

**E**xposure to a lethal gas underneath their house poisoned a family in Amarillo, Texas, in January 2017. In an attempt to rid his house of rodents, the father sprayed water on the aluminum phosphide tablets he had placed under the house. This created phosphine gas, which the occupants of the house inhaled. Four children died from pulmonary edema, and the parents were hospitalized in critical condition. Four other children survived. The pesticide aluminum phosphide—brand name Weevil-Cide® (UPL Corporate, King of Prussia, PA)—is strictly regulated due to its acute toxic effects. Product dealers and pest removal personnel need to be licensed to use aluminum phosphide; investigators are currently tracing the source of the man's illegal possession of this hazardous material.<sup>1</sup>

Aluminum phosphide is used as a pesticide and rodenticide. Phosphine gas is released when a phosphide comes into contact with moisture or acid.<sup>2</sup> This gas is toxic and potentially flammable and has an odor of decaying fish or garlic. Phosphine inhibits cytochrome C oxidase and causes oxidative stress followed by severe mitochondrial dysfunction, impaired cellular respiration, tissue hypoxia, and eventually multiorgan failure.

Patients are exposed to this compound either through ingestion of tablets or through inhalation of the toxic gas. They typically develop nausea, vomiting, abdominal pain, dyspnea, hypotension, severe metabolic acidosis, acute respiratory distress syndrome, acute kidney injury, and possibly disseminated intravascular coagulation. There is no definitive treatment or antidote, and treatment is largely supportive.<sup>2</sup>

Other small epidemics like the one in Amarillo have been reported in the medical literature. Dadpour reported an epidemic of aluminum phosphide poisoning in 36 tourists staying in a hotel in Iran.<sup>3</sup> These guests inhaled phosphine gas released from an aluminum phosphide powder placed in the hotel room for pest control. Three deaths occurred in patients less than 3 years of age, and one death occurred in a 14-year-old. The deceased patients presented with

shock and severe metabolic acidosis refractory to all treatment. One patient also had massive pulmonary hemorrhage due to disseminated intravascular coagulation. Six family members in Utah were poisoned by phosphide pellets used to eliminate voles in their yard.<sup>4</sup> These pellets were placed by a commercial pest management company in burrows made by the rodents near the house. All family members became sick within eight hours, and two children died with cardiopulmonary failure. One child was four years old, and one child was 15 months old. In a similar incident, three family members were poisoned when exposed to the phosphine gas released from aluminum phosphide tablets stored in rice bags which were in the bedroom where they slept.<sup>5</sup> All three family members developed epigastric pain. The 6-year-old boy developed multiorgan system failure and died.

In summary, aluminum phosphide pellets have the potential to cause unpredictable poisoning with severe morbidity and mortality. These events can happen even when the application is managed by licensed personnel. These pellets should never be used around or in buildings inhabited by humans, household pets, or farm animals.

## REFERENCES

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