

Organophosphorus and Carbamate Insecticide Poisoning

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BASIC INFORMATION

Description

An insecticide is a compound that is designed to kill insects. Organophosphorus and carbamate insecticides act on the nervous systems of both insects and animals, so they can produce adverse effects in exposed animals. These insecticides are formulated as sprays, powders, dips, and granules and are used to control a number of agricultural, garden, and residential insect pests.

Causes and Toxicity

These insecticides bind to an enzyme called *acetylcholinesterase* that normally breaks down a transmitter substance in the nervous system. Binding of the enzyme results in overstimulation of the nervous system. Most insecticides in this class of agents are well absorbed by any route (skin, mouth, gastrointestinal tract). The degree of toxicity can vary widely, depending on the compound involved and its formulation. Some organophosphorus and carbamate insecticides are highly toxic, and small amounts can be deadly. Others have a much wider margin of safety. Brand names include *Bonide/Ortho Systemic Rose* and *Flower Care* (disulfoton), *Dursban* and *Lorsban* (chlorpyrifos), *Paramite* (phosmet), *Orthene* (acephate), and *Golden Malrin* (methomyl).

Clinical Signs

These insecticides may cause a number of signs in animals, including drooling, tearing, increased urination, diarrhea, difficulty breathing, vomiting, increased or decreased heart rate, and pupil constriction. In some cases, muscle weakness, tremors, and seizures may be noted. Death can occur. Depending on the insecticide involved, its potency, and whether exposure was by ingestion (via eating) or by absorption through the skin, signs may be seen within minutes to days. Rarely, a delayed neurologic syndrome may develop 1-4 weeks after exposure that results in permanent muscle weakness and decreased sensation (feeling), progressing to varying degrees of paralysis.

Diagnostic Tests

Diagnosis is based on a history of exposure, appropriate clinical signs, a measured decrease in whole blood cholinesterase

activity on laboratory testing, and finding the chemical in body tissues as well as the suspect feed or bait. No specific changes are expected on routine laboratory tests or x-rays, but these tests may be needed to rule out other causes of similar clinical signs. Unfortunately, the measurement of cholinesterase activity and analysis for the chemical in suspected poisons may take several days to weeks, so they do not help with an immediate diagnosis.

TREATMENT AND FOLLOW-UP

Treatment Options

Animals that have eaten one of these insecticides may be treated by inducing vomiting to remove any residual poison from the stomach. Vomiting should be induced under the direction of a veterinarian. Vomiting may be followed by administration of activated charcoal to bind the agent, depending on the compound, when it was ingested, and whether the animal is showing clinical signs. Exposure of the skin is usually treated with bathing to remove the product.

Animals that are showing signs may be treated with a number of drugs that help counteract the effects of the insecticides and decrease the clinical signs or provide support for the animal. Oxygen therapy may be required for animals with breathing problems.

Follow-up Care

Recovery times can vary from 12-24 hours to weeks, depending on the insecticide involved and the extent of signs.

Prognosis

The prognosis is favorable for animals that are treated rapidly and aggressively. No permanent changes are expected. Animals that have eaten large amounts of a rapidly acting insecticide and those with long-standing signs before treatment have a poorer prognosis.