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# Life-threatening risk of using Kambó in alternative medicine

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We report on the potential for severe neurologic effects from the use of Kambó (also known as *Sapo*). Kambó is the term for the secretions obtained from the frog genus *Phyllomedusa bicolor*, which is found in the Amazon basin and other surrounding areas.<sup>1</sup> The secretions, which are a protective mechanism to deter predators, are increasingly being used in alternative medicine rituals in both rural and urban locations in South American countries such as Brazil, Peru, Bolivia, and Chile, and additionally in Europe.<sup>1-3</sup> The ritual consists of making various types of skin lesions with a burning stick and applying the secretions from *P bicolor* to the fresh wounds (figure). Typically, for women, these are located on the legs, whereas for men, they are on the arm or chest.

## PRACTICAL IMPLICATIONS

For patients with unexplained altered consciousness, the presence of the typical skin lesions may indicate Kambó poisoning.

A 41-year-old woman sought treatment for depression with Kambó from a shaman in the north of Chile. She did not have any other relevant medical history and was not taking any medications (and specifically no monoamine oxidase [MAO] inhibitors). The shaman made wounds on her left leg with burning sticks (figure) to which the Kambó was applied. A few minutes after this application, she became unresponsive, with extreme hypotonia of the limbs and hypoventilation. Emergency medical services intubated her at home, and she was hospitalized, requiring mechanical ventilation for 3 days. No further sedatives or other medications were administered initially. After she recovered consciousness, she developed visual (animals and people) and auditory hallucinations and occasional generalized seizures. She was given valproic acid 500 mg twice a day as an anticonvulsant but no antipsychotics or sedatives. Brain imaging with CT and MRI were normal, as was EEG. On day 2, she developed rhabdomyolysis and renal failure, which resolved with hydration over the next few days. By 7 days after presentation, she had fully recovered and was discharged.

On outpatient evaluation 15 days later, she was fully alert, with mild deficits in attention, but was otherwise neurologically intact. Follow-up brain MRI and EEG were normal. Valproic acid was gradually tapered off without further seizures.

## Discussion

The skin of the neotropical and South American frogs contains large amounts of a wide range of biologically active peptides that are either identical or highly homologous to hormones, neurotransmitters, and other bioactive peptides of higher vertebrates<sup>4</sup> (table). More than a hundred active peptides have been isolated from the skins of these frogs to date.<sup>2-4</sup> The mechanisms of action of the *P bicolor* secretions are not completely understood; a number of

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**Figure** The sites where Kambó was inoculated on the patient's left leg



cytotoxic effects on different cell types have been identified.<sup>5,6</sup> In addition, some of the toxins dilate blood vessels and increase the permeability of the blood-brain barrier.<sup>5</sup>

The use of the Kambó secretions has become increasingly popular in cleansing rituals during which intense vomiting is induced. Claims of medicinal effects have not been supported by medical evidence.<sup>3</sup> Other alternative medicines

that are becoming more widely used for this purpose include Ayahuasca and Jurema-Preta from Central/South America and Iboga from Western Central Africa. Experienced shamans typically (and traditionally) oversee the rituals; however, this is no longer always the case. These medicines are contraindicated specifically if the patient is on MAO inhibitors because of the increased risk of side effects.

The shamanic ritual was initially used to improve luck in hunting by the Matses Indians of the Northern Peru, but has subsequently become used as a purification rite.<sup>5,6</sup> The drug causes the prompt appearance of violent peripheral gastrointestinal (nausea and vomiting) and cardiovascular effects, followed by marked central effects (sensation of increased physical strength, heightening of senses, resistance to hunger and thirst, and increased capacity to face stressful situations).<sup>5,6</sup> The period of intense illness (typically <1 hour) is followed by a state of listlessness and sleep lasting from 1 to several days. Carneiro<sup>1</sup> reported that vivid hallucinations occur, although this is not supported by other observations.<sup>1</sup> The intensity of human reactions to the frog secretion is doubtless dose dependent.<sup>1</sup>

There are few published reports of Kambó toxicity<sup>2,3,7</sup>; 1 woman is reported to have died in a major hospital in Chile following Kambó use. Clinicians must be aware of the increasing use of this hazardous substance and its clinical manifestations, especially in light of the fact that Kambó secretions can now be readily obtained over the internet. In the unconscious patient, recognition of these typical lesions (on the legs for women and the left arm or chest for men) indicates the diagnosis of Kambó poisoning.

**Table 1** Summary of constituents of Kambó, pharmacologic mechanism of action, and clinical effects

Substance	Class	Action	Clinical effects	Other notes
<b>Deltorphin</b>	Opioid peptide	Potent opioid delta receptor agonists	Pain relief and respiratory depression	4000× more potent than morphine; 40× more potent than endogenous b-endorphin
<b>Deltorphin I</b>	Opioid peptide			
<b>Deltorphin II</b>	Opioid peptide			
<b>Dermorphin</b>	Opioid peptide			
<b>Phyllocaerulein</b>	Peptide hormone peptide (similar to cholecystokinin)	Stimulates the adrenal cortex and pituitary gland	Decrease blood pressure, tachycardia, and increased secretion of bile and pancreatic enzymes	
<b>Sauvagine</b>	Peptide hormone (corticotropin-releasing factor)	Stimulates the adrenal cortex, persistent hypotension, and tachycardia		
<b>Adenoregulin</b>	Antibiotic peptide (dermaseptin)	Activation of adenosine receptors	Metabolism of high-energy compounds and regulation of cardiac function	
<b>Phyllomedusin</b>	Tachykinin		Neuronal excitation, evokes behavioral responses, contracts smooth muscles, potent vasodilator, and secretagogue	

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## Appendix (continued)

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<b>Ruth H. Walker, MB, ChB, PhD</b>	1) James J. Peters Veterans Affairs Medical Center, Bronx, NY, USA 2) Mount Sinai School of Medicine, New York City, NY, USA	Author	Major role in the design of the paper; interpreted and summarized the information; and revised the manuscript for intellectual content

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