

Abstract

Once we know all the radiobiology we need to know, how might we use it to predict risk, reduce uncertainty, develop countermeasures, and achieve fame and fortune?

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We discuss current and future approaches to the prediction of risk from space radiation exposures. Astronauts have flown in space for nearly 40 years and there are 300 individuals that have been exposed to low and moderate doses of trapped protons and galactic cosmic rays (GCR). The completion of the International Space Station will add substantially to the number of exposed individuals as well as the collective astronaut dose from GCR. We review these exposures and consider the possibilities for future epidemiological analysis of the NASA astronaut cohort. Risk prediction is necessarily a quantitative endeavor and it is not always obvious how many experimental radiobiology studies aided in improving risk assessment. The NASA Space Radiation Health Program has developed a critical set of research questions for understanding the mechanisms of proton and heavy ion damage. We discuss possibilities for the use of the answers to these questions in qualitative predictions of risks and the development of countermeasures.