Folic Acid Lowers Blood Arsenic Levels, According to Mailman School Study

A new study by researchers at the Mailman School finds that folic acid supplements can dramatically lower blood arsenic levels in individuals exposed to arsenic through contaminated drinking water. This toxic element, naturally present in some aquifers used for drinking, is currently a significant public health problem in at least 70 countries, including several developing countries and also parts of the U.S. Chronic arsenic exposure is associated with increased risk for skin, liver and bladder cancers, skin lesions, cardiovascular disease, and other adverse health outcomes. The study results are published in the October issue of the *American Journal of Clinical Nutrition.*

The researchers found that treatment with 400 micrograms a day of folic acid, the U.S. recommended dietary allowance, reduced total blood arsenic levels in the study population by 14 percent. Folate, a B vitamin found in leafy vegetables, citrus fruits, beans, and whole grains, can also be taken as a vitamin supplement, and in the U.S., is added to flour and other fortified foods. The researchers found that folate deficiency is very common in Bangladesh, where the study was conducted.

“Folic acid supplementation enhanced the detoxification of arsenic to a form that is more readily excreted in urine,” said Mary Gamble, PhD, assistant professor of Environmental Health Sciences and lead author. The study is jointly supported by the National Institute of Environmental Health Sciences, part of the National Institutes of Health and the federally funded Superfund Basic Research Program (SPRB), which seeks solutions to the complex health and environmental issues associated with the nation’s hazardous waste sites.

Folic acid increased the methylation or detoxification of arsenic in the body, allowing the body to change some of its more toxic metabolite, or methylarsonic (MMA) acid, to a form that could more easily be excreted from the body, thus lowering the levels of arsenic found in the blood.

Chronic arsenic exposure currently affects 100 million persons worldwide, including populations in Bangladesh. The arsenic levels in drinking water in some parts of Bangladesh reach as high as 100 times the World Health Organization and the U.S. Environmental Protection Agency (EPA) guidelines, which set a limit of 10 micrograms per liter for arsenic in drinking water.

The initial intervention study included 200 folate-deficient participants drawn from a larger cohort study in Bangladesh examining the adverse health effects of arsenic. Dr. Gamble pointed
out, “The technology to measure arsenic in blood, and particularly to measure the individual arsenic metabolites in blood, didn’t exist when the studies were first planned.” She credits the advanced technology to recent advances in other laboratories at Columbia, including work conducted by Superfund grantee Joseph H. Graziano, PhD, professor of Environmental Health Sciences and a co-author on the study.

“Clearly the first priority should focus on mitigation efforts to lower arsenic exposure. But this very exciting and significant finding implies that folic acid has therapeutic potential for people who have been exposed to arsenic,” said Dr. Gamble. “Although additional studies are needed, the results of this study suggest that a simple, low-cost nutritional intervention may help to prevent some of the long-term health consequences associated with arsenic exposure for the many populations at risk.”

William Suk, PhD, acting deputy director of the NIEHS, discussed the significance of this work in Bangladesh to the U.S. He explains that arsenic contamination of groundwater is one of the five most common inorganic compounds found at Superfund sites and is present at over 70% of the sites. “Because of the prevalence of arsenic, the SBRP has placed an emphasis on supporting arsenic-related research in heavily affected areas all over the world to understand and mitigate the health issues arising from arsenic exposure via drinking water. This research is already demonstrating its relevance to exposures that are occurring in the United States.”

Claudia Thompson, PhD, acting director of the SPRB, said, “The work that our grantees are doing in Bangladesh is extraordinary. Not only is the research they are conducting improving the quality of life for the people in Bangladesh, but it can potentially help the more than 100 million people worldwide that are chronically exposed to arsenic.”

The study results also imply that folic acid supplementation may help to reduce body stores of arsenic even after exposure has been reduced. Elevated risk for adverse health outcomes persists for decades after exposure has been eliminated. The researchers stress that additional studies are needed to determine the optimal dosage and duration of treatment, as well as studies that include health outcomes.

The National Institute of Environmental Health Sciences (NIEHS), a component of the National Institutes of Health, supports research to understand the effects of the environment on human health. The research conducted by the SBRP is a coordinated effort with the Environmental Protection Agency, which is the federal entity charged with cleaning up the worst hazardous waste sites in the country.
http://www.niehs.nih.gov/research/supported/sbrp/index.cfm

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