

# Harmful effects of pesticides and emergency response

By Laurie Ann Hurner

This CEU article grants one General Standards (Core) CEU when submitted and approved toward the renewal of a Florida Department of Agriculture and Consumer Services restricted-use pesticide license.

**M**erriam-Webster Dictionary defines the word *pesticide* as “a chemical that is used to kill animals or insects that damage plants or crops.” Every pesticide has some harmful effects. By definition, we want pesticides to be toxic to the undesirables they are intended for. Unfortunately, with toxicity comes

danger to people, plants and animals pesticides are not intended to harm. This toxicity, in some cases, may be fatal. This article will discuss:

- Types of harmful effects attached to different pesticide applications
- Common human exposure routes for pesticides
- How to recognize typical symptoms of pesticide exposure in humans
- Emergency response procedures

Pesticides can cause short-term and long-term effects in humans and non-target animals. These effects can be found on the pesticide label in the Hazards to Humans and Domestic

Animals section. This section is a sub-section of the Precautionary Statements section of the label. An applicator should always refer to the product’s Safety Data Sheet (SDS) for more information about toxicities and other safety precautions.

## TYPES OF HARMFUL EFFECTS

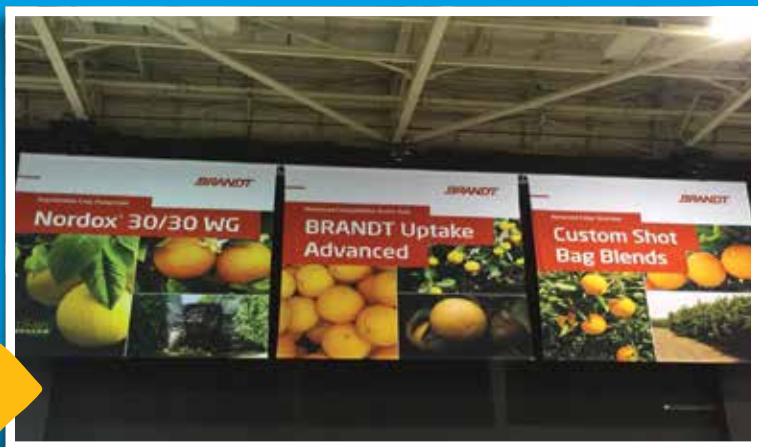
In general, the harmful effects and symptoms of human exposure to pesticides can be divided into four basic categories: acute, chronic, delayed and allergic. It is very important to know what these terms mean and how these effects are acquired and expressed.

**Acute toxicity** usually occurs after just one exposure, and symptoms develop within minutes to hours. Pesticides that cause acute toxicity can do so even with minimal exposure, depending on the strength or concentration (parts per million) of the pesticide. This toxicity may occur through the mouth (ingestion), the skin (absorption) or via inhalation through the lungs or respiratory system.

**Chronic toxicity** refers to harmful effects that usually occur after repeated, long-term exposure to pesticides. This type of exposure is very complex and

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Degree of severity	Symptoms	
Mild poisoning	Fatigue Headache Dizziness Blurred vision	Excessive sweating/salivation Nausea and vomiting Stomach cramps and diarrhea
Moderate poisoning	Inability to walk Weakness Chest discomfort	Constriction of pupils Mild symptoms more severe
Severe poisoning	Unconsciousness Severe constriction of pupils Muscle twitching Running nose and drooling	Breathing difficulty Coma and death

**Table 1**

very subtle in the ways it presents itself in the form of symptoms. Some examples of chronic toxicity are production of malignant tumors, birth defects, changes in genetic structure and effects on the fertility or reproductive rates of animals. Males and females may be affected. As you can see, these examples may well represent some other issue besides chronic pesticide toxicity. Things such as cancerous tumors from smoking cigarettes and endometriosis in women are two things that are not related to pesticides, but may cause the issues described above.

**Delayed effects** include illnesses or injuries that do not appear immediately (usually within 24 hours) after exposure to a pesticide. These types of effects may appear days, months or even years after exposure and may be caused by either acute or chronic exposure to pesticides. One such example occurs after significant inhalation exposure to the herbicide paraquat, which may cause severe or fatal lung injury that does not appear for three to 14 days after the initial exposure.

**Allergic effects** are harmful effects that only some people develop in reaction to exposure to a pesticide substance. The exposure does not cause the same reaction in all people. You may not become allergic to a substance after the first exposure, but repeated exposure may lead to a sensitization that leads to an allergic effect. An example of such an allergic effect would be a man who has enjoyed eating crab legs his entire life,

and then one night, he eats crab legs, his throat gets tight and he has to go to the hospital.

## COMMON EXPOSURE ROUTES FOR PESTICIDES

Exposure to pesticides occurs when pesticide is taken into the body. Pesticides can enter the body through the mouth and digestive system (orally), through the eyes (ocular), through the skin (dermally) or through the nose and respiratory system (inhalation).

People do not pay close attention to the exposure they receive from pesticides. In a study done with the chemical parathion on absorption rates in the human body, it was shown that as much as 11.8 percent of chemical on an exposed palm of the hand is absorbed, 36.3 percent of chemical on an exposed forehead is absorbed and 100 percent of the chemical that reaches the genital area of the body is absorbed.

You may be asking how some of these exposures occur in the first place. Well, the truth is most folks do not think to wash their hands before they use the bathroom after applying pesticides. They also do not think how pesticide residues can be transferred to other parts of the head and body.

**Oral exposure** can occur in a variety of ways. Applicators may not recognize the exposure risks when they blow out a clogged nozzle with their mouth or eat food without washing their hands after handling delivery equipment. In addition, many oral exposures occur as accidents when

children, animals or untrained adults come into contact with pesticides through their hands or eating/drinking from an unlabeled container of product. Applicators take huge chances by removing the product from its original labeled container and placing it in a soda can or food container. Since there is no identification of what might be contained in an unlabeled container, many people may become exposed simply because of curiosity. *Please know: You are breaking federal and state law when you store pesticides in containers other than within their own original containers.*

**Dermal exposure** is the most common type of pesticide exposure. These exposures account for about 97 percent of all reported cases of pesticide exposure. The reason the percentage is so high is that exposure to skin can happen at the mixing, loading, application and clean-up stages of the pesticide application. People do not think about the fact that even though it may be just a small amount of pesticide that lands on their forearm, if they do not stop and rinse it off, that small amount stays on the skin for a long time and makes the exposure all the more injurious.

**Inhalation exposure** is much easier than you realize. Most people incorrectly think pesticides are difficult to inhale. Examples of inhalation risks include inhaling smoke from the burning of pesticide containers, applying pesticides without respirators, and mixing and loading wettable powder formulations. Smokers need

Heat exhaustion	Organophosphate/carbamate poisoning
Sweating	Sweating
Headache	Headache
Fatigue	Fatigue
<i>DRY membranes</i> <i>Dry mouth</i> <i>No tears</i> <i>No spit present</i>	<i>MOIST membranes</i> <i>Salivation</i> <i>Tears</i> <i>Spit present</i>
<i>FAST pulse (slow if person has fainted)</i>	<i>SLOW pulse</i>
<i>Nausea</i>	<i>Nausea and diarrhea</i>
<i>DILATED pupils</i>	<i>Possible SMALL pupils</i>
Central nervous system depression	Central nervous system depression
Loss of coordination	Loss of coordination
Confusion	Confusion
<i>Fainting (recovery prompt)</i>	<i>Coma (can't awaken)</i>

**Table 2**

to be careful where they place their cigarettes. The pack can quickly absorb spray material, and then the individual cigarettes will be exposed.

**Ocular exposure** is a potential exposure route of great concern. The tissues of the eye are very absorbent. Blood vessels are close to the surface and are plentiful. Exposure can happen from airborne material, splashes and spills of liquid materials from broken hoses and nozzles, and from wiping the eyes with your hands. Safety glasses are not always handy, comfortable or easy to keep track of. But if you get splashed, you will be glad you had them on. Eyesight is important, yet so vulnerable without proper protection. *Please wear the appropriate eye protection when working with potentially harmful pesticide products.* Eyes are one of the few parts of the body that still cannot be replaced, fixed or helped along the way once they have been damaged.

## RECOGNIZING SYMPTOMS OF PESTICIDE EXPOSURE

At times, it is hard to tell if someone is suffering from pesticide exposure/poisoning or from something else. Table 1 (page 29), from “Applying Pesticides Correctly” by Frederick M. Fishel, lists many of the symptoms related with differing degrees of pesticide exposure.

Pesticide applicators must know and understand the diversity of symptoms that can be expressed after pesticide exposure. The applicator must also be prepared to self-diagnose and tell others of symptoms they believe they may be having. These symptoms can be warnings of many other illnesses such as the flu, heart attack, stroke or a hangover — just to name a few.

Heat stress is a common problem in Florida, particularly when temperatures creep up near 100 degrees and humidity is high. Unfortunately,

the symptoms of heat stroke can be easily confused with symptoms of pesticide exposure. Table 2, also from “Applying Pesticides Correctly” by Frederick M. Fishel, shows some of the symptom similarities and differences.

## EMERGENCY RESPONSE PROCEDURES

All of this talk about getting sick leads to the question of what to do if something happens. In most cases, emergency medical services need to be alerted immediately by calling 911. It is very important to remember some of these general first-aid points:

1. Make sure the person is breathing.
2. Make sure the person is removed from the pesticide exposure area so they are not exposed, or worse, you become exposed. This may mean that you need to put on some type of personal protective equipment before you go into an area where the ill person is. *Take care of yourself first so you can be of most help.*
3. If the person is not vomiting and needs CPR, only perform CPR if you are certified to do so.
4. If the chemical has entered the person’s body through the eyes, you *must* flush the eyes with clean water for 15 minutes in order to

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dilute the product and reduce damage. The person should see an eye doctor immediately after such an accident.

5. When a person must be transported by an ambulance to a hospital or clinic, send the pesticide label and SDS sheet with the ambulance or get it to the facility by another route (fax or e-mail) as soon as possible.
6. If the person's clothes have been contaminated, remove their clothing immediately. The longer the person is exposed, the more the chemical is absorbed and the greater the danger.
7. If the chemical has burned the skin, *do not apply* ointment, salve, powders or any other medications unless advised by medical personnel. The safe bet is to cover the skin loosely with some clean fabric and get help quickly.

Pesticides play an essential role in the Florida citrus industry. We must respect them the same way we respect fire, lightning and vehicles. The biggest thing to remember if you or someone you work with is ever exposed to pesticides is to *not panic*. Remain calm, remember your training and get help! 🍊

**Source:** "Applying Pesticides Correctly" (SM1) by Fred Fishel, published by the University of Florida.

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Mail the answer sheet or a copy of the form to:

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If you have questions regarding this form, test or CEUs, e-mail Laurie Ann Hurner at lhurner@ufl.edu or call 863-402-7150. Please allow two weeks to process your CEU request.

### 'Harmful effects of pesticides and emergency response' test

To receive one Core continuing education unit (CEU), read "Harmful effects of pesticides and emergency response" in this issue of *Citrus Industry* magazine. Answer the 20 questions on the magazine's website ([www.citrusindustry.net](http://www.citrusindustry.net)) or mail the answers and application information to the address at the bottom of the page. The article and test set are valid for up to one year from the publication date. After one year, this test will no longer grant a CEU.

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|--|-----|
| 1. Pesticides never hurt humans.   | T F |
| 2. A pesticide should never be transferred out of its original packaging and into an unmarked container.   | T F |
| 3. If a person's skin is burned by a pesticide, immediately apply butter to the affected skin and rush to the hospital.  | T F |
| 4. Acute effects of a pesticide exposure may not occur for 50 years after the exposure.  | T F |
| 5. Effects of pesticide exposure or poisoning are very different and are never confused with symptoms of a heart attack or stroke.                                     | T F |
| 6. The most common way that a person is exposed to a pesticide is through the skin.  | T F |
| 7. There are basically two ways that pesticides can enter the human body.  | T F |
| 8. As long as you wear a respirator when you are applying pesticides, you will never suffer from inhalation exposure.  | T F |
| 9. The easiest way to avoid contaminating your genitals when applying pesticides is to wash your hands before going to the bathroom.                                   | T F |
| 10. If you accidentally get soaked with pesticide from a hose break, you should immediately remove the soaked clothing to reduce cumulative exposure.                  | T F |
| 11. A person can become sensitized and then allergic to a pesticide after he/she has been applying it for years without problems.                                      | T F |
| 12. Heat stress is never a problem in Florida agriculture because we have air-conditioned trucks and tractor cabs.   | T F |
| 13. Acute effects of pesticide exposure occur within 24 hours of exposure.   | T F |
| 14. A pesticide is a chemical that will always kill everything that it touches no matter what.   | T F |
| 15. Wettable powders can be easily inhaled by the applicator during certain points in the application process.   | T F |
| 16. Malignant tumors, fertility issues and birth defects are examples of acute toxicity.   | T F |
| 17. Effects of pesticide use can be found on the pesticide label under the Hazards to Humans and Domestic Animals section.   | T F |
| 18. Dermal exposure is the most common type of pesticide exposure reported.  | T F |
| 19. Oral exposure to a pesticide can happen as easily as forgetting to wash your hands before you stop to eat lunch.   | T F |
| 20. The most important thing to remember when responding to a person who has been exposed to pesticides is to leave the person alone and not move them no matter what. | T F |

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#### Pesticide Applicator CEU Form

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