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Radiation Fields, Effects and Risks in Human Space Missions (5)

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TARGET EFFECTS VS. NON-TARGET EFFECTS IN ESTIMATING THE CARCINOGENIC RISK
DUE TO GALACTIC COSMIC RAYS IN EXPLORATORY SPACE MISSIONS.

Abstract

Space radiobiology is an interdisciplinary science that examines the biological effects of ionizing radiation on humans involved in aerospace missions. The knowledge of the risk assessment of the health hazard related to human space exploration is crucial to reducing damages induced to astronauts from galactic cosmic rays and sun-generated radiation. Galactic Cosmic Rays (GCR) have been identified as one of the primary sources of radiation exposure in space. In this context, an accurate characterization of the possible risk of carcinogenesis induced by exposure to GCRs particles is a significant concern for human exploratory space missions. In this talk, the tumour prevalence is used to investigate the effects of Non-Target Effects (NTE) in predictions of chronic GCR exposure risk. The NTE model led to a predicted risk 2-fold higher compared to a targeted effects model. Therefore, it is nowadays accepted that the detrimental effects of ionizing radiation are not restricted only in the irradiated cells but also to non-irradiated bystanders or even distant cells manifesting various biological effects. In this talk, an extensive study will be presented about the risk increase due to the Non-Target Effects that the GCRs radiation will imply when added to the Target one. Status of the art results will be summarized, recent observations and theoretical framework presented, and some new hints derived from the data collected from the AMS02 detector. Finally, the possible future development will be highlighted about the possibility of an accurate estimate of the tumour prevalence function for different exposure exploratory space mission scenarios.