CHLORPYRIFOS
GENERAL FACT SHEET

What is chlorpyrifos?

Chorpyrifos is an organophosphate insecticide. Pure chorpyrifos is made up of white or colorless crystals. It has a slightly skunky odor, like rotten eggs or garlic. Chorpyrifos is used to control many different kinds of pests, including termites, mosquitoes, and roundworms. Chorpyrifos was first registered as an insecticide in 1965 and the United States Environmental Protection Agency (U.S. EPA) re-registered it in 2006. The only legal indoor use for chlorpyrifos is in containers with treated baits.

What are some products that contain chlorpyrifos?

Products with chlorpyrifos in them are used in agriculture in cattle ear tags. They may be used on golf courses, and to control fire ants and mosquitoes for public health purposes. Products containing chlorpyrifos are also used to treat wood fences and utility poles.

Use of chlorpyrifos on most food crops was revoked in 2022 by the U.S. EPA because of concerns related to dietary exposure, especially for children. However, the following year certain food uses were reinstated following legal challenges. Regulatory updates are ongoing.

Always follow label instructions and take steps to avoid exposure. If any exposures occur, be sure to follow the First Aid instructions on the product label carefully. For additional treatment advice, contact the Poison Control Center at 800-222-1222. If you wish to discuss a pesticide problem, please call 800-858-7378.

How does chlorpyrifos work?

Chlorpyrifos can be harmful if it is touched, inhaled, or eaten. Chlorpyrifos works by blocking an enzyme which controls messages that travel between nerve cells. When the enzyme is blocked, the nervous system can't send normal signals. This causes the nervous system to malfunction and this is how it eventually kills the pest.

How might I be exposed to chlorpyrifos?

People can be exposed to pesticides by eating them, breathing them in, or getting them on the skin or in the eyes. You could be exposed to chlorpyrifos if you apply products containing chlorpyrifos either as part of your job or outside of your own home. If a bait station in the house contains chlorpyrifos, people or pets could be exposed if the bait station is broken. People could be exposed to chlorpyrifos if their well water has been contaminated. This can happen if products containing chlorpyrifos were used near the well for termite control. Risks can be reduced by always reading the entire label and following all instructions.

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What are some signs and symptoms from a brief exposure to chlorpyrifos?

Chlorpyrifos affects the nervous system of people, pets, and other animals the same way it affects the target pest. Signs and symptoms can appear within minutes to hours after exposure. These effects can last for days or even weeks. During this time, the body is replacing the depleted enzymes in the nervous system so it can function normally again.

Exposure to small amounts of chlorpyrifos can cause runny nose, tears, and increased saliva or drooling. People may sweat, and develop headache, nausea, and dizziness. More serious exposures can cause vomiting, abdominal muscle cramps, muscle twitching, tremors and weakness, and loss of coordination. Sometimes people develop diarrhea or blurred or darkened vision. In severe poisoning cases, exposure can lead to unconsciousness, loss of bladder and bowel control, convulsions, difficulty in breathing, and paralysis.

What happens to chlorpyrifos when it enters the body?

Chlorpyrifos moves to all parts of the body after exposure. When the body tries to break it down, it creates another form called chlorpyrifos oxon. The oxon binds permanently to enzymes which control the messages that travel between nerve cells. When chlorpyrifos binds to too many of the enzymes, nerves and muscles do not function correctly. The body then must make more enzymes so that normal nerve function can resume. The body can break down and excrete most of the unbound chlorpyrifos in feces and urine within a few days. Chlorpyrifos that finds its way into the nervous system may stay there much longer.

Is chlorpyrifos likely to contribute to the development of cancer?

Researchers have exposed rats and mice to chlorpyrifos in laboratory studies to see if chlorpyrifos would cause tumors. Chorpyrifos was not linked to cancer by any of these studies. The U.S. EPA has decided that there is "evidence of non-carcinogenicity for humans" for chlorpyrifos.

Has anyone studied non-cancer effects from long-term exposure to chlorpyrifos?

Scientists exposed laboratory rats, mice, and dogs to low levels of chlorpyrifos for long periods of time. Some animals lost weight, and some of their internal organs got bigger and they had other tissue changes that were not normal. Many studies have shown nervous system effects that were similar to those seen in short-term exposures. Sometimes the test animals seemed to be able to tolerate the effects of chlorpyrifos over time. We don't know why or how this happens.

Long-term exposure to chlorpyrifos in people caused the same nervous system effects as short-term exposures did, but did not cause any additional health problems. Some people have suffered delayed nervous system damage if they were exposed to very large amounts of chlorpyrifos. This is very rare, and scientists and doctors do not understand it very well.

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Are children more sensitive to chlorpyrifos than adults?

Chorpyrifos exposure was linked to changes in social behavior and brain development as well as developmental delays in young laboratory animals. Other studies showed that chlorpyrifos affected the nervous system of young mice, rats, and rabbits more severely than adult animals.

Researchers studied the blood of women who were exposed to chlorpyrifos and the blood of their children from birth for three years. Children who had chlorpyrifos in their blood had more developmental delays and disorders than children who did not have chlorpyrifos in their blood. Exposed children also had more attention deficit disorders and hyperactivity disorders.

In general, children may be more sensitive to pesticides than adults. One reason for this is that their bodies may break down pesticides differently. Children are also more likely to be exposed to pesticides when playing and may put their hands in their mouths more often than adults. Children may also be more sensitive to exposures because they have more surface area of skin for their body size than adults.

What happens to chlorpyrifos in the environment?

When chlorpyrifos gets into the soil, it can take weeks to years for all of the chlorpyrifos to break down. Chlorpyrifos in the soil may be broken down by ultraviolet light and chemicals in the soil. Soil temperature and pH level may also affect how long chlorpyrifos stays in the soil. Chlorpyrifos will break down more slowly in acidic soils than in basic soils.

Once chlorpyrifos is in the soil, it sticks very strongly to soil particles. Plant roots won't usually pick it up, and it won't easily get into groundwater. Chlorpyrifos may wash into rivers or streams if erosion moves the treated soil. One of the breakdown products of chlorpyrifos, called TCP, does not bind to soil and may get into groundwater.

Most of the chlorpyrifos applied to plant leaves will evaporate, but some may remain for 10 to 14 days. Chlorpyrifos or the chemicals it breaks into may get into the atmosphere and travel long distances. Researchers found chlorpyrifos in indoor air, dust, carpets, and on children's toys in homes where products with chlorpyrifos in them had been used.

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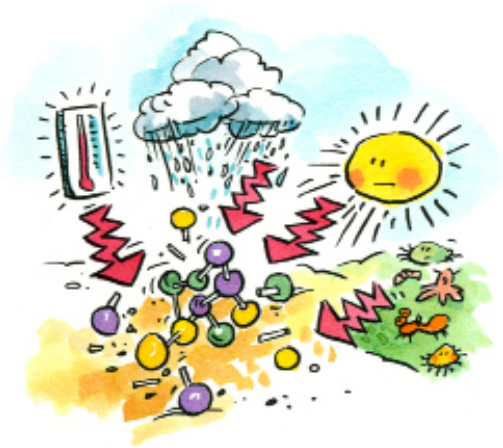
Can chlorpyrifos affect birds, fish, or other wildlife?

Chlorpyrifos is very toxic to many bird species such as grackles and pigeons, and it is moderately toxic to others such as mallard ducks. Mallard ducks fed chlorpyrifos laid fewer eggs and raised fewer ducklings. The eggshells were thinner than normal, and many of the young ducklings died. Of all birds, robins are most often found dead following accidents involving chlorpyrifos use.



Chlorpyrifos is also very toxic to fish and aquatic invertebrates. It may build up in the tissues of fish and other animals that eat smaller animals. This is known as bioaccumulation.

Chlorpyrifos is very toxic to bees. It can poison non-target insects for up to 24 hours after it is sprayed. Chlorpyrifos can be toxic to earthworms for up to 2 weeks after it is applied to soil.

Where can I get more information?

For more detailed information call the National Pesticide Information Center, Monday - Friday, 8:00am and 12:00pm Pacific Time (11:00 AM to 3:00 PM Eastern Time) at 800-858-7378 or visit us on the web at npic.orst.edu. NPIC provides objective, science-based answers to questions about pesticides.

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