



## ToxTalks:

A Bulletin for Healthcare Professionals Who Manage Poisoned Patients

In Partnership with the UVA Division of Medical Toxicology – Department of Emergency Medicine

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### *Hallucinations or Harm? The Perils of Chasing Highs from the Bufo Toad*

Members of the *Bufo* genus, such as the Colorado River toad or the cane toad, produce a substance from the parotid glands made of a combination of several toxins including bufodienolides, bufotenine, and other tryptamines. Bufodienolides are toxins categorized as cardiac glycosides, similar to digoxin. Bufotenine, or 5-OH-DMT, as well as 5-MeO-DMT, are tryptamines. Tryptamines are psychoactive substances like psilocybin. There are many myths surrounding the psychoactive properties of *Bufo* toad secretions, including the notion that “toad-licking” is a way to experience hallucinations. Dried secretions from the toad have also been smoked or used in a traditional Chinese medicine called “chan su” or even sold as an aphrodisiac. Due to the combination of multiple toxins present in toad secretions, those intending to use the substance as a psychoactive agent are at risk for experiencing other unintended toxicity.



Image: [New Hampshire PBS](#)

#### ***Bufotenine and 5-MeO-DMT***

Bufotenine, one of the toxins contained in secretions from the Bufo toad, is a tryptamine, which is structurally similar to serotonin and to other hallucinogens such as psilocybin and ayahuasca. 5-MeO DMT is an agonist at serotonin 1A and 2A receptors, and its action at serotonin 2A receptors is likely the primary mechanism for its hallucinogenic effects. Adverse effects are not well studied but intoxication may present similar to other hallucinogenic agents, characterized by agitation and psychosis. Tryptamines have been rarely associated with serotonin toxicity, especially in combination with other serotonergic agents such as MAOI's or SSRIs. Neither 5-MeO-DMT nor Bufotenine are bioavailable orally due to extensive first pass metabolism by monoamine oxidase enzymes in the gut and liver, but is most often smoked to avoid this first pass metabolism.

*Continued next page*

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**Bufodienolides**

Bufodienolides are cardiac glycosides that work by antagonizing the sodium/potassium-ATPase pump in cardiac myocytes. This is the same mechanism as digoxin or other plant derived cardiac steroids. When inhibited, cells are unable to move potassium into the cell and sodium out of the cell. When sodium builds up inside the cell, calcium is prevented from exiting the cell, which causes increased inotropy therapeutically, but can also cause cardiac arrhythmias. Toxicity from bufodienolides can present similarly to digoxin toxicity with vomiting, diarrhea, bradycardia, dysrhythmia, and cardiovascular collapse.

**Management**

Though exposures to *Bufo* toads themselves are rare, what may be more likely encountered is a patient who has ingested or smoked a product made from the toad secretions. Agitation or psychosis can be treated with GABA-A agonists such as benzodiazepines or with antipsychotics, and patients should be monitored for symptoms of serotonin toxicity such as hyperthermia or hyperreflexia. Patients that present with dysrhythmias or hyperkalemia may need treatment with digoxin specific Fab fragments, which have the ability to bind other cardiac glycosides. Natural cardiac glycosides other than digoxin have variable cross-reactivity with digoxin lab testing, so treatment should be guided based on symptoms rather than laboratory levels.

**Summary**

*Bufo* toads produce a combination of multiple toxins including both bufotenine, a hallucinogenic tryptamine, as well as bufodienolides, categorized as cardiac glycosides. What may start as an ill-informed attempt at using a psychoactive substance can turn into a potentially severe cardiotoxic poisoning if someone ingests a product made from the *Bufo* toad. 5-Meo-DMT and Bufotenine toxicity may be characterized by serotonergic symptoms such as agitation, altered awareness, tachycardia, hyperreflexia, and hyperthermia. Bufodienolide toxicity is characterized by nausea, vomiting, diarrhea, and in severe cases dysrhythmia and cardiovascular collapse. Management should be focused on treating symptoms of GI upset or agitation, and potentially digoxin specific Fab fragments if needed for dysrhythmia or hyperkalemia.

*References available upon request.*