Sources of Exposure

General Populations

- The primary route of exposure for the general population is ingestion of food, including fish caught in contaminated areas.
- Breathing low levels in contaminated air or ingesting low levels in contaminated water.
- Eating or touching contaminated soil for those living near facilities where hexachlorobenzene is produced as a byproduct and for individuals living near current or former NPL hazardous waste sites where this compound is present.

Occupational Populations

- Occupational exposures may occur among workers in the chlorinated solvent manufacturing industry, and workers currently involved in the manufacture and application of pesticides contaminated with hexachlorobenzene.
- Military or firefighting personnel who use pyrotechnic mixtures that release hexachlorobenzene and workers involved in combustion of municipal waste or those involved in the handling and treatment of wastes at hazardous waste sites may be exposed to higher than background concentrations of hexachlorobenzene.

Toxicokinetics and Normal Human Levels

Toxicokinetics

- Studies in humans indicate that hexachlorobenzene in air is poorly absorbed through the lungs and that ingested hexachlorobenzene is moderately absorbed from the gastrointestinal tract.
- Hexachlorobenzene distributes to fat and organs with high fat content, where it can remain for years.
- Some hexachlorobenzene is biotransformed by microsomal enzymes in the liver, lung, kidneys, and intestine.
- Most hexachlorobenzene is excreted mainly unchanged in the feces and as metabolites (pentachlorophenol and pentachlorothiophenol) in the urine.

Normal Human Levels

- A national survey of the U.S. general population conducted in 2003-2004 showed that the mean levels of hexachlorobenzene in the serum of 1,961 participants was 15.2 ppb (lipid-weight basis).

Biomarkers/Environmental Levels

Biomarkers

- Hexachlorobenzene in tissues, body fluids, and feces can be used as biomarker for hexachlorobenzene exposure. Levels in blood, urine, and feces indicate more recent exposure.

Environmental Levels

Air

- Typical levels in air are low, in the range of ng/m^3.

Sediment and Soil

- Concentrations are greatly depending on location. Hexachlorobenzene levels as high as 53,000 ppb were measured in soil from a contaminated area in Louisiana.

Water

- Levels are typically in the low ppb to ppt range.

Reference

Agency for Toxic Substances and Disease Registry (ATSDR). 2015. Toxicological Profile for Hexachlorobenzene. Atlanta, GA: U.S. Department of Health and Human Services, Public Health Service.

C_6Cl_6

ToxGuide™ for Hexachlorobenzene

C_6Cl_6

CAS# 118-74-1

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U.S. Department of Health and Human Services
Public Health Service
Agency for Toxic Substances and Disease Registry
www.atsdr.cdc.gov

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ATSDR
AGENCY FOR TOXIC SUBSTANCES AND DISEASE REGISTRY

Chemical and Physical Information

Hexachlorobenzene is a solid

- Hexachlorobenzene is a white crystalline solid at room temperature.
- Hexachlorobenzene has not been commercially produced in the U.S. since the late 1970s.
- In the past, it was used as a fungicide in the U.S. until 1984.
- Although not currently manufactured, it is formed as a waste product during the manufacture of other chemicals, and is a contaminant in some pesticides. Small amounts can also be produced during combustion of municipal waste.

Routes of Exposure

- Inhalation – Minor route of exposure for the general population.
- Oral – Predominant route of exposure for the general population through ingestion of contaminated food.
- Dermal – Skin contact with contaminated soil may be important route of exposure, for those living nears waste sites, especially children.

Hexachlorobenzene in the Environment

- Hexachlorobenzene breaks down slowly in air. It can be transported long distances in the air.
- It does not dissolve easily in water. In water it binds to sediments and settles to the bottom. Half the hexachlorobenzene in surface water will disappear in 3-6 years.
- It has low mobility in soil and may evaporate from soil surfaces. It takes years to break down in soil. It is slowly degraded by soil microorganisms.
- Hexachlorobenzene is highly bioaccumulated by aquatic organisms.

Relevance to Public Health (Health Effects)

Health effects are determined by the dose (how much), the duration (how long), and the route of exposure.

Minimal Risk Levels (MRLs)

Inhalation

- No acute-, intermediate- or chronic duration inhalation MRLs were derived for hexachlorobenzene.

Oral

- An MRL of 0.008 mg/kg/day has been derived for acute-duration oral exposure (≤14 days).
- An MRL of 0.0004 mg/kg/day has been derived for intermediate-duration oral exposure (15–364 days).
- An MRL of 0.00007 mg/kg/day has been derived for chronic-duration oral exposure (≥365 days).

Health Effects

- Brief exposure to high levels caused effects on the nervous system such as weakness, tremors, and convulsions; skin sores; and liver and thyroid effects.
- Long-term exposure can cause effects similar to those seen after brief exposure.
- There is no strong evidence that hexachlorobenzene causes cancer in people.
- The U.S. Department of Health and Human Services (DHHS) considers hexachlorobenzene as reasonably anticipated to be a human carcinogen. EPA says that it is a probable human carcinogen. The International Agency for Research on Cancer (IARC) says that it is possibly carcinogenic to humans.

Children's Health

- Infant and young children appeared to be especially sensitive to the effects of hexachlorobenzene in a case of accidental poisoning in Turkey during the 1950s.
- Breast-fed infants of mothers known to have eaten bread contaminated with hexachlorobenzene developed a disease that produced skin lesions known as "pink sore." Other symptoms were weakness and convulsions.
- Young children older than 2 years of age did not get pink sore, but developed numerous skin, nervous system, and bone abnormalities later in life.