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ACADEMIC AND RESEARCH MEDICAL INSTITUTE

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## MILITARY ARMED CONFLICTS AS A SOURCE OF THE INFLUX OF TOXIC METALS INTO THE ENVIRONMENT AND THE HUMAN BODY

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**Introduction.** Military armed conflicts and active combat actions are a significant factor in the influx of toxic metals into the environment and the human body (Petrushka et al., 2024). Toxic metals can enter the human body directly from the air during military armed conflicts, as large quantities of gaseous products containing toxic metals are formed during ammunition explosions. Additionally, there are likely long-term effects of accumulation of heavy metal fragments and microparticles in the soil and groundwater, which can enter the bodies of animals and humans through trophic chains (Trokhymenko et al., 2023).

**Aim.** To provide an analytical review of the possibilities of toxic metal influx into the environment and the human body due to active combat actions and to assess the risks to human health and the environment.

**Materials and methods.** The study was conducted based on the analysis of Ukrainian and international publications regarding the current state of environmental pollution with toxic metals, analysis of their toxicity for humans and animals, and their impact on environmental objects.

**Results.** Increasing scientific evidence demonstrates that armed conflicts and military activities significantly contribute to environmental pollution with toxic metals. The detonation of missiles and artillery shells leads to the generation of various chemical compounds containing elements such as zinc (Zn), copper (Cu), lead (Pb), chromium (Cr), nickel (Ni), and cadmium (Cd) (Petrushka et al., 2024). Military activities release metals in the form of gunshot residue (GSR) including lead (Pb), copper (Cu), cadmium (Cd), antimony (Sb), chromium (Cr), nickel (Ni), and zinc (Zn) into the environment. Military activity has resulted in heavy metal exposure to humans through inhalation or ingestion of metal particles and injuries with embedded metal fragments (Shukla et al., 2023).

Current health risk assessments for humans have been conducted for cadmium (Cd) and lead (Pb). Cadmium is classified as a Group B1 substance – probable carcinogen, with evidence of its impact on human health. Lead falls into Group B2 substances and demonstrates the potential to cause cancer when ingested or inhaled (Andrusyshyna et al., 2022).

**Conclusion.** Today, more than ever, Ukraine needs programs for the implementation of biomonitoring studies to detect the impacts of toxic metals that enter the environment and the human body in the context of military armed conflicts and prolonged combat actions.

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