

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

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**Abstract :** In recent years, interest in ecogenetic and biomedical problems related to the effects on the population of radon and its daughter decay products has increased significantly. 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. In addition, irradiation can lead to somatic mutations, morphoses and modifications. These damages most likely occur from changes in the composition of the substances of the cell. Such changes are epigenetic since they affect the regulatory processes of ontogenesis. Variability in the expression of regulatory genes refers to conditional mutations that modify the formation of signs of intraspecific similarity. Characteristic features of these conditional mutations are the dominant type of their manifestation, phenotypic asymmetry and their instability in the generations. Currently, the terms "morphosis" and "modification" are used to describe epigenetic variability, which are maintained in *Drosophila melanogaster* cultures using linkaged X- chromosomes, and the mutant X-chromosome is transmitted along the paternal line. In this paper, 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 ( $\text{Pu}^{238}$ ), generating radiation with an energy of about 5500 eV, was used as a source of alpha particles. In an experiment in the first generation ( $F_1$ ), 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; "generalized" melanomas; curled, curved wings; shortened wing; bubble on one wing; absence of one wing, deformation of thorax, interruption and violation of tergite patterns, disruption of distribution of ocular facets and bristles; absence of pigmentation of the second and third legs. Statistical analysis by the Chi-square method showed the reliability of the difference in experiment and control at  $P \leq 0.01$ . 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.

**Keywords :** alpha-radiation, genotoxicity, morphoses, radioecology, radon

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