

Lead accumulation in shin bone may be associated with resistant high blood pressure

October 24 2018

Accumulations of low levels of lead in the shin bone of men were associated with treatment-resistant high blood pressure, according to new research in the *Journal of the American Heart Association*, the Open Access Journal of the American Heart Association/American Stroke Association.

"Our study demonstrates that cumulative lead burden, as measured by [cortical bone](#) in the tibia ([shin bone](#)), may be an unrecognized risk factor for drug resistant hypertension," said Sung Kyun Park, Sc.D., M.P.H., the lead author of the study and an associate professor of epidemiology and environmental health sciences at the University of Michigan School of Public Health, in Ann Arbor, Michigan. Cortical bone is the hard outer shell of the bone. "We believe this is the first study to find this association," he said.

Researchers tested lead levels in the [blood](#), tibias and kneecaps of 475 predominantly white men with high blood [pressure](#) at a Veteran's Affairs center in Boston, including 97 who developed high blood pressure and didn't respond well to medications.

Patients are diagnosed with resistant hypertension when they need three or more medications from different drug classes to treat high blood pressure, but still have blood pressure that exceeds the goal for hypertension established in [2017 in the American Heart Association/American College of Cardiology guidelines for hypertension](#). In addition, patients whose blood pressure achieves target values on

four or more different types of blood-pressure-lowering medications are also considered to have resistant hypertension.

After adjusting for demographics, lifestyle and socioeconomic factors, including age, race, education, income, body weight and cigarette smoking, the researchers found a 19 percent higher risk of resistant hypertension in men with every 15 microgram per gram increase in lead levels in the tibia. Statistically meaningful associations between lead accumulation and resistant [high blood pressure](#) were not seen in the blood or knee bones (patella).

"Laws limiting lead exposure have been on the books for decades, but in recent years it is recognized that lead remains an environmental toxin that is still with us. This likely reflects the long after-effects of historically high lead exposures, which is what shin [bone](#) lead partly represents, but it also likely reflects continuing lead exposure from, for example, an aging infrastructure where water pipes in many urban areas are older and contain lead," Park said. "Since the lead problems in the drinking water in Flint, Michigan, have surfaced, the issue has become more troubling, especially in older U.S. cities."

The study had several limitations and additional research is needed to confirm the findings. Resistant [hypertension](#) in the study participants may have been due to secondary causes such as over-the-counter drugs or non-compliance with blood pressure medications, or due to variations in blood pressure tests at different doctors' offices. Also, because most of the study patients were white men, the potential association needs to be studied in other groups of patients, according to Park.

The men were tracked by the Normative Aging Study (NAS), a longitudinal Veterans Affairs study in 2,280 volunteers that was started in 1963 to characterize different health and disease risk factors that impact the natural aging process.

Provided by American Heart Association

Citation: Lead accumulation in shin bone may be associated with resistant high blood pressure (2018, October 24) retrieved 20 April 2024 from <https://medicalxpress.com/news/2018-10-accumulation-shin-bone-resistant-high.html>

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