims**: Although, parental caregiving is key to survival and relies on large scale brain functional networks, little is known about the brain basis that enable parents to become expert in discriminating the level of distress associated with a baby's cry.

**Methods**: Here, we measured, using fMRI, brain activity and functional connectivity between nodes of the 'parental caregiving' connectome in response to baby crying from pain or discomfort in 80 healthy participants; 40 parents and 40 non-parents in both sexes.

**Results**: All participants were able to dissociate the distress level evoked in the cry, and overall, they recruited common neural basis. However,compared with childless men, fathers attributed lower ratings to babies' cries and had lower activity in aversive brain regions such as the amygdala nucleus, but higher connectivity in emotional control brain network, whereas mothers were hyper-sensitized to pain cry and had higher connectivity between brain regions involved in top-down cognitive control and inferring others' mental states compared with childless women. Non-parents showed higher connectivity in

the empathic network, a brain circuit that plays a key role to identify the baby's pain state from the cry acoustic features (roughness). Mothers had also higher activity and connectivity in a set of subcortical regions identified as the maternal caregiving network (including the putamen, the hippocampus, and the caudate nucleus) compared with fathers.

**Conclusions**: These findings demonstrate the specialization of brain organization associated with parental experience and emphasize an adaptive mechanism that may involve different brain circuits in mothers and fathers.

# Pharmacological therapies

## Abstract no.: 1124

### ERENUMAB HAS NO EFFECT IN PATIENTS WITH TRIGEMINAL NEURALGIA: A PLACEBO-CONTROLLED, DOUBLE-BLIND, RANDOMIZED, PROOF-OF-CONCEPT STUDY

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**Background and aims**: Trigeminal neuralgia is the most common facial pain disorder causing debilitating and severe trigger-evoked paroxysmal pain. The available treatments carry a high risk of cognitive side effects or surgical complications. Calcitonin gene-related peptide (CGRP) receptor monoclonal antibodies has changed the landscape of migraine treatment. These drugs modulate pain processing in the trigeminal pain-signaling pathways and have high tolerability. We aimed to evaluate the efficacy of the CGRP receptor monoclonal antibody erenumab in trigeminal neuralgia.

**Methods**: In a placebo-controlled, double-blind, randomized single-center study, we randomly (1:1) assigned 80 adults aged 18-85 years with primary (idiopathic and classical) trigeminal neuralgia to 140 mg erenumab or placebo. The primary outcome was the number of responders with a reduction of ≥ 30% in the mean average daily pain intensity during the treatment period (4 weeks) compared with the baseline period (4 weeks).

**Results**: We screened 834 patients for eligibility and included 80 participants. There was no significant difference in the number of responders in the erenumab group 14 (35%) compared to the placebo group 18 (45%) (p = 0.36). There was no significant difference in the number of patients with a 30% decrease in number of paroxysms (17 (43%) vs. 21 (53%). Adverse events were reported by 20 (50%) participants in each group.

**Conclusions**: Erenumab did not reduce pain intensity or the number of paroxysms compared to placebo in patients with trigeminal neuralgia. There continues to be a need for effective and tolerable treatments in trigeminal neuralgia. (Funded by Novartis. ClinicalTrials.gov, number NCT04054024.)

# Placebo

## Abstract no.: 787

### NOCEBO HYPERALGESIA CAN BE MORE EASILY INDUCED THAN PLACEBO HYPOALGESIA: PRELIMINARY FINDINGS FROM A STUDY ON OBSERVATIONAL LEARNING

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**Background and aims**: Placebo effects are beneficial and nocebo effects are adverse health outcomes induced by the psychosocial context. These effects may be experienced following observation of either hypoalgesia or hyperalgesia in other people (i.e., observational learning; OL). No study to date has systematically compared the magnitude of OL-induced placebo- versus nocebo effects in pain.

**Methods**: 63 healthy participants (42.9% male) were randomized to a 1) placebo, 2) nocebo, or 3) no-observation control

group. Depending on group allocation, participants observed a male model experiencing either hypoalgesia or hyperalgesia following the application of a sham cream on one arm. Pain was evoked experimentally on both arms using thermal heat stimuli at baseline and post-OL. In addition, participants rated how much pain they expected to experience following observation.

**Results**: 3x2x2 repeated measures ANOVAs were conducted to compare groups. After OL, participants in the nocebo group expected more pain (M±SD=6.2±1.9) following cream application compared to the placebo (2.8±1.4) and control (3.0±2.1) groups (both $p<.001$). A significant three-way interaction demonstrated that OL influenced pain experience ($p=.005$). However, planned comparisons revealed no between-group difference in pain following OL (all $p \geq .051$). In the nocebo group exclusively, pain increased significantly from baseline (3.5±1.6) to post-OL (4.6±1.8) for the intervention arm, indicating hyperalgesia.

**Conclusions**: Overall, there was limited evidence for OL-induced hypoalgesia. Nocebo hyperalgesia was found, which suggests that it is easier to induce nocebo than placebo effects by observational learning. Replication in larger samples is necessary to unravel how OL may modulate placebo and nocebo effects.

# Psychological therapies

## Abstract no.: 521

### VIRTUAL REALITY AND COPING WITH ANXIETY AND ASSOCIATED PROCEDURAL PAIN IN BURN PATIENTS – FIRST CONCLUSION FROM THE PRELIMINARY DATA OF THE PROJECT

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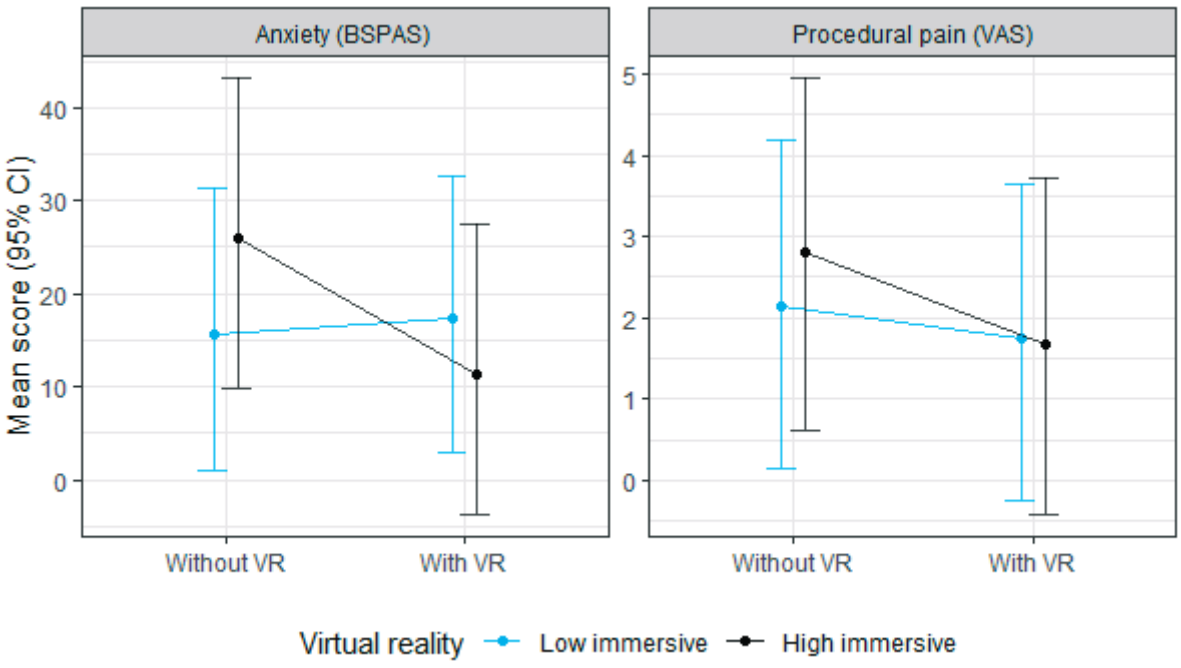
**Background and aims**: The goal of our study was to reduce anxiety associated with procedural pain in burn patients using virtual reality (VR).

**Methods**: We included n = 10 patients (9 men, 1 woman) from Department of Burn Medicine of 3rd Faculty of Medicine, Charles University and University Hospital KV in Prague. Adult patients were aged 19-67 years (mean 37.5), burn area 1%-15% (mean 6.9%), prevailed flame burn; no psychiatric comorbidities. The differences in pain intensity (VAS, Visual analogue scale) and anxiety (BSPAS, Burns Specific Pain Anxiety Scale) scores were examined using mixed effect linear models. The effect of whether the VR was used in current part of dressing and the effect of the group (control with low-immersive VR vs. experimental with high-immersive VR) as well as its interaction were tested. The model also included a random factor *proband* and covariates *session number* and whether the VR was deployed during the first or the second part of the dressing change. Patients evaluated VR using IPQ (Igroup presence questionnaire).

**Results**: The results shows decrease in anxiety (BPAS) and in pain intensity (VAS) when high-immersive VR was used. The effect is significantly greater compared with the effect in low-immersive VR in BSPAS, t(26) = -2.086, p = .047, but not in VAS, t(26) = -.543, p = .592.




**Conclusions**: High-immersive VR can decrease anxiety and procedural pain. These results are promising but inconclusive as limited sample size provides us with unsatisfactory statistical power.

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## Abstract no.: 645

### FEASIBILITY OF BRIEF INTERVENTION AS A METHOD FOR REDUCING CENTRAL NERVOUS SYSTEM DEPRESSING MEDICATION IN THE OLDER ADULT - A PILOT STUDY

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**Background and aims**: Central nervous system depressant medications (CNSD) including benzodiazepines, z-hypnotics and opioids are regularly prescribed for older patients. We have previously described how older adults are at risk for medication misuse. We have also demonstrated that the method of brief intervention (BI) is useful for reducing pain medication misuse in headache. Here, we aim to investigate whether BI is a feasible method for reducing CNSDs among older adults.

**Methods**: Five older adults with previous misuse of z-hypnotics were invited. Two medical doctors performed the BI which assessed individual severity of dependence (SDS score) followed by a discussion of individual risk of misuse. The patient made a plan to reduce their z-hypnotics. Follow-up was after six weeks. Data collected consisted of self-reported quantitative and qualitative measures. Main outcomes were feasibility of the intervention and patients experience.

**Results**: 4/5 patients reported using z-hypnotics > 6 days/week before intervention. Median SDS score was 5/15. Immediately after the intervention, the patients expectations and belief in their own ability to reduce varied greatly. The average time of the brief intervention consultation was 15 minutes. The intervention was easier to perform in an office setting compared to bedside. All five patients, whether with positive expectations or not, were open and positive towards participating in the brief intervention conversation. Further descriptive qualitative data will be presented.

**Conclusions**: The results from this pilot study will assist in constructing the optimal design for a full scale RCT of brief intervention for reducing CNSD misuse in the older adult.

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## Abstract no.: 690

### A FEASIBILITY TRIAL OF ONLINE ACCEPTANCE AND COMMITMENT THERAPY (ACT) FOR WOMEN WITH PROVOKED VESTIBULODYNIA

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**Background and aims**: Acceptance and Commitment Therapy (ACT), a form of Cognitive Behavior Therapy, is widely applied in chronic pain and appears effective. However, ACT has not yet been fully examined for the treatment of persistent vulvar pain disorders. This study examines the feasibility and preliminary effects of online ACT for patients with provoked vestibulodynia (PVD).

**Methods**: Women diagnosed with PVD were recruited and assigned randomly to online ACT or to a waitlist control group. Feasibility assessment focused on recruitment, treatment credibility, treatment adherence, and retention in trial. Participants also completed measures of pain outcomes, sexual functioning, emotional and relationship adjustment, and potential treatment processes before and after treatment.

**Results**: Of the 111 women who were invited to participate in the study, 44 were included (39.6% recruitment rate). Mean age of participants was 26.86 years (SD= 5.27). Thirty-seven participants (84.1%) completed the pre-treatment assessment. Participants who received online ACT reported high treatment credibility, and completed on average 4.31 (SD = 1.60) of six treatment modules. Among participants, 34 provided post treatment data, giving a trial retention rate of 77%.

Effect size estimates from this online ACT treatment, as compared to waitlist, were small for pain with sexual activity, sexual satisfaction, relationship adjustment, and depression, medium for anxiety and pain catastrophizing, and large for pain acceptance and quality of life.

**Conclusions**: Feasibility criteria for this study were largely met, except for the target sample size of N=52. With some adjustments to improve overall recruitment, a full scale randomized controlled trial of online ACT for PVD appears feasible.

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## Abstract no.: 882

### ROLE OF MIRROR IMAGE THERAPY FOR PHANTOM LIMB PAIN IN BELOW KNEE AMPUTEES

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**Background and aims**: The pain caused by surgery is usually of a transient nature, however the perception of pain in an amputated limb often persists. This prolonged pain, which is often refractory to pain-killing medication, nerve block and surgical treatment may severely affect the patient's quality of life. The phenomenon of phantom limb pain has been investigated using neurological, neurophysiological and psychopathological approaches. However exact cause of phantom limb pain is still a mystery. In this study we analysed the role of mirror therapy for treatment of phantom limb pain in below knee amputation.

**Methods**: 96 patients who had phantom limb pain after below knee amputation were included in this study. They had to visit the hospital four times a week for a 15-minute treatment period. In this technique they performed movement of unaffected limb while watching its mirror reflection and thus creating a visual illusion of movement of affected limb. The degree of pain relief was measured on visual analog scale (VAS).

**Results**: 70 patients out of 96 reported an improvement of 4 or more degrees of VAS score after 6 months of the treatment. The result was statistically significant.

**Conclusions**: 70 patients out of 96 reported an improvement of 4 or more degrees of VAS score after 6 months of the treatment. The result was statistically significant.

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## Abstract no.: 1071

### PSYCHOLOGICAL FLEXIBILITY AND APPLYING THE ACT-MODEL TO VULVODYNIA

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**Background and aims**: Women with vulvodynia suffer serious consequences in their sexual, emotional, and relational health, and there has been a lack of effective treatments. The last decade of research underscores the importance of embracing a broad biopsychosocial perspective for treatment advancement. Although biological mechanisms set the stage, psychosocial mechanisms seem equally important, in particular pain-related fear and avoidance are key maintaining factors. Yet, there are some fundamental distinctions from other pain conditions, such as the intimate interpersonal context. As such, there is a need for adjusting the biopsychosocial model to fit the specificities of vulvodynia. This workshop will delineate insights gleaned from recent research around the applicability of a biopsychosocial model to vulvodynia, and how this may inform treatment development

**Methods**: The workshop will delineate theoretical models of pain, specifically ACT, in the context of Vulvodynia and recent studies supporting the proposed links will be presented. This presentation will build upon the others, emphasizing the similarities and continuous theoretical development. The audience will be involved through interactive tools, to maximize learning and facilitate clinical use of the workshop content.

**Results**: findings from data related to ACT in Vulvodynia will be shown.

**Conclusions**: The most recent treatment advances will be outlined, and key issues for clinical implication will be pointed out.

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## Abstract no.: 1075

### IMPROVING PAIN-RELATED COMMUNICATION IN CHILDREN WITH AUTISM SPECTRUM DISORDER AND INTELLECTUAL DISABILITY

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**Background and aims**: The communication of pain in individuals with co-morbid Autism Spectrum Disorder and Intellectual Disability (ASD-ID) is largely unexplored. The communication deficits associated with ASD-ID can result in non-verbal

behavior such as self-injurious behavior, aggression, irritability, and reduced activity as a means to communicate that pain is present. The objective of this study was to determine whether a behaviorally-based educational intervention could increase the pain-related communication of children with ASD-ID who experience pain frequently.

**Methods**: The sample included 3 children with ASD-ID who experienced pain frequently, using a series of case studies. The intervention utilized educational materials and behavioral reinforcements. Pain was assessed daily by caregivers using The Non-Communicating Children's Pain Checklist – Revised (NCCPC-R) and the ability of the individual to identify and express pain was recorded using The Wong Baker FACES Pain Scale. Challenging behavior was recorded based on frequency count.

**Results**: The results indicated that teaching children to identify the location of pain and to indicate the severity of pain, along with visual representations of pain relief options, increased the communication of pain when teachers asked the individuals how they were feeling. The results suggest a role for behavioral-based educational interventions to promote communication of pain in people with ASD-ID.

**Conclusions**: The current study supports the clinical utility of the NCCPC-PV as a measure to assist staff in identifying the presence of pain in individuals with ASD-ID, and thus assisting in identifying appropriate opportunities to teach the communication of pain.

# Rehabilitation therapies

## Abstract no.: 446

### CAN SPINAL NOCICEPTION ASSESSED USING THE NOCICEPTIVE FLEXION REFLEX BE MODULATED BY CONSERVATIVE TREATMENT MODALITIES? A SYSTEMATIC REVIEW AND META-ANALYSIS

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**Background and aims**: The nociceptive flexion reflex (NFR) is a spinally mediated withdrawal response and is considered as an objective electrophysiological marker of descending modulation of spinal nociception. In healthy people it was shown that less efficient endogenous inhibition of spinal nociception predicts future chronic pain risk, and lower NFR thresholds suggestive for spinal hyperexcitability have been established in patients with chronic musculoskeletal pain. Hence, interventions reducing spinal nociception are needed in the prevention and treatment of chronic pain. However, it remained unexplored whether and to what extent spinal nociception measured through the assessment of the NFR is modulated by conservative therapy in patients and healthy individuals. The current study summarized, synthesized and analysed the existing knowledge to answer the latter question.

**Methods**: A systematic review and meta-analysis was performed following the PRISMA-guidelines. Relevant articles were identified from 5 electronic databases and examined for risk of bias using Version 2 of the Cochrane tool for randomized trials. The evidence synthesis for this review was conducted in accordance with GRADE.

**Results**: Thirty-six articles were included. Meta-analyses provided low-quality evidence showing that conservative therapy decreases NFR area and NFR magnitude, and moderate-quality evidence for increases in NFR latency.

**Conclusions**: This study suggests that conservative interventions can exert immediate central effects by activating descending inhibitory pathways to reduce spinal nociception. Such interventions may help prevent and treat chronic pain characterized by enhanced spinal nociception. Furthermore, given the responsiveness of the NFR to conservative interventions, the NFR assessment seems to be an appropriate tool in empirical evaluations of treatment strategies.

## Abstract no.: 448

### RETURNING TO WORK AFTER BREAST CANCER SURGERY: AN IMPORTANT ROLE FOR PAIN SCIENCE EDUCATION?

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**Background and aims**: Pain is a common and long-lasting side effect of breast cancer treatment that can have a significant impact on all aspects of daily-life functioning, including return to work. Erroneous pain-related beliefs (such as viewing pain as a sign of tissue damage and that the body should therefore rest) might unnecessarily limit people from resuming their daily-life activities. Adjusting these perceptions trough pain science education (PSE) may result in improved return to work outcomes. The aim was to investigate the effect of PSE compared to biomedical pain education after breast cancer surgery trough a randomized controlled trial on (1) work status at 12 months postoperatively, (2) time until work resumption and (3) change in return-to-work expectations.

**Methods**: Participants were randomly assigned to either PSE or biomedical pain education in addition to a standard physical therapy program after surgery for breast cancer.

**Results**: One hundred eleven patients were included. In the group that had received PSE, 20% more women were working at 12 months after surgery compared to controls (p=0.07). In addition, neither time until work resumption (p=0.28) nor the change in estimation of own ability to return to work up to 12 months postoperatively (p=0.27) significantly differed between both groups.

**Conclusions**: Although not significant, the proportion of women working one year postoperatively was 20% higher for those who had received PSE. Therefore, in addition to providing a foundation for future research, this study highlights the potential use of PSE in return-to-work interventions following breast cancer surgery.

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## Abstract no.: 452

### THE IMPACT OF COVID-19 LOCKDOWN ON THE GENERAL HEALTH STATUS OF PEOPLE WITH CHRONIC HEALTH CONDITIONS IN BELGIUM: A CROSS-SECTIONAL SURVEY STUDY

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=**Background and aims**: Patients with chronic health conditions risk aggravation of their health status due to reduced access to health services during the COVID-19 related lockdown. The aim was to investigate the impact of Belgian COVID-19 measures on general health status (i.e. worse or stable/better) of patients with chronic health conditions and how this change in health status relates to personal and health behavior-related factors.

**Methods**: A cross-sectional study using an online survey was conducted during the first COVID-19 related lockdown in Belgium. Associations between change in health status since the lockdown and (change in) personal and health behavior-related factors (including physical activity, access to healthcare services and social activities) were investigated.

**Results**: In adults (n=561), almost all personal factors, including feelings of distress, depression, anxiety, somatization and low self-efficacy were significantly worse in patients with a worse health status during the lockdown (n=293, 52%) compared to patients reporting a stable/better health status. Mainly participants with musculoskeletal disorders dominated by chronic complaints such as pain and fatigue reported a worse health status. Also, these patients reported lower physical activity levels, more teleconsultations and less social activities.

**Conclusions**: Fifty-two percent of the adults with mainly painful chronic health conditions reported worsening of their general health status during the lockdown in March-May 2020 in Belgium. Negative personal factors and unhelpful health behavior seems to be associated with a worse health status.

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## Abstract no.: 616

### PHYSIOTHERAPY FOR PAIN AND DISABILITY IN ADULTS WITH COMPLEX REGIONAL PAIN SYNDROME (CRPS) TYPES I AND II. AN UPDATED COCHRANE SYSTEMATIC REVIEW

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**Background and aims**: Complex regional pain syndrome (CRPS) is a painful and disabling condition that usually manifests in response to trauma or surgery and is associated with significant pain and disability. Guidelines recommend the inclusion of physiotherapy as part of the multimodal treatment of people with CRPS. The aim of this updated Cochrane systematic review was to determine the effectiveness of physiotherapy interventions for treating pain and disability associated with CRPS types I and II in adults.

**Methods**: We searched the following databases from February 2015 to July 2021: CENTRAL, MEDLINE, Embase, CINAHL, PsycINFO, LILACS, PEDro, Web of Science, DARE and Health Technology Assessments for randomised controlled trials (RCTs) of physiotherapy interventions for treating pain and disability in adults with CRPS. Two review authors independently evaluated trials for eligibility, extracted data, performed risk of bias assessments and rated the certainty of evidence using GRADE.

**Results**: We included 16 new trials (600 participants) along with the 18 trials from the original review totalling 34 RCTs (1339 participants). Twenty-seven trials were at overall high risk of bias and seven were at unclear risk of bias. The certainty of the evidence was very low for all comparisons. Overall we found no clear evidence of clinical effectiveness for any physiotherapy interventions. Graded motor imagery and mirror therapy may provide clinically meaningful improvements in pain and disability.

**Conclusions**: We found insufficient evidence to confidently support or refute the effectiveness of any physiotherapy interventions. The optimum approach for physiotherapy treatment of CRPS remains uncertain.

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## Abstract no.: 703

### DO PATIENTS WITH CHRONIC LOW BACK PAIN MEET WORLD HEALTH ORGANISATION'S RECOMMENDED PHYSICAL ACTIVITY LEVELS?

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**Background and aims**: **Background:** In 2010, the world Health Organisation recommended that adults should perform >150 minutes of moderate intensity physical activity (PA) throughout the week, or >75 minutes of vigorous-intensity PA, occurring in bouts of ≥10 minutes. Recommendations were revised in 2020, with an important update being the removal of MVPA occurring in bouts of ≥10 minutes.

**Aims:** Primary: to analyse the time that patients with Chronic Lower Back Pain (CLBP) admitted to pain rehabilitation spent on moderate to vigorous PA (MVPA) and compare this to the recommendations. Secondary: to explore factors that might differentiate between those who met the recommendations, and those who did not.

**Methods**: Cross-sectional study embedded in secondary interdisciplinary rehabilitation of adults with CLBP. PA was measured with a tri-axial accelerometer for 1 week during admission phase. Time spent in each PA level was calculated. MVPA was also analysed in ≥10 min bouts. Complete datasets of 4-6 days recorded accelerometry of n=46 patients were analysed.

**Results**: The time spent in MVPA was on average 6.0% per day. MVPA per day in ≥10-minute bouts occurred on average 0.8 times per day (sd = 0.9; min-max 0-4). The percentage of patients meeting the recommended level of MVPA was 21.7% (29/46) and 84.8% (39/46) for respectively the 2010 and 2020 guidelines. Most demographic and clinical variables did not seem to differentiate between those who met the WHO recommendations.

**Conclusions**: The minority of the patients (22%) met the recommended MVPA level of the 2010. The more lenient guideline of 2020 was met by 85%.

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## Abstract no.: 710

### THE IMPACT OF VIRTUAL REALITY INTEGRATION FOR YOUTH WITH CHRONIC PAIN PARTICIPATING IN INTENSIVE REHABILITATION

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**Background and aims**: Exposure is gold-standard treatment for persistent musculoskeletal (MSK) pain. However, fear, avoidance, and low pain self-efficacy are often barriers to engagement. To mitigate these, researchers have worked to integrate virtual reality (VR), but research remains limited. A tailored VR program for pain was integrated into an intensive pediatric pain rehabilitation program (PReP) in the western United States. This study examined changes in pain outcomes for youth with MSK pain enrolled in PReP with and without the tailored VR program, as well as PReP+VR at home, which consisted of commercially available VR programming delivered in home due to COVID-19.

**Methods**: Patients enrolled in PReP between 2017-2021 (N=90; $M_{age}$=14.3±2.61; $N_{female}$=70) were categorized according to treatment (PReP (n=35), PReP+VR (n=32), PReP+VR at home (n=23)), and completed the Fear of Pain Questionnaire, Chronic Pain Self-Efficacy Measure, and the Patient-Reported Outcomes Measure at baseline and discharge. ANCOVAs were conducted to assess for changes in outcomes across time and treatment groups.

**Results**: Significant differences were observed in avoidance over time, with PReP and PReP+VR showing significant improvements compared to PReP+VR at home ($F(2,1) = 10.21$, $p<.001$). Significant improvement in self-efficacy ($p<.001$), and fear of pain ($p=.043$) were observed across time, however treatment approach did not significantly contribute to these models.

**Conclusions**: While integration of VR may mitigate therapy engagement barriers, in-person rehabilitation and tailored VR programming remain critical elements of MSK treatment. However, these results alongside previous qualitative findings that indicate patients perceive VR as helpful, prompt additional research to fully illuminate the potential impact of VR integration.

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## Abstract no.: 971

### INFLUENCE OF PREOPERATIVE PAIN, COGNITIONS AND SENSORY FUNCTION ON THE TREATMENT EFFECT OF PERIOPERATIVE PAIN NEUROSCIENCE EDUCATION IN PATIENTS WITH LUMBARRADICULOPATHY

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**Background and aims**: The benefits of perioperative pain neuroscience education (PPNE) for people undergoing surgery for lumbar radiculopathy have recently been established.However so far, not much is known about which factors influence PPNE's treatment success. Therefore, this study aims to assess the potential influence of preoperative pain intensity, pain cognitions and sensory function on the PPNE treatment effect for postoperative quality of life 1 year following surgery for lumbar radiculopathy.

**Methods**: This study is a secondary analysis of a randomized controlled trial in which 120 patients were randomized to receive either PPNE or perioperative biomedical education (PBE). Quality of life was assessed using the Short Form 36-item Health Survey (SF-36) at baseline (1 week pre-surgery), and 6 weeks, 6 months and 1 year post-surgery. Linear mixed models will be built for the SF-36 Physical component, SF-36 Mental component, and SF-6D utility scores using the following independent variables: treatment (PPNE versus PBE), time, and baseline scores for back pain intensity, leg pain intensity,

pain catastrophizing, kinesiophobia, hypervigilance, and measures of quantitative sensory testing (i.e., electrical pain threshold, temporal summation, and conditioned pain modulation).

**Results**: It is hypothesized that patients who report unfavorable scores for these preoperative factors will show a larger treatment effect of PPNE on postoperative quality of life. Analysis for this study is currently underway and results are expected soon.

**Conclusions**: Findings will provide novel insight into the potential moderating effect of preoperative factors on treatment outcome following PPNE in people undergoing surgery for lumbar radiculopathy.

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## Abstract no.: 995

### EFFECTIVENESS OF STRATIFIED VOCATIONAL ADVICE OR MOTIVATIONAL INTERVIEWING FOR RETURN TO WORK AMONG WORKERS ON SICK LEAVE WITH MUSCULOSKELETAL DISORDERS: A RANDOMISED CONTROLLED TRIAL

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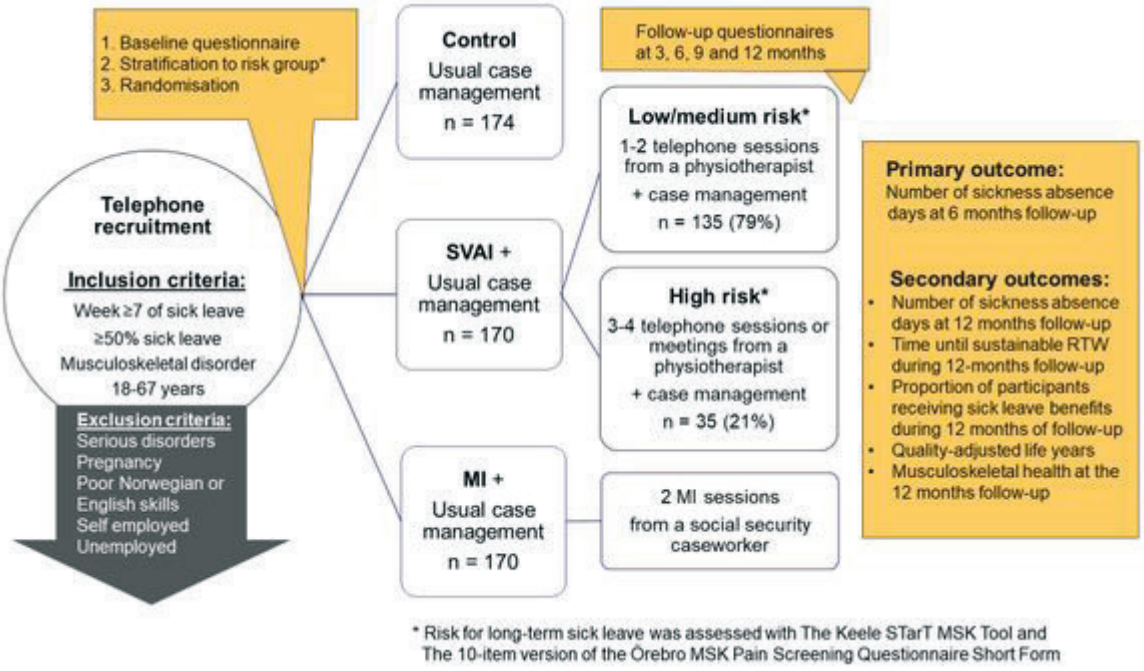
**Background and aims**: Musculoskeletal disorders (MSDs) are a major cause of sick leave and disability, and effective return to work interventions are needed. Our aim was to evaluate if adding a stratified vocational advice intervention (SVAI) or motivational interviewing (MI) to usual case management (UC) was effective in reducing sickness absence during 6 months compared to UC alone for workers on sick leave with MSDs.

**Methods**: In this randomised controlled trial, workers on sick leave with MSDs were allocated to either UC (control-group) or UC plus SVAI provided by physiotherapists (SVAI-group), or UC plus MI provided by social security caseworkers (MI-group). Eligibility criteria and intervention details are shown in the figure. Data on sickness absence were obtained from national registries six months after entry in the study and analysed using Mann-Whitney-Wilcoxon tests and robust linear regressions.

**Results**:



Of the 514 included participants, 57% were women and the median age was 48 years (range 24-66). In the SVAI group 153 (89%) received the intervention and in the MI group 119 (70%) received the intervention. We had data on the primary outcome for 492 (96%) of the participants. The results from the primary analyses have not been published and will be revealed at the EFIC congress, pending abstract acceptance.

**Conclusions**: This trial provides new evidence about the effectiveness of SVAI and MI in reducing sickness absence in workers on sick leave with MSDs.

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**ClinicalTrials.gov identifier:** NCT03871712

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### Abstract no.: 1168

### THE EFFECT OF COMBINED ACTION OBSERVATION THERAPY AND ECCENTRIC EXERCISES IN THE TREATMENT OF MID-PORTION ACHILLES-TENDINOPATHY: A FEASIBILITY PILOT RANDOMISED CONTROLLED TRIAL

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**Background and aims**: Mid-portion Achilles Tendinopathy (AT) is a common musculoskeletal condition with varying rehabilitation success rates. Current treatment approaches bias the biomedical model which emphasises physically treating and loading the tendon. Overall, there is a lack of consideration for the central nervous system which is commonly implicated in chronic injuries. The aim of this pilot study is to explore the feasibility of combining Action Observation Therapy, a treatment technique with targets central changes and can influence motor learning, with eccentric exercises in the treatment of Mid-Portion AT.

**Methods**: This was a double-blinded randomised controlled pilot study. All participants underwent the 12-week Alfredson protocol. The intervention group watched videos of the exercises before performing them, whilst the control group watched nature videos before performing the same exercises. Study feasibility was the primary outcome measure(OM), with the VISA-A selected as the primary clinical OM.

**Results**: 30 participants were recruited, reflecting a 75% eligibility rate and 100% enrolment rate. The retention rate was 80%. At week 6 the mean VISA-A score improved by 18.08(95%CI 10.18-25.98) in the intervention group and 7.58(95%CI .28 -14.89) in the control group, with 75% and 33% of participants in each group exceeding the minimal clinically important difference(MCID). The week 12 mean VISA-A score change from baseline was 22.25(95%CI 12.52-31.98) in the intervention group and 16.5 points(95%CI 8.47-24.53) in the control group, equating to 75% and 58% in each group respectively exceeding the MCID.

**Conclusions**: The positive feasibility OM's and exploratory data from the clinical OM's strongly suggest that further investigation is warranted.

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# Surgical therapies

### Abstract no.: 220

### MULTIMODAL ANALGESIA IN MINI-INVASIVE ECHO-CONTROLLED SURGICAL INTERVENTIONS ABOUT PURULENT COMPLICATIONS OF ACUTE PANCURITIS

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**Background and aims**: Pain is one of the main symptoms of acute pancreatitis (AP), which requires appropriate analgesia. Multimodal analgesia (MMA) is used for this purpose. Experimental and clinical data indicate the high efficiency of dexketoprofen not only as a systemic but also as a local anesthetic. The aim of the study was to evaluate the effectiveness of MMA with dexalgin (dexketoprofen) when performing minimally invasive echo-controlled surgeries (MIES) for purulent complications of AP.

**Methods**: The study involved 100 patients. The comparison group (50 people) consisted of patients in whom MIES was performed under local anesthesia with 2% lidocaine, ketoprofen (200 mg daily) was used intramuscularly after it. In the main group (50 people) patients received dexalgin (150 mg daily) topically during the MIES and intramuscularly after it. In case of inefficiency of treatment, patients received opiates. The effectiveness of treatment was assessed using visual analog scales and blood cortisol.

**Results**: MMA was quite sufficient for patients of the main group. Opiates was required in 12 patients of the comparison group (24%). Patients of this group rated pain during the first day in 2.5±0.3 points, the main group - 2.1±0.3 points. Blood cortisol levels after the intervention were: after 3 hours main group - 355.6±21.3, comparison group - 534.3±16.3, after 6 hours respectively - 431.2±8.2 and 600.2±15.7, after 12 hours respectively - 559.3±8.3 and 658.5±12.6 ($p<0.0001$).

**Conclusions**: MMA by dexalgin in MIES is highly effective in patients with complicated AP.

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## Abstract no.: 384

### SUCCESSFUL TREATMENT OF CHRONIC PAIN WITH SPINAL CORD STIMULATION IMPROVES MOOD ALTERATIONS AND QUALITY OF LIFE IN CHRONIC PAIN POPULATION

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**Background and aims**: Chronic pain is one of most disabling condition that strong influences quality of life; it appears to share some mechanisms with frailty. Previous studies have suggested that effective pain treatment may improve or prevent symptoms related to a frailty condition.

The aim is investigate the possible correlation between some frailty related conditions and chronic pain, and verify if a successful pain treatment could improve these conditions in chronic pain population.

**Methods**: Patients with chronic low back pain (n=22, ± 65yo), eligible for Spinal Cord Stimulator (SCS) implant, were enrolled. Blood samples were collected at baseline and 1-3-6 months after implantation; some frailty symptoms, including anxiety, depression, difficulties to perform daily activity and quality of life were evaluated at each follow up. The expression of pro- and anti-inflammatory cytokines mRNAs in PBMC was determined by real-time PCR. The analysis on cytokines released by PBMCs differently stimulated is also ongoing.

**Results**: 19 patients reported an improvement of pain after 1 month of SCS and until 6 months later. Compared with baseline, the level of PBMC IL-1β mRNA was significantly down-regulated after 3 months of SCS, while IL-4 expression was significantly increased after 1 month of SCS. Psychological symptoms improved in all patients after 1 month of SCS in comparison to baseline. A correlation between pain severity and decrement of some frailty conditions was found.

**Conclusions**: Our preliminary results suggest that chronic pain and frailty could influence each other, and that successful pain treatment may reduce progression of symptoms related to frailty, improving patients' quality of life.

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## Abstract no.: 524

### FOLLOWING GUIDELINES FOR PERIOPERATIVE PAIN MANAGEMENT AFTER CAESAREAN SECTION IS ASSOCIATED WITH BETTER OUTCOMES: ANALYSIS OF REGISTRY DATA

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**Background and aims**: In the clinical routine, women after Caesarean Section (CSection) report severe pain and related interference. One reason might be inconsistent implementation of evidenced-based guidelines. We assessed the association between conforming to guidelines and pain-related patient reported outcomes (PROs) after CSection.

**Methods**: PAIN OUT, an international perioperative pain registry, provided methodology for evaluating pain management and PROs on the first day after CSection and access to a patient cohort.

We assessed whether:

[i] regional anaesthesia included a neuraxial opioid OR general anaesthesia included wound infiltration or TAP block;

[ii] a full daily dose of a non-opioid analgesic was administered;

[iii] pain was assessed.

Credit for care was given only if all three elements were administered (='Full'), otherwise, it was 'Missing'. The primary end-point was a 'Pain Composite Score' (PCS), evaluating pain intensity, its physical and emotional interference and side-effects.

**Results**: Data from 5182 women, from 15 countries were analysed. 'Full' care was administered to 20% of women, whose PCS was lower compared to 'Missing' ($p<0.001$), a small-moderate effect size. Some single PROs were more favourable in women receiving 'Full' versus 'Missing' care. Being in severe pain ≥50% of the time after surgery was reported by 28% versus 54% of women in 'Full' and 'Missing' care, respectively. Other PROs remained poor in a high proportion of women.

**Conclusions**: In this large cohort, only 20% of women received three simple to implement, guideline-recommended treatment elements. This was associated with a small improvement in the PCS. Closing the evidence-practice gap remains challenging.

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## Abstract no.: 969

### THE PERIOPERATIVE PAIN MANAGEMENT BUNDLE IS FEASIBLE: RESULTS FROM A MULTI-CENTER CROSS-SECTIONAL STUDY FROM THE PAIN OUT REGISTRY

D. Stamenkovic[1], P. Baumbach[2], D. Radovanovic[3], M. Novovic[4], N. Ladjevic[5], E. Dubljanin Raspopovic[6], I. Palibrk[7], D. Unic-Stojanovic[8], A. Jukic[9], R. Jankovic[10], S. Bojic[11], J. Gacic[12], U. Stamer[13], W. Meissner[2], R. Zaslansky[2]

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**Background and aims**: Pain-related patient-reported outcomes (PROs) after surgery are often poor. A 'bundle', a small set of evidence-based interventions, is associated with improved outcomes in different settings. We assessed whether staff could implement a 'perioperative pain management bundle' and whether this would be associated with improved PROs.

**Methods**: Ten hospitals in Serbia participated in the study. PAIN OUT, a perioperative pain registry, provided tools for evaluating PROs and management on the first post-operative day. The bundle consisted of four elements: full daily doses of 1-2 non-opioids; at least one local/regional block; pain assessment by staff; offering patients information about pain management. The primary endpoint was the proportion of bundle-treated patients. The effect of the bundle on pain was assessed with a composite score, Pain Composite Score' (PCS), evaluating multi-dimensional features: pain intensity, interference, side-effects.

**Results**: 2354 patients contributed data between January 2018-December, 2019. Within six months of introducing the bundle, 37.5% of patients received all elements and this was associated with a significant reduction in the PCS ($p<0.001$, small-to-medium effect size). Individual PROs were consistently better in patients receiving all bundle elements compared to those receiving 0-3 elements only: time in severe pain ≥50% was reported by 23% vs 13%; interference with moving in bed NRS≥6 was reported by 37% vs 24% of patients receiving 0 vs all elements.

**Conclusions**: Our findings point towards the benefit of adhering to clinical practice guidelines for perioperative pain management in a manner that all four recommended treatment elements selected (='bundle') are administered to patients.

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# VIRTUAL POSTERS - LIVE ONLINE POSTER SESSION

# Pain Syndromes - Acute pain

## Abstract no.: 225

### INVOLVING PARENTS DURING PAINFUL INTERVENTIONS FOR THEIR PRETERM INFANTS: A SYSTEMATIC REVIEW

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**Background and aims**: Worldwide, 15 million babies are born before 37 completed weeks of gestation. Hospitalised on neonatal intensive care units, often these preterm infants undergo painful treatment. Parents are not routinely involved in pain reducing interventions. The aim of the current study was to systematically review the current state of the art regarding the effectiveness of parents' involvement during painful interventions for their preterm infants.

**Methods**: We performed a systematic search of PubMed, EMBASE, CINAHL, Livivio, and PsychInfo using the keywords *preterm infants, pain,* and *parents*.

Articles were eligible for inclusion if published between 2000 and 2021 and reported randomized clinical trials (RCT) in which preterm infants underwent painful interventions, and parents were present and actively involved in pain reducing measures.

We used the Consolidated Standards of Reporting Trials checklist for RCTs for data extraction. We assessed methodological quality using critical appraisal for RCTs according to the Joanna Briggs Institute.

**Results**: In total, 22 articles of 18 studies met the inclusion criteria. These studies focused on kangaroo/skin-to-skin care (n=15), on breastfeeding (n=1), and on facilitated tucking (n=2). Overall, kangaroo/skin-to-skin care and facilitated tucking resulted in clinically and statistically significant decreases in pain. Overall, outcomes used to evaluate pain reduction by parental involvement varied substantially.

**Conclusions**: The current evidence suggests that involving parents during painful interventions is beneficial. However, more research is needed about the different and most effective methods of involving parents in pain reducing measures.

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## Abstract no.: 707

### RECOVERY LIES IN CALMNESS: COVID-19 RESTRICTIONS RESULT IN LESS POST-OP PAIN

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**Background and aims**: The COVID-19 pandemic affected provision of care in hospitals, worldwide. Among other restraints, elective surgeries were postponed, and access for visitors and relatives was stopped or strictly limited. Aim of this study was to evaluate if patients rated their maximum post-operative pain equally, higher, or lower from January to March 2021 when strict restriction were imposed in German hospitals.

**Methods**: Based on data from the German QUIPS project (Quality Improvement of Post-Operative Pain Treatment), we compared data about post-op maximum pain. Patients assessed their pain using a numeric rating scale from 0 to 10 after two non-elective surgeries (appendectomy, laparoscopic cholecystectomy) in two periods: from January to March 2021 (shutdown period group, sample size 226 patients) and from January to March 2019 (control group, sample size 479 patients). We used T-tests with a 95% confidence interval.

**Results**: During the shutdown period, patients reported significantly lower maximum pain scores: mean maximum pain in appendectomy patients was 4.6 during shutdown compared to 5.5 in 2019 (p=0.039); in cholecystectomy patients, mean maximum pain was 4.7 during shutdown and 5.1 in 2019 (p=0.049).

**Conclusions**: Our results suggest that patients perceived the quality of postoperative pain management to be better during Covid-19-related hospital restrictions. Patients might benefit from quiet and privacy after surgery, and they might feel grateful for medical care received in face of a burdened health system.

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# Pain Syndromes - Cancer pain

## Abstract no.: 769

### OPIOID-INDUCED CONSTIPATION IN CANCER PAIN PATIENTS: EFFECTIVENESS OF NALOXEGOL

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**Background and aims**: Opioid-induced constipation (OIC) is the most common side effect of opioids, that can be responsible for deterioration of the patients' quality of life (QoL) and an inappropriate reduction in opioid doses. This real-world study mainly aimed assessing the efficacy and safety of naloxegol for the treatment of OIC in cancer pain patients with inadequate response to laxative(s), and the evolution of their quality of life.

**Methods**: A non-interventional, 4-week follow-up, French study was conducted between 2018 and 2019. Eligible patients were aged ≥18 years, received opioids for cancer-pain, and started naloxegol for OIC with inadequate response to laxatives. The response rate to naloxegol was assessed at W4. The evolution of QoL was measured using the Patient Assessment of Constipation Quality of Life (PAC-QOL).

**Results**: 124 patients were included (mean age 62±12 years; ECOG ≤2: 79%; primary cancer: lung 18%, breast 16%, prostate 11%, head and neck 9%, digestive 9%...; metastatic stage: 80%). At inclusion, the median opioid dosage was 60 mg of oral-morphine or equivalent. At W4, the response rate was 73.4% (95%CI 63.7%-83.2%) and 62.9% (95%CI 51.5%-74.2%) of patients had a clinically relevant change in QoL (decrease in PAC-QOL score ≥0.5 point). Related adverse events were reported in 8% of patients (7% with gastrointestinal events; one serious diarrhea).

**Conclusions**: This real-world study shows that naloxegol is effective and well tolerated in cancer pain patients with OIC and that their quality of life improves under treatment.

# Pain Syndromes - Central neuropathic pain

## Abstract no.: 344

### REAL-WORLD SCS OUTCOMES USING SUB-PERCEPTION-BASED CUSTOMIZED FIELD SHAPES FOR TREATMENT OF CHRONIC PAIN

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**Background and aims**: Recent studies in patients using Spinal Cord Stimulation (SCS) systems capable of multiple waveforms including advanced waveforms and combination therapy report effective outcomes. We sought to assess use of sub-perception-based custom field shape programming in a cohort of SCS device-implanted patients with chronic pain.

**Methods**: This is a multicenter, consecutively-enrolled, observational case-series in patients permanently implanted with an SCS system for treatment of chronic pain as part of an ongoing retrospective chart review of outcomes for chronic pain (Clinicaltrials.gov: NCT01550575). Patients were implanted with an SCS system (Boston Scientific) programmed with a sub-perception-based customized field shape algorithm (Contour, Boston Scientific) designed to engage anti-nociceptive terminals over a broader coverage area (versus an 8mm bipole) to produce a stronger dorsal horn effect. Patient reported pain scores at baseline and follow-up were collected.

**Results**: A total of 52 permanently-implanted patients programmed with a customized field shape algorithm have been analyzed. Mean baseline NRS was determined to be 7.9±1.5. A 4.3-point improvement ($p<0.0001$) in overall pain was found at 3-months and sustained up to 12-months ($\Delta = 4.6$, $p<0.0001$). At last follow-up, 40% reported an NRS pain score of two or less. Sixty-seven percent assessed at last follow-up were found to prefer a customized stimulation targeting algorithm.

**Conclusions**: Patient-specific programming is thought to be key to enabling the most optimal analgesic outcomes using SCS-based therapy. Results of this study support this premise on basis of observed patient outcomes in those who used a sub-perception-based field shape algorithm as part of this ongoing multicenter case-series.

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## Abstract no.: 1167

### THE EFFECTS OF OPIOIDS ON IMMUNE SYSTEM – THE ROLE OF GLIAL CELLS IN THE DEVELOPMENT OF OPIOID TOLERANCE AND OIH IN MODEL OF NEUROPATHIC PAIN

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**Background and aims**: Tolerance and opioid-induced hyperalgesia (OIH) are the major side effects of opioids in pain therapy. Currently, the mechanisms underlying the phenomena remain largely uncertain. Cytokines signalling has been implicated in the pathogenesis of neuropathic pain. The aim of our study was to investigate the roles of cytokines of glial origin in opioid tolerance and OIH.

**Methods**: Morphine was injected intraperitoneally in Chronic Constriction Injury (CCI) mouse model of neuropathic pain, and pain-like behaviour was evaluated by von Frey/cold plate tests. Protein expression was analyzed using Western blotting/ Luminex assays.

**Results**: Our results demonstrated that repeated intraperitoneal administration of morphine, in two experimental schemes, caused potent analgesic effect in the first days of injection, followed by side effects, including drug tolerance and opioid-induced hyperalgesia, arising on the course of time.Our results suggest that tolerance and OIH result from the opioid-induced glial cells' excitation in the spinal cord. Important findings include the increased phosphorylation of MOR and the excessive release of pronociceptive factors by glia, i.e. IL-1beta, IL-6, TNF-α, CCL2, CCL3, CXCL9, CXCL10.

**Conclusions**: Our data provide evidence that opioids modulate the functions of neuroimmune system, exerting direct effects on its cells' activity, the factors released, and the functions of opioid receptors located on the cells. Hence, the pharmacological modulation of such interactions may comprise a new strategy for effective neuropathic pain therapy.

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# Pain Syndromes - Complex Regional Pain Syndrome

## Abstract no.: 418

### KINESIOPHOBIA AND DEPERSONALIZATION PREDICT BODY PERCEPTION DISTURBANCES (BPD) IN CHRONIC COMPLEX REGIONAL PAIN SYNDROME (CRPS) PATIENTS: A PATH ANALYSIS MODEL

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**Background and aims**: BPD are common among CRPS patients and are manifested as limb alienation or decreased limb attention. We tested a theoretical model assuming that disruption in pain pathways and psychological factors may contribute to BPD, which may have an effect on clinical pain intensity and Quality of Life (QoL).

**Methods**: Sixty-one CRPS and 31 chronic limb pain patients participated, aged 36.1±12.9 years, 55 females (59.8 %). Path analysis was applied to test the hypotheses concerning the relationships and directionality between the intensity of hyperalgesia and hyperpathia; scores of Cambridge Depersonalization Scale (CDS); Tampa Scale of Kinesiophobia (TSK); CRPS Severity Score (CSS); Bath and Neurobehavioral Questionnaires (NQ) - both measures of CRPS BPD; SF-36 QoL; and McGill Pain Questionnaire (MPQ).

**Results**: The model showed good fit indices: $\chi^2(11) = 16.71$, $p=.117$, CFI=.984, GFI=.960, RMSEA=.076. CDS had a direct effect on Bath ($\beta=.45$, $p<.001$) and NQ ($\beta=.23$, $p=.015$), and TSK directly affected NQ ($\beta=.24$, $p=.009$). CSS had a direct effect on Bath ($\beta=.31$, $p<.001$) and NQ ($\beta=.23$, $p=.036$). The Bath directly and indirectly linked with SF-36 QoL and MPQ, respectively ($\beta=.-.22$, $p=.017$), ($\beta=.14$, $p=.010$). Intensities of hyperalgesia and hyperpathia had no direct effect on BPD.

**Conclusions**: These findings indicate that fear of movement, limb detachment and disease severity show causal association with BPD in chronic CRPS, yet abnormal pain processing may not contribute. BPD directly contribute to QoL and indirectly to clinical pain via QoL. These findings strengthen the need for development of interventions aimed at body perception restoration.

## Abstract no.: 465

### QUANTITATIVE DYNAMIC ALLODYNOGRAPHY: A STANDARDIZED MEASURE FOR TESTING ALLODYNIA IN CHRONIC PAIN

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**Background and aims**: Allodynia, a pain response in the absence of noxious stimulation, is prevalent in various pain syndromes, and is a clinical manifestation of peripheral and/or central sensitization. Moreover, allodynia area has been linked to syndrome severity, pain level, and Quality of Life (QoL). Yet, no standardized, reliable and a valid method to measure allodynia's surface area has been reported. This study aimed at establishing psychometric properties for the *Quantitative Dynamic Allodynography (QDA)*, a newly developed measure.

**Methods**: Seventy-eight chronic complex regional pain syndrome (CRPS) patients aged 19-65 underwent an allodynia measurement using the *QDA*, a method utilizing the *ImageJ* program. Test-retest reliability conducted twice one week apart (N=20), and inter-rater reliability were performed. Divergent and convergent validity were tested utilizing self-reports: CRPS Severity Score (CSS), the short-form health questionnaire (SF 36) testing QoL, the short-form McGill pain questionnaire (SF-MPQ) testing the pain emotional dimension and overall pain intensity, and the Tampa Scale of Kinesiophobia (TSK) testing fear of movement.

**Results**: Excellent inter-rater reliability (intraclass correlation coefficient (ICC)=*.96, p<.001*) and test–retest reliability were found ($r$=.98, $p$<*.001*). Furthermore, the allodynia area was found to be correlated with CSS *(r=.52, p<.001)*, VAS in MPQ *(r=.44, p<.001),* and SF36 physical scale *(r=-.50, p<.001)*, total physical health scale *(r=-.47, p<.001)*, and total QoL *(r=-.41, p<.001)*. No statistically significant correlation was found with the TSK.

**Conclusions**: The QDA is the first developed reliable and valid method for measuring dynamic allodynia in a clinical setting. The QDA may be used as an outcome measure advancing the pain precision medicine approach.

## Abstract no.: 500

### GLUCOCORTICOID TREATMENT IN PATIENTS WITH COMPLEX REGIONAL PAIN SYNDROME: A SYSTEMATIC REVIEW

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**Background and aims**: There is growing evidence supporting the role of inflammatory mechanisms in complex regional pain syndrome (CRPS). It is known that glucocorticoids are often used in treating inflammation. Despite the known role for inflammation in CRPS, corticosteroids are not always used. The aim of this study was to systematically review the efficacy of glucocorticoids in CRPS.

**Methods**: Embase, Medline, Web of Science, and Google Scholar were systematically searched for articles focusing on glucocorticoid treatment and CRPS. Screening based on title and abstract was followed by full-text reading (including reference lists) to determine a final set of relevant articles. Bias was assessed using the revised Cochrane risk-of-bias-tool for randomized trials (Rob2).

**Results**: Forty-one studies were included, which reported on 1208 CRPS patients. A wide variety of glucocorticoid administration strategies were applied, with oral as most chosen. Additionally, a large heterogeneity in outcome parameters was found, including: clinical symptoms, pain relief, and range of motion. Use of glucocorticoids caused an improvement of

different parameters in all but two studies. In particular, improvement in pain relief and range of motion were reported. Using corticosteroids in CRPS of longer duration (>3 months) appears to be less effective.

**Conclusions**: Based on the present review there is evidence to support glucocorticoid treatment in CRPS. However, it is still unclear which route of administration and which dose are best. Therefore, we recommend future research on this, preferably in a intervention study. We also recommend studies on the aetiological mechanisms and corresponding optimal treatment, because CRPS pathogenesis is only partially understood.

# Pain Syndromes - Low back pain and lumboradicular pain

## Abstract no.: 362

### CHANGES IN PAIN-RELATED FEAR ARE NOT ASSOCIATED WITH CHANGES IN SPINAL MOVEMENT FOLLOWING AN INTERDISCIPLINARY REHABILITATION PROGRAM IN PATIENTS WITH CHRONIC LOW BACK PAIN

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**Background and aims**: While the fear-avoidance model (FAM) assumes a causal relationship between pain-related fear and avoidance of spinal movement in patients with chronic low back pain (CLBP), evidence supporting this relationship is scarce. This study aimed to test if decreases in pain-related fear were associated with increases in lumbar amplitude and velocity of movement, or decreases in paraspinal muscles activity, accounting for possible changes in pain intensity in patients treated for CLBP.

**Methods**: Sixty-two patients with CLBP were assessed before and after an interdisciplinary rehabilitation program (IRP). Pain-related fear was measured with the Tampa scale of kinesiophobia and a task-specific measure. Spinal movement was characterized through the maximum flexion angles and angular velocities at the lower and upper lumbar spine and the maximum lumbar paraspinal muscles activity measured using state-of-the-art motion capture systems during five daily-life activities. Correlation and multivariable linear regression analyses were conducted.

**Results**: The large decrease in pain-related fear observed following the IRP was not significantly ($p>0.05$) associated with the changes in spinal movement in 96% of the tests ($r$: -0.17 to 0.3; standardized $\beta$: -0.17 to 0.3). Results remained comparable whether more or less feared activities were analyzed and whether specific or general measures of pain-related fear were considered.

**Conclusions**: Small effect sizes and non-significant relationships between changes in pain-related fear and spinal movement were frequently observed, not supporting the relationship proposed in the FAM. While pain-related fear has been repeatedly associated with disability in patients with CLBP, these results questioned the influence of spinal movement avoidance in this relationship.

## Abstract no.: 480

### ALTERATIONS IN STRUCTURAL AND FUNCTIONAL BRAIN CHARACTERISTICS ARE ASSOCIATED WITH PAIN-RELATED OUTCOMES AND PAIN COGNITIONS IN WOMEN WITH CHRONIC LOW BACK PAIN

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**Background and aims**: Research revealed brain alterations in patients with chronic low back pain (CLBP) but studies examining various brain features together and associations with pain-related outcomes and pain cognitions is lacking.

Combining brain features gives the advantage of a multi-component approximation of CLBP. Therefore, the primary aim was to look for multi-component differences at brain level (i.e., white matter and grey matter structure, functional connectivity) between women suffering from CLBP and healthy women. Furthermore, associations between brain alterations, and pain-related outcomes and pain cognitions were examined.

**Methods**: 32 patients with CLBP and 32 healthy pain-free controls were enrolled. Pain intensity, symptoms related to central sensitization, pain catastrophizing, kinesiophobia, pressure pain thresholds, and conditioned pain modulation (CPM) were assessed. Also, T1- and diffusion-weighted magnetic resonance (MR) images and resting-state functional MR images were acquired examining respectively grey matter volume, fractional anisotropy (FA), and seed-to-seed resting-state functional connectivity.

**Results**: Changes in FA, grey matter volume, and resting-state functional connectivity in various regions of interest were found in patients with CLBP compared to controls. Hyperalgesia, decreased CPM efficacy, higher pain catastrophizing, kinesiophobia, pain intensity, and symptoms related to central sensitization were found in patients compared to controls ($p < .05$). The observed white matter and functional connectivity changes were moderately to strongly correlated with local hyperalgesia, maladaptive pain cognitions, higher pain intensity and dysfunctional endogenous analgesia ($p < .05$).

**Conclusions**: Patients with CLBP showed both structural and functional brain changes related to dysfunctional pain modulation and pain cognitions. Multi-modal biopsychosocial therapy targeting this neuroplasticity is recommended.

# Pain Syndromes - Orofacial pain

## Abstract no.: 305

### A QUALITATIVE STUDY OF TRIGEMINAL NEURALGIA PATIENTS' LIVED EXPERIENCES AND DESIRED OUTCOMES OF TREATMENT

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**Background and aims**: Trigeminal neuralgia (TN) is a unilateral electric shock like pain limited to the distribution of the trigeminal nerve. Despite being a rare disorder medical and surgical interventions are available for its management. Pain intensity/relief are commonly used outcomes of treatment, although the burden on emotional wellbeing and quality of life, is known. Knowledge about what patients consider to be important outcomes and a detailed description of what it means to live with TN are missing. The aim of this study was to understand, from the patient perspective, what it means to live with TN and what outcomes of treatment do patients consider important.

**Methods**: 14 patients with a diagnosis of TN participated in a qualitative study with focus group work. Discussions between group members were recorded and transcribed verbatim and analysed using framework analysis.

**Results**: Four themes and 14 subthemes were identified. Theme 1 reflects the uncertainty about TN aetiology and prognosis; theme 2 includes descriptions of the mental, social, and physical impact of TN which contrasts with coping mechanisms developed over time; theme 3 reflects participants' views of what a successful treatment means and what specific outcomes they expect following treatment, patient's willingness to self-manage their conditions whilst supported is also reflected here; finally, in theme 4, the importance of appropriate and timely access to healthcare and the importance of peer support are highlighted.

**Conclusions**: This study confirms the need of moving beyond the biological models of disease to patient centred care and research approaches.

## Abstract no.: 361

### DELINEATION OF CENTRAL AMYGDALA AND THE TRIGEMINAL MOTOR NUCLEUS CONNECTIVITY IN HUMANS: AN ULTRA-HIGH FIELD DIFFUSION MRI STUDY

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**Background and aims**: Awake bruxism— a stress-related oral behavior characterized by repetitive or sustained tooth clenching—is strongly associated with temporomandibular disorders (TMD), the most common chronic orofacial pain condition. Yet, the brain circuits underlying this behavior remain elusive. A recent rodent study revealed a novel circuit between the trigeminal motor nucleus (5M) and the central amygdala (CeA), which controls biting attacks. We aim to resolve the 5M-CeA circuit humans using ultra-high field (7T) and high field (3T) diffusion-weighted imaging (DWI).

**Methods**: In 30 healthy adults from the Human Connectome Project, we delineated the 5M bilaterally. The basolateral amygdala (BLAT) was used as a negative control, given that we do not anticipate strong 5M-BLAT connectivity based on the rodent study. The CeA and the BLAT seeds were imported from the Tyzska-Pauli atlas. Data were preprocessed and tractography was performed in FSL. Bidirectional probabilistic tractography was performed between each amygdalar nucleus (CeA and BLAT) and 5M to construct putative white matter pathways with 10,000 samples per voxel for each seed, and hemisphere. Connectivity strength was based on the number of tracts between each region of interest, corrected for seed size, and compared using paired t-tests. Significance was set at a Bonferroni-corrected $p<0.0125$ (Left vs. Right, BLAT-5M vs. CeA-5M).

**Results**: The CeA-5M circuit had significantly higher connectivity strength than the BLAT-5M circuit, in each hemisphere at both 7T and 3T.

**Conclusions**: This study—the first delineating the CeA-5M circuit in humans—provides a neuroanatomical substrate to investigate mechanisms of awake bruxism and TMD.

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## Abstract no.: 476

### UNRAVELLING THE ROLE OF UNMYELINATED FIBERS IN TRIGEMINAL NEURALGIA WITH CONCOMITANT CONTINUOUS PAIN

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**Background and aims**: Trigeminal Neuralgia is a neuropathic facial pain condition characterized by recurrent paroxysmal episodes of unilateral facial pain in the distribution of one or more branches of the fifth cranial nerve. Beside this characteristic paroxysmal pain, due to the focal demyelination of trigeminal afferents, up to 50% of patients experiences a concomitant continuous pain. The observation that continuous pain is associated with nerve atrophy suggested that this type of pain is related to trigeminal axonal loss. In this prospective study, we aim at testing the function of all sets of primary trigeminal afferents through the agreed neurophysiological methods.

**Methods**: We enrolled 65 patients with a definite diagnosis of classical TN. Patients were grouped in patients with purely paroxysmal pain (36) and patients with also concomitant continuous pain (29). All participants underwent trigeminal reflex testing to assess the function of non-nociceptive, large, myelinated fibers and laser evoked potentials after stimulation of small, myelinated Ad and unmyelinated C fibers.

**Results**: The only neurophysiological characteristic distinguishing the two subgroups of patients was the amplitude of C-LEPs ($p =0.02$). In patients with concomitant continuous pain a significant side asymmetry in N2 amplitude of C-LEPs was disclosed, whereas in the group of patients with purely paroxysmal pain neurophysiological tests did not disclose any significant side asymmetry.

**Conclusions**: Our neurophysiological study showing that continuous pain is associated with C-LEPs attenuation, may suggest that this type of pain is related to unmyelinated fibre loss, possibly triggering abnormal activity in denervated trigeminal second order neurons.

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## Abstract no.: 688

### OROFACIAL PAIN AND CIRCADIAN MISALIGNMENT AS MUTUALLY INTERACTIVE ADDITIONAL CONTRIBUTORS TO CARDIOMETABOLIC RISK IN PATIENTS WITH INSOMNIA AND SLEEP DISORDERED BREATHING

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**Background and aims**: The aim of this study was to add an evidence based support through a group of 2 studies consolidating the relevant role of orofacial pain and circadian misalignment as adiditional contributors to cardiometabolic risk in patients with insomnia and sleep disordered breathing (SDB).

**Methods**: Two hypothesis were tested in different clinical settings: 1) a group of 1236 anonymized patients seeking care for orofacial pain (OP) was assessed regarding insomnia (Insomnia Severity Index-ISI) and snoring as a surrogate of SDB. Patients with sleep disorders were compared regarding psychosocial stress factors (assessed through the Patient Health Questionnaire-4 - PHQ-4) as an indicator of cardiometabolic risk; 2) A group of 11 patients with OP and a psg diagnose of SDB and insomnia were compared before and after treatment with a mandibular advancement device (MAD). Circadian clock alignment was inferred by a change in the mid point of sleep between diagnostic and therapeutic PSG. Cardiometabolic impact was inferred by changes in autonomic modulation as measured by NerveExpress version 7.5.

**Results**: From the first study, the PHQ-4 scored higher in Orofacial patients with insomnia, SDB and comorbid insomnia and SDB compared with either general population or those with otherwise non-comorbid OP; From the second study, CSD patients with OP significantly improved either from insomnia, SDB, OP related complaints and autonomic modulation.

**Conclusions**: Our findings highly suggest a mutual contribution from orofacial pain and circadian misalignment to cardiometabolic risk in patients with insomnia and SDB. This burden is even more impacting within the comorbid condition (insomnia+SDB).

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# Pain Syndromes - Osteoarthritis, Rheumatoid Arthritis

## Abstract no.: 247

### THE IMPACT OF THE COVID-19 PANDEMIC ON PATIENTS WITH PSORIASIS ARTHRITIS

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**Background and aims**: To evaluate the clinic of a patient with psoriasic arthritis during the covid19 pandemic.

**Methods**: Review of the clinical evolution of a patient with psoriasic arthritis by telephone contact.

Patient with a diagnosis of axial and peripheral Psoriasis Arthritis since 2013, in clinical remission.

It started as hand dactylitis 10 years ago.

Interlinear clamping of both wrists without progression with periosteal reaction in proximal interphalangeal hands, 5 right metatarsophalangeal clamping (traumatic antecedent) and erosion in 5 left metatarsophalangeal without progression in recent years.

Right sacroiliitis with syndesmophytes in the lumbar and cervical spine without current symptoms of inflammatory low back pain. No radiological progression(2017).

Hemorrhagic colitis attributed to methotrexate, reason for which it was suspended

Controlled with Leflunomide. LastX-ray(2020).

Other clinical processes: Diabetes mellitus. chronic ischemic heart disease. Pericatheterism with 3 stents(2016). Head injury with loss of consciousness(2015). Vaccinated for flu, and covid-19(Pfizer),May 2021, does not consist of pneumococcus. He does not currently smoke, he exercises.

**Results**: 06/12/20: External consultations canceled due to epidemiological situation due to COVID-19. Consultation is made phone and the patient accepts it. Stable without arthritis and without progression in X-rays. More degenerative signs in proximal interphalangeal and right metacarpophalangeal.

Analytical: Erythrocyte sedimentation rate 8, Normal C-Reactive Protein, Glucose 152, Creatinine 1.41.

Treatment:atorvastatin 40 mg/24h,Acetylsalicylic acid 100 mg/24h,Leflunomide 20 mg/24h,Lorazepam 1mg/24h, Metformin/Sitagliptin 50MG/1000MG/24h,Bisoprolol 5 MG 1c/day,Amlodipine 5 mg/24h,Omeprazole 20 mg/24h,calcipotriol/betamethasone(50 micrograms/g+0.5mg/g) skin foam 3 applications/24H.

**Conclusions**: The covid-19 pandemic has generated an impact on psoriasis patients with consequences in relation to their disease and the health care received.

## Abstract no.: 439

### PRE-EXPOSURE TO MORPHINE LEADS TO EXACERBATED PAIN BEHAVIOUR IN OSTEOARTHRITIS-LIKE KNEE PAIN CONDITIONS IN RODENTS

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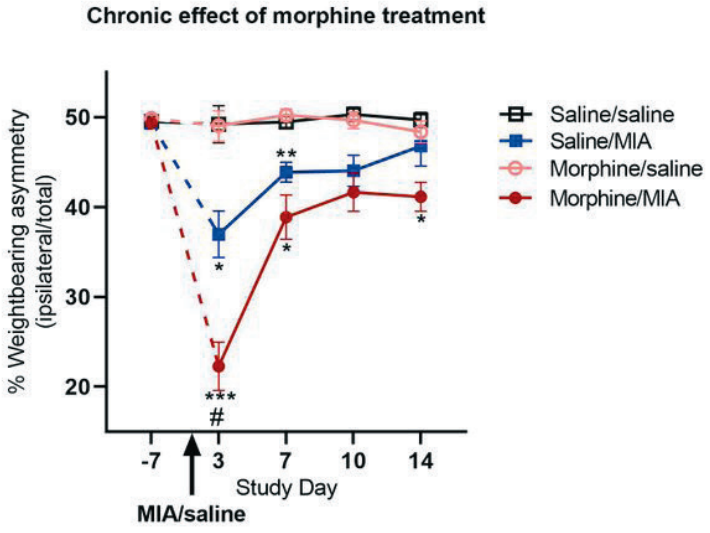
**Background and aims**: Opioid drugs are commonly use to manage moderate-to-severe pain, including osteoarthritis (OA) pain. Despite limited analgesic benefit, and the wide-ranging consequences (including tolerance and hyperalgesia), long-term opioid use in chronic pain patients has escalated. Here, we tested the hypothesis that pre-exposure to opioids may lead to greater sensitization in chronic pain conditions, evaluating the effects of pre-exposure to morphine on pain behaviour in rats with OA-like pain.

**Methods**: To examine the impact of pre-exposure to morphine on OA-like pain behaviour, female Sprague-Dawley rats were bi-daily dosed with morphine (3mg/kg, s.c.) or saline for 1 week prior to induction of the monoiodoacetate (MIA) model (2mg MIA or saline; n=6/group - Morphine/MIA, Morphine/Sal, Sal/MIA, and Sal/Sal) and then 2 weeks after. Weight-bearing was determined before (chronic on-going effect) and after (acute effect) the first injection each day.

**Results**: Morphine pre-exposure in the MIA group resulted in 25±4% hyperalgesia, compared to 13±6% hyperalgesia in the saline pre-exposure MIA group (p=0.003). Immediately following morphine injection, there was a trend towards acute analgesia (37±14% reversal, p=0.07) on day 3 of the MIA model, but this was absent by day 10. These findings were replicated in male Sprague-Dawley rats receiving continuous mini-pump delivery of morphine.




*p<0.05, **p<0.01, ***p<0.001 vs morphine/saline
# p<0.05 vs saline/MIA
RM 2-way ANOVA with Tukey's *post-hoc* test

**Conclusions**: Pre-exposure to morphine was associated with an exacerbated pain behavioural phenotype in the MIA model, which was not subject to tolerance over the time-frame studied, mimicking the clinical problem.

## Abstract no.: 456

### EFFECTS OF BODY COMPOSITION THROUGH METABOLIC AND INFLAMMATORY MEDIATORS ON HAND PAIN

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**Background and aims**: Some evidence has suggested associations between body weight and pain in non-weight bearing joints like hands. While direct loading is an unlikely mechanism here, the possible indirect effects of body composition via metabolic or inflammatory mediators on hand pain are lacking. Thus, we aimed to investigate the associations of body fat, limb muscles, and bone density via serum triglyceride, fasting glucose and C-reactive protein (CRP) on hand pain.

**Methods**: We utilised data from the Chingford Study. We used total fat mass (TFM), limb lean mass (LLM), and total bone mineral density (TBMD) measured by dual-energy X-ray absorptiometry as predictors; serum triglycerides, fasting glucose and high-sensitivity CRP as mediators. The hand pain episode presence in the previous year and its duration (<=2 weeks, >2 weeks) were outcomes. We assessed the associations using binary and ordinal logistic regression analyses with parallel mediation models.

**Results**: We included 738 women (mean age=60.6, SD=5.9); 38% of them reported hand pain episodes, and 6% the episode lasting >2 weeks. We did not find direct effects of TFM, LLM, or TBMD on hand pain. However, we did observe a positive indirect effect of LLM via triglycerides on the presence and duration of hand pain.

Table 1. Associations of body composition via metabolic and inflammatory mediators on hand pain (cross-sectional mediation analyses)

| Predictor | Mediator | Outcome | |
|---|---|---|---|
| | | Hand pain<br>OR (95% CI) | Hand pain duration<br>OR (95% CI) |
| Total fat mass | Triglycerides<br>Fasting glucose<br>hs-CRP | 1.01 (0.99, 1.03)<br>1.00 (0.99, 1.01)<br>0.99 (0.99, 1.01)<br>0.99 (0.99, 1.01) | 1.00 (0.99, 1.01)<br>1.00 (0.99, 1.00)<br>1.00 (0.99, 1.00)<br>1.00 (0.99, 1.00) |
| Limb lean mass | Triglycerides<br>Fasting glucose<br>hs-CRP | 1.01 (0.95, 1.08)<br>1.01 (1.01, 1.03)<br>0.99 (0.99, 1.01)<br>1.00 (0.99, 1.01) | 1.01 (0.98, 1.03)<br>1.01 (1.00, 1.01)<br>1.00 (0.99, 1.00)<br>1.00 (0.99, 1.01) |
| Total bone mineral density | Triglycerides<br>Fasting glucose<br>hs-CRP | 0.91 (0.17, 4.99)<br>1.08 (0.95, 1.36)<br>0.99 (0.86, 1.10)<br>0.99 (0.96, 1.23) | 1.02 (0.55, 1.89)<br>1.03 (0.98, 1.11)<br>1.00 (0.96, 1.05)<br>0.99 (0.99, 1.06) |

OR – odds ratio; CI – confidence interval; hsCRP – high-sensitivity C-reactive protein.
Models were constructed using binary and ordinal logistic regressions with parallel mediation model to estimate direct effects of predictors and indirect effects of predictors through mediators on the hand pain episode and duration of episode, respectively. Models were adjusted for age.

**Conclusions**: We found evidence for the role of triglycerides in hand pain pathophysiology. In women likely more engaged in physical activity/manual work, i.e., having more limb muscles but having uncontrolled serum triglycerides possibly due to an unhealthy diet, triglycerides increased the chance of hand pain and its longer duration.

## Abstract no.: 958

### PSYCHOLOGICAL VARIABLES ASSOCIATED WITH PAIN INTENSITY AND DISABILITY IN PATIENTS WITH OSTEOARTHRITIS: THE KEY ROLE OF SELF-EFFICACY

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**Background and aims**: Psychological variables are potentially modifiable factors that influence pain and disability. This work aims to analyze how positive and negative psychological variables are associated with pain intensity and disability in patients with hip or knee osteoarthritis.

**Methods**: Assessments included sociodemographic, pain-related, disability and psychological characteristics. Firstly, two separate hierarchical linear regression models controlling for confounders were created for each dependent variable (pain intensity and disability). Model 1 included negative (pain catastrophizing, emotional distress) and model 2 included positive (self-efficacy, optimism, satisfaction with life) psychological variables. Statistically significant variables in models 1 and 2 entered a final model for each dependent variable.

**Results**: This study included 66 participants (55% females), with a mean age of 67.8 years (SD=7.3). Variables significantly associated with pain intensity were disability in model 1 ($\beta$=0.264, p=0.039) and self-efficacy in model 2 ($\beta$=-0.375, p=0.017). The final model including these variables explains 21% of the variance [F(4.61)=5.34, p=0.001], with self-efficacy emerging as the only statistically significant variable ($\beta$=-0.380, p=0.008). For disability, pain location ($\beta$=0.293, p=0.017), pain intensity ($\beta$=0.244, p=0.038) and depression ($\beta$=0.290, p=0.015) were significant variables in model 1, along with self-efficacy in model 2 ($\beta$=-0.412, p=0.003). The final model explains 34% of the variance [F(5.60)=7.785, p<.001], with self-efficacy being the only statistically significant variable ($\beta$=-0.479, p=0.001).

**Conclusions**: Self-efficacy was the psychological variable with the strongest association with pain intensity and disability, above clinical characteristics. Promoting patients' competency beliefs may be a useful strategy for pain control.

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## Abstract no.: 1064

### PAIN IS A PREDICTOR OF RAPID PROGRESSION IN PATIENTS WITH OSTEOARTHRITIS

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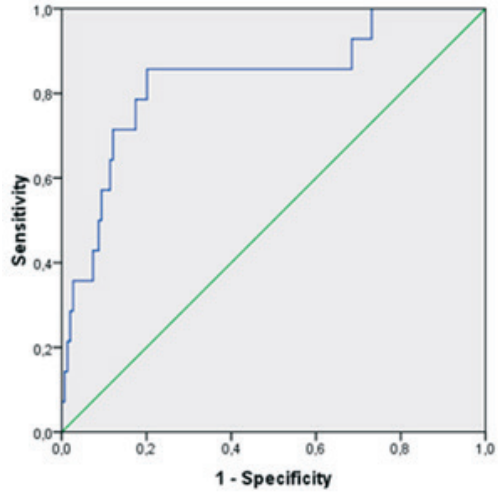
**Background and aims**: To determine predictors of knee osteoarthritis (OA) rapid progression.

**Methods**: 185 females aged 40-75 were enrolled. OA (ACR) was diagnosed, stages varied I-III (Kellgren&Lawrence). Mean age 59.6 ± 6.8 years, BMI 27.7 ± 4.4 kg/m$^2$, mean disease duration 12 ± 6.1 years. Patients underwent knee X-ray, US and MRI (WORMS).

**Results**: Progression occurred in 15 patients (8.1%). When comparing groups with (n=15) and without progression (n=170), WOMAC showed differences (pain – 330.5 ± 66.0 vs 237.8 ± 85.4 mm, $p$ <0.0001; function - 1044 ± 190.4 vs 859.8 ± 243.8 mm, $p$ <0.007; total – 1479.6 ± 227.8 vs 1164.2 ± 357.7, $p$ <0.002). More progression group patients had metabolic syndrome (MS) (86.7% vs 40.6%, p<0.05) and T2D (33.3% vs 12.9%, p=0.04). MRI showed more cartilage defects (CDs) in group 1 (p<0.003), when evaluated in medial and lateral tibial compartments (57.2% vs 18.6%, RR = 3.06, 95% CI 1.74 – 5.38, $p$ < 0.003; 57.2% vs 14%, RR = 4.08, 95% CI 2.23 – 7.46 $p$ < 0.0006). Same was found when comparing medial (71.4% vs 12.2%, RR = 5.83, 95% CI 3.38-10.1, $p$ <0.000004) and lateral (21.4% vs 4.1%, RR = 5.25, 95% CI 1.47- 18.7, $p$ = 0.03) tibial bone marrow lesions (BMLs). Discriminant analysis showed that WOMAC pain, MS, BMLs and CDs were the most important factors of rapid OA progression. We have created a formula which allows predicting the risk of rapid OA progression with high accuracy.

| Factors | Discriminant function coefficients | ROC-curve |
|---|---|---|
| WOMAC pain, mm | 0.00702 | |
| T2D | 1.94653 | |
| BMLs in medial tibial compartment | 1.36865 | |
| Medial tibial compartment cartilage defect | 0.69292 | |
| Constant | 10.5694 | AUC=0.832 (95% CI 0.708-0.956) |




**Conclusions**: We have shown that the main predictors of rapid OA progression are high WOMAC pain, MS, BMLs and CDs in the medial tibial compartment.

# Pain Syndromes - Pain in children

## Abstract no.: 550

### GROWING PAIN DURING CHILDHOOD AND ROLE OF VITAMIN D

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**Background and aims**: Growing pains a well known clinical entity, is considered to be a normal occurrence in about 25% to 40% of children with no organic pathology.d is almost always bilateral and constitute the most frequent cause of musculoskeletal pain in children., the disorder's exact nature and aetiology remain unclear little is known about the association between vitamin D deficiency and musculoskeletal pain in children. studies shown that vitamin D receptors are present in both the nuclei and plasma membranes of skeletal muscle cells in mammals, indicating an association between vitamin D and skeletal muscle .We presents our observation that growing pain was less prevalent in children with vitamin D supplementation.

**Methods**: 112 children attending our clinic 9 months to 2 years age were studied who were diagnosed with growing pain .their parent were given a questioner and were interviewed. and were given 400iu of vitamin D daily for 60 days and were reevaluated.

**Results**: It was noted that 82 (72%) children has shown remarkable improvement ,who were taking vitamin D supplementation regularly after 60 days. It was noted that 40 children who showed poor pain tolerance were not taking vitamin D regularly and their parents were reluctant to give vitamin D.

**Conclusions**: Though our observation and study is small but suggest possible vitamin D deficiency as cause of growing pain in children. More large scientific studies may be done for further studier.

### Abstract no.: 628

## PREVALENCE AND PREDICTORS OF PAIN-RELATED SCHOOL ABSENTEEISM AMONG ADOLESCENTS WITH FREQUENT PAIN: A POPULATION BASED PROSPECTIVE STUDY

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**Background and aims**: Adolescents with pain are more frequently missing out from school compared to pain-free peers. Nevertheless, not all are absent. The research has so far mainly studied general absenteeism, not pain-specific, focusing on clinical samples using cross-sectional designs. Hence, this prospective study aimed to estimate *pain-related* school absenteeism in a non-clinical sample and explore potential risk factors.

**Methods**: Using a prospective cohort design with a one-year follow-up, 1300 Swedish adolescents (mean age =16.9; 17.8% immigrants) with frequent pains (headache, abdominal and/or musculoskeletal pain ≥ 1/week during 6 months) filled out questionnaires at school. Absenteeism was operationalized as 1) any pain-related absenteeism or 2) frequent pain-related absenteeism (>3 times during 6 months). Potential risk factors included in logistic regressions were demographics, pain characteristics and burden, and adolescent stressor domains.

**Results**: Overall, 64.3% reported any pain-related absenteeism, while 26.8% reported frequent absenteeism. Age, pain intensity, medication use, and stress due to school attendance independently predicted any absenteeism at follow-up, totally explaining 29% (Nagelkerke $R^2$) of the variance ($\chi^2(16) = 308.84$, $p < 0.001$). For frequent absenteeism, age, Swedish background, pain intensity, medication use, healthcare seeking, depressed mood, stress due to school attendance, and school/leisure conflict were independent predictors, totally explaining 24.5% (Nagelkerke $R^2$) of the variance ($\chi^2(16) = 239.36$, $p < 0.001$).

**Conclusions**: Several adolescents with pain frequently miss out on school due to their pain. Identified risk factors cover demographics, pain characteristics as well as stress due to personal and everyday life, pointing out directions for early interventions.

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# Pain Syndromes - Pain in general

### Abstract no.: 1174

## EVALUATION OF MEDICAL NEEDS AND AVAILABLE MEDICAL SERVICES OF END-OF-LIFE CANCER PATIENTS WITH CHRONIC PAIN – GEORGIAN EXPERIENCE

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**Background and aims**: Goal of the study – Improve quality of life of patients with cancer pain in Georgia through evaluation of needs, availability and accessibility of opioids.

**Methods**: Questionnaire survey, analysis of patients, medical professionals, patients medical records and patients care givers were applied in the study.

**Results**: The several problems associated with caregivers and difficulties with respect to clinical groups, problems with opioids prescription, dose selection, their availability and administration forms of opioids were assessed and included in data base along with medical problems. The 159 questioners were analyzed: 84 (52.8%) patients, 53 (33.3%) caregivers and 22 (13.8%) medical professionals. In accordance with the obtained material comparative analysis was performed, study results reliability was evaluated based thereof, wherein p value indicator was considered to be statistically reliable.

**Conclusions**: Application of clinical groups in medical practice is provisional; it represents the part of post-soviet system and the unit of oncology patients' health examination. Clinical group creates a barrier in adequate pain management, makes impossible to prescribe opioids to patients with medical means during anti-cancer radical treatment in case of strong pain;

Clinical group fails to provide complete information on general condition of patient, quality of life. It is nor applied in accordance with international clinical guidelines and is maintained only in the countries of post-soviet region;

The main barriers of non-adequate pain control and challenges in opioids availability in Georgia are: lack of the opioids, limited knowledge of medical professionals, opioid phobia between medical professionals, patients and whole population, incompliance of normative bases, legislation and regulations.

# Pain Syndromes - Pain in the elderly

**Abstract no.: 389**

## THE EFFECTS OF HEALTHY AGEING UPON SPINAL SOMATOSENSORY NETWORKS IN RATS

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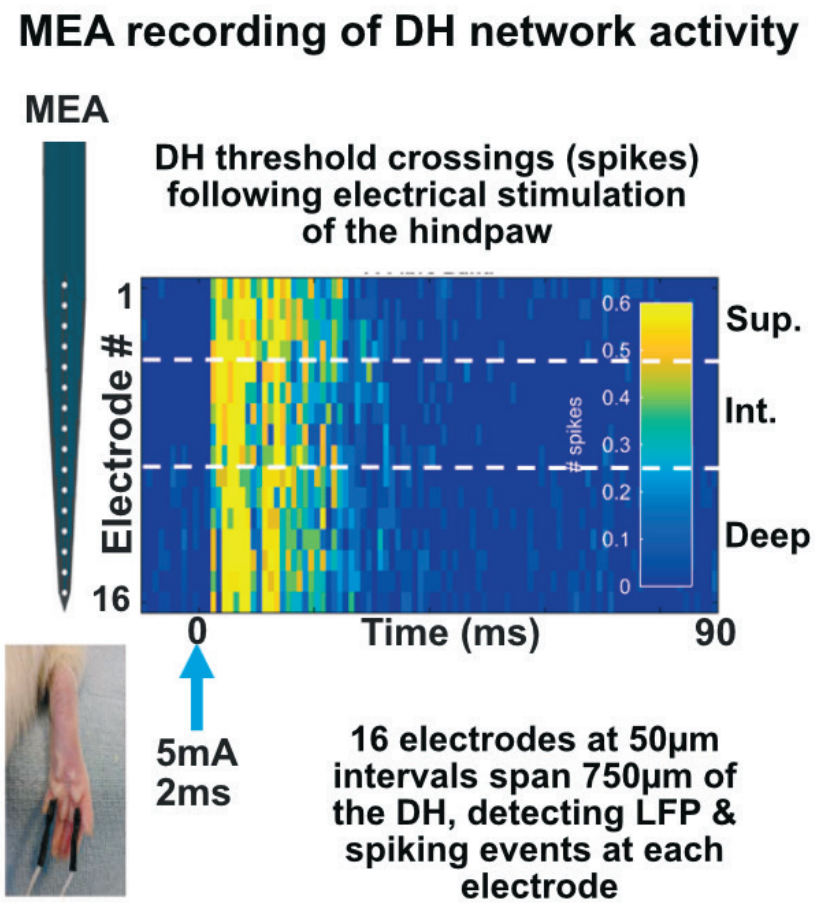
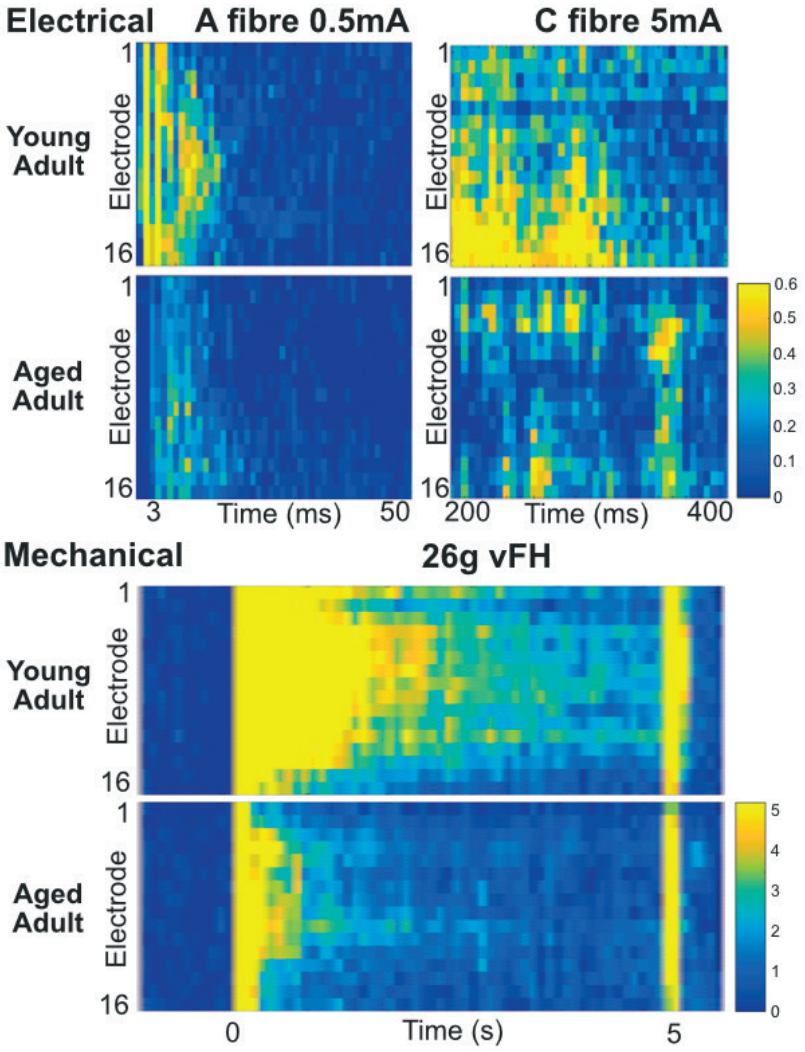
**Background and aims**: Pain perception changes across the life-course, with reduced mechanical sensitivity but increased pain in old age. Most preclinical pain research utilises young adult animals, meaning the effects of healthy ageing on somatosensory signalling remain largely unknown. We utilised *in vivo* multi-electrode array (MEA, figure 1) recording to compare dorsal horn (DH) sensory network activity in aged and young adult rats.




**Methods**: *In vivo* spinal recordings of neuronal activity across the whole DH were obtained via 16-electrode MEAs in anaesthetised aged male (18-20 months, *n*=5) and mixed sex young adult (2 months, *n*=5) Sprague Dawley rats. Responses to mechanical (2-26g) and electrical (0.1-5mA) stimuli were recorded, sorted by response latency (A fibre 3-50ms, C fibre >200ms), and compared between age groups.

**Results**: Overall, aged rats displayed lower whole DH activity in response to noxious mechanical stimuli (whole array threshold crossings; 15g: -71%, 26g: -63%, % change vs young adult, $p<0.01$), and innocuous electrical stimuli (0.5mA) in the A fibre latency band (-52%, $p<0.05$). Responses to noxious electrical stimuli in the C fibre latency band were also lower, though more variable (5mA, -41%, $p=0.2$). Alterations in spatial and temporal patterns of activity were also observed, including lower deep DH activity in response to noxious electrical stimuli, and less sustained firing during noxious mechanical stimuli (figure 2).




**Conclusions**: Significant changes in spinal network activity likely contribute to altered somatosensation with healthy ageing.

**Acknowledgements:** The authors wish to thank Eli Lilly for supplying aged rats. This work was supported by Versus Arthritis (grants 18769, 20777).

## Abstract no.: 1009

### BRAIN CORRELATES OF PAIN PERCEPTION IN OLDER ADULTS SUFFERING FROM CHRONIC PAIN

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**Background and aims**: The prevalence of chronic pain is known to increase with advancing age. Moreover, aging seems to be associated with altered pain perception (increased pain thresholds, but reduced amplitudes in pain-related evoked potentials). However, few studies have investigated how aging and chronic pain combine to produce enhanced pain perception. The present study compared pain-related evoked potentials of older participants (>65 years old) with and without chronic musculoskeletal pain, as well as healthy younger adults (<25 years old).

**Methods**: Participants received, in the thenar eminence of the non-dominant hand, a block of 30 trains of painful electrical stimulation (3 stimulus of 1ms duration, separated by 5ms) individually adjusted to elicit a pain of four in a 0-10 rating scale. Moreover, a similar block but with non-painful stimuli was presented.

**Results**: Preliminary results showed that chronic pain older participants reported increased pain ratings and altered evoked potentials to painful electrical stimulation in comparison to older adults without pain.

**Conclusions**: These results suggest that plastic changes driven by suffering from long-lasting pain outweigh those triggered by the normal aging process, when both conditions coexist.

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## Abstract no.: 1012

### ALTERED AFFECTIVE MODULATION OF SOMATOSENSORY PROCESSING IN OLDER PEOPLE WITH AND WITHOUT CHRONIC PAIN

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**Background and aims**: Recent studies suggested that the increased prevalence of chronic pain in the older population could be related to alterations in the affective component of pain processing. However, no studies have examined the response of older adults with chronic pain to affective stimuli and the modulation of somatosensory processing evoked by affective state. Therefore, in this study, we aimed to observe whether older people with chronic musculoskeletal pain suffer alterations in the affective modulation of somatosensory processing in comparison to younger (< 25 years old) and older healthy adults (>65 years old).

**Methods**: For this purpose, somatosensory-evoked potentials (SEPs) elicited by nonpainful pneumatic stimuli, delivered to the right and left hand following an oddball paradigm, were recorded while patients were viewing pleasant, unpleasant, and neutral pictures.

**Results**: Preliminary results show that younger adults displayed increased SEPs while viewing pleasant and unpleasant pictures in comparison to neutral ones, while no such affective modulation of SEPs was observed in older adults, regardless the presence of pain.

**Conclusions**: These results suggest that somatosensory processing is altered in older adults, and that chronic pain it does not seem to exacerbate this disturbance.

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## Abstract no.: 1112

### MULTIMORBIDITY AND CHRONIC PAIN IN COMMUNITY DWELLING OLDER ADULTS: A SCOPING REVIEW OF RANDOMIZED CONTROLLED TRIALS

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**Background and aims**: Chronic pain and comorbid conditions present together in older adults, yet the effectiveness of non-pharmacologic interventions for pain management in older adults with multimorbidity has not been studied. The purpose of this scoping review was to provide an overview of the nature of the published evidence on effective nonpharmacological interventions for community- dwelling older adults with chronic pain and comorbid conditions.

**Methods**: CINAHL, PubMed, and ProQuest, were searched for studies that used randomized controlled trial (RCT) design in community dwelling older adults with comorbid conditions aged 65 years or more using PRISMA guidelines. The secondary aim was to identify the extent to which multilevel interventions at the level of the person (age, race, ethnicity, BMI, comorbidities), family (income, education, social support), and community (urban/ rural setting, transport) are included within non-pharmacological intervention studies in community dwelling older adults with chronic pain and comorbidity.

**Results**: Out of eleven studies identified as high quality based on critical appraisal criteria, most studies showed comorbidities as exclusion criteria but did not target a specific comorbidity. No multilevel interventions at the level of the person (age, race, ethnicity, BMI, comorbidities), family (income, education, social support), and community (urban/ rural setting, transport) were not considered in these studies.

**Conclusions**: Few studies examine non-pharmacological interventions for pain management in community dwelling adults who experience comorbidities. Future research should address interventions on comorbidities as well pain and other health outcomes. Using a holistic person-centered approach to intervention development and research would lead to greater improvement of overall physical and psychosocial wellbeing.

# Pain Syndromes - Pain in vulnerable groups

## Abstract no.: 1128

### PAIN IN PATIENTS WITH BORDERLINE PERSONALITY DISORDER: HOW DIFFERENT IS IT?

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**Background and aims**: Borderline personality disorder (BPD) is characterized by affective dysregulation, dysfunctional self-concepts and impaired social interactions. Nonsuicidal self-injury (NSSI) behaviour is commonly used as an emotion regulating mechanism and patients frequently report diminished or absent pain during those behaviours. Paradoxically, BPD seems to be over-represented in the chronic pain setting. This review aims to explore the particulars of pain in BPD patients.

**Methods**: We conducted a qualitative review on this topic based on a literature search in PubMed/MEDLINE database using the MeSH terms “Pain” and “Borderline Personality Disorder”.

**Results**: Several experimental studies demonstrate that BPD patients exhibit increased pain-threshold in response to different types of noxious stimulus. Pain hyposensitivity occurs early-on, even in the absence of distress and relates to dissociation. Painful stimulus significantly reduces aggression, stress and arousal.

Pain disorders are highly prevalent. About 30% of chronic pain patients suffer from BPD and it associates with increased pain severity, affective pain, central sensitization, disability and prescription opioid misuse. Negative affect, specially depression, potentiates pain severity.

NSSI behaviour reduces hyperactivation of amygdala – a possible trait marker of BPD.

Dialectical behaviour therapy may reduce the role of pain as a coping mechanism. Termination of NSSI and decline of psychopathology associates with normalization of pain perception.

**Conclusions**: Studying pain in BPD contributes to understand NSSI behaviour and the interaction between affective and physical dimensions of pain. Addressing co-occurrent pain disorders prevents long term suffering, impairment and substance abuse. BPD should be vigilantly screened and therapeutically approached in the chronic pain setting.

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# Pain Syndromes - Peripheral neuropathic pain

## Abstract no.: 1085

### EFFECTS OF MIR-30C-5P MODULATION ON THE NUCLEOLAR STRESS RESPONSE OF DORSAL ROOT GANGLIA NEURONS AFTER SCIATIC NERVE INJURY

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**Background and aims**: Neuropathic pain (NP) is a prevalent and debilitating chronic syndrome highly refractory to current analgesics. The development and maintenance of NP include long-term pathological plasticity in the nervous system. The nucleolar stress response is an important sensor of neuronal dysfunction in several neurodegenerative disorders. However, the impact of nucleolar dysfunction on NP development after nerve injury remains elusive. MicroRNAs (miRNAs) are small noncoding RNAs that modulate post-transcriptionally gene expression. Previous results of our group support a major role for miR-30c-5p in neuropathic pain development (Tramullas *et al*., 2018). Our study aims to assess nucleolar stress in neurons of dorsal root ganglia (DRG) in response to sciatic spared nerve injury (SNI) and the consequences of miR-30c-5p-gain and loss-of-function.

**Methods**: NP was induced to rats by SNI. Mechanical allodynia was assessed with von Frey monofilaments. Lumbar dorsal root ganglia (DRG) were obtained and processed for immunofluorescence on days 5 and 10 post-SNI.

**Results**: Our results indicate that SNI induces important structural alterations of the nucleolus in the DRG primary neurons, in association with NP development. The harmful effect of SNI was potentiated by the treatment with miR-30c-5p mimic, with pro-allodynic consequences. In contrast, SNI-induced DRG damage was prevented by the treatment with miR-30c-5p inhibitor with anti-allodynic consequences.

**Conclusions**: The nucleolus is one of the cellular organelles affected by SNI, which is particularly vulnerable to alterations of miR-30c-5p expression. [Supported by PID2019-104398RB-I00 and PDC2021-120878-I00].

## Abstract no.: 1086

### ROLE OF TGF-B SIGNALLING AND GENDER INFLUENCE ON NEUROPATHIC PAIN-EVOKED ANXIETY IN MICE

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**Background and aims**: Neuropathic pain (NP) is a debilitating chronic syndrome that is often refractory to currently available analgesics. Furthermore, NP is often associated with comorbidities like anxiety and depression, resulting in a low health-related quality of life.Although both chronic anxiety and pain conditions are more prevalent in females, most of the studies are performed only in males, and to date, few studies have included females, or even both sexes. Transforming growth factors-β (TGF-β) constitute a large family of pleiotropic and multifunctional cytokines. We have previously reported that male mice lacking the TGF-β pseudoreceptor BAMBI present an antiallodynic phenotype after peripheral nerve injury (Tramullas et al., 2010). Our study aims to investigate whether BAMBI deficiency affects **a)** the establishment of NP in female mice and **b)** the impact of NP on anxiety-like behavior in female and male mice.

**Methods**: Adult male and female C57BL6 and BAMBI$^{-/-}$ mice were exposed to sciatic nerve crush injury. Two weeks after surgery, mechanical allodynia was assessed with von Frey monofilaments. Anxiety-related behaviours were evaluated using open field and light-dark box tests.

**Results**: Lack of BAMBI does not protect females from the development of NP. Both, male and female BAMBI-/- mice exhibit increased anxiety-like behaviors. However, after nerve injury, female C57BL6 mice, but not male, shows increased anxiety-like behaviours.

**Conclusions**: Our results highlight a key role for BAMBI in the development of neuropathic pain and unconditioned anxious behaviours and the importance of the gender perspective in these pathological processes. [Supported by PID2019-104398RB-I00 and PDC2021-120878-I00].

## Abstract no.: 1122

### INCIDENCE OF POSTMASTECTOMY PAIN SYNDROME AND ASSOCIATED RISK FACTORS, A LONGITUDINAL STUDY

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**Background and aims**: Breast cancer is the most commonly diagnosed malignancy in women and surgical intervention is the mainstay of treatment. Post mastectomy pain syndrome is described as persistent pain, greater than 3 months, after a surgical procedure with neuropathic characteristics. The aim of this study is to describe the incidence of postmastectomy pain syndrome and the possible associated risk factors.

**Methods**: We designed a longitudinal prospective study at Hospital Universitario Mayor Mederi in Bogotá, Colombia. Patients with breast cancer and who had a surgical plan were included. We excluded patients who had herpes zoster, breast surgery in the last year, thorax surgery or orthopedic pathology in the same side of the breast tumor or those patients who had any other tumor with breast metastasis. We performed a follow-up on day 1 and15, 3 and 6 months postoperative according to the DN4 scale for neuropathic pain.

**Results**: Twenty five patients with breast cancer underwent breast surgery and completed the follow-up between September 2018 and March 2019.The median age was 63 years old. The most common procedure was total mastectomy with 60%.

None of the patients received neoadjuvant therapy. Sixty percent of the patients received radiotherapy at some point during the follow-up. The incidence of postmastectomy pain syndrome was 24%. Postoperative pain higher than 6 in the numeric pain rating scale had a significant association ($p$= 0.015) in the presentation of postmastectomy pain syndrome.

Table 1. Sociodemographic distribution

| | | Mean | n | % |
|---|---|---|---|---|
| Age | | 63 | | |
| BMI* | Low weight | | 1 | 4 |
| | Normal weight | | 4 | 16 |
| | Over weight | | 17 | 68 |
| | Obesity | | 3 | 12 |
| Marital Status | Single | | 6 | 24 |
| | Married | | 12 | 48 |
| | Satable union | | 3 | 12 |
| | Divorcee | | 1 | 4 |
| | Widower | | 3 | 12 |
| Education | Primary school | | 11 | 44 |
| | Secondary school | | 11 | 44 |
| | Higher education | | 3 | 11 |

Table 2. Risk factors associated with the appearance of Postmastectomy pain syndrome

| Variable | | Group with postmastectomy pain syndrome (n=6) | | Group without postmastectomy pain syndrome (n=19) | | Chi2 (p) |
|---|---|---|---|---|---|---|
| | | n | % | n | % | |
| Neoadyuvant chemotherapy | Yes | 2 | 33.33 | 9 | 47.37 | 0.54 |
| Surgery | Mastectomy | 4 | 66.67 | 11 | 57.89 | |
| | Quadrantectomy | 2 | 33.33 | 5 | 26.32 | 0.29 |
| | Mastectomy + TRAM Flap | 0 | 0 | 3 | 15.79 | |
| | Sentinel lymph node biopsy | 1 | 16.67 | 2 | 10.53 | 0.68 |
| | Axillary lymph node dissection | 4 | 66.67 | 16 | 84.21 | 0.34 |
| Chemotherapy | | 6 | 100 | 19 | 100 | - |
| Radiotherapy | | 3 | 50 | 10 | 52.63 | 0.91 |
| Hormonotherapy | | 6 | 100 | 19 | 100 | - |
| Postoperatory pain | NPRS** <6 | 1 | 16.66 | 19 | 100 | 0,015 |
| | NPRS** >6 | 5 | 83.33 | 0 | 0 | |

*Transverse rectus abdominis musculocutaneous flap, **Numeric pain rating scale

**Conclusions**: We found a significant association with records greater than 6 in the numerical analogue scale and the presentation of postmastectomy pain syndrome.

# Pain Syndromes - Widespread pain

## Abstract no.: 286

### PREDICTIVE BIDIRECTIONAL RELATIONS BETWEEN PAIN, FATIGUE, AND DYSCOGNITION IN FIBROMYALGIA

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**Background and aims**: Fibromyalgia (FM) is a common and disabling disorder characterized by chronic widespread pain, fatigue, and dyscognition. Previous studies have demonstrated strong positive correlations between pain, fatigue, and dyscognition. However, bidirectional relationships, particularly with dyscognition modeled as a predictor, have rarely been established. The purpose of this study was to examine the bidirectional, predictive nature of the relationships between these FM symptoms.

**Methods**: Pain, fatigue, and dyscognition were measured via the Brief Pain Inventory, Multidimensional Fatigue Inventory, and Multiple Ability Self-Report Questionnaire at baseline and a two-year follow-up in a large sample of 450 well-characterized female patients with FM. Relationships between FM symptoms were evaluated using a cross-lagged, longitudinal model.

**Results**: Dyscognition, pain, and fatigue were positively correlated at both baseline and follow-up (rs .13 -.53, ps<.01). Dyscognition at baseline was predictive of more dyscognition (B=.76, β=.75, p<.001), pain, (B=.01, β=.09, p=.033) and fatigue (B=.05, β=.08, p=.050) at follow-up. Pain at baseline was predictive of more pain (B=.59, β=.59, p<.001 ), dyscognition (B=.88, β=.07, p=.022), and fatigue (B=.85, β=.11, p=.004) at follow-up. Fatigue at baseline was only associated with more fatigue (B=.61, β=.60, p<.001) at follow-up.

**Conclusions**: Dyscognition is predictive of future pain and fatigue in patients with FM. Continued work should examine dyscognition as a clinical predictor of future severity of core symptoms such as pain and fatigue.

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## Abstract no.: 506

### MAGNESIUM ALLEVIATES MODERATE STRESS IN PATIENTS WITH FIBROMYALGIA: A RANDOMIZED DOUBLE-BLIND CLINICAL TRIAL

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**Background and aims**: Patients suffering from fibromyalgia often report stress and pain, both often refractory to usual drug treatment. Magnesium supplementation has been reported to improve fibromyalgia symptoms but the level of evidence is still poor.

**Methods**: This is a randomized, controlled, double-blind trial in fibromyalgia patients comparing once a day oral magnesium 100 mg to placebo, for one month. The primary endpoint was the level of stress on the DASS-42 scale, and secondary endpoints were pain, sleep, quality of life, fatigue, catastrophism, social vulnerability, and magnesium blood concentrations.

**Results**: Magnesium supplementation significantly reduced mild/moderate stress subgroup (DASS-42 stress score: 22.1±2.8 to 12.3±7.0 in magnesium vs 21.9±11.9 to 22.9±11.9 in placebo, p=0.003). Pain severity diminished significantly (p=0.029) with magnesium while other parameters were not significantly different between both groups.

**Conclusions**: Findings show for the first time that magnesium improves mild/moderate stress and reduces the pain experience in fibromyalgia patients. This suggests that daily magnesium could be a useful treatment to improve the burden of disease of fibromyalgia patients and calls for a larger clinical trial.

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## Abstract no.: 558

### ATTENUATED PARASYMPATHETIC NERVOUS SYSTEM RESPONSE TO COGNITIVE STRESS IN FIBROMYALGIA PATIENTS ASSOCIATES WITH MOOD DISTURBANCE

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**Background and aims**: Fibromyalgia (FM) is associated with dysautonomia, but the connection between dysautonomia and FM symptoms is unclear. Subgroups of FM patients may differ by clinical variables and level of dysautonomia. We aimed to cluster FM patients by dysautonomic features distinguishing them from healthy control by heart rate variability (HRV) analysis.

**Methods**: We recorded the HRV measures of heart rate (HR) and parasympathetic (PNS) and sympathetic (SNS) nervous systems indices of 51 female FM patients and 31 age-matched healthy female controls during a 20-minute protocol of alternating relaxation and cognitive stress (mental arithmetic). We identified HRV reactivity features differentiating FM patients and used these features to cluster the FM patients.

**Results**: FM patients had higher baseline HR and SNS index, and lower baseline PNS index, compared with controls. FM patients also reacted to repeated cognitive stress with an attenuated rise in HR and attenuated suppression of PNS, compared with controls. Clustering of FM patients by PNS reactivity resulted in three clusters characterized by 1) low baseline PNS index, low PNS reactivity, and high levels of depressive mood and anxiety, 2) low baseline PNS index but normal PNS reactivity, and medium levels of depressive mood and anxiety, and 3) normal HRV and low levels of depressive mood and anxiety.

**Conclusions**: Compared with healthy controls, FM patients have dysautonomia characterised by higher sympathetic and lower parasympathetic activities and attenuated autonomous reactions to cognitive stress. This seems to be due to inadequate parasympathetic activity, which associates with mood disturbance.

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## Abstract no.: 952

### MEDITATIVE-BASED BIOFEEDBACK VERSUS VAGUS NERVE STIMULATION IN THE TREATMENT OF FIBROMYALGIA—A RANDOMIZED CONTROLLED TRIAL: THE BODY VERSUS MACHINE STUDY

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**Background and aims**: Vagus nerve innervation may be a promising treatment avenue for fibromyalgia (FM). The objective was to explore and compare the treatment effectiveness of active and sham transcutaneous vagus nerve stimulation (tVNS) and meditative-based biofeedback (MBF) for FM.

**Methods**: A total of N = 116 adults aged 18 – 65 years with confirmed self-reported FM were randomized to receive active tVNS (n = 28), sham tVNS (n = 29), active MBF (n = 29), or sham MBF (n = 30). Treatments were self-delivered at home for 15 min/morning and 15 min/evening for 14 days. Follow-up was at 2 weeks. Primary outcome was change from baseline in cardiac-vagal heart rate variability (HRV) at 2 weeks. Secondary outcomes included changes in self-report average pain intensity (NRS 0-10) and overall fibromyalgia severity. We hypothesized that 1) participants randomized to active MBF or active tVNS would display greater increases in HRV as compared to those randomized to sham MBF or sham tVNS after 2-weeks and 2) that a change in HRV would be correlated with a change in average self-reported NRS pain intensity.

**Results**: SDNN had a significant negative association with average pain intensity during treatment. No significant across-group changes in HRV were found.

| Table 1. PairwiseSpearman Correlations of Change from Clinical Visitation I to Clinical Visitation II (N = 116) | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Heart rate variability (HRV) parameters | NRS average pain intensity | P-value | NRS current pain intensity | P-value | Widespread pain index (WPI) | P-value | Symptom severity scale (SSS) | P-value | Fibromylgia severity (FS) | P-value | Psychological distress (HSCL-25) | P-value |
| rMSSD (root mean square of successive differences) | -0.07 | 0.444 | 0.09 | 0.315 | -0.06 | 0.515 | 0.06 | 0.537 | 0.02 | 0.867 | 0.03 | 0.782 |
| SDNN (standard deviationof the N-N intervals) | **-0.231** | **0.013** | -0.05 | 0.607 | -0.07 | 0.474 | -0.05 | 0.629 | -0.07 | 0.458 | -0.09 | 0.327 |
| hfHRV (high-frequency heart rate variability) | -0.172 | 0.066 | -0.01 | 0.884 | -0.02 | 0.826 | 0.12 | 0.204 | 0.03 | 0.726 | -0.15 | 0.121 |

| Table 2. Mean (95% CI) Differences Between Treatment Groups at 2-wksFollow-up & Total Average Change in HRV &Painfrom Baseline toFollow-up(Imputed Analyses Adjusted for Baseline Differences; N = 116) | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| SelectedHRV Parameters & Pain Parameters | Total (N = 116) | | Active tVNS (n = 28) | | Sham tVNS (n = 28) | | Active MBF (n = 29) | | Sham MBF (n = 30) | | |
| | Mean (95% CI) | Overall P-value for difference between CVI and CVII | Mean (95% CI) | p- value | Mean (95% CI) | p- value | Mean (95% CI) | p- value | Mean (95% CI) | p- value | Overall P-value for difference between groups at CVII |
| SDNN | 0.97 (0.90, 1.04) | 0.360 | 0.85 (0.74, 0.99) | 0.037 | 1.06 (0.92, 1.22) | 0.407 | 1.01 (0.88, 1.16) | 0.858 | 0.94 (0.82, 1.08) | 0.404 | 0.184 |
| hfHRV | 0.95 (0.87, 1.05) | 0.311 | 0.83 (0.68, 1.00) | 0.050 | 1.02 (0.84, 1.23) | 0.841 | 0.97 (0.81, 1.17) | 0.778 | 0.99 (0.83, 1.19) | 0.924 | 0.411 |
| Overall FM severity (FS) | -2.08 (-2.58, -1.58) | <0.001 | -2.82 (-3.81, -1.83) | <0.001 | -2.90 (-3.87, -1.92) | <0.001 | -1.28 (-2.25, -0.30) | 0.010 | -1.37 (-2.32, -0.41) | 0.005 | 0.025 |
| NRS average pain intensity in the last week (0 – 10) | -0.59 (-0.71, -0.46) | <0.001 | -0.57 (-0.92, -0.22) | 0.001 | -0.86 (-1.20, -0.52) | <0.001 | -0.59 (-0.93, -0.25) | 0.001 | -0.33 (-0.67, 0.01) | 0.051 | 0.199 |

**Conclusions**: Treatment with active or sham versions of either MBF or tVNS resulted in nonsignificant across-group changes in cardiac-vagal HRV and average pain intensity; active MBF, active tVNS, and sham tVNS all had significant effects on average pain intensity. HRV may not be associated with vagal tone or treatment-specific changes in pain intensity for FM.

## Abstract no.: 997

## EPIDEMIOLOGY AND DISEASE CHARACTERISTICS OF FIBROMYALGIA IN GERMANY – RESULTS OF AN ANALYSIS OF THE GERMAN PAIN E-REGISTRY ON 15211 PATIENTS

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**Background and aims**: To gain insight into the epidemiology and disease characteristics of patients with fibromyalgia (FM) vs. other chronic non-malignant pain (CNMP) types.

**Methods**: Retrospective analysis of depersonalized data derived from the German Pain e-Registry (GPeR; status quo June 30, 2021; n=330234) for individuals who fulfilled the revised diagnostic FM criteria of the American College of Rheumatology (ACR; EUPAS identifier 44365).

**Results**: 15211 FM patients (4.5%; 85.7% female, age: 55.5±11.4 [range:16-100] years) were identified of which in 28.4% this diagnosis was not previously known. Age of onset was 39.2±15.0 (15-95) and disease duration 16.3±14.2 (0-80) years; in 67.7% FM started before the age of 40, however, 8.8% were >60 years at onset. Pain was graded as von Korff stage IV in 67.9% and in 93.5% as chronic (MPSS). Lowest/ average/ highest 24-hr. pain intensities were 40.4±22.6/60.9±18.8/81.3±16.1 mm VAS. Predominant pain phenotype was neuropathic (51.3%), with tactile/thermal allodynia and hyperalgesia as typical clinical features. Patients recorded 11.3±2.7 (3-22) different background and 2.6±1.5 (0-9) rescue medications. In comparison to other CNMP patients, those with FM presented with significantly worse physical/ mental QoL, sleep problems, daytime sleepiness, concentration disturbances, overall wellbeing, as well as stress, anxiety, and depression ($p<0.001$ and Cohen´s d/h >0.5 for each) and were 10-times more likely to express suicidal thoughts (RR 9.5; 95%-CI: 9.0-9.9).

**Conclusions**: The revised ACR criteria offer the opportunity to identify FM as a distinct – underdiagnosed – pain syndrome that harms (more and more severe than other CNMP types) any physical/emotional dimension of life.

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### Abstract no.: 1069

## GENDER SPECIFIC EPIDEMIOLOGY AND DISEASE CHARACTERISTICS OF FEMALE VS. MALE PATIENTS WITH FIBROMYALGIA – RESULTS OF AN ANALYSIS OF THE GERMAN PAIN E-REGISTRY ON 15211 PATIENTS.

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**Background and aims**: To gain insight into gender-specific epidemiology and disease characteristics of patients with fibromyalgia (FM) vs. other types of chronic nonmalignant pain (CNMP).

**Methods**: Retrospective analysis of depersonalized data derived from the German Pain e-Registry (GPeR; status quo June 30, 2021; n=330234) for individuals who fulfilled the revised diagnostic FM criteria of the American College of Rheumatology (ACR; EUPAS identifier 44365). Gender specific comparison vs. data of CNMP patients.

**Results**: 13037/2174 female/male patients were identified with FM and compared with 207470/107553 female/male patients with CNMP. In general patients with FM were significantly more impaired than those with CNMP, however, gender specific risk analysis revealed significantly worse CNMP-adjusted risk rates for male vs. female FM patients with respect to physical QoL (80.7/28.2; excess 2.9), suicidal ideation (18.1/7.6; excess 2.4), daytime sleepiness (3.3/1.5; excess 2.1), overall wellbeing (3.2/1.7; excess 1.8), mental QoL (11.6/6.5; excess 1.8), as well as severe anxiety (4.1/2.6; excess 1.5) and depression (2.5/1.8; excess 1.4).

**Conclusions**: In comparison to other types of CNMP, FM interferes significantly more with many physical/emotional dimensions of life – irrespective of patient gender. However, gender specific analysis revealed a significantly stronger impairment for male vs. female patients with FM – highlighting a so far unknown and critical (e.g. suicidal risk) gender-specific risk factor of FM.

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# Pain Syndromes - Other

### Abstract no.: 564

## DIFFERENCES IN TINNITUS-RELATED FACTORS, PAIN-RELATED AND PSYCHOSOCIAL FACTORS BETWEEN TINNITUS PATIENTS AND PATIENTS WITH HEADACHE, TEMPOROMANDIBULAR PAIN OR NECK PAIN: A SYSTEMATIC REVIEW

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**Background and aims**: Tinnitus is present in 5 to 40 % of the population and can be influenced by dysfunctions at several physiological and psychological levels, showing similarities with the mechanisms in chronic pain. Therefore, the aim of the present systematic review is to create an overview of differences and associations regarding tinnitus-related, pain-related and psychosocial factors in tinnitus patients with and without pain.

**Methods**: Eligible articles were obtained by searching Pubmed, Web of Science and Embase . Articles were found relevant if they included at least a patient group with tinnitus and a patient group with headache, temporomandibular pain or neck pain with or without tinnitus and investigated tinnitus-related, pain-related or psychosocial factors.

**Results**: Twelve case-control studies were included. Conflicting results or weak evidence was found for differences in tinnitus-related factors between both groups. Low to moderate evidence was found for a higher presence of stress, depression and lower quality of life in patients with both tinnitus and pain, compared to tinnitus patients. Moderate evidence was found for positive associations between tinnitus severity and headache. Weak evidence was found for the absence of associations between tinnitus severity/intensity and depression or anxiety.

**Conclusions**: Patients with both tinnitus and pain conditions are likely to report higher psychosocial dysfunction, compared to patients with only tinnitus, reflecting a possible cumulative effect of both central symptoms. Tinnitus severity seems to be associated with the presence of headache but not with the presence of depression and anxiety, suggesting a possible dominant role of the pain symptoms over the tinnitus symptoms.

# Basics in Pain - Education of pain care

## Abstract no.: 1177

### UNDERSTANDING MEDICAL STUDENTS' KNOWLEDGE AND PERCEPTIONS REGARDING MEDICAL CANNABIS

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**Background and aims**: Medical cannabis is used to treat chronic pain symptoms. Despite being legalised in 2018, there has been a lack of medicinal cannabis prescriptions by the NHS.

Aim: To understand medical students' knowledge and perception regarding current medical cannabis use.

**Methods**: An *online questionnaire* was distributed to medical students from universities across the UK (Imperial, Barts, St Andrews, Leeds, Liverpool) via social media platforms.

**Results**:
Knowledge:
- 33%know where to find information about the use of medical cannabis.
- 59% of medical students stated that they don't know when medical cannabis is used.
- Only 42% knew correctly who can give the first medical cannabis prescription in the NHS.

Attitudes:
- 47% said "yes", 51% "maybe" and 2% "no" when asked if they are willing to prescribe medical cannabis to their patients in the future.
- When asked if they would consider taking cannabis over opioids for themselves, 38% would, 42 % wouldn't be sure and 20% would not.

Source of information:
- 85% said Media, 7% Family and friends, 5% Medical school, 3% Independent research.

Beliefs:
- 73% agreed that medical cannabis is effective treatment.
- 83% disagreed that prescribing it will lead to drug abuse.

Future:
- 93% of students reported that they want to learn more about medical cannabis.
- 95% indicated that medical cannabis should be incorporated into the curriculum.

**Conclusions**: A lack of knowledge regarding medical cannabis use amongst medical students and associated negative beliefs as a new treatment for chronic pain has been shown by the results, with these beliefs not differing across the years.

# Basics in Pain - Epidemiology

## Abstract no.: 387

### THE BRIEF FIVE-ITEM CHRONIC PAIN QUESTIONNAIRE: A SHORT MEASURE FOR GENERAL POPULATION STUDIES ON A WIDE PHENOTYPE

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**Background and aims**: There is an urgent need to update general population Chronic Pain (CP) prevalence, considering CP as a wide phenotype. There is a lack of standardized investigation tools and estimates are quite fragmented. The study describes the design and validation process of a short Italian questionnaire to detect a few key dimensions of CP from a public health perspective.

**Methods**: Literature analysis and experts' consultations for design and content validity assessment were carried out; reliability assessment was performed through two double-wave email surveys conducted by the Italian Twin Registry at the Istituto Superiore di Sanità in Italy; construct validity assessment was performed by using the measure within the 2019 European Health Interview Survey.

**Results**: Literature search findings: most of the retrieved questionnaires resulted rarely validated and important public health CP aspects seldom adopted. CP main aspects from a public health perspective were discussed by the experts as key dimensions to be investigated. Test-retest analyses showed adequate reliability of the measure: k values were at least "moderate" with the highest values for CP "occurrence" and "intensity". Cancer, depression, age, and education CP correlations confirmed a good construct validity.

**Conclusions**: The developed "1 item-1 dimension" self-administered measure is particularly suitable to detect chronic pain, as a whole phenotype, and its intensity. It is designed also to detect CP potential underlying causes/triggers, drugs/treatments taking and frequency, and self-perceived effectiveness of drugs/treatments in large-scale general population surveys. The measure is presented to be further validated in other Countries and different socio-cultural contexts.

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## Abstract no.: 396

### AN ITALIAN TWIN STUDY OF CHRONIC PAIN AS A WIDE PHENOTYPE, ITS INTENSITY AND BODY LOCATION

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**Background and aims**: Scientific evidence is growing about Chronic Pain (CP) as a distinct disease. The need for inclusion of pain intensity and site in phenotype definition was recently highlighted. The main aim of this study is to estimate genetic and environmental contributions to CP occurrence, intensity, and body location, as a wide phenotype irrespective of the underlying causes/triggers.

**Methods**: A nationwide email survey was conducted in February 2020 on more than 6000 monozygotic and dizygotic adult twins enrolled in the Italian Twin Registry. A validated 5-item questionnaire was used to detect CP condition (plus its intensity, underlying causes or triggers, treatments, and self-perceived efficacy), and a body mannequin to map CP areas was also administered. Liability-threshold model-fitting analyses will be applied to decompose total variance of these phenotypes into genetic and environmental components.

**Results**: A total of 1524 twins from 762 intact pairs (age range: 18-82 years, 34% male, 57% MZ) were considered in preliminary analyses. CP prevalence was about 24%. Among CP-affected subjects, 60% reported a moderate pain intensity, 40% declared a trauma without surgery as pain origin, and 74% were under treatment (with 86% of them reporting beneficial effects). Model-fitting analyses provided heritability estimates of 36% and 29% for CP occurrence and intensity, respectively. These latter analyses are still underway to extend them on pain site data and to incorporate information from unmatched twins.

**Conclusions**: Our twin study on a wide phenotype of CP intensity and body location is novel in the biomedical panorama and may encourage comparisons across different European populations.

## Abstract no.: 784

### COMMON JOINT PAIN IN THE RUNNING COMMUNITY

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**Background and aims**: The Covid-19 pandemic has seen an increase in people becoming more physically active to help achieve or maintain healthy body weight, whilst improving overall physical and mental health. However, aside from the health benefits of running, high training load, poor technique and insufficient recovery are associated with musculoskeletal injuries and joint pain. This study aimed to investigate self-reported joint pain in the running community.

**Methods**: Baseline data from 'Running Through', a prospective cohort study of community runners, joggers and Nordic walkers were collected via electronic survey between February – October 2021.

**Results**: The baseline survey was completed by 2606 participants, 57% female, mean age 49.78 years (SD 12.69). Spine, back or neck problems were the cause of 22.72% reporting they currently experienced pain and discomfort, with 14.44% regularly taking Non-Steroidal Anti-Inflammatory Drugs (NSAIDs). Pain, discomfort, or problems with their hip(s) or groin was experienced by 19.64%, with 45.77% of these runners having had to alter their activities as a result of this pain and 14.02% regularly taking NSAIDs. Pain was reported to be experienced on most days of the last month in knees (11.86%) and ankles (6.78%) with 14.38% and 11.02%, respectively, of those experiencing pain in these joints taking NSAIDs regularly.

**Conclusions**: Many people participating in running-related activities in the community are experiencing joint pain, which they currently manage through altering their physical activities or taking NSAIDs medications. There is a need to develop preventative interventions to reduce the risk of injury and pain whilst supporting people to remain physically active.

## Abstract no.: 795

### PREDICTORS OF HEALING AND DEVELOPING CHRONIC PAIN IN A LARGE SAMPLE OF THE SWISS POPULATION

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**Background and aims**: Chronic pain (CP) is a multidimensional condition that deeply affects patients' wellbeing worldwide.

Previous studies individuated variables involved in the predisposition of developing this condition, but less is known on the predictors of recovery, especially in a wide population.

**Methods**: We examined a longitudinal cohort (CoLaus), in which pain questionnaires were collected at two time-points, 5 years apart. Subjects completed questionnaires regarding pain presence and characteristics (e.g. duration, location), habits (e.g. medications, smoking, sleep) and mood (e.g. anxiety, depression). The final sample included 3222 participants (1392 males, average age: 57.83±10.49 at the first FU and 62.1±10.08 at the second FU). Across the two time points, 1292 participants never declared CP, 850 suffered from CP both times, 492 developed CP and 436 recovered from CP.

We computed odd ratios through logistic regression analysis to individuate the predictors for both recovering and developing CP.

**Results**: Results highlight that participants who developed CP were more often female and with a low sleep quality. Interestingly, participants who recovered from CP were more often male, not taking pain medication and with a higher self-reported general health score. Some of the above-mentioned factors, such as gender, are in line with prior publications. Yet, the contribution of self-perceived health is rather novel.

**Conclusions**: To our knowledge, this represents one of the few studies on predictors of CP focusing on the possibility of recovering from CP (not only developing CP). Additionally, it represents the first of this kind in a Swiss cohort, allowing comparisons with other large European samples.

## Abstract no.: 908

### THE EXPLANATORY ROLE OF SEDENTARY SCREEN TIME AND OBESITY IN THE INCREASE OF CHRONIC BACK PAIN AMONG EUROPEAN ADOLESCENTS: THE HBSC STUDY 2002-2014

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**Background and aims**: Previous research has shown that chronic back pain among European adolescents is increasing. Identifying the factors associated with this increasing trend is important for developing prevention strategies. Here we used data from the Health Behavior in School-aged Children (HBSC) survey to examine whether increases in screen time and/or obesity between 2002 and 2014 explained the increase in the prevalence of chronic back pain among European adolescents during the twelve-year period.

**Methods**: Data from 423,092 adolescents from 27 European countries/regions were drawn from the HBSC questionnaire-based surveys conducted in 2002, 2006, 2010, and 2014. The Karlson-Holm-Breen method was used to examine the explanatory role of increases in screen time and obesity on the increase in the prevalence of chronic back pain.

**Results**: Increases in both screen time and obesity between 2002 and 2014 were associated with increases in the prevalence of chronic back pain ($p < .001$).The percent of chronic back pain prevalence increase accounted for by screen time and obesity were 4.0% and 1.2%, respectively.

**TABLE 1** Decomposition of the total effects of survey year on chronic back pain

| | $\beta$(95% CI) | *P*-value |
|---|---|---|
| *Survey year* | | |
| Total | 0.021 (0.015 – 0.027) | <.001 |
| Direct | 0.019 (0.014 – 0.026) | <.001 |
| Indirect | 0.001 (0.000 – 0.002) | <.001 |
| Components of the difference | | |
| | $\beta$(S.E.) | |
| Screen time | 0.0008412 (0.000245) | |
| Obesity | 0.0003485 (0.000092) | |

**TABLE 2** The contribution of screen time and obesity on the trend of chronic back pain

| | Indirect effect (%) | Confounding percentage (%) |
|---|---|---|
| Screen time | 70.71 | 3.98 |
| Obesity | 29.29 | 1.65 |

**Conclusions**: The increase in the prevalence of chronic back pain among European adolescents may be explained, in part, by the rising trends in both sedentary screen time and obesity.The fact that screen time and obesity only accounted for a small part of the increase in the prevalence of chronic back pain indicates that other unmeasured factors also play a role.

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## Abstract no.: 1030

### THE ASSOCIATION BETWEEN WORK-RELATED PHYSICAL AND PSYCHOSOCIAL FACTORS AND MUSCULOSKELETAL DISORDERS IN HEALTHCARE WORKERS: MODERATING ROLE OF FEAR OF MOVEMENT

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**Background and aims**: Knowledge is lacking on the interaction between fear of movement (FOM) and work-related physical and psychosocial factors in the development and persistence of musculoskeletal disorders (MSDs).

**Methods**: In this cross-sectional study, 305 healthcare workers from several Belgian hospitals filled out a questionnaire including socio-demographic factors, work-related factors (social support, autonomy at work, workload and physical job

demands), FOM and MSDs for different body regions during the past year. Path analysis was performed to investigate 1) the association between the work-related factors, FOM and MSDs, and 2) the moderating role of FOM on the association between the work-related factors and MSDs among healthcare workers.

**Results**: Complaints were most frequently located at the neck-shoulder region (79.5%) and lower back (72.4%). Physical job demands (odds ratio (OR) 2.38 and 95% confidence interval (CI) [1.52-3.74]), autonomy at work (OR 1.64 CI [1.07-2.49]) and FOM (OR 1.07 CI [1.01-1.14] and OR 1.12 CI [1.06-1.19]) were positively associated with MSDs. Healthcare workers who experienced high social support at work (OR 0.61 CI [0.39-0.94]) were less likely to have MSDs. Fear of movement interacted negatively with workload (OR 0.92 CI [0.87-0.97]) and autonomy at work (OR 0.94 CI [0.88-1.00]) on MSDs.

**Conclusions**: Work-related physical and psychosocial factors as well as FOM are related to MSDs in healthcare workers. FOM is an important moderator of this relationship and should be assessed in healthcare workers in addition to work-related physical and psychosocial factors to prevent or address MSDs.

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## Abstract no.: 1076

### INVESTIGATING PHYSICAL ACTIVITY AND MUSCULOSKELETAL PAIN IN NORDIC WALKERS USING DIGITAL TECHNOLOGY

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**Background and aims**: **Background:** Nordic Walking is a popular fitness activity using specially designed ski poles, suitable for all fitness levels. It provides a full-body workout, improving upper and lower body muscular strength, flexibility and cardio-respiratory fitness. Little research investigating Nordic Walker's exercise habits currently exists.

**Aim:** To use digital technology to investigate physical activity levels and musculoskeletal pain prevalence in Nordic Walkers.

**Methods**: Between February – December 2021 a prospective global cohort study, 'Running Through', was used to collect data weekly from Nordic Walkers via electronic survey and the sharing of activity data from smartwatches and mobile phone apps.

**Results**: The baseline survey was completed by 55 participants, 76% female, mean age 57 years (SD 10.1), mean body mass index (BMI) 24.1 (S.D. 4.5). A total of 27.3% reported currently experiencing pain and discomfort in their spine, back or neck. Pain, discomfort, or problems with their hip(s) or groin was experienced by 20%, with pain also reportedly experienced on most days of the last month in knees (20% respondents) and ankles (7.3%). Respondents shared their smart device data for a mean of 13 weeks (range 1-26). Nordic Walkers reported that they participated 2 times a week (S.D. 1) recording a mean weekly distance covered of 20.9Km (range 9.1-32.8).

**Conclusions**: Nordic Walking is particularly popular with older adults, enabling them to meet weekly physical activity guidelines despite self-reporting musculoskeletal pain. Further studies with appropriate technical instruction should investigate if Nordic Walking is a suitable activity for specific painful musculoskeletal conditions such as osteoarthritis.

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## Abstract no.: 1115

### CORRELATES OF INDIVIDUAL PREOPERATIVE FACTORS AND EXPECTATIONS WITH ACUTE POSTOPERATIVE PAINA PROSPECTIVE OBSERVATIONAL STUDY

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**Background and aims**: Individual risk factors have been shown to have an effect on acute postoperative pain in specific surgical procedures. The aim of this study is to investigate the correlation of individual psychological and demographic risk factors and the role of preoperative information given, with acute postoperative pain after wide spectrum of elective surgery.

**Methods**: In this prospective, observational multicenter study, 516 patients scheduled for surgery on twelve different surgical specialties were recruited. Patient demographics, psychological risk factors and details on the sufficiency and source of preoperative information were recorded preoperatively. Details on surgery, anesthesia, analgesia and side effects were recorded. Movement evoked pain and pain at rest on NRS were recorded for two postoperative days.

**Results**:

**Table 1.** Characteristics of the surgical procedures, anesthesia and analgesia (N= 516).

| Surgical procedure | |
|---|---|
| 1 Major abdominal or gynecological surgery | 94 (18%) |
| 2 Minor abdominal or gynecological surgery | 141 (28%) |
| 3 Thoracic surgery | 11 (2%) |
| 4 Surgery of thyreoidea or neck | 42 (8%) |
| 5 Plastic surgery | 64 (13%) |
| 6 Ear, nose and throat surgery | 34 (7%) |
| 7 Orthopedics | 71 (14%) |
| 8 Neurosurgery | 9 (3%) |
| 9 Vascular surgery | 25 (5%) |
| 10 Urology | 25 (5%) |
| Duration of surgery | |
| 1 < 1 hour | 149 (29)% |
| 2 1-2 hours | 211 (41%) |
| 3 2-3 hours | 139 (27%) |
| 4 > 3 hours | 15 (3%) |
| Anaesthesia method | |
| 1 GA – Inhalation anaesthetics | 212 (41%) |
| 2 GA- TIVA | 218 (42%) |
| 3 LA | 24 (5%) |
| 4 GA & epidural | 34 (7%) |
| 5 LA & sedation | 28 (5%) |
| Analgesic method | |
| 1 Conventional | 345 (67%) |
| 2 Epidural | 88 (17%) |
| 3 Conventional & LA | 74 (14%) |
| 4 PCA | 8 (2%) |
| Hospitalization (days) | 2 (0-83) |
| Day case surgery, 0 days | 74 (14%) |
| 1 day | 104 (20%) |
| 2 days | 108 (21%) |
| 3-5 days | 136 (26%) |
| 6-8 days | 50 (10%) |
| Over 8 days | 41 (8%) |
| Surgical complications | 28 (5%) |

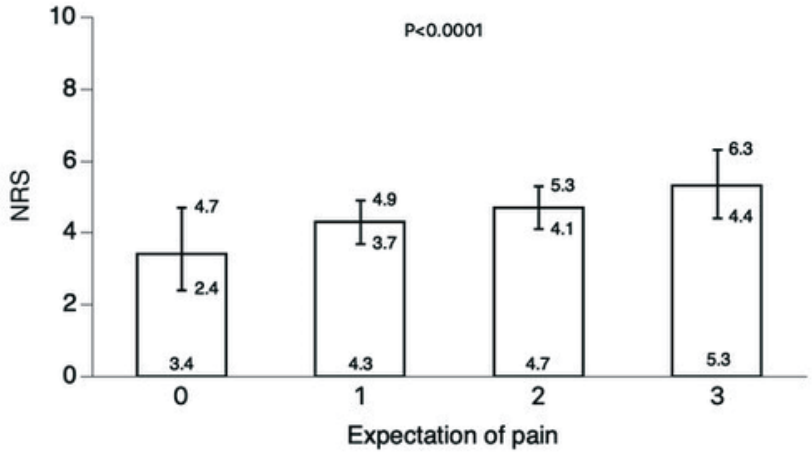


**Fig 1.**
The association between the preoperative expectation of pain and postoperative worst pain in movement. The expectation is expressed as 0-no pain, 1- moderate pain, 2-intensive pain, 3-severe pain.
NRS; numerical rating scale.

A total of 517 patients were recruited to the study. 48 % reported severe pain (NRS 6-10) and 24 % moderate pain (NRS 4-5) during first two postoperative days. There was a correlation between the expectation of pain, chronic pain, prior opioid use and younger age and the postoperative pain. Resolution of acute pain was slower in patients with high expectation of pain. The patients` experience of inadequate information on pain and pain management was associated with postoperative pain.

**Conclusions**: Preoperative expectation of pain, chronic pain and younger age have an effect on postoperative pain in a mixed surgical population, and the resolution of acute pain is slower in patients with high expectation of pain. Preoperative information concerning pain management is inadequate in many cases, and this has an effect on postoperative pain.

# Basics in Pain - Organisation of clinical pain care

## Abstract no.: 1148

### MANAGEMENT OPIOID THERAPY IN OUT-PATIENT ELDERLY WITH CHRONIC PAIN ON DISTANCE

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**Background and aims**: Institute of geriatrics and palliative care is out-patient medical institution whose medical teams deliver comprehensive medical treatment and nurse care of elderly patients in terminal stage of serious diseases. The population of elderly characterize polimorbidity, politerapy, functional disability, mental and sensory declines, and, often, solitary life and economic impotence. During the lock down period daily routine of visiting patients in their homes were significantly reduced.

**Methods**: Observational, descriptive study. The selected population of elderly with chronic pain were treated with opioids by phone, January, 01 - June, 30, 2021y.

**Results**: Total of N=77 patients (74% female, 26% male,57/20), aged ave.80.72±avedev'6.89y suffered malignant, 51%, and non-malignant pain, 49%. *Tramadol* has been used in 40.26%. 31/77 patients, but others received strong opioids (e.g. *morphine-sulphate, oxycodone, oxycodone+naloxone, fentanyl patch, hydromorphone*). Polytherapy were registrated in 80.52%, 62/77 patients, due to polymorbidity, n=840 diagnoses. Cognitive impairments ($F_{00\text{-}09,}G_{30}$) were denominated as 1.43% (12/840) of overall morbidity, and hearing problems 0.83% ($H_{60\text{-}90,}$7/840). Phone communication was reasonably accepted by patients and family. The calls were frequent (e.g. daily) and prolonged (e.g. one hour), since detailed questionnaire was performed. The attention was paid to medical (e.g. opioid initiation, titration, dose adjustment, rotation, side effects, ect.) and psycho-social details (e.g. living alone, relationships, sources of support, ect.). The communication was clear, instructions simple and patient's understanding was the most important.

**Conclusions**: Initiation and management of opioid therapy by phone can be successful. Patience, clear communication, slow talk and comprehensive assessment are necessity, but advanced audio-visual technologies are benefit.

### Abstract no.: 1171

## CLINICAL GROUPS (CG) IN CANCER PAIN MANAGEMENT AS PART OF FORMER SOVIET HEALTH CARE SYSTEM (SHCS) –REGULATION, PRACTICE, EXPERIENCE AND IMPACT ON MODERN HEALTHCARE SYSTEMS

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**Background and aims**: More then one third of the cancer patients requiring adequate cancer pain care at the different level of their treatment. Despite of achieved success in this direction, regulatory documents in SHCS fail to correspond to the international standards and acknowledged regulations.

**Methods**: Literature review of articles, methodological guides, orders, manuals published medical databases indicated to cancer pain treatment performed.

**Results**: Concept of CG in oncology represents the unit of dispenserisation remaining from the soviet system. Notwithstanding the fact that throughout the world, there are several factors defining general criteria for assessment of incurable patient, such as general standing, incidence/outbreak of cancer, concomitant diseases, current complications, along with the all above-mentioned, life quality of the patient, elements of the SHCS precondition receipt of such significant treatment for the cancer patients, as adequate administration of chronic pain, build a kind of bureaucratic barrier between the patients and the medical service. Use of the CGs in the medical practice is conditional and its presence interferes with the complete/perfect service rendering to the patients, making it impossible for the patients to be prescribed with opioids for medical needs in case of severe pain while anti-cancer treatment.

**Conclusions**: CG creates a barrier in adequate pain control for cancer patients; makes impossible to prescribe opioids to patients with medical needs during anti-cancer treatment;

CG fails to provide information on general condition of patient, quality of life. It is nor applied in accordance with international clinical guidelines and is maintained only in the countries of post-soviet region.

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# Basics in Pain - Organisation of research in pain

### Abstract no.: 940

## EARLY PHASE PAIN INVESTIGATION CLINICAL NETWORK (EPPIC-NET) PROVIDES INFRASTRUCTURE AND FUNDING FOR EARLY PHASE CLINICAL TRIALS OF NON-ADDICTIVE PAIN THERAPEUTICS

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**Background and aims**: In 2018, NIH launched the Helping to End Addiction Long-term Initiative, or NIH HEAL Initiative, to speed scientific solutions to the opioid crisis. As part of that effort, NINDS established the Early Phase Pain Investigation Clinical Network (EPPIC-Net), with the aim of providing robust support for early phase clinical trials of non-addictive pain therapeutics.

**Methods**: EPPIC-net provides academic and industry investigators with expertise in study design, conduct, and analysis. It utilizes a unique, rigorous, 3-stage application and review process, with trials funded under NIH's "Other Transactions" Authority. Trials built around accepted assets are run at no cost to asset providers, while the asset owner retains intellectual property rights to their asset. Network infrastructure includes a Clinical Coordinating Center, Data Coordinating Center, and 12 Specialized Clinical Centers.

**Results**: In its first two years of operation, EPPIC-Net funded clinical trials for three assets. The first trial, focused on painful knee osteoarthritis, is open to enrollment. Start-up activities are underway for the others. The latter two trials will be conducted under an innovative master platform protocol for painful diabetic peripheral neuropathy. The master protocol will run in parallel with clinical trials for additional accepted therapeutics addressing other pain conditions of high unmet need.

**Conclusions**: EPPIC-Net provides a robust, readily accessible network of pain experts and research sites for early phase trials incorporating proof-of-concept testing, biomarker validation, and novel study design. EPPIC-Net continues to accept and review applications. Ultimately it should reduce reliance on opioids through development of non-addictive pain therapeutics.

## Abstract no.: 449

### PROGESTERONE MODULATES THE DEVELOPMENT OF NEUROPATHIC PAIN, EPHRIN-B2 EXPRESSION, AND INDUCTION OF LONG-TERM POTENTIATION AFTER PERIPHERAL NERVE INJURY IN RATS

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**Background and aims**: Recent studies have shown that ephrins/Eph signaling pathway activation may contribute to neuropathic pain. Progesterone may be to counteract ephrins/Eph-related damage in pathophysiological processes of nerve injuries. The present study aimed to assess the role of progesterone on the development of neuropathic pain, spinal cord ephrin-B2 expression, and induction of long-term potentiation (LTP) following the chronic constriction nerve injury (CCI) model.

**Methods**: Thirty adult male Wistar rats were used. In these experiments, the sciatic nerve constricted chronically. Behavioral tests were performed before nerve constriction (day 0) and on days 1, 3, 7, and 14th of post-CCI. Daily progesterone injected (15mg/kg) during ten days post CCI. Western blotting and the spinal extracellular single-unit recording were performed on day14th of post-CCI.

**Results**: The findings showed that after CCI, in parallel with mechanical allodynia and thermal hyperalgesia, the expression of ephrin-B2 in the spinal cord and induction of long-term potentiation (LTP) significantly increased. Post-injury administration of progesterone decreased mechanical allodynia and thermal hyperalgesia, ephrin-B2 expression, and hyperresponsiveness of WDR neurons following CCI on day14th.

**Conclusions**: In conclusion, the results of this study indicated that ephrin-B2 activation mediates neuropathic pain and LTP induction in the C fiber following peripheral nerve injury. Post-injury repeated administration of progesterone is an effective way for treating neuropathic pain, and the underlying mechanisms are suppressing ephrin-B2 activation and reducing WDR neurons hyper-responsiveness.

# Basics in Pain - Psychology

## Abstract no.: 516

### MODERATION EFFECT OF CULTURAL BACKGROUND, BELIEFS AND COPING IN THE ADJUSTMENT TO CHRONIC PAIN: A CROSS-CULTURAL STUDY

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**Background and aims**: Chronic pain is a multidimensional and subjective experience hypothesized to be influenced by biopsychosocial variables. However, the effects of cultural background (as reflected by country of origin) on pain remain understudied. Preliminary results suggest that cultural background influence pain and adjustment to pain via their effects on pain-related beliefs and coping. An important next step for research in this area is to test this hypothesis. Greater scientific knowledge regarding the effects of cultural background on pain and adjustment to pain would help inform the adaptation of pain treatments to patients from specific cultural backgrounds, enhancing their efficacy. This research will address this knowledge gap by testing a moderation model on the association between cultural background, pain-related beliefs, coping and adjustment to chronic pain.

**Methods**: This is a cross-cultural cross-sectional questionnaire-based study comparing samples of adults with chronic pain from the USA (n=300) and from Portugal (n=300). Study participants completed a sociodemographic questionnaire, and measures of pain-related beliefs and coping, pain, and physical and psychological functioning.

**Results**: A moderation effect of cultural background, as reflected by country of origin, was observed for some (but not all) associations between pain-related beliefs and coping, pain, and physical and psychological functioning.

**Conclusions**: Study findings suggest the need to culturally customize the multidisciplinary pain treatment programs with a psychosocial component originally developed in the USA and other Anglo-Saxon countries, to improve their effectiveness in adult patients from Portugal. Results will be discussed with respect to their implications for the design of culturally appropriate psychosocial interventions.

## Abstract no.: 520

### 'EXTERNAL TIMING' OF PLACEBO ANALGESIA IN AN EXPERIMENTAL MODEL OF SUSTAINED PAIN

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**Background and aims**: Research on placebo analgesia commonly focuses on the impact of information about direction and magnitude of the expected analgesic effect whereas temporal aspects of expectations have received little attention so far. In a recent study using short-lasting, low-intensity stimuli we demonstrated that placebo analgesia onset is influenced by temporal information. Here, we investigate whether such 'external timing' effect can be found in longer lasting, high-intensity pain in a Cold Pressor Test (CPT).

**Methods**: Fifty-three healthy volunteers were allocated to one of three groups. Participants were informed that the application of an (inert) cream would reduce pain after 5 minutes (Placebo group, P5) or 30 minutes (Placebo group, P30). The third group was informed that the cream only had hydrating properties (No Expectation group, NE). All participants completed the CPT at baseline, and 10 (Test10) and 35 minutes (Test35) following cream application. Percentage change in exposure time (pain tolerance) from baseline to Test10 ($\Delta_{10}$) and to Test35 ($\Delta_{35}$) as well as changes in heart rate (HR) during CPT were compared between groups.

**Results**: $\Delta_{10}$ was greater in P5 than in NE and P30, indicating that analgesia was only present in the group that was expecting an early onset of analgesia. $\Delta_{35}$ was greater in P5 and P30 compared to NE, reflecting a delayed onset of analgesia in P30 and maintained analgesia in P5. HR differences between groups were not significant.

**Conclusions**: Our data suggest that 'externally timing' of placebo analgesia may be possible for prolonged types of pain.

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## Abstract no.: 536

### STORIES OF SUFFERING AND STORIES OF PEACE: A QUALITATIVE STUDY OF BREAST CANCER PATIENTS AND THE STORIES THAT MAY INFLUENCE DEVELOPMENT OF CHRONIC POST-SURGICAL PAIN

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**Background and aims**: Chronic post-surgical pain (CPSP) is a societal and individual problem, and for breast cancer patients, 25-60 % experience pain up to 7 years after surgery. Psychological factors such as pain catastrophizing and expectations predict CPSP and are promising targets for preventive interventions. However, while the trauma of cancer leads some to dispair, others find hope and meaning. Rich, qualitative descriptions of these adaptive stories may strengthen preventive interventions. Therefore, the aim of this study is to describe the different stories that breast cancer patients live with; how preventive, psychological interventions may influence these stories; and the consequences these stories have for quality of life.

**Methods**: This qualitative study is based on interview and diary data from patients (N = 4) who have undergone breast cancer surgery. Two patients had received a pre-operative hypnosis intervention and a post-operative, web-based intervention based on Acceptance and Commitment Therapy (ACT). The other two had received only a pre-operative mindfulness intervention. Data are analysed with narrative methodology.

**Results**: The different stories the participants lived with will be described, and how some of these stories contributed to quality of life, optimism, and internal peace, while others contributed to suffering, pessimism, and stress. Further, I will show how the different interventions the women received affected – or failed to affect – their stories.

**Conclusions**: Rich, qualitative knowledge of breast cancer stories that enhance quality of life may inform us in supporting patients to face this life trauma in a way that protects against the development of CPSP.

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## Abstract no.: 783

### ROLE OF THE DYNORPHINERGIC PROJECTION OF CENTRAL AMYGDALA TO NUCLEUS ACCUMBENS ON PAIN-INDUCED NEGATIVE AFFECTS

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**Background and aims**: Chronic pain patients suffer comorbid psychological disorders, such as anxiety, stress, and loss of motivation. Recent data has revealed that the activation of dynorphinergic neurons in the nucleus accumbens (NAc) is sufficient to cause inflammatory pain-induced negative affect. But it is not known what projection is involved in this phenomenon. Here, we studied if the dynorphinergic projection from central amygdala (CeA) to NAc (dynCeA>NAc) is involved in the development of the pain-induced negative affect in mice.

**Methods**: We first analysed the development of anxiety-like behaviour in the light-dark box paradigm of Complete Freund's Adjuvant (CFA)-injected mice for 2 weeks. To study the involvement of the dynCeA>NAc, we used an optogenetic approach to measure local field potentials in the NAc combined with real time place preference after an injection of CFA in female mice after 1 and 2 weeks.

**Results**: Interestingly, we found a reduction in the time expend in the light box only in CFA-female during the first week but not in the second. Furthermore, we found an overexpression of Δ-Fosb only in the CeA of the CFA-female mice. Finally, we found a decrease in the amplitude of the local field potential in the NAc only in CFA-female mice, as well aversion to the stimulation chamber during the place preference test only during the first week after CFA injection.

**Conclusions**: In conclusion, our data revealed that inflammatory pain differentially impact the negative affect depending on sex and time. Furthermore, dynCeA>NAc is probably involved in the development pain-induced negative affect.

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## Abstract no.: 890

### DOES A HIGH PRE-OPERATIVE PAIN CATASTROPHISATION SCORE INFLUENCE OUTCOMES FOLLOWING HALLUX SURGERY?

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**Background and aims**: Surgical intervention for hallux valgus and rigidus is an option for patients. Literature suggest patients with high Pain Catastrophisation Scores (PCS) have poorer outcomes in spinal and arthroplasty surgery. There is however very little evidence pertaining to footfoot surgery.

We aimed to study whether catastrophisation as measured by PCS influenced the outcomes following forefoot surgery.

**Methods**: Ethical approval for this prospective portfolio study was obtained from NRES Committee South Central and Oxford. Approval was granted from the local R&D department.

All patients listed for forefoot surgery were invited to participate. Recruitment started in September 2017 and is ongoing.

Pain catastrophising score (PCS), Manchester Oxford Foot Questionnaire (Mox-FQ), Visual analog scale (VAS) for pain and EQ-5D-3L were completed Pre-op (baseline), at 3, 6 and 12- months post-surgery.

**Results**: Data for 93 patients with minimum 6 months follow-up was analysed using SPSS software. A P-value <0.05 was considered significant. The mean age was 58.5 years and 83% were women.

70% of the patients had surgery for hallux valgus and rest for rigidus.

Both PROMS and PCS improved significantly following surgical intervention.

Patients with higher pre-operative PCS had a worse 6-month PROM score and more pain.

**Conclusions**: This study confirms that a high pre-operative PCS score has an adverse effect on outcomes following hallux surgery.

Risk stratifying patients based on their pre-operative PCS scores may be a useful strategy to identify those at risk of poorer outcomes. We recommend that behavioural change interventions should be considered to try to improve outcomes in patients with pre-operative PCS.

## Abstract no.: 947

### THE CLASSICAL CONDITIONING OF PAIN

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**Background and aims**: Chronic pain is a major health problem worldwide. Yet, the underlying cause is often unknown. The idea that chronic pain may be a consequence of classical conditioning has been advocated in contemporary theories aiming to explain pain maintenance in medically unexplained pain conditions. Supposedly, conditioned stimuli themselves may be reported as the cause of pain, in the absence of the painful input (US). Empirical evidence is however largely lacking.

**Methods**: In a virtual reality driven task, healthy participants (N=21) learned that one pen (CS+) was predictive of a painful electrocutaneous stimulus (US; US low= pin prick threshold, US high= added 20%), while another pen (CS-) was not. The acquisition phase was one block of 20 trials (CS+ : 80% reinforcement; CS- : 0%). Consecutively, 4 identical test phases had 32 trials each (CS+ : 37.5% reinforcement; CS- : 0%). The main outcome was reporting the US in its absence (false alarm).

**Results**: Self-reported attention, pain, fear and US expectancy were significantly ($p<0.0005$) higher for CS+ than for CS-, showing successful conditioning. 62% of the participants reported false alarms. False alarms occurred in 2.52% trials (1.51% for the CS+ and 1.01% for the CS-). The CS+ (n=33) had significantly more (.50%) false alarms than CS- (n=22).

**Conclusions**: The results provide first evidence that a low form of pain i.e. pin prick can be classically conditioned. They lend preliminary support to previous theories on the creation of conditioned pain. Further research is needed to better understand the conditions under which it is most possible.

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## Abstract no.: 972

### BODY-MIND IN CHRONIC MUSCULOSKELETAL PAIN: INSIGHTS FROM THE LITERATURE

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**Background and aims**: Chronic musculoskeletal pain is highly prevalent and burdening worldwide. Notably, patients with chronic musculoskeletal pain frequently report disruptions in how they experience their own bodies. These disruptions have been associated with worse psychosocial factors of pain adjustment. The relation between bodily experiences and the psychological dimension of persistent pain is a recent and promising field of research. We conducted a scoping review to identify current trends and gaps in research on the relationship between bodily experiences and psychological factors in adults with chronic musculoskeletal pain.

**Methods**: The study was guided by the Arksey and O'Malley and the PRISMA-ScR recommendations. PubMed and PsycInfo databases were searched using keywords related to bodily experiences and pain. We analyzed 2045 articles, from which 37 were retained.

**Results**: The results showed inconsistent definitions of bodily experience constructs (body schema, body image, and body awareness), which were mostly examined as a correlate/predictor of psychological factors. Body awareness was the most investigated construct, and in general, an improved bodily experience was associated with better psychological processes and outcomes.

**Conclusions**: The results support the importance of addressing body-mind interactions in chronic musculoskeletal pain in both research and practice to optimize multidisciplinary therapeutic interventions.

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## Abstract no.: 1145

### DECODING OF PAIN THROUGH FACIAL EXPRESSIONS: INFLUENCES OF SUFFERERS' RACE AND GENDER ON CHINESE OBSERVERS' INTENSITY ESTIMATION AND TREATMENT RECOMMENDATIONS

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**Background and aims**: Facial expression is a nonverbal pain communication often incorporated in clinical assessment and treatment. While previous research has only focused on interpretations of pain expressions by White Caucasians, the primary aim of this research is to address the gap by investigating how Chinese interpret pain expressions of different races.

**Methods**: An online experiment was conducted to examine Chinese participants' evaluation of pain intensity, the necessity of painkillers and pain authenticity for East Asians (EA), African/African Americans (AA) and White Caucasians (WC) through facial expressions. The research also investigates the possible underlying mechanisms by studying pain attitudes, gender role expectations, and pain empathy towards different races.

**Results**: The pattern showed Chinese observers rated AA's pain > WC's> EA's. The underestimation for EA's pain is particularly strong for female sufferers. The racial effect is not due to differences in the facial expressiveness of pain sufferers. When the same level of pain expressions was shown, EA females were most underestimated, whereas WC females' pain was perceived to be slightly stronger than WC males. AA's pain was still rated the strongest. Pain intensity estimation significantly predicts pain treatment provided and accounts for over 67% of the variance, which means underestimation is likely to lead to under-treatment.

**Conclusions**: Chinese observers most underestimate the pain of EA, of which females' pain is more vulnerable to be underestimated. Further analysis will be conducted to investigate the underlying mechanisms associated with pain attitude, gender role expectation, and empathy for pain. Implications will be further discussed.

# Basics in Pain - Societal impact

## Abstract no.: 187

### THE PAIN SYMPTOM IN COVID-19

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**Background and aims**: 1. Determine the presence of the pain symptom of COVID disease in the population of two urban Basic Health Zones that required hospital assessment.

2. Analyze the most common regions of the body that present pain during the covid-19 process.

**Methods**: **Design:** Descriptive, cross study.

**Setting:** Two Basic Urban Health Zones.

**Subjects:** All patients>14 years of age with a diagnosis of Coronavirus disease and a positive test between 05/01/2020 and 01/31/2021.

**Main measurements:** Indicator used: number of patients with pain symptoms for every 100 patients seen in the usual consultation of the health center and who required hospital assessment.

**Results**: 2225 patients were included. 575 interconsultations(IC) were made to hospital specialists. In 21.40% of these IC, the cause was pain (85% with normal referral,12% with preference and only 3% urgently).

The most frequent pathologies consulted:92% related to the locomotor system, highlighting arthralgia, fractures and trauma and 8% due to other causes, among which are mainly cholecystitis, pancreatitis and renal colic.

The most common painful regions were:Spine (26%) and extremities (60%).

**Conclusions**: The number of IC performed by a team from Primary Care (PC) is a reference of their correct functioning and their ability to resolve.

The clinical evaluation of the COVID-19 patient with persistent arthralgic symptoms in PC has to follow similar principles to

those of the usual clinical practice of arthritis symptoms in the field of PC (anamnesis, ruling out previous pathologies and symptom-oriented physical examination). Evidence-based clinical practice guidelines are necessary for the management of painful symptoms of COVID-19 in PC.

**Abstract no.: 738**

### IMPACT OF CLUSTER HEADACHE ATTACK DURATION ON ASPECTS OF PATIENTS' MENTAL HEALTH AND SLEEP PATTERNS – RESULTS FROM A REAL-WORLD SURVEY

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**Background and aims**: Cluster headache (CH) is a debilitating, painful, primary headache disorder. Attacks occur in cyclical patterns, typically lasting between 15 minutes and 3 hours, from 1 to 8 times a day. This study aimed to understand the impact of CH attack duration on patients' feelings and sleep patterns.

**Methods**: Data were drawn from the Adelphi 2017 CH Disease Specific Programme™, including physicians and their consulting patients from Germany, United Kingdom and United States. Patients were categorised by mean duration of CH attack: ≤30mins (n=200), >30-≤60mins (n=221), >60-≤120mins (n=147) and >120mins (n=73). Patients reported feelings experienced during a typical CH attack and rated aspects of impact on sleep patterns during a cluster period, with responses ranging from 'Not at all' to 'Frequently/ Always'. Descriptive analyses were performed.

**Results**: Feelings of anxiety (43%), agitation (42%) and stress (41%) were most frequently experienced by patients during an attack. Feeling stressed (30% ≤30mins to 61% >120mins); agitated (36% ≤30mins to 52% >120mins); isolated/wanting to avoid people (22% ≤30mins to 36% >120mins) and angry (18% ≤30mins to 32% >120mins) all increased with duration of attack (DOA). Half of patients reported frequently/ always having trouble falling asleep during a cluster period, this increased as DOA lengthened (42% ≤30mins to 65% >120mins). Two fifths of patients reported frequently/ always waking early and being unable to get back to sleep, increasing with longer DOA (39% ≤30mins to 56% >120mins).

**Conclusions**: Reducing the duration of CH attacks could have a positive impact on mental-health related aspects of patients' CH condition.

## Basics in Pain - Somatosensory system

**Abstract no.: 1070**

### DEPOLARIZATION INDUCES NOCICEPTOR SENSITIZATION DEPENDENT ON $CA_V1.2$-MEDIATED PKA-II ACTIVATION

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**Background and aims**: Depolarization of neurons drives neuronal plasticity. However, if depolarization drives sensitization of peripheral nociceptive neurons to painful stimuli remains elusive.

**Methods**: Sensory neurons were isolated from rat dorsal root ganglia (DRG) and depolarized *ex vivo* with potassium chloride (KCl) or the voltage-gated sodium channels agonist veratridine. The depolarization-dependent signal transduction was quantified by High Content Screening (HCS) microscopy to analyze large numbers of DRG neurons. Whole cell patch-clamp electrophysiology recordings were performed before and after applying a train of depolarization events. In addition, the influence of depolarization on the mechanical pain threshold (Randall-Selitto) was investigated in rats.

**Results**: By HCS microscopy, we revealed that depolarization of nociceptors rapidly activates protein kinase A type II (PKA-II) in smaller sized and RIIβ-positive neurons, both hallmarks of nociceptive neurons. PKA-II activation was also observed after opening of voltage-gated sodium channels (VGSCs, Nav) with veratridine. Testing various ion channel agonist and antagonists revealed that activation of PKA-II was dependent on calcium influx through the L-type voltage-gated calcium channel $Ca_V1.2$. In turn, PKA-II activated by depolarization phosphorylated S1928 in the distal C-terminus of CaV1.2 thereby increasing channel gating, whereas dephosphorylation of S1928 involved the phosphatase calcineurin. Patch-clamp and behavioral experiments confirmed that depolarization leads to calcium- and PKA-dependent sensitization of calcium currents ex vivo and local peripheral hyperalgesia in the skin in vivo.

**Conclusions**: Our data suggest a local activity-driven feed forward mechanism, which selectively translates strong depolarization into further activity and thereby facilitates hypersensitivity of nociceptor terminals by a mechanism inaccessible to opioids.

## Basics in Pain - Clinical diagnostics for the assessment of pain

**Abstract no.: 356**

### PAIN TRAJECTORIES, DETERMINED CLINICALLY AND BY QUANTITATIVE SENSORY TESTING IN EARLY PHASE AFTER SPINAL CORD INJURY: A FEASIBILITY STUDY

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**Background and aims**: Neuropathic pain (NeP) often develops as a complication following traumatic spinal cord injury (SCI). We aimed to investigate the development of pain trajectories by clinical examination and Quantitative sensory testing (QST) in early post-trauma stages.

**Methods**: Seven patients with traumatic SCI were followed by neurological and pain workup, including QST, performed 11 and 24 weeks. QST was applied according to the German Research Network on Neuropathic Pain (DFNS) protocol above, at and below the neurological level of injury.

**Results**: Low recruitment rate revealed limited feasibility for several reasons. Determination of different pain trajectories was feasible as follows: pain free, development of nociceptive pain or neuropathic pain, persistent nociceptive or neuropathic pain, change from nociceptive to neuropathic pain, change of neuropathic pain sub type and resolve of nociceptive pain. QST-feasibility was limited by several factors as: neuronal deafferentation, test side related factors and others.

**Conclusions**: Several factors influencing the feasibility in studies involving QST in early stages following SCI need to be considered in study planning. Preliminary results due to low recruitment rate suggest ongoing adaption mechanisms in sensory pathways in early stages of SCI, which may worthwhile for further exploration and may be relevant for prognostic and preventive strategies against the development of chronic neuropathic and nociceptive pain.

**Abstract no.: 570**

## CLUSTERS OF ACUTE POSTSURGICAL PAIN PATIENTS: ARE THERE HIGH-RISK PATIENTS AND HOW TO IDENTIFY THEM? A STUDY FROM THE INTERNATIONAL PAIN OUT REGISTRY

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**Background and aims**: To identify and characterize relevant patient clusters on the first postoperative day (POD1) and to obtain a continuous multidimensional pain-related outcome.

**Methods**: The PAIN OUT registry provides a framework for assessing patient reported outcomes (PROs) on POD1, demographic, clinical and perioperative treatment data. Data from patients undergoing general (n = 4,221), orthopaedic/traumatologic (n = 3,778), gynaecologic/obstetric (n = 1,222) and urological surgery (n = 544) between 2017 and 2019 in Mexico, China and 8 European countries was analysed. We applied *k*-means clustering to pain intensity, interference and side effects items from the International PAIN OUT Questionnaire.

**Results**: A highly stable two-cluster solution was identified. The first patient cluster (n = 3,684, 37.7%, $C_{high}$) was characterized by worse ratings in all PROs compared to the second patient cluster (n = 6,081, 62.3%, $C_{low}$). In addition, patient clusters significantly differed in perception of care items (e.g. wish for more treatment) and variables known to be associated with pain-related outcomes on POD1. In a retrospective analysis using data from the EUCPSP-project, $C_{high}$ membership was associated with a higher risk for chronic post-surgical pain (CPSP) 6 months after surgery ($C_{high}$: 21% *vs.* $C_{low}$: 11.6%, $p < 0.001$). Finally, we developed a pain composite score, which accurately classifies cluster membership and is suitable as continuous multidimensional outcome.

**Conclusions**: We identified two patient clusters, which showed statistically and clinically relevant differences in pain related PROs on POD1 and the risk for developing CPSP. Future prospective studies should validate these findings and assess predictors for cluster membership.

**Abstract no.: 686**

## VALIDATION OF ALGORITHM USED FOR CENTRAL SENSITIZATION DISCRIMINATION IN PERSISTENT PAIN

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**Background and aims**: The recognition of Central Sensitization (CS) is an important component for the effectiveness of the treatment of patients with persistent pain. There is no gold standard for CS discrimination, however specific clinical indicators have been developed. The purpose of this study was to evaluate the inter-rater reliability, test-retest reliability and criterion validity of an algorithm (Nijs et al. 2014) to recognize the presence of central sensitization mechanisms.

**Methods**: Clinical vignettes are short hypothetical evidence-based patient scenarios. Thirty-two vignettes included patients' histories with persistent pain were created. Two experts categorized them as CS or non-CS scenarios. Four physiotherapists with knowledge of chronic pain (Neurophysiology of Pain Questionnaire Score >17) evaluated them based on their subjective clinical reasoning and two weeks later, they assessed them again based on the examined algorithm. One month later, the algorithm-based evaluation was repeated.

**Results**: According to experts, fifteen vignettes included patients with CS. Agreement between physiotherapists and experts

examined with Cohen's Kappa. The results showed that there was a satisfactory agreement (k = 0.47-0.68) between the diagnosis of physiotherapists and experts. There was a poor to moderate agreement between physiotherapists (k = 0.25-0.5) whereas the first criterion of the algorithm (Disproportionate pain experience) seemed to have great variability in the agreement between physiotherapists (k = 0.06-0.75).

**Conclusions**: Clinicians may need to be more careful in the assessment of patients with persistent pain. There is a need to develop valid tools and procedures for the evaluation of patients with persistent pain and to train clinical therapists.

**Abstract no.: 888**

**FUNCTIONAL STATUS AND PAIN IN PATIENTS WITH ANKYLOSING SPONDYLITIS**

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**Background and aims**: To evaluate the functionality and pain of patients with ankylosing spondylitis.

**Methods**: The study is retrospective-prospective and includes 20 (15 male, 5 female) patients of both sexes that were treated in the Medical Rehabilitation Clinic, University Clinical Center of Vojvodina in the period from November 2018 to November 2021. VAS , BASFI (Bath Ankylosing Spondylitis Functional Index), BASDAI (Bath Ankylosing Spondylitis Disease Activity Index), and BASMI (Bath Ankylosing Spondylitis Metrology Index) questionnaires were used to assess subjects. The medical documentation of the respondents was also used for the study.

**Results**: The site of the most dominant spinal pain was the lumbar region (78%). Average pain VAS scores were significantly reduced during the rehabilitation treatment (7.85 vs 5.20; $p<0.05$). Women performed worse in the BASMI test ($t = 0.65$; $p = 0.27$), the BASDAI test ($t = 1.10$; $p = 0.16$), and the BASFI test ($t = 0.34$; $p = 0.37$) in comparison to men, however a statistically significant difference was not found in their scores. Improvement was found in BASMI, BASFI and BASDAI tests after the rehabilitation treatment, with a statistically significant difference found in the BASFI test ($p<0.05$).

**Conclusions**: Most patients with ankylosing spondylitis have the most dominant pain in the low back, which was significantly reduced during rehabilitation. There is no significant difference in functionality between men and women with ankylosing spondylitis. Rehabilitation treatment significantly enhances functionality and reduces pain in patients with ankylosing spondylitis.

**Abstract no.: 905**

**ACUTE SHOULDER PAIN**

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**Background and aims**: To evaluate the clinic of a patient with acute shoulder pain.

**Methods**: Evaluate the therapeutic action procedure.

A 78-year-old man with a history of diabetes and polyarthrosis, seeks urgent attention due to great pain, functional impotence

and inability to mobilize the right shoulder. The frame began after falling from its height on it with the arm in external rotation. Physical examination: Pain on palpation and loss of relief in the right shoulder. Radial pulse present. Normal neurological examination. Shoulder X-ray: Anterior dislocation.

Diagnosis: Right anterior glenohumeral dislocation.

Treatment: A Kocher maneuver is performed with reduction of the dislocation.

**Results**: A new radiograph shows joint congruence, not appreciating other acute bone lesions. After reduction, the patient was examined, not detecting swelling, hematoma or deformity. There are no alterations in the territory of the circumflex nerve or in the distal neurovascular. No tenderness in bony prominences. Passive abduction, rotations and strength preserved. A sling is placed, recommending functional rest and local cold for 5-10 min every 4 hours for 6 weeks.

**Conclusions**: Glenohumeral dislocation is the most common of the dislocations (50%). More than 90% are anterior, where the humeral head is inward and downward. It presents with intense pain in the shoulder region with functional impotence of the same. A correct physical examination and different complementary tests are necessary to rule out fractures or associated neurovascular injuries. The doctor must make a correct diagnosis with an early reduction and a good follow-up, avoiding further complications.

**Abstract no.: 1151**

**ACUTE LOW BACK PAIN, NOT EVERYTHING IS WHAT IT SEEMS**

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**Background and aims**: Assess the clinic of a patient with low back pain.

**Methods**: Study of acute low back pain, not everything is what it seems.

Case description: 59-year-old woman with left patellofemoral osteoarthritis, cervical and lumbar discopathy, dyslipidemia. Consultation due to pain in the right lumbar region not radiating to the extremities. With an inconclusive exploration, she was oriented as possible low back pain and analgesia was prescribed.

The patient returned due to non-radiated pain in the right renal fossa up to 4 times, alternately diagnosing renal colic and non-radiated low back pain. The last consultation presented great affectation due to pain on an anodyne examination, Lasegue very doubtful, weakly positive left renal fist percussion. Represcription of analgesia with clinical improvement. Abdominal ultrasound was requested without finding signs of obstructive uropathy. Normal blood count and biochemical analysis.

**Results**: Clinical judgment: non-irradiated low back pain.

Differential diagnosis: With low back pain versus lumbociatalgia, left renal colic, lumbar herpes zoster. In the same week she consults again due to burning pain in the renal area without irradiation, and the examination shows the appearance of vesicles with an erythematous base in clusters located in dermatomes compatible with herpes zoster. After several days of evolution, she was continued with analgesics, presenting a slow resolution of the condition one month after diagnosis.

**Conclusions**: When a patient consults again on so many occasions, a detailed re-examination is essential, being attentive to less frequent pathologies, such as the case that debuted with herpes zoster where initially there were no vesicular lesions

## Basics in Pain - Instruments for the assessment of pain

**Abstract no.: 212**

## MULTIDIMENSIONAL PAIN MEASUREMENT AND ASSESSMENT SCALE (EMMADOR-SABER): PERCEPTION OF KNOWLEDGE

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**Background and aims**: Pain is characterized as the fifth vital sign, and the training of health professionals is essential for effective management, considering that the pain phenomenon is multidimensional. The purpose of the study is to identify the perception of knowledge of students and professors of Nursing, Physiotherapy, Medicine, Dentistry, and Psychology courses about pain measurement and evaluation instruments, as well as the contribution of their use in clinical practice.

**Methods**: We developed the EMMADOR-SABER scale after identifying pain measurement and assessment instruments available in the literature. The scale was validated in terms of appearance and content by invited judges, and then a pilot test was carried out. The project was approved by the Research Ethics Committee of the School of Nursing of Ribeirão Preto, following with Resolution number 466/12, under CAAE nº 31628020.7.0000.5393, and opinion nº 4.258,371. We will analyze the data qualitatively in a descriptive way.

**Results**: The preliminary data of the scale, in its definitive form, present 50 instruments for measuring and evaluating pain, being 23 unidimensional and 27 multidimensional, which can be applied in different contexts according to the individuality of each subject.

**Conclusions**: Through the use of pain measurement and evaluation instruments available in the literature, the painful phenomenon has the possibility of being evaluated and managed effectively, considering its multidimensionality, and the training of health professionals being of fundamental importance since graduation.

**Abstract no.: 233**

## OPTIMIZING ELECTRONIC HEALTH RECORD (EHR) INTEGRATED PATIENT REPORTED OUTCOMES (PRO) INSTRUMENTS FOR THE INDIVIDUAL AND POPUATION-BASED ASSESSMENT OF PAIN

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**Background and aims**: Minimizing patient and provider burden through optimized survey instruments with EHR integration is a necessary criterion for successful PRO deployment. The aim is to identify optimal individual and population assessment tools, describe EHR integration and collection cadence, and discuss the strategy of successful deployment in a large academic health system.

**Methods**: Collaborative efforts between 14 Mayo Clinic spine care provider specialties (> 1,000 providers) identified programmatic deployment criteria for PRO instruments on meaningful and complete patient populations. Specialty stakeholder input yielded patient-centric and provider-friendly visualizations within the Epic EHR. Collated Epic EHR and PRO data were unified in a population-based dashboard assessing therapeutic procedural interventions.

**Results**: Consensus among Spine provider specialties identified the survey instrument (PROMIS Computer Adaptive Testing [CAT] domains), deployment criteria for baseline PRO collection (diagnostic, procedural and surgical codes), and series cadence. Epic EHR intergrated PRO collection modes targeted a baseline collection of 95%; patient-centric collection modes were developed to achieve a subsequent cadence collection of 80%. Customized provider visualizations within the Epic EHR utilized Synopsis and Print Groups, noting anchor events that include care progression, procedural and surgical care interventions. Epic data extracted into a Tableau Dashboard displays population data by procedural intervention, location, specialty, provider and patient demographic.

**Conclusions**: Patient-centric pain assessment tools improves patient engagement, education, diagnosis, treatment and continual monitoring of symptoms. Population-based Epic EHR data creates feedback loops of patient phenotypes and their response to care interventions. These feedback loops can validate current and enable future spine care algorithms.

**Abstract no.: 354**

## NO DIFFERENCE IN DISTRIBUTION OF NEUROPATHIC PAIN CLUSTERS OBTAINED BY QUANTITATIVE SENSORY TESTING IN PATIENTS WITH CENTRAL OR PERIPHERAL NEUROPATHIC PAIN FOLLOWING SPINAL CORD INJURY

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**Background and aims**: While cluster analysis in quantitative sensory testing (QST) has been established in patients with neuropathic pain (NeP) of peripheral origin, in patients with neuropathic spinal cord injury pain (nSCIP) of central and/or peripheral origin it is lacking. The aim was to close this knowledge gap.

**Methods**: QST data, acquired according to the German Research Network on Neuropathic Pain (DFNS) protocol, were analysed retrospectively. Pain diagnoses were made according to the international spinal cord injury pain classification as At-level nSCIP in patients with cauda equina syndrome (At-L-CES), Below-level nSCIP (Be-L-SCL) and At-level nSCIP (At-L-SCL) in patients with a spinal cord lesion. While At-L-CES is regarded as NeP due to peripheral and Be-L-SCL due to central lesions, in At-L-SCL a mix of peripheral and central pain origins is assumed.

**Results**: 62 patients (female n=15), aged 49,5±15,6 years were included with pain duration of 86±104 months. 89 QST profiles from different pain sites were obtained and assigned as follows: At-L-CES (n=11), Be-L-SCL (n=43) and At-L-SCL (n=35). Cluster analysis revealed the following cluster distribution: loss of function (n=44), thermal hyperalgesia (n=23) and mechanical hyperalgesia (n=22). There was neither a statistical difference in cluster distribution nor mean of QST-parameters between different pain diagnoses. Frequency of gain or loss in QST-parameters in each diagnosis was not statistically different.

**Conclusions**: QST-clusters, known from peripheral neuropathic pain, can also be found in patients with nSCIP regardless of underlying pain diagnosis. Further research should address the question, whether in nSCIP additional clusters might be present.

**Abstract no.: 716**

## CENTRAL SENSITIZATION INVENTORY SCORES ARE ASSOCIATED WITH PAIN THRESHOLDS AND CONDITIONED PAIN MODULATION IN A MIXED COHORT OF CHRONIC PAIN AND HEALTHY CONTROL SUBJECTS

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**Background and aims**: Quantitative sensory testing (QST) can identify central nervous system dysfunction in pain processing, which can suggest the presence of central sensitization (CS). The Central Sensitization Inventory (CSI) is a patient-reported outcome measure which assesses CS-related symptomology. Conflicting results have been reported in previous studies that have explored the relationship between QST and CSI scores, with a relatively high percentage showing

weak or no relationship between these measures.

**Methods**: The present study evaluated association between CSI scores and two QST measures [Pressure Pain Thresholds (PPT) in the lower back and forearm and conditioned pain modulation (CPM)] in a combined sample of chronic pain patients with fibromyalgia (FM), lumbosacral radiculopathy (NPLSR), and healthy subjects (HS) reporting no pain.

**Results**: A total number of 175 subjects were assessed (average age 49.99±12.71 years, 135(77.1%) females), including 57 (32.6%) with FM, 52 (29.7%) with NPLSR, and 66 (37.7%) HS. Large correlations were found between CSI total scores and PPT on the forearm (r=-0.594, p<0.01) and lower back (r=-0.596, p<0.01), while medium correlations were observed between the CSI and CPM (-0.320, p<0.01).

**Conclusions**: Unlike some previous studies, total CSI scores in the present study were significantly and highly correlated with two QST measures (PPT and CPM), implying the potential clinical usefulness of the CSI in helping to identify when a patient's symptom presentation may be related to CS. It is hoped that future studies can provide some explanation for the conflicting results that have been reported in previous studies about the relationship between QST and CSI scores.

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## Abstract no.: 934

### THE SPANISH VERSION OF THE FREMANTLE BACK AWARENESS QUESTIONNAIRE: PRELIMINARY RESULTS OF THE VALIDATION PROCESS

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**Background and aims**: People with chronic low back pain (CLBP) have feelings of exclusion, alienation, and rejection of their back. These changes in body image may impact on the pain state. Therefore, contemporary care of CLBP should explicitly address disrupted body image, but there is a need for valid and reliable tools for its evaluation. The Fremantle Back Awareness Questionnaire (FreBAQ) was recently developed to assess back-specific self-perception in people with CLBP. Although it has been validated in English, Japanese, Dutch, Turkish and German populations, still lacks a Spanish version. Thus, the aim of the study was to translate the FreBAQ into Spanish and to validate it in a Spanish-speaking population with CLBP.

**Methods**: Forward-backward translation process was used to develop a Spanish version of the questionnaire (FreBAQ-S). A convenience sample of 143 participants with chronic low back pain (48 males; aged 46.27 ± 12.1) completed the FreBAQ-S via an online survey. Exploratory factor analysis was conducted to explore the structure of the questionnaire. Reliability analysis was conducted using the Cronbach's alpha estimate.

**Results**: Although two factors ($F_2$: items 4-6) were found with the eigenvalues (up to 1.382), the parallel analysis suggested a 1-factor structure of the questionnaire (communalities between 0.84-0.19; factor loadings between 0.4-0.6). In our sample, the questionnaire demonstrated good internal consistency in terms of Cronbach's alpha (0.84, with 95% CI).

**Conclusions**: Preliminary results support a one-factor structure of the questionnaire with acceptable reliability. Further analyses must be performed prior to its use in clinical settings, which are currently being conducted.

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## Abstract no.: 983

### THE EFFECT OF BEING HUGGED BY A ROBOT ON PAIN

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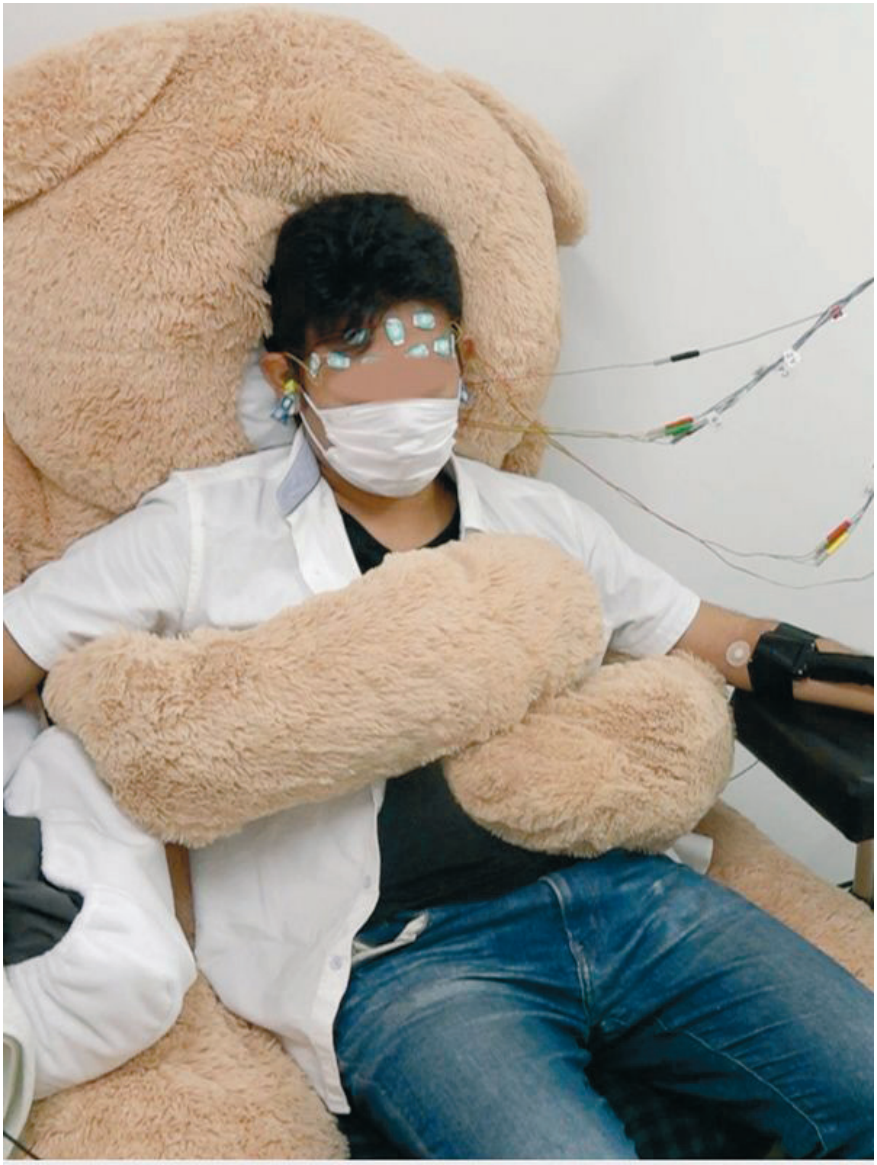
**Background and aims**: As human-to-human contact is limited in Covid_19, the role of robots is gaining attention. It has been reported that hugging can reduce people's mental stress and alleviate pain.Pain is a subjectivesymptom; however, it is sometimes difficult to prescribe analgesics based on subjective complaints. The development of an objective evaluation method is desired. We have developed an algorithm based on EEG data with experimental pain stimuli.The purpose of this study was to objectively evaluate the effect of hugging by a robot on pain.

**Methods**: After written informed consent, 40 healthy volunteers participated in this study. The robot used was a giant stuffed bear that had been modified by roboticists to allow hugging by pushing buttons remotely (fig.1). Participants received experimental pain stimulation using Pathway (Medoc, Israel) twice (without robot, called “control condition”, then with robot, called “robot condition”). To get accustomed to the robot, before robot condition, participants chatted with the robot using an audio system placed around the robot’s face for 30 minutes.

Pain Score (PS) was calculated from the 8-channel EEG of the frontal forehead using a deep learning-based algorithm, and the differences were compared by using a corresponding t-test.



**Results**: PS was significantly lower in the robot condition compared to the control condition at 48℃($p<0.05$).

**Conclusions**: PS could allow us to objectively evaluate the effect of hugging by the robot on pain.

This research work was supported in part by JST CREST Grant Number JPMJCR18A1, Japan.

## Abstract no.: 1003

### THE GERMAN PAIN E-REGISTRY – A NEW APPROCH TO USE REAL-TIME SAMPLED ROUTINE DATA FOR HEALTH CARE RESEARCH

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**Background and aims**: To develop a cloud-based, sector-crossing patient/physician-driven web-application to sample anonymized real-time data of patients suffering from chronic pain for health-care research purposes (HCR).

**Methods**: Based on validated patient-reported multidimensional pain questionnaires, the web-based online application iDocLive® has been developed for patients suffering from chronic pain to improve diagnostic as well as therapeutic strategies through the real-time evaluation of routine data. Data are entered by patients, therapists, and centre staff via secured online pathways and authorized electronic devices, merged, encrypted and stored on secured server banks in Germany to grant worldwide real-time access by authorized participants. Patients and physicians agreed by written informed consent with the transfer of anonymized data copies into the German Pain e-Registry (GPeR) for HCR purposes.

**Results**: Until December 31, 2021 the GPeR collected data of 353,056 patient cases and 1,435,346 questionnaires with more than 10.7 million validated instruments containing ~288 million variables on patient-relevant bio-psycho-social aspects of pain, pain-related interferences with daily life and quality-of-life, as well as pharmacological and non-pharmacological treatments. Spectrum of pain disorders is wide – covering back pain (50.9%), headaches (9.3%), arthralgia (16.8%), neuropathic pain (9.3%) and others (13.7%) – and offers together with a growth rate of ~200 new patient records per day a rapidly proliferating basis for pain-related HCR approaches.

**Conclusions**: Routine-data based HCR gains increasing importance for evidence-based decision processes and complements results of randomized controlled trials. With its real-time access to routine data, the GPeR represents an ideal basis for cross-sectional as well as longitudinal HCR analyses.

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## Abstract no.: 1072

### PAINRE-LIFE: INTEGRATED TOOLS FOR CHRONIC PAIN PATIENT MANAGEMENT

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**Background and aims**: Chronic pain (CP) is a burdensome condition characterized by high social impact, psychological complications and psycho-physical disability. Furthermore, it is often unrecognized and inadequately controlled. A systematic assessment of CP is neglected in most practices and efforts to establish diagnostic-therapeutic pathways are scarce. PainRE-Life, a project aimed at developing a technology ecosystem for CP, analyzed the therapeutic pathways of different CP patients examining critical aspects and defining where digital tools could support an integrated care.

**Methods**: As use cases, PainRE-Life selected CP in post-stroke, early breast cancer and fibromyalgia patients, and implemented several technological assets: a cloud platform for defining the care pathway and collecting data, a big data infrastructure, and personalized applications for monitoring treatment response, physical and psychological assessment, decision aid (DA), exercise-therapy, neurostimulation and lifestyle enhancement.

**Results**: Three Pilot Studies, each specific for a type of pain, will be conducted in clinical centers of excellence. The study on breast cancer patients focuses on CP monitoring and evaluates the DA's usability through the care pathway. The post-stroke study focuses on the patients' management in hospital and at home, using quantification tools and multidimensional clinical measures. The fibromyalgia study investigates the combined effects of tDCS and tele-rehabilitation.

All protocols aim to promote a better evaluation of pain and the use of combined approaches, including questionnaires and pain assessment scales.

**Conclusions**: The approach adopted and the technologies developed might serve as a model for other conditions associated with CP, especially where they require continuity of care, multidisciplinary approaches and heterogeneous data collection.

# Basics in Pain - Measurement of psychosocial aspects of pain

## Abstract no.: 314

### CONSTRUCTION AND VALIDATION OF AN INSTRUMENT TO ASSESS CHRONIC NON-CANCER PAIN IMPACT IN DAILY LIFE IN SPANISH-LANGUAGE

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**Background and aims**: Chronic Non-Cancer Pain (CNCP) is a personal experience lasting more than three months; it is not associated with oncological pathologies, and it affects 1.5 billion people throughout the world. Its treatment requires an adequate assessment of the impact it causes to establish interventions beyond the pharmacological ones. The objective of this study was to build an instrument in the Spanish language to assess CNCP impact on daily life.

**Methods**: Cross-sectional study of psychometric validation in three stages: 1) item selection and content validation using the Delphi panel methodology in three rounds; 2) piloting (n=30) in October 2019 to assess the understanding and administration time of the items and 3) internal validation through a cross-sectional study between January and March 2020 (n=395). The inclusion criteria for participation were people over 18 years of age with some condition of CNCP treated in Primary Care Centres or Pain Units in Seville (Spain).

**Results**: Initially, 157 items were included, which were reduced to 55 after content validation. Finally, the instrument was reduced to 36 items, showing an acceptable internal consistency ($\alpha$=0.72) and a structure of nine factors that explain 71.02% of the total variance. The nine constructs that composed the Pain_Integral Scale© instrument were called self-esteem, social support, sleep, coping, mobility, treatment compliance, resilience, hopelessness due to pain and pain catastrophising.

**Conclusions**: The Pain_Integral Scale© could be used by health professionals as the first evaluation of patients with CNCP after they are diagnosed in order to form a treatment plan and evaluate the effectiveness of the latter.

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## Abstract no.: 341

### PSYCHOMETRIC PROPERTIES AND FACTOR STRUCTURE OF THE FINNISH VERSION OF THE HEALTH CARE PROVIDERS' PAIN AND IMPAIRMENT RELATIONSHIP SCALE

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**Background and aims**: **Background:** Health care providers' beliefs influence the outcomes of low back pain patients care.

**Aim:** The aim of this study was to translate and cross-culturally adapt the Health Care Providers' Pain and Impairment Relationship Scale into Finnish (HC-PAIRS-FI) and to evaluate its psychometric properties and factor structure in a sample of Finnish physiotherapists and physiotherapy students.

**Methods**: The translation was performed using established guidelines. Participants answered an online survey consisting of HC-PAIRS-FI and the Finnish Tampa Scale of Kinesiophobia adapted for health care providers (TSK-HC-FI). Internal consistency was assessed using Cronbach's alpha. Intraclass correlation coefficient (ICC) was used to determine test-retest reliability. A second round of analysis, exploratory factor analysis (EFA) and confirmatory factor analysis (CFA) was performed as the fit indices of the initial CFA were not satisfactory.

**Results**: A sample of 202 physiotherapists and 97 physiotherapy students completed the survey. The second round of analysis EFA and CFA, conducted on a randomly split subsample, revealed and confirmed a three-factor, 11-item HC-PAIRS-FI scale with satisfactory model fit indices. Cronbach's alpha 0.79 and ICC = 0.82 ($p < 0.001$) indicate good internal consistency and test-retest reliability. The standard error of measurement was 2.12. HC-PAIRS-FI scores correlated moderately with TSK-HC-FI ($r = 0.69$, $p < 0.001$).

**Conclusions**: The 11 items HC-PAIRS-FI appears to be a valid and reliable questionnaire to evaluate Finnish physiotherapists' and physiotherapy students' attitudes and beliefs about the relationship between low back pain and impairment. Future studies are required to validate this scale for other health care providers.

## Abstract no.: 390

### SCRINING STUDY OF THE MENTAL STATE IN PAIN CLINIC: ANXIETY, DEPRESSION, COMORBID DISORDER AND THEIR INFLUENCE ON THE FUNCTIOL STATE AND PAIN

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**Background and aims**: Scientific studies demonstrate negative influence of the depression and anxiety on the treatment results in pain clinics. The aim of the study: to explore the structure of the psychopathology in pain clinic and influence on functional outcome and pain.

**Methods**: Inclusion criteria: primary visit of the pain clinic. Exclusion criteria: prevalence of the productive psychiatry symptoms (hallucinations, delusions), severe cognitive impartment.

100 patients (77 women, 33 men), age 59,4±12,6 year, duration of the pain syndrome from 3 month to 40 years. Main pain localization was thoracic spine 6 patients,

low back pain —70,

cervical region — 6,

shoulder pain — 2,

headache — 7 patients,

facial pain —3,

pelvic pain — 1,

widespread pain — 5,

another location — 1.

Patients were tested hospital anxiety and depression scale (HADS), visual analog scale (VAS) maximum and minimum, Charlson comorbidity index (CCI), functional status (appetite, mood, sleep, ability to walk and work).

**Results**: Screening results were VAS maximum 7,5±2,4; VAS mimimum1,4±2,4; CCI 2,4±1,8; HADS anxiety 8,7±4,5; HADS depression 7,02±4,1. Normal mental state have 35% of patients, psychopathological state have 65% of patients. Anxiety and depression were calculated in 58.5% of psychopathology cases, anxiety — 26.2%, depression — 15.4%. We revealed relationship between severity of anxiety and worst functional state ($r=0.42$, $p<0.05$), also depression and worst functional state ($r=0.39$, $p<0.05$). There was not statistical significant correlation between anxiety, depression, CCI and VAS.

**Conclusions**: The psychopathology structure presents anxiety-depression, anxiety and depression disorders. The presence of anxiety-depression disorders result is worsening functional state of patients with chronic pain.

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## Abstract no.: 526

### PATIENTS SATISFACTION WITH PHONE CONSULTATION IN A CHRONIC PATIENT UNIT DURING COVID-19 PANDEMIC

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**Background and aims**: The COVID-19 pandemic forced rapid reorganization of health services.

In Portugal all non-urgent healthcare services were cancelled, including activities in the chronic pain units (CPU). At the CHEDV in-person consultations were cancelled and telephone consultation was established for patients being followed up CPU.

The aim of this study is evaluate the impact of these on patient satisfaction.

**Methods**: Restrospective, observacional cross-sectional study

After informed consent and approval by the ethics committee a questionnaire was offered to patients by telephone.

The questions were based on overall satisfaction, communication, the challenges of telephone consultation, fear of contamination by COVID 19 and the possibility of maintaining teleconsultation in the future.

**Results**: 215 patients met the inclusion criteria of the study. Most patients (93%) consider themselves very satisfied/satisfied with the consultation. 45.6% prefer the maintenance of teleconsultation.

86.51% had no difficulties in performing the consultation, obtaining or understanding the prescription.

Data analysis revealed no statistically significant difference between patient satisfaction and demographic variables. P>0.05

A relationship is identified between the age of the patients and the existence of technical difficulties.There is a correlation between patient satisfaction and fear of infection with Sars-Cov-2.

**Conclusions**: Overall the patients are very satisfied with the teleconsultation.

Technical difficulties are age-related.

There is a relationship between patient satisfaction and fear of infection - patients who are satisfied with teleconsultation are those with the highest fear of Sars-CoV-2 infection.

No relationship appears to exist between demographics and patient satisfaction.

Teleconsultation was an effective approach to consult patients, however most patients prefer face-to-face consultation.

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## Abstract no.: 641

### UNPLEASANT DREAMS AS A PUTATIVE CRITICAL ELEMENT FOR HISTORY OF OROFACIAL PAIN VIA PSYCHOSOCIAL STRESS: A THEORETICAL MODEL FROM A SMALL NUMBER OF CASE-CONTROL OBSERVATIONS

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**Background and aims**: Although pain as part of the dreaming world have been questioned, research has shown that pain sensations may occur in 1/3 of patients with acute, severe pain. As sleep-pain interaction occur in a multilevel fashion within Central Nervous System and involves emotional regulatory mechanisms contributing to perpetuation, it is hypothesized that unpleasant dreams may contribute to pain persistence and thus, to the chronification via a modulatory role on the interactive pathways between pain and the affective brain.

**Methods**: Based on a retrospectively analysis of 4 adult females (2 claimed that never dreamed or only occasionally, e.g. less than 1 time per week, and 2 dreaming regularly, e.g. more than 3 times per week and a bad dreams content/nightmares), history of pain development was taken and exhaustively characterized. For Sleep and Dream evaluation, Pittsburgh Sleep Quality Index (PSQI) and Mannheim Dream questionnaire (MADRE) were performed and for pain, the Pain Frequency Intensity and Burden Scale (P-FIBS) as well as a Visual Analogue Scales for measuring impact of self-perceived pain during dreams were performed. Data was empirically analyzed and discussed.

**Results**: All the 4 patients had a poor sleep quality (PSQI>5), the 2 of them complaining of regular bad dreams/nightmares were more severely affected on pain related measures (either intensity, frequency or persistence) compared with those without history of regular unpleasant dreams. Patients referring unpleasant dreams also revealed to be more stressed and anxious.

**Conclusions**: Unpleasant dreams may affect the history of pain and possibly being a contribute for pain chronification via psychosocial stress modulators.

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## Abstract no.: 722

### TO ASSESS THE PATTERN OF PSYCHOLOGICAL HEALTH PROBLEMS OF RHEUMATOID ARTHRITIS AND CHRONIC PAIN PATIENTS IN BANGLADESH

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**Background and aims**: Psychological problems are highly globally and make considerable contribution to the burden of disease. Data from World Mental Health surveys revealed that between 12% to 47% of country population are suffering from one or more mental disorders in their lifetime. Yet a substantial proportion of these people do not receive treatment. This

discrepancy is more larger in low and middle income countries where between 75% to 85% people with serious psychological problem or disorders remain untreated and often undiagnosed. It is estimated that mental disorders accounts for 13% of the global burden of disease. Several researches indicated that psychological problems appear to be particularly common among rheumatoid arthritis and chronic pain patients. Depression, Panic attacks, Anxiety neurosis Suicidal ideation, Psychological distress Disability Eating problem and sleep disorder etc. are main psychological problems among the RA disease. A study in Bangladesh revealed high prevalence of mental health problems. National Psychological Counselling law of Bangladesh also gave emphasis on the importance of psychological intervention. The study demanded a further study for determining psychological health problems. COVID19 situation demands and scale up effective psychological intervention in the world.

**Methods**: This willbe a mixed methods study. Both qualitative and quantitative method will be applied for data collection.

The sample of study comprise 200 rheumatoid arthritis patients.

**Results**: The self reporting questionnaire applied for identification of probable cases and nonprobablle cases. Respondents who scored 6 and above was positive and who scored 5 and below was negative.

**Conclusions**: Improve access to health services and improved health outcomes.

# Basics in Pain - Structural and functional imaging in pain

## Abstract no.: 414

### X-RAY ASSISTED LUMBAR INTERLAMINAR EPIDURAL INJECTIONS: AN EVALUATION OF DYE FLOW CONFIRMED BY RADIOLOGICAL VIEW

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**Background and aims**: Epidural steroid injections are used for treating lumbar radicular pain. The delivery of steroids is completed using radiological view. The target is to evaluate the dye flow in epidural space after lumbar interlaminar injections.

**Methods**: 100 patients received X-ray assisted epidural injections using loss of resistance technique. The injections made on prone position in the L4-L5 level. Patients allocated in two groups by the volume of dye: 1mL and 3mL. The level of dye spread measured using the X-ray view.

**Results**: 66 patients received 1mL of contrast and 34 – 3mL. Ventral dye spread resulted in 48% (32 out of 66) in 1mL and 79% (27 out of 34) in 3mL group (p=0.02). Bilateral flow occurred in 65%, 1mL group 84% (56 out of 66) vs. 41% in 3mL (14 out of 34) (p=0.044). The mean number of dorsal flow levels cephalad from the injection site 1.86 in 1 mL vs. 3.00 in 3mL group (p=0.02) and caudad flow 0.80 in 1mL vs. 1.52 in 3 mL group (p=0.05). Means for ventral flow 1.88 in 1 mL vs. 3.00 in 3 mL group (p=0.016) and 0.92 in 1mL vs. 1.2 in 3 mL group (p=0.05) respectively. There was significant difference in more cephalad than caudad contrast flow (p=0.001). The observed dye flow must be studied clinically to determine the effect on clinical outcome.

**Conclusions**: All injections performed in selected interlaminar space. 50% revealed ventral dye flow. Bilateral flow occurred in 65%, more often in the smaller volume group. Caudad flow is less than cephalad.

# Pain Therapies - Complementary medicine

## Abstract no.: 207

### EMBEDDING ULTRA-BRIEF MINDFULNESS INTERVENTIONS IN SURGICAL CARE PATHWAYS IMPROVES PATIENT OUTCOMES: RESULTS FROM THREE RANDOMIZED CLINICAL TRIALS

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**Background and aims**: Even after a technically sound knee or hip replacement, 20% of patients report chronic postoperative pain in their replaced joint and 17%-42% are still using opioids 3 months after surgery. Clearly, knee and hip replacement patients need better, non-opioid pain management strategies. Ultra-brief mindfulness-based interventions (MBI) may be able to improve patient outcomes without burdening patients and providers.

**Methods**: This presentation will review results from three randomized clinical trials (RCTs) examining the effects embedding ultra-brief (i.e., 3 - 20 minute) MBIs in the surgical care pathways of knee and hip replacement patients. Each study was a single site, three-arm, parallel group RCT.

**Results**: Study 1 (N=285) found that a single, 15-minute, therapist-led, preoperative MBI immediately reduced pain, anxiety and pain medication desire as well as improved postoperative physical function. Study 2 (N=118) found that a single, 20-minute, therapist-led, preoperative MBI immediately reduced pain and decreased pain and opioid use in the first month after surgery. Study 3 (N=128) found that a single, 3-minute, nurse-led, preoperative MBI immediately reduced pain and pain medication desire. Postoperative data is still being collected in this project.

**Conclusions**: Results from these studies, suggest an ultra-brief, preoperative MBI may be able to improve surgical patients' pain and opioid related outcomes. Moreover, the ultra-brief, scripted MBIs used in this study are highly feasible, capable of being delivered by nearly any healthcare provider, and requiring minimal clinic time given their brevity. As such, embedding ultra-brief MBIs in surgical care pathways has considerable potential.

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## Abstract no.: 926

### THE INFLUENCE OF CHRONIC USE OF OPIOIDS ON THE INTENSITY OF THE PAIN AFTER KNEE AND HIP REPLACEMENT SURGERY

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**Background and aims**: During the last years, has increased significantly the number of patients who take opioids for long time in order to treat pain caused by the severe osteoarthritis. Taking the opioids for long time with the purpose to treat the pain may provoke the risk of addiction as well as possibly change pain perception after surgery.

**Methods**: Prospective observational study conducted. Patients aged from 30 to 85, with BMI 20–40 prepared for an elective total knee or hip replacement in the case of osteoarthritis, were included. Their habits of medicament use and the impact of various medications on the postsurgical pain intensity were studied. Postoperatively, patients received multimodal analgesia. Intensity of pain and satisfaction with pain relief were measured in various periods after the surgery applying the VAS score. A telephone survey took a place after the surgeries, not earlier than 30days after the discharge.

**Results**: 48patients, 6 in the Opiod User (OPU) group and 42 in the control (CG) group. Total amount of Morphine used for both groups of the study: for the OPUgroup – 12mg, for the CGgroup – 32mg (P=0,01).

**Conclusions**: There are no significant statistical differences between groups. However, there is a tendency that the OPU group had slightly less pain and had almost three times less consumption of Morphine equivalents in the postsurgical period than the CG group. The results of our study did not confirm the fact that use of opioids before a surgery would make an impact to the more intensive pain and chronification in the postoperative period.

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## Abstract no.: 1010

### EFFECTS OF KINESIO TAPING METHOD ON MENSTRUAL PAIN: A RANDOMISED, SINGLE-BLIND, PLACEBO-CONTROLLED CROSSOVER STUDY

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**Background and aims**: Current research promotes complementary methods of coping with menstrual pain (MP). The objective of this study was to examine the effectiveness of the Kinesio Taping (KT) intervention on MP and determine whether KT has therapeutic impact or whether there is presence of placebo.

**Methods**: In within-subject design, 30 female participants were divided into two groups: the first group received an application of KT spatial correction technique (E), then placebo KT (P), while in the other group the reverse order of interventions was used. Every phase included one menstrual cycle. The average age of participants was 23.5 years (18-39). VAS, Brief Pain Inventory Scale, and some SF-36 subscales were used in the assessment.

**Results**: The worst MP without any intervention (6.17) did not significantly differ from P phase (6.07) but decreased significantly to 5.10 during E phase (F=18.38; p=0.000). There was also a significant difference between E and P phase in the average MP, in the worst experienced MP, the mildest one, and for current pain: in E phase all types of pain were less intense. Regarding quality of life, significantly better results were obtained during phase E for physical functioning, energy/fatigue, role limitations due to physical health, and due to pain. For emotional well-being and general health there weren't significant differences between E and P phase.

**Conclusions**: KT has beneficial effect in reducing MP and its consequences and it is significantly superior to placebo. The order of intervention showed no statistical significance, which also confirms the therapeutic effect of KT.

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## Abstract no.: 1079

### MUSIC FOR THE MANAGEMENT OF ACUTE PAIN IN PATIENTS WITH TRAUMATIC WOUNDS IN THE EMERGENCY DEPARTMENT

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**Background and aims**: Acute trauma pain is one main cause of hospital admission, and its inadequate management is frequently reported. Music has emerged as a non-pharmacological intervention, with a significant effect on reducing pain intensity. However, this remains a poorly structured intervention in the emergency context.

The aim of this investigation is to propose an intervention with music, for the management of acute pain, of the patient with a traumatic wound in the emergency department.

**Methods**: In a multi-study, multi-method perspective, and based on the Medical Research Council guidelines for the development of complex interventions, it is intended to develop an investigative path, limited to the development stage, that will comprehend five studies – a systematic review of the literature (Study I); a characterization of the patient with acute pain, based on data from clinical records (Study II); telephone interviews with the patients, to comprehend their experience of pain, preferences and availability for an intervention with music (Study III); a focus group, to obtain the perception of health care professionals, regarding the applicability and facilitating and hindering aspects of the intervention (Study IV) and the submission of the intervention to a panel of experts, using the modified e-Delphi method, to evaluate its content and applicability (Study V). The investigation was approved by an ethics committee.

**Results**: Obtain the components to develop an intervention for the management of pain.

**Conclusions**: This intervention will embrace this specific context, the fundamental needs and complexity of the patient, as well as contribute to improve scientific knowledge and health care quality.

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# Pain Therapies - Digitization in pain management

## Abstract no.: 296

### EHEALTH INTERVENTIONS TO SUPPORT SELF-MANAGEMENT IN THOSE WITH MUSCULOSKELETAL DISORDERS: 'EHEALTH: IT'S TIME': A SCOPING REVIEW

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**Background and aims**: eHealth-mediated interventions are considered an option to support self-management in those with musculoskeletal disorders (MSDs). This scoping review aimed to chart the evidence regarding eHealth modalities, musculoskeletal diagnosis, and outcomes of eHealth-mediated self-management support interventions in persons with MSDs and identify any gaps within the literature.

**Methods**: Six databases (MEDLINE, CINAHL, PsycINFO, Embase, Scopus, Cochrane Database of Systematic Reviews), seven grey literature sources and reference and citation lists of included studies were searched from inception to July 2020. Published studies of adults with a MSD utilising an eHealth intervention to support self-management were included. Studies were limited to those published in English. Two reviewers independently screened all studies. Data were extracted by one reviewer and reviewed by another reviewer.

**Systematic review registration:** Open Science Framework (https://osf.io/29rd6) and published (Kelly et al., 2021).

**Results**: After screening 3377 titles and abstracts and 176 full-texts, 87 studies fulfilled the eligibility criteria. Most studies were published in the last five years (55%), with almost one-third originating in the USA (32%). The most common eHealth modality type was internet-based (35%) with almost one half (47%) of studies involving participants with widespread musculoskeletal symptoms. The most commonly reported outcomes related to body functions (i.e. pain intensity) (n=67; 45%), followed by activities and participation (i.e. function) (44%), with environmental factors (i.e. healthcare utilisation) the least commonly reported (20%).

**Conclusions**: Considerable variation exists within the eHealth-mediated self-management support intervention literature. Research is needed on the role of eHealth-mediated self-management support interventions across a broad range of MSDs to guide clinical practice.

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## Abstract no.: 662

### PREVALENCE OF SYMPTOMS REPORTED BY RHEUMATOID ARTHRITIS PATIENTS AT ELECTRONIC PLATFORM DURING COVID-19 PANDEMIC

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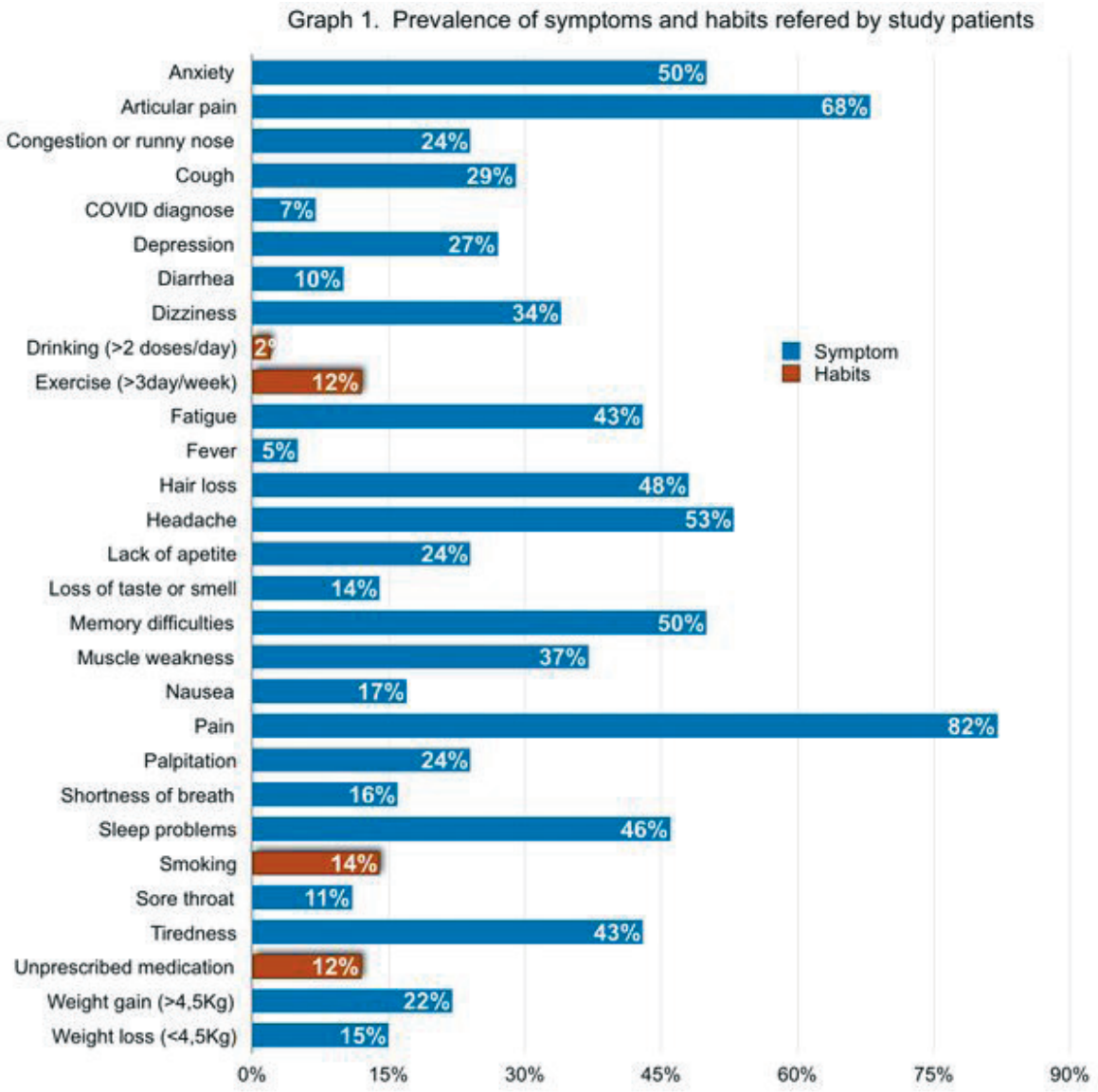
**Background and aims**: The COVID-19 pandemic accelerated the use telemedicine for rheumatologic patients. Patient reported outcomes (PRO) can provide prioritization criteria for the form of face-to-face care in situations of social restriction, and optimization of early care by identifying high-risk patients. Our aim was to demonstrate the prevalence of symptoms during this period for rheumatoid arthritis (RA) patients.

**Methods**: Patients with RA according to 2010 ACR/EULAR and access to digital platforms were enrolled in the study, from January to august 2021. A weblink was sent to a PRO elaborated in electronic platform. The study was approved by the ethics committee of Hospital de Clínicas de Porto Alegre – Brazil and all patients agreed with a Term of Informed Consent.

**Results**: A total of 129 RA patients completed the PRO, mean age was 60 years (S.D. 14) and 83% were female. The mean DAS28, SDAI and HAQ were 3.8 (S.D. 1.6), 14.2 (S.D. 11.0) and 1.2 (S.D. 0.7). Nearly 50% reported anxiety and 27% depression. Pain (VAS ≥ 5) was a common symptom for 82% of patients, followed by articular pain (68%), headache (53%), memory difficulties (50%), sleep problems (46%), fatigue (43%), muscle weakness (37%) and weight gain (22%). Only 16 patients were physically active and 104 sedentary in the last 6 months of response. Markedly, 14 patients reported a fall or fracture in the same period.




**Conclusions**: Maintaining PRO is aligned with patient-centered care, allowing relevant data source and identification of high-risk patients - in our study: patients in pain, sedentary and in major risk of fracture.

## Abstract no.: 776

### DEVELOPMENT AND FEASIBILITY TESTING OF A WEB BASED SELF-MANAGEMENT INTERVENTION FOR NURSES WITH LOW BACK PAIN: A MIXED METHOD STUDY

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**Background and aims**: Nurses have a higher prevalence of low back pain (LBP) than other occupations globally; this is associated with decreased job productivity, greater work absence and functional limitations. Digital interventions have demonstrated efficacy in supporting self-management for patients with LBP and improvements in self-reported outcome measures . A theoretically informed web-based intervention programme was designed and tested for a nursing population in the Kingdom of Saudi Arabia (KSA). The purpose of this study is to test the feasibility and acceptability of a web-based intervention programme for the self-management of LBP (WBI-BACK) among a nursing population in the KSA.

**Methods**: A convergent parallel mixed method research (MMR), feasibility study design. Primary outcomes included the feasibility of the study design, recruitment rate, methods, and delivery of the WBI-BACK programme. Secondary outcomes involved exploratory analysis of LBP-related measures including pain, disability, quality of life, physical activity, and exercise self-efficacy.

**Results**: Fifty-three nurses (35 participants with LBP and 18 participants without LBP) were recruited. Thematic analysis of the interview data revealed four themes (nurses' perception of usability of WBI-BACK , nurses' perceptions on potential WBI-BACK usefulness , nurses' engagement with WBI-BACK and nurses attitudes towards the WBI-BACK ) relating to the necessary features of WBI-BACK programme to be used successfully with the nurses. Nurses with LBP improved significantly in their physical functioning and moderated physical activity exercise after WBI-BACK intervention while there were no significant differences on other secondary measures.

**Conclusions**: The WBI-BACK programme is feasible and acceptable to be delivered for nurses in KSA.

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## Abstract no.: 1154

### A SMART-PHONE BASED TREATMENT CAN HELP IMPROVE PAIN SEVERITY, ANXIETY AND DEPRESSIVE SYMPTOMS IN ADULTS WITH FIBROMYALGIA: A PILOT STUDY

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**Background and aims**: Fibromyalgia is a common condition associated with widespread pain that diminishes quality of life. Fibromyalgia treatment is complex, and is not always accessible to those who could benefit. Mobile applications are increasingly being used to facilitate treatment for individuals with chronic conditions such as fibromyalgia. The aim of this study was to conduct a preliminary evaluation of Fibroline®, a mobile app-delivered, Cognitive Behavioral Treatment (CBT)-based psychosocial intervention, in helping adults to self-manage fibromyalgia symptoms.

**Methods**: A total of 111 adults with fibromyalgia (*M [SD]*age = 49.81, *[9.99*] years; 94% women) were given access to the app 47-day digital treatment program. Pain severity, anxiety and depression symptoms, fatigue, and sleep quality were assessed at pre-treatment, post-treatment, and 3-months follow-up.

**Results**: One hundred of the enrolled participants downloaded and used the app, and 53 completed the treatment. Data showed significant improvements in pain severity ($P$=0.007, $d$=0.43), anxiety ($P$=0.011, $d$=0.40) and depressive symptoms ($P$=0.001, $d$=0.50) from pre-treatment to post-treatment. The effect sizes associated with app use are consistent with improvements seen in previously published clinical trials of CBT for fibromyalgia. Improvements were generally maintained at 3-month follow-up, although there was some decrease in the observed improvements. Most participants reported that they were very satisfied with the app.

**Conclusions**: The use of the app was associated with similar levels of improvements found with in-person CBT treatment for fibromyalgia. Future research to evaluate the effectiveness of the app in a controlled trial is warranted.

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# Pain Therapies - Interventional blockade therapies

## Abstract no.: 290

### RECTUS SHEATH BLOCK FOR LAPAROSCOPIC SURGERY

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**Background and aims**: Rectus sheath blocks (RSBs) can be utilised for minor laparoscopic surgery below umbilicus, to help with analgesia post operatively. The primary aim of this study was to establish if RSBs reduce opioid use when used for this indication and aimed to establish if nausea and vomiting improved with RSB, which was the secondary aim.

**Methods**: A prospective study looking at 48 patients having simple elective/ emergency uncomplicated laparoscopic surgery. 24 patients were managed without RSBs and 18 with RSBs- 6 were not included in analysis due to chronic pain, incomplete

data or surgery being converted to open. Oral morphine equivalent (OME) requirements were noted during surgery, in recovery and on the ward for 24 hours post-operatively, along with patient reported pain scores and incidences of nausea and vomiting.

**Results**: Average intra-operative morphine use was reduced by 62% with RSBs from an OME of 27.36mg to 10.43mg. OME in recovery was reduced by 84% (12.27mg- 1.88mg) in patients with RSBs and there was also a marginal reduction in opioid use on the ward by 3% (13.67mg- 12.88mg). The reduction in opioid use also reflected in improvement in pain scores post operatively from an average of 4.23 down to 2.3 with the RSB cohort. There was also a reduction in nausea and vomiting reported from an incidence of 12% to 6%.

**Conclusions**: Patients who had RSBs performed intra-operatively reported less pain; along with this they also required less opioid both intra-operatively and in the following 24 hours. These patients also reported less nausea and vomiting.

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## Abstract no.: 575

### FAILURE TO CHECK REGIONAL BLOCKADE, A PAINFUL PROBLEM

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**Background and aims**: Whilst there is no clear national guidance or agreement regarding the correct method of checking regional blockade prior to knife to skin for Caesarean section, there is sufficient evidence to show that sensation should be assessed to both light touch and cold. Complaints of pain following assessment in just one of these modalities is difficult to defend.

**Methods**: 50 anaesthetic charts reviewed following regional blockade for obstetric intervention over a 5 week period. The level of block to light touch and cold were noted to see if they were at T5 and T4 respectively, those not achieving this should have documentation detailing why it was decided to proceed. It was also noted if there was any discomfort reported, if any IV analgesia was given or if the case was converted to GA due to pain.

**Results**: Less than half of patients (48%) had their block checked with ethyl chloride and light touch, with core trainees being the most diligent at checking blocks. 4 patients experienced discomfort requiring alfentanil and 2 cases were converted to GA. Only one of these were correctly identified as having a potentially inadequate block prior to knife to skin. Half of these cases were not checked to the above recommendations, missing an opportunity to potentially reduce patient pain.

**Conclusions**: After identifying that blocks aren't sufficiently checked at our hospital we are educating the department to refresh knowledge around this issue and improve patient experience and care.

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## Abstract no.: 1024

### EFFECT OF TRANSVERSUS ABDOMINIS PLANE BLOCK WITH BUPRENORPHINE ON POSTOERATIVE PAIN AND WOUND HYPERALGESIA AFTER INGUINAL HERNIA REPAIR

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**Background and aims**: Transversus abdominis plane (TAP) block is an effective regional anesthetic technique to manage postherniorapy pain. Addition of adjuvants with antihyperalgesic effect not only prolongs the analgesia but may also reduce the wound hyperalgesia, a factor contributing to severe acute postoperative pain & later chronic pain. We hypothesized that the addition of buprenorphine to TAP block will exert antihyperalgesic effect along with its analgesic effects.

**Methods**: Sixty male patients were randomly allocated into 2 groups to receive TAP block after inguinal hernia repair (IHR). Group B (20ml of .25% bupivacaine); Group BB (20ml 0f .25% bupivacaine + 300 mcg of buprenorphine). Duration of analgesia (DOA), quality of analgesia, analgesic consumption up to 48 hrs and wound hyperalgesia index (WHI) at 24 & 48 hrs were studied.

**Results**: WHI at 24hrs [1.18(0.39) vs 0.08(0.05)] & 48 hrs [ 0.99(0.33) vs 0.05(0.03)] [median (IQR)] were significantly differentbetween group B & BB. DOA was significantly prolonged in group BB than B (871.37 vs 390. 9 min). Tramadol consumption up to 48hrs was significantly reduced in group BB than group B (461.9 vs 634.1 mg). Except at 48hrs, the median pain scores were significantly better at 6, 12 & 24hrs both at rest and at sitting in group BB than B.

**Conclusions**: Present study shows that the addition of buprenorphine to TAP block after inguinal hernia repair not only provides superior postoperative analgesia but also lowers the extent of wound hyperalgesia without any significant side effects.

# Pain Therapies - Multidisciplinary programs

## Abstract no.: 566

### THROWING THE BABY OUT WITH THE VIRTUAL BATHWATER! COMPARING IN-PERSON VERSUS VIRTUAL PAIN MANAGEMENT PROGRAMMES IN AN ACUTE IRISH HOSPITAL

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**Background and aims**: Evidence base well established for intensive, three-week, in-person, psychologically-based pain rehabilitation groups, delivered by dedicated interdisciplinary teams (British Pain Society, 2021). St. Vincent's University Hospital specialises in multidisciplinary treatment of chronic pain and Cognitive-Behavioural Pain Management Programmes (CBT-PMP's). Previous audits of outcomes validated it's efficacy and indicated biopsychosocial improvements. Challenged to change by Covid-19, a ten-day computer-assisted Virtual Pain Management Programme (VPMP) with 6-week review was developed utilising technology such as online WebEx platform. Positive Psychology informed content. Physio App supported adherence. Aims include establishing best practice and guidelines by comparing Virtual and In-person Pain Management Programme audits.

**Methods**: St. Vincent's Clinical Audit Committee ethically approved CBT-PMP and VPMP audits. Both historical in-person and ongoing virtual evaluations utilise quantitative and qualitative, pre-post intervention methods, and similar psychometric tools such as British Pain Society Rating Scales of pain intensity, distress and activities interference; Oswestry and Bespoke Pain Patient Experiences Questionnaires.

**Results**: Comparisons focussed on feasibility, usefulness, patient improvements and experience of both approaches. Audits indicated both in-person and virtual approaches beneficial and satisfactory to patients.

**Conclusions**: Traditional inclusion barriers removed and access enhanced particularly for patients with disabling co-morbidities using telehealth/ telepsychology. However, mental health gains and peer-to-peer support enjoyed by in-person groups. Embracing digitalisation for the benefit of chronic pain patients is core to Specialist Pain Medicine teams future directions. For best of both worlds, blending aspects of both in-person and virtual into a Hybrid Pain Management Programme approach recommended.

## Abstract no.: 577

### WITHDRAWAL FROM CHRONIC OPIOID USE FOR NON-CANCER PAIN: RESULTS OF A TWO-PHASE INPATIENT PROGRAM

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**Background and aims**: Opioid withdrawal in long-term opioid use for chronic pain is a challenge. We assessed the success rate in a cohort of patients undergoing a new two-phase inpatient opioid withdrawal program from 2018 to 2020.

**Methods**: Patients were eligible if they had been using opioid medication for >6 months. Phase 1 of the program included opioid withdrawal on an internal medicine ward. We rotated opioid medications to oral morphine and then tapered stepwise over 10 days. Phase 2 consisted of a 3-week inpatient multimodal pain therapy on a psychosomatic ward. The primary outcome was the number of opioid-free patients upon completion of the program. Secondary outcomes included the number of patients who were opioid-free 3 months after completion of the program, and change in pain level on a numeric rating scale (NRS 0 to 10) when compared to the start of the program.

**Results**: Among 30 patients included in the cohort 28 patients (93%) successfully stopped using opioids after completion of the program. Follow-up information after 3 months was available for 25 patients, 22 of whom were opioid free (88%). Of those, 15 reported pain reduction (decrease in NRS -1 to -9 points) and 4 reported pain increase (increase in NRS +1 to +5 points) 3 months after completing the program.

**Conclusions**: After completing a two-phase inpatient opioid withdrawal program the majority of patients remained without opioids up to 3 months. More importantly, a substantial proportion of patients reported an improvement of their pain after opioid discontinuation.

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## Abstract no.: 678

### ONE-YEAR FOLLOW-UP OF A CASE MANAGER-LED MULTIMODAL PAIN INTERVENTION IN PRIMARY CARE

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**Background and aims**: Unimodal pain rehabilitation in primary care (PC) is the standard treatment for patients with chronic pain in Finland. The aim of this pilot study was to evaluate the effects of a case manager (CM)-led multimodal pain rehabilitation intervention (MMR) for patients with chronic pain in a Finnish PC-centre. Further, the aim was to explore variables associated with change in health care utilization (HCU) one-year before and after intervention.

**Methods**: 36 patients with chronic pain, without access to occupational health care and a score > 50 points on the Örebro musculoskeletal pain screening questionnaire, thus at risk of work disability, were consecutively recruited. They were offered a CM-led MMR consisting of a team assessment, a rehabilitation plan and CM follow-up. Data at entrance and one-year after was collected with a comprehensive questionnaire including pain intensity, function, coping, health-related quality of life (HRQoL) and work-related factors. HCU-data one-year before and after intervention was analysed with multiple regression analysis.

**Results**: Pain intensity was significantly reduced (p=0.023, ES 0.55). The participants also reported significant improvements in HRQoL (p=0.009, ES 0.63), work satisfaction (p=0.011, ES 0.42) and self-reported work ability (p=0.001, ES 0.41). The use of psychologist and psychiatric nurse services as well as reduced use of PC- and rehabilitation physicians were factors associated with decreased HCU at one-year follow-up.

**Conclusions**: CM-led MMR and reorganization of existing PC-resources for patients with chronic pain resulted in increased psycho-social wellbeing. Early psychological intervention for patients with chronic pain was associated with decreased health care utilization.

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## Abstract no.: 773

### A COMBINATION OF ELECTROTHERAPY AND EXERCISE-BASED PHYSIOTHERAPY PROGRAM COULD IMPROVE QUADRICEPS MUSCLE WEAKNESS, ADHERENCE TO EXERCISES AND REDUCE REPETITIVE INTRA-ARTICULAR CORTICOSTEROID INJECTIONS IN KNEE OSTEOARTHRITIS

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**Background and aims**: A recent RCT revealed a structured physiotherapy program (a combination of hands-on treatment and exercise-based physiotherapy) as a better alternative than intra-articular corticosteroids (IACs) in the treatment of knee osteoarthritis (OA). Likewise, combining the quadriceps neuromuscular electrical stimulation (NMES) with exercise could optimize the muscle weakness and exercise adherence along with reducing the risk of repetitive IACs, which is the aim of our study.

**Methods**: Forty-one ASA 1-3 in-hospital patients, aged ≥ 42, treated for symptomatic chronic knee OA with or without IACs followed by quadriceps NMES with strengthening exercises were examined retrospectively. Patients with IACs (Group A, n=17) and without IACS (Group B, n=24) received a structured physiotherapy program implemented twice-a-year (at 6-month intervals). NMES was applied sequentially to each of the four quadriceps' heads (frequency 50 Hz, pulse duration 1 ms, on:off ratio 1:2, 30 contractions followed by exercise, sessions frequency 5d/wk, 3 wk). The exercises continued to be applied individually after discharge. The adherence to physiotherapy program and IACs consumption were checked at

6-month and 1-year visits. Data regarding demographics, ASA and CCI scores, Kellgren-Lawrence grade, and inflammatory variables were collected as well.

**Results**: The only between group differences were increased baseline effusions in Group A (p=0.035). The whole-group comparison revealed all 41 patients to receive physiotherapy again at 6-month visits, of them 7 still needed repetitive IACs (p=0.017), and only two dropouts at 12-month visits.

**Conclusions**: The implementation of a structured physiotherapy program utilizing quadriceps NMES with exercise improve adherence to the program and reduce the need of repetitive IACs.

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## Abstract no.: 810

### MIGRAINE AND MULTIDIMENSIONAL SLEEP DISTURBANCE: A CASE OF A COMPLEX OVERLAP SUCCESSFULLY MANAGED WITH A MANDIBULAR ADVANCEMENT DEVICE

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**Background and aims**: Relationship between sleep and pain modulation is well known and involve some important feedback loops between pain and sleep modulatory mechanisms, but also, circadian timing system and neuroimmune system. Such interaction leads to a common overlap between painful conditions and common factors inducing inadequate sleep resulting in nighttime complaints as well as in diurnal consequences which highly impact the quality of life and health. We present a case of an overlap condition between migraine and a multidimensional sleep disturbance with significant consequences and which was successfully managed with a mandibular advancement device (MAD).

**Methods**: We report a case of a patient with a multidimensional sleep disturbance (i.e insomnia, obstructive sleep apnea and increased activation of masticatory movements during sleep) which also presented with a history of migraine for more than 5 years.

**Results**: A female patient, 52 years old, complaining from poor sleep and frequent awakenings during the night and reporting a persistent rather intermittent episodes of headache for more than 5 years was diagnosed with comorbid insomnia and sleep apnea. Either validated questionnaires and polysomnographic parameters confirmed difficulty on sleep maintenance and sleep related respiratory disturbance. Additionally patient reported sporadic teeth clenching during nightime. Patients was indicated for a MAD therapy which resulted in a general improvement.

**Conclusions**: Sleep and chronic pain overlap conditions have an important impact on health and wellbeing. Adequate assessment and management of SDB may significantly improve both the multidimensional sleep problems (i.e insomnia and sleep related movement disorder) as well chronic pain syndrome (I.e migraine).

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## Abstract no.: 963

### CATASTROPHIZING AS PROGNOSTIC FACTOR FOR PAIN AND PHYSICAL FUNCTION IN THE MULTIDISCIPLINARY REHABILITATION OF FIBROMYALGIA AND LOW BACK PAIN

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**Background and aims**: Quantitative data on longitudinal associations between catastrophizing and pain or physical function are patchy. The study aimed to quantify the prognostic value of catastrophizing for pain and function in fibromyalgia and low back pain before and after rehabilitation.

**Methods**: Patients were assessed before (baseline) and after participation in the Zurzach Interdisciplinary Pain (Schmerz) Program (ZISP), a comprehensive interdisciplinary inpatient rehabilitation program. The associations of state and change on the Multidimensional Pain Inventory (MPI) Pain severity scale, the Short Form 36 (SF-36) Physical functioning scale, and the Six-Minute Walking Distance (6MWD) with the Coping Strategies Questionnaire (CSQ) Catastrophizing scale in both conditions were quantified by multiple regression modeling and compared.

**Results**: Sex- and age matched cohorts (n=71 each) were compared. Pain and catastrophizing was worse in fibromyalgia than in low back pain, whereas the function levels were comparable. Baseline catastrophizing predicted pain change by adjusted correlations of 0.552 (fibromyalgia) and 0.450 (low back pain), self-rated function by 0.403 and 0.308, and the 6MWD by 0.270 and –0.072. The change in catastrophizing was associated to the change in pain by 0.440 (fibromyalgia) and 0.614 (low back pain), self-rated function by 0.122 and 0.465, and the 6MWD by 0.186 and 0.162.

**Conclusions**: Catastrophizing was a potential prognostic factor, especially for pain, somewhat less for self-rated physical function but little for the walking distance in both conditions, independently of potential confounders as sex, age, baseline severity and others. Adaptive pain coping may relieve pain and increase function in both conditions.

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## Abstract no.: 1001

### INTERDISCIPLINARY MULTIMODAL OUTPATIENT PAIN MANAGEMENT PROGRAMS AS A SUBSTITUTE FOR SPINE SURGERY. RESULTS OF 4415 PATIENTS WITH DIFFICULT TO TREAT (LOW) BACK PAIN IN GERMANY

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**Background and aims**: Spinal surgery is frequently offered to patients with (low) back pain [(L)BP] refractory to nonsurgical pain management, however, often rejected by second opinion (2ndOp) which recommend patients to participate alternatively in interdisciplinary multimodal outpatient pain management programs (IMOP).

**Methods**: Descriptive data evaluation of an IMOP realized in 4415 (L)BP patients (50.7±13.8 yrs., 61% female) for whom 2ndOp recommended conservative treatment. IMOP has been developed by IMC, an interdisciplinary network of 34 German pain centers, and consisted of a individualized multimodal treatment concept with medical, physio- and psychotherapeutic components, performed as low/high-intensity course over three months/weeks (n=424/3991). IMOP was free of charge for patients and financed by various statutory health insurance companies in Germany within the framework of an integrated care contract according to §§ 140a-d Social Code V.

**Results**: Until end of the IMOP, average 24-hr. pain intensity (PIX: 26.3±18.4 vs. 48.9±16.5; ≥MCID/50%: 54.3/49.0%) and pain-related disabilities (mPDI: 29.8±21.7 vs. 53.1±20.9; ≥MCID/50%: 54.1/47.3%) improved significantly vs. baseline (BL), as well as physical (VR12-PCS: 41.6±9.5 vs. 30.4±9.3) and mental (VR12-MCS: 45.7±10.2 vs. 39.4±11.8) quality-of-life, and pain self-efficacy (FESS: 44.5± 10.5 vs. 29.7± 13.4); patients' work-related behavioral health risks (AVEM) improved in 68.6% and percentages of patients with normal/minor depression/anxiety/stress scores increased from 57.1/70.2/60.2% at BL to 77.1/90.0/88.5% at end of IMOP (each $p<0.001$). In parallel, patients´ need for background and rescue pain medications (89.1/17.4%) decreased significantly vs. BL (100/47.5%).

**Conclusions**: IMOPs are efficacious non-surgical alternatives for (L)BP patients for whom spinal surgery was rejected by 2ndOP.

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## Abstract no.: 1022

### PATIENT QUALITY OF LIFE OUTCOMES FOR AN ADAPTED ONLINE PAIN MANAGEMENT PROGRAMME COMPARED TO FACE TO FACE

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**Background and aims**: The Covid 19 pandemic has created the impetus to develop alternative ways of delivering our pain management programmes (PMPs). We adapted our face to face programme (F2F PMP), and designed a fully interactive, clinician led, online programme (OPMP).We compared the outcome of our new OPMP, with our pre-pandemic (F2F) PMP.

**Methods**: Patients were >18 years old and assessed by the multidisciplinary team for suitability prior to attending F2F PMP (n=177) and OPMP (n=60). Patients unsuitable for OPMP may have been placed on a waiting list for F2F or discharged. Data were collected at pre-treatment baseline and post-treatment reassessment. Outcomes measures comprised: pain intensity, pain distress, pain catastrophizing, depression, pain self-efficacy, occupational performance and physical functioning.

**Results**: Patients accessing online groups were generally younger and more likely to be employed than the F2F population. The outcomes for the OPMP surpassed accepted benchmarks for effect size across all domains (Fenton & Morley, 2013). More online patients described a clinically significant reduction of their pain distress, and pain intensity. The F2F PMP outperformed the OPMP for pain catastrophizing reduction, improving self-efficacy and reduced depression.

**Conclusions**: These results suggest that our OPMP is an effective treatment; and comparable, in this study, to our F2F PMP. However OPMP patients were both self-selected and clinician selected, and the group demographics were different. We consider that this fully interactive OPMP is an effective treatment for younger, less complex, more motivated, chronic pain patients.

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## Abstract no.: 1058

### STANDARDISED AND OPTIMISED ANALGESIA FOR LOWER LIMB AMPUTATION PATIENTS

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**Background and aims**: Amputation is associated with significant pain which can be difficult to manage. Sub-optimal analgesia in the peri-operative period is associated with patient distress and chronic pain syndromes.

Areas of intended improvement included:

Use of Gabapentin and Amitriptyline

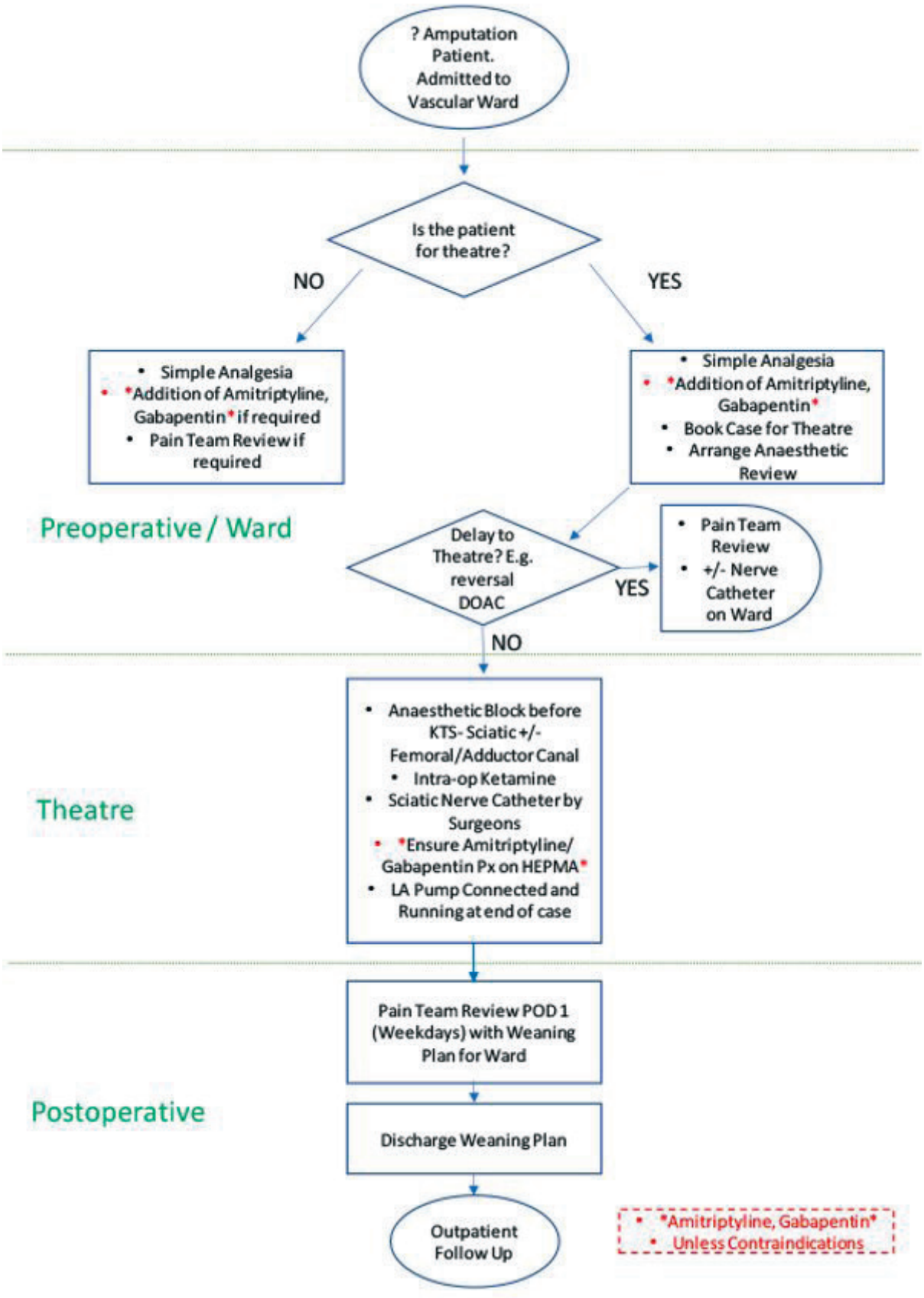
Regional blockade (Sciatic & Femoral nerve) prior to knife to skin

Sciatic nerve catheter postoperatively

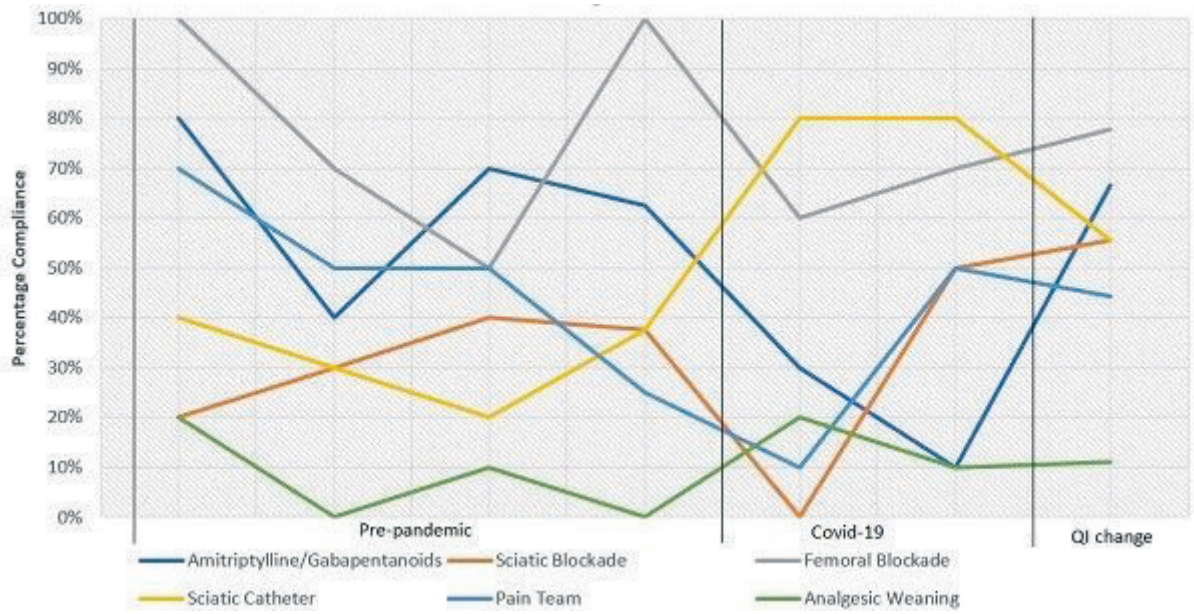
Paint team review and analgesic weaning plan

**Methods**: A multi-disciplinary quality improvement (QI) team was established including anaesthetic doctors, pain and specialist vascular nurses. We created a patient process map and utilised this to create our process measures.

Run charts were utilised to gather our baseline data (established from pre-pandemic data and two covid-19 points), furthermore they would be used to assess our ongoing changes/improvements. We produced a "patient care pathway checklist" to be used with every potential amputation patient that also functioned as a data collection tool. We developed a generic analgesic weaning plan letter for distribution to GPs on hospital discharge.




**Results**: Our initial results demonstrate that although we have shown an improvement in intraoperative care, more focus is required on pre and post-operative care.




**Conclusions**: This highlights the importance of staff "buy in" of a project and human factors. It is likely that our first attempt had a lack of instruction for ward based staff and surgeons. Our next QI change will focus on education and promotion of the pathway with these staff.

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## Abstract no.: 1078

### BRIEF INTERPROFESSIONAL INTERVENTION FOR CHRONIC PAIN MANAGEMENT: PILOT STUDY

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**Background and aims**: Chronic pain causes negative impact on quality of life and requires interprofessional attention. The aim of this study is to test the effects of a brief interprofessional intervention and to assess the correlation between disability and self-efficacy, pain, fatigue and depressive symptoms.

**Methods**: Quasi-experimental pilot study. The brief interprofessional intervention had a psychoeducational focus and was based on the Self-Efficacy Theory and Cognitive-Behavioral Therapy strategies. The purpose of the intervention was to improve the management of chronic pain. Conducted in a group, over six weeks, with a two-hour weekly meeting, it includes educational strategies, stretching and relaxation techniques. Self-efficacy, pain intensity, disability, fatigue and depressive symptoms were assessed. Data were analyzed using the paired t-test and Pearson's correlation.

**Results**: Adults with moderate to severe pain participated in the study. Between 48 eligible patients, 25 began the program and 15 completed .The recommendation adherence rate was good for stretching (100%) and relaxation technique (73.3%), moderate to walking (53.3%). Post-intervention analysis showed significant increase in self-efficacy ($p=0.004$) and significant decrease in pain intensity ($p=0.024$), disability ($p=0.012$), fatigue ($p=0.001$) and depressive symptoms ($p=0.042$). Correlations between disability and other variables showed moderate negative correlation between disability and self-efficacy ($r=-0.601$; $p<0.001$) and moderate positive correlations between disability and fatigue ($r=0.603$; $p<0.001$) and disability and depressive symptoms ($r=0.545$; $p<0.001$). There was no significant correlation between disability and pain intensity.

**Conclusions**: The effects of brief interprofessional intervention were positive for chronic pain management. Studies with more robust designs and a larger sample are suggested to confirm these findings.

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## Abstract no.: 1103

### PAIN AND DEPRESSION: AN UPDATE ON THE RELATIONSHIP AND THE TREATMENTS AVAILABLE

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**Background and aims**: The co-occurrence of pain and depression is frequent and can lead to impaired functioning, lower treatment response and limited treatment options. Through a brief review we aim to address new evidence on the relationship between pain and depression as well as the current treatments available.

**Methods**: We conducted a qualitative review about the topic, using PubMed database. MeSH terms used: “pain”; “depressive disorder”, “depression”, “chronic pain”.

**Results**: Studies have shown consistent overlap between pain and depression. These include neurobiological mechanisms, neuropathic pathways and brain regions that are also involved in mood management and pain regulation. A bidirectional relationship between pain and depression has been proposed, in which one is a risk factor for the other and vice versa. They also affect each other in terms of recovery time and symptom duration, suggesting a synchronicity in symptom severity. Thus, they should be addressed simultaneously. Antidepressants, some antipsychotics and opioid partial agonist-antagonists have been used to treat pain with comorbid depression. Recently ketamine and cannabinoids have also been considered promising approaches. Additionally, intensive short-term dynamic psychotherapy, cognitive-behavioural therapy and mindfulness-based therapies have proven to reduce depression and pain symptoms, therefore they may be options to consider.

**Conclusions**: The management of co-occurring pain and depression should be part of the overall pain management, with special attention to the mental health and social conditions of the patient. Further investigations are necessary to understand the distinct relationship between pain and depression in order to provide proper recommendations and address treatment efficacy.

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# Pain Therapies - Neuromodulative therapies

## Abstract no.: 349

### COMBO RCT: TWO-YEAR OUTCOMES OF AN SCS SYSTEM CAPABLE OF SIMULTANEOUS DELIVERY OF MULTIPLE MODALITIES

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**Background and aims**: Positive outcomes with dual use of sub- and supra-perception-based neurostimulative modalities (i.e. combination therapy) in patients implanted with a Spinal Cord Stimulation (SCS) device have now been recently reported. Here, we report long-term outcomes out to 2-years follow-up derived from a prospective, randomized controlled trial (RCT) evaluating use of SCS-based combination therapy for chronic pain.

**Methods**: COMBO is a prospective, multicenter, RCT with an adaptive design (clinicaltrials.gov: NCT03689920) where participants received an SCS System capable of multiple neurostimulation modalities (Spectra WaveWriter, Boston Scientific). Subjects were randomized to receive combination therapy (paresthesia-based and a sub-perception-based customized field shape algorithm) or monotherapy (paresthesia-based SCS only) for 3-months.The primary endpoint was proportion with ≥50%reduction from baseline in overall pain and no opioid increase at 3-months. Assessments of pain, quality-of-life, disability were collected up to 2-years follow-up. Adverse events are also collected.

**Results**: The study achieved its primary endpoint (n = 89, $p<0.001$) on basis of an 88% responder rate with no increase in opioids (71% in monotherapy control group), along with significant improvement in disability and satisfaction in combination

therapy group at 3-months (versus control). At 1-year follow-up, an 84% responder rate was reported. Furthermore, significant improvement in disability (22-point ODI improvement) and satisfaction was sustained (87%). Data describing outcomes out to 2-years follow-up will be presented.

**Conclusions**: These primary endpoint and 1-year follow-up results provide evidence supporting the postulate that providing multimodal therapy, via application of patient-specific neurostimulation field configurations that utilize sub- and supra-perception SCS techniques in combination, can produce highly effective clinical outcomes.

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## Abstract no.: 673

### IMPROVED PAIN AND CARDIOVASCULAR FUNCTION AFTER OCCLUSAL SPLINT FOR SLEEP BRUXISM CONTROL

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**Background and aims**: The aim of this study was to access wether occlusal splints for sleep bruxism control in patients with painful temporomandibular disorder (TMDp) would contribute to improve cardiovascular function as measured by cardiac autonomic function modulation.

**Methods**: From thirteen consecutive patients with a mean age of 39.0 ±9.6, Sleep Bruxism was clinically diagnosed and Temporomandibular disorder (TMD) was evaluated according to research diagnostic criteria (RDC). The presence of masseter, temporalis, cervical pain and headache was scored according to the frequency of the symptoms as never (0), rarely (1), sometimes (2), or often (3). Visual Analogue Scale was additionally used to assess intensity pain level. All patients received a rigid, flat occlusal splint (OS), with 3mm thickness. Heart rate variability (HRV) was accessed and analized by rythmography. TMD symptoms and HRV were evaluated prior and after 3 months of treatment.

**Results**: All patients presented painful TMD at initial examination, which decreased after 3 month of OS use (8 to 3 according do VAS for pain). The time-domain parameter improved from 833,01±104,16 to 912,30±116,90 ($p<0,01$). The frequency–domain parameter for parasympathetic activity was significant for both Fast Fourrier Transform ( 654±154,65 to 1269,70±198,65 ) and Wavelet (781,89±285,1 to 1219,72±245,6) spectral method.

**Conclusions**: In this preliminary clinical setting, occlusal splint for bruxism control showed to improve cardiac autonomic modulation, as reflected by changes in heart rate variability. These results seem to reinforce the hypothesis of a link between sleep bruxism and cardiovascular dysfunction in a cause-effect relationship which need further confirmation.

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## Abstract no.: 1021

### RADIOFREQUENCY DENERVATION OF SACROILIAC JOINT AS PAIN GENERATOR TREATMENT FOR LOW BACK PAIN: OUR EXPERIENCE

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**Background and aims**: In 15-20% of Low Back Pain (LBP) Sacroiliac Joint (SJ) is considered as pain generator.

Radiofrequency Denervation (RFD) is indicated for SJ pain refractory to conventional treatments as drugs, corticosteroid infiltrations or physical therapy.

The aim of our study was to evaluate the efficacy of RFD for SJ in LBP.

**Methods**: We considered patients with chronic LBP with SJ as pain generator refractory to conservative treatments and low benefit three months after ultrasound-guided infiltration of the SJ.

We included 17 patients with positive local anesthetic block test.

Outcomes were NRS pain scores before and after 1, 3 and 6 months RFD and post-treatment discontinuation of opioids.

The statistical test used was the Wilcoxon signed-rank test.

Thermolesion was carried out by conventional monopolar radiofrequency with three lesions on the side of the S1 foramen,

three lesions on S2, two lesions on S3 and one lesion respectively on L4 and L5 medial branches.

**Results**: Severe pain (NRS 10) was described by all patients.

Pain scores improved significantly after the procedure at 1, 3 and 6 months with a mean NRS (±STD) respectively of 4,3 (±2,5), 4,4 (±2,4) and 4,7 (±2,4); the difference was significant (p<0,0005) for all three intervals analyzed.

4 of the 10 patients that used opioids chronically prior to treatment have discontinued it after RFD.

**Conclusions**: Sacroiliac Joint RFD is an effective treatment for LBP.

Patients refractory to conservative therapy and infiltrations experience a pain relief up to six months.

Pain control after RFD allows opioid discontinuation or limitation.

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## Abstract no.: 1113

### EVALUATION OF THE EFFICACY OF SACRAL NEUROSTIMULATION IN THE TREATMENT OF REFRACTARY CHRONIC PELVIC PAIN SYNDROME.

M.A. Canos-Verdecho[1], R.M. Izquierdo Aguirre[1], J. Igualada Sevilla[1]

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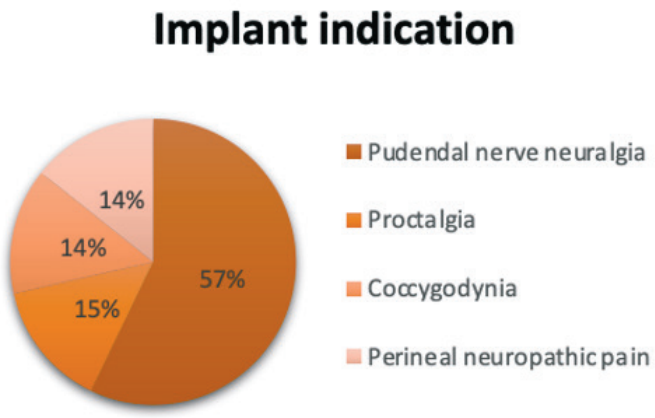
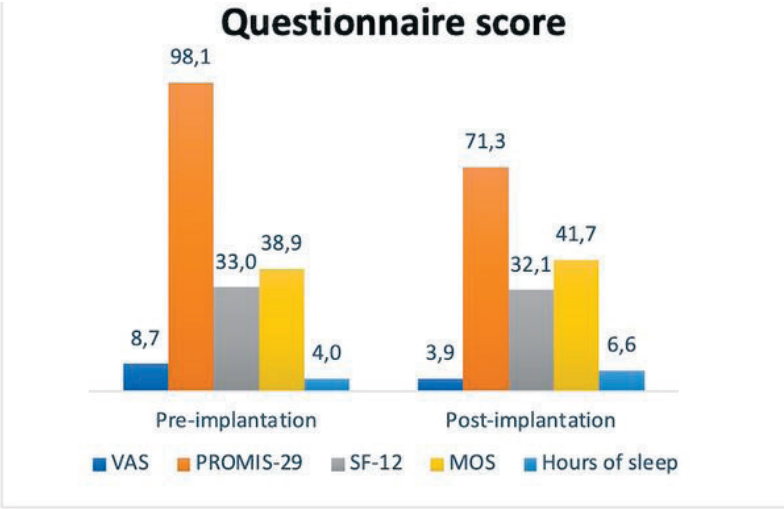
**Background and aims**: Chronic pelvic pain syndrome has a significant impact on the quality of life of people. Sacral root stimulation is a minimally invasive technique. The study evaluates the quality of life of these patients after treatment

**Methods**:




Retrospective study with 7 patients. Indications are included in figure 1. The questionnaires were evaluated: SF12, MOS-SS, PROMIS-29 and VAS. The differences before and after the implant were analyzed using the means, the standard deviation (expressed as M +/- SD) and the interquartile range (IQR). Statistical analysis R-Commander R-project was used.

**Results**:




| | |
|---|---|
| **VAS** | -55,7% |
| **PROMIS-29** | -27,4% |
| **SF-12** | -2,6% |
| **MOS-SS** | +7,3% |
| **•Hours of sleep** | +64,3% |

The mean Pre-I score obtained on the SF-12 was 33 with an IQR of 1.5, and the post-impl score was 32.1 and an IQR of 2; assuming ↓2.6%. Using the MOSS-SS, 38.9 were obtained with an IQR of 14.5 and 41.7 with an IQR of 12.5, respectively, before and after the implants, which represents ↑7.3%. The PROMIS-29 gave us the following results: 98.1 with an IQR of 18.5 Pre-I and 71.3 Post-I and an IQR of 12 with a difference between them of 27.4%. The VAS scale had a Pre-I score of 8.7 with an IQR of 1.5 and a Post-I score of 3.9 with an IQR of 5; represents ↓55.75 % pain. The number of hours of sleep ↑ from 4 with an IQR of 1 point, to 6.6, which represents ↑64.3% (Figure 1, 2). Some complications appeared (Table 2).

**Conclusions**: Although the results confirm improvement after implantation, the need to develop more sensitive instruments and studies with a larger number of patients is suggested.

# Pain Therapies - Palliative care

## Abstract no.: 153

### THE EFFECTIVENESS OF CANNABIS AND CANNABIS DERIVATIVES IN TREATING LOW BACK PAIN IN THE AGED POPULATION

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**Background and aims**: Cannabis is increasingly used in the management of pain, though minimal research exists to support its use since approval. Reduction in stigma has led to a growing interest in pharmaceutical cannabinoids as a possible treatment for lower back pain (LBP). The objective of this study was to assess the role and efficacy of cannabis and its derivatives in the management of LBP and compile global data related to the role of cannabis in the management of LBP in an ageing population.

**Methods**: A systematic review was conducted using predetermined keywords by three independent researchers. Predetermined Inclusion and exclusion criteria were applied and 23 articles were analysied.

**Results**: Studies identified both significant and insignificant impact of cannabis on LBP. Contradicting evidence was noted on the role of cannabis in the management of anxiety and insomnia, two common comorbidities with LBP. Existing literature suggests that cannabis may be used in the management of LBP and comorbid symptoms.

**Conclusions**: Further research is needed to consider cannabis as an independent management option. There is a lack of evidence pertaining to the benefits of cannabis in a geriatric population, and thus additional research is warranted to support its use in the aged.

# Pain Therapies - Pharmacological therapies

## Abstract no.: 158

### PREVALENCE OF NON-PRESCRIBED CODEINE USAGE AMONGST IRISH UNIVERSITY STUDENTS

B. Nolan[1]

*[1]University College Cork, Cork, Ireland*

**Background and aims**: Codeine-based medications in Ireland are available over-the-counter (OTC) with restricted sale (Pharmacy Act 2007). The pattern of Irish student usage of codeine-based analgesics has not been investigated. We hypothesized students using codeine-based products, but not being cognizant of associated risks.

Aims: Assessing levels of student usage and risk awareness of codeine-based medications.

**Methods**: A 24-question web-based cross-sectional survey was designed and e-mailed to registered University College Cork students. Ethical approval was granted by the Social Research Ethics Committee (UCC). The survey explored four main areas: Demographics; Codeine awareness; Level of usage and Risk awareness – addressing legal implications and abuse potential. Codeine self-usage was analysed, and data cross-tabulation was conducted using IBM-SPSS statistics (v26). Chi-square tests were conducted examining strength of association between Codeine self-usage and field of study.

**Results**: 417 respondents (aged 21.5±1.8 years) – 84% aged 18-24 (M:F=108:309).

82% of students were aware of codeine products, with Nurofen Plus and Solpadeine being most recognised. Females showed higher awareness of codeine than males (p=0.02), and medical students more than other University students ($p$<0.001).

1-in-4 participants have used codeine-based medication - 25% for headaches and 10% dysmenorrhoea.

58% were unaware of codeine sale restrictions and 1-in-3 of drug-driving legislation. 90% recognised being under-informed regarding codeine-based medication.

**Conclusions**: Approximately 60% of students were unaware of dependency-related legal implications. 83.5% underestimated the dose of codeine per tablet. Our findings highlight a further need to address the implications of opioid-dependency to prospective careers through student well-being/awareness projects.

## Abstract no.: 379

### ONSET OF EFFECT OF LIQUID PARACETAMOL IN PEDIATRIC PATIENTS

W. Zempsky[1], V. Mossali Dolmen[2], J. Bell[3], P. Kachroo[4], K. Siddiqui[4]

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**Background and aims**: Paracetamol is recommended globally as first-line treatment for mild-moderate pain and fever in children and in some areas may be the only analgesic available. This review aimed to evaluate analgesic and antipyretic onset of action in children (1 month-12 years) for oral liquid paracetamol.

**Methods**: A literature search in PubMed/Embase, Medline and Biosis (until Oct 2021) identified 434 papers; 20 were included in the analgesic and 43 in the antipyretic efficacy data review. Only studies with data on earliest time to onset of action of paracetamol dosed at 10-15 mg/kg were included.

**Results**: One postoperative dental analgesia study (N=51) found statistically significant pain reduction (mean score 6.49±2.77 vs 8.13±3.07, p=0.017), on observation by the researcher, as early as 15 minutes in the paracetamol/ibuprofen (15/5 mg/kg) combination group compared with paracetamol (15 mg/kg) only. Temperature reduction with paracetamol was observed as early as 15 minutes in children across seven published studies (N=695) and three unpublished studies (N=132). At 15 minutes, there was statistically significant decrease from baseline in tympanic temperature (0.20-0.33°C; two studies, N=368) and rectal temperature (-0.19°C; one study, N=40). Three unpublished studies reported mean reduction of 0.13°C from baseline at 15 minutes.

**Conclusions**: Current evidence suggests antipyretic effects of paracetamol may start as early as 15 minutes in children, by up to 0.33°C from baseline (even though not clinically relevant). Similar effects may exist in analgesia, although more studies evaluating paracetamol's earliest time of onset of analgesia may be helpful to evaluate this.

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## Abstract no.: 400

### SAFETY OF VIXOTRIGINE IN IDIOPATHIC OR DIABETES-ASSOCIATED PAINFUL SMALL FIBER NEUROPATHY (SFN): RESULTS FROM A PHASE 2, PLACEBO-CONTROLLED, ENRICHED-ENROLLMENT, RANDOMIZED WITHDRAWAL STUDY (CONVEY)

C.G. Faber[1], N. Attal[2], G. Lauria[3], A. Hajihosseini[4], M. Serenko[4], H. Finnigan[5], C.J. Morris[4], M. Kotecha[4]

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**Background and aims**: Vixotrigine (BIIB074) is a voltage- and use-dependent sodium channel blocker under investigation for the treatment of neuropathic pain. In the CONVEY phase 2 study (NCT03339336) reported here, the safety of vixotrigine was assessed in participants with painful SFN that was either idiopathic or associated with diabetes.

**Methods**: Of 265 adults with painful SFN (biopsy confirmed) who received open-label vixotrigine 350 mg BID for 4 weeks, 123 were randomly assigned (1:1:1) to receive twice-daily vixotrigine 200 mg or 350 mg or placebo for a 12-week double-blind period; 122 participants received ≥1 dose of double-blind treatment.

**Results**: During the open-label period, 41.9% of participants experienced an adverse event (AE), with 24.2% and 15.1% reporting mild or moderate events, respectively. The most common (≥2.5%) AEs were dizziness (9.4%), headache (9.4%), nausea (4.2%), vertigo (4.2%), and fatigue (2.6%). Fourteen participants (5.3%) discontinued open-label vixotrigine due to an AE.

During double-blind treatment, AEs were mostly mild to moderate in all treatment groups; severe AEs were reported by a greater proportion of placebo-treated participants versus vixotrigine-treated participants (**Table**). The most common (≥5%) AEs in either vixotrigine group were fall, nasopharyngitis, muscle spasm, and urinary tract infection (**Table**). A greater proportion of placebo-treated participants (7.3%) discontinued due to an AE compared with those receiving vixotrigine 200 mg (5.0%) or 350 mg BID (0.0%). No signals for abuse potential or withdrawal symptoms were noted during the study.

**Table.** Summary of Safety During Double-Blind Treatment (Safety Population[a])

| Preferred term, n (%) | Placebo BID (n=41) | Vixotrigine 200 mg BID (n=40) | Vixotrigine 350 mg BID (n=41) |
|---|---|---|---|
| Any AE | 25 (61.0) | 19 (47.5) | 18 (43.9) |
| Mild | 13 (31.7) | 10 (25.0) | 10 (24.4) |
| Moderate | 8 (19.5) | 7 (17.5) | 8 (19.5) |
| Severe | 4 (9.8) | 2 (5.0) | 0 |
| SAE | 4 (9.8) | 1 (2.5) | 1 (2.4) |
| Common AEs (≥5.0%) in any treatment group | | | |
| Headache | 5 (12.2) | 1 (2.5) | 1 (2.4) |
| Diarrhea | 4 (9.8) | 1 (2.5) | 2 (4.9) |
| Fall | 0 | 0 | 3 (7.3) |
| Nasopharyngitis | 3 (7.3) | 2 (5.0) | 2 (4.9) |
| Nausea | 3 (7.3) | 0 | 0 |
| Muscle spasms | 1 (2.4) | 2 (5.0) | 1 (2.4) |
| UTI | 3 (7.3) | 2 (5.0) | 0 |

AE, adverse event; BID, twice daily; SAE, serious AE; UTI, urinary tract infection.
[a] All randomized participants who received ≥1 dose of double-blind treatment.

**Conclusions**: Twice-daily vixotrigine (200 and 350 mg) was well tolerated in participants with painful SFN.

## Abstract no.: 467

### EFFICACY OF VIXOTRIGINE IN IDIOPATHIC OR DIABETES-ASSOCIATED PAINFUL SMALL FIBER NEUROPATHY (SFN): RESULTS FROM A PHASE 2 PLACEBO-CONTROLLED ENRICHED-ENROLLMENT RANDOMIZED WITHDRAWAL STUDY (CONVEY)

C.G. Faber[1], N. Attal[2], G. Lauria[3], A. Hajihosseini[4], M. Serenko[4], H. Finnigan[5], C.J. Morris[4], M. Kotecha[4]

*[1]School for Mental Health and Neuroscience, Maastricht UMC, Department of Neurology, Maastricht, Netherlands, [2]Ambroise Paré Hospital, APHP, Boulogne-Billancourt and Université Paris-Saclay, INSERM U 987, Paris, France, [3]3rd Neurology Unit, Fondazione IRCCS Istituto Neurologico 'Carlo Besta' and Department of Biomedical and Clinical Sciences 'Luigi Sacco'. University of Milan, Milan, Italy, [4]Biogen, Cambridge, United States, [5]Biogen, Maidenhead, United Kingdom*

**Background and aims**: No pharmacological treatments are indicated for painful SFN. The CONVEY study evaluated the efficacy of the voltage- and use-dependent sodium channel blocker vixotrigine in treating painful SFN.

**Methods**: Following a 4-week open-label period in which 265 adults with painful SFN received vixotrigine 350 mg BID, 123 participants were randomized (1:1:1) to receive twice-daily vixotrigine 200 mg, 350 mg, or placebo for a 12-week double-blind period. Primary endpoint was change from baseline (CFB) to Week 12 in average daily pain (ADP) score on the 11-point numerical rating scale. Secondary endpoints included proportion of participants with ≥30% CFB in ADP score and Patient Global Impression of Change (PGIC) responders ("much improved" or "very much improved") at Week 12. Predefined $\alpha$ was set at 0.10.

**Results**: At Week 12, a statistically significant difference in least-squares mean CFB in ADP score was observed with vixotrigine 200 mg BID (−0.85; p=0.0501) but not 350 mg BID (−0.17; p=0.6951) versus placebo. The proportion of participants with ≥30% CFB in ADP score at Week 12 was numerically greater with vixotrigine 200 mg BID (72.5%; p=0.1305) and 350 mg BID (68.3%; p=0.1212) versus placebo (52.5%). At Week 12, vixotrigine 350 mg BID resulted in significantly more PGIC responders than placebo (48.8% vs 30.0%; p=0.0580); results with vixotrigine 200 mg BID were similar to placebo (37.5% vs 30.0%; p=0.7376).

**Conclusions**: Vixotrigine 200 mg BID met the primary endpoint. Furthermore, a numerically greater proportion of vixotrigine-treated participants experienced ≥30% CFB in ADP score versus placebo at Week 12.

## Abstract no.: 489

### THE NIH HEAL INITIATIVE PRECLINICAL SCREENING PLATFORM FOR PAIN (PSPP) VALIDATION OF THE MONOIODOACETATE (MIA) MODEL OF OSTEOARTHRITIS PAIN IN THE RAT

S. Woller[1], M. Urban[2], T. Hanania[2], S. Iyengar[1]

*[1]National Institute of Neurological Disorders and Stroke, NIH, Rockville, United States, [2]PsychoGenics Inc., Paramus, United States*

**Background and aims**: The National Institutes of Health Helping to End Addiction Long-term℠ Initiative, or NIH HEAL Initiative℠, Preclinical Screening Platform for Pain (PSPP) aims to accelerate the discovery and development of non-opioid, non-addictive pain therapeutics. PSPP is collaborating with PsychoGenics, Inc. to validate preclinical models and endpoints to enable screening and profiling of assets. Here, we describe the optimization and validation of the rat monoiodoacetate (MIA) model of osteoarthritis pain.

**Methods**: The left hindlimb knee joint of adult male and female Sprague Dawley rats (N=10, each sex) was injected intraarticularly with MIA (0.3 – 3 mg). Tactile sensitivity, weight bearing, gait, and knee pressure were systematically evaluated longitudinally. Pharmacological validation of the model was established using morphine (3 mg/kg), duloxetine (60 mg/kg), and ketoprofen (6 mg/kg) after acute and repeated dosing.

**Results**: Intraarticular injection of MIA produced unilateral hind paw tactile hypersensitivity, changes in gait, and deficits in dynamic weight bearing in both sexes. Female, but not male, rats showed hypersensitivity to pressure and pinch stimuli. Subcutaneous injection of morphine reduced hind paw tactile hypersensitivity and weight bearing deficits in both sexes, whereas acute oral administration of ketoprofen and duloxetine were less effective. In contrast, repeated treatment with ketoprofen or duloxetine (4 days, b.i.d.) significantly reduced tactile hypersensitivity and weight bearing deficits.

**Conclusions**: The results suggest that both tactile sensitivity and dynamic weight bearing in the acute and repeated treatment paradigms of the rat MIA model may be used to identify and differentiate novel therapeutics for treatment of osteoarthritis within the HEAL Initiative's PSPP program.

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## Abstract no.: 514

### PRESCRIPTION PATTERN OF ANALGESICS FOR THE TREATMENT OF MILD TO MODERATE PAIN; A RETROSPECTIVE COHORT STUDY IN DANISH POPULATION

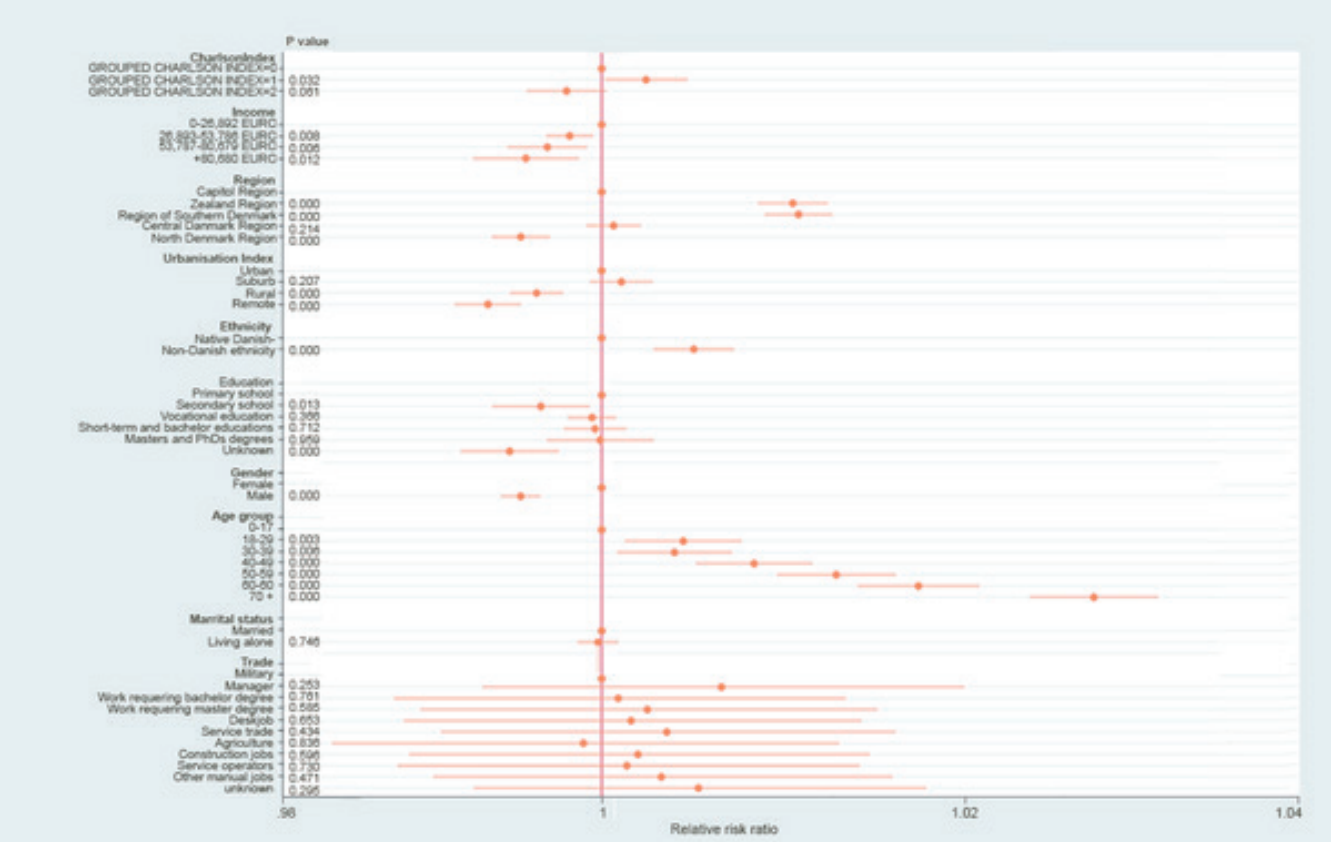
D. Nair[1], E.K. Fredslund[2], M.S. Jensen[2], A.L. Haveric[3]

*[1]GlaxoSmithKline Consumer Healthcare, Stockholm, Sweden, [2]VIVE, Aarhus N, Denmark, [3]GlaxoSmithKline Consumer Healthcare, Lausanne, Switzerland*

**Background and aims**: Excessive and inappropriate prescriptions of analgesics may induce adverse health outcomes in patients with mild-to-moderate pain. Thus, periodic assessment of prescription patterns promotes rational prescribing and quality of pain management. The aim of this study was to investigate the prescription pattern of different analgesics in Danish population.

**Methods**: A retrospective cohort study was conducted using prescription data from Statistics Denmark database. All prescriptions of immediate release paracetamol (IRP), extended release paracetamol (ERP), NSAIDs, opioids and other analgesics for mild to moderate pain were analyzed for the period of 2016 to 2018. User prevalence rates were calculated and stratified by different socio-demographical characteristics. We also used multinomial logistic regression to determine which socio-demographical characteristics are associated with a preferential use of different analgesics, with an emphasis on ERP.

**Results**: Of 221,779 patients, majority were prescribed with NSAIDs (42.14%) followed by IRP (28.94%), opioids (18.46%), ERP (2.12%) and other analgesics (8.33%). After adjustment, multinomial logistic regression analysis revealed that ERPs are significantly more likely to be prescribed in individuals with advanced age, especially females and there are large differences between geographical health care management units (regions) (Figure 1). Individuals with higher socioeconomic status and those living in rural area are less likely to be prescribed with ERP.




**Conclusions**: Prescription pattern of different analgesics varied with socioeconomic status, location and comorbidities. Most individuals with advanced age and moderate comorbidities were prescribed ERP. However, differences in prescription of ERP due to municipal rurality, health management region and gender have no obvious clinical reasons.

## Abstract no.: 600

### COMPARISON OF THE POSTOPERATIVE ANALGESIC EFFECTS OF NEFOPAM AND KETOPROFEN IN FEMALES UNDERGOING CAESAREAN SECTION: A RANDOMIZED CLINICAL TRIAL

J.C. Stephan[1,2,3], C. Nasr[1,3], M. Maroun[4], K. Kamel[3]

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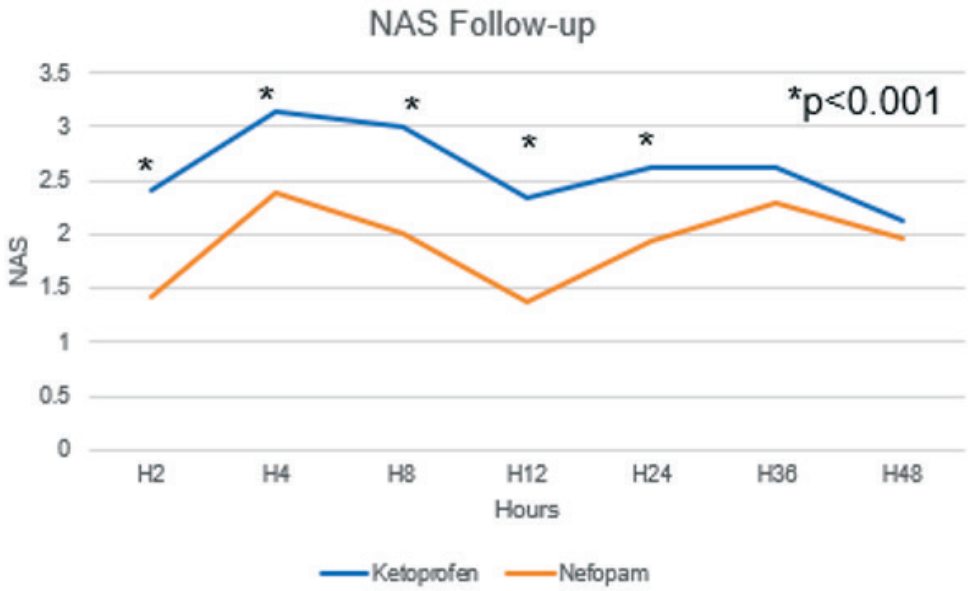
**Background and aims**: Ketoprofen and Nefopam are both analgesics used to improve post operative pain management. To our knowledge no study has compared the anti-nociceptive activity of both drugs in human. Our aim in this study is to compare the additional analgesia efficacy of Ketoprofen or Nefopam on post-partum pain.

**Methods**: 65 eligible women undergoing C-section were randomized to one of two groups: Group A (n=32) (100mg Ketoprofen, i.v., q8h) and Group B(n=33) (20mg Nefopam, i.v., q4h), in addition to standard postoperative analgesia comprising paracetamol and Pethidine as a rescue. Patients received bupivacaine spinal anesthesia with intrathecal morphine. The investigators assessing the subjects post-operatively were blinded to group assignment. The primary outcome was the pain score measured with NAS in the PACU and ward at 2,4,12,24,48 hours postoperatively and secondary end points were side effects occurrence and satisfaction rating. Data was analyzed using t test and chi square test.

**Results**: In patients receiving spinal morphine, Nefopam given postoperatively, compared with Ketoprofen, reduced post operative NAS pain score significantly 2 hours postoperatively (2.41±0.53 v/s 1.41±1.25; p< 0.001) up to 24 hours (2.63±0.72 v/s 1.93±0.19; p<0.001). Incidence of Nausea/vomiting was reduced in patients receiving Ketoprofen compared to Nefopam (22.5% v/s 56.6%; p= 0.006), with better satisfaction score in Group B than Group A (7.80±1.09 v/s 6.90±1.4; p=0.002) , but no statistically significant difference in terms of tachycardia , sweating or Pethidine administration.




**Conclusions**: In conclusion, this study suggests that Nefopam produces better postoperative analgesia compared with Ketoprofen in females undergoing C-section.

## Abstract no.: 617

### SYSTEMATIC REVIEW OF TOPICAL INTERVENTIONS FOR THE MANAGEMENT OF PAIN IN PATIENTS WITH CHRONIC WOUNDS

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**Background and aims**: Chronic wounds adversely impact individuals quality of life. Pain is associated with chronic wounds and its impact can vary according to wound aetiology, condition, and patient factors. This systematic review aims to examine the effectiveness of topical agents in the management of pain in chronic wounds.

**Methods**: A systematic review guided by PRISMA recommendations of RCTs where **pain is the primary outcome.** Inclusion criteria: Adults (18yo +) with chronic venous, arterial, diabetic or pressure ulcers where pain has been managed through topical administration of pharmacological/non-pharmacological agents. Searches were conducted in EMBASE, MEDLINE, CINAHL, CENTRAL, PubMed, Web of Science and Scopus. Studies were screened for eligibility, risk of bias, and had data extracted by two independent assessors.

**Results**: Searches retrieved 10,327 titles and abstracts( (7,759 post deduplication).Ten full texts (n = 668 participants) examining the following were included: ibuprofen (n =4), morphine (n =3), diamorphine (n =1), EMLA (n = 1), BWD + PHMB [BWD + PHMB[FD1] [ polihexanide-containing biocellulose wound dressing] (n = 1). Meta-analysis was not possible but initial exploration indicates some evidence for the efficacy of topically applied ibuprofen foam across four studies when compared with control conditions. However, there was contradictory evidence of the efficacy of morphine with one of the studies finding no effect. Due to many studies having limited statistical power, small sizes, and high co-morbidity results should be interpreted with caution.

**Conclusions**: Initial review of included studies indicates that topical application of interventions may provide an effective source of pain relief with further adequately powered trials recommended.

## Abstract no.: 655

### THE NIH HEAL INITIATIVE PRECLINICAL SCREENING PLATFORM FOR PAIN EFFORTS TO VALIDATE TWO MODELS OF CHEMOTHERAPY-INDUCED PAINFUL NEUROPATHY IN THE RAT

S. Iyengar[1], M. Urban[2], M. Varney[2], T. Hanania[2], S. Woller[1]

*[1]National Institute of Neurological Disorders and Stroke, NIH, Rockville, United States, [2]PsychoGenics Inc., Paramus, United States*

**Background and aims**: The National Institutes of Health Helping to End Addiction Long-term℠ Initiative, or NIH HEAL Initiative℠, Preclinical Screening Platform for Pain (PSPP) program PSPP is collaborating with PsychoGenics, Inc. to validate preclinical models and endpoints to enable screening and profiling of assets with the goal of accelerating the discovery and development of new non-opioid, non-addictive pain therapeutics. Here, we describe the validation and optimization of the paclitaxel and oxaliplatin models of chemotherapy-induced peripheral neuropathy in the rat.

**Methods**: Adult male and female Sprague Dawley rats (N=10, each sex, each experiment) were administered either paclitaxel (2 mg/kg, i.p., 4 mg/kg, i.p. or 2 mg/kg, i.v.), on 4 alternate days or oxaliplatin (3 mg/kg, i.v.) 2 days per week for 4 weeks. Hind paw tactile sensitivity using von Frey filaments and hind paw cold sensitivity using the acetone test were evaluated in both models. Effects of mechanical and cold priming of the hind paws on the development of hypersensitivity as well as the effects of chemotherapeutic agents on these endpoints were evaluated for a maximum period of 8 weeks.

**Results**: The careful evaluation of paclitaxel or oxaliplatin, taking pharmacokinetic parameters into consideration produced similar bilateral hind paw tactile and cold hypersensitivity which were significantly inhibited by morphine sulfate in a dose dependent manner.

**Conclusions**: The rigorous validation of the paclitaxel and oxaliplatin models of chemotherapy-induced peripheral neuropathy further highlights efforts within the NIH HEAL Initiative's PSPP program to validate endpoints and models for evaluating novel assets.

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## Abstract no.: 676

### DEXMEDETOMIDINE AND DEXAMETHASONE AS ADJUVANTS TO ROPIVACAINE IN TRANSVERSE ABDOMINIS PLANE BLOCK FOR CESAREAN SECTION: A PROSPECTIVE RANDOMIZED STUDY

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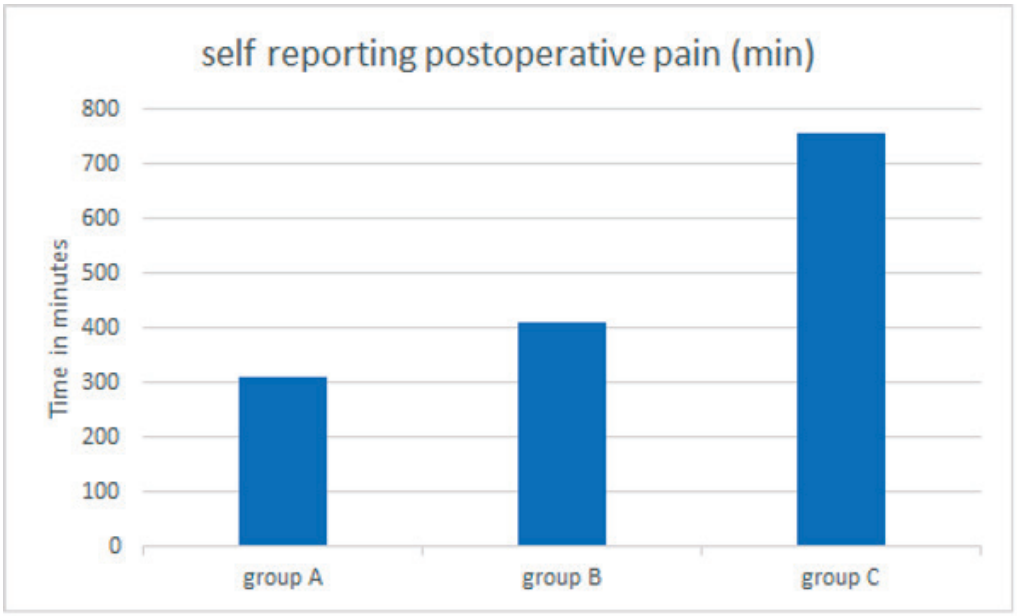
**Background and aims**: Dexamethasone and dexmedetomidine have most consistently demonstrated prolongation of a transversus abdominis plane (TAP) blocks. The objective of this study is to determine if the addition of dexmedetomidine and dexamethasone to ropivacaine can improve the analgesic effect of TAP blocks.

**Methods**: 108 eligible women undergoing cesarean section under spinal anesthesia were randomized to one of three groups and received ultrasound-guided (USG) bilateral TAP block with 30ml of 3mg/kg ropivacaine along with 0.2mg/kg dexamethasone (Group A ; n=34) or 1.5µg/kg dexmedetomidine (Group B; n=36) or 0.2mg/kg dexamethasone and 1.5 µg/kg dexmedetomidine (Group C; n=38). The primary outcome was the time to initial self-reporting of post-operative pain. Secondary outcomes included safety assessment and satisfaction. A p value < 0.005 was considered as statistically significant.

**Results**: The duration of analgesia in group C (759.0±133 min) was longer than that in group B (411.35±105.6 min) and group A (309±100.3 min) (p<0.001). Time to first rescue analgesic in group C (792.30±102 min) was longer than group B (439.30±111 min) and group A(362±106 min), (p<0.001). patient satisfaction was significantly better in group C as compared to group A and B. No significant difference was observed in the incidences of adverse effects between the three groups.




**Conclusions**: Combining dexmedetomidine and dexamethasone to ropivacaine as compared with dexamethasone or dexmedetomidine alone improves significantly the analgesic effect of a bilateral TAP block following caesarean section.

## Abstract no.: 731

### FIBROMYALGIA AND MIGRAINE: A COMMON PATHOPHYSIOLOGICAL AND CLINICAL GROUND FOR A POTENTIAL COMMON THERAPEUTIC TARGET?

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**Background and aims**: Fibromyalgia is a chronic widespread pain syndrome involving a peripheral pain generator enhancing or initiating a central sensitization via a dysregulated central processing pathway due to an imbalance in excitatory vs inhibitory mechanisms. Clinical efficacy of pregabalin and SNRIs (serotonin norepinephrine reuptake inhibitors) points to the importance of central mechanisms in regulating neuronal hyperexcitability. Strategy to modulate central sensitization in the spinal cord has been clinically validated through two classes of approved FM therapies, pregabalin/SNRI. Other molecules, such CGRP antagonists if capable to penetrate the CNS, may also act on same neuronal axis by blocking information relay & effectively dampening excitability at this key first synapse.

**Methods**: Review from available literature has been carried out by looking at physiopathology, clinical ground and therapeutic targets of fibromyalgia and migraine.

**Results**: A clear link between FM and migraine was demonstrated in a large retrospective study in >30,000 patients (Penn, 2019). After adjustment for sex, age and comorbidities, the overall incidence of FM in the migraine cohort was 1.57 times greater than that in the corresponding control cohort. Additionally, there is evidence for increased level of CGRP in the CSF of patients with fibromyalgia (Vaerøy, 1989). From clinical standpoint, an increased migraine frequency was shown to worsen symptomatology in FM patients, resulting in enhanced hypersensitivity and spontaneous FM pain (Giamberardino, 2016).

**Conclusions**: The association between these two pain conditions may suggest common ground mechanisms operating in FM and migraine. Based on this view, novel molecules should be developed with a common therapeutic target in both indications.

## Abstract no.: 900

### AUDIT OF OFF-LABEL USE OF GABAPENTINOID IN A NORTH-WEST HOSPITAL IN UNITED KINGDOM

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**Background and aims**: In the UK, Gabapentin and Pregabalin prescribing has increased by 350% and 150% over 5 years, respectively to combat the Opioid crisis .

This audit was conducted to ascertain the percentage of Off-Label use of Gabapentinoids in the Stockport area as compared to the national average and in addition to determine if the patients who suffered from neuropathic pain were able to derive any benefit from them.

**Methods**: 50 random patients who were taking Gabapentinoids were selected during their appointment at the Pain clinic in Stepping Hill Hospital

- A simple questionnaire was applied and the grading system of probable/possible/definite neuropathic pain was used to assess if the patient had neuropathic pain. The Leeds assessment ofneuropathic symptoms and signs (LANSS) was used if doubts persisted.
- The patients were also asked if the medications were helpful and if they took any additional neuropathic agents.

**Results**: 34% (17 pts) of the patients were prescribed off-label Gabapentinoids of which 23% (4 pts) found it helpful.

- 34%(17 Pts) were definite NP of which 70.5%(12 pts) found it helpful.
- 31 Pts took Gabapentin and 19 took Pregabalin. 61% of the Gabapentin (19/31 pts) found it helpful whereas only 23%( 5/19) found it helpful in the Pregabalin group.
- 12 pts took an additional neuropathic agent of which only 7 were diagnosed to have NP.

**Conclusions**: The off-label prescribing in our area was only 34% compared to the national average of 60%. This was mainly due to the GP education programme which our Pain department conducts once every 6 months.

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## Abstract no.: 955

### EFFECTIVENESS OF NONSTEROIDAL ANTI-INFLAMMATORY DRUGS (NSAIDS) IN THE MANAGEMENT OF POSTOPERATIVE PAIN

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**Background and aims**: Effective postoperative pain (pp) control is an essential component of care of the surgical patients because it is associated with reduced morbidity, faster mobilization, shorter length of hospital stay and reduced cost of care. Opioids have demostrated efficacy for the management of pp, but they are associated with a variety of dose-dependent adverse symptoms which may conduct to delayed recovery. The aim of this study was to evaluate the effectiveness of NSAIDs in the management of pp.

**Methods**: Patients who underwent major abdominal surgery during a 5-year period were prospectively studied. Management of pp consisted of systemic administration of 1g paracetamol every 6h and 40mg parecoxib sodium every 12h immediately started after surgery, for a total of 3 consecutive days. Patients rated pain intensity throughout the first 3 postoperative days (pd) on a scale of 0 (none/minimal pain) to 3 (severe).

**Results**: Out of 124 patients included in the study, adequate pain control (rating scale 0 -1) permiting fast mobilization was obtained in 108 (87%) on the 1st pd, in 118 (90,3%) on the 2nd, and in 119 (95,9%) on the 3rd. The patients with pain severity of rating scale 2 -3 (16 on the 1st pd, 6 on the 2nd, and 5 on the 3rd) required the addition of opioids to control pain. No side effects related to the NSAIDs were observed.

**Conclusions**: In the majority of patients undergoing major abdominal surgery, adequate pp control can be obtained with the systemic administration of NSAIDs, without any side effect related to their use.

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## Abstract no.: 999

### RISK FACTORS FOR OPIOID USE DISORDER IN CHRONIC NON-CANCER PAIN PATIENTS: A PHARMACOGENETIC COHORT STUDY IN REAL WORLD PAIN MANAGEMENT

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**Background and aims**: Chronic pain frequently leads to prescription of long-term opioid analgesics, increasing the risk of developing opioid use disorder (OUD). Thus, the aim of this study was to develop a prediction risk model of OUD in chronic non-cancer pain (CNCP) patients.

**Methods**: An observational case-control study was conducted in 806 OUD cases and controls with CNCP and long-term use of opioids (≥ 6 months). OUD diagnosis was based on DSM-5 criteria. Socio-demographic characteristics (age, sex, employment status, incomes), clinical (pain, quality of life and tolerability), and pharmacological (analgesic prescription and morphine equivalent daily dose (MEDD)) outcomes were registered. Genetic variants (*OPRM1*(rs1799971), *COMT* (rs4680) and *CYP2D6*(phenotypes)) were also analysed.

**Results**: The logistic regression model with a backward stepwise selection selected five OUD risk predictors out of sixteen variables chosen based on significance analysis and biomedical criteria. These independent predictors were young age (OUD cases: 54 ± 13 vs. controls: 64 ± 14 years, p<0.001), high work disability (49% vs. 14%, p<0.001), high MEDD (median [IR]: 120 [72-217] vs. 60 [40-120], p<0.001), wild-type *OPRM1*-AA genotype and extreme *CYP2D6* phenotypes. Nevertheless, previous abuses, the use of fentanyl and anxiolytics and sleep disturbance were more prevalent in cases.

**Conclusions**: This model could help clinicians in pain practice in identifying patients at a high risk of developing OUD. However, it is needed a validation of the model to analyse its reliability.

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## Abstract no.: 1053

### ADVERSE EVENTS IN CHRONIC PAIN PATIENTS: SEX INFLUENCE AND NOTIFICATION OF ADVERSE DRUG REACTIONS

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**Background and aims**: Although opioids are mostly used to treat severe pain, their potential adverse events (AEs), partly influenced by sex, make their use controversial. Our aim was to analyse the sex differences in AEs detection in our Pain Unit population.

**Methods**: An 18-month retrospective observational study was carried out collecting data from telephone calls of Pain Unit ambulatory patients at Alicante University General Hospital. Calls related to any potential AE due to pain pharmacological therapy were recorded by nursing. The number, type of AE, affected system according to the *Medical Dictionary for regulatory Activities* (MedDRA) and potential causative drug were analysed. Data were analyzed by sex.

**Results**: In 91/1476 (6.1%) calls, 72 patients (71% female) reported 93 AEs. Gastrointestinal symptoms predominated in both sexes (46% women vs 36% men), however, in women were more related to opioid use (69% vs. 33%, p=0.165) whereas in men, due to non-opioids drugs, mostly baclofen (33%). Neurological system was the second most frequently affected (20/93, 22%). Here, a significant difference was observed in drowsiness (6/20, 30%) between women and men (8% vs. 63%, p=0.018). None of these AEs was notified as an adverse drug reaction (ADR).

**Conclusions**: A different tolerability pattern by sex in the detection of AEs was found. Women evidenced a higher sensitivity to gastrointestinal symptoms related to the opioid use and men more drowsiness. It is necessary to understand the impact of sex and gender on the AEs reporting and the issue of ADR under-reporting from doctors.

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## Abstract no.: 1060

### A SNAPSHOT: HIGH DOSE OPIOID USAGE IN CHRONIC PAIN PATIENTS IN A SINGLE HOSPITAL

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**Background and aims**: Opioids are commonly used analgesia. However, there is no evidence of efficacy with high dose usage in chronic pain. Instead, long-term opioid use of > 120 mg oral morphine equivalent is associated with various side effects and harms.[1]

[1]Faculty of Pain Medicine, Royal College of Anaesthetists. Opioids Aware. [online] [Updated 2021, cited 22 Jan 2021] Available from: http://www.rcoa.ac.uk/faculty-of-pain-medicine/opioids-aware

**Methods**: Patients are selected from those who attended the chronic pain outpatient clinics in Aberdeen Royal Infirmary (ARI) in January 2021. I went through the patients' electronic patient records to determine those who use opioids for non-cancer chronic pain. Other details collected include the dose of opioids prescribed and duration of use.

**Results**: There are 226 patients included in this audit. 19% of these patients are on strong opioids. 7.5% of these patients are on > 120 mg oral morphine equivalent for at least a year.

**Conclusions**: The ultimate aim is to have no patients on > 120 mg oral morphine equivalent for non-cancer chronic pain. Chronic pain physicians are at an advantageous spot to educate patients about the dangers of prolonged opioid use and monitor the potential side effects. They have increased awareness of this issue and benefit from longer consultation time. A quality improvement project will be conducted to encourage ongoing efforts to monitor and educate patients attending chronic pain clinics on high dose opioids. A mutual understanding with the primary care team about these issues would be ideal as most opioids are prescribed in the community.

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## Abstract no.: 1089

### NADPH OXIDASE ISOFORM-2 INHIBITOR GSK2795039 ATTENUATES MECHANICAL ALLODYNIA AND TRANSIENTLY DECREASES MICROGLIAL ACTIVATION IN A MOUSE MODEL OF PERIPHERAL NERVE INJURY

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**Background and aims**: NADPH oxidase isoform-2 (NOX2), whose sole function is production of reactive oxygen species, has been implicated in neuropathic pain, in part by modulating neuroinflammation. We evaluated the effects of GSK2795039, a NOX2 inhibitor (NOX2i), in the spared nerve injury (SNI)-mouse.

**Methods**: SNI was induced in 96 male and female C57BL/6J mice, randomly allocated within sex to groups NOX2i (70 mg/kg) and vehicle. Drug or vehicle were subcutaneously administered b.i.d. for 2 days, starting 1h before surgery. Mechanical withdrawal thresholds were assessed at baseline and post-operative days 4 and 9. Spinal cords (L3-L5 segments) were collected on days 2 and 11 to evaluate cytokines IL-1ß, IL-10, IL-6 and macrophage colony-stimulating factor (M-CSF), and microglial activation, by multiplex immunoassay and Iba-1 immunofluorescence, respectively.

**Results**: NOX2i-treatment increased mechanical withdrawal thresholds in SNI animals on days 4 ($P$=0.028) and 9 (P=0.042). NOX2i-treated SNI-animals showed reduced microglial activation in ipsilateral dorsal horn on day 2 (P=0.003), but not on day 11. Although on day 2 no differences in cytokines were found between NOX2i- and vehicle-treated mice, on day 11 IL-6 was marginally lower in NOX2i-treated females ($P$=0.055) and M-CSF, recently proposed to trigger spinal microglial activation after peripheral nerve injury, was increased in NOX2i-treated males ($P$=0.030).

**Conclusions**: Short-term early treatment with GSK2795039 attenuated SNI-induced mechanical allodynia and microglial activation at early timepoints, while these effects were reduced and absent, respectively, at later timepoints. Further work is needed to explain the treatment effects in M-CSF.

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## Abstract no.: 1102

### PATHOLOGICAL SUBTROCHANTERIC FRACTURE

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**Background and aims**: Evaluate the clinic of a patient with acute pain in the lower extremity.

**Methods**: Evaluate the therapeutic action procedure and secondary effects.

A 56-year-old patient with a history of pareoporosis secondary to cerebral analysis, usually bedridden and totally dependent for activities of daily living, who is evaluated because her relative refers to an increase in the perimeter of the right thigh accompanied by pain and functional impotence of three days of evolution. With a history of infiltrating ductal carcinoma in the right breast in 2021 under treatment with Letrozole.

Right lower extremity with swelling and deformity, shortened and slightly externally rotated. Pain on palpation of the inner region of the thigh and on passive mobilization. Good distal neurovascular function. X-ray: subtrochanteric fracture of the left femur.

**Results**: Pathological subtrochanteric fracture of the left femur in relation to taking aromatase inhibitors in a patient at risk due to his history of cerebral palsy and immobility.

**Conclusions**: Osteoporosis increases the risk of fracture. Among the different exogenous risk factors, drugs play a very important role. Aromatase inhibitors, such as letrozole, are used as first-line adjuvant therapy for women with hormone receptor-positive breast cancer. Although they reduce the risk of recurrence and mortality, they have also been associated with side effects. An important one is the accelerated loss of bone mass and an increased risk of osteoporotic fractures. By blocking the conversion of androgens to estrogens in the peripheral tissues of menopausal women, which contributes to the loss of bone mineral density.

# Pain Therapies - Physical/occupational therapies

## Abstract no.: 213

### MANAGEMENT OF PAIN EXISTENCETHROUGH RELIGION: ONE POSSIBILITY OF MEETING WITH YOURSELF

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**Background and aims**: The literature indicates the growing interest about pain and religion.Concerning the concept of total pain and the framework of psychophysics, the present study aimed to develop the Assessment Instrument of Religious Items (IACOR).

**Methods**: 240 subjects. Data collection was conducted through IACOR (semi-structured interview and scale). The content analysis was carried out and arithmetic mean and standard deviation were calculated.

**Results**: The following categories emerged: time affiliation, initiation of religious practice and changes in affiliation, liability for the acts and relationship with death, description of God, awareness of the existence of profound experiences, chance of reward, increased faith in proximity to death, religion in an attempt to explain human limitations, relationship between religion and science and the religion of the past and present in relation to science. Regarding IACOR scale, the highest assigning items were: “believe that nature should be respected” (9.94 ± 0.28), “I believe that all living beings deserve respect” (9.81 ± 0.64), “My life is a process of transformation” (9.59 ± 1.11), “Making a life worth living”

(9.51 ± 1.21) and “I feel that my life has purpose and meaning”

(9.47 ± 1.22).

**Conclusions**: There are associations between participant’s perceptions and constructs of religious denomination. It highlights the need to understand and address the religious phenomenon as part of the human being and potential resource for management and modulation of the pain of existing, expressed by pain in the face of issues related to death, finitude and hopelessness.

## Abstract no.: 324

### MUSCLE ENERGY TECHNIQUE AND STATIC STRETCHING IN PATIENTS WITH MECHANICAL NECK PAIN: A RANDOMIZED CONTROL STUDY

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**Background and aims**: Neck pain is becoming increasingly common throughout the world with a considerable impact on individuals. This study compared the effects of muscle energy techniques (MET) and Static Stretching (SS) on pain intensity and functional disability of patient with mechanical neck pain.

**Methods**: Fifty subjects with mechanical neck pain recruited were randomly allocated into MET and SS groups equally. Subjects in MET received MET protocol, and SS groups were treated with SS; both groups had treatment twice a week for six weeks. Pain intensity and functional disability at baseline, 3rd and 6th week of treatment were measured . Descriptive and Inferential statistics were used to analyze the data. Alpha level was set at < 0.05.

**Results**: There was a significant reduction in pain intensity and disability in MET's and SS group ($P < 0.05$) when pre-treatment, 3rd week and 6th week treatment were compared. There was a significant reduction when the effects of MET and SS on pain intensity ($F=47.680, P <0.001$) and functional disability ( $F=15.671$, $P=0.000$) were compared at the 6th week.

**Conclusions**: It can be concluded from this study that MET reduces pain intensity and NDI better than and SS.

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## Abstract no.: 328

### PREVALENCE OF LOW BACK PAIN AMONG MUSLIMS AND NON MUSLIMS FAITH ADHERENT IN OBAFEMI AWOLOWO UNIVERSITY, ILE IFE, A COMPARATIVE STUDY

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**Background and aims**: Prevalence of low back pain (LBP) among Muslims and Christians have been reported in several populations, but not in Nigeria. The study assessed the prevalence of LBP among Muslims and Christians in Obafemi Awolowo University, Ile Ife Nigeria.

**Methods**: Two hundred and forty respondents (120 Christian and 120 Muslims) were recruited for the study. A standardized questionnaire adopted from a study in India was used for the study. Each respondent was given a copy of the questionnaire to complete which was collected as soon as possible. Data was analyzed using descriptive and inferential statistics and alpha level was set at 0.05.

**Results**: Result shows that point prevalence of low back pain (98, 81.7%) was more in Muslim respondents, than that of Christians (62, 60%). In the last 12 months, 104 (86.7%) Christians and 85 (70.8%) of Muslims reported pain. With respect to 12 months absent from the work 44 (45%) Christians 36 (30%) Muslims respondents were involved there was a significant association between prevalence of low back pain and religion ($X^2 = 14.415$, $P = 0.001$). Posture was the major cause of low back pain with 78 (65%) Muslims and 47 (39.2%) Christian respondents.

**Conclusions**: In conclusion, the it was shown that the prevalence of low back pain was more among Muslim respondents, but more Christians were absent from work.

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## Abstract no.: 329

### DEVELOPMENT AND FEASIBILITY TESTING OF A VIDEO-BASED MCKENZIE PROTOCOL FOR MANAGEMENT OF NON SPECIFIC NECK PAIN

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**Background and aims**: Exercise therapy is a common Physiotherapy intervention in the management of neck pain. Tele-rehabilitation removes the barrier of distance, especially in patients with mobility issues. The aim of the study was to develop a video-based and test the feasibility of a McKenzie protocol for patient with neck.

**Methods**: Ten patients with neck pain were recruited to participate in the study. Extension, rotation, flexion dysfunction exercises, were done using McKenzie protocol and recorded in a short video. This was given to participants to watch and imitate twice in a day for four weeks. Usability of the video, pain intensity and neck disability of patients were assessed before and after four weeks intervention using the USE questionnaire verbal rating scale and neck disability index. Descriptive and inferential statistics was used to summarize data. Alpha value was set at $p<0.05$.

**Results**: The designed video-based McKenzie protocol had 100% or excellent usability. There was a significant difference in the 'pre' and 'post' treatment pain intensity ($t=6.096$ $p=0.000$) while there was no significant difference in the 'pre' and 'post' treatment disability ($t=0.950$ $p=0.355$).

**Conclusions**: It can be concluded that video-based McKenzie protocol is demonstrable, easy, satisfactory for use and effective in reducing pain intensity among patients with neck pain.

## Abstract no.: 484

### ARE CONTEXTUAL FACTORS ASSOCIATED WITH FUNCTION AND SATISFACTION WITH PHYSIOTHERAPY IN PERSONS WITH MUSCULOSKELETAL SHOULDER PAIN? A COHORT STUDY

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**Background and aims**: CF related to the personal and therapeutic environment are contributors of recovery in pain patients. How various aspects of these CF relate to AF3m and SP3m in PwMSP is unknown. The aim of the study were to determine whether contextual factors (CF - personal: partner/work status and therapeutic: aspects of therapeutic alliance) relate to arm function and satisfaction with physiotherapy at 3 months (AF3m and SP3m, respectively) in persons with musculoskeletal shoulder pain (PwMSP).

**Methods**: Self-reported data were collected in 38 PwMSP, consulting a physiotherapist for the shoulder pain (Table 1). Kruskal-Wallis tests (work status) and Mann-Whitney tests (partner status) assessed differences in AF3m and SP3m between work and partner status categories. Spearman correlation coefficients assessed the relation between aspects of therapeutic alliance and AF3m and SP3m.

Table 1. Details on assessments

| Construct | Questionnaire/Scale | Interpretation |
|---|---|---|
| Work-status | 4 categories at work/sick leave/retired/ unemployed | / |
| Partner-status | 2 categories: single/having a partner | / |
| Therapeutic alliance: Patient-therapist agreement on therapy tasks | Working Alliance Inventory, item 2,8,10,12 | Higher scores indicate a better agreement on therapy tasks |
| Therapeutic alliance: Patient-therapist agreement on therapy goals | Working Alliance Inventory, item 1,4,6,11 | Higher scores indicate a better agreement on therapy goals |
| Therapeutic alliance: Development of affective patient-therapist bond | Working Alliance Inventory, item 3,5,7,9 | Higher scores indicate a more affective patient-therapist bond |
| Arm function (AF) | Disabilities of the Arm, Shoulder and Hand questionnaire | Higher scores indicate less arm function |
| Satisfaction with physiotherapy (SP) | 7-point likert scale, from not satisfied (1) to completely satisfied (7) | Higher scores indicate more satisfaction |

**Results**: There was no difference in AF3m or SP3m between the categories of work status. Single persons were significantly more satisfied with treatment than persons having a partner ($p=.049$). AF at three months was not significantly correlated with any aspect of therapeutic alliance. Increased SP3m was related to increased patient-therapist agreement on the tasks of therapy ($r=0.42$,$p.01$), and a trend towards a significant relation with increased patient-therapist agreement on the goals of therapy was observed ($r=0.32$,$p.055$).

**Conclusions**: In contrast to the literature, this pilot study did not find a relation between AF3m and CF (personal and therapeutic). SF3m was related to aspects of therapeutic alliance. Due to the small sample size and the limited follow-up time, results should be interpreted cautiously.

## Abstract no.: 679

### PREVALENCE OF WORK RELATED MUSCULOSKELETAL DISORDERS AND QUALITY OF WORK LIFE AMONG A NIGERIAN ACADEMIC STAFF

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**Background and aims**: Globally, musculoskeletal disorders are one of the most common work-related illnesses causing significant economic burden in terms of lost wages, treatment, and compensation. The aim of the study was to assess the prevalence of work related musculoskeletal disorders and quality of work life among University of Medical Sciences academic staff.

**Methods**: Fifty nine academic staff (36 males, 23 females) was purposefully recruited to participate in the study. The following questionnaires were administered to the respondents: Nordic, Quality of work life and Visual Analogue Scale. Each of the questionnaires was given to each of the respondent, they were retrieved after they due completion. Data collected were analyzed using descriptive and inferential statistics. Alpha level was set at $P<0.05$

**Results**: Results showed that 51 (86.4%) reported 12-months prevalence of musculoskeletal pain across different body parts. Thirty-six respondents, (61%); reported musculoskeletal disorder in the last 7 days. The body part most affected was the neck, followed by lower back and the right Shoulder. Meanwhile in the last 7 days, most musculoskeletal pain was reported to be experienced at neck, upper back and lower back. There was an inverse relationship between pain intensity and each of work experience ($r = -0.289$, $P = 0.026$), cadre ($r = -0.312$, $P = 0.016$) and extra working hours ($r = -0.372$, $P = 0.004$).

**Conclusions**: This study has shown that there was high prevalence of musculoskeletal pain among academic staff and neck was the most prevalent site followed by low back.

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## Abstract no.: 755

### NONPHARMACOLOGICAL MANAGEMENT OF RHEUMATOID ARTHRITIS

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**Background and aims**: As well as pharmacotherapy for rheumatoid arthritis (RA) a multidisciplinary approach combining patient education, psychological intervention, promotion of physical activity and nutrition, and occupational therapy is recommended to reduce disease activity and optimise function and quality of life.

**Methods**: SMOKING

Patients who smoke are at increased risk of seropositive RA, active disease and cardiovascular disease, and show poorer treatment responses to both conventional synthetic disease modifying anti rheumatic drugs (DMARDs) and biological DMARDs All patients who smoke should be actively encouraged and supported to quit.

EDUCATION and Psychological Intervention

Patient education may reduce pain, disability and depression. Education should include general information about RA, treatment options,skills for management and strategies for preserving functions. Psychological interventions and cognitive behavioural therapy also may reduce symptoms of fatigue and improve self esteem, function and pain.

EXERCISE

Individual resistance and aerobic exercise may reduce disease activity, fatigue, pain and overall cardiovascular risk. Tailored exercise programs based on level of fitness and the severity of inflammation can be developed by physiotherapist.

DIET

The Mediterranean diet may provide benefits to patients, but there is no convincing evidence for specific dietary manipulations in Rheumatoid arthritis. Despite this, general consensus recommends a diet low in salt and high in vegetables and fish to reduce cardiovascular risk.

**Results**: Nonpharmacological management is also important in reducing disease activity and optimising function and quality of life in patients with rheumatoid arthritis, including those receiving DMARDs.

**Conclusions**: A multidisciplinary approach focusing on patient education, psychological intervention, physical activity , nutrition and occupational therapy is recommended.

## Abstract no.: 981

### CAN ROBOT'S HUG ALLEVIATE HUMAN PAIN?

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*[1]Osaka University, Suita, Japan, [2]Advanced Telecommunications Research Institute International, Kyoto, Japan*

**Background and aims**: As human-to-human contact is limited in Covid_19, the role of robots is gaining attention. It has been reported that hugging can reduce people's mental stress and alleviate pain.

It has been reported that growth hormone secretion is decreased in fibromyalgia patients, and may be involved in the pain mechanism.

We investigated the possibility that robot's hug could alleviate pain, along with changes in the secretion of growth hormone (GH).

**Methods**: After written informed consent, 49participated in this study. The robot used was a giant stuffed bear that had been modified by roboticists to allow hugging by pushing button remotely. Participants received experimental pain stimulation using Pathway (Medoc, Israel) twice (without robot, called "control condition", then with robot, called "robot condition"). To get accustomed to the robot, before robot condition, participants chat with the robot using an audio system placed around the robot's face for 30 min. Blood samples were taken 4 times before and after each painful stimulation.

**Results**: All the scores of SFMPQ-2 subscales significantly decreased in the robot condition compared to control condition (continuous, intermittent, $p<0.0005$; neuropathic, affective, $p<0.05$) The significant decrease in GH seen in the control condition($p<0.05$) was not observed in the robot condition.

**Conclusions**: Robots' hug has the potential to alleviate human pain. Its effects may be regulated via GH secretion.

This research work was supported in part by JST CREST Grant Number JPMJCR18A1, Japan

# Pain Therapies - Psychological therapies

## Abstract no.: 413

### RESILIENCE FACTORS AND SELECTIVE LEARNING IN PATIENTS WITH FIBROMYALGIA: AN ONLINE PARADIGM

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**Background and aims**: Previous research has shown impaired selective learning in patients with fibromyalgia (Meulders et al., 2018). Growing evidence put resilience factors forward as a possible pathway to counter pain-related disability. The Best Possible Self (BPS) is a positive psychology intervention used to increase positive affect and optimism by describing and visualizing a future in which everything has gone well. We proposed that 1) resilience factors will be increased through the intervention and that 2) selective learning will be facilitated with higher degrees of resilience factors.

**Methods**: Using a randomized online trial, patients with fibromyalgia (N=150) underwent either the BPS intervention (experimental group) or described and visualized a typical day (control group). We adapted the BPS intervention for a population with chronic pain and put it into an online format with video guidance. The blocking procedure in form of a diary of a fictitious patient with fibromyalgia was used to assess selective learning. Positive affect and optimism were measured before the intervention, directly after, and at the end of the experiment.

**Results**: Preliminary analyses revealed higher positive affect and state optimism for the experimental group compared to the control group. Further analyses showed that positive future expectations could predict selective learning when controlled for negative future expectations.

**Conclusions**: This study uses an innovative experimental online approach. Our data sheds light on the role of resilience factors as counterpart to well-studied vulnerability factors such as fear and negative affect in chronic pain.

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## Abstract no.: 472

### IMMEDIATE EFFECTS OF A 20-MINUTES MINDFULNESS MEDITATION ON EXPERIMENTALLY INDUCED (ACUTE) PAIN

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**Background and aims**: Previous research supports the usefulness of mindfulness-based interventions on pain experience, especially among patients with chronic pain. However, the beneficial effects of brief mindfulness-based interventions on acute pain have been less studied. If a brief mindfulness meditation (MM), is proven to be helpful in acute pain management, such an intervention could be of potential use in primary healthcare. This prospective experimental study, with two parallel arms, aimed at assessing the effects of a brief session of MM in reducing pain intensity. Secondary aims were to assess: the interaction effect of sex; and if the magnitude of changes in pain intensity is significantly predicted by pre-test pain intensity and group allocation.

**Methods**: 67 healthy adults were randomly assigned to 20-minute sessions of MM or attention control. All participants underwent two cycles of Cold Pressor Arm Wrap, prior to and after the 20-minute sessions, delivered through an audio recording. Participants responded to pre and post-test pain intensity measurements.

**Results**: There was neither a significant decrease in pain intensity nor a significant effect of group allocation and sex. The magnitude of changes in pain intensity was significantly predicted by pre-test pain intensity.

**Conclusions**: Our findings seem to suggest that a single brief MM session might not be enough and that larger and more intense interventions, delivered by a trained facilitator and combined with personal daily practice might be more beneficial for pain management. Effective acute pain management is necessary since the early stages of pain onset.

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## Abstract no.: 475

### EFFECTS OF MINDFULNESS MEDITATION VERSUS SELF-HYPNOSIS VERSUS PRAYER VERSUS AN ATTENTION CONTROL ON COLD PRESSOR ARM WRAP PAIN-RELATED OUTCOMES: AN EXPERIMENTAL STUDY

A. Ferreira-Valente[1,2], M.A. Day[3,2], J. Pais-Ribeiro[1,4], C. Teotónio do Carmo[5], F. Pimenta[1], R.M. Costa[1], M.P. Jensen[2]

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**Background and aims**: Previous research supports the usefulness of mindfulness meditation, self-hypnosis, and spiritual/religious practices for pain management, especially among patients with chronic pain. However, the beneficial effects of such brief practices on acute pain have been less studied, and no previous research, to the best of our knowledge, compared the effects of all these three approaches on pain-related outcomes on the same study. This study examined if brief sessions of mindfulness meditation (MM), self-hypnosis (SH), and Christian prayer (CP) produce changes in cold pressor arm Wrap (CPAW) pain (intensity, tolerance).

**Methods**: This is a prospective experimental study with two parallel arms. Healthy adults (N=200) were randomly assigned to 20-minute sessions of MM, SH, CP or an attention control (CN). All participants underwent two cycles of CPAW, prior and after the 20-minute sessions. Sessions were audio-delivered. Participants responded to pre and post-test pain intensity measurements. Pain tolerance (sec) was assessed during the CPAW cycles.

**Results**: A decrease in pain intensity, and an increase in pain tolerance, were observed from pre to post-test CPAW. MM and SH participants reported greater increases in pain tolerance, and SH participants reported greater decreases in pain intensity. SH participants reported significantly lower pain intensity and higher pain tolerance at post-test relative to CN and CP participants.

**Conclusions**: These preliminary results indicate single sessions of SH and MM, but not CP, are effective in producing changes in CPAW pain tolerance. SH is effective in reducing pain intensity. Further research is needed to identify mediating mechanisms for these pain management approaches.

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## Abstract no.: 522

### BEHAVIOURAL INTERVENTION TO SUPPORT OPIOID REDUCTION (BIOR) IN PRIMARY CARE: A PROTOCOL

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**Background and aims**: Around 30-50% adults suffer from moderate/severe chronic non cancer pain (CNCP) and many receive opioids, despite their limited efficacy and reported side effects. The 'opioid crisis' has led to efforts to reduce inappropriate prescribing and a maximum 120mg morphine equivalent daily dose (MED) recommended for CNCP. Reducing MED is challenging and tapering with support may help. Following Behaviour Science principles we have developed a brief intervention to provide such support.

Aims: To investigate the feasibility of BIOR to support opioid tapering in primary care.

**Methods**: RCT. N=100 CNCP patients taking ≥120mg MED/day randomised to 'taper only' or 'taper with support'. All initially attend a consultant in pain medicine led primary care clinic. A tapering protocol reduces doses by 10%/week or 10%/fortnight if poorly tolerated. The 'taper with support' group also receive BIOR including education about harms, realistic goal setting and brief advice supported by written and online materials. Six brief BIOR sessions delivered by pharmacists and nurse prescribers offers emotional, informational and instrument support to promote self-management and provides access to a named social prescriber trained in BIOR. Outcomes including pain, MED and quality of life are assessed at baseline, 3, 6, 9 and 12 months and interviews with patients and HCPs inform the process evaluation.

**Results**: Results will demonstrate feasibility and acceptability of the intervention and its impact to inform any amendments to BIOR prior to a definitive multi-centre trial.

**Conclusions**: Training primary care staff to deliver BIOR has the potential to ease the burden of CNCP for patients and service providers.

## Abstract no.: 555

### PAIN AND STRESS-RELATED ILL-HEALTH IN EMPLOYEES: OUTCOMES OF A SELECTIVE PREVENTIVE PSYCHOSOCIAL PROGRAM IN A CLUSTER RANDOMIZED CONTROLLED TRIAL

H. Zetterberg[1], C. Owiredua[2], S. Edlund[2], P. Åsenlöf[1], R. Lennartsson[2], G. Brodda Jansen[3], K. Boersma[2], S. Linton[2], S. Reme[4], W. Shaw[5], M. Nicholas[6], I. Flink[2]

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**Background and aims**: Pain and stress-related ill-health are major causes of long-term disability and sick leave. This study evaluated the effects of a psychosocial selective prevention program for an at-risk population with emerging pain and stress problems.

**Methods**: The Effective Communication within the Organization (ECO), where supervisors and employees were trained in communication and problem solving, was compared to an active control consisting of psychoeducative lectures (PE) about pain and stress. First-line supervisors were randomized to either the ECO or to PE, and employees with self-reported pain and/or stress-related ill-health were included. The programs consisted of 2-3 group sessions, with corresponding web-based materials. Data were collected at baseline, immediately after the intervention, and at a 6-month follow-up. The effects were evaluated on sick leave, work ability, perceived social support, pain-disability risk, exhaustion symptoms, perceived stress, perceived health, quality of life among employees, and acceptability of the programs.

**Results**: Data analysis is ongoing, and final results will be presented.

**Conclusions**: This study provides an example of engaging supervisors at the workplace in selective prevention for pain and stress-related ill-health among employees. Final results and implications will be discussed.

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## Abstract no.: 588

### HOW DO PEOPLE WITH CHRONIC PAIN CHOOSE THEIR MUSIC FOR PAIN MANAGEMENT? EXAMINING THE EXTERNAL VALIDITY OF THE COGNITIVE VITALITY MODEL

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**Background and aims**:

Self-chosen music is the greatest predictor of effective music listening interventions for pain (Lee, 2016). Self-chosen music is readily accessible using smart-phones and streaming services, however little is known in terms of how to support patients to use this resource. The study provides greater understanding of chronic pain patients music preferences, and attentional strategies for pain management.

**Methods**:

Seventy chronic pain patients completed the study using a smart-phone. The study was conducted in three parts.

(1) Patients listened to different music samples and rated their preferences, musical features were controlled for using Spotify audio features data.

(2) Patients chose a song from an unlimited choice, and evaluated their reasons for choosing that song using a custom questionnaire that was developed using a theoretical framework called the Cognitive Vitality Model (CVM Figure1).

(3) Patients provided open qualitative responses about using music for pain.

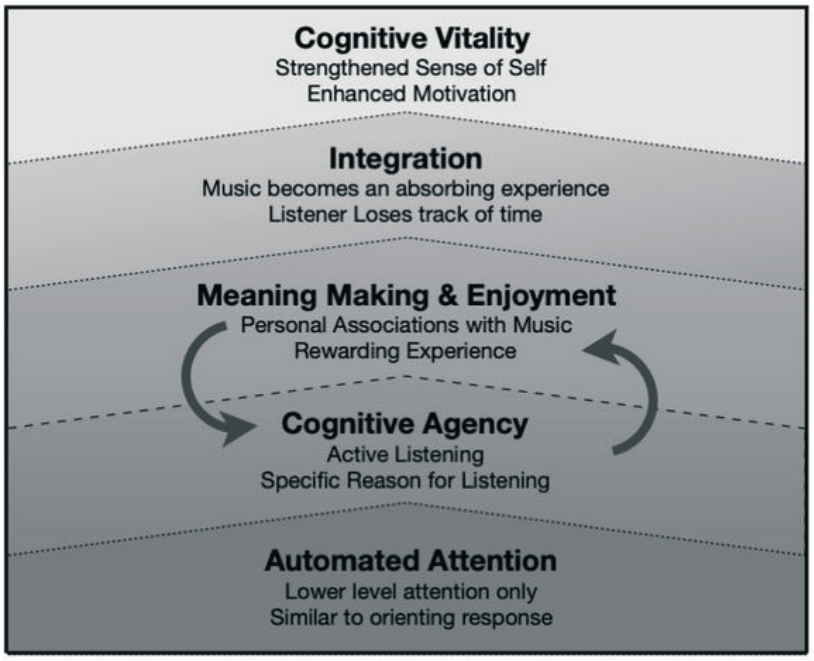


*Figure 1.* Cognitive Mechanisms in Cognitive Vitality Model

**Results**: (1) Patients preferred music with low momentum.

(2) Regression analysis of participants questionnaire responses identified that patients song choice could be predicted by the factors *Musical Integration* (expectation of absorption from music) and *Cognitive Agency (increased feelings of control).*

(3) Patients identified that they chose different music depending on the level of pain they experienced and the type of activity.

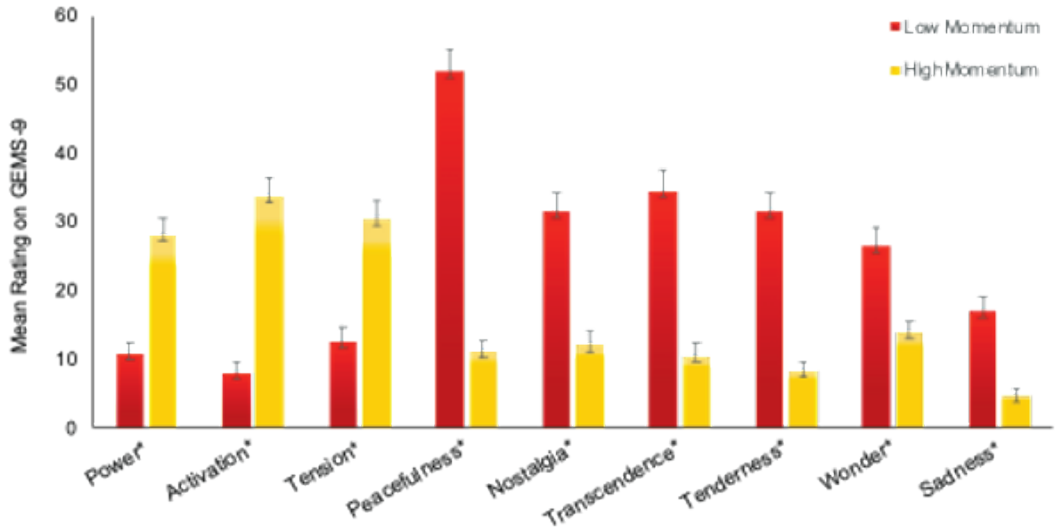


*Figure 2.* Patient music preferences based on Spotify Audio Features

| Analytical Theme | Descriptive Theme | Codes |
|---|---|---|
| Musical Integration | Escape From Reality | Escape beyond the music<br>Getting lost<br>Transportation |
| | Absorption | Particularly involving<br>Zone out |
| | Forget about pain | Forget about troubles<br>Take away thoughts of pain |
| Cognitive Agency | Individuality | Self-chosen music<br>Unique music preference<br>Specific genre or artist preferences |
| | Self-strengthening | Feeling more than the illness<br>Lost without music<br>Feel for a while you're just like everyone else |
| | Active Participation | Playing music<br>Music Lessons<br>Watching music videos |
| Emotion Regulation | Personal Meaning | Lyrics<br>Sentimental Meaning<br>Reminder of specific people |
| | Familiarity | Expecting the beat<br>Familiar |
| | Emotional Regulation | Uplifting<br>Emotional outlet<br>Wallow too much<br>Coping strategy<br>Amplify emotion<br>Experience different emotions simultaneously |
| Optimal Arousal | Relaxation | Calm music<br>Peaceful atmosphere<br>Meditation<br>Complex music with layers |
| | Physical Motivation | Energetic music<br>Music with a beat<br>Music for Movement |
| | Match Music to outcome | Different music for different levels of pain<br>Upbeat music for movement<br>Dreamy instrumental music for relaxation<br>Relaxing music can be boring |

**Table 1.** Results of Qualitative Analysis

**Conclusions**: The findings demonstrate that chronic pain patients have specific attentional strategies (Musical Integration and Cognitive Agency) that they use with music for pain management.

## Abstract no.: 914

### HEADACHE AND PSYCHOLOGICAL FLEXIBILITY: AN OVERVIEW OF THE EFFICACY OF ACCEPTANCE AND COMMITMENT THERAPY FOR CHRONIC HEADACHE MANAGEMENT

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**Background and aims**: Chronic headaches have a significant impact on the quality of life, associated with disability and affective distress. Acceptance and Commitment Therapy (ACT) emphasizes psychological flexibility, acceptance and valued-

based actions in the presence of pain and has been suggested as an alternative approach for chronic headaches. Although the benefits of ACT for chronic pain have been established, its efficacy on chronic headache treatment is poorly known. Therefore, we aim to address the evidence of the efficacy of ACT for chronic headache management.

**Methods**: We conducted an integrative review using PubMed/Medline database. Search terms: “acceptance and commitment therapy” AND “headache”/ “migraine”. Only randomized control trials (RCTs) were included in the analysis.

**Results**: Six RCTs were eligible. Most of the studies involved patients with primary headache and chronic migraine without aura. The main measured outcomes were disability, affective distress, medication intake, functional status and quality of life. ACT was more clinically effective than controls on most outcomes. One study described greater results when ACT is added to usual pharmacological treatment, which can improve the main clinical outcomes such as headache frequency and medication intake. Another study shows no differences between the groups in general functional status.

**Conclusions**: The ACT approach, focusing on acceptance and value-based actions, seems to improve disability and quality of life among patients with chronic headache, but there is still a lack of scientific evidence. Additionally, methodological limitations may have led to overestimated favourable outcomes. Therefore, further methodologically robust trials are required.

# Pain Therapies - Rehabilitation therapies

## Abstract no.: 179

### INTEGRATING THE MOTIVATIONAL INTERVIEWING INTO THE EXERCISE THERAPY APPROACH IN CHRONIC MUSCULOSKELETAL PAIN. A SYSTEMATIC REVIEW

J. Argüello Marcos[1], J. Cuadros Vicente[1], M. Ramírez Marco[2], J. Montaño Ocaña[1,3], S.E. Martín Pérez[4,1], E.A. Sanchez Romero[1], M.D. Sosa Reina[5,1], J.L. Alonso Pérez[1,4,3]

*[1]Universidad Europea de Madrid, Musculoskeletal Pain and Motor Control Research Group, Faculty of Biomedical and Health Sciences, Villaviciosa de Odón, Spain, [2]Universidad Europea de Madrid, Musculoskeletal Pain and Motor Control Research Group, Faculty of Biomedical and Health Sciences, Villaviciosa de Odon, Spain, [3]Onelife Center, Centro Multidisciplinar en el Tratamiento del Dolor, Alcorcón, Spain, [4]Universidad Europea de Canarias, Musculoskeletal Pain and Motor Control Research Group, Faculty of Health Sciences, La Orotava, Spain, [5]Universidad Alfonso X El Sabio, Villanueva de la Cañada Madrid, Spain*

**Background and aims**: Motivational interviewing (MI) is said to stimulate coping and enhance motivation on exercise therapy (ET). The aim of this study was to evaluate the efficacy of MI on the clinical results of ET in chronic musculoskeletal pain (CMP).

**Methods**: *A systematic review was performed following PRISMA statements using the MeSH keywords “Chronic Pain”, “Exercise Therapy”, “Motivational Interviewing”, “Adherence» and free terms “anxiety”, “kinesiophobia”, “depression”, “avoidance” “fear” and “physical function*” in Cochrane Library, MEDLINE (PubMed), TripDatabase, PEDro and OpenGrey from February to April 2021. Eligibility criteria were:

(1) RCTs

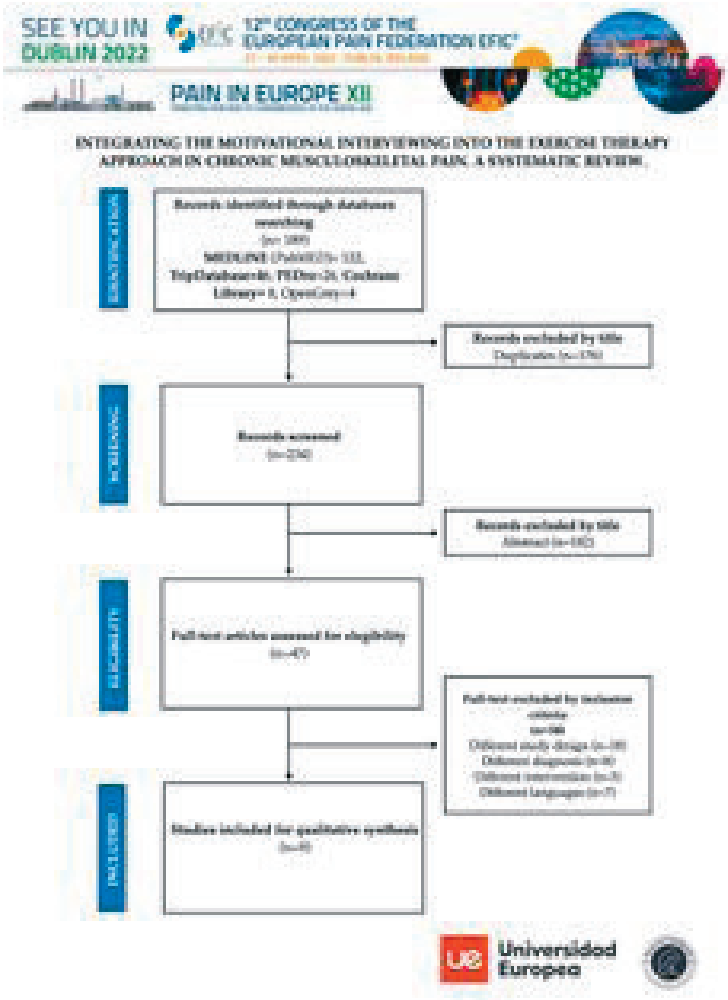
(2) published since the inception to April 2021 in which

(3) subjects were diagnosed by a CMP condition

(4) undergone ET protocol in which a MI has been included. Methodological quality and the risk of bias were blindly and independently assessed with the PEDro scale and Risk of Bias-ROB 2.0 respectively.

**Results**:

9 full-text articles (n=1062 subjects) were included with excellent interrater reliability (Cohen’s kappa=0.822) and rated as moderate quality (M:8.11/10, SD:0.75) and moderate risk of bias. Firstly, ET in combination with a MI reduces the intensity of CMP in subjects with fibromyalgia, spinal low back pain, and knee osteoarthritis (6 RCTs,n=914). Secondly, 3 RCTs (n=164) suggest MI improves physical function due to a greater ET adherence.




**Conclusions**: ET in combination with a MI reduce CMP and promote therapeutic adherence. However, the high heterogeneity of the recruited samples and differences between interventions carried out, as well as the limited follow-up, require to consider these findings with caution.

## Abstract no.: 312

### INDIVIDUAL PATTERNS AND TEMPORAL TRAJECTORIES OF CHANGES IN FEAR AND PAIN FOLLOWING EXPOSURE IN VIVO: A MULTIPLE SINGLE-CASE EXPERIMENTAL DESIGN IN INDIVIDUALS WITH CHRONIC PAIN

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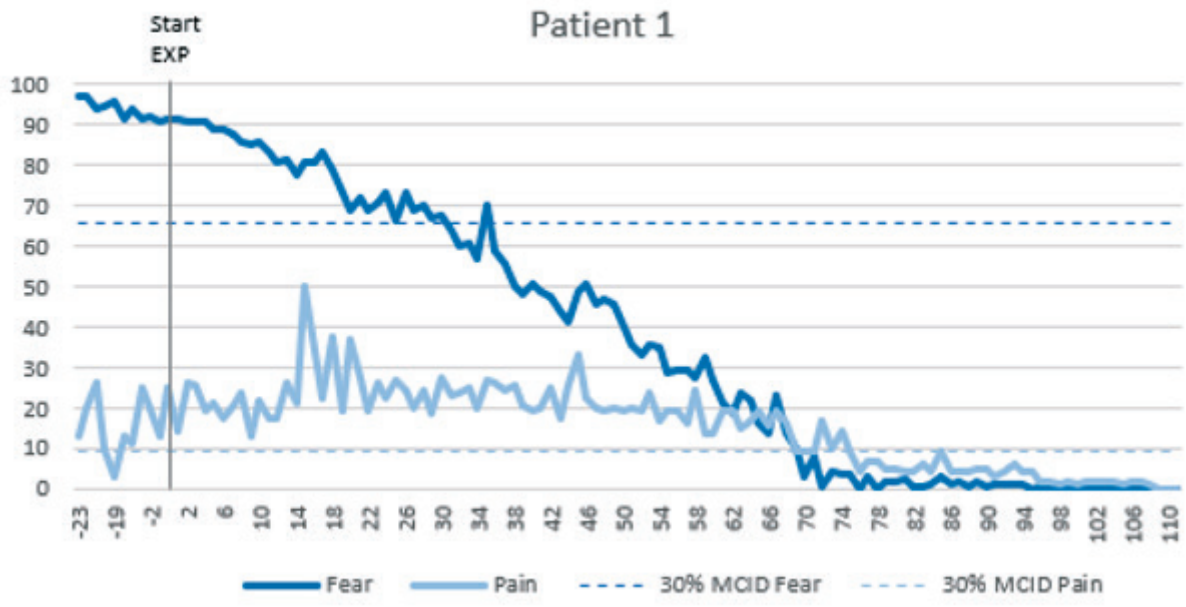
**Background and aims**: Pain-related fear is an important contributor to chronic disability. Exposure in vivo (EXP) is an effective treatment to reduce pain-related fear and disability in chronic pain populations. Although pain is no primary target, a subset of patients also experience pain relief. However, it remains unclear how reductions in pain and fear relate to each other. This single-case experimental design study attempted to identify patterns in the individual responses to EXP based on daily measurements and to unravel temporal trajectories of fear and pain.

**Methods**: Daily diaries were completed before, during and after EXP. Multilevel modelling analyses were performed to evaluate the overall effect. Temporal effects were scrutinized by individual regression analyses and determination of the time to reach a minimal clinically important difference. Furthermore, individual graphs were visually inspected for potential patterns.

**Results**: Twenty patients with chronic low back pain and complex regional pain syndrome type I were included. On a group level, both fear and pain were reduced following EXP. Individually, fear was significantly reduced in 65% of the patients, while pain in only 20%. A decrease in fear was seen mostly in the first weeks, while pain levels reduced later or remained stable.

**Conclusions**: Daily measures provided rich data on temporal trajectories of reductions in fear and pain following EXP. Overall, reductions in fear preceded pain relief and seems to be essential to achieved pain reductions. Future research should further unravel the benefits of patient clustering for screening and treatment approaches.

**Figure: example of an individual response to EXP.**




## Abstract no.: 338

### EFFECTIVENESS OF BODILY ILLUSION THERAPY COMBINED WITH PHYSICAL THERAPY ON PAIN IN PATIENTS WITH INCOMPLETE SPINAL CORD INJURY

S. Mollà-Casanova[1], N. Sempere-Rubio[1], M. Inglés[1], E. Muñoz-Gómez[1], M. Aguilar-Rodríguez[1], P. Serra-Añó[1]

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**Background and aims**: Neuropathic pain has an important impact on people with incomplete spinal cord injury (iSCI) life. The aim of this study is to evaluate the effectiveness of bodily illusion therapy combined with physical exercise on pain and basic daily activity affectation on people with iSCI.

**Methods**: Ten participants with chronic iSCI coursing neuropathic pain were involved in this study. The program lasted six weeks with three sessions per week. Each session included two parts: at the first part, the volunteers stood in front of a mirror (upper body) and a screen (lower body) with a projected video with walking legs, for 10 minutes. The second part consists of 30 minutes of physical exercise.

Neuropathic pain and its impact on the volunteers' life were assessed by the Brief Pain Inventory two times: before intervention (T1) and after intervention (T2).

**Results**: Repeated measures T-Student test concluded that there are statistically significant differences for the pain severity between T1 and T2 ($p<0.05$), but there are not statistically significant differences on interference of pain on daily activities.

**Conclusions**: Bodily illusion therapy combined with physical exercise improve neuropathic pain severity in people with iSCI, but this improvement does not entail a decrease of interference of this pain on daily activities.

## Abstract no.: 487

# THE EFFECTS OF ADDING A CENTRAL NERVOUS SYSTEM-FOCUSED APPROACH TO MANUAL THERAPY AND HOME STRETCHING PROGRAM IN PEOPLE WITH FROZEN SHUOLDER: A RANDOMIZED CONTROLLED TRIAL

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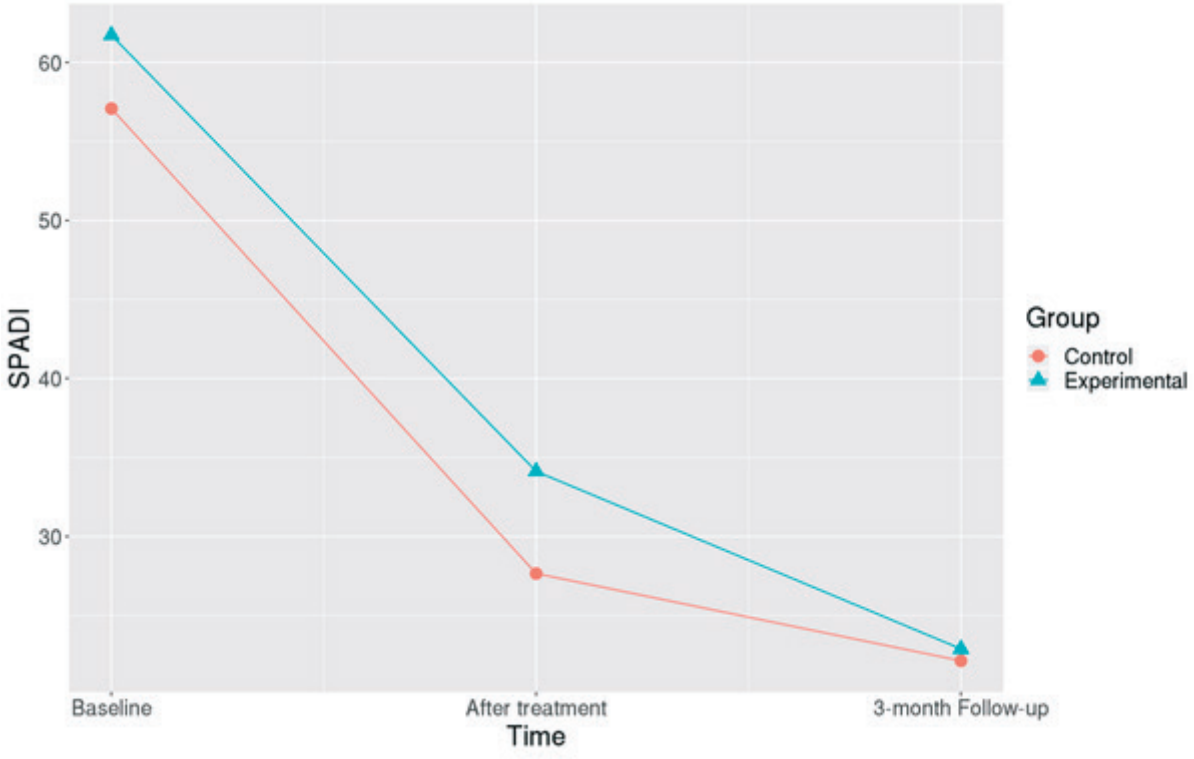
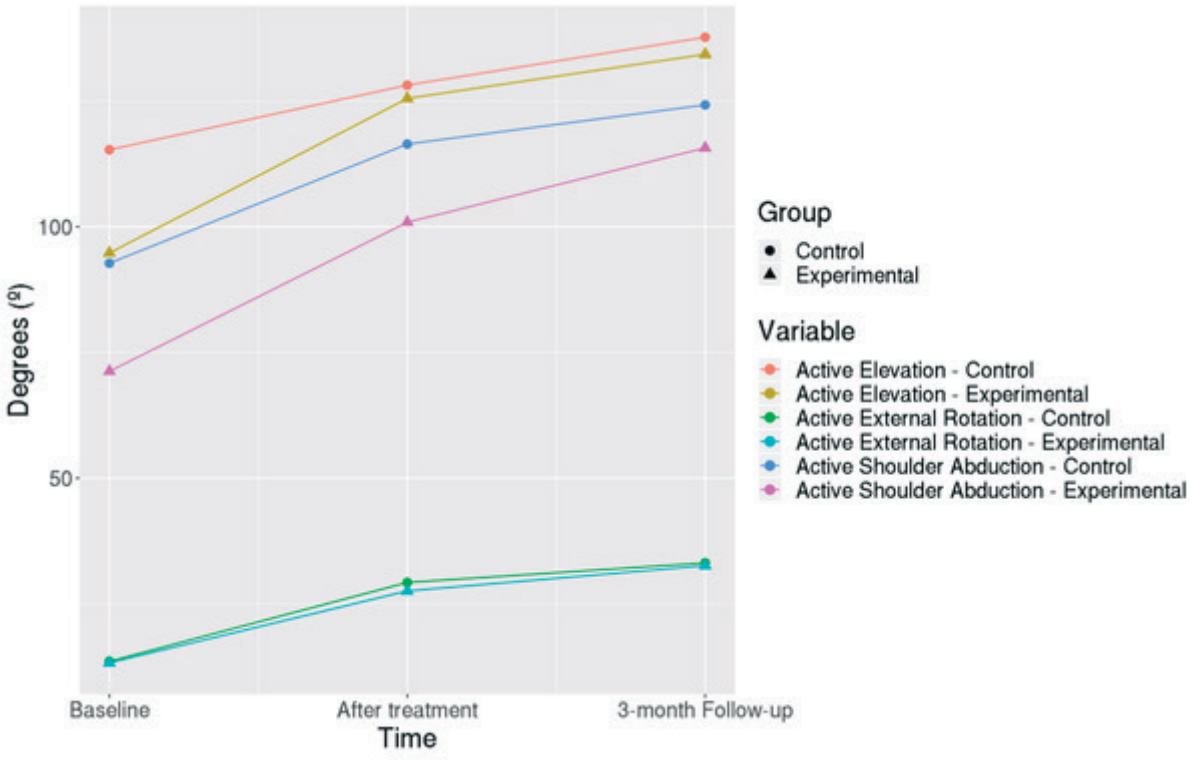
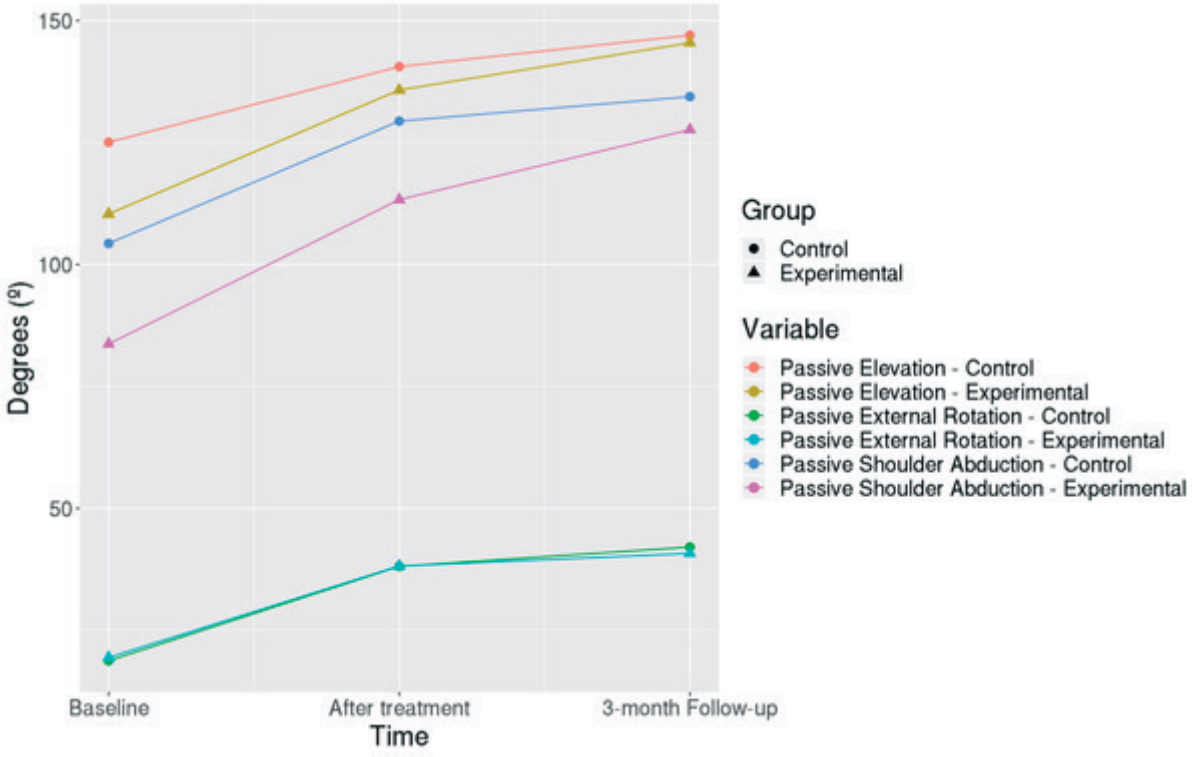
**Background and aims**: Frozen shoulder (FS) is a highly disabling condition which underlying physiopathology is still poorly understood. There is compelling evidence on the effectiveness of a wide variety of conservative and non-conservative interventions for the management of FS. However, there is still no therapeutic approach either showing superiority over others or influencing the natural history of FS, so innovative research in this area has been claimed in the last years. Different central nervous system (CNS)-focused approaches have been recently used for treating shoulder pain including FS with promising results. The aim of this study was to evaluate the effect of adding a CNS-focused treatment approach to manual therapy and home stretching program in people with FS.

**Methods**: Thirty-four subjects with FS were randomly allocated to receive either a 12-weeks manual therapy and home stretching program or manual therapy and home stretching program plus a CNS-focused approach including sensory discrimination training and graded motor imagery. The Shoulder Pain and Disability Index (SPADI) was the primary outcome. Self-perceived shoulder pain, shoulder range of motion (ROM) and the Patient Specific Functional Scale (PSFS) were also measured. Measurements were performed at baseline, after a 2-weeks washout period, after the intervention and at three months follow-up.

**Results**: Between-groups analysis did not show significant differences (p>0.05) in any outcome measure at any of the assessment points.






**Conclusions**: Our results suggest that adding a CNS-focused approach to a manual therapy and home stretching program provide no additional benefits in terms of shoulder pain and function in people with FS.

## Abstract no.: 527

# SEX AND PAIN CHARACTERISTICS INFLUENCE THE EFFECTIVENESS OF PREOPERATIVE PAIN NEUROSCIENCE EDUCATION IN PEOPLE UNDERGOING TOTAL KNEE ARTHROPLASTY: SECONDARY ANALYSIS OF A RANDOMIZED CONTROLLED TRIAL

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**Background and aims**: This study explores the moderating effect of sex and pain characteristics on the effectiveness of preoperative pain neuroscience education (PNE) plus knee joint mobilization versus biomedical education plus knee joint mobilization in people with knee osteoarthritis (KOA) undergoing total knee arthroplasty (TKA).

**Methods**: After baseline assessment of questionnaires (pain intensity, disability, symptoms of central sensitization and pain cognitions) and experimental pain measurements, 44 participants with KOA were randomized into the PNE plus knee joint mobilization or biomedical education plus knee joint mobilization group. Questionnaires were retaken directly after and 1 month after the intervention, and 3 months post-surgery. Based on principal components and cluster analysis of baseline experimental pain measurements, the sample was subdivided into a high (high pain levels and low pressure pain thresholds) and low pain cluster. Intervention effects over time were evaluated using 3-way ANOVA›s with intervention, sex and pain cluster as between factors.

**Results**: Women, but not men, benefited significantly more from PNE compared to biomedical education in terms of self-reported symptoms of central sensitization (Figure1). Participants in the high pain cluster benefitted more from the PNE intervention in terms of pain (Figure 2), pain willingness, pain magnification and pain vigilance (Figure 3) as compared to the low pain cluster.

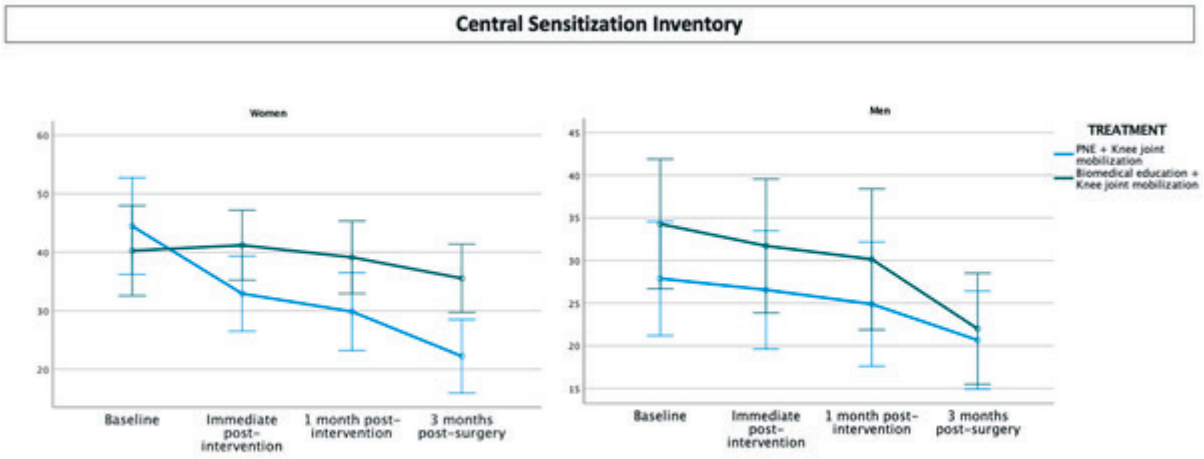


**Figure 1:** Mean outcomes for the Central Sensitization Inventory scores (including 90% error bars) for the PNE and control intervention in women and men over time

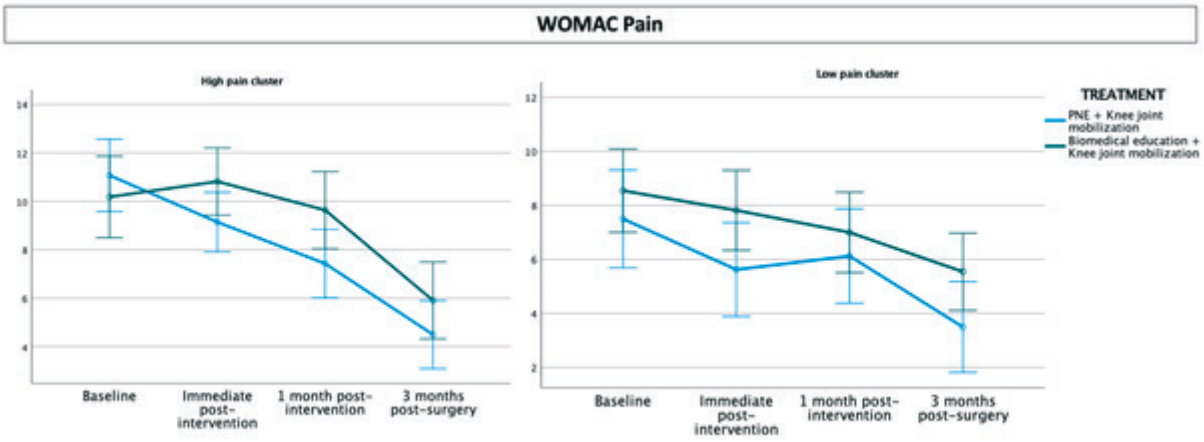


**Figure 2:** Mean outcomes for the WOMAC pain subscale scores (including 90% error bars) for the PNE and control intervention in the high and low pain cluster over time

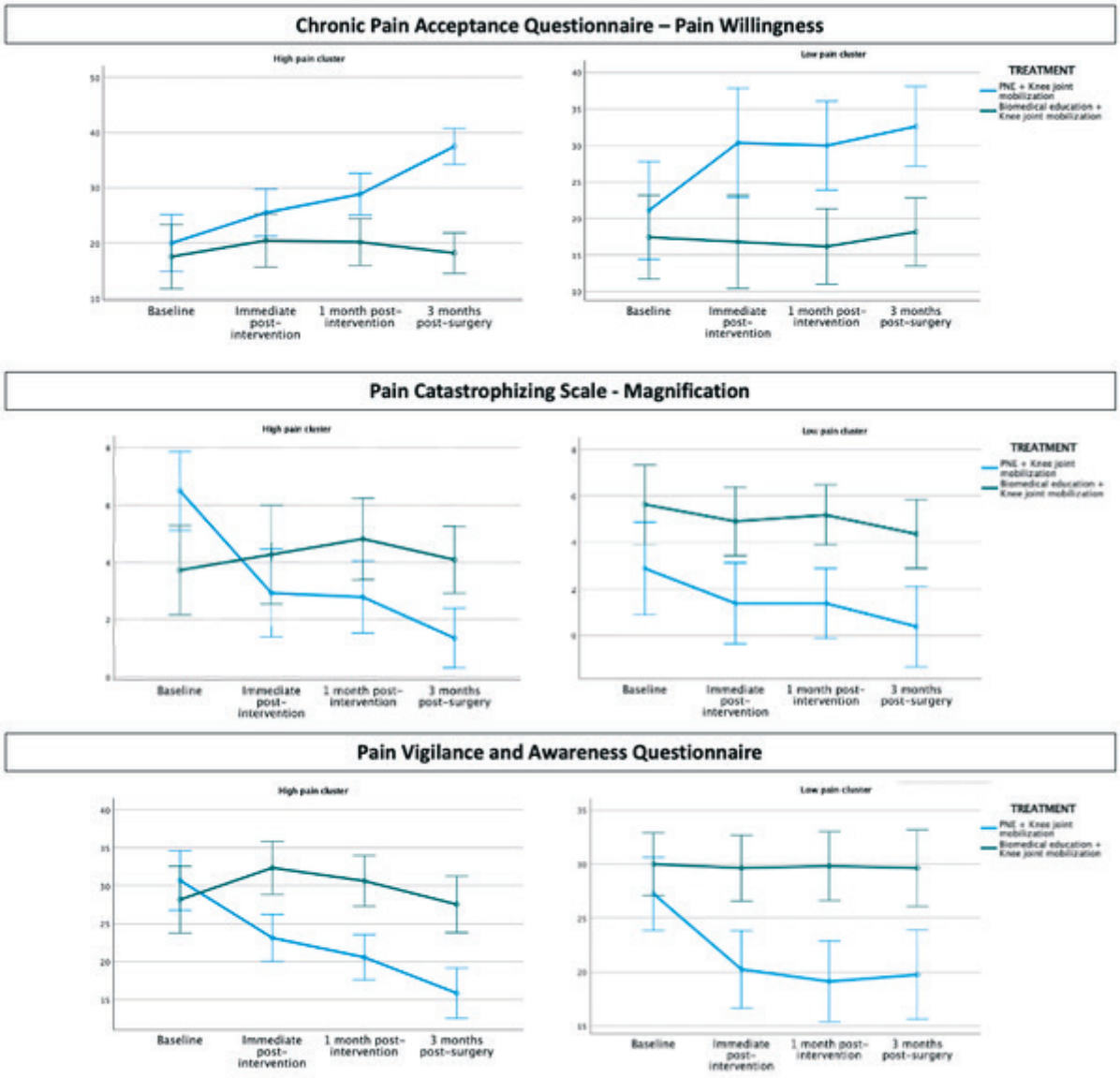


**Figure 3:** Mean outcomes for pain willingness, pain magnification and pain vigilance (including 90% error bars) for the PNE and control intervention in the high and low pain cluster over time

**Conclusions**: Based on these explorative analyses it can be concluded that sex and preoperative pain measures may influence the effectiveness of preoperative PNE and should be considered when implementing this intervention in people with KOA scheduled to undergo TKA.

## Abstract no.: 636

### USE OF NON-MEDICATIONS TO TREAT STRESS HEADACHE AFTER COVID-19

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**Background and aims**: The effect of the complex (acupuncture, d'arsonval currents and variable magnetic field) for the pain intensity of the patients having post-COVID-19 tension-type headache was investigated.

**Methods**: 80 patients aged from 30 to 55 (42 females and 38 males) having post-COVID-19 tension- type headache were observed. The pain was examined and measured according to the visual analogue scale (6 - 8 points). All patients were observed (MRI, doppler ultrasound vessels of the head and neck, electromyography etc.). All the patients selected by us had had a mild form of covid-19 without developing pneumonia. They had the disease 3 to 8 months ago. In all patients in the corresponding period of the disease, immunoglobulins M and G to COVID-19, strain Alpha were found.

The patients were divided into two groups. The first group (61 patients) received in addition their basic medication and complex: acupuncture (individual points), variable magnetic field to the neck paravertebrally and d'arsonval current on the scalp and neck - shoulder region. The complete course was 10 - 12 procedures. The second group (control, 19 patients), received only the basic medication.

**Results**: The pain intensity of the patients in the first group was reduced after 12 - 17 days of treatment (96,7% patients) compared to the control group, where pain reduction after 22 - 26 days of treatment (44,4% patients); p< 0,01.

**Conclusions**: The addition of the acupuncture, variable magnetic field and d'arsonval current to the treatment of post-COVID-19 tension-type headache resulted in earlier remission.

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## Abstract no.: 744

### COLLECTIVE BRISK WALKING PLUS YOGA IS MORE EFFECTIVE THAN INDIVIDUAL PHYSICAL THERAPY ON PHYSICAL FITNESS, ACTIVITIES AND PARTICIPATION IN PEOPLE WITH CHRONIC LOW-BACK PAIN

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**Background and aims**: The current study investigates the effectiveness of collective brisk walking plus yoga compared to individual conventional physical therapy (ICPT) on impairments, activities of daily living (ADL) limitations and social participation (SP) restrictions in people with nonspecific chronic low-back pain (CLBP).

**Methods**: This is a two-arm parallel, randomized controlled trial with blinded assessments. Fifty-eight individuals with CLBP were randomly assigned to either brisk walking plus yoga (n=29) or ICPT (n=29). Both groups participated in three weekly sessions for 12 weeks followed by 12 weeks of follow-up period. The primary outcome measure was ADL limitations measured with Roland Morris Disability Questionnaire. Secondary outcomes included pain with numerical rating scale, depression with Beck depression inventory, fear avoidance beliefs with fear avoidance beliefs questionnaire, trunk muscles endurance with Shirado and Sorensen tests, exertion with Borg category ratio scale, and SP restrictions with 5-Item Pain Disability Index.

**Results**: Within groups analysis showed significant improvement in both groups for all variables ($0.001<p\leq0.040$), except trunk extensors endurance ($p = 0.150$) and perceived exertion ($p=0.123$) in ICPT group. Between group analysis demonstrated no significant differences in pain, depression and fear avoidance beliefs ($p>0.05$) but walking plus yoga was statistically superior to ICPT with regards to abdominals endurance, spine extensors endurance, perceived exertion, ADL limitations and SP restrictions ($0.001<p\leq0.034$).

**Conclusions**: Both collective brisk walking plus yoga and ICPT improved significantly CLBP-related outcomes, except spine extensors endurance and perceived in ICPT group. Collective brisk walking plus yoga was superior to ICPT for muscle endurance, perceived exertion, ADL limitations and SP restrictions.

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## Abstract no.: 788

# CURRENT PHYSIOTHERAPY MANAGEMENT APPROACHES FOR THE MANAGEMENT OF PAIN IN PATIENTS WITH ENDOMETRIOSIS

P. Sardesai[1]

[1]*University of Nottingham, Nottingham, United Kingdom*

**Background and aims**: Endometriosis is defined and diagnosed surgically by the appearance of endometrial-like glands and stroma in the site's exterior to the uterus. It is a complex, multifactorial condition occurring in women of reproductive age. The research in the pain management of this chronic condition is evolving, and the role of physiotherapy and patient-centred care is still embryonic.

**Methods**: The review summarises thirteen published studies on the effects of various types of physiotherapy interventions on patients with endometriosis. The articles comprise manual therapy, exercise, acupuncture, yoga, progressive muscular relaxation exercises and electrotherapy. A conceptual framework framed to summarise the non-invasive, allied health treatment for endometriosis.

**Results**: Acupuncture, manual therapy, electrotherapy and yoga were found to be clinically significant in relation to the alleviation of pain and overall quality of life. In contrast, exercises did not affect nor change the pain in the patients. There is a need to research suitable exercises for patients with endometriosis. Overall, mind-body interventions, when accompanied by drug therapy, yields better results and poses a new clinical finding as to its requirement to counter the side-effects of the medical and surgical interventions.

**Table 1. Studies involving Manual therapy and conventional physiotherapy intervention**

| Authors | Participants | Design | Mode of Intervention | Outcome measures | Results |
|---|---|---|---|---|---|
| Hunt[14] (2019) | Diagnosis: -Referred for Pelvic floor dysfunction -Previous history of 3 surgeries due to endometriosis N: 1 Age: 50 Sex: F Setting: Private Clinic | Case Report | Manual therapy, Relaxation techniques, Self-pelvic floor manual therapy, hip stretching, walking<br><br>One-hour session with a total of 10 visits over four months | PFIQ-7, VAS | Patient reported 0-1/10 (VAS) after therapy with 3-4/10 in pain scale in activities compared to 7-8/10 (VAS) she experienced before the treatment |
| Goyal et al.[15](2017) | Diagnoses: Endometriosis + low back pain + abdominal pain N: 1 Age: 28 Sex: F Setting: Outpatient Clinic | Case Report | Manual therapy Two sessions once a week over four weeks | HRQOL, VAS | Patient reported a decrease in pain after therapy with 4/10 from 8/10 in VAS. She reported 26/100 compared to 72/100 in HRQOL. |
| Petrelluzzi et al.[20] (2012) | Diagnosis: endometriosis + chronic pelvic pain N: 26 Age: 30-33 Sex: F Setting: Hospital | Experimental study | Conventional Physiotherapy: Relaxation, exercises, stretching, massage + cognitive behavioural therapy Ten sessions lasting two and a half hour, once a week | HRQOL, VAS, PSQ | Clinically significant results in VAS compared to PSQ in the patients. |

VAS-Visual Analogue Scale, HRQOL- Health-related quality of life, PSQ-Perceived stress questionnaire, Pelvic Floor Impact Questionnaire Short-form 7-PFIQ-7

**Table 2. Studies involving Electrotherapy for patients with endometriosis**

| Authors | Participants | Design | Mode of Intervention | Outcome measures | Results |
|---|---|---|---|---|---|
| Mira et al. [21] (2015) | Diagnosis: Deep Infiltrating Endometriosis + pelvic pain N: 22 Age: 28-44 Sex: F Setting: Tertiary healthcare centre | RCT | Acupuncture-like TENS Versus Self TENS 30 mins/once a week over eight weeks for Acupuncture-Like TENS 20 mins/twice a day for eight weeks for self-applied TENS. | VAS, EQOL-Q | Patients reported significant improvement in deep dyspareunia, chronic pelvic pain in women. |
| Thabet and Alshehri.[22] (2018) | Diagnosis: Endometriosis N: 40 Age: 24-32 Sex: F Setting: Umm Al-Qura University Hospital | RCT | Pulsed High-Intensity Laser therapy versus Sham Laser Therapy<br><br>Twenty minutes for three sessions/week for eight weeks. | PPI, PRS, EHP-30 | Patients undergoing pulsed high laser therapy reported a clinically significant decrease in pain compared to Sham laser therapy |

EHP-30- Endometriosis health profile, PPI- Present Pain Intensity, PRS- Pain relief scale, EQOL-Q- Endometriosis Quality of Life Questionnaire

**Table 3. Studies involving Yoga and PMR for endometriosis**

| Authors | Participants | Design | Mode of Intervention | Outcome Measures | Results |
|---|---|---|---|---|---|
| Goncalves et al.[23] **(2016)** | Diagnosis: Endometriosis<br>N: 40<br>Age: 24–49<br>Sex: F<br>Setting: Medical School of University of Campinas | Semi-structured interview + RCT | Yoga versus no yoga<br>3:1 divide of groups<br>90 minutes of the session over eight weeks | Women's physical and emotional state at the beginning of the practice, control and management of the practice of yoga | Participants undergoing yoga treatment reported greater self-knowledge and awareness as compared with no intervention. |
| Goncalves et al.[24] (2017) | Diagnosis: Endometriosis + chronic pelvic pain<br>N: 40<br>Age: 28–42<br>Sex: F<br>Setting:<br>Public University Hospital | RCT | Hatha Yoga<br>Versus no yoga<br>3:1 group divided<br>Yoga session held for 2 hours twice a week | VAS, EHP-30 | There was a significant difference in pain and quality of life as compared to no yoga group |
| Zhao et al.[25] **(2012)** | Diagnosis: Endometriosis<br>N: 100<br>Age: 18–48<br>Sex: F<br>Setting: Xiangya Hospital, Central South University | RCT | Progressive muscular relaxation (PMR) plus GnRH agonist therapy versus GnRH agonist therapy<br>Twice per week over 40 minutes in twelve weeks | State trait anxiety inventory, Hospital anxiety and depression scale and SF-36 for Quality of Life | The PMR group showed a significant decrease in anxiety, depression and overall QOL in contrast to the control group. |

VAS- Visual Analogue Scale, SF-36- Short Form 36

**Table 4. Studies involving Exercise for endometriosis**

| Authors | Participants | Design | Mode of Intervention | Outcome Measures | Results |
|---|---|---|---|---|---|
| Bonocher et al.[26] (2014) | Women population with endometriosis | Systematic review | Physical exercises such as running, gymnastics | The relationship between exercise and endometriosis | The results are inconclusive regarding physical activity and its potential impact of training on the course of the endometriosis. |
| Poli-Neto et al.[27] **(2019)** | Diagnosis: Endometriosis<br>N: 21<br>Age: 43<br>Sex: F<br>Setting: University Hospital of Ribeir~ao Preto Medical School | Quasi-experimental study | Strength exercises<br>Once a week exercise session for four weeks on an extensor chair | Electric algometer (pain threshold) | Women with endometriosis-related symptoms did not present significant alterations in pain threshold after exercise. |

Table 5. Studies involving Acupuncture for endometriosis

| Authors | Participants | Design | Mode of Intervention | Outcome Measures | Results |
|---|---|---|---|---|---|
| Payne[28] (2019) | Diagnosis: Endometriosis N: 1 Age: 43 Sex: F Setting: Traditional Chinese medicine clinic | Case Report | Acupuncture and herbal formulas Twice per week over six months | Pain Quality Assessment Scale | The patient reported a significant decrease in pain (from level 10 to 3) and lesser clots during menstrual bleeding. |
| Wayne et al.[29] (2008) | Diagnosis: Endometriosis N: 18 Age: 18-22 Sex: F Setting: Tertiary referral hospital | Randomised sham-controlled trial | Acupuncture versus sham-acupuncture Sixteen treatments over eight weeks | EHP, Paediatric Quality of Life, PSQ, and Activity Limitations | Participants who underwent acupuncture treatment experienced a reduction in pain compared to the group which underwent sham Acupuncture. |
| Zhu et al.[30] (2011) | Women diagnosed with endometriosis with the chief complaints of chronic pelvic pain | Systematic review | Acupuncture versus placebo/sham/no treatment | VAS | Dysmenorrhoea was significantly lesser in the acupuncture group compared to the control group. |
| Xu et al.[31] (2017) | Women diagnosed with endometriosis with the chief complaints of chronic pelvic pain | Systematic review | Acupuncture versus the control group | Pain scale, Peripheral blood CA-125 levels | Acupuncture decreases serum CA-125 levels and pain. |

VAS- Visual Analogue Scale, PSQ- Perceived Stress Questionnaire, EHP- Endometriosis Health Profile

**Conclusions**: Although the studies here are hopeful, further research is needed with larger samples and a diverse population of women to strengthen and translate the clinical outcomes of these interventive measures to patient-therapist practice.

## Abstract no.: 1141

### THE EFFECT OF PSYCHOSOCIAL INTERVENTIONS TARGETING CHRONIC PAIN IN PEOPLE WITH COPD: A SYSTEMATIC REVIEW

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[1]*Teesside University, Middlesbrough, United Kingdom*

**Background and aims**: Chronic Obstructive Pulmonary Disease (COPD) is a debilitating, non-reversible lung disease frequently complicated by chronic pain at greater intensities than the general population, yet chronic pain management is not reflected in current COPD management guidelines and pharmacological treatments appear largely ineffective. This systematic review aimed to establish the effect of psychosocial interventions on chronic pain and investigate behavioural interventions and their components associated with effective pain management in individuals with COPD.

**Methods**: The systematic review was conducted with reference to PRISMA and GRADE. Fourteen electronic databases were searched for RCT and Non-RCT trials of psychosocial interventions targeting chronic pain as a primary or secondary outcome in people with COPD. Quality of life outcome measures were included where pain was a component.

**Results**: Twenty-seven trials were identified including 2,814 participants with mild to very severe COPD. Twenty-one studies were RCTs. Interventions varied considerably including education, exercise, breathing, self-management and psychotherapeutic interventions. A proportion included enhanced follow up or telephone monitoring. Six studies with varied methodologies reported a minimally important clinical differences (MICD) in pain outcomes. Two were statistically significant. The quality of the studies reviewed was low, predominately due to statistical power issues and risk of bias. No single intervention type or change technique was shown to consistently improve pain for people with COPD.

**Conclusions**: These findings support previous systematic reviews that suggest current COPD management interventions do not assist with pain management. More targeted, behaviour change pain management interventions should be developed for this population.

## Abstract no.: 1153

# PEOPLE WITH CHRONIC PAIN HAVE REDUCED BREATHING QUALITY DURING TASKS, AND GREATER RISK OF BREATHING DISORDERS, THAN PEOPLE WITHOUT CHRONIC PAIN: A SCOPING REVIEW

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*[1]University of South Australia, Adelaide, Australia, [2]Curtin University, Perth, Australia*

**Background and aims**: Chronic pain management is complex with multimodal interventions such as breathing. Despite widespread use, the relationship between breathing quality and chronic pain is poorly understood. We undertook a scoping review to examine all levels of evidence for the relationship between breathing and chronic pain.

**Methods**: Six electronic databases were searched from inception to April 2021 for studies investigating breathing quality in adults with chronic non-cancer pain (>3 months duration) or the association between chronic pain in adults with breathing disorders. English publications, which excluded co-morbid neurological (such as head injury or stroke) or other chronic conditions (including COVID-19) were screened, charted and categorised.

**Results**: Of 36834 studies (16,658 duplicates), forty-seven studies with 74 outcome measures (40 breathing, 20 pain and 14 disability) examined the relationship between breathing and chronic pain. People with or without chronic pain breathe similarly when resting. The addition of a functional activity reduced diaphragm excursion and increased respiration rate and upper costal breathing more for people with LBP. Eight of 11 randomised controlled trials reported decreased chronic pain intensity following a breathing intervention compared to controls, and three reported greater than 3-point reductions on an 11-point numerical rating scale. Chronic pain was higher in people with chronic obstructive pulmonary disease (60%) or moderate asthma (47%) than without.

**Conclusions**: Breathing quality and chronic pain are linked. People with or without chronic pain breathe similarly at rest, yet reduce breathing quality during functional tests. People with chronic obstructive pulmonary disease or asthma reported more chronic pain than people without breathing disorders.

# AUTHOR INDEX

## A



## Á



## Ä



## Å



## B

## C

## D

## E



## F

## G

## H

## I



## J

## K

## L

## M

## N

## O



## Ø



## P

## Q



## R

## S

## T



## U



## V

## W

## Y



## Z