

P193 DEVELOPMENT OF A FULL-AUTOMATED SYSTEM TO ASSESS THE BONE MINERAL DENSITY OF THE PROXIMAL FEMUR FROM CLINICAL CT IMAGES

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Objective: QCT can be employed as a substitute for DXA in measuring proximal femur BMD. However, as commercially available software is usually necessary for quantifying BMD from QCT, we aimed to 1) develop a full-automated system that quantifies BMD from CT images and 2) validate its accuracy in a multi-center study. **Methods:** This study included 872 pairs of hip CT and DXA images with a diagnosis of osteoporosis (380 hips) according to the T-score calculated from the DXA measurements of the proximal femur (DXA-BMD). CT images were acquired at three institutions with five CT models and seven imaging protocols. From the CT images, the femur and a calibration phantom were automatically segmented using a deep-learning model that we have reported previously (Figure). Then, nine landmarks at the proximal femur (centers of the head and neck, four at the head-neck junction, lesser trochanter, and 2&5 cm below the lesser trochanter) were selected by a deep-learning model trained by manual landmark selection of 315 cases. These landmarks were used to rotate the femur to the neutral position, and the landmarks and the femur model were projected onto the coronal plane. The calibration phantom was employed to convert the Hounsfield units into density, and the BMD of the proximal femur region was quantified (CT-aBMD). CT-aBMD was correlated to the DXA-BMD, and the accuracy in diagnosing osteoporosis was quantified by a receiver operating characteristic (ROC) analysis.

Results: The correlation coefficient between CT-aBMD and DXA-BMD was 0.944 ($p < 0.01$), and the mean absolute difference between CT-aBMD and DXA-BMD was 0.05 g/cm². In the ROC analysis, the area under the curve for diagnosing osteoporosis was 0.979, with a sensitivity of 92.5% and a specificity of 92.4%.

Conclusion: Quantification of proximal femur BMD and diagnosis of osteoporosis from QCT were accurately performed with the system developed in this study. This system can aid clinicians in opportunistically screening osteoporosis from CT images acquired for other clinical purposes.

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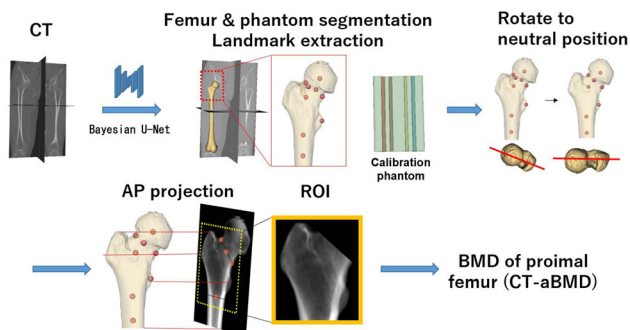


Figure: Flowchart for quantifying the CT-aBMD

P194 PHYSICAL ACTIVITY ASSESSMENT IN YOUNG ADULTS WITH JUVENILE IDIOPATHIC ARTHRITIS

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Objective: Musculoskeletal features of juvenile idiopathic arthritis (JIA) may cause reduced physical activity (PA). This study aimed to assess PA in patients with JIA and investigate its associated factors. **Methods:** This is a single-center cross-sectional study involving young patients with JIA. Inclusion criteria: patients with JIA aged 18–44. The exclusion criteria were refusal to participate in the study and any comorbidity. Patients responded to the International Physical Activity Questionnaire-Short form (IPAQ-SF). The following categories of PA levels were used: low PA (less than 600 MET-minutes per week); moderate PA (600–1500 MET-minutes per week); high PA (more than 1500 MET-minutes per week).

Results: 40 patients were included (16 M/24 F) with an average age of 24.4 ± 5 years. The mean duration of JIA was 13.8 ± 8.1 years. About 90% of patients were from an urban setting. The mean of vigorous PA was 677.7 ± 1057.7 MET-min/week; the mean moderate PA was 826.9 ± 906.6 MET-min/week; the mean walking time was 594 ± 682 min/d; the mean sitting time was 330 ± 118 min/d; the mean sum of PA— 2099 ± 2453 MET-min/week. IPAQ distribution: 40% (16) of patients had low PA, 25% (10) had moderate PA while 35% (14) of the patients had high PA. The sum level of PA positively correlated with femoral neck BMD ($r = 0.429$, $p = 0.02$), ultradistal radius BMD ($r = 0.534$, $p = 0.05$), arm lean mass ($r = 0.678$, $p < 0.001$), leg lean mass ($r = 0.748$, $p < 0.001$), hand-grip strength ($r = 0.617$, $p < 0.001$), gait speed ($r = 0.511$, $p < 0.001$); and negatively correlated with total fat (%) ($r = -0.396$, $p = 0.01$), total fat (g) ($r = -0.340$, $p = 0.03$), swollen joint count ($r = -0.312$, $p = 0.05$) and articular damage index JADI-A ($r = -0.311$, $p = 0.05$). Disease activity (DAS28, JADAS27 indices), pain by VAS, vitamin D, and Health Assessment Questionnaire scores did not correlate with the level of PA ($p > 0.05$).

Conclusion: Young patients with JIA perform different levels of PA. Except for lean, bone mass, articular damage, muscle strength and performance, no other associated factors were found.

P195 COMPREHENSIVE GERIATRIC ASSESSMENT FOR IDENTIFYING MORTALITY RISK IN OLD PATIENTS AFTER HIP FRACTURE SURGERY

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Objective: To determine the characteristics of old patients with hip fracture via comprehensive geriatric assessment (CGA) and identify mortality risk factor.

Methods: In this prospective cohort study, old adults (≥ 60 years) who had undergone hip fracture surgery were consecutively enrolled in a single medical center from January 2020 to December 2021. The CGA, including physical health, functional status, psychological health, and nutrition, as well as clinical information of each patient was recorded during the hospital stay. The Cox regression model was performed to analyze the relationship of survival with the relevant variables.

Results: A total of 164 old patients (66 males and 98 females) with mean age of 81.09 ± 8.84 years were included. 27 patients died within one year with a mortality rate of 16.46%. In Cox regression