NCRP Report No. 183: Radiation Exposures in Space and the Potential for Central Nervous System Effects: Phase II

Overview

NCRP Report No. 183: *Radiation Exposures in Space and the Potential for Central Nervous System Effects: Phase II* summarizes the steps and approaches needed to more fully understand the risk of central nervous system effects following radiation exposures in space and provides guidance for radiation protection, including risk management. Understanding of this topic is essential to the U.S. continued exploration of space. The Report was prepared by national and international experts from universities, medical centers, government agencies, and private industry.

Answers to Important Questions about the Effects of Space Travel

The Report provides the latest scientific information on key questions related to space travel such as:

- How should a significant impairment in performance due to radiation exposure in space be defined?
- Do risk assessments for chemical toxicity, including neurotoxicity, provide guidance for understanding potential effects?
- Is the adverse outcome pathway framework used by the U.S. Environmental Protection Agency useful in the context of space radiation and central nervous system effects?
- Are nonhuman primate experiments necessary, and if so, how should they be considered?
- Are there threshold levels of exposure below which the concern about central nervous system effects are minimal?
- How might space radiation “interact” with other aspects of a mission that would impair performance?
- What is the relative balance between the likelihood of neurobehavioral effects that would impair operational performance and adversely affect the mission, and the likelihood that serious neurodegenerative diseases develop such as Alzheimer’s, Parkinson’s, Huntington’s, amyotrophic lateral sclerosis, and dementia?
- Do brain compensation mechanisms exist that would influence the likelihood of getting to a level of significant impairment that would adversely affect performance and the mission?

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What is New in NCRP Report No. 183?

- information on managing risks of radiation exposure to the central nervous system, including recommendations on how "significant impairment" can be defined;
- a summary of observations relevant to mechanisms, including cellular neuronal structure and function, molecular studies and functional imaging;
- the applicability of mechanistic models and considerations for extrapolations from rodents to humans; and
- information from observation of humans exposed to radiation during medical procedures or industrial situations and its applicability to exposure of humans in space.

Anyone who is affiliated with or has an interest in space travel must read this report to get the latest information available about potential effects on the central nervous system from exposure to radiation in space. The Report will be of special interest to researchers focusing on the long-term health impacts of the U.S. space mission and keeping our astronauts safe and in good health.

*NCRP is the National Council on Radiation Protection and Measurements, a Congressionally chartered body that seeks to formulate and widely disseminate information, guidance and recommendations on radiation protection and measurements which represent the consensus of leading scientific thinking.

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