Arsenic in drinking water damages hearts of young adults, study says

By Sandee LaMotte, CNN

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Photos: Foods in which arsenic may be present

Because rice takes up arsenic more readily than other grains, the U.S. Food and Drug Administration looking at the effects of long-term exposure to very low amounts of arsenic in rice and rice products. importance as a staple in regions around the world makes it a priority for food researchers.

In April, the FDA proposed a limit of 100 parts per billion of inorganic arsenic in infant rice cereal.

(CNN) — Young adults free of diabetes and cardiovascular disease developed heart damage after only five years of exposure to low-to-moderate levels of arsenic commonly found in groundwater. This was the finding of a study published Tuesday in Circulation: Cardiovascular Imaging, an American Heart Association journal.

"Low-level arsenic exposure is associated with a disproportionate growth of the heart independent of hypertension and other traditional risk factors," the study's lead author, Dr. Gernot Pichler, wrote in an email.

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"The higher the arsenic content in drinking water, the greater the damage to the heart," said Pichler, who is a medical specialist at Hospital Hietzing/Heart Center Clinic Floridsdorf in Vienna, Austria.

Long-term exposure to inorganic arsenic, a human poison that occurs naturally in the Earth's crust, has been linked to various cancers, kidney damage, hypertension, cardiovascular disease and diabetes. Organic arsenic, such as what's found in seafood, is not known to be toxic to humans.

Though arsenic can be found in the air and soil, the World Health Organization says the greatest threat to public health globally comes from groundwater, which is contaminated as it flows through rocks and minerals containing arsenic.

In the United States, people who live in rural and some suburban areas can be exposed to untreated groundwater through the use of private wells.

"It is important for the general public to be aware that arsenic can be a risk factor for cardiovascular disease," Pichler said. "Private wells are currently not regulated and people using private wells, including children and young adults, are not protected."

Arsenic and heart disease

Research has shown an association between low to moderate levels of arsenic and diabetes, hypertension and cardiovascular problems, but just how this occurs is still unclear.

The new study analyzed data from the Strong Heart Family Study, a longitudinal study looking at cardiovascular risk factors among American Indians who traditionally rely on well water living in Oklahoma, Arizona, North and South Dakota.

Urine samples were gathered from 1,337 adults, with an average age of 30.7 years, and tested for arsenic levels. The size, shape and functionality of their hearts were also assessed via ultrasound.

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doubled, the chance of developing left ventricular hypertrophy, a thickening of the walls of the heart's main pumping chamber, rose to 47%.

As the walls of the heart muscle thicken, the heart must work harder and harder to pump blood throughout the body. According to the American Heart Association, the condition is closely linked with sudden cardiac arrest, stroke and heart failure.

Study participants who had pre-hypertension or existing high blood pressure had a 58% greater risk for thickening of the walls to occur.

"The stronger association in subjects with elevated blood pressure suggests that individuals with pre-clinical heart disease might be more prone to the toxic effects of arsenic on the heart," Pichler said.

While the study was performed among tribal populations, the study's findings can apply to anyone living in a rural location with low or moderate levels of arsenic in their groundwater, according to Pichler.

Arsenic and groundwater

Related Article: Coal ash contaminating groundwater nationwide, groups say

As one of the "most abundant environmental metals worldwide," arsenic affects "more than 200 million people" in more than 70 countries via drinking water alone, the University of Cambridge's Rajiv Chowdhury and Kim Daalen wrote in an editorial accompanying the study.

In the United States, the highest levels tend to be found in private wells that tap into the ground in areas contaminated by arsenic.

"The water from public suppliers must meet Environmental Protection Agency standards of less than 10 micrograms of arsenic per liter or 10 parts per billion," said hydrologist Joseph Ayotte of the US Geological Survey's New England Water Science Center.

"It's a really small amount, but there's evidence concentrations much lower than that can cause human health issues," Ayotte said, adding that several states are looking at lowering their limits to 5 micrograms per liter.

About 44 million people in the US mainland use private well water, according to a 2017 study by the US Geological Survey and the Centers for Disease Control and Prevention, led by Ayotte. Of those, over 2 million people are estimated to be drinking from wells that have high concentrations of arsenic.

This map shows the areas of the United States that are more likely to have well water with arsenic levels of 10 micrograms or more. However, water in private wells can exceed "1,000 micrograms per liter" in some areas, Ayotte said.

States that may have high levels of arsenic in groundwater include Washington, Oregon, Nevada, California, Arizona, New Mexico, Maine, Massachusetts, New Hampshire, New Jersey, Maryland, Michigan, Wisconsin, Illinois Ohio, Indiana, Florida, Virginia, North Carolina and South Carolina.

Anyone concerned about the arsenic contamination of their well water should have it tested immediately.

"Start with state, public health and environmental groups in your own state," Ayotte said. "No one solution fits everywhere, so they are the best to advise on what to do."

Potential solutions include adding a treatment system to the water as it exits the well, drilling a new well in a contamination-free area and relying on bottled water, he said.

More research needed

The new study had several limitations, Chowdhury and Daalen wrote in their editorial, such as the use of urinary tests, which can measure only recent exposure, instead of toenail testing, which can show long-term exposure. In addition, groundwater can contain a number of other environmental metals, such as lead, which are known to be extremely toxic.

Still, they wrote, "these studies are important since cardiovascular disease remains the single leading cause of adult premature death worldwide and millions of individuals globally are exposed to arsenic and other metal contaminants."

According to Pichler, next steps in research should look at whether the changes to the heart are reversible if exposure is reduced.

"Some changes have occurred in water sources in the study communities that led to a reduction in arsenic exposure," he said. "It will be important to check the potential health impact of those changes."

Another important research area, he said, would be to investigate the impact of past arsenic exposure during pregnancy, because there's increasing evidence to show that in-utero arsenic exposure can have a long-term impact.

Clarification: A previous version of this story did not state the full name of the journal where the study was published.