

THE TOX LAB

Podcast Transcript

Episode 10: Elephant in the Room: The Tusko Experiment

This transcript was created by AI from audio and lightly edited for readability. Treat it with caution, and assume occasional transcription errors may remain.

TRANSCRIPT

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

I'm Rob. The title of this week's episode is Elephant in the Room.

Rebecca, what happens if you give a huge dose of LSD to an elephant?

Is this another one of your awful tox-related jokes?

Unfortunately, no. This is an experiment that was actually attempted in the 1960s.

So bear with me while I transport us back to the Oklahoma City Zoo in 1962. Imagine the warm sun, winding paths, the smell of cut grass and popcorn, children running past with candy floss, the sound of the zoo train, the monkey enclosure in the distance, and in the centre of it all a huge bull elephant called Tusko.

Tusko is who we're going to be talking about today.

For a bit of historical context, LSD was first synthesised in 1938, but its psychoactive effects were not really recognised until Albert Hofmann's famous Bicycle Day in 1943, which we will definitely have to cover in a future episode.

By the early 1960s, LSD experimentation was everywhere. It was being explored for its effects on the mind and psyche, and, disturbingly, even in Cold War contexts. One of the authors of this study, Louis Jolyon West, had links to broader LSD research associated with projects like MKUltra.

And, importantly, the ethical standards we have today for animal experimentation simply did not exist in anything like the same form. Scientists could get away with things that would now be unthinkable.

So Rebecca, with all that in mind, why don't you introduce the experiment?

Tusko was a male Indian elephant, about 14 years old. The stated aim of the study was to try to induce musth using LSD.

Musth is a condition seen mainly in adult male elephants, especially Asian elephants, and is associated with hormonal and behavioural changes. It can involve restlessness, irritability, and aggression, and it often includes secretion from the temporal glands, which are located between the eye and the ear.

So the researchers' idea was essentially this: elephants undergo this dramatic behavioural state naturally, LSD can alter behaviour profoundly, so perhaps LSD could be used to induce something resembling musth.

They were also interested in collecting and studying the temporal gland secretion, which had not really been characterised.

So, in essence, the scientific question was: can you chemically induce musth-like behaviour in an elephant using LSD?

Exactly. And before they gave Tusko the LSD, they did a kind of control injection the previous day using penicillin G delivered by a dart-like system fired from a compressed CO2 gun, just to see how he reacted to being injected.

He was startled, showed a couple of minutes of restlessness, and then returned to normal behaviour.

The next day they injected him with LSD, specifically 297 milligrams in 5 millilitres.

Tusko initially started trumpeting and running around, which was similar to the reaction he had shown to the control injection. But his restlessness then escalated. Within a few minutes he became very uncoordinated. His female companion, Judy, reportedly tried to support him and stop him from falling over, which is genuinely quite sad.

Five minutes after the injection he trumpeted, collapsed heavily onto his side, defecated, and began having what was described as a seizure. He developed eye spasm, dilated pupils, laboured breathing, and a cyanotic tongue.

The researchers then attempted treatment. They gave him a large dose of promazine hydrochloride, which appeared to partially improve his respiration and reduce some of the tonic component of the convulsive activity.

Later they also gave pentobarbital, although the paper is frustratingly vague about exactly how much.

Tusko died about one hour and forty minutes after the initial LSD injection.

So in less than two hours the experiment had ended in tragedy.

Let's break this down a bit. LSD is a psychedelic drug, but it is not generally known for high acute physiological toxicity in humans. It is active at microgram doses.

Yes. A typical psychedelic dose in a human might be something like 75 to 100 micrograms, maybe a bit more depending on context. Tusko received nearly 300 milligrams, which is obviously massively more than a human psychedelic dose.

Now, of course, Tusko was much bigger than a human, but still, this was clearly an enormous dose.

So why did they pick such a high dose?

In the paper, they discuss the fact that humans can experience marked effects at doses around 100 to 200 micrograms, and that much higher doses can produce severe agitation, hallucinations, and autonomic effects.

They also argued that other species sometimes require far higher doses of LSD than humans to show obvious behavioural effects. At the time, they referred to "lower animals" such as cats and rhesus macaques, which is not language we'd use now, and they pointed out that those animals had required much higher milligram-per-kilogram doses in some experiments.

So their reasoning was essentially that if elephants were relatively resistant, like some other species appeared to be, then they might need a much higher dose than a human.

In other words, they guessed.

Pretty much, yes. They also justified it by referring to elephant resistance to certain other agents, such as neuromuscular blockers used in the field, but that is a very weak foundation for choosing an LSD dose.

And clearly, whatever logic they thought they had, it turned out disastrously.

They did carry out a necropsy afterwards, didn't they?

Yes. The cause of death was reported as respiratory failure secondary to laryngeal spasm, so in very simple terms he appears to have suffocated.

So it may have been a massive direct toxic effect of LSD, but the story is not actually that simple, is it?

No. Because in the 1980s, another group did something very similar and got a very different outcome.

So Rebecca, take us through that paper.

In 1984, researchers attempted a sort of follow-up experiment using both a female and a male Asian elephant. They tried to establish the dose more cautiously than the Tusko team had.

They started with a very low dose of LSD given orally in water, then moved to a much higher dose in later experiments. Importantly, though, this was oral dosing, not an intramuscular dart injection like Tusko received.

The elephants were water deprived beforehand and then given access to a large volume of water containing the LSD. The authors estimated that they drank the dose within about five minutes.

If you've ever seen an elephant drink, that is entirely believable.

With the lower dose, both elephants showed behavioural changes within about 10 to 20 minutes. The female developed signs like unsteadiness, eyelid drooping, and altered behaviour. The male showed more intense and aggressive displays.

Then at the higher dose, the female showed behaviour that sounded much more similar to Tusko's, including trumpeting, collapsing, shallow respirations, and tremor. The male also became aggressive and trumpet-like in his vocalisations, but crucially neither animal died.

And both recovered within about 24 hours.

So that does suggest that something else may have contributed to Tusko's death.

Yes. One major possibility is that the route of administration mattered. Intramuscular injection could have produced a very rapid and extreme peak effect compared with oral dosing.

Another possibility is that the rescue medications made things worse. The Tusko paper mentions promazine and pentobarbital, but it does not make the pentobarbital dosing clear. Pentobarbital itself can be fatal at the wrong dose.

So it is possible Tusko died because of the LSD, because of the treatment, or because of a combination of both.

And one of the reasons this story still matters, even now, is that there were so many failures in the scientific design before the actual drug ever went in.

Exactly. They used an enormous dose, there was no proper dose-finding work beforehand, they did not appear to have meaningful veterinary expertise built into the experimental plan, and the scientific question

itself was weak.

Two psychiatrists and a zoo director are not the same thing as a proper veterinary and pharmacological team.

The repeat experiment in the 1980s is also quite shocking in its own way, but at least they did attempt a more cautious dose-escalation approach rather than immediately jumping to a huge injected dose.

That is really the only slightly better thing about it.

So there was a lot of public backlash at the time, wasn't there?

Yes. The Tusko experiment attracted criticism and has become a kind of symbol of poor research ethics. And rightly so.

It is the sort of study that helps explain why modern ethical review exists. It shows exactly what can happen when people decide that curiosity alone is enough justification.

I still find it astonishing that the original study was published in such a prominent journal.

It is completely bonkers by modern standards.

Would Tusko's fate have been different if modern welfare standards had existed?

Potentially, yes. With modern ethical oversight, proper dose modelling, veterinary involvement, and a genuine requirement for scientific justification, the experiment probably never would have happened in the first place.

And if it had been proposed, the committee would almost certainly have asked why on earth this question needed answering.

That, I think, is really the key point. Even now, we still do some animal work in science, but the standard is supposed to be that it must answer a meaningful scientific question and that animal use should be minimised and treated as a last resort.

Exactly. And the Tusko experiment fails that test badly.

So in summary, what happens if you give a massive dose of LSD to an elephant?

The honest answer is that we still do not entirely know, because Tusko's case is confounded by the treatment he received and by the very poor design of the experiment.

Could the LSD itself have been fatal? Possibly.

Could the rescue efforts have contributed or even been the decisive factor? Also possibly.

Either way, it is probably not a question we ever needed to answer in the first place.

No. And I think that is the real takeaway: if you are going to do animal experimentation, it should answer a genuinely worthwhile question, and it should be done with expertise, care, and integrity.

But I do think it is important to remember Tusko's story, because it shows how far research ethics have had to come.

I think we're going to wrap it up there. I hope you've enjoyed listening to this week's episode.

Do give us a like and a follow on social media. You can find us on Instagram at @the_tox_lab.

Feel free to comment on any of our posts or send us a message if you have ideas for papers or topics you would like us to cover in the future.

And a quick shout-out to Helen, one of our colleagues, who often helps us source papers for episodes.

Hope you've all had a wonderful week, and we'll see you next time. Bye.