

Vitamin B diminishes effects of air pollution-induced cardiovascular disease

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B vitamins can mitigate the impact of fine particle pollution on cardiovascular disease, according to new research conducted at Columbia University's Mailman School of Public Health. Healthy non-smokers who took vitamin B supplements nearly reversed any negative effects on their cardiovascular and immune systems, weakening the effects of air pollution on heart rate by 150 percent, total white blood count by 139 percent, and lymphocyte count by 106 percent.

This is the first clinical trial to evaluate whether B [vitamin supplements](#) change the biologic and physiologic responses to ambient [air pollution exposure](#). The study initiates a course of research for developing preventive pharmacological interventions using B vitamins to contain the health effects of air pollution. The findings are published online in the Nature Publishing Group journal, *Scientific Reports*.

Ambient fine particulate pollution contributes to 3.7 million premature deaths annually worldwide, predominantly through acute effects on the cardiovascular system. Particulate matter pollution is the most frequent trigger for myocardial infarction at the population level.

"Ambient PM_{2.5} pollution is one of the most common air pollutants and has a negative effect on cardiac function and the immune system," said Jia Zhong, PhD, principal investigator, and postdoctoral research officer in the Department of Environmental Health Sciences at Columbia's Mailman School. "For the first time, our trial provides evidence that B-vitamin supplementation might attenuate the acute effects of PM_{2.5} on

cardiac dysfunction and inflammatory markers."

The paper builds on research published in March that found B vitamins reduce the negative effects of air pollution as measured by epigenetic markers.

In the new study, researchers recruited ten healthy, 18 to 60-year-old, non-smoking volunteers who were not on any form of B vitamin supplements or other medication. All volunteers received a placebo for four weeks preceding a two-hour [exposure](#) experiment to concentrated ambient PM2.5 (250 μ g/m³), after which they were administered B vitamin supplements for four weeks before the next two-hour exposure experiment to PM2.5. A particle-free two-hour exposure was included to provide baseline data. The controlled exposure experiments were conducted from July 2013 to February 2014 at the same time of day and adjusted for season, temperature, and humidity.

"Our results showed that a two-hour exposure to concentrated ambient PM2.5 had substantial physiologic impacts on [heart rate](#), heart rate variability, and white blood counts. Further, we demonstrated that these effects are nearly reversed with four-week B-[vitamin](#) supplementation," noted Andrea Baccarelli, MD, PhD, chair and Leon Hess Professor of Environmental Health Sciences at the Mailman School.

Because the researchers studied healthy adults from lightly polluted urban environment, they caution that their findings might not be generalizable to populations that are at higher risk for pollution-induced cardiovascular effects, including children, older adults, individuals with pre-existing cardiovascular disease, and individuals residing in heavily polluted areas.

"With ambient PM2.5 levels far exceeding air quality standards in many large urban areas worldwide, [pollution](#) regulation remains the backbone

of public health protection against its cardiovascular health effects. Studies like ours cannot diminish—nor be used to underemphasize—the urgent need to lower [air pollution](#) levels to—at a minimum—meet the air quality standards set forth in the United States and other countries. However, residual risk remains for those who are sensitive, and high exposures are, unfortunately, the rule still in many megacities throughout the world," said Dr. Baccarelli.

More information: Jia Zhong et al, B-vitamin Supplementation Mitigates Effects of Fine Particles on Cardiac Autonomic Dysfunction and Inflammation: A Pilot Human Intervention Trial, *Scientific Reports* (2017). [DOI: 10.1038/srep45322](https://doi.org/10.1038/srep45322)

Provided by Columbia University's Mailman School of Public Health

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