HUMAN EXPOSURES TO INORGANIC MERCURY

Among the major sources of human exposures to inorganic mercury are dental amalgams, mercury spills, and occupational exposures. In addition to dental amalgams, inorganic mercury has a variety of other medical and dental uses. Inorganic mercury is also widely used in industrial processes and consumer products. The physical properties of mercury make it an ideal material for use in measuring devices, switches, fluorescent lamps, and in lab and pharmaceutical chemicals.

For detailed information on exposures to and the health effects of inorganic mercury, see EPA's *Mercury Study Report to Congress*[1] and the Agency for Toxic Substances and Disease Registry's *Toxicology Profile on Mercury*.[2]

MEDICAL AND DENTAL USES OF INORGANIC MERCURY

Medical uses. Hospitals and the health care industry are large users of mercury. Medical waste incinerators are the fourth largest known source of mercury emissions into the environment in the United States.[1]

Some of the most common uses of mercury in hospitals include: blood pressure monitors, thermometers, esophageal dilators, feeding tubes, and laboratory chemicals.

Dental offices. Mercury is a primary ingredient in mercury-silver amalgam dental fillings. Inorganic mercury contamination of dental offices can occur unless a great deal of care is taken in preparation of these amalgams. Once in place in the tooth, these amalgams may release mercury. Following chewing of food, gum chewing,[3] or "grinding" of teeth,[4] inorganic mercury (as mercury vapor) is released from the filling and can be measured in the mouth with special instruments. Some of this mercury is swallowed and accumulates in tissues.[5–8] A correlation has been found between inorganic mercury in human breast milk and mercury-silver dental amalgams in the mother.[9–11] There is an ongoing controversy over whether people experience adverse effects from the amount of mercury released by mercury-silver amalgam restorative materials.[12–14]

Folk healing practices. Mercury is used by some groups in the US for healing purposes. Medicinal uses include swallowing mercury and sprinkling it in bath water. (Some groups use mercury in their religious practices; spiritual uses include wearing amulets containing mercury or sprinkling it around a room or bed for good luck.)

MERCURY IN CONSUMER PRODUCTS

Mercury is found in numerous consumer products. In addition to fever thermometers and the mercury switches that regulate our thermostats, mercury is used in many other common products, including measuring devices, fluorescent lamps, and pilot light sensors. (Mercury-containing sensors are found in some gas-fired appliances that have pilot lights, such as stoves, water heaters, and furnaces.) Mercury is also found in certain laboratory and pharmaceutical chemicals such as reagents.

Measuring devices. Many thermometers and barometers contain elemental mercury. Most mercury fever thermometers are extremely fragile and can be easily broken, allowing mercury to escape. Accidental mercury releases in the home pose a significant poisoning risk for children.

Switches. Mercury switches are used in a number of applications. Many home thermostats use mercury switches to control heating systems. Silent light switches use a mercury switch rather than a mechanical one to turn on and off lights. In automobiles, mercury is found in switches that turn on trunk and hood lights and in some anti-lock breaking systems.

Lighting. Fluorescent lamps also contain small amounts of mercury. The industry has reduced the amount of mercury in lamps since the mid 1990s; although the amount in each lamp is relatively low, some of the mercury is immediately released to the atmosphere once a lamp is broken, so it is critical that used lamps are managed appropriately.

OCCUPATIONAL EXPOSURE TO INORGANIC MERCURY

In the 19th century, hat makers' exposure to mercury used as a fixative may have given rise to the familiar term "mad as a hatter." Occupational exposure to mercury may occur in hospitals, laboratories, dental practices, and in industrial workplaces, particularly in the chemical and drug manufacturing industries.[15] Workers may be exposed to mercury during the manufacture of:

measuring instruments, mercury arc lamps, mercury switches, fluorescent lamps, mercury boilers, mirrors, electric rectifiers, electrolysis cathodes, pulp and paper, zinc carbon and mercury cell batteries, dental amalgams, antifouling paints, explosives, and disinfectants. Workers in the fur processing industry are also at risk for exposure to inorganic mercury. Other industrial uses of mercury include metallic mercury, mercury salts, mercury catalysts (used in making urethane and epoxy resins), mercury fulminate, Millon's reagent, chlorine and caustic soda, pharmaceuticals, and antimicrobial agents.[16]

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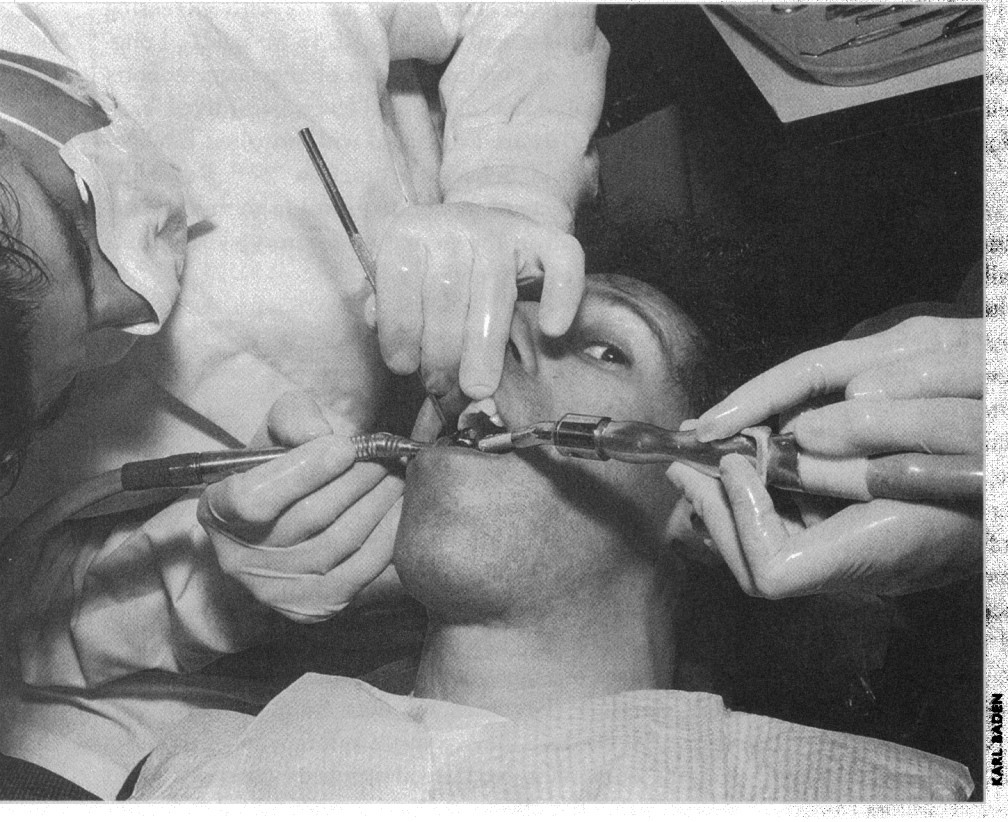

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The views expressed in this manuscript are the professional opinions of the authors and should not be interpreted as policies of their respective agencies.

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