University of Lethbridge News Release

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U of L contributes to roadmap for enhancing human resistance to radiation for life in space

With more space exploration and possible colonization on the horizon, a group of international researchers, including the University of Lethbridge's Dr. Olga Kovalchuk, combined forces to produce a roadmap to enhancing human radioresistance, or the level of radiation an organism is able to withstand. The group recently published a paper exploring the subject in the peer-reviewed journal *Oncotarget.*

Earthlings enjoy natural protection from radiation thanks to the planet's magnetic field and atmosphere but when they venture into space, radiation becomes a serious concern. In space, subatomic particles from the sun and other sources can tear through DNA molecules, splitting them or damaging the instructions they contain for cell reproduction, which can lead to cancers or other diseases. Astronauts receive some protection from their spacecraft but better shielding is needed for space missions that venture outside Earth's magnetosphere, such as a trip to Mars.

"Space radiation affects gene expression in the entire body," says Kovalchuk. "It affects epigenetic regulations, which are the underlying mechanisms that regulate gene expression. Gene expression is essentially the key machinery that underlies all biological processes in the human body."

The team of researchers from NASA Ames Research Center, Environmental and Radiation Health Sciences Directorate at Health Canada, Oxford University, Canadian Nuclear Laboratories, Belgian Nuclear Research Centre, Insilico Medicine, Boston University, Johns Hopkins University and many others collaborated to synthesize current information, identify the main hazards and ways of mitigating them, and propose further directions for exploration.

"There had never been an in-depth, systematic analysis of the health effects, possible outcomes, mechanisms behind these health effects and preventative strategies of exposure to radiation," says Kovalchuk, a biology professor. "We want to be able to send people into space and have them as healthy as they are here. This is an example of a huge consortium working together and I'm so happy to have been a part of it."

Space radiation exposure could affect the brain, cardiovascular system and the aging process. In addition to the need to find protective substances against radiation, research into daily regimens and geroprotectors, therapeutic agents that affect the cause of aging and age-related diseases, is needed.

Such research would also have applications for the aging population on Earth.

“We want to age in a way where we are active and healthy and productive,” says Kovalchuk. “Even though cosmic radiation is a bit of a different beast, what we learn from cosmic rays is still transferable. So, it will be pertinent for people in the nuclear industry, people who work with radiation on an occupational basis, and for me, as the Canadian Institutes for Health Research Chair in Gender, Work and Health, as we look at the health effects of exposure to occupational and environmental radiation. It may even be relevant to our radon exposures, which are very prominent in Alberta. A lot of what is learned can be applied here on Earth.”

This news release can be found online at Enhancing Human Radioresistance.

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