SOURCES AND ETIOLOGY

Poisoning from Heavy Metals (Mercury, Lead, and Cadmium)

J.J. Chisolm, Jr. PEDIATR ANN 1980 Dec; 9(12):458-68.

From author's conclusions: Exposure of the family to heavy metals is primarily through dust, food, and, in certain locations, water. About half of present lead production and use is devoted to the manufacture of lead-acid batteries. In this usage, about 98% of the lead is recovered and recycled, while many of the remaining uses ultimately result in the dispersion of lead into the environment. However, the uses of cadmium and mercury result ultimately in the dispersion of 80% to 90% into the environment. All of these heavy metals ultimately come to rest in surface soil, aquatic bottoms, and sewage sludge. Thus, heavy metals can enter the home and its inhabitants in many ways. Maintenance of residential surfaces in good repair and cleanliness are clearly important in suppressing this type of contamination. Good industrial practice, which prohibits the transport of heavy-metal-containing dust on the clothing and person of workmen from the workplace to the home, would prevent this type of contamination. Mercury and lead readily cross the placenta. Outbreaks of severe poisoning have demonstrated their fetotoxicity. Cadmium apparently does not cross the placenta. Postnatally, once these metals are assimilated into the body, they are very slowly excreted. In industrialized societies, the body burdens of lead and cadmium increase with age. Fortunately, 90% or more of the total body lead burden is sequestered in bone. There is no evidence that it is released rapidly enough from bone to cause toxicity in the soft tissues late in life. Although chelation therapy may be lifesaving in acute inorganic mercury and lead poisoning, it does not necessarily prevent serious sequelae. The suspected benefits of chelation therapy in chronically increased lead absorption remain to be documented. In any case, therapeutic maneuvers cannot substitute for adequate preventive measures. Clearly, the only valid public health approach in the long run is the preventive approach.

Sources of Lead Pollution

D. Gloag. BR MED J 1981 Jan 3;282(6257):41-4.

From author's discussion: Environmental lead concentrations today are grossly increased over the natural levels, even far away from cities. An appreciable number of young children, and possibly pregnant women, may have undesirable concentrations of lead in their blood. A recent report concluded that most adult city dwellers not especially exposed to lead, and with blood concentrations in the usual range of 0.05-1.0 μmol/l (10-20 μg/100ml), derive 45%-90% of their blood lead from food, 0%-45% from water, and 10%-20% from air. In certain circumstances, inhaled lead might be the principal contributor. More tentative estimates for children are 55%-95% from food, 0%-40% from water, and 3%-10% from air, provided that no substantial amounts are ingested from paint, dust, or other sources. Another report proposes a range of 32%-69% for inhaled lead in adults. Considerable immediate benefits are likely to come from much more rigorous attention to the sources of lead thought to be important—especially industrial pollution, lead plumbing, lead paint, black spots for air pollution, contaminated dust and soil, and certain cosmetic preparations. More comprehensive monitoring of young children and pregnant women and of the environment, with investigations on the origins of environmental lead, could result in a large measure of protection.

Hair Lead Concentration in Children with Minimal Cerebral Dysfunction

J.C. Hansen, L.B. Christensen, and U. Tarp. DAN MED BULL 1980 Dec 6;27(6):259-62.

Authors' abstract: Lead concentrations in hair have been determined in a group of children with minimal cerebral dysfunction (MCD) and in a control group matched according to age, sex, socioecónomic level, place of domicile (rural or urban), and father's occupation. A significantly higher lead level was found in the MCD children compared with the control group. When compared with normal values reported in the literature, the lead levels in the hair of both groups could be regarded as within normal range. The role of lead as an etiologic factor in MCD is discussed.

Fecal Lead Excretion in Young Children as Related to Sources of Lead in Their Environments

P.B. Hammond, C.S. Clark, P.S. Gartside, O. Berger, A. Walker, and L.W. Michael. INT ARCH OCCUP ENVIRON HEALTH 1980;46(3):191-202.

Authors' abstract: Fecal lead excretion (PbF) was studied in young children with elevated lead exposure. PbB (blood lead concentration) was generally 40-70 μg/dl. The children's home environments were classified according to lead-based paint hazard and traffic density. There was a significant correlation between paint hazard classification and PbF but not between traffic density and PbF. There also was a correlation of PbB with paint hazard classification. Long-term fecal collections were instituted among 10 children who lived in high-hazard homes and 3 children with low PbB's, whose PbF's were considered normal. Among the children living in high-hazard homes, median fecal lead excretion generally was only moderately elevated. Grossly elevated amounts of lead were found only occasionally, and only in a few of the children. Movement of two children from a high-hazard home to a low-hazard home resulted in prompt and substantial reduction in PbF. By contrast, PbB fell only very slowly.

Blood Lead Levels of Some Children in New South Wales

A. Bell. MED J AUST 1981 Jan 10;1(1):23-6.

Author's abstract: The venous blood lead levels of 400 children under 16 years of age who lived in Port Kembla or in Cocklecreek and of 202 patients in several New South Wales hospitals are reported and compared with criteria announced by the National Health and Medical Research Council, the European Economic Community, and the American Environmental Protection Agency. The results of this study do not show reason for concern. The samples from hospital patients stress the importance of domestic exposure, such as to flaking paint containing lead. The findings of this study are also compared with a Victorian and a New South Wales survey of schoolchildren.

Ambient Lead Concentrations in New York City and Their Health Implications

B. Nathanson and H. Nudelman. BULL NY ACAD MED 1980 Nov-Dec;56(9):866-75.

Lead compounds are emitted into the atmosphere from three sources: gasoline-powered vehicles, industrial processes, and incineration. Lead compounds emitted by motor vehicles into the city's atmosphere are decreasing, but continue to outweigh all other sources. Data from rooftop samplers scattered around the city show, as expected, the highest ambient lead levels at stations closest to heavily traveled streets. The correlation between blood lead levels and these ambient measurements, although positive, does not appear to be very high. These data and evidence from the seasonal variation in lead levels suggest that insofar as the mechanisms of children's exposures are concerned, the total flux of lead into the environment appears to be more important than the concentration in any single primary or secondary medium of exposure or transport. The hypothesis that ingestion of deposited lead is the most likely pathway is reinforced by strong evidence to show that dust and soil lead can be significant determinants of blood lead levels.

A Fatal Case of Lead Poisoning Due to a Retained Bullet

V.J. DiMaio and J. Garriott. VET HUM TOXICOL 1980 Dec;22(6):390-1.

From authors' introduction: The most common causes of lead poisoning in the United States are ingestion of lead-based paint by children, consumption of "moonshine" liquor contaminated with lead, and environmental exposure. Lead poisoning from a retained bullet or missile is very rare and dependent on the location of the lead joint. Even rarer is death from lead poisoning due to a retained bullet. This case report describes a fatal case of lead poisoning due to a retained bullet.

Lead-Glazed Pottery: A Potential Health Hazard in the Middle East

A. Acra, R. Dajani, Z. Raffoul, and Y. Karahagopian. LANCET 1981 Feb 21;1(8217):433-4.

Authors' summary: Lead-glazed pottery produced by obsolete methods in Lebanon and other countries in the Middle East is potentially hazard-

ous when used in contact with acidic foods. This conclusion was deduced from the testing of 423 glazed utensils for the amount of lead leached by 4% acetic acid. Control measures, surveillance, and regulations are therefore warranted.

The Impact of Natural Radioactivity from a Coal-Fired Power Plant

A. Bauman and D. Horvat. SCI TOTAL ENVIRON 1981 Jan;17(1):75-81.

Authors' abstract: In a coal-fired power station burning coal which contained between 14-100 ppm U, ^{210}Pb was detected in the urine of an exposed group of individuals. Chromosome aberrations (complex, numerical, and the percentage of total aberrations) were also registered.

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