G3 Case Report of a Death Involving Methylenedioxypyrovalerone (MDPV) From Bath Salt Use

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After attending this presentation, attendees will be aware of the rise in use of bath salts as an alternative to methamphetamine use. Attendees will understand that one potential active drug in bath salts is methylenedioxypyrovalerone (MDPV) and how to include it in drug screens. Attendees will understand the effects of MDPV and its potential contribution to death.

This presentation will impact the forensic science community by alerting attendees to a relatively new designer drug in use across the nation and the world.

A 41-year-old white male was found unresponsive in his bed. He had a history of hypertension, anxiety, and bipolar disorder. He also had a history of chronic ethanol abuse and methamphetamine use. The decedent had recently stopped using methamphetamine and had begun using bath salts approximately two weeks prior to his death. According to his wife, he had been "high" and awake for the previous three days.

Autopsy revealed superficial ulcers of the mucosa of the upper and lower lips. Head and neck cyanosis was also observed. Linear discontinuous healing superficial excoriations as well as an apparent needle puncture site with adjacent ecchymosis were on the skin of the arms. The coronary arteries were mildly to markedly narrowed by atheroma. The lungs exhibited moderate edema. Mucosal erosions were also at the mid and lower aspects of the esophagus. Histologically, no definitive contraction band necrosis was identified.

Femoral blood, heart blood, vitreous fluid, urine, liver tissue, brain tissue, gastric contents, and a packet labeled "Blue Magic 350 mg" were submitted for toxicological analysis. The femoral blood was used for all drug and volatile testing and the remaining biological samples were stored in a freezer at -20°C.

Using gas chromatography with a flame ionization detector, two separate aliquots of femoral blood tested negative for ethanol, acetone, isopropanol, and methanol. A 0.5mL aliquot of femoral blood was extracted with methanol and analyzed for nine drugs of abuse using enzyme immunoassay (EIA). A 1mL aliquot of femoral blood was extracted using bicarbonate buffer (pH 11.0) and n-butyl acetate. The aliquot was then analyzed by gas chromatography/mass spectrometry (GC/MS) for more than 150 drugs. Benzodiazepines, diphenhydramine, tramadol, and MDPV (methylenedioxypyrovalerone) were detected. Benzodiazepines analysis showed the presence of alprazolam. All of the drugs except diphenhydramine were quantified by liquid chromatography-tandem mass spectrometry (LC-MS/MS). O-Desmethyltramadol, an active metabolite of tramadol, was also quantified. Quantification of diphenhydramine was deemed clinically insignificant. Toxicological analysis of femoral blood revealed MDPV at a concentration of 130ng/mL. Tramadol and its metabolite, o-desmethyltramadol, were identified at concentrations of 9000ng/mL and 320ng/mL, respectively. Alprazolam was detected at a concentration of 26ng/mL.

The packet submitted, "Blue Magic 350mg," had a zip lock closure with the inscription "Bath Salts, Novelty Bath Salts, Not for human consumption" on the back aspect of the packet. The packet contained a broken blue capsule with an unknown white powder. Approximately 10mg of white powder was dissolved in deionized water and analyzed by EIA, thin layer chromatography (TLC) and GC/MS. MDPV was determined to be present.

The concentration of tramadol is markedly above the therapeutic range and is sufficient alone to cause death. At this concentration, tramadol causes respiratory depression, hypertension, tachycardia, and seizures. MDPV is a synthetic stimulant, or designer drug. It is sold in the form of bath salts and is known to cause insomnia, severe agitation, tachycardia, and hypertension. The final cause of death was ruled as tramadol overdose with MDPV intoxication as a contributing factor. The manner of death was accident.

Scene investigators should be aware that the use of bath salts is increasing as an alternative to methamphetamine. Any packets of bath salts should be collected with the body. Bath salts may be ingested, injected, or inhaled. In the case above, the exact method with which the decedent used the bath salts is unknown. He had evidence of ingestion and injection. Oral mucosal (aphthous) ulcers have not been previously reported as being a potential adverse effect of bath salt use. With evidence of bath salt use, the pathologist should notify the toxicology lab of the suspicion. MDPV may or may not be detected on typical drug screens. The bath salt packet may also be sent to toxicology for evaluation.

MDPV (methylenedioxypyrovalerone), Bath Salts, Intoxication

 ** Presenting Author*