G45 Death Due to Renal Toxicity Following Bath Salts Abuse

Joseph A. DelTondo, DO, 709 Sloop Rd, Pittsburgh, PA 15237; Todd M. Luckasevic, DO, and Baiyang Xu, MD, OCME, 1520 Penn Ave, Pittsburgh, PA 15222; Abdulrezak M. Shakir, MD, OME of Alleghany County, 542 Fourth Avenue, Pittsburgh, PA 15219; and Karl E. Williams, MD, OCME, 1520 Penn Ave, Pittsburgh, PA 15222*

The goal of this presentation is to illustrate a case of death associated with the use of Psychoactive Bath Salts (PABS) and the associated renal findings.

This presentation will impact the forensic science community by illustrating the unusual renal findings in a death associated with PABS and a novel theory.

The abuse of PABS has become increasingly common in the United States since being introduced in the early 2000s. Cases of overdose are increasing in presentation and significant morbidity and mortality have been reported.

PABS belong to a family of drugs known as synthetic cathinones. Cathinone is a naturally occurring amphetamine analogue found in the *Catha edulis* plant. The most commonly isolated synthetic cathinone found in PABS appears to be Methylenedioxypyrovalerone (MDPV). In one study analyzing patient blood, urine, and PABS samples, no other synthetic cathinones other than MDPV were detected. Testing for MDPV poses an issue in forensic medicine as MDPV is not commonly screened for in routine toxicological testing and may cause a false-positive result for Phencyclidine (PCP).

The effects of PABS are similar to those attributed to other amphetamines and central nervous system stimulants by inhibiting dopamine and/or norepinephrine reuptake. Rhabdomyolysis, hepatic and renal failure, and cardiac and neurologic toxicity have been reported.

Although illegal in the United States, PABS are reportedly accessible via the Internet and are commonly produced overseas, often in China. Currently, the short- and long-term physiologic effects of PABS and their etiology are not fully understood.

Materials and Methods: The case involved a 42-year-old Caucasian male with a history of alcohol abuse, Hepatitis C, and liver disease. He was found unresponsive by family members at his residence where he had reportedly been ingesting PABS.

Initial toxicology screening performed at the treating hospital was positive for PCP and opiates and negative for alcohol. He ultimately developed multisystem organ failure and sepsis after a prolonged stay in the intensive care unit. Death ensued thirteen days after initial presentation. Treating physicians could not rule out a possible overdose.

Results: External examination revealed mild anasarca, moderate pulmonary congestion and edema, jaundice, and one liter of ascites fluid. Microscopic examination of the liver revealed portal lymphocytosis and stage III bridging fibrosis compatible with the clinical history of Hepatitis C virus. Sections of the kidneys demonstrate mildly dilated tubules containing round to ovoid, lightly eosinophilic, green crystals with concentric peripheral lamellations and central radiations, both singly and in small aggregates. Literature review revealed that these crystals are compatible with melamine/cyanuric acid crystals.

Conclusions: Considering these findings in the context of reported PABS abuse and what little is known about PABS manufacturing, it is possible that melamine toxicity contributed to the renal failure in this case. Melamine is an organic compound used in the production of plastics, dyes, fertilizers and various textiles. In the late 2000s, melamine was found to be present in several products produced overseas including pet food, livestock feed, and infant milk, where it was used as filler to falsely increase the protein content.

Both the acute and chronic toxicity of melamine has been well documented. In one study, sheep fed a single 100g dose of melamine all died of renal failure within 11 days.

In this case, melamine may have served as an unintentional contaminant of PABS manufacturing or as filler to falsely increase the amount of the crystalline drug. Future plans for research are to analyze various PABS with both Fourier Transform Infrared Spectroscopy (FTIR) and Gas Chromatography-Mass Spectroscopy (GC/MS) for the presence of melamine.

Additional pre- and postmortem investigation is required to further establish an etiology of multisystem organ toxicity in PABS abuse.

Bath Salts, Melamine, Renal Failure

 ** Presenting Author*