



PUBLIC HEALTH STATEMENT

ENDOSULFAN

CAS#: 115-29-7

Division of Toxicology

September 2000

This Public Health Statement is the summary chapter from the Toxicological Profile for Endosulfan. It is one in a series of Public Health Statements about hazardous substances and their health effects. A shorter version, the ToxFAQs™ is also available. This information is important 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. For more information, call the ATSDR Information Center at 1-888-422-8737.

This Statement was prepared to give you information about endosulfan and to emphasize the human health effects that may result from exposure to it. The Environmental Protection Agency (EPA) has identified 1,177 sites on its National Priorities List (NPL). Endosulfan and/or endosulfan sulfate (a major breakdown product) has been found at 17 of these sites. However, we do not know how many of the 1,177 NPL sites have been evaluated for endosulfan or endosulfan sulfate. As EPA evaluates more sites, the number of sites at which endosulfan or endosulfan sulfate is found may change. The information is important for you, because endosulfan may cause harmful health effects and because these sites are potential or actual sources of human exposure to endosulfan.

When a chemical is released from a large area, such as an industrial plant, or from a container, such as a drum or bottle, it enters the environment as a chemical emission. This emission, which is also called a release, does not always lead to exposure. You can be exposed to a chemical only when you come into contact with the chemical. You may be exposed to it in the environment by breathing,

eating, or drinking substances containing the chemical or from skin contact with it.

If you are exposed to a hazardous substance such as endosulfan, several factors will determine whether harmful health effects will occur and what the type and severity of those health effects will be. These factors include the dose (how much), the duration (how long), the route or pathway by which you are exposed (breathing, eating, drinking, or skin contact), the other chemicals to which you are exposed, and your individual characteristics such as age, sex, nutritional status, family traits, life style, and state of health.

1.1 WHAT IS ENDOSULFAN?

Endosulfan is a man-made insecticide. It is used for control of a number of insects on food crops such as grains, tea, fruits, and vegetables and on nonfood crops such as tobacco and cotton. It is also used as a wood preservative.

Endosulfan is sold as a mixture of two different forms of the same chemical (referred to as alpha- and beta-endosulfan). It is a cream-to-brown-colored solid that may appear crystalline or be in flakes. It has a distinct odor similar to turpentine. Endosulfan does not burn.

Endosulfan enters air, water, and soil when it is manufactured or used as a pesticide. Endosulfan is often applied to crops using sprayers. Some endosulfan in the air may travel long distances before it lands on crops, soil, or water. Endosulfan on crops usually breaks down within a few weeks. Endosulfan released to soil attaches to soil particles. Endosulfan found near hazardous waste sites is usually found in soil. Some endosulfan in soil

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evaporates into air, and some endosulfan in soil breaks down. However, it may stay in soil for several years before it all breaks down. Rain water can wash endosulfan that is attached to soil particles into surface water. Endosulfan does not dissolve easily in water. Most endosulfan in surface water is attached to soil particles floating in the water or attached to soil at the bottom. The small amounts of endosulfan that dissolve in water break down over time. Depending on the conditions in the water, endosulfan may break down within 1 day or it may take several months. Some endosulfan in surface water evaporates into air and breaks down. Because it does not dissolve easily in water, only very small amounts of endosulfan are found in groundwater (water below the soil surface; for example, well water). Animals that live in endosulfan-contaminated waters can build up endosulfan in their bodies. The amount of endosulfan in their bodies may be several times greater than in the surrounding water.

1.2 HOW MIGHT I BE EXPOSED TO ENDOSULFAN?

The most likely way for people to be exposed to endosulfan is by eating food contaminated with it. Endosulfan has been found in some food products such as oils and fats and fruit and vegetable products. You can also be exposed to low levels of endosulfan by skin contact with contaminated soil or by smoking cigarettes made from tobacco that has endosulfan residues on it. Well water and public water supplies are not likely sources of exposure to endosulfan. Workers can breathe in the chemical when spraying the insecticide on crops. Accidental spills and releases to the environment at hazardous waste disposal sites are also possible sources of exposure to endosulfan. The most likely exposure to

endosulfan for people living near hazardous waste sites is through contact with soils containing it.

Endosulfan is usually not found in the air, and it is infrequently found in soil and water. When endosulfan is found in soil and water, levels of less than 1 part of endosulfan in 1 billion parts of surface water (ppb) and less than 1 part of endosulfan in 1 million parts of soil (ppm) have been reported.

1.3 HOW CAN ENDOSULFAN ENTER AND LEAVE MY BODY?

Endosulfan can enter your body through your lungs when you breathe air containing it, through your stomach and intestines when you eat food or drink water containing it, or through your skin. We have no information on how fast it enters the body tissues when it is breathed in. However, studies in animals show that endosulfan passes slowly through the stomach into the body tissues after it is taken in by mouth. Much of it leaves in the feces without actually entering the body tissues. Studies in animals also show that when endosulfan is applied to the skin it passes slowly through the skin into body tissues. Once endosulfan is in the body, it is broken down in the liver and kidneys and leaves in the urine and feces within a few days or a few weeks.

1.4 HOW CAN ENDOSULFAN AFFECT MY HEALTH?

Symptoms of endosulfan poisoning have been seen in some people who were exposed to very large amounts of this pesticide during its manufacture. Symptoms of endosulfan poisoning have also been seen in people who intentionally or accidentally ate

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or drank large amounts of endosulfan. Most of these people experienced convulsions or other nervous system effects. Some people who intentionally ate or drank large amounts of endosulfan died. The health effects in people exposed to smaller amounts of endosulfan for longer periods are not known. We have no information on whether it affects the ability of people to have children or whether it causes birth defects in children. We also do not know whether endosulfan has ever affected the ability of people to fight disease or has ever caused cancer in people. The Department of Health and Human Services (National Toxicology Program), the International Agency for Research on Cancer, and EPA have not classified endosulfan as to its carcinogenicity.

Results from animal studies show that exposure to very large amounts of endosulfan for short periods of time can cause adverse nervous system effects (such as hyperexcitability, tremors, and convulsions) and death. Because the brain controls the activity of the lungs and heart, lethal or near lethal exposures in animals have also resulted in failure of these organs. Other effects seen in animals after short-term, high-level exposures include harmful effects on the stomach, blood, liver, and kidney. After somewhat longer exposures, the ability of animals to fight infection was also impaired. The kidney, testes, and possibly the liver are the only organs in laboratory animals affected by longer-term exposure to low levels of endosulfan. The seriousness of these effects is increased when animals are exposed to higher concentrations of endosulfan.

Studies in animals show no evidence that endosulfan causes cancer in animals. Studies in animals also show no evidence that endosulfan affects the ability of animals to have babies. Some

studies show that large amounts of endosulfan damage the testes, but it is unknown whether such large amounts affect the ability of animals to reproduce. Pregnant animals given endosulfan by mouth had some offspring with low birth weight and length and some offspring with skeletal variations. In some cases, the pregnancies were terminated at an early stage. Often, these effects were seen at doses where the pregnant animals showed signs of poisoning by the endosulfan. Because these effects occurred in animals, they might also occur in humans.

1.5 IS THERE A MEDICAL TEST TO DETERMINE WHETHER I HAVE BEEN EXPOSED TO ENDOSULFAN?

Endosulfan and its breakdown products can be measured in your blood, urine, and body tissues if you have been exposed to a large amount. Tests to measure endosulfan in such bodily tissues or fluids are not usually available at a doctor's office because special equipment is needed for measuring endosulfan and its breakdown products. However, a sample taken in the doctor's office can be properly packed and shipped to a special laboratory if necessary. Because endosulfan leaves the body fairly quickly, these methods are useful only for finding exposures that have occurred within the last few days. At this time, these methods can only be used to prove that a person has been exposed to endosulfan. The test results cannot be used to predict if you will have any adverse health effects. Exposure at the same time to other chemicals at hazardous waste sites could cause some confusion in understanding these results.

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1.6 WHAT RECOMMENDATIONS HAS THE FEDERAL GOVERNMENT MADE TO PROTECT HUMAN HEALTH?

The federal government has set standards and guidelines to protect people from the possible health effects of endosulfan in drinking water and food. EPA recommends that the amount of endosulfan in lakes, rivers, and streams should not be more than 74 micrograms per liter ($\mu\text{g/L}$) (74 ppb). 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 Food and Drug Administration (FDA) allows no more than 24 ppm of endosulfan on dried tea, and EPA allows no more than 0.1–2.0 ppm endosulfan on other raw agricultural products.

The Occupational Safety and Health Administration (OSHA) has set a limit (permissible exposure limit, or PEL) of 0.1 milligrams (mg) endosulfan per cubic meter (m^3) of workroom air to protect workers during an 8-hour shift over a 40-hour work week.

1.7 WHERE CAN I GET MORE INFORMATION?

If you have any more questions or concerns, please contact your community or state health or environmental quality department or:

Agency for Toxic Substances and Disease Registry
Division of Toxicology
1600 Clifton Road NE, Mailstop F-32
Atlanta, GA 30333

Information line and technical assistance:

Phone: 888-422-8737

FAX: (770)-488-4178

ATSDR can also tell you the location of occupational and environmental health clinics. These clinics specialize in recognizing, evaluating, and treating illnesses resulting from exposure to hazardous substances.

To order toxicological profiles, contact:

National Technical Information Service
5285 Port Royal Road
Springfield, VA 22161
Phone: 800-553-6847 or 703-605-6000

Reference

Agency for Toxic Substances and Disease Registry (ATSDR). 1993. Toxicological profile for endosulfan. Atlanta, GA: U.S. Department of Health and Human Services, Public Health Service.

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