



## **A 2 Year Old who Presents with Seizures: What's that Smell?**

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A 3 year-old female is presented to the ED with a generalized tonic clonic seizure. The child had been previously well, but had a recent upper respiratory infection. She was being administered an over the counter cold remedy. At home, she had an abrupt onset of vomiting, followed by a seizure within 30 minutes. 2 doses of lorazepam were given, followed by an IV load of phenobarbital, after which the seizure stopped.

Physical exam revealed a temperature of 38 degrees centigrade, pulse 126, respirations 28, blood pressure 96/palp and oxygen saturation 99% on 100 % oxygen. The child was somnolent and lethargic. There was an aromatic “mothball” odor on the breath. Pulmonary, cardiac, and abdominal examinations were within normal limits. She could localize to painful stimuli and demonstrated spontaneous eye opening and movements.

Routine laboratory investigations, including basic chemistries, glucose, CBC and lumbar puncture were all within normal limits.

## **Key Clinical Questions**

Which over-the counter products contain camphor?

What is a toxic dose for camphor?

What are the symptoms of camphor toxicity?

What are the treatments for camphor toxicity?

## **Key Learning Points**

- Camphor is a common ingredient in many over the counter preparations and can manifest severe toxicity; abrupt onset of vomiting, seizures and CNS depression.
- There is no diagnostic test specific for camphor toxicity.
- Ipecac is contraindicated after camphor is ingested.

## **Camphor-Induced Seizures**

### **Background, Risk factors and Epidemiology**

According to 2001 data from the American Association of Poison Control Centers *Toxic Exposure Surveillance System* (TESS), there were 8,505 exposures to camphor-containing products. Of these, there were 89 moderate to severe outcomes, and no deaths.(1) In 1983, the FDA banned the sale of oils containing > 11% camphor, but products with higher concentrations are still available in other countries. (2)

Common camphor containing products include mothballs, antiseptics, muscle liniments, and cold remedies. Most camphor poisoning result from ingestion of camphorated oil when it is mistaken for another medication (castor oil). There have been case reports of toxicity due to ingestion, dermal, intranasal, intraperitoneal and transplacental administration of camphor.(2-5)

### **Pathophysiology**

Camphor is synthesized from the hydrocarbon pinene, a turpentine derivative. It causes CNS depression and seizures, and its mechanism of action is unknown. (2)

### **ED Presentation**

Patients with camphor toxicity emit a characteristic aromatic odor. Symptoms begin abruptly, 5-90 minutes post-ingestion, and consist of emesis, seizures and CNS depression.(2,3)

### **Lab Studies**

Routine laboratory workup of seizures, including serum electrolytes, calcium and glucose, and head CT if indicated, should be considered. Camphor and its metabolites can be measured in blood or urine, however, levels are not available in real-time, and levels do not correlate with symptoms.(2,3)

### **Emergency Department Care**

As with all patients, attention to the ABCs is of foremost importance. Benzodiazepines should be first-line agents used for seizures. If benzodiazepines are unsuccessful, barbiturates may also be used. Phenytoin is not recommended for toxin-induced seizures.

The skin of a patient with dermal exposure should be irrigated. Ipecac is contraindicated, due to potential for rapid deterioration of mental status. Gastric lavage may be considered if the patient presents soon after ingestion. Activated charcoal may be effective; its efficacy remains unstudied. Hemodialysis (with a lipid dialysate) and charcoal hemoperfusion have been used for camphor toxicity, with varying results.(6) These modalities are not widely available, and not currently recommended. There is no specific antidote for camphor poisoning.(2,3)

## **Consultations and Admission**

Patients presenting with significant toxicity from camphor ingestion should be admitted to a monitored setting. Consultation with a medical toxicologist through a regional poison center may be helpful to guide therapy.

## **References**

1. American Association of Poison Control Centers, Toxic Exposure Surveillance System, 2001. [www.aapcc.org](http://www.aapcc.org).
2. "Camphor and Moth repellants" in: Goldfrank, Lewis, et al. 2002. Goldfrank's Toxicologic Emergencies, 7<sup>th</sup> ed. McGraw-Hill, New York. 1295-1303.
3. "Camphor and Mothballs" in" Ford, Delaney, et al. 2001. Clinical Toxicology. W.B. Saunders Company, Philadelphia. 339-342
4. Phelan, WJ: Camphor Poisoning: Over the Counter Dangers. *Pediatrics* 1976; 57(3) 428-431.
5. Trestrail, JH, Spartz, ME: Camphorated and Castor oil Confusion and its Toxic Results. *Clinical Toxicology* 1977; 11(2) 151-158.
6. Ginn, HE et al. Camphor intoxication treated by lipid dialysis. *JAMA* 1968; 203(5) 164-165

## **Patient Outcome**

Diagnosis: Camphor Toxicity

The child had been found 2 hours prior to presentation with an open jar of Vicks Vapo-rub. It was estimated that approximately 1 tablespoon was missing (1 tablespoon contains 0.7 grams of camphor). No further seizures occurred. The child's lethargy resolved over the next 24 hours and she was discharged.

## Annotated Bibliography

**1. Phelan, WJ: Camphor Poisoning: Over the Counter Dangers. *Pediatrics* 1976; 57(3) 428-431.**

Very interesting case series of camphor poisoning.

**2. Trestrail, JH, Spartz, ME: Camphorated and Castor oil Confusion and its Toxic Results. *Clinical Toxicology* 1977; 11(2) 151-158.**

An excellent review of camphor intoxication. Product confusion is illustrated through photographs.

**3. American Association of Poison Control Centers, Toxic Exposure Surveillance System, 2001. [www.aapcc.org/](http://www.aapcc.org/).**

This database is a valuable resource for tracking outcomes for various toxic exposures. Data only reflects what is reported to regional poison centers and therefore, for many toxins may be underreported.

**4. Goldfrank, Lewis, et al. 2002. Goldfrank's Toxicologic Emergencies, 7<sup>th</sup> ed. McGraw-Hill, New York. 656-660.**

A comprehensive textbook and excellent reference for acute care toxicology.

## **Questions**

- 1. Initial management of patients presenting with camphor overdose should include all of the following except?**
  - a. Attention to airway, breathing, and circulation
  - b. Administration of benzodiazepines if seizures occur
  - c. Establishing IV/O<sub>2</sub>/Cardiac monitoring
  - d. Administration of syrup of ipecac
  - e. All the above
  
- 2. Which of the following physical properties can differentiate camphor from naphthalene?**
  - a. Camphorated mothballs float in water.
  - b. Camphorated mothballs are smaller than naphthalene mothballs.
  - c. Naphthalene mothballs are darkly colored.
  - d. Camphorated mothballs have no odor.
  
- 3. In 1983, the FDA banned products containing greater than what percent camphor?**
  - a. 20%
  - b. 11%
  - c. 8%
  - d. 5%
  - e. 0.1%
  
- 4. Which of the following statements is true regarding naphthalene?**
  - a. It is a reducing agent.
  - b. It has no active metabolites.
  - c. It can cause hemolysis and methemoglobinemia.
  - d. All of the above statements are true.
  
- 5. Common camphor containing products include:**
  - a. Vicks vapo-rub
  - b. Muscle liniments
  - c. Campho-Phenique
  - d. Mothballs
  - e. All of the above

**Answers**

**1. Answer d.**

Syrup of ipecac is contraindicated with camphor poisoning, due to the potential for rapid onset of CNS depression.

**2. Answer d.**

Camphorated mothballs float in water.

**3. Answer b.**

In 1983, the FDA banned products containing > 11% camphor. However, these products are still available in other countries.

**4. Answer c.**

Naphthalene can cause hemolysis and methemoglobinemia. Patients with G6PD deficiency are at increased risk.

**5. Answer e.**

All of the listed products may contain camphor.