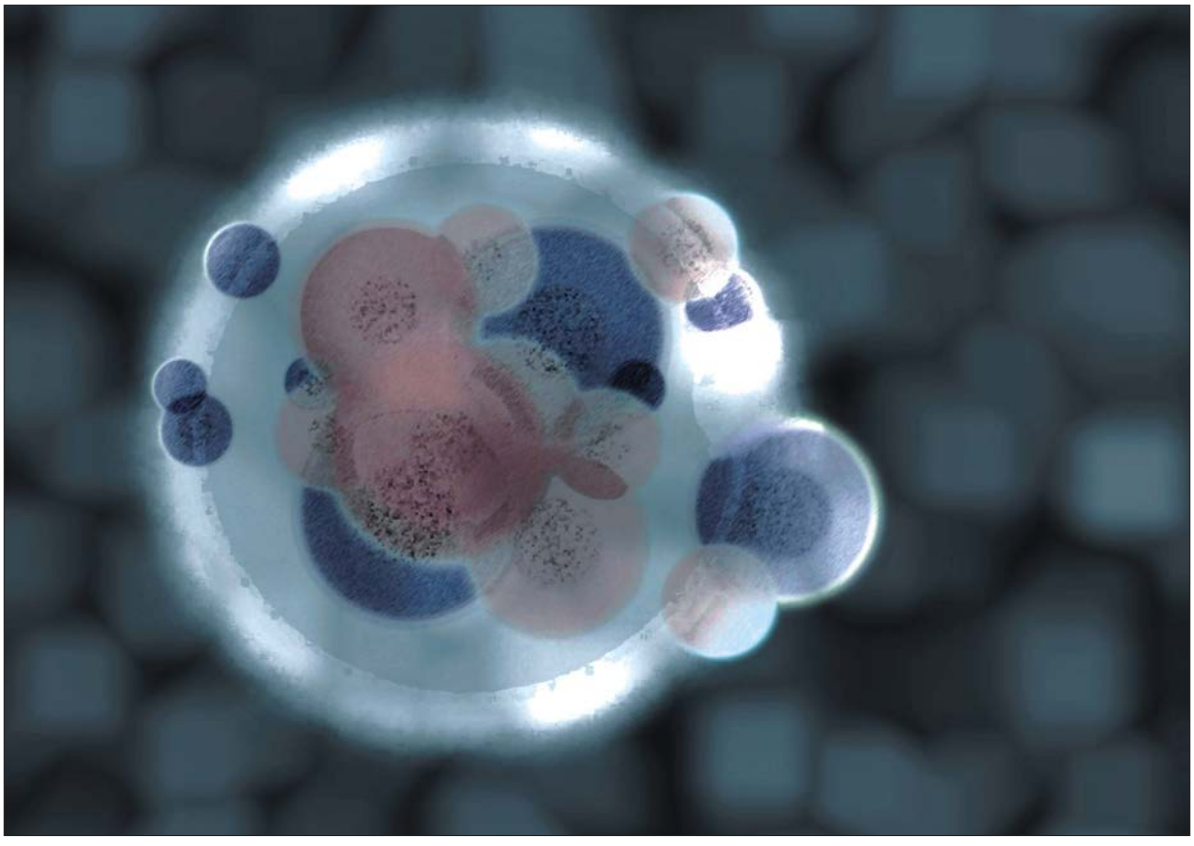

Journal of Biological Sciences

ISSN 1727-3048

science alert

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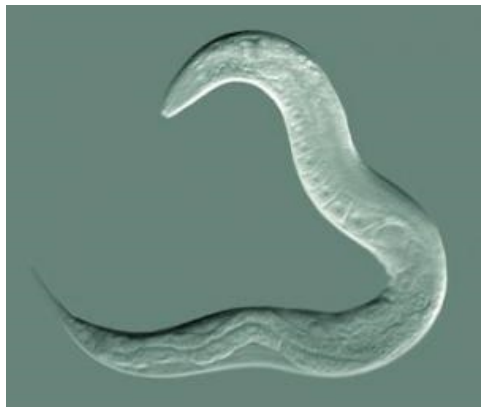

Free Radicals Good for You? Banned Herbicide Makes Worms Live Longer

It sounds like science fiction Dr. Siegfried Hekimi and his student Dr. Wen Yang, researchers at McGill's Department of Biology, tested the current "free radical theory of aging" by creating mutant worms that had increased production of free radicals, predicting they would be short-lived. But they lived even longer than regular worms! Moreover, their enhanced longevity was abolished when they were treated with antioxidants such as vitamin C.

The researchers then sought to mimic the apparent beneficial effect of the free radicals by treating regular, wild worms with Paraquat, an herbicide that works by increasing the production of free radicals. Paraquat is so toxic to humans and animals that it is banned in the European Union and its use restricted in many other places. Much to his delight, Hekimi discovered that the worms actually lived longer after being exposed to the chemical. "Don't try this at home!" Dr. Hekimi feels he should remind everyone. These findings were published December 6 in PLoS Biology.

Free radicals are toxic molecules produced by our bodies as it processes oxygen. As the body grows and uses its cells' various functions, it consumes oxygen, generating free radicals as a by-product, which in turn causes damage to cells. A long-standing theory suggests that aging is caused by a vicious cycle involving increasing production of free radicals, followed by damage to the cell and a further increase in free radicals because of the damage.

"These findings challenge our understanding of how free radicals are involved in the aging process," Hekimi said. "The current theory is very neat and logical, but these findings suggest a different framework for why oxidative stress is associated with aging." The genetically modified worms demonstrated that the production of free radicals can help to trigger the body's general protective and repair mechanisms. In other words, at certain stages in life, free radicals may be a key part of our well-being, despite their toxicity.

"Further experimentation is required to explore exactly how this data might change our theory of aging," Hekimi explained. "Free radicals are clearly involved, but maybe in a very different way than in the way people used to think". For this work, the research team headed by Dr. Hekimi received funding from the Canadian Institutes of Health Research. Dr. Hekimi also holds the Robert Archibald and Catherine Louise Campbell Chair of Developmental Biology.

Heidi A. Tissenbaum, Wen Yang, Siegfried Hekimi. A Mitochondrial Superoxide Signal Triggers Increased Longevity in Caenorhabditis elegans. PLoS Biology, 2010; 8 (12): e1000556 DOI: 10.1371/journal.pbio.1000556