Sources of Exposure

General Populations

- Endrin is a man-made chemical used as a pesticide. It has not been produced or used in the United States since 1991.
- Environmental exposure is expected to be low.
- The general population may be exposed to endrin through ingestion of imported contaminated food or from contaminated water, soil, or air near waste disposal sites.

Occupational Populations

- Occupational exposures to endrin may occur among workers involved in the handling and treatment of materials at hazardous waste sites, and among agricultural workers at sites formerly treated with endrin.

Toxicokinetics and Biomonitoring

Toxicokinetics

- Toxic effects following oral, inhalation, or dermal exposure indicate that the body absorbs endrin via all routes; however, data regarding absorption rates are very limited.
- Endrin is rapidly metabolized and excreted in urine and feces.
- Low concentration of endrin may remain and be distributed in fat. Endrin can also cross the placenta.
- The major biotransformation product of endrin is anti-12-hydroxyendrin and the corresponding sulfate and glucuronide metabolites.

NHANES Biomonitoring

- Serum endrin levels in the National Health and Nutrition Examination Survey (NHANES) (2001–2004) were below the level of detection. No other data are available.

Biomarkers/Environmental Levels

Biomarkers

- Levels of endrin and endrin metabolites can be measured in blood, fatty tissue, urine, feces, and breast milk.
- Measurements of endrin in blood are best suited for detecting recent exposures because endrin is cleared rapidly from blood.
- Hair has been shown to be a sensitive target to detect prior endrin exposure.

Environmental Levels

- There are no recent monitoring data for environmental levels of endrin in air. water, or soil.
- Monitoring data at hazardous waste sites are available. The geometric mean levels were 0.0024 ppbv in air (4 National Priorities List [NPL] sites), 0.651 ppb in water (13 NPL sites), and 1,160 ppb in soil (24 NPL sites).

Reference

Agency for Toxic Substances and Disease Registry (ATSDR). 2021. Toxicological Profile for Endrin. Atlanta, GA: U.S. Department of Health and Human Services, Public Health Services.

ToxGuide™ for Endrin

$C_{12}H_8Cl_6O$

(CAS # 72-20-8)

March 2021

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

ATSDR
AGENCY FOR TOXIC SUBSTANCES AND DISEASE REGISTRY

Chemical and Physical Information

Endrin is a Solid

- Endrin is a solid, white, almost odorless substance.
- Endrin's principal use was as an insecticide, rodenticide, and avicide beginning in 1951.
- Endrin's production and use has been discontinued since 1991 mostly due to its toxicity on nontarget populations of birds such as raptors (birds of prey) and migratory birds.
- Endrin aldehyde and endrin ketone occur as impurities of endrin or as degradation products.

Routes of Exposure

- Inhalation – Not likely an exposure route for the general or occupational population.
- Oral – Most likely route of exposure for the general population through ingestion of contaminated imported foodstuffs and water.
- Dermal – Not likely an exposure route of concern for the general or occupational population.

Endrin in the Environment

- There is potential for endrin to be released into the environment from hazardous waste sites, unregistered use, or inappropriate disposal.
- Endrin is generally not found in the air except when it was applied to the fields in the past during agricultural application.
- Endrin adsorbs strongly to soil particles and sediment and tends to be immobile.
- The estimated half-life of endrin in soil is approximately 14 years.
- It is not expected to migrate significantly from soil to groundwater; however, at waste sites where endrin may become mixed with organic solvents, migration may be increased.
- Endrin may be transported to surface water via runoff from rain or irrigation.
- Endrin transformation products can be detected in plants grown in soils treated at least 16 years prior to planting.
- Endrin has the potential to significantly bioconcentrate in 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 endrin.

Oral

- An acute-duration (≤14 days) oral MRL of 0.0006 mg/kg/day was derived for endrin.
- The acute-duration oral MRL of 0.0006 mg/kg/day was adopted as an intermediate-duration (15–364 days) oral MRL for endrin.
- A chronic-duration (≥365 days) oral MRL of 0.0003 mg/kg/day was derived for endrin.

Health Effects

- The central nervous system is the most sensitive target to endrin in humans.
- Exposure to high levels of endrin can cause harmful neurologic effects, including convulsions, jerking of arms and legs, twitching facial muscles, clonic contractions, changes in electro-encephalogram (EEG) patterns, sudden collapse, and death in humans.

Health Effects

- In animal studies, inhalation, oral and dermal exposure resulted in neurological effects (altered activity, convulsions). and hepatic toxicity.
- With the exception of increased locomotor activity in rat offspring, developmental effects were only observed at doses that caused significant maternal mortality and/or toxicity.
- The U.S. Environmental Protection Agency (EPA) has classified endrin in Group D, not classifiable as to carcinogenicity in humans. The International Agency for Research on Cancer (IARC) has classified endrin in Group 3, not classifiable as to its carcinogenicity in humans.

Children's Health

- It is not known if children are more sensitive to endrin toxicity than adults.