# Study finds new way to clean up radioactive sites, protect radiotherapy patients, astronauts

December 21 2017

A new discovery by scientists could aid efforts to clean up radioactive waste sites, and could also help protect military personnel, cancer patients, and astronauts.

According to a collaborative study, led by researchers at the Uniformed Services University of the Health Sciences, published Dec. 20 in *PLOS One*, "Microbial cells can cooperate to resist high-level chronic ionizing radiation," the team examined growth characteristics of bacteria under high-level continuous gamma radiation. They found radiation-sensitive bacteria, E. coli (Escherichi coli), when mixed with radiation-resistant bacteria, Deinococcus radiodurans, can survive high doses of chronic ionizing radiation.

These findings suggest the Deinococcus bacteria (and also some fungi)—which express high concentrations of antioxidants—could be used as a natural radioprotective probiotic to protect microbes in the intestines of radio- and chemotherapy patients. These unexpected findings also suggest a new tool that could help protect military personnel and astronauts who experience gastrointestinal side effects from high levels of chronic ionizing radiation.

In 2004, it was discovered that radiation-sensitive bacteria were living alongside extremely radiation-resistant bacteria underneath a leaking Cold War radioactive waste tank holding leftovers from the Manhattan

Project. The team of scientists at USU sought to better understand this mystery—why it is that, in radioactive waste sites, radiation-sensitive bacteria can survive where only extremely radiation-resistant bacteria usually grow.

Now, with this better understanding of the characteristics of the Deinococcus bacteria, the researchers believe that they could help expedite the clean-up of Cold War radioactive wastes by harnessing the capabilities of other more sensitive microbes.

"Importantly, this study also shows that many yeasts can grow as well as Deinococcus under high-level chronic gamma radiation. These microbes have shown us that cells deal with radiation in the form of a big blast in a very different way from radiation in the form of long exposures—say, following a nuclear power accident, such as Fukushima," according to USU professor Dr. Michael J. Daly, who led the study.

**More information:** Igor Shuryak et al. Microbial cells can cooperate to resist high-level chronic ionizing radiation, *PLOS ONE* (2017). DOI: 10.1371/journal.pone.0189261

Provided by Uniformed Services University of the Health Sciences