

NCRP Report No. 167, *Potential Impact of Individual Genetic Susceptibility and Previous Radiation Exposure on Radiation Risk for Astronauts*

NCRP Report No. 167, *Potential Impact of Individual Genetic Susceptibility and Previous Radiation Exposure on Radiation Risk for Astronaut*, evaluates the potential impact of individual genetic susceptibility and previous radiation exposures on radiation associated health risks for astronauts during their lifetimes following space missions. The Report also evaluates whether either of these factors needs to be included in the radiation protection program for astronauts.

With the development of techniques to sequence the human genome, the science of genetics has advanced rapidly over the past few years. Using these sequencing techniques, it may become possible in the future to determine the genetic background of individuals and thus to better understand individual risk and the mechanisms involved in radiation-related cancer. With current genetic techniques, it is possible to define many different mutations involving numerous known genes that may alter an individual's lifetime risk for radiation-induced cancer. Linking research on genetic background to radiation sensitivity may pave the way to predicting an individual's radiation-related risks and thus improve radiation protection guidance. Currently, this is not possible as all risk estimates are derived from large populations. The information available on the impact of genetic background on risk and its future potential is one of the major subjects addressed in this Report.

Another major purpose of this Report is to determine whether the risk associated with past radiation exposures from medical therapy or diagnostic procedures is altered by radiation exposure during space exploration. Whether to include nonoccupational exposure in evaluating total lifetime risk limits set by the National Aeronautics and Space Administration will be discussed. It was determined that such exposures should not be added to occupational exposures. It should be recognized that in population studies, risk estimates incorporate all sources of radiation that the population receives, whether natural background or medical, as part of the background exposure, albeit the magnitude is not known. Thus, the risk estimates that are derived are those that are above the normal population exposures to these other sources. This Report includes an evaluation of the regulatory, legal and ethical issues associated with using information on radiation-related genetic background and previous radiation exposures to predict an individual's lifetime radiation risk.

Report No. 167 includes primary conclusions reached by NCRP and recommendations based on the evaluation of genetic susceptibility and prior radiation exposures as risk factors that may contribute to overall astronaut health risks from exposure to radiation in the space environment:

The Report is available from the NCRP website, <http://NCRPpublications.org>, in both soft- and hard-copy formats. For additional information contact David A. Schauer, ScD, CHP at schauer@NCRPonline.org, 301.657.2652 (x20) or 301.907.8768 (fax).