

Calcium supplements and the danger of lead

Warning: Calcium supplements may be hazardous to your health. That advisory may not appear on the package label, but it's the conclusion reached in a new study that looked for lead contamination in these dietary preparations.

Lots of Americans take extra calcium, which is sold in a range of forms, including tablets, bonemeal, and liquids. This dietary additive is popular because evidence shows it wards off a variety of ills, including osteoporosis, a bone-thinning disease that strikes older women.

Adults aren't the only ones who rely on this mineral. A report in the Aug. 18 *JOURNAL OF THE AMERICAN MEDICAL ASSOCIATION* shows that 12-year-old girls who take calcium tablets for 18 months build more bone mass than those who don't, a possible hedge against osteoporosis later in life. That conclusion has spurred some experts to advise girls to take calcium supplements or drink calcium-fortified juices.

Furthermore, calcium supplements are given to toddlers and young children who are allergic to or have difficulty digesting calcium-rich dairy products, such as milk and cheese.

Yet some calcium supplements contain lead. For children, even small amounts of this poisonous metal can be detrimental, leading to diminished IQ and stunted growth (SN: 1/27/90, p.63; 9/21/91, p.189). Indeed, more than 10 years ago the Food and Drug Administration (FDA) warned about the dangers of excess lead in certain forms of calcium supplements, particularly bonemeal, which is made from pulverized animal bones.

A study in the August *AMERICAN JOURNAL OF PUBLIC HEALTH* suggests that lead in calcium supplements remains a public health threat.

Bernard P. Bourgoin of the National Water Research Institute in Burlington, Ontario, Alfredo J. Quattrone, a toxicologist with the California Department of Health Services in Sacramento, and their colleagues analyzed 70 brands of calcium supplements sold in the United States and Canada. They grouped the supplements into five categories: dolomite, a chalky compound often derived from petrified mollusk shells; bonemeal; refined and natural-source calcium carbonate; and calcium chelates, which include the calcium added to fruit juices.

The amount of lead present in the products ranged widely, the team found. Of the 70 products they studied, 17 (24 percent) exceeded the FDA's limit of 6 micrograms of lead per day for children age 6 and younger. And that's the total lead that can be safely ingested from all sources, not just a calcium tablet, Quattrone notes. Fewer than 20 percent of the products had concentrations of lead equal to or lower than those found in

cow's milk, the researchers discovered.

How can the average consumer find a lead-free calcium supplement? Right now, that's a tough task, admits FDA toxicologist Michael Bolger, who points out that the agency has no standards for lead in food supplements. However, FDA does plan to regulate the lead content of these supplements in the future, he says.

Until then, Quattrone points out, consumers can avoid bonemeal, the worst offender in their study. Particularly alarming, he notes, is that people often ingest more than the recommended

amount of this form of calcium.

As for tablet or liquid forms, Quattrone says that preparations with the USP (United States Pharmacopeia) seal of approval are purified by the manufacturer. Products that meet these voluntary standards are less likely to contain high concentrations of lead or other contaminants.

For people who want extra calcium without the worry, there's always the time-honored approach of adding more calcium-rich foods to the diet, Bolger points out. For those who can't eat dairy products, that means generous portions of foods high in calcium, such as kale and broccoli.

—K.A. Fackelmann

Lean times and fat times recorded in teeth

Cementum, a bone-like tissue that grows in bands and anchors the teeth in the mouth, can reveal crucial details about an animal's life and death. It not only records the age and season of death of mammals, but also can be used to reconstruct diet and growth rate over the animal's lifespan, says Daniel E. Lieberman, an anthropologist at Harvard University.

Implications of the discovery span the fields of archaeology, anthropology, and bone biology, says Farish A. Jenkins Jr., an anatomist at Harvard. Lieberman published his findings in the Aug. 27 *SCIENCE*.

"Cementum is like tree rings in that it continues to grow throughout life," preserving a record of the seasons, Lieberman says. But while scientists have used cementum as an indicator of age for many years, they did not understand what causes the bands to form.

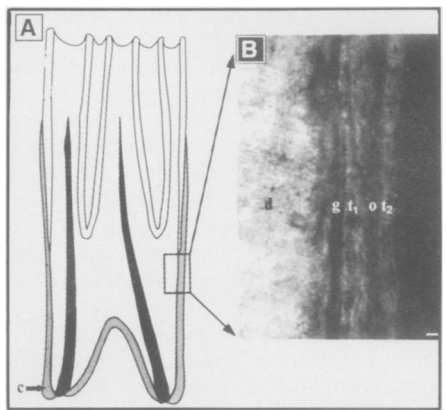
To get to the root of the matter, Lieberman put six goats on strict diets. He varied their cuisine every four months for one year, giving different goats food of varying hardness and nutritive value. He found that two phenomena explain the banding patterns: nutrition and the strain that chewing places on teeth.

A complex array of collagen fibers, extruded by the gums, holds teeth in place. The fibers become mineralized, forming cementum. Lieberman discovered that when an animal chews tough food, the collagen fibers orient more vertically to keep the teeth from sinking. On a softer diet, the fibers orient horizontally. When viewed under a polarized-light microscope, vertical bands appear opaque, horizontal bands translucent.

In most mammals, therefore, opaque bands indicate hard food, lean times, and winter, whereas translucent bands indicate the seasonal abundance of summer's often softer, easier-to-chew food.

Furthermore, cementum growth slows when animals are nutritionally deprived. These slow-growing bands, however, are highly mineralized and thus strong.

Lieberman is using the bands to an-



A: Cross section of a goat tooth showing cementum (c). B: Polarized light micrograph of cementum reveals opaque and translucent bands.

swer questions about the behavior of our human ancestors. One ongoing study examines what prompted hominids to begin eating meat — a high-risk activity given the dangers of the hunt. Many anthropologists propose that necessity drove protohumans to become carnivorous during dry seasons, when other food was scarce. Cementum of animal teeth found at archaeological sites should record the season of the animal's death, thus bolstering or refuting this theory. In a separate study, Lieberman is analyzing differences in diet between the line of hominids that evolved into modern humans and their cousins, who turned out to be an evolutionary dead end.

The findings also provide a means of studying bone growth. Lieberman's experiments demonstrate a direct relationship between force (from the strain of chewing) and the shape of the tooth, says William J. Landis, a cellular biologist at Harvard Medical School in Boston. This relationship between force and bone structure may provide insight into the mechanisms involved in osteoporosis, care of bedridden patients, and bone depletion in astronauts living in zero gravity, Landis says.

—B. Wuethrich