Research looks at heavy metals in our food and the risk of cancers, other serious health conditions

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The problem of food-borne metal contamination has taken on new urgency, thanks in part to a 2021 US Congressional Report detailing high

levels of metals found in infant food pulled off grocery shelves. (More recently, high levels of lead were discovered in children's fruit puree pouches.)

Now, two new studies provide information on the correlation between exposure to [heavy metals](link) in food and the risk of cancers and other serious health risks. The findings were presented at the [2023 Society for Risk Analysis Annual Conference](link).

Food crops can absorb heavy metals from contaminated soil, air, and water. As a result, traces of dangerous heavy metals—lead, arsenic, and cadmium—are found in common foods from rice and cereals to nuts and spinach. Felicia Wu, Michigan State University food scientist and incoming president of the SRA, is leading several investigations to gain a better understanding of the health risks of heavy metal exposure.

She presents the results of two recent studies at the December SRA meeting. The first is a comprehensive evaluation of the health risks associated with dietary exposure to lead, arsenic, and cadmium. The second is a quantitative assessment of the risk of [cancer](link) from inorganic arsenic exposure.

"Results from these studies have important implications for food safety regulations, public health policies, and consumer awareness," says Wu.

Health risks of dietary exposure to lead, arsenic, and cadmium

In the first study, Wu, working with postdoctoral research fellow Charitha Gamlath and Ph.D. student Patricia Hsu, gathered data on the dietary intake of each metal from various sources such as food and water samples and existing studies and reports.

The researchers analyzed the data to determine the strength of the association between dietary exposure and [adverse health effects](#). Both cancer and non-cancer health effects were considered, and the strengths of the links between heavy metal exposure and each effect using Bradford Hill Criteria scores.

Lead is a toxic metal commonly found in old paint, water pipes, and contaminated soil. Food sources of lead include root vegetables like beets. In the study, lead showed moderate to high-risk scores for causing lung, kidney, bladder, stomach, and brain cancers. It also showed moderate to [high scores](#) for non-cancer risks (hematopoietic, reproductive, neurological, renal, and respiratory effects).

Arsenic is a naturally occurring toxic element that can contaminate drinking water and food—especially in areas with high levels of arsenic in the soil. It can be found in rice, wheat, and leafy green vegetables, among other foods.

Arsenic demonstrated moderate to high scores for skin, bladder, lung, kidney, and liver cancers. It also showed moderate to high scores for non-cancer risks (skin lesions, cardiovascular disease, immunological, neurological, reproductive, developmental, and renal effects).

Cadmium is a toxic metal found in nuts, potatoes, seeds, cereal grains, leafy green vegetables, and tobacco smoke. Among its sources in the environment are fertilizers and industrial emissions.

In the study, cadmium revealed moderate to high-risk scores for prostate, renal, bladder, breast, pancreatic, and endometrial cancers. It also showed moderate to high scores for non-cancer risks (renal, developmental, reproductive, immunological, and neurological effects).

Earlier this year, Wu co-authored a study on cadmium in baby food that

was published in Food and Chemical Toxicology. In that paper, the researchers found that babies and young children 6 months to 5 years old are the most highly exposed to cadmium in common foodstuffs.

American infants and young children of these age groups who regularly consumed rice, spinach, oats, barley, potatoes, and wheat had mean cadmium exposures exceeding the maximum tolerable intake level set by the Agency for Toxic Substances and Disease Registry (ATSDR).

Arsenic exposure and bladder, lung, and skin cancer cases in the U.S.

In the second study, Wu and Ph.D. student Rubait Rahman conducted a quantitative cancer risk assessment for different food products in the United States containing inorganic arsenic.

Their preliminary estimates suggest that every year, more than 6,000 additional cases of bladder and lung cancers and over 7,000 cases of skin cancers can be attributed to the consumption of inorganic arsenic in the United States. The researchers also found that certain food products can be associated with higher cancer risk than others. These include rice, wheat, and leafy green vegetables.

For this project, a comprehensive review of scientific literature was conducted to identify relevant studies on inorganic arsenic contamination in various food products and associated cancer risks. Data on arsenic levels in food products were obtained from regulatory agencies, such as the U.S. Food and Drug Administration (FDA) and the U.S. Department of Agriculture (USDA).

Quantitative cancer risk assessment models were applied to estimate the cancer risk attributable to inorganic arsenic exposure through different

food products. These models integrated exposure data, dose-response relationships, and population characteristics to quantify the probability of cancer occurrence.

More information: Cancer burden from dietary exposure to inorganic arsenic in the United States: Risk assessment and policy implications-Tuesday, December 12, 11:00-11:15 a.m.

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