

Changes of Mitochondrial Potential in the Midgut Epithelium of *Lithobius forficatus* (Myriapoda, Chilopoda) Exposed to Cadmium Concentrated in Soil

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Abstract : *Lithobius forficatus*, commonly known as the brown centipede, is a widespread European species, which lives in the upper layers of soil, under stones, litter, rocks, and leaves. As the soil organism, it is exposed to numerous stressors such as xenobiotics, including heavy metals, temperature, starvation, pathogens, etc. Heavy metals are treated as the environmental pollutants of the soil because of their toxic effects on plants, animals and human being. One of the heavy metals which is xenobiotic and can be taken up by plants or animals from the soil is cadmium. The digestive system of centipedes is composed of three distinct regions: fore-, mid- and hindgut. The salivary glands of centipedes are the organs which belong to the anterior region of the digestive system and take part in the synthesis, accumulation, and secretion of many substances. The middle region having contact with the food masses is treated as one of the barriers which protect the organism against any stressors which originate from the external environment, e.g., toxic metals. As the material for our studies, we chose two organs of the digestive system in brown centipede, the organs which take part in homeostasis maintenance: the salivary glands and the midgut. The main purpose of the project was to investigate the relationship between the percentage of depolarized mitochondria, mitophagy and ATP level in cells of mentioned above organs. The animals were divided into experimental groups: K - the control group, the animals cultured in a laboratory conditions in a horticultural soil and fed with *Acheta domesticus* larvae; Cd1 - the animals cultured in a horticultural soil supplemented with 80 mg/kg (dry weight) of CdCl₂, fed with *A. domesticus* larvae maintained in tap water, 12 days - short-term exposure; Cd2 - the animals cultured in a horticultural soil supplemented with 80 mg/kg (dry weight) of CdCl₂, fed with *A. domesticus* larvae maintained in tap water, 45 days - long-term exposure. The studies were conducted using transmission electron microscopy (TEM), flow cytometry and confocal microscopy. Quantitative analysis revealed that regardless of the organ, a progressive increase in the percentage of cells with depolarized mitochondria was registered, but only in the salivary glands. These were statistically significant changes from the control. In both organs, there were no differences in the level of the analyzed parameter depending on the duration of exposure of individuals to cadmium. Changes in the ultrastructure of mitochondria have been observed. With the extension of the body's exposure time to metal, an increase in the ADP/ATP index was recorded. However, changes statistically significant to the control were demonstrated in the intestine and salivary glands. The size of this intestinal index and salivary glands in the Cd2 group was about thirty and twenty times higher, respectively than in control. Acknowledgment: The study has been financed by the National Science Centre, Poland, grant no 2017/25/B/NZ4/00420.

Keywords : cadmium, digestive system, ultrastructure, centipede

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