USRA Division of Space Life Sciences (DSLS) Space Radiation Team

Modeling Team

Lori Chappell	*Yongfeng Li*
Shaowen Hu	*Hatem Nounu*
Yared Kidane	*Ianik Plante*
Myung-Hee Kim	*Artem Ponomarev*

Biological Science Team

Megumi Hada
Janice Huff
Zarana Patel
Janapriya Saha
Minli Wang

NASA Technical Monitor

Torin McCoy
Honglu Wu

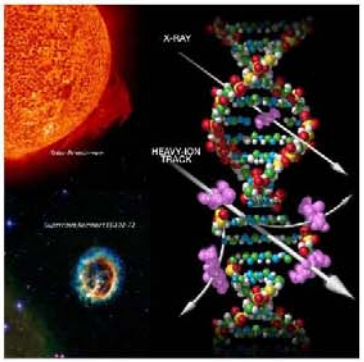
For more information about NASA Space Radiation Program, contact
John Uri, Manager
Lisa Simonsen, Acting Element Scientist

http://www.nasa.gov/exploration/humanresearch/elements/research_info_element-srpe.html

DIVISION OF SPACE LIFE SCIENCES
UNIVERSITIES SPACE RESEARCH ASSOCIATION

3600 Bay Area Blvd
Houston Texas 77058

Phone: 281-244-2000
E-mail: info@dsls.usra.edu
Website: http://www.dsls.usra.edu/

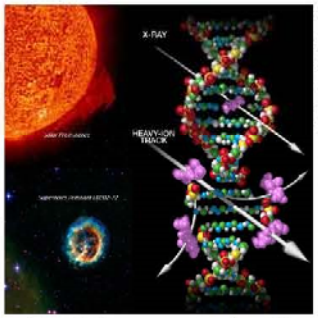


NASA Human Research Program

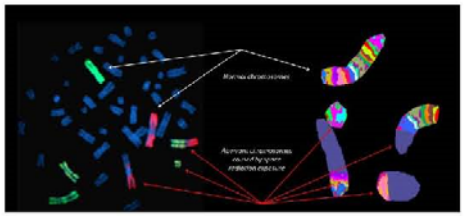
Space Radiation Program Element

Ensuring that Crews Can Safely Live and Work in the Space Radiation Environment

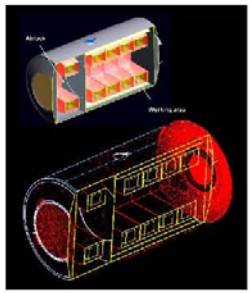
The goal of the NASA Human Research Program's Space Radiation Program Element is to ensure that crews can safely live and work in the space radiation environment. Current work is focused on developing the knowledge base and tools required for accurate assessment of health risks resulting from space radiation exposure including cancer and circulatory and central nervous system diseases, as well as acute risks from solar particle events. Division of Space Life Sciences (DSLS) Space Radiation Team scientists work at multiple levels to advance this goal, with major projects in biological risk research; epidemiology; and physical, biophysical, and biological modeling.



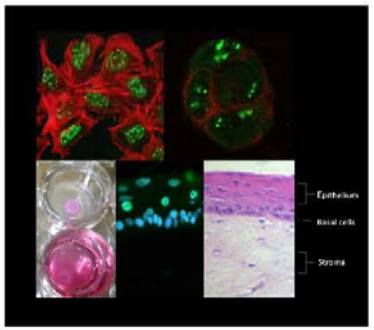
Outside the Earth's protective magnetosphere, astronauts are at risk from exposure to radiation from solar particle events and high-energy galactic cosmic rays. Cell and tissue damage caused by exposure to these types of radiation are distinct from that caused by terrestrial radiation sources such as X-rays, and the biological consequences are poorly understood.



Cytogenetics techniques are used to detect chromosomal damage, a biomarker of cancer risk, resulting from radiation exposure. In this picture, complex chromosomal aberrations caused by space radiation exposure are detected in blood lymphocytes using multicolor fluorescence *in situ* hybridization (left) and multicolor banding (right) techniques.



These pictures show the capabilities of the Space Radiation Program ray tracing tool. The results demonstrate the ability to locate and visually present — in red dots — the weak shielding areas on a three-dimensional Martian Transport Vehicle prototype allowing for iterative optimization of vehicle design.



Cell culture models are used to study the effects of space radiation simulants on molecular pathways important for cancer development.

Three-dimensional organotypic cell culture (a form of tissue engineering) provides a realistic model that mimics the structure and growth characteristics of fully differentiated human tissue.

USRA's Division of Space Life Sciences scientists are actively involved in development of an integrative risk models tool kit that includes models for acute radiation risk and organ dose projection, space radiation cancer risk projection, GCR event-based risk assessment, heavy ion track structure, and radiation track image interface.