

Fluoroacetate (1080)

Also known as: sodium monofluoroacetate, SMFA, compound 1080.
Fluoroacetamide (1081) is a related compound which is less toxic.

History

- This pesticide was discovered in the 1940s as a naturally occurring compound in plants from Africa, Australia, and South America.
- Fluoroacetate has since been used worldwide to control 'pest' species, including rodents, rabbits, brushtail possum, coyotes, and wolves.
- Fluoroacetate is water soluble, colorless, and odorless.
- Access to fluoroacetate is tightly controlled due to its high toxicity and lack of species specificity.
- The only licensed use of fluoroacetate in the United States is a 'predator protection collar' for sheep and goats.
- Alberta is the only province in Canada which licenses fluoroacetate for use in pest control.

Species sensitivity

- Carnivores are the most sensitive to fluoroacetate poisoning, followed by ruminants, rabbits, horses, primates, rodents, and birds.
- The toxic dose of fluoroacetate for a dog or cat is as low as 0.05 mg/kg.
- Secondary poisoning is possible, particularly if the gastrointestinal tract of a poisoned animal is ingested by another animal.

Mechanism of action

- Fluoroacetate is metabolized to fluorocitrate in the liver.
- Fluorocitrate blocks the Krebs or tricarboxylic acid (TCA) cycle within the cells of the body. As a result, cells are unable to produce energy, leading to cell death.
- Cell death leads to dysfunction of the heart and the brain (central nervous system).

Clinical signs

- Occur 30 minutes to 2-4 hours after ingestion of fluoroacetate.
- Signs of toxicity do not appear immediately because fluoroacetate must be metabolized in the liver first.
- Approximately one hour after exposure, dogs show anxious, frenzied behaviour, followed by vomiting and diarrhea, frothing from the mouth, difficulty breathing, seizures, heart arrhythmias, elevated body temperature, and running and barking fits.
- Seizures are not induced by external stimulation such as noise or touch (unlike strychnine-associated seizures).
- Death occurs 2-12 hours after exposure, usually due to failure of the heart and lungs.

Diagnosis

- Usually requires a history of exposure and observation of clinical signs.
- Post mortem findings are nonspecific and fluoroacetate is usually undetectable in body tissue.
- Fluoroacetate can sometimes be identified in stomach contents or vomit, but this may require specialized testing.

Treatment

- There is no antidote for fluoroacetate.
- Treatment is usually futile and the prognosis is grave.

References

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