



No. 26: Comparing Symptoms of Heat Stress and Pesticide Poisoning

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RECOGNIZING HEAT STRESS

Suppose you've come across a pesticide applicator who is sweating profusely, complaining of having a headache, feeling fatigued, and nauseous. He seems confused, and is exhibiting a loss of coordination. It's 2 p.m., the air temperature is 93°F, and the applicator has been applying an organophosphate (OP) insecticide since early this morning. He is wearing the appropriate personal protective equipment except the recommended organic vapor respirator. What is this applicator suffering from?

Initial speculation might be that he is suffering from acute organophosphate poisoning, since reported symptoms are commonly seen in the early stages of OP-type poisonings. However, these exact same symptoms are also early indications that the applicator could be suffering from heat stress.

Heat stress is just as serious as pesticide poisoning, and it can be just as deadly. When the body becomes overheated, less blood goes to the active muscles, the brain, and other internal organs. The victim gets weaker and becomes less alert. As strain from the heat becomes more severe, there can be a rapid rise in body temperature and heart rate. The victim may not realize that this is happening because there is no pain. Yet an increase in body temperature of 2°F can affect mental performance, and an increase of 5°F can result in serious illness or death. In fact, it has been reported that more than 20% of people afflicted with heat stroke (the most serious heat illness) die, including young and healthy adults.

Heat illness may also be an underlying cause of other types of injuries, such as heart attacks on the job, falls, and equipment accidents arising from poor judgment.

Educating People to Help Themselves

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Heat related stresses include:

- **early heat illness** (mild dizziness, fatigue, irritability, impaired judgment),
- **heat rash** (tiny blister-like spots commonly found on clothed areas of the body),
- **heat cramps** (painful spasms of leg, arm, or abdominal muscles),
- **heat exhaustion** (fatigue, headache, dizziness, muscle weakness, loss of coordination, fainting, collapse), and
- **heat stroke** (headache, dizziness, confusion, irrational behavior, coma).

When a pesticide handler becomes ill while working with OP or carbamate insecticides in a hot environment, determining whether the handler is suffering from heat exhaustion or pesticide poisoning can be difficult. These illnesses share some similar symptoms, and combined problems of heat stress and pesticide poisoning may also occur. The following chart compares and contrasts symptoms of these two diseases.

Heat Exhaustion Symptoms	OP/Carbamate Poisoning Symptoms
Sweating	Sweating
Headache	Headache
Fatigue	Fatigue
Nausea	Nausea and diarrhea
Dry membranes · dry mouth · no tears · no spit present	Moist membranes · salivation · tears · spit present in mouth
Fast pulse	Slow pulse
Dilated pupils	Small or pinpoint pupils
CNS depression · loss of coordination · confusion · fainting	CNS depression · loss of coordination · confusion · coma

MANAGING HEAT STRESS

Just as when managing pesticide exposure, managing heat stress is the responsibility of both the person exposed and management. A heat stress control program should be in place to protect all persons exposed at an establishment, especially those who are older, unaccustomed to heat, or not in the best physical shape. Government regulations [29 U.S. code 654 (a)(1)] require that employers provide working conditions that will not cause illness or death from the effects of heat or from other recognized hazards.

High temperatures and high humidities put exposed persons at special risk of heat illness. Pesticide handlers and early entry workers are at even greater risk because of the special clothing and equipment worn for chemical exposure protection. This protective equipment can restrict the evaporation of sweat, blocking the body's natural way of cooling itself, which results in a buildup of body temperature. Exposure to certain pesticides can also produce sweating, and there can be combined effects with exposure to heat. Additionally, pesticides are absorbed through hot, sweaty skin more quickly than through cool skin.

Precautions employers can take include:

- Training workers in recognizing and managing heat stress
- Monitoring temperature and humidity
- Checking on workers at least hourly in high temperatures
- Gradually acclimating workers to high temperatures
- Ensuring employees drink enough water
- Shortening work periods
- Lengthening breaks and providing shade
- Halting work under extreme conditions

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