

This fact sheet answers the most frequently asked health questions (FAQs) about pyrethrins and pyrethroids. For more information, call the ATSDR Information Center at 1-888-422-8737. This fact sheet is one in a series of summaries about hazardous substances and their health effects. It is important you understand this information because these substances 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:** Pyrethrins and pyrethroids are insecticides that are applied to crops, garden plants, pets, and also directly to humans. High levels of pyrethrins or pyrethroids can cause dizziness, headache, nausea, muscle twitching, reduced energy, changes in awareness, convulsions and loss of consciousness. Pyrethrins have been found in at least 5 of the 1,636 current or former NPL sites identified by the Environmental Protection Agency (EPA), and permethrin (a pyrethroid compound) has been found in at least 2 of the sites. No other pyrethroids were detected at NPL sites.

## What are pyrethrins and pyrethroids? (Pronounced pI-'rE-thren; pI-'rE-'throid)

Pyrethrins are naturally-occurring compounds with insecticidal properties that are found in pyrethrum extract from certain chrysanthemum flowers. The pyrethrins are often used in household insecticides and products to control insects on pets or livestock.

Pyrethroids are manufactured chemicals that are very similar in structure to the pyrethrins, but are often more toxic to insects as well as to mammals, and last longer in the environment than the pyrethrins. More than 1,000 synthetic pyrethroids have been developed, but less than a dozen of them are currently used in the United States. Permethrin is the most frequently used pyrethroid in the United States.

## What happens to pyrethrins and pyrethroids when they enter the environment?

- Pyrethroids enter the environment primarily due to their use as insecticides.
- In air, all six of the pyrethrins and many of the pyrethroids are broken down rapidly (1–2 days) by sunlight or other compounds found in the atmosphere.
- Pyrethrins and pyrethroids bind strongly to soil and are

eventually degraded by microorganisms in soil and water; they generally do not move from the soil to groundwater.

## How might I be exposed to pyrethrins and pyrethroids?

- Pyrethrins and pyrethroids usually enter the body when people eat foods contaminated by these chemicals.
- They may also enter your body when you breathe air that contains these compounds or when you get them on your skin.
- The use of products that contain pyrethrins and pyrethroids, such as household insecticides, pet sprays and shampoos, lice treatments that are applied directly to the head, and mosquito repellents that can be applied to clothing, may lead to exposure.

## How can pyrethrins and pyrethroids affect my health?

Pyrethrins and pyrethroids interfere with the normal way that the nerves and brain function. Exposure to very high levels of these compounds for a short period in air, food, or water may cause dizziness, headache, nausea, muscle twitching, reduced energy, changes in awareness, convulsions and loss of consciousness. Changes in mental state may last several days after exposure to high levels of pyrethroids has ended.

ToxFAQs™ Internet address is <http://www.atsdr.cdc.gov/toxfaq.html>

There is no evidence that pyrethrins or pyrethroids affect the ability of humans to produce children, but some animal studies have shown reduced fertility in males and females.

## How likely are pyrethrins and pyrethroids to cause cancer?

There is no evidence that pyrethrins or pyrethroids cause cancer in people or in animals. The International Agency for Research on Cancer (IARC) has determined that the carcinogenicity to humans for three pyrethroids (deltamethrin, fenvalerate, permethrin) is not classifiable.

## How can pyrethrins and pyrethroids affect children?

It is likely that health effects seen in children exposed to high levels of pyrethrins or pyrethroids will be similar to the effects seen in adults. We do not know whether children differ from adults in their susceptibility to these chemicals.

Birth defects have not been observed in humans exposed to pyrethrins or pyrethroids. Offspring of animals that ingested pyrethrins or pyrethroids while pregnant showed signs of possible damage to the immune system. Some animals that were exposed to pyrethrins or pyrethroids right after birth showed altered behavior as adults.

## How can families reduce the risk of exposure to pyrethrins and pyrethroids?

Exposure to pyrethrins and pyrethroids can be reduced by exercising care when using pesticides containing these compounds around the house, on pets, and on children and by storing them properly. Certain pyrethroids are sprayed to control mosquitos during the spring and summer; remaining indoors and closing your windows while your neighborhood is being sprayed will lessen your exposure. Additional ways to reduce possible exposure include thoroughly washing fruits and vegetables before eating them, ensuring that

children wash their hands before eating, and discouraging young children from eating dirt.

Children should avoid playing in soils near uncontrolled hazardous waste sites where pyrethrins and pyrethroids may have been discarded.

## Is there a medical test to show whether I've been exposed to pyrethrins or pyrethroids?

Pyrethrins, pyrethroids, and their breakdown products can be detected in your blood and urine, but only within a few days after your last exposure. These tests are not usually available at your doctors office, but your doctor can send the samples to a laboratory that can perform the tests. None of these tests can predict whether you will experience any related health effects.

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

The Occupational Safety and Health Administration (OSHA) has set a limit of 5 milligrams of pyrethrins per cubic meter of workplace air (5 mg/m<sup>3</sup>) for 8 hour shifts and 40 hour work weeks.

The EPA has recommended daily oral exposure limits for 10 different pyrethroids ranging from 0.005 to 0.05 mg per kilogram of body weight per day (0.005-0.05 mg/kg/day).

The EPA has established tolerances for residues of pyrethrins and various pyrethroids that range from 0.01 to 75 parts per million parts (0.01-75 ppm) of a variety of foods.

## References

Agency for Toxic Substances and Disease Registry (ATSDR). 2003. Toxicological Profile for Pyrethrins and Pyrethroids. Atlanta, GA: U.S. Department of Health and Human Services, Public Health Service.

**Where can I get more information?** For more information, contact the Agency for Toxic Substances and Disease Registry, Division of Toxicology, 1600 Clifton Road NE, Mailstop F-32, Atlanta, GA 30333. Phone: 1-888-422-8737, FAX: 770-488-4178. ToxFAQs Internet address via WWW is <http://www.atsdr.cdc.gov/toxfaq.html>. 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.

