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SPACE RADIATION AND INDIVIDUAL RADIOSENSITIVITY- ANSTO CAS & HUMAN HEALTH IN AIR BEAM EXPERIMENTS

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Radiation exposure is a major limiting factor for long duration manned space flights. Radiation protection standards are based on the assumption that individuals are equally resistant to ionizing radiation. However, for over a century, there is evidence that humans do not respond equally to radiation. Particularly, the studies of secondary effects post-radiotherapy have shown a great variability among individuals. More specifically, large discrepancies among astronauts after the same flight were observed. Recently, from a collection of hundreds of fibroblast cell lines derived from patients suffering from genetic disease or post-radiotherapy radiosensitivity, we have shown that the delay in the nucleoshuttling of the ATM protein may cause a lack of double strand break (DSB) recognition, incomplete DSB repair and radiosensitivity. Interestingly, the model of the ATM nucleoshuttling was shown to be relevant not only for low-dose and repeated exposures, but also for high-LET particles, which renders this model compatible with space radiation exposure scenarios. Lastly, this model could lead to a novel approach for radiation protection, consisting of interventions to accelerate ATM nucleoshuttling. Such an approach may help in developing efficient countermeasures that could assist with manned space flights. In 2019-2021, teams from ANSTO CAS and Human Health have been collaborating to adapt the ANTARES beamline for in air irradiation of living matter and study the effects of secondary radiation produced by interaction of cosmic and galactic rays with spacecraft shielding. DNA repair and mitochondrial activity processes will be studied.

Level of Expertise

Early Career <5 Years

Presenter Gender

Woman

Pronouns

She/Her

Which facility did you use for your research

Centre for Accelerator Science

Students Only - Are you interested in AINSE student funding

Do you wish to take part in the Student Poster Slam

Condition of submission

Yes

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