

Review of the Radiogen project (extension of the Radiogen project for 2024-2028)

“Molecular genetics of radiation-induced gene and genome changes in *Drosophila melanogaster*

Important Research

In the project under review, it is planned to continue the previously initiated molecular genetic research to investigate the nature and frequency of inherited DNA changes at the level of individual genes and the genome as a whole in the offspring of γ -irradiated *Drosophila* males. At the same time, it is proposed to expand genomic studies on *Drosophila* using different quality radiation. The planned genomic studies in mice are new and undoubtedly important, since comparative data obtained in the *Drosophila*-mice system are essential for extrapolation to humans. I would especially like to emphasize the fundamental nature of the planned genomic research, which, without exaggeration, lays the scientific basis for a new direction in radiation biology - radiation genomics. This determines the relevance and novelty of the genomic studies planned in the project on *Drosophila* and mice. The foregoing is confirmed by the first and priority results of the authors of the project on the multiplicity of structural DNA changes in the offspring genome of irradiated *D. melanogaster* males, which allows to expect a high degree of DNA damage in offspring genome from irradiated mice. In this regard, the planned genomic research are particularly important and interesting. The project is logically completed by suggested studies on the expression of mutation-altered genes with a known pattern of DNA damage, which will provide new data on such a fundamental problem as the relationship between the structure and function of a gene.

Scientific, methodological and technical significance

The continuation of the project will be carried out in two main directions, which are based on the methodology of comparative analysis as the most fruitful for elucidating the general patterns and features of changes in individual genes and the genome as a whole under the action of different quality ionizing radiation. The first line of studies is the analysis of inherited intragenic DNA changes induced by γ - rays and neutrons. The methods used for this purpose (PCR and Sanger's sequencing) are adequate and informative to achieve this goal. The second goal of project is to examine character and scale of inherited DNA changes at the level of the entire genome. These studies are based on a modern molecular approach including the next generation of genome-wide sequencing. In this regard, the expected results will significantly expand our understanding of the nature and extent of inherited DNA changes in offspring at the level of individual genes and the entire genome.

Competitiveness, the probability of project implementation, the correspondence of resources to the significance of the project and the qualifications of the authors

The strengths of the project are the many years of experience of the main performers in the field of general, radiation and molecular genetics, their wide popularity in the scientific community of our country