



## Pathology & Biology Section – 2008

### G53 A Brush With Death: Suicidal Ingestion of Toothpaste

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The goal of this presentation is to describe the gross findings and the physiologic derangement resulting in death in toothpaste/fluoride toxicity.

This presentation will impact the forensic community by making medical examiners aware of the potential acute toxicity of [widely-available] fluoridated toothpaste, its recognition and the high national incidence of non-fatal toothpaste poisonings

This poster presentation will permit the attendee to brush up on the toxic effects that accompany the ingestion of toothpaste with fluoride, an extremely common, if rarely fatal, poisoning event. After attending this presentation, the attendee will be able to describe the gross findings in acute fluoride poisoning, the circumstances in which toothpaste poisoning may occur and the physiologic derangement that results in injury or death.

A 51-year-old man was found unresponsive on his bed, by his wife, when she came home from work. The bedroom door was locked from the inside. There was a history of domestic abuse, and reportedly the wife had assaulted him three days earlier, resulting in visible contusions on the right eye and upper arm. Resuscitative attempts were unsuccessful and he was pronounced dead at the scene. There was no investigative evidence of acute trauma or foul play.

Past medical history was significant for bipolar disorder, hypertension and chronic back pain. The decedent was known to abuse cocaine and multiple burnt copper pad fragments were identified throughout the house.

Two weeks earlier, the decedent, who was noted by his wife to be depressed for several months, had uttered an isolated suicidal statement to the effect that when his medications arrived by mail he should "take them all". His medications (Depakote, bupropion and olanzapine) were irregularly out of count and some were in a pile on the bedside table, along with a Thermos. No note was found.

Autopsy revealed an overweight male (BMI 28.5 kg/m<sup>2</sup>) with cardiomegaly (600 grams), organized anterior infarct, marked concentric left ventricular hypertrophy and chronic lung disease with pulmonary hypertension. There was florid hemorrhagic necrosis of the entire gastric mucosa. The stomach contained frank blood (300 ml) and a 230-gram conglomerate of translucent blue-green paste (with a minty odor).

Follow-up investigation located an almost empty 119-gram tube of toothpaste as well as multiple partially full tubes of toothpaste in the outdoor trash. The wife indicated that the decedent had some level of sophistication regarding medications, had a sibling who was a pharmacist, and would be aware of the dangers of toothpaste ingestion, especially with the warning on the package.

Toxicological evaluation revealed the presence of cocaine and benzoylecgonine as well as bupropion and citalopram. A biochemical vitreous screen was unremarkable. Fluoride was not detected in femoral blood.

The cause of death was: gastrointestinal hemorrhage due to massive ingestion of fluoridated toothpaste, hypertensive heart disease, and cocaine intoxication were significant contributing factors.

Given the history of suicidal intent, the concealment of the toothpaste tubes and the noxiousness of ingestion, the manner of death was certified as suicide.

Gastrointestinal signs and symptoms usually predominate upon ingestion of toothpaste. Other observed effects have included headache, numbness, and electrolyte disturbances, especially hypocalcemia. Hypotension and dysrhythmias are evident in severe poisonings. Toothpaste often contains up to 5 mg of fluoride per teaspoon. The fluoride is the component of toothpaste associated with toxicity. In many cases, 3 to 5 milligrams per kilogram of elemental fluoride is a toxic dose. The mechanism for toxicity following the ingestion fluoride-containing substances is thought to be a reaction between the sodium fluoride in the toothpaste gastric acid, resulting in the production of highly corrosive hydrogen fluoride (HF). The HF causes adverse effects reported in large ingestions, including nausea, vomiting, diarrhea, abdominal pain, and acute hemorrhagic gastroenteritis.

According to Annual Reports of the American Association of Poison Control Centers, over 118 thousand poisoning exposures were reported to poison centers nationally during the five-year period ending in 2005. Of these, 91 percent were unintentional exposures; roughly 90 percent involved children less than six years old. This case is unique in the respect that it was the sole fatality attributed to toothpaste ingestion during this period.

#### **Toothpaste, Fluoride, Poisoning**