Lecture title: Pyrethroids and Pyrethrins

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- Pyrethroids and Pyrethrins

• As a class of insecticides, these agents carry low risk of mammalian intoxication.

• Pyrethrum is a naturally occurring combination of insecticidal compounds derived from the flowers of Chrysanthemum spp. of plants. زهرة الاقحوان

• Pyrethrins are individual representatives of this group of compounds extracted from botanical sources.

• Pyrethroids are synthetically produced chemicals similar to natural pyrethrins. Pyrethroids have a broader insecticidal spectrum of activity and greater environmental stability. • Most commercially available pyrethroids also contain synergists (piperonyl butoxide or MGK 264) that inhibit metabolism of the insecticide and may potentiate intoxication.

Source : Insecticides (dips, shampoos)

• Type I compounds : allethrin • permethrin • pyrethrin

• Type II compounds: cypermethrin • deltamethrin

Species • Cats and dogs more commonly • Fish more sensitive than mammals

Clinical Signs

• Hypersalivation • Tremors • Hyperexcitability or depression

.• Seizures • Vomiting • Diarrhea

Mechanism of Action

• Pyrethroids act on several intracellular, neuronal sites.

• A common feature of the proposed mechanisms is an increase in the amount of neurotransmitter released from presynaptic nerve terminals.

• The action on neuronal sodium channels is persistent depolarization.

• prolonged sodium influx through the channel

• delay in closure of the “inactivation” gate of the sodium channel

• Antagonism of the -aminobutyric acid (GABA)–mediated chloride channel, especially type II pyrethroids

• antagonism of the GABA receptor complex

• reduction of chloride influx through the channel

• Inhibition of synaptic Ca2+,Mg2+-adenosine triphosphatase

• increased intracellular calcium

• Inhibition of neuronal calmodulin • increased intracellular calcium

Diagnosis

• Clinical signs

• History of exposure

• No specific diagnostic test for pyrethroids • Whole-blood analysis for acetylcholinesterase activity to differentiate from carbamate and organophosphorus intoxication • Animals with pyrethroid intoxication should have normal acetylcholinesterase activity. • Some laboratories can perform chemical analysis for presence of pyrethroids. • fat, skin, liver, and brain samples obtained at necropsy • only indicates exposure, not a definitive diagnosis

Treatment

1- Seizure control: Administer diazepam 0.2–2.0 mg/kg IV.

2- Dermal decontamination : Use a mild detergent with warm water.

• Wear gloves and protective clothing while washing the animal.

3- Gastrointestinal decontamination : Induce emesis, if indicated, within 1–2 hours of ingestion.

• Administer activated charcoal and cathartic agent within 3–4 hours of ingestion.

4- Symptomatic therapy • Administer fluids to correct dehydration after vomiting or diarrhea. • Inject atropine to decrease salivation, especially in the treatment of cats.