Lead heightens hypertension risk in blacks

U.S. blacks suffer a one-third greater risk of high blood pressure than whites, perhaps in part because their bodies are more sensitive to several known hypertension risk factors, including psychological stress and dietary salt. Researchers have now added lead — a toxic heavy metal once commonly used in house paint, water pipes and gasoline — to the list of hypertension hazards that selectively target blacks.

Dozens of previous studies have pointed to lead as a blood-pressure-elevating agent, at least in men. However, several other studies have turned up no such link. Even in the studies suggesting a tie, the blood pressure elevation attributable to blood lead levels usually proved small — about a 2-millimeter mercury (mmHg) increase for each 10-microgram increase of lead per deciliter of blood (SN: 9/3/88, p. 158).

In the April AMERICAN JOURNAL OF EPIDEMIOLOGY, researchers at the University of California in Berkeley and San Francisco describe new research comparing lead's effect on blood pressure among several racial groups. The study involved 249 male bus drivers in the Bay Area, all with similar blood pressure levels in the normal range. After the investigators accounted for established blood pressure boosters such as age, weight, caffeine consumption, alcohol intake and tobacco use, lead emerged as a potent, independent risk factor for hypertension — but only among the 132 blacks in the group. Lead played no apparent role in raising blood pressure among the study's whites, Hispanics and Asians.

Hypertension risk among the blacks rose as lead levels in the bloodstream increased from 2 to 21 micrograms per deciliter. After comparing blood pressure readings for blacks with the highest and lowest blood lead levels, the researchers estimated that lead had elevated systolic and diastolic blood pressure by roughly 15 and 9 mmHg, respectively, among those with highest lead levels. That's "a huge elevation," says Berkeley epidemiologist Dan S. Sharp, who led the study. Moreover, he notes, the highest blood lead levels measured in the study were still well below those considered excessive for children, the group most vulnerable to lead toxicity.

A mere 2-mmHg decrease in blood pressure might correspond to an 8 to 10 percent decrease in premature deaths from heart disease, according to data from the Hypertension and Detection Follow-Up Program, described by Herman A. Tyroler at the University of North Carolina at Chapel Hill in the June 1988 ENVIRONMENTAL HEALTH PERSPECTIVES.

While noting that many of the previous studies involved only whites or viewed racially diverse groups as a whole, Sharp says he believes several additional factors may have helped to mask lead's effect on blacks. For one, though blood pressure increases while a person smokes a cigarette, the body apparently attempts to compensate for these "hypertensive spikes" by lowering blood pressure between cigarettes. Since people seldom smoke while having their blood pressure measured, the readings for black smokers with high blood lead levels may have been artificially depressed, he says. Moreover, blacks are known to be more sensitive than whites to catecholamines, stress-related blood hormones that can elevate blood pressure. Sharp says his data now indicate that in blacks, "lead appears to interact with catecholamines to poison the body's blood-pressure-regulating system."

The California study gains support, he adds, from a similar study he has just completed with 2,000 white Welsh men. Sharp, who is temporarily working with the Medical Research Council in Cardiff, Wales, told SCIENCE NEWS, "We don't see any relationship at all between blood pressure and blood lead concentrations in these Welsh men."

Though Sharp's team is the first to report lead's selective effect on blood pressure in blacks, the observation "makes pretty reasonable sense," comments Michael G. Ziegler at the University of California, San Diego, Medical Center. "Blacks really do handle catecholamines differently, and lead does alter their response to catecholamines." If confirmed in larger studies, he says, the finding may "point to a new avenue for addressing the hypertension problem in blacks" — intensive efforts to remove the remaining lead from their environment.

Ziegler suspects the critical period for protecting black males may be when they're very young. He says his own data from animal studies suggest that lead can alter the body's catecholamine response significantly and irreversibly, even when the exposure occurs only during fetal development. — *J. Raloff*

Stressed-out art: A preservation paradox

Without intervention by art conservators, the process of decay would slowly transform museums into warehouses filled with hopelessly deteriorated objects. The healthy appearance of thousands of venerable artworks suggests the custodians of cultural heritage have successfully kept decay at bay.

But appearances can mislead, warns Marion F. Mecklenburg of the Smithsonian Institution's Conservation Analytical Laboratory in Suitland, Md. Drawing from his quarter-century of experience as an art conservator, he suggests that even routine "cleanings" of oil paintings may hasten deterioration rather than delay it. Mecklenburg recalls unnerving occasions when paintings felt "mushy" during such procedures. Although mild soap solution may safely remove superficial dirt, conservators often use stronger organic solvents to remove top layers so old or discolored that they diminish a painting's aesthetic value.

"Things are happening [to paintings] that we didn't even dream of thinking about," Mecklenburg reported last week at a meeting of the Materials Research Society in San Francisco. Most investigations by scientific conservators have focused on the chemical effects of acetone, alcohols and other organic solvents. "But a lot of what goes wrong with museum objects is not chemical, it's mechanical," Mecklenburg contends.

For example, he found that even a 5-second acetone swab on model paintings that mimic old oil paintings can produce potentially damaging stresses. As solvent films evaporate, they draw heat from their surroundings and rapidly cool underlying regions to near-freezing temperatures. The paintings' different layers — such as the fabric and the sealing glue that prevents paint layers from penetrating the fabric — contract and expand differently in response to such temperature changes. Mecklenburg says he has measured "extraordinarily high stresses" in acetone-swabbed paintings.

Solvents pose other mechanical dangers. Each time a conservator applies a solvent to a painting, some of the oil base of the paint layers may leach out. "The paint becomes less flexible and more prone to mechanical damage," Mecklenburg told SCIENCE NEWS. He says researchers are only beginning to learn how these subtle effects work. Museum workers could use such information to implement safer procedures for handling, shipping and storage.

Collaborating with scientists at the Canadian Conservation Institute in Ottawa, Ontario, Mecklenburg has compared computer predictions of surface stress distribution with tests on artificial surfaces designed to behave like old paintings. Both the experiments and the computer models indicate that vibrations from impacts may not threaten oil paintings as much as curators suspect, he says. When the scientists dropped framed test paintings from carrying heights, the surfaces didn't shatter unless the impact occurred at a corner of the frame. This finding, though potentially reassuring to nervous handlers, hints that other "hidden" mechanical stresses — such as those from solvents — may underlie much of the deterioration observed in museum pieces. — *I. Amato*