

DI(2-ETHYLHEXYL)PHTHALATE AND DIBUTYLPHTHALATE

GENOTOXIC EFFECT ON RAT ERYTHROCYTES

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Phthalates are substances that have mutagenic and endocrine disrupting properties and tend to accumulate in the environment. Phthalates leach into water, both from wastewater and plastics, in small amounts, but this can have serious consequences for human health and the ecosystem. The aim of this project was to evaluate the effect of two types of phthalates (which consistently exceed the maximum allowable concentration in Lithuanian waters) in rat bone marrow cells using an in vivo micronucleus assay.

To find out the genotoxic effect, an analysis of micronuclei in polychromatic erythrocytes of rats was carried out. Female rats of Wistar strain, 5-8 weeks old, were divided into control and 5 experimental groups, which get standard food and additionally received a piece of ecological biscuit with different doses of phthalate dissolved in olive oil: 1) DEHP 200 µg/kg; 2) DEHP 1000 µg/kg; 3) DBP 100 µg/kg; 4) DBP 500 µg/kg; 5) mixture of phthalates (DEHP 200 µg/kg, DBP 100 µg/kg). Control animals received only a piece of the biscuit with olive oil. After 3 months, the rats were killed in a CO₂ chamber. Later, during the autopsy, femurs were dissected and bone marrow slides were prepared for the observation of micronuclei in polychromatic erythrocytes. Micronucleus analysis was performed by calculating 2000 PCE (polychromatic erythrocyte) and the ratio of PCE and NCE (normochromatic erythrocyte) and data were analysed using one-way ANOVA. Statistical analysis was performed using GraphPad Prism 9.0.0.

It was found that even small doses of phthalates during daily continuous consumption have a negative genotoxic effect on rats. All results were statistically significant ($p < 0.05$). Significantly more micronuclei were found in bone marrow preparations of rats exposed to DBP than to DEHP. The results of the study reveal that it is necessary to regulate the amount of phthalates in Lithuanian wellfields more effectively and to regulate wastewater treatment more strictly.
