New study links cadmium to more severe flu, pneumonia infections

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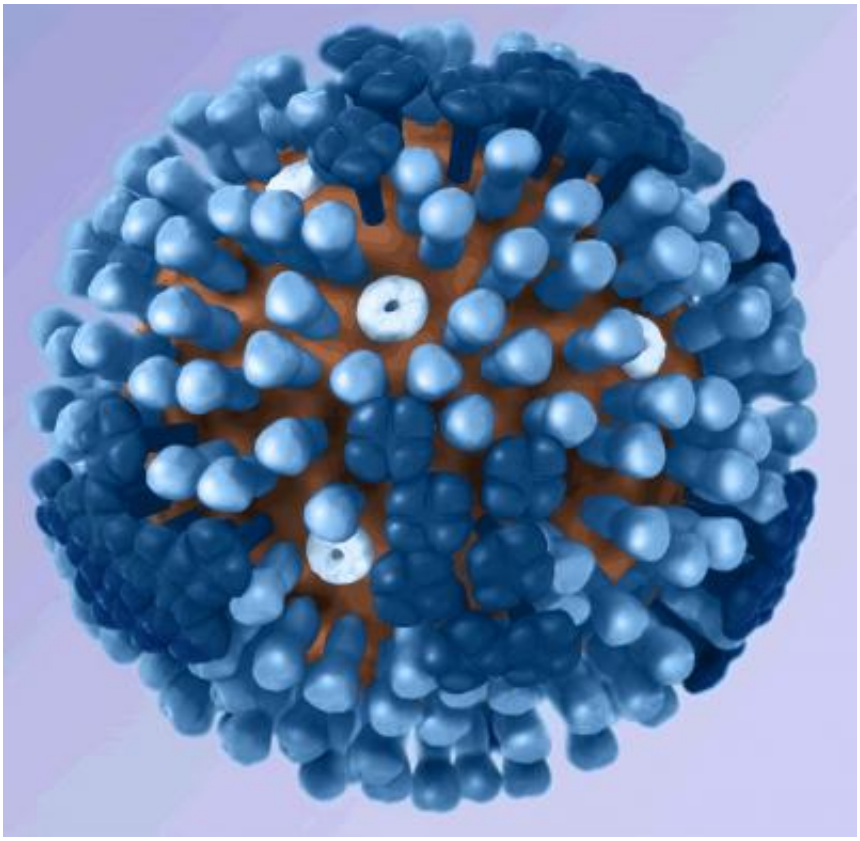

A 3-D image of a flu virus. Credit: Center for Disease Control

High levels of cadmium, a chemical found in cigarettes and in contaminated vegetables, are associated with higher death rates in patients with influenza or pneumonia—and may increase the severity of COVID-19 and other respiratory viruses, according to a new study.

"Our study suggests the public in general, both smokers and nonsmokers, could benefit from reduced exposure to cadmium," said lead author Sung Kyun Park, associate professor of epidemiology and environmental health sciences at the University of Michigan School of Public Health.

Long-term exposure to cadmium, even at low levels, may undermine our defense system in the lungs, and people with high levels of the chemical may not be able to cope with influenza virus attacks, Park said.

The study by researchers at U-M, the University of Southern California and the University of Washington is published in the December issue of *Environmental Health Perspectives*.

"The associations we found need to be verified in other populations and also studied with respect to cadmium's potential impact on COVID-19 related morbidity and mortality," said senior author Howard Hu, professor and chair of USC's Department of Preventive Medicine and an occupational/environmental physician.

"Unfortunately, the human body finds it much more difficult to excrete cadmium than other toxic metals, and its presence in many nutritious foods means it is critical to continue reducing sources of environmental pollution that contribute to its presence in air, soil and water."

Early in the pandemic, as data was starting to come out of Wuhan, China, a large percentage of people dying from the coronavirus shared a few characteristics—they were male, smokers and older.

That prompted Finnish researcher Matti Sirén, a co-author of the study, to reach out to Park and Hu, who a decade ago had conducted a comprehensive study on the impact of cadmium on chronic diseases, including lung and cardiovascular diseases.

Interested in looking into the association between cadmium and COVID-19, but understanding that little data would be available to look at this link, the researchers instead focused on studying the potential association of cadmium to other viral infections: influenza and pneumonia.

The researchers utilized data from the U.S. National Health and Nutrition Examination Survey from 1988-1994 and 1999-2006. NHANES is conducted by the National Center for Health Statistics and provides nationally representative survey data on the health and nutritional status of the noninstitutionalized U.S. population.

Nearly 16,000 participants in the two separate cohorts were used for the analysis. Cadmium was measured in urine in the first survey and blood in the second. And because tobacco has more than 3,000 chemical components, researchers also looked at cadmium levels in nonsmokers.

After adjusting for age, sex, race/ethnicity, education, body mass index, serum cholesterol and hypertension, researchers found that patients with cadmium levels in the 80th percentile were 15% more likely to die of influenza or pneumonia compared to those in the 20th percentile.

Among those who never smoked, the difference was even greater with a 27% higher risk of mortality among those in the 80th percentile compared to the 20th percentile.

"We couldn't directly look at cadmium body burden among COVID-19 patients in the early pandemic," Park said. "Our motivation was to find a modifiable risk factor that can predispose people with COVID-19 infection to develop a severe complication and die of COVID-19.

"COVID-19 may not be a one-time event. Our findings suggest that the public can benefit from reduced cadmium exposure when the next

pandemic occurs. This cannot be done suddenly and takes time through policy changes."

In the meantime, Park said smokers should stop smoking. And everyone should be aware of the major sources of cadmium in their diets: cereal, rice, animal organs such as the liver and kidneys, soybeans and some types of leafy vegetables.

There are many other sources of vitamins, he said. Cruciferous vegetables, such as cabbage and broccoli, contain high levels of antioxidants but relatively low levels of cadmium.

"This isn't a recommendation for a draconian change in lifestyle, since many of these foods are typical staples of a balanced, nutritious diet, and their overall contribution to cadmium burden is likely modest," Hu said. "Rather, the suggestion is to consider some shifts in choices.

"Meanwhile, epidemiologists need to focus on the issue we raised. Increased scrutiny is needed of sources of cadmium exposure and surveillance of cadmium levels in the general population, and policymakers need to work on continuing to reduce environmental cadmium pollution."

More information: *Environmental Health Perspectives* (2020). doi.org/10.1289/EHP7598

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