K14 Deaths Involving Methylenedioxypyrovalerone (MDPV) in Upper East Tennessee

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After attending this presentation, attendees will learn about the abuse of MDPV and the significance of blood and urine MDPV concentrations in actual postmortem cases.

This presentation will impact the forensic science community by providing actual case studies of deaths involving recreational MDPV abuse and the respective MDPV concentrations in postmortem blood and urine.

Two deaths involving the drug 3,4-methylenedioxypyrovalerone (MDPV) are reported from the Upper East Tennessee region. MDPV is a synthetic stimulant that affects the central nervous and cardiovascular systems. MDPV is one of the constituents commonly found in "bath salts," the other being mephedrone (4-methylmethcathinone). Bath salts are legal, cheap, and readily available in the Upper East Tennessee region and the effects have been compared to those of methamphetamine. To date no postmortem MDPV biological concentrations have been reported in the literature. A qualitative and quantitative analysis for MDPV was performed by gas chromatography-mass spectrometry and liquid chromatography-mass spectrometry on two postmortem cases.

A 46-year-old white male was found dead on the floor by his partner after injecting and smoking baths salts in the days prior to his death. He was reportedly nauseous, weak, and vomiting for several days but refused medical attention. The decedent had a history of diabetes mellitus and his blood sugar was elevated days prior to his death. He had a history of known drug abuse including opiates, heroin, and methamphetamine; however, the weekend before his death was the first time he tried bath salts. Ten vials of bath salts labeled Drone IV were collected from the scene, analyzed, and found to contain the bath salt constituent, MDPV. Analysis of the femoral venous blood and urine revealed MDPV concentrations of 39ng/mL and 760ng/mL. Metoclopramide was also present in the femoral blood at a concentration of 490ng/mL. No mephedrone was detected in the Drone IV vials, blood, or urine. At this time no cause of death has been established.

The second fatality was a 40-year-old white male found dead who had a history of drug and bath salt abuse. The deceased was alleged to have been smoking and/or snorting bath salts prior to death. He was HIV positive and undergoing hormone therapy treatment for gender reassignment. Analysis of the femoral venous blood revealed a MDPV concentration of 130ng/mL, dextromethorphan of 250ng/mL, and a butalbital concentration of 5.1µg/mL. The urine MDPV concentration was 3800ng/mL. Dextromethorphan, guaifenesin, bupropion, diphenhydramine, phenothiazine metabolites, barbiturates, and caffeine were also present in the urine. No mephedrone was detected in the blood or urine. At this time no cause of death has been established.

Toxic or lethal ranges for MDPV have not been established in the literature. A study by Ojanoerä monitoring opioid-dependent patients undergoing opioid substitution treatment screened each subject's urine for MDPV.[1] The median MDPV concentration from nine positive urines was 160ng/mL with a range of 40 to 3900ng/mL. Urine MDPV concentrations from our postmortem cases are within their documented recreational abuse range. The other drugs and/or combination of the drugs present do not solely explain the causes of death in these two cases. Preliminary pathological findings indicate other contributing factors for their causes of death.

Postmortem blood and urine MDPV concentrations in cases with bath salt abuse is presented. Literature and preliminary autopsy findings suggest that the deceased were recreational abusers and that other factors contributed to their deaths.

Reference:

[1] Ojanoerä et al. Urine analysis of 3,4-methylenedioxypyrovalerone in opioid-dependent patients by gas chromatography-mass spectrometry. Ther Drug Monit. 2011; 33(2):257-63.

Methylenedioxypyrovalerone (MDPV), Bath Salts, Postmortem Blood and Urine Concentrations

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