Streszczenie w języku angielskim

Oxidative stress underlies the development of numerous diseases in the body, including oral cavity, such as inflammation of soft tissues and destruction of bone tissues of the masticatory apparatus [10, 67, 70, 78, 161].

Oxidative stress is also one of the mechanisms of toxicity of many xenobiotics, which a person can be exposed to throughout life, including cadmium, which is one of the most toxic heavy metals [5, 27, 28, 49, 92, 150]. Long-term, low exposure to this element, which currently occurs in highly industrialized countries, can negatively affect the bones and contribute to the development of bone diseases [19, 150]. Due to the fact that the risk of exposure to cadmium will increase in the future, solutions are being sought to limit its absorption from the diet and adverse effects on health. Particular attention is paid to the possibility of using for this purpose nutrients with antioxidant properties, including zinc. This bioelement can protect against the development of cadmium-induced oxidative stress in parenchymal organs [13, 45, 70, 111], therefore, in own research, it was examined whether an increased supply of zinc can also protect against oxidative stress in the mandibular bone tissue.

Studies were conducted in adult male rats of Wistar strain [Crl:WI(Han)] who were treated with cadmium chloride ($CdCl_2$) aqueous solution with concentration of 5 or 50 mg Cd/dm^3 and/or zinc chloride ($ZnCl_2$) solution with concentration of 30 or 60 mg Zn/dm^3 and LSM standard feed for 12 months.

Antioxidant status (GPx, SOD, CAT, GR, and TAS) and oxidative status (H_2O_2) were assessed, as well as the degree of severity of oxidative stress (OSI) in the mandibular bone tissue, as well as biomarkers of oxidative damage to lipids (LPO), proteins (PC), and nucleic acids (DNA/RNA), and Cd and Zn concentrations in this organ.

Conducted studies have shown that both moderate (5 mg Cd/dm^3) and relatively high (50 mg Cd/dm^3) chronic exposure of rats to cadmium led to a weakening of the enzymatic antioxidant barrier, an increase in the concentration of prooxidants, and as a result, the development of oxidative stress and oxidative modifications of lipids, proteins and DNA/RNA in the mandibular bone tissue.

The most important result of own research is demonstration, for the first time, that an increase in zinc intake of 71% and 146% during exposure to cadmium significantly protects against excessive accumulation of H_2O_2, decrease in the activity of GPx, SOD and CAT, as well as oxidative damage to proteins, lipids and nucleic acids of this organ.

The studies in this paper provide solid evidence that Zn^{2+} ions can protect bone tissue from damage caused by moderate to relatively high chronic exposure to cadmium. The research carried out has not only scientific and cognitive value, but also important practical implications. The results of own research, together with the results of previous research in the same experimental model, suggest that zinc supplementation can be used in the prevention of health risks arising from exposure to cadmium. However, it should be stressed that the possibility of using zinc to prevent the effects of exposure to cadmium, including its toxicity to the human mandibular bone tissue, requires further studies.