

This fact sheet answers the most frequently asked health questions (FAQs) about endosulfan. For more information, call the CDC Information Center at 1-800-232-4636. This fact sheet is one in a series of summaries about hazardous substances and their health effects. It's important you understand this information because this substance may harm you. The effects of exposure to any hazardous substance depend on the dose, the duration, how you are exposed, personal traits and habits, and whether other chemicals are present.

**HIGHLIGHTS:** Exposure to endosulfan occurs mainly from eating contaminated food, but may also occur from skin contact, breathing contaminated air, or drinking contaminated water. Endosulfan affects the function of the nervous system. Endosulfan has been found in at least 176 of the 1,699 National Priorities List sites identified by the Environmental Protection Agency (EPA).

## What is endosulfan?

Endosulfan is a restricted-use pesticide. It is particularly effective against aphids, fruit worms, beetles, leafhoppers, moth larvae, and white flies on a wide variety of crops.

Endosulfan is sold as a mixture of two different forms of the same chemical (referred to as  $\alpha$ - and  $\beta$ -endosulfan). Technical grade endosulfan also contains endosulfan sulfate. It is a cream-to-brown-colored solid that may appear crystalline or in flakes. It has a distinct odor similar to turpentine.

Endosulfan is applied to crops by aerial or ground-level foliar spray. The use of endosulfan is being restricted to certain crops and is scheduled to be canceled for all uses by 2016.

## What happens to endosulfan when it enters the environment?

- Endosulfan can travel long distances by air. Levels in air are highly variable depending on location. Rural areas tend to have higher concentrations.
- Both  $\alpha$ - and  $\beta$ -endosulfan may be broken down in air by chemical reactions. Endosulfan sulfate may be broken down by sunlight.
- In water,  $\alpha$ - and  $\beta$ -endosulfan change into a less toxic substance, endosulfan diol. Endosulfan sulfate is more resistant to break down in water.
- In soil, endosulfan attaches to soil particles. This limits its movement towards groundwater. Both  $\alpha$ - and  $\beta$ -endosulfan break down in soil; endosulfan sulfate is more resistant.
- It can build up in the body of animals that live in endosulfan-contaminated water.

## How might I be exposed to endosulfan?

- Eating food contaminated with endosulfan. The diet is the main source of exposure for the general population.
- Breathing contaminated air or drinking contaminated water.
- Touching contaminated soil or fruits or plants that have been sprayed with endosulfan will result in a small amount entering the body through the skin.
- Pesticide applicators can be exposed by inhalation or skin contact if they do not wear proper protection.

## How can endosulfan affect my health?

The main target of endosulfan toxicity is the nervous system. Exposure to high amounts of endosulfan induces hyperactivity and convulsions, regardless of the route of exposure. Severe poisoning may result in death.

There are no studies of people exposed to low levels of endosulfan for long periods of time (i.e., years). Studies in animals have shown that swallowing endosulfan in contaminated food for long periods of time affects mainly the kidneys.

## How likely is endosulfan to cause cancer?

Studies of occupational and environmental exposure of humans have not provided conclusive evidence that endosulfan can cause cancer. Endosulfan did not cause cancer in animal studies.

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The Department of Health and Human Services (DHHS), the International Agency for Research on Cancer (IARC), and the EPA have not classified endosulfan as to its ability to cause cancer.

## How can endosulfan affect children?

Endosulfan has been shown to affect children in the same manner as adults, causing tremors and seizures after high exposure.

We do not know whether endosulfan can produce birth defects in humans. Studies in humans have suggested associations between maternal exposure to endosulfan and autism and altered thyroid function and development of the nervous system in newborn children. Other studies suggested that direct exposure of children might be associated with blood cancer and altered sexual maturation in boys. In all these cases the evidence was suggestive but not conclusive.

Endosulfan has been detected in human breast milk, which means that it can be transferred to babies by nursing.

## How can families reduce the risk of exposure to endosulfan?

- Make sure you wash fruits and vegetables before eating them.
- Prevent children from playing in an area too soon after endosulfan has been applied.
- Endosulfan is a restricted-use pesticide and should not be used for residential purposes. Make sure you ask to see a license and certification of anyone who applies endosulfan for you.
- Pesticide applicators should wash clothing, skin, and hair before going home.

## Is there a medical test to show whether I've been exposed to endosulfan?

Endosulfan and its breakdown products can be measured in blood, urine, fat tissue, and breast milk. However, the detection of these substances does not necessarily mean that you will suffer adverse health effects.

Because endosulfan and its degradation products leave the body fairly rapidly, the tests need to be conducted within a few days after exposure.

## Has the federal government made recommendations to protect human health?

The EPA recommends that the levels of endosulfan sulfate in lakes, rivers, and streams should not be more than 62 micrograms per liter (62 µg/L). This should prevent any harmful health effects from occurring in people who drink the water or eat fish or seafood that live in the water.

The Occupational Safety and Health Administration (OSHA) has not set a legal limit for endosulfan in workplace air.

The National Institute for Occupational Safety and Health (NIOSH) recommends a limit of 0.1 milligram per meter cubic (0.1 mg/m<sup>3</sup>) for endosulfan in workplace air averaged over a 10 hour work day.

## References

This ToxFAQs™ information is taken from the 2015 Toxicological Profile for Endosulfan produced by the Agency for Toxic Substances and Disease Registry, Public Health Service, U.S. Department of Health and Human Services, Public Health Service in Atlanta, GA.

## Where can I get more information?

For more information, contact the Agency for Toxic Substances and Disease Registry, Division of Toxicology and Human Health Sciences, 1600 Clifton Road NE, Mailstop F-57, Atlanta, GA 30329-4027.

Phone: 1-800-232-4636.

ToxFAQs™ on the web: [www.atsdr.cdc.gov/toxFAQs](http://www.atsdr.cdc.gov/toxFAQs)

ATSDR can tell you where to find occupational and environmental health clinics. Their specialists can recognize, evaluate, and treat illnesses resulting from exposure to hazardous substances. You can also contact your community or state health or environmental quality department if you have any more questions or concerns.