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A BULLETIN FOR HEALTHCARE PROFESSIONALS WHO MANAGE POISONED PATIENTS

Blue Ridge Poison Center

**University of Virginia Health** 

February 2023

# **Pyrethroid Insecticides**

# **Background:**

*Pyrethroids* are a class of synthetic insecticides widely used in various products, including household insect sprays, pet shampoos, and agricultural products. They were first developed in the 1970s as a safer alternative to older insecticides, such as organophosphates. Pyrethroids have a similar mode of action as the naturally occurring pyrethrins, which are found in chrysanthemum flowers. However, pyrethroids are synthetic and have been modified to increase their stability and effectiveness as insecticides. Pyrethroids have a unique chemical structure that allows them to bind to and activate voltage-sensitive sodium channels in the nervous system of insects, leading to paralysis and death. This unique chemical structure gives them less affinity for the human



nervous system, making them much less toxic to humans. In high doses, primarily via oral exposure, pyrethroids can cause activation of human voltage-activated sodium channels, resulting in neurotoxicity. This can manifest as tremors, ataxia, muscle fasciculations, altered mental status, and/or seizures.

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#### Exposures

Human exposure to pyrethroids typically occurs through the skin, but as these substances are poorly absorbed and rapidly metabolized, toxicity is typically limited unless a massive dermal exposure occurs. The pyrethroid permethrin is used medically to treat lice and is applied

to clothing to repel insects. Pyrethroids have greater oral and inhalational absorption but are also rapidly metabolized by the liver. Systemic toxicity is reported following large ingestions. Symptoms may include nausea, vomiting, salivation, tremor, paresthesias, altered mental status, and seizures. There have also been reports of large inhalational exposures, such as in commercial insecticide sprayers, resulting in symptoms such as headache, nausea, shortness of breath, and muscle weakness. In addition to exposure to the active ingredients in pyrethroid insecticides, toxicity can also occur due to exposure to the hydrocarbons solvents that are often present in the same containers such as xylene. Inhalation or ingestion of these hydrocarbons can lead to toxicity and symptoms such as headache, dizziness, nausea, vomiting, chemical pneumonitis, and respiratory distress.

continued next page

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## Management

Asymptomatic patients who have an accidental or exploratory exposure to pyrethroids can be managed at home in discussion with the poison center by phone. In cases of large-volume exposures, decontamination may be necessary, which involves removing contaminated clothing and washing the affected area with soap and water. For symptomatic pyrethroid exposures, the primary treatment is to provide supportive care, as there is no antidote available for this type of poisoning. Care may include providing antiemetics, providing fluid/ electrolyte replacement, and airway support as needed. If a seizure develops, benzodiazepines are the first line of therapy. If respiratory symptoms develop, consider possible aspiration of hydrocarbons as a cause of chemical pneumonitis, which may not have findings on early chest radiographs. Patients with signs of systemic toxicity should be admitted for further monitoring and supportive care. For any questions on the management of pyrethroid exposure, contact the Blue Ridge Poison Center at 1-800-222-1222. Healthcare workers may call the dedicated HCP hotline at 1-800-451-1428.



# NATIONAL POISONING PREVENTION WEEK

is March 19-25, 2023. We are inviting all pharmacies to partner with us by including one poison center magnet in every prescription filled that week. Having the number handy in a poisoning emergency can save lives.

Last year, pharmacies distributed magnets to over 85,000 households in the Blue Ridge Poison Center area.

If your pharmacy wants to participate, contact Kristin Wenger, Education Coordinator, at <u>KLW2S@UVAHEALTH.ORG</u>.

