

Effect of radioprotective Damage suppressor protein (Dsup) on non-irradiated and exposed to various types of ionizing radiation D. melanogaster at transcriptome and physiological levels

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High dose of ionizing radiation is one of the most harmful exposome factors, in that view, recently discovered tardigrade damage suppressor protein (Dsup) is promising for the development of new genetically engineering way of innate radioprotection that does not require targeted drug delivery. Dsup is a nuclear localized protein, which binds to DNA and nucleosomes and as suggested increases protection of chromatin by direct shielding from ROS. Real mechanism of radioresistance, structural properties of Dsup protein, possibility to induce hindrance to chromatin compaction, translation, reparation are remaining unexplored. The objective of this work was to reveal how Dsup protein affects gene expression and lifespan in normal conditions and after irradiation in well-studied model object *D. melanogaster*. We generated several lines of *D. melanogaster* expressing *Dsup* under control of *Act5C* gene promoter. Transcriptome analysis of *Dsup* expressing flies established alterations in expression of genes related to transcription, chromatin silencing, chromosome organization, mitotic spindle elongation etc. that indicates some level of disorder in DNA machinery and chromatin compaction. Currently ongoing lifespan test for *D. melanogaster* expressing *Dsup* will allow to elucidate the impact of this disorder on physiological parameters. To estimate radioresistance of *Dsup* expressing flies, we treated them with γ -radiation dose of 1000 Gy, which is close to LD₅₀, and plan to carry on irradiation with heavy ions. Three days survival rate after irradiation was higher in *Dsup*-expressing line and this is the first confirmation of *D. melanogaster* radioresistance enhancement by Dsup. Difference in response to ionizing radiation between Dsup-expressing and control biological groups will be estimated by transcriptome analysis. For further step we pretend to reveal Dsup spatial structure and parameters of Dsup-DNA conjugate by SANS and SAXS techniques.

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