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**News Release**

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## **In Deserts or In Space: Death by Protein Damage**

**BETHESDA, Md.** — A team of researchers from the Uniformed Services University of the Health Sciences (USU) led by Michael J. Daly, Ph.D., professor, Department of Pathology, in conjunction with researchers from the Department of Energy's Pacific Northwest National Laboratory and Florida State University in Tallahassee will publish a study in the April 8, 2008 issue of *International Society for Microbial Ecology (ISME) Journal*, a cooperative effort between ISME and Nature Publishing Group.

Chances are, unless you are a sea-monkey (brine shrimp), a water bear (tardigrade), a bdelloid rotifer, or something like the bacterium *Deinococcus radiodurans*, you will not survive drying for long. Their secret to surviving dehydration is a mystery, made even more curious by their equally impressive ability to resist ionizing radiation (x-rays and gamma-rays). The mechanism underlying these resistance traits is the focus of a recent study titled "Protein oxidation: key to desiccation resistance?" The results support that the mutual nature of desiccation and radiation resistance resides in the ability of cells to prevent protein damage. The radiation and desiccation tolerant bacteria examined, many within the genus *Deinococcus*, were isolated from the deserts of south-central Washington State. The mechanism of extreme radiation and desiccation resistance appears to revolve around small manganese-dependent antioxidants, which prevent a form of protein oxidation known to occur in diverse settings, including in deserts as cells dry, in space under cosmic radiation, by ultraviolet rays during sunbathing, in disease, and as we age.

The findings provide insights on the evolution of extreme radiation resistance mechanisms in desert environments; radiation countermeasures; how to better preserve the function of enzymes during drying, and perhaps even on slowing down the aging process.

The complete manuscript titled: "Protein Oxidation: Key to Bacterial Desiccation Resistance?" can be read in *The ISME Journal* at: <http://www.nature.com/ismej/index.html> citation number (doi: 10.1038/ismej.2007.116). The work was funded by the US Department of Energy Office of Science's Environmental Remediation Science Program (ERSP); and the US Department of Defense, Air Force Office of Scientific Research.

*Learning to Care for Those in Harm's Way*

The university's nationally ranked military and civilian faculty conduct cutting edge research in the biomedical sciences and in areas specific to the DoD health care mission such as combat casualty, infectious diseases, and radiation biology. The university is committed to technology transfer to ensure that the results of research are made widely available.

Pacific Northwest National Laboratory is a DOE Office of Science national laboratory that solves complex problems in energy, national security and the environment, and advances scientific frontiers in the chemical, biological, materials, environmental and computational sciences. PNNL employs 4,000 staff, has a \$760 million annual budget, and has been managed by Ohio-based Battelle since the lab's inception in 1965.

For more information about the study, contact Dr. Michael Daly at: [mdaly@usuhs.mil](mailto:mdaly@usuhs.mil).

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