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Mutagenic effects of phenylpyrazole pesticides

Kolumbaeva S. Zh., Begimbetova D.A., Kalimagambetov A.M., Lovinskaya A.V.

1. Al-Farabi Kazakh National University, Almaty, Kazakhstan. E-mail: S_kolumb@mail.ru

Abstract: The crisis ecological situation, which is accompanied by an increase in morbidity, reduction in the number of rare and endemic plants and animals, the destabilization of natural ecosystems, is characterized for many regions of Kazakhstan. The problem of environmental contamination by pesticides is relevant. In recent years phenylpyrazole insecticides, where the main active ingredient is fipronil, widely used against pests in Kazakhstan. Despite the information about the toxic effects of fipronil pesticides, their mutagenic effects are studied insufficiently. The purpose of this research was the study of mutagen activity of fipronil pesticide and its metabolite fipronil-sulphone. The objects of study were laboratory rats of various age groups and backgrounds rodent species from fipronil contaminated habitats. In this research work were used cytogenetic and biochemical methods. Fipronil and its metabolite fipronil-sulfone shown expressed genotoxic effect by repeated influence on rats. It was established a significant increase of the frequency of structural and genomic mutations in the bone marrow cells of laboratory animals. It wasn't detected significant differences in the manifestation of genotoxic effect of fipronil and its metabolite fipronil-sulphone. The level of xenobiotic induction mutagenesis depended on the age of the animals. The frequency of structural and genomic mutations in 12-month-old rats was higher compared to the 1-month rats.

The content of fipronil decreased in animal with increasing of their exposure time, and the content of its metabolite fipronil-sulfone increased. It was noted statistically significant increase of primary (lipid hydroperoxide) and secondary (malondialdehyde), lipid peroxidation products in animals, fipronil treatment, that is indicated on the enhancement of free radical processes.

Also it was observed cytogenetic instability and the enhancement lipid peroxidation in the background rodents from phenylpyrazole polluted habitats. The results of these researches indicate the presence of mutagenic factors in habitats, exposed to phenylpyrazoles.