

# Drug & Poison News

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## Camphor toxicity in a young child... by Dr Angelina Ang, KKH\*

**The case:** A 3-year-old Indian boy followed his mother to a Hindu temple and was allowed to hold on to some cubes of camphor for incense burning. He ingested 3 cubes of camphor measuring 1cm each. He spat out the first cube, but swallowed the second and third cube.

Forty-five minutes later, he developed generalized seizures which lasted five to ten minutes. He had post-ictal drowsiness, and vomited once. He was brought by ambulance to adult general hospital emergency department. On arrival, he was drowsy with a Glasgow Coma Scale of 8, temperature 37°C, pulse rate 98/min sinus, blood pressure 90/47 mmHg, pulse oximetry 96%. His pupils were 2mm and equal and his neck was supple. Examination of the heart, lungs and abdomen showed normal findings. His GCS improved to 9 while under observation, and he was then transferred to the children's hospital for definitive care.

On arrival at the emergency department of the children's hospital, his GCS improved to 13. He was given activated charcoal orally, and then admitted to high dependency ward. Enroute to the ward, his GCS deteriorated to 7, hence he was transferred to the intensive care unit for closer monitoring. Blood gas analysis, serum urea, electrolytes, creatinine levels, calcium and magnesium levels, and liver function tests were all normal. He was given one loading dose of intravenous phenytoin. His cardiorespiratory functions remained stable. He regained full consciousness overnight without further seizures and was discharged well two days after admission.



Camphor for incense burning

Camphor is an ingredient in many over-the-counter liniments, muscle sprays and inhalant rubs.<sup>1-3</sup> For example, in Vick's Vapor Rub and Tiger Balm. It acts as a topical rubefacient, analgesic, antipruritic, and antitussive agent, often in conjunction with other potentially toxic substances, including methyl salicylates.<sup>4</sup> In South Asia and South-East Asia, camphor crystals are also used for the burning of incense.

Since 1983, the US FDA required that the concentration of camphor in products not exceed 11%. However, children continue to suffer toxic reactions from the unintentional ingestion of camphor at various concentrations.<sup>5</sup>

Camphor is highly lipid soluble, and is rapidly absorbed when taken orally. Considerable amount may also be absorbed by inhalational or transdermal route. It is a rapid-acting neurotoxin, with both excitatory and depressant actions. The mechanism of camphor-induced seizure activity is unknown.

### Symptoms

The initial signs and symptoms of toxic exposure include nausea, vomiting, epigastric pain, and a sensation of warmth. Symptoms occur within 5-15 mins of ingestion.<sup>6-8</sup> There may also be tachycardia, mydriasis, visual disturbances, urinary retention, albuminuria, mild transient elevations of liver enzymes, and rarely, hepatic failure.<sup>9</sup>

In severe toxicity, the patient develops restlessness, tremors, and jerky movements. Delirium and seizures soon follow (occurring up to 2 hours after ingestion). Seizures may occur suddenly and without warning. Central nervous system depression and coma will follow in the subsequent phase. Death can result from respiratory depression or status epilepticus.<sup>3-4,10-12</sup>

Unintentional ingestion of small amounts of rubs containing topical camphor has been reported to cause toxicity in young children.<sup>1,3-5,8,10-17</sup> Infants and young children have a relatively large body surface area. Hence transdermal toxic exposures of camphor, causing hepatotoxicity and seizures, have also occurred.<sup>18,19</sup>

### Clinical management

In terms of management, the benefits of gastric decontamination and activated charcoal are unproven. Activated charcoal may be considered if a child has ingested more than 30mg/kg (equivalent to 7g rub containing 5% camphor or 1.8ml camphorated oil in a 12kg child) within 1 hour.<sup>8</sup> There is no specific antidote for camphor toxicity. Treatment is largely supportive, and the main priorities are airway management and seizure control.

The AAP (American Academy of Pediatrics) position is that the potential medical benefits from the use of camphor-containing products pale in comparison to their well-documented toxicity. In 1978, the Committee on Drugs asked in the title of the original statement, "Camphor: Who Needs It?" In 1993, the Committee on Drugs has the same answer as before: no one.<sup>5</sup>

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# Prescribing in the elderly... by Dr Gregory Cham, TTSH\*

Overt overdoses become less common in the elderly. Accidental drug ingestions or more insidiously, adverse drug reactions or interactions are more common in the elderly. The elderly generally consume more medication, with age related visual impairment and cognitive changes, render the elderly more likely to make a mistake with their medication. Changes in drug distribution and clearance, and the higher likelihood of an intercurrent disease puts the elderly at risk of a drug interaction.

## Pharmacokinetic changes in ageing

The elderly undergo physiological changes that affect the way they handle medications. The volume of distribution is altered due to changes in body composition. A higher fat composition causes drugs that are distributed in fat, e.g. barbiturates, to have a higher volume of distribution. The effects tend to linger. Drugs that distribute in body water, e.g. lithium, would have a lower volume of distribution, the same dose would lead to a higher concentration in the blood. Consequently these drugs need to be adjusted to a lower dose. Albumin has an affinity for acidic drugs (e.g. diazepam), it is decreased in the elderly during an illness, resulting in a higher free drug fraction during debility. Hepatic circulation and glomerular filtration rate are reduced in the elderly and could affect drug metabolism and elimination as do the decline in liver mass and enzyme concentrations with age.

## Polypharmacy

The use of multiple medications may sometimes be inevitable when trying to address a multitude of medical conditions. However the expectation to address various symptoms in the elderly with a medication is wrought with problems. More medications increase the likelihood of adverse drug-drug or drug-disease interactions to occur, quite apart from the alterations in drug handling already present in the elderly patient. Mamun, studied 454 nursing home residents in Singapore, and found individuals were on average 5.32 types of medications each. Polypharmacy was seen in 58.6%, and medications that were considered to be inappropriate were given to 70% of these patients. The choice of medications used also bear a significant effect. Lindblad, evaluated 397 frail elderly inpatients. It was found that 40.1% patients had one or more potential drug-disease interaction. The commonest potential interactions found in that study were calcium-channel blockers in heart failure (12.3%); and  $\beta$ -blockers in diabetes (6.8%). The use of multiple drugs and age  $\geq 75$  years lead to higher odds ratios of a drug-disease interaction to occur. Cooper, found that reducing the amount of psychoactive medications to treat dementia-associated agitation and aggression, has been shown to reduce falls.

## Clinical presentation of adverse drug events

The clinical presentation of adverse drug reactions is subtle in the majority of cases. Hohl, found that Emergency Physicians identified only about half of the adverse drug events that presented to them while the patient was seen for an illness or injury.

While Naranjo proposed an algorithm to screen for adverse drug reactions, it may be cumbersome to apply in practice. It is also prudent to consider drug toxicity in the elderly if there were *new* cognitive changes, loss of bladder or bowel control, appetite changes, changes in activity or new onset of recurrent falls.

The main approach is thus avoiding potential adverse drug events at the point of prescribing and administration. Caution should be exercised in prescribing, bearing in mind that altered pharmacokinetics pose a unique challenge to the clinician. Medication, dosing and purpose should be compatible with the patient's physiology, while considering concurrent alterations in target organs and organs of metabolism and elimination. To reduce adverse drug events in the elderly, their medications should be reviewed periodically, minimise the number of drugs and assess the patient's ability or that of their carers to cope with the increased need for supervision.

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# Seminar on Occupational Toxicology

The DPIC held its first seminar on Occupational Toxicology on 16<sup>th</sup> April 2007. The guest speaker was Dr Scott Phillips from the Rocky Mountain Poison and Drug Center in Denver who gave a presentation on pulmonary toxicity following exposure to chlorine gas. After that were case presentations from Ms Caroline Tee of the DPIC and occupational toxicologists from the Ministry of Manpower. The session ended with a spirited and lively discussion on the cases.



## Did you know?

... Camphor containing products like Vicks Vapour Rub and Tiger Balm Ointment and Liniment, are sold widely as an over-the-counter product in retail pharmacies, traditional medicine shops, and convenience stores. Pure camphor cubes are sold packaged like sweets in Indian shops for religious burning. In the temples, the camphor cubes may inadvertently be placed within easy reach to young children.

In children, ingestions of 0.7 to 1.0 g of camphor have proven fatal. If a product containing 5% camphor is ingested, 20 mL, or 4 teaspoons, is a potentially lethal dose. Pediatric ingestions are usually exploratory and are seldom dangerous. However, camphor has been listed as one of the poisons which can kill a toddler with just one mouthful.

## Our Statistics

### Poisoning

- Over 1 500 calls received!
- 81% of our callers are healthcare professionals
- 98% answered immediately or within 15min
- 62% of non-hospital calls resulted in avoidance of an ED visit
- 68% of calls resulted in avoidance of hospital admission
- Common agents : analgesics 12%, psychotropics 10%, and cleaning products 6%.

### Drug Information

- Over 19 000 queries received!
- 79% of our callers are healthcare professionals
- 93% answered immediately or within 15min
- Common queries : dosage 19%, drug safety 10%, and drug interactions 9%.

