New study on antioxidants shows mixed results for life extension

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First the good news: a study by scientists at the Buck Institute for Age Research shows four common antioxidants extended lifespan in the nematode worm C. elegans. And the not such good news: those four were among 40 antioxidants tested, the majority of which did nothing or caused harm to the microscopic worms.

The findings highlight the complexity of biological processes involved in aging and sends a cautionary signal to consumers who take antioxidants assuming the supplements will help them live longer, healthier lives. Results of the study now appear in the online edition of *Experimental Gerontology*.

In 2000, Buck Institute scientists made the landmark discovery that a chemical compound could extend the lifespan of simple animals. This discovery fuelled speculation that human lifespan could be extended with similar antioxidant compounds. In this follow up study, the scientists chose antioxidants readily available at health food stores along with those commonly used by chemists in various skin care or food products. The four which extended lifespan (by 15% - 20%) in the nematodes are Lipoic acid, Propyl gallate, Trolox and Taxifolin.

“We’ve taken a careful look at the way antioxidants affect aging in simple animals and what we find is that it’s a hodge-podge of effects,” said Buck Faculty member Gordon Lithgow, PhD, lead author of the study. “We see antioxidants that appear to make simple invertebrates live healthier, longer lives and we also find antioxidants that have precisely

the opposite effect, that compromise the animal's survival," he said.

Scientists have been testing the effects of compounds with antioxidant properties for nearly 25 years. Studies have been based on the theory that free radicals (unpaired electrons produced during normal metabolism) are toxic to most molecules, and that oxidative damage from these highly reactive electrons accumulates over time and either causes or contributes to aging and age-related disease. Antioxidants are believed to either protect against or repair damage caused by oxidative stress. No precise mechanism of action, as it relates to aging, has been identified for antioxidants. Earlier studies on the four life-extending antioxidants point to different mechanisms of action for each of the compounds.

"I'm an optimist, I think we can make positive statements about the potential for intervening in aging with compounds that manage oxidative stress," said Lithgow. "I'm also saying that we're not there yet, and if only four of the 40 compounds are having the desired effect, that's not good when we think about applying these results to humans today."

In the Buck Institute study, results from experiments involving Lipoic acid highlight the lack of understanding of basic biological processes, Lithgow said. While Lipoic acid, at a particular dosage, did make the worms resistant to stress and extended their lifespan, it also reduced the fertility of the animals. At lower dosages Lipoic acid actually made the animals more sensitive to stress and reduced their survival. Further studies on the mechanisms by which Lipoic acid and the other three compounds extend lifespan are now underway.

"There's still a big gap in our understanding of how these compounds work," said Lithgow. "I think what we've got to do is be very careful. If consumers are looking at a product that makes an anti-aging claim, they need to investigate that claim and see where the evidence comes from,"

he said.

Provided by Buck Institute