Melanin's 'trick' for maintaining radioprotection studied

August 23 2011

Sunbathers have long known that melanin in their skin cells provides protection from the damage caused by visible and ultraviolet light. More recent studies have shown that melanin, which is produced by multitudes of the planet's life forms, also gives some species protection from ionizing radiation. In certain microbes, in particular some organisms from near the former nuclear reactor facilities in Chernobyl, melanin has even been linked to increased growth in the presence of ionizing radiation.

Research at the U.S. Department of Energy's Savannah River National Laboratory, in collaboration with the Albert Einstein College of Medicine, has provided insights into the electrochemical mechanism that gives the complex polymer known as melanin its long-term radioprotective properties, with a goal of using that knowledge to develop materials that mimic those natural properties.

A recent article in the journal *Bioelectrochemistry* (*Bioelectrochemistry* 82 (2011) 69-73) relates how the researchers established that ionizing radiation interacts with melanin to alter its oxidation-reduction potential, resulting in electric current production.

Radiation causes damage by stripping away electrons from its target. "Over time, as melanin is bombarded with radiation and electrons are knocked away, you would expect to see the melanin become oxidized, or bleached out, and lose its ability to provide protection," said Dr. Charles Turick, Science Fellow with SRNL, "but that's not what we're seeing.

Instead, the melanin continuously restores itself."

The team's research took them one step closer to understanding that self-restoration mechanism. They demonstrated that melanin can receive electrons, countering the oxidizing effects of the gamma radiation. The work showed, for the first time, that constant exposure of melanin to gamma radiation results in electric current production.

Mimicking that ability would be useful, for example, in the space industry, where satellites and other equipment are exposed to high levels of radiation for long spans of time. "Looking at materials, a constantly gamma radiation-oxidized electrode consisting in part of melanin would continuously accept electrons, thereby resulting in a current response," Turick said. "If we could understand how that works, we could keep that equipment working for a very long time."

Provided by Savannah River National Laboratory

Citation: Melanin's 'trick' for maintaining radioprotection studied (2011, August 23) retrieved 19 September 2024 from https://phys.org/news/2011-08-melanin-radioprotection.html