

Antioxidants are unlikely to prevent aging, study suggests

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Diets and beauty products which claim to have anti-oxidant properties are unlikely to prevent ageing, according to research funded by the Wellcome Trust. Researchers at the Institute of Healthy Ageing at UCL (University College London) say this is because a key fifty year old theory about the causes of ageing is wrong.

"Superoxide" free radicals – oxygen molecules that have an imbalance of electrons to protons – are generated in the body through natural processes such as metabolism. These free radicals can cause oxidation in the body, analogous to rust when iron is exposed to oxygen. Biological systems, such as the human body, are usually able to restrict or repair this damage.

In 1956, Denham Harman proposed the theory that ageing is caused by an accumulation of molecular damage caused by "oxidative stress", the action of reactive forms of oxygen, such as superoxide, on cells. This theory has dominated the field of ageing research for over fifty years. But now, a study published online today in the journal *Genes & Development* suggests that this theory is probably incorrect and that superoxide is not a major cause of ageing.

"The fact is that we don't understand much about the fundamental mechanisms of ageing," says Dr David Gems from UCL. "The free radical theory of ageing has filled a knowledge vacuum for over fifty years now, but it just doesn't stand up to the evidence."

Dr Gems and colleagues at the Institute of Healthy Ageing studied the action of key genes involved in removing superoxide from the bodies of the nematode worm *C. elegans*, a commonly-used model for research into ageing. By manipulating these genes, they were able to control the worm's ability to "mop up" surplus superoxide and limit potential damage caused by oxidation.

Contrary to the result predicted by the free radical theory of ageing, the researchers found that the lifespan of the worm was relatively unaffected by its ability to tackle the surplus superoxide. The findings, combined with similar recent findings from the University of Texas using mice, imply that this theory is incorrect.

"One of the hallmarks of ageing is the accumulation of molecular damage, but what causes this damage?" says Dr Gems. "It's clear that if superoxide is involved, it only plays a small part in the story. Oxidative damage is clearly not a universal, major driver of the ageing process. Other factors, such as chemical reactions involving sugars in our body, clearly play a role."

Dr Gems believes the study suggests that anti-ageing products which claim to have anti-oxidant properties are unlikely to have any effect.

"A healthy, balanced diet is very important for reducing the risk of developing many diseases associated with old age, such as cancer, diabetes and osteoporosis," he says. "But there is no clear evidence that dietary antioxidants can slow or prevent ageing. There is even less evidence to support the claims of most anti-ageing products."

The research was welcomed by Dr Alan Schafer, Head of Molecular and Physiological Sciences at the Wellcome Trust.

"With increasing lifespan comes greater exposure and vulnerability to

the ageing process," comments Dr Schafer. "Research such as this points to how much we have to learn about ageing, and the importance of understanding the mechanisms behind this process. This new study will encourage researchers to explore new avenues in ageing research."

Source: Wellcome Trust

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