



K44 Strange Bedfellows: Fentanyl Mixed With the Antiquated Poison Strychnine

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After attending this presentation, attendees will be familiar with two overdose deaths in which toxicological analysis detected strychnine in addition to fentanyl. These cases highlight the diverse methods often employed by clandestine laboratories in the production of illicit drugs.

This presentation will impact the forensic science community by providing two examples of cases of fentanyl overdoses in which strychnine was also detected. Attendees will find it an interesting juxtaposition of a modern synthetic drug with an antiquated natural poison. These cases also emphasize the wide spectrum of drugs the modern toxicologist could encounter.

The potent synthetic opioid fentanyl was first developed in the 1960s, having been derived from the structurally related drug meperidine. After discovering its potent effects, fentanyl was and is used regularly for palliative purposes. Illicit use of fentanyl began in the 1970s and continues to grow. Like all opioids, overdose deaths related to fentanyl have also increased dramatically in recent years. This growing demand has, in turn, been met by an increased supply and has also spurred greater diversity in techniques employed by clandestine laboratories in the illicit preparation of fentanyl. Presented here are two unusual death cases in which it is proposed that the illicit fentanyl was prepared with strychnine.

A 59-year-old White male was complaining of heartburn and vomiting one evening and was later found dead in his bed. Autopsy revealed changes related to hypertension, but no specific anatomic cause for death. Toxicological analyses of iliac blood reported fentanyl (0.003mg/L), strychnine (<0.025mg/L) and heroin metabolites: 6-monoacetylmorphine (0.006mg/L), morphine (0.159mg/L), and codeine (0.011mg/L). Death was attributed to heroin and fentanyl toxicity. Four days later, a 29-year-old Black male in another city, but in the same county, was discovered dead on his living room floor. The decedent had recently been released from prison and had also been treated at a hospital for pneumonia. Autopsy did not detect any residual pneumonia in the lungs or other anatomic cause for death. Toxicological analyses of iliac blood detected fentanyl (0.008mg/L), olanzapine (<0.025mg/L), and strychnine (<0.025mg/L). Death was attributed to fentanyl toxicity.

Strychnine is a potent alkaloid classically derived from the seeds of the *Strychnos nux-vomica* tree, which grows in warm climates in southern Asia and Australia. Strychnine was first isolated from the *Strychnos* genus in 1753, though the toxic effects of the *nux-vomica* bean had been well known in India and China for centuries before that. It is primarily used as a pesticide to kill small vertebrate pests such as rodents and has restricted availability in the United States due to the potential for deaths of animals for which it is not intended. Consumption of strychnine causes generalized muscle spasms. At lower doses, this can be restricted to tachycardia, cramping, rigidity, and agitation. Higher doses can lead to seizures, hypertension, cyanosis, and opisthotonus (dramatic back spasms causing arching of the back and neck). Death can occur from resultant cardiac arrest, respiratory failure, or brain damage.

In neither of these two cases was strychnine determined to be at sufficient levels to have contributed to death, especially given the presence and concentrations of the opioids. Nonetheless, its presence in these two cases underscores the diverse methods employed by clandestine laboratories in the production of illicit opioids and also illustrates an unusual marriage of a historic natural poison with more modern, synthetic drugs such as fentanyl.

Fentanyl, Strychnine, Opioids