**Modeling of Alpha-Particles Epigenetic Effects in Short-Term Test on Drosophila melanogaster**

*Zarema M. Biyasheva, Madina Zh. Tleubergenova, Yuliya A. Zaripova, Alexsandr L. Shakirov*

Al-Farabi Kazakh national University, Research Institute of Biology and Biotechnology Problems, The Republic of Kazakhstan, Almaty city

E-mail: [zaremabiya@gmail.com](mailto:zaremabiya@gmail.com)

Radon and its decay products are sources of more than half the volume of natural radiation. Genotoxic and carcinogenic effects of radon action are actively investigated. Of particular interest is the assessment of the consequence of irradiation at hazardous radon areas, which includes the Almaty region due to the large number of tectonic faults that enhance radon emanation. In connection with the foregoing, the purpose of this work was to study the genetic effects of exposure to supernormal radon doses on the alpha-radiation model.

Irradiation does not affect the growth of the cell, but rather its ability to differentiate. The researchers found that in animals, irradiation, first of all, leads to the occurrence of phenocopies, somatic mutations, morphoses and modifications. The listed damages arise, most likely, as a result of change of composition of substances of a cell. Modern genetics classifies such events as epigenetic, they primarily affect the regulatory processes of ontogeny. Epigenetic variability, as a rule, is not related to the variability of the primary DNA sequence, but is due to a change in genetic material. This variability concerns the so-called conditional mutations - these are mutations of regulatory genes responsible for the formation of signs of intraspecific similarity. One of the characteristic features of conditional mutations is the dominant type of their manifestation. Other features of these same mutations are asymmetry and their instability in generations. At present, the terms "morphosis" and "modification" are used to describe epigenetic variability. Conditional mutations are often maintained in cultures with concatenated X-chromosomes, where the mutant X chromosome is transmitted along the paternal line.

In this test system, we investigated the epigenetic effects of alpha particles, whose source in nature is mainly radon and its daughter decay products. In the experiment, an isotope of plutonium-238 (Pu238), generating radiation with an energy of about 5500 eV, was used as a source of alpha particles. In an experiment in the first generation (F1), deformities or morphoses were found, which can be called "radiation syndromes" or mutations, the manifestation of which is similar to the pleiotropic action of genes. The proportion of morphoses in the experiment was 1.8%, and in control 0.4%. In this experiment, the morphoses in the flies of the first and second generation looked like black spots or melanomas on different parts of the imago body and determined as "Generalized" melanomas. The changing on wings look as curled, curved wings, shortened wing, bubble on wing or absence of one wing. Observed the deformation of thorax, interruption and violation of tergite patterns, disruption of distribution of ocular facets and hairs or absence of pigmentation.

Statistical analysis by the Chi-square method showed the reliability of the difference in experiment and control at P≤0.01. On the basis of this, it can be considered that alpha particles, which in the environment are mainly generated by radon and its isotopes, have a mutagenic effect that manifests itself, mainly in the formation of morphoses or deformities.

**Key words:** alpha-radiation, genotoxicity, morphoses, radioecology, radon.