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Review

for the project Study of the radioprotective properties of Damage suppressor protein (Dsup) on a model object *D. melanogaster* and HEK293T human cell culture

In a reviewed project, it is proposed for the first time to analyze the effects of Dsup protein with radioprotective activity on the model organism *Drosophila melanogaster* and the human cell culture HEK293T using a wide range of modern and classical methods of molecular biology. The principal novelty consists in experiments at the level of functional activity of genes (transcriptome analysis) for control and experimental lines and in the first case of analysis of changes in the radiosensitivity of a multicellular complex organism expressing Dsup.

Scientific significance and novelty of the work. This project relates to the most advanced field of modern radiobiology - the study of extremophile proteins in the long term of their use to increase the radioprotective properties of organisms. In addition, the study of the properties of the new Dsup protein allows to describe the mechanisms of DNA protection from ionizing radiation that have not yet been studied, which will further enable them to be associated with the theory of aging. Therefore, the new data obtained during the implementation of the project will have both fundamental and applied character.

The scientific content of the project. The project is based on two model objects - *D. melanogaster*, a multicellular complex organism that reflects all the fundamental processes inherent in highly organized eukaryotes, and HEK293T cell culture, which at this stage is the maximum approximation to the features of the functioning of human cells. Thus, a comprehensive study of the tasks set in the project is carried out. A study of the effect of Dsup protein will be investigated both under normal conditions and after exposure to various types of ionizing radiation. Certainly, the capabilities of JINR will make it possible to obtain the declared types of radiation and evaluate the specifics of the response of organisms and cells expressing Dsup, depending on the type of radiation. It is proposed to evaluate the effect of Dsup on the survival of cells and organisms, as well as apply the latest transcriptome analysis methods, which will allow to evaluate the complete response at the level of gene expression in the studied objects to the expression of Dsup under normal conditions and after irradiation. The obtained data will allow to characterize the influence of Dsup and propose models of its action. An additional assessment of the life expectancy of *D. melanogaster*, announced in the project, is another extremely interesting direction, since the mechanisms underlying aging and the mechanisms that are triggered in the cell after exposure to radiation are very similar, therefore, studying the contribution of


Dsup to aging can give good results. One of the important directions of the project is the transition to the molecular level of the analysis of interactions between Dsup and nuclear DNA not *in vitro*, but directly in a living cell, by creating fusion proteins, which will directly assess and describe the binding of Dsup and chromatin on *D. melanogaster* polytene chromosomes. It should be noted that the scientific content of the project meets high standards, and the proposed methodology is at the world level.

The presence of a significant part of the equipment necessary for the implementation of the project and the amount of requested funding are in accordance with the declared work plan. High qualification of employees with academic degrees in the field of molecular genetics and radiobiology and the presence of graduate students and young specialists among the executives with confidence allows to say that the project is well provided with personnel and that the project will be implemented and the results will be adequately published.

Conclusion. The researches declared in the project belong to the priority area, correspond to the world scientific level and certainly deserve financial support.

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Подписи

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