This meeting will be the first of a new series of small biennial workshops sponsored by NASA to assess ongoing research results and to discuss new approaches to improve risk assessments. These workshops will typically be limited to fewer than 40 persons and will include members of the NASA Specialized Centers of Research (NSCOR) teams.

At the workshop in Dallas, we will hold a 90-minute round table discussion to consider the following questions

1. The Committee on the Biological Effects of Ionizing Radiation (BEIR), the National Council on Radiation Protection and Measurements (NCRP), and other bodies have recommended similar cancer risk projection models that make use of the following critical assumptions:

   i) Scaling of charged particles and neutrons risks to gamma-ray risks.
   ii) Additivity of effects from different radiation components.
   iii) Linearity of effect.
   iv) Usage of population averages for background and radiation-induced cancer effects.

   For assessing risks to astronauts on the International Space Station and for planning new journeys to the moon, NASA follows the model described in NCRP Report 132. At the round table discussion, we will discuss new scientific evidence that both supports and refutes these assumptions, including:

   • Will these assumptions be based on cancer or tissue type?
   • Is there strong evidence at this time to dismiss one or more of these assumptions?
   • How best can mechanistic research be used to test these assumptions?
   • What research is needed to gather further evidence or to implement a new cancer risk projection model?

2. The risks of damage to the central nervous system from the heavy ions present in galactic cosmic rays and from exposure to a large solar proton event dose (0.5-2 Gy) provide cause for concern. NASA has invested in research on CNS effects at various levels for more than 10 years. We will discuss these aspects of the CNS problem:

   • Is there enough evidence to establish a dose limit for CNS risks (acute or late)?
   • If there is enough evidence, is a threshold dose plausible as a function of particle type?
   • What research is needed to develop a quantitative model for projecting acute and long-term CNS risks?

3. Mechanistic research provides many insights into different aspects of space radiation risk assessment and future biomarker and countermeasure development. NASA has funded several projects in systems biology to integrate molecular-based research on mechanisms into quantitative descriptions of risks, biomarkers, and countermeasures.

   • What new experimental approaches should be pursued to obtain quantitative data in support of qualitative systems biology approaches?
   • What theoretical approaches are required to develop an accurate predictive theory of the biochemical processes leading to radiation health effects?
   • What are the important milestones along the pathway to determination of radiation risks?
   • How can we best translate risk data from 2- or 3-D cellular studies or from animal studies to human studies?
   • How does one account for individual sensitivity to radiation, including polymorphisms?