

Trace metals leave more than trace effects

Trace metals, once ignored by scientists, are now considered significant and essential to life on earth. But proper concentrations of many of these metals in the human body and their exact roles in health remain unclear. Since trace elements can contribute to the activity of a wide range of enzymes, says Stanley Skoryna of McGill University in Montreal, "it's obvious that the development of pathological conditions affected by these enzymes will be related in some way to concentrations of the pertinent trace element."

On one hand, deficiencies can contribute to disease states; for example, the lack of iodine leads to goiters, as the thyroid overworks in a vain attempt to produce the hormone thyroxin. On the other hand, excess metals can be toxic or harmful; for instance, some parts of the Dakotas have selenium-rich soils, and one type of grass termed "locoweed" takes up the metal. Animals that eat this grass go crazy, may lose their hooves and live in pain, notes Delbert Hemphill of the University of Missouri. Selenium-rich grasslands must be fenced off, he adds. (Selenium, zinc, copper and cadmium are among the trace elements present in minute quantities and obtained—they cannot be synthesized—from air, water or food.)

Hemphill and Skoryna were among about 100 researchers who shared study results at the Trace Substances in Environmental Health conference last week at the University of Missouri in Columbia. Conference topics ranged from environmental levels of metals and pollution to work on excesses and deficiencies of metals to the role of trace metals in aging.

- Freshly opened cans of grapefruit and orange juice have lead concentrations that exceed the Environmental Protection Agency standard for drinking water, 0.05 micrograms per milliliter, says Denis Bourcier of East Carolina University in Greenville. Lead-soldered cans account for about 14 percent of total human lead ingestion, he adds. Though this solder makes good can seals, children are sensitive to lead, and canned juices reach "critical" lead levels of five times the EPA standard within five days after opening, he says. Juices should be put in non-metallic containers as soon as they are opened, he suggests.

- Household dust may be a source of lead and arsenic for children, says Elisabeth Culbard of the Imperial College in London. Her study of homes in mineralized areas of the United Kingdom found that these metals can bind with dust, and be inhaled or eaten by children.

- Women with high levels of chromium in their hair may give birth to smaller infants, says Beth Kunhert of Case Western Reserve University in Cleveland. Many factors contribute to birth weight—the child's sex, the mother's age, and whether

the mother is diabetic or smokes. But hair chromium outweighed all other factors except for the infant's sex, Kunhert says. Mothers with low hair chromium gave birth to average weight infants.

"In those patients with high hair chromium for some reason there does not seem to be a transfer across the placenta, the result being a low birth-weight infant. It seems the mother's loss [low chromium] is the infant's gain," Kunhert says.

- Chronic alcoholics suffer zinc deficiencies, says Herta Spencer of the Veterans Administration Hospital in Hines, Ill. Alcoholics excrete more zinc, and also take in less of the metal, as chronic drinkers generally do not eat properly, she says. Although zinc deficiencies are associated with a variety of illnesses, Spencer says she saw no clinical effects from low zinc in her study, which found that zinc levels become normal when alcoholics stop drinking.

Another study found that alcoholics are not more vulnerable to selenium deficiencies in any tissues, except for their testes. But John Bodgen of the University of Medicine and Dentistry of New Jersey in Newark says this is due more to poor eating than to drinking.

- Arizona's high technology industries appear environmentally "clean," but are a major source of groundwater pollution, says Sandra Eberhardt of that state's Department of Health. Heavy metals are one pollutant, but most troublesome are such volatile organics as tetrachloroethylene, used by industries to clean and degrease. Contaminants have been found in 17 sites, and cleanup costs may run up to \$10 million each, Eberhardt says. Pollution from these high-tech industries mainly stems from waste disposal in dry wells, unlined ponds or landfill sites, as well as from leaking tanks, she says.

- Acid rains falling on soils already laden with metals makes the earth give up metals into groundwater, says William Strain of Cleveland Metropolitan General Hospital. As pH goes down, metal levels go up and make their way into many of the country's 12 million wells, he says. "The ground in so many areas is seriously contaminated with heavy metals. I have a lot of experience with people who have neurological problems as a result of copper," Strain says. But rains acidic from sulfur dioxide are not novel. "The destruction of Sodom and Gomorrah was with sulfur dioxide, probably, and brimstone," he says.

- Cadmium, present in drinking water and a potential contributor to liver and heart injury, will kill if consumed in large doses. Five milligrams per kilogram of body weight kills animals. People are frequently exposed to between 28 and 100 micrograms per day, and that small amount may give resistance to large lethal doses, says Curtis Klassen of the University of

Kansas Medical Center in Kansas City. A little cadmium pretreatment "is a good thing," Klassen says. However, effects of chronic cadmium exposure are not known, he adds.

- Several researchers called for more studies on metal intakes by the elderly. Janet Greger of the University of Wisconsin in Madison says studies suggest that the elderly get insufficient zinc and copper from their diets. Low zinc is linked to poor wound healing, dermatitis and poor immune function, all typical problems of old age, Greger notes. And Mary Bess Kohrs of the University of Illinois in Chicago says the elderly often lack iron, causing anemia, and may not eat enough chromium, which in animals results in hyperglycemia and high cholesterol. Chromium-rich brewer's yeast can counteract high cholesterol in the elderly, she says. Some theories on aging tie trace elements to the process, but more research is needed, says Mildred Seelig of New York University Medical Center.

—A. Rowand

Sakharov fate delays visit

National Academy of Sciences (NAS) President Frank Press postponed a planned U.S.-Soviet meeting on plans for renewed scientific exchange last week to protest the continuing confusion regarding the health and fate of physicist Andrei Sakharov.

Sakharov, exiled in 1980 to the closed city of Gorki, reportedly began a hunger strike May 2 in an attempt to pressure the Soviet government into allowing his wife to go abroad for medical treatment for eye and heart problems.

On Monday of this week, the head of the Communist Party's International Information Department told reporters in Moscow that the Nobel laureate and his wife were "all right"; everything in the Western press about a hunger strike, he said, was "just allegations."

But despite a statement, later retracted, attributed to a senior Reagan administration official that Sakharov was alive, concern remains high. So little information is available from the city of Gorki that the Associated Press was left to report that "there have been no reliable unofficial reports" in Moscow regarding Sakharov's condition.

Sakharov's research was a key factor in the USSR's hydrogen bomb effort. He lost favor with his government when he began speaking out against nuclear weapons.

The postponed meeting, which was to have been in Moscow, had been intended to produce a formal agreement with the Academy of Sciences of the USSR renewing bilateral scientific symposia. The U.S. academy allowed an earlier agreement to lapse as a protest against the initial exile of Sakharov, who was elected as a foreign associate of NAS in 1973. □