

# **Beneficial influence of zinc supplementation under chronic exposure to cadmium on the strength of rat's teeth**

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## **Introduction**

Cadmium belongs to the main chemical pollutants of the natural environment and food, it may accumulate in the bones and teeth, and disturb their mineralization and weaken the strength properties. Zinc deficiency in the organism inhibits the process of bone tissue formation and increases bone resorption, contributing to weakening the bone biomechanical strength and increasing the risk of fracture.

## **Aim**

The study was aimed to examine the impact of zinc administration under chronic exposure to cadmium on the strength of rat's teeth.

## **Materials and methods**

Upper incisors of the male Wistar rats administered zinc (30 and 60 mg Zn/l) and cadmium (5 mg Cd/l) in drinking water alone or together (5 mg Cd/l + 30 mg Zn/l and 5 mg Cd/l + 60 mg Zn/l) for 6 and 12 months, as well as of control animals, were used. Biomechanical properties such as the yield load, ultimate load, and displacement at yield and at ultimate were measured, and stiffness of the teeth was assessed in a compression test performed with the use of a Zwick Z2.5 universal testing machine.

## **Results**

The exposure to 5 mg Cd/l resulted in a decrease in the force causing the first detectable damage to the tooth integrity (yield load) and its complete destruction (ultimate load). This effect was noted after 6 months of the exposure and intensified with the duration of the treatment. The administration of 30 and 60 mg Zn/l alone for 6 and 12 months had no impact on the yield and ultimate load, the displacement at yield and at ultimate as well as on the stiffness of the upper incisors. The administration of zinc, at both concentrations, under the chronic exposure to cadmium resulted in a decrease in the force causing the first detectable damage to the tooth integrity and its complete destruction compared to the animals treated with Cd alone.

## **Conclusions**

The results allow for the conclusion that zinc supplementation under chronic exposure to cadmium provide protection from this heavy metal-induced weakening in the strength properties of the upper incisors and in this way may protect from their damage.