



*VI international scientific conference
Brussels. Belgium
21-22.04.2026*

DIALOGUE OF TIMES: PAST, PRESENT, FUTURE

Proceedings of the VI International Scientific and Practical Conference

21-22 April 2026

BRUSSELS. BELGIUM

2026

UDC 001.1

BBC 1

VI International Scientific and Practical Conference «Dialogue of times: past, present, future», April 21-22, 2026, Brussels. Belgium. 172 p.

ISBN 978-91-65424-69-2

DOI <https://doi.org/10.5281/zenodo.19823915>

Publisher: «SC. Scientific conferences»

Main organization: 

Editor: Hans Muller

Layout: Ellen Schwimmer

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The sample of the citation for publication is Gugin Aleksandr, Lisnievska Yuliia ANTI-ADVERTISING IN THE HOTEL BUSINESS // VI International Scientific and Practical Conference «Dialogue of times: past, present, future», April 21-22, 2026, Brussels. Belgium. Pp.9-11, URL: <https://sconferences.com>

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MOLECULAR MIMICRY OF Tl^+ : THE MECHANISM OF ITS TOXIC EFFECTS AND ITS CONSEQUENCES FOR THE HUMAN NERVOUS SYSTEM

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Introduction. Despite restrictions on the use of thallium compounds in the agricultural sector, the problem of thallium poisoning remains acute due to extensive human activity. The release of thallium into ecosystems as a result of industrial use of the element leads to its persistent bioaccumulation in food chains and cases of serious poisoning.

The main material. Thallium is a trace element in the periodic table, located in the 6th period, Group III (or Group 13 according to the current IUPAC classification), with atomic number 81; it is characterized by high toxicity, significant reactivity, and high bioavailability [1, p. 1; 2, p. 1; 3, p. 1]. The element dissolves rapidly in water and acids, after which it exhibits two oxidation states, Tl^+ and Tl^{3+} . The first form is considered the most dangerous due to its ionic radius, which is close to that of K^+ (0.176 nm for Tl^+ and 0.160 nm for K^+), and its identical valence (+1). These properties lead to rapid accumulation of the toxin by cells [1, p. 1-3; 2, p. 1; 3, p. 1-2].

The highest concentrations of thallium are found in crookesite, lorandite, hutchinsonite, and urbaite, but on an industrial scale, it is obtained during the processing of non-ferrous metal ores. After the element was discovered in 1861, it was used in pesticides and therapeutic agents for tuberculosis, malaria, syphilis, gonorrhoea, ringworm, and other conditions. Over time, these uses were banned in many countries around the world. Today, the element is still found in diagnostic agents, used in the creation of costume jewelry, green fireworks, optical technologies, measuring instruments (scintimeters), and photovoltaic cells, and is employed in the gravitational enrichment of minerals [1, p. 2; 2, p. 1-3; 3, p. 2].

Tl_2O is released into the Earth's atmosphere as a result of the metallurgical industry, volcanic eruptions, and soil erosion. It is estimated that approximately 5 tons of thallium enter ecosystems annually due to human activities. The highest concentrations of this toxin are found in urban areas and industrial regions. The deposition of thallium compounds or sediment leads to excessive bioaccumulation of the element in organisms of the hydrosphere and lithosphere. It is important to note that Tl^+ ions are the most common form in ecosystems due to their thermal stability. The food chain, starting with producers, is considered the typical mechanism for the transfer of the element to higher trophic levels [1, p. 2-3; 2, p. 2;]. For example, crops grown on polluted land can lead to thallium poisoning in humans [1, p. 3].

Thallium enters the body through ingestion, percutaneous absorption, inhalation, and other routes. It typically occurs in the form of salts (Tl_2SO_4), oxides (Tl_2O , Tl_2O_3), or hydroxides ($TlOH$). The lethal dose of the element is 10–15 mg/kg, and with chronic exposure, it is 0.1–100 mg/kg. The body may be more sensitive to thallium due to age, physical characteristics, and other factors [1, p. 3; 2, p. 1-3; 3, p. 3; 4, p. 30]. In many cases, the toxin is successfully absorbed by the body. This process is most effective when the compounds come into contact with mucous membranes: between 80% and 100% of the thallium is absorbed [2, p. 3; 3, p. 3; 4, p. 30; 5, p. 115]. A key characteristic of the substance in the context of poisoning is the striking similarity of its physical and chemical properties to those of potassium. Tl^+ effectively replaces K^+ in the sodium-potassium ATPase mechanism, exhibiting an affinity for the pump that is many times higher than that of potassium. At this stage, the imbalance of particles causes depolarization of the cell membrane and disrupts the ionic balance, particularly that of Ca^{2+} . The element has a similar effect on mitochondria: by penetrating transport systems similar to the sodium-potassium pump, thallium causes a decrease in mitochondrial membrane potential. The mitochondria swell and become vacuolated [1, p. 4-5; 2, p. 7-8; 3, p. 2-3; 4, p. 31; 5, p. 114]. It is important to note that thallium is capable of forming complexes with sulfhydryl groups (-SH, which are characteristic of certain proteins and membrane components), thanks to its empty d-orbital [1, p. 4; 2, p. 7; 4, p. 31; 5, p. 114]. Inside the cells, the

toxin inhibits cysteine-containing pyruvate kinase and pyruvate dehydrogenase, disrupting energy metabolism [1, p. 4; 2, p. 7; 3, p. 3; 4, p. 31-32; 5, p. 114]. When Tl^+ interacts with glutathione, the latter is inactivated, leading to an excess of reactive oxygen species, such as the superoxide radical $O_2^{\cdot-}$ and the hydroxyl radical OH^{\cdot} (oxidative stress) [1, p. 4; 2, p. 8; 4, p. 31-32; 5, p. 114]. In addition, contact between the toxin and phospholipid anions leads to disruption of the function of membrane receptors, enzymes, and channels. Researchers also report that the ribosomal complex is destroyed under the influence of Tl^+ [5, p. 114]. The combination of structural and metabolic abnormalities leads to the release of apoptotic factors, such as cytochrome C [1, p. 4].

Exposure to a toxin typically triggers neurological symptoms within 2 to 5 days, especially in cases of chronic poisoning [2, p. 5; 3, p. 5; 4, p. 33; 5, p. 115]. In the early stages, peripheral neuropathy is observed: weakness, pain, paresthesia, and hyporeflexia, primarily in the lower extremities. The upper body is affected only over time [2, p. 5-6; 3, p. 5; 4, p. 33; 5, p. 115]. Sometimes the cranial nerves (pairs 2, 3, 4, and 6) are damaged, causing the person to suffer from ptosis, nystagmus, ophthalmoplegia, amblyopia, and optic nerve atrophy [3, p. 5; 4, p. 34; 5, p. 116]. Equally characteristic are changes in mental health and circadian rhythms. Insomnia, anxiety, apathy, impaired emotional self-regulation, depression, delirium, psychosis, and hallucinations may develop [2, p. 6; 3, p. 5; 4, p. 33-34; 5, p. 116]. Depending on the amount of thallium absorbed by the body, choreoathetosis, ataxia, and amnesia may occur [2, p. 6; 3, p. 5; 5, p. 116].

Conclusions. The toxic effects of thallium are based on its physical and chemical similarity to potassium: Tl easily penetrates cells and triggers a cascade of destructive processes. These include mitochondrial damage and the inhibition of energy metabolism enzymes and glutathione. For the nervous system, this has fatal consequences, manifesting as acute neuropathies and cognitive-psychiatric disorders. Its high bioavailability and potential for bioaccumulation in tissues make thallium one of the most dangerous toxins of our time.

References

1. Moura, Alexandre Varão, Lucas Aleixo Leal Pedroza, José Domingos Santos da Silva, et al. (2026). Thallium: An overview of its distribution in the environment and its cellular and molecular toxicity. *Toxicology Letters*, 418, 111857. <https://doi.org/10.1016/j.toxlet.2026.111857>.
2. Fujihara, J., Nishimoto, N. (2024). Thallium - poisoner's poison: An overview and review of current knowledge on the toxicological effects and mechanisms. *Current Research in Toxicology*, 6, 100157. <https://doi.org/10.1016/j.crttox.2024.100157>.
3. Galván-Arzate, S., Santamaría A. (1998). Thallium toxicity. *Toxicology Letters*, 99, (1), 1-13. [https://doi.org/10.1016/S0378-4274\(98\)00126-X](https://doi.org/10.1016/S0378-4274(98)00126-X).
4. Hoffman, R. S. (2003). Thallium Toxicity and the Role of Prussian Blue in Therapy. *Toxicological Reviews*, 22, 29-40. <https://doi.org/10.2165/00139709-200322010-00004>
5. Cvjetko, P., Cvjetko, I. & Pavlica, M. (2010). Thallium Toxicity in Humans. *Archives of Industrial Hygiene and Toxicology*, 61(1), 111-119. <https://doi.org/10.2478/10004-1254-61-2010-1976>