Health and Safety Alert – Cats, Pyrethrins and Synthetic Pyrethroids (Permethrin)

Background

PMANZ have had a number of reports of cats dying from unknown causes, coincidently shortly after pest control treatments have been carried out for spiders and/or ants.

The owners have alleged that the technician’s treatment caused the death of their beloved pet. In all cases Synthetic Pyrethroids were used, begging the questions did the cats come into contact with the wet spray or dust?

The one report received from a veterinarian indicated, “She presented with generalised body tremors, sneezing and paw flicking. One of the possible causes for this presentation is pyrethroid toxicity. There was a history of the house recently being sprayed with a pyrethrum based ant spray”.

Regrettably, we will never know for sure as laboratory detection of pyrethroids (blood test) is not readily available and haematology, biochemistry and other findings might be normal.

Synthetic Pyrethroid sprays eliminate a wide range of insects and can be highly effective; however, it can be very toxic to cats if they come into contact with the wet spray.

Some additional information follows that may help you get a better understanding of this potentially unique problem that initially manifested itself with common ‘spot-on’ flea treatments.

Pyrethrum, Pyrethrins and Pyrethroids

Pyrethrum is the natural extract from the flowers of Chrysanthemum cinerariaefolium (Dalmation pyrethrum daisy).

The six active insecticidal compounds of pyrethrum are called pyrethrins. They are pyrethrin I, pyrethrin II, cinerin I, cinerin II, jasmolin I, and jasmolin II.

Pyrethrum or the pyrethrins represent much less of a risk than synthetic pyrethroids – mostly because they are seldom used in urban pest management, but also because they degrade so rapidly that most of the active ingredient has disappeared within 5 hours after application - if applied during day light hours.

The pyrethroids are synthetic analogues of the original pyrethrins and comprise hundreds of derived insecticides. Relatively few of these have been developed commercially. Permethrin is a synthetic pyrethroid widely used in flea control products for small animals, mainly dogs. Accidental toxicity can occur with off-label usage, and cats are particularly susceptible.
Although they are based on the chemical structure and biological activity of the pyrethrins, the development of synthetic pyrethroids has involved modifications that make these compounds more toxic and less degradable in the environment than pyrethrins.

It is permethrin, a Synthetic Pyrethroid (SP) that represent most risk to cats due to their persistence.

However, all SP’s should be considered hazardous to cats.

**Australian Pesticides and Veterinary Medicines Authority (APVMA)**

The APVMA had this to say on pyrethrin and pyrethroid use on cats (extracts)


**The issue**

The APVMA has received enquiries about exposure of cats to insecticide products containing pyrethrin and the potential for pyrethrin-toxicity following exposure.

There are nearly 200 insecticidal products containing pyrethrins registered for use in Australia, including powders, sprays and shampoos. Of these, around 50 are registered for use on cats.

**General information and guidance**

- Pyrethrins are insecticidal substances produced from the *Chrysanthemum cinerariaefolium* flower that may be toxic to cats at high concentrations
- Pyrethroids, including permethrin, are synthetic forms of pyrethrins that are toxic to cats at high concentrations

**Toxicity**

Pyrethrins are insecticidal substances produced from the flower head of the pyrethrum plant, *Chrysanthemum cineraiaeefolium*. Pyrethrins rapidly knock down, paralyze and kill insects by disrupting nerve function.

Pyrethroids are synthetic analogues and derivatives of pyrethrins, which have undergone extensive chemical modifications to make them more toxic to insects, with a greater knockdown effect than the plant pyrethrins.

**What is the toxicity of pyrethrins and pyrethroids?**

The toxicity among the various pyrethrins and pyrethroids varies greatly, which is reflected in the wide range of LD50 concentrations— LD50 is the dose at which 50 per cent mortality is observed in exposed laboratory animals.
Generally, pyrethrins are less toxic to mammals than pyrethroids and the toxicity of pyrethroids varies depending on the type of pyrethroids (isomer ratio), as well as factors such as the type of formulation.

The primary target of acute pyrethin, or pyrethroid, induced toxicity appears to be the nervous system. In cats exposed to high concentrations of permethrin (a third-generation pyrethroid), clinical signs such as hyperexcitability, depression, vomiting, excessive salivation, muscle tremors, not eating, seizures, convulsions, lack of coordination and death have been observed within minutes or days after treatment.

**Permethrin toxicity in cats: a retrospective study**

From a retrospective study of 20 cases of permethrin toxicity in cats treated at an emergency clinic in Brisbane, Queensland from October 2004 to June 2005, the following became evident:

The diagnosis of permethrin toxicity was made on the basis of a history of exposure and characteristic clinical signs, including seizures, muscle fasciculations, and tremors. Decontamination and appropriate seizure or muscle fasciculation control were the basis of treatment.

The outcome was good after rapid intervention and 19 of the 20 cats were successfully treated, with the only death occurring in a kitten for which treatment was delayed for 24 h. No long-term complications were reported by the cats’ owners at 4-month follow-up after discharge from hospital.

**Source:** [https://www.ncbi.nlm.nih.gov/pubmed/18498556](https://www.ncbi.nlm.nih.gov/pubmed/18498556)

**Impact on Cats**

Synthetic Pyrethroids’s are metabolised by mammals and birds in the liver, and cats have different liver metabolic pathways to other animal species (they are deficient in hepatic glucuronosyltransferase enzyme) leading to a poor ability to break down SP’s.

Cats lack the ability to metabolize SP’s when they come into contact with them through their skin or when they lick them off of their fur while grooming according to the Veterinary Support Personnel Network.

This makes them highly toxic to cats and they should never be applied to their skin or to an area where they might encounter exposure.

Signs of poisoning in cats include seizures, tremors and muscle spasms, usually appearing within 48 hours of exposure to the toxin according to the ASPCA (American Society for the Prevention of Cruelty to Animals) National Animal Poison Control Centre.

Scholarly articles on cat poisoning with permethrin show that much of the occurrence is due to dog flea treatments (permethrin shampoos and powders) being used to treat cats rather than poisoning due to pest management treatments.
Recommended Treatment Procedures for Homes with Cats

Proper Usage

Prior to spraying, notify neighbours and get your client to bring their feline friends indoors to prevent them from getting the spray on their fur.

Before spraying with SP’s inside or around a home the PMANZ suggest:

- Ask the owner if they have cats and to bring them inside, and close the windows to the rooms where they are and not let them out until the insecticide is dry.
- Get your customer to speak with their neighbours to let them know when and where you’ll be spraying the so they can keep their cats indoors as well.
- If spraying indoors for fleas, the cat should be removed off-site to a cattery until treatment is complete and surfaces and carpets are dry.
- Lift all food and drink bowls off the floor or cover with suitable non porous material.
- Keep cats away from wet spray until dry. This may take longer in wet weather.
- Use the four hour stand-down rule for flea and other spray treatments, but insist that the owner make sure carpeting is dry before allowing cats onto them.
- Once the insecticide is dry, it’s safe for kitties to come out again.
- Use alternative insecticides when treating homes where cats are present.

The Signs of Pyrethrin or Pyrethroid Toxicity in Cats

If you suspect your customer’s cat or kitten has encountered SP spray while outdoors, wash the skin and fur with dish soap to remove as much of the toxin as possible. After washing, bring the cat to a veterinarian for treatment immediately. Quick treatment can prevent a possible tragedy.

Cats that have been exposed to a large amount of pyrethrin/pyrethroid-based insecticides will often have whole-body tremors. Other signs often include:

- Excessive salivation/drooling
- Agitation or restlessness
- Vomiting
- Loss of coordination
- Difficulty jumping, standing or walking
- Shaking, twitching, muscle tremors (often mistaken for seizures)
· Difficulty breathing

If left untreated, pyrethroid toxicity can be fatal to cats.

**Clinical signs and diagnosis**

Clinical signs are normally noticed immediately after exposure, but can be delayed for up to 72 hours. In mild exposures, paraesthesia induced by direct contact with the substance may result in paw flicking, ear twitching and uncontrolled contractions of the cutaneous trunk muscles.

Grooming of a contaminated body area can result in hyper salivation and vomiting. Severe muscle tremors, seizures and/or depression are normally seen only in severe intoxications.

Laboratory detection of pyrethroids is not readily available and haematology, biochemistry and other findings might be normal.

One of the principal differential diagnoses is organophosphate/carbamate toxicoses.

Where available, measurement of cholinesterase levels may be helpful in distinguishing between the two groups of toxins — with levels being unremarkable in pyrethroid toxicity and most likely decreased in organophosphate toxicity.

**Treatment and prognosis**

Dermal decontamination should be instituted at the earliest possible opportunity. Bathing of the patient is generally useful and the use of a hand- or dishwashing detergent might enhance the cleaning process.

Hypothermia may potentiate the effect of pyrethroids on ion-channel activity and, therefore, bathing the patient with cold water and/or prolonged sedation should be avoided.

Conversely, bathing in water that is too warm might enhance resorption through the skin due to hyperaemia and should also be avoided. The patient should be actively dried and, if transport to a veterinary facility is delayed, owners can be advised to wrap it in a warm towel.
How do I know if my product contains synthetic pyrethroids?

The active ingredient is always listed on the label of insecticides. You can check this alphabetical list of the most common insecticides we use in Urban Pest Management to find out if the insecticide of your choice is a Synthetic Pyrethroid. NOTE: your specific insecticide of choice may not be on this list so please check your label or SDS.

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<tr>
<th>Aqua K-Othrine (Deltamethrin)</th>
<th>Fendona 15 SC (Alpha Cypermethrin)</th>
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<tr>
<td>Barricade 500EC (Permethrin synthetic pyrethroid)</td>
<td>Fury 120SC (80g/L Bifenthrin, 40g/L Alpha Cypermethrin)</td>
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<td>Bestox PC 50 (Alpha-cypermethrin)</td>
<td>Homerun (alpha cypermethrin)</td>
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<td>Bestseller 100ec, (alpha-cypermethrin)</td>
<td>Key Beta (beta cyfluthrin)</td>
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<td>BIFF ANT (bifenthin)</td>
<td>Key Delta Aqua (Deltamethrin)</td>
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<tr>
<td>Biflex 100ec, ((Bifenthrin)</td>
<td>Key Trimix (40g/L betacyfluthrin, 40 g/L alpha-cypermethrin and 30 g/L acetamiprid)</td>
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<td>Biflex Aqua, (Bifenthin)</td>
<td>Kiwicare deltamethrin (Deltamethrin)</td>
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<td>Biflex Ultra (Bifenthin)</td>
<td>Maxxthor (Bifenthin)</td>
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<td>Bifice Granules (bifenthrin)</td>
<td>No Pests X-it Ant (bifenthrin)</td>
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<td>Brigade Granular Insecticide (Bifenthin)</td>
<td>Perigen 500 (Permethrin)</td>
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<td>Cislin 25,( Deltamethrin)</td>
<td>Permex Dust, (Permethin)</td>
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<td>Country alpha cypermethrin 1S SC (alpha-cypermethrin)</td>
<td>PyGar (Permethrin)</td>
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<td>Responsar Beta (Beta Cyfluthrin)</td>
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<td>DELTRA*Residual Insecticide (Deltamethrin)</td>
<td>Ripcord, (Cypermethrin)</td>
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<td>Demand (LAMBDACyhalothrin)</td>
<td>Strike Out (Cypermethin)</td>
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<tr>
<td>Dominex PC100 (Alpha-cypermethrin,)</td>
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<tr>
<td>Dragnet Insecticidal Powder (Permethrin)</td>
<td>Tempo (beta cyfluthrin)</td>
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<tr>
<td>Dust2Dust (permethrin)</td>
<td>Temprid 75 (50g/L Imidacloprid; 25g/L Beta-Cyfluthrin)</td>
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