## THE TOX LAB

Podcast Transcript

# Episode 6: Methanol Poisoning

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## TRANSCRIPT

Hi everyone, welcome back to The Tox Lab. I'm Rebecca.

I'm Rob. This week we're going to be looking at methanol poisoning, and that is because it had become very topical at the time of recording due to an emerging situation in Laos.

Rebecca, why don't you take us through what was known at the time?

For everyone listening, we recorded this episode on 26 November 2024, so more information may well have emerged between recording and publication.

At that point, the broad picture being reported was that multiple travellers had died and others were critically unwell after suspected methanol-spiked alcohol exposure linked to backpacker venues in Vang Vieng, Laos.

So Rob, do you want to tell us a bit about methanol and why it is such a concern in cases like this?

Methanol is an alcohol. When we normally talk about alcohol in drinks, we are talking about ethanol, which is a two-carbon alcohol. Methanol is a one-carbon alcohol.

Methanol can be produced naturally in small amounts during fermentation, particularly in drinks made from pectin-rich fruit, but normally the levels are low compared with ethanol.

Problems arise in a couple of ways. One is poor distillation practice, where methanol can become concentrated in spirits. The other is outright adulteration, where industrial methanol is added to an alcoholic drink because it is cheaper than ethanol and can make the product appear stronger while increasing profit.

And from the drinker's point of view, that is especially dangerous because methanol looks, smells, and tastes very similar to ethanol. Most people would have no idea they were drinking it.

I know from lab work that methanol smells remarkably like ethanol. I have never tasted it, obviously, but it is widely reported to be difficult to distinguish.

As far as I was aware at the time this episode was recorded, there had not been much detailed public information released about confirmatory testing, either on the drinks or on the patients.

And that is not all that surprising, because specific methanol testing, especially in biological samples, requires equipment and expertise that may not be readily available in all healthcare settings, particularly if cases occur in relatively rural regions.

So although there may have been some uncertainty in the early reporting, methanol poisoning was certainly a very plausible explanation.

So Rebecca, why don't you take us through why methanol is poisonous?

Methanol itself is not really the main problem. The real problem is what your body turns it into.

Like ethanol, methanol is metabolised by alcohol dehydrogenase in the liver. Methanol is first converted to formaldehyde and then rapidly to formic acid.

Formic acid is the really toxic part. It inhibits mitochondrial respiration, particularly cytochrome c oxidase, which disrupts the cell's ability to generate energy.

This causes a severe metabolic acidosis and can lead to optic nerve and retinal injury, which is why methanol poisoning is so strongly associated with visual symptoms and potentially permanent blindness.

It can also cause central nervous system depression, confusion, vomiting, abdominal pain, and ultimately multi-organ failure and death.

And the really frightening thing is that quite small amounts can do serious harm. Even around 10 millilitres of pure methanol may be enough to cause blindness, and larger amounts can be fatal.

Another important clinical point is that there is often a delay. People may initially seem intoxicated or just mildly unwell, and then only later, once the methanol has been metabolised to formic acid, they deteriorate quite dramatically.

Because this was such a fast-moving news story at the time, we thought it would be useful to look at a previous, well-described outbreak.

So this week we're looking at a paper on a methanol poisoning outbreak in Uganda in 2017, caused by contaminated locally distilled alcohol.

Rebecca, why don't you take us through that?

On 23 June 2017, a cluster of seven deaths was reported in the Maganjo parish of Wakiso district in central Uganda. The deaths had all occurred after the victims had consumed alcohol, and the reported symptoms included sudden-onset headache, vomiting, loss of vision, and loss of consciousness before death.

An epidemiological investigation was then carried out. The case definition they used was onset of acute loss of vision followed by symptoms such as vomiting, headache, nausea, dizziness, or loss of consciousness in that district during June 2017.

They reviewed hospital records, interviewed survivors and relatives of people who had died, and tried to identify the source of the alcohol involved.

They identified 15 probable cases, 12 of which were fatal, giving a case fatality rate of about 80 percent, which is very high but not unheard of in methanol outbreaks.

The median age was 43, and, yet again, males were over-represented.

All of the cases developed symptoms between 9 and 19 June. All had consumed alcoholic drinks before symptoms developed, and the typical symptoms included sweating, vomiting, loss of vision, and loss of consciousness.

The average time between drinking and symptom onset was about 12 hours, and death occurred on average about 19 hours after symptoms began.

Around 60 percent of the patients sought medical care and received treatment within four hours of symptom onset. Those who survived tended to have shorter delays to treatment than those who died.

And that is an important reminder that methanol poisoning is treatable if recognised early enough.

There are two main antidotal approaches. One is ethanol itself, which sounds counterintuitive, but ethanol competes for alcohol dehydrogenase and can effectively block methanol metabolism by occupying the enzyme.

The other is fomepizole, which directly inhibits alcohol dehydrogenase and prevents formation of the toxic metabolites.

So, in both cases, the basic principle is the same: stop methanol from being converted into formic acid.

Exactly.

The investigators eventually determined that all 15 individuals had consumed an alcohol called waragi. Most of them had obtained it through bars supplied by one particular wholesaler, which made that source highly suspicious.

They collected alcohol samples from affected bars and tested them. The samples contained high concentrations of methanol, with a mean concentration of about 1,200 milligrams per litre.

For comparison, a much lower concentration would be expected in a safe product.

The contaminated alcohol was traced back through the supply chain, and the investigators concluded that the most likely explanation was adulteration by the wholesaler rather than a simple distillation error.

So this was not just accidental bad brewing. It looked like methanol had been added somewhere along the line.

How does that compare with what was known from Laos at the time?

There was much less information publicly available for Laos, but one thing that seemed possible was that the contamination might not have been limited to a single drink at a single venue. If multiple people had been moving between hostels, bars, and parties, it raised the possibility that there was a wider contaminated supply somewhere in the area.

Methanol poisoning outbreaks like this are unfortunately not rare globally, especially in settings where alcohol is illicitly produced or poorly regulated.

And although methanol poisoning had suddenly captured headlines because of the Laos outbreak, it is not a uniquely rare event. Similar outbreaks have occurred in many countries, including India, Uganda, the Czech Republic, Iran, and elsewhere.

It is not a huge problem in highly regulated alcohol markets, but it is a very real problem in places where illicit alcohol supply chains exist.

So for anyone travelling, or planning to travel, are there any practical tips?

It is a difficult one, because methanol does not obviously change the taste, smell, or appearance of a drink in a way that most people would notice.

Methanol test strips do exist, but I do not know how widely available or reliable they are in real-world travel settings.

General risk-reduction advice would be to be cautious with very cheap spirits, drinks from uncertain sources, and situations where alcohol may be homemade or illicitly supplied.

Beer is probably safer than spirits in this context because the opportunities for dangerous methanol concentration or adulteration are lower, although nothing is completely risk-free if the supply chain is compromised.

It is quite a scary thing to think about, because most of us take for granted that if we buy a drink in a bar, it contains ethanol and not something else.

Exactly.

I think we're going to wrap it up there. If any major updates emerged on the Laos situation after recording, we had planned to put them on the episode post on Instagram.

If you are listening, please do give us a like and follow, or even better leave us a comment. We'd love to hear what listeners think, and if you've got topics you'd like us to cover, please let us know.

I hope you all have an amazing week, and we'll see you next time. Bye.