

Zinc deficiency mechanism linked to aging, multiple diseases

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Oysters have the highest zinc content of almost any food. Credit: Lynn Ketchum, courtesy of Oregon State University

(Medical Xpress)—A new study has outlined for the first time a biological mechanism by which zinc deficiency can develop with age, leading to a decline of the immune system and increased inflammation associated with many health problems, including cancer, heart disease, autoimmune disease and diabetes.

The research was done by scientists in the Linus Pauling Institute at Oregon State University and the OSU College of Public Health and Human Sciences. It suggests that it's especially important for elderly people to get adequate [dietary intake](#) of zinc, since they may need more

of it at this life stage when their ability to absorb it is declining.

About 40 percent of elderly Americans and as many as two billion people around the world have diets that are deficient in this important, but often underappreciated micronutrient, experts say.

The study was published in the *Journal of Nutritional Biochemistry*, based on findings with laboratory animals. It found that zinc transporters were significantly dysregulated in old animals. They showed signs of [zinc deficiency](#) and had an enhanced [inflammatory response](#) even though their diet supposedly contained adequate amounts of zinc.

When the animals were given about 10 times their dietary requirement for zinc, the biomarkers of inflammation were restored to those of young animals.

"The elderly are the fastest growing population in the U.S. and are highly vulnerable to zinc deficiency," said Emily Ho, an LPI principal investigator. "They don't consume enough of this nutrient and don't absorb it very well."

"We've previously shown in both animal and human studies that zinc deficiency can cause DNA damage, and this new work shows how it can help lead to [systemic inflammation](#)," Ho said.

"Some inflammation is normal, a part of [immune defense](#), wound healing and other functions," she said. "But in excess, it's been associated with almost every [degenerative disease](#) you can think of, including cancer and heart disease. It appears to be a significant factor in the diseases that most people die from."

As a result of this and what is now known about zinc absorption in the elderly, Ho said that she would recommend all senior citizens take a

dietary supplement that includes the full RDA for zinc, which is 11 milligrams a day for men and 8 milligrams for women. Zinc can be obtained in the diet from seafood and meats, but it's more difficult to absorb from grains and vegetables – a particular concern for vegetarians.

"We found that the mechanisms to transport zinc are disrupted by age-related epigenetic changes," said Carmen Wong, an OSU research associate and co-author of this study. "This can cause an increase in DNA methylation and histone modifications that are related to disease processes, especially cancer. Immune system cells are also particularly vulnerable to zinc deficiency."

Research at OSU and elsewhere has shown that zinc is essential to protect against oxidative stress and help repair [DNA damage](#). In zinc deficiency, the risk of which has been shown to increase with age, the body's ability to repair genetic damage may be decreasing even as the amount of damage is going up.

Medical tests to determine zinc deficiency are rarely done, scientists say, and are not particularly accurate even if they are done. The best approach is to assure adequate intake of the nutrient through diet or supplements, they said, especially in the elderly.

Even though elderly people have less success in absorbing zinc, the official RDA for them is the same as in younger adults. That issue should be examined more closely, Ho said.

Levels of zinc intake above 40 milligrams per day should be avoided, researchers said, because at very high levels they can interfere with absorption of other necessary nutrients, including iron and copper.

Provided by Oregon State University

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