K35 Death by "Legal Psychedelic Piperidines and Phenethylamines": Postmortem Tissue Distribution of Desoxypipradrol (2-DPMP) and 4-Chloro-2,5- Dimethoxyamphetamine (DOC)

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After attending this presentation, attendees will have a better understanding of the piperidine and amphetamine class designer drugs desoxypipradrol (2-DPMP) and 4-chloro-2,5-dimethoxyamphetamine (DOC) and their concentrations in postmortem matrices.

This presentation will impact the forensic science community by informing forensic professionals on new abuse trends for amphetamines and designer drugs, particularly in our youth. It adds to the relatively sparsely published data concerning the potential toxicity of these stimulant drugs and provides a comprehensive approach to extraction, detection, and quantification of these substances.

These type of compounds have recently achieved "epidemic" status for abuse by young people. 2-DPMP exhibits a cocaine-like binding profile while DOC is a long-acting agonist of serotonin receptors; the fluoroamphetamines stimulate release and prevent reuptake of dopamine, serotonin, and norepinephrine.

Toxicities observed are similar to amphetamine toxicity: tachycardia, nausea, hypertension (vasoconstriction), insomnia, hyperthermia, mydriasis, panic attack, and seizures with the added predominant neuropsychiatric features of hallucinations, paranoia, and agitation.

A 30-year-old White male called a friend and advised him he had been snorting "DOC," 4-chloro-2,5-dimethoxyamphetamine, and was "tripping" and needed assistance. EMS and police were called and found the individual lying face down, breathing, but unresponsive, convulsing, extremely warm to the touch, and sweating heavily. He was conveyed to the hospital with an initial diagnosis of an acute drug overdose. The decedent had a history of selling, manufacturing, and using illegal drugs. All indications were that the overdose occurred within the last three hours. The individual died 42 hrs later at the hospital. A collection of narcotics and drug paraphernalia were confiscated from the residence as evidence and later submitted for analysis.

An autopsy was performed at the Cuyahoga County Medical Examiner's Office. Autopsy findings included dilated cardiomyopathy with a 460-gram heart, cerebral edema, and edematous lungs. Heart and femoral blood, vitreous humor, bile, liver, brain (medulla), and gastric were submitted for a comprehensive toxicology analysis.

The heart blood was positive for amphetamine 0.058mg/L, methamphetamine 0.170mg/L, fentanyl 2.0ng/mL; norfentanyl 0.44ng/mL, acetaminophen, atropine, caffeine, cotinine, lidocaine, and nicotine. The femoral blood was not sufficient in volume for analysis. No antemortem admission blood samples were available for subsequent analysis.

Because of the decedent's drug history, further testing was performed to determine the presence of other possible phenethylamine and amphetamine class drugs. Samples were extracted at a basic pH into ethyl acetate. 2-DPMP, DOC, and the fluoroamphetamines were separated and detected by an Agilent GC/MS-EI in full scan mode with a Restek-DB5 capillary column.

Further confirmatory testing was performed at AIT Laboratories, Indianapolis, IN, for the 2-DPMP, DOC, and fluoroamphetamines. Specimens were extracted at a basic pH into n-butyl chloride. Separation and detection was completed by a Waters Acquity UPLC coupled to a Waters LCT Premier XE TOF mass spectrometer as well as a Waters Acquity UPLC coupled to a Waters Tandem Quadrupole Detector (TQD). The analytical column for both analyses was a Waters BEH C18, 2.1 x 100mm, 1.7µm particle size.

The concentrations for the subsequent testing are as follows: desoxypipradrol (2-DPMP) concentrations (mg/L) were 0.283, heart blood; 0.236, vitreous humor; 1.98mg/kg, liver; 0.817mg/kg, brain (medulla); >1.0, bile, and negative, in the gastric.

4-chloro-2,5-dimethoxy amphetamine (DOC) concentrations (mg/L) were 0.466, heart blood; 0.380, vitreous humor; 1.40mg/kg, liver; 1.09mg/kg, brain (medulla); and 2.04 in the bile. Fluoroamphetamine and fluoromethamphetamine were qualitatively present in all the specimens.

2-DPMP and DOC was found to be distributed among multiple matrices with values ranging from 0.236 to >1.0mg/L for 2-DPMP and 0.380 to 2.04mg/L for DOC. Tissues responsible for detoxification/excretion had higher concentrations of the drugs. 2-DPMP, DOC, and the fluoroamphetamines were present in all tissues analyzed except gastric.

Drug chemistry results from submitted drug and drug paraphernalia exhibits were found to contain the following: 2-fluoromethamphetamine; alprazolam; 2-(1-pyrrolidinyl)-(4-methylphenyl)-1-propanone (MPPP); methamphetamine; dimethyltryptamine (DMT); psilocin; cannabis; fluoromethamphetamine; 4-chloro-2,5-dimethoxyamphetamine (DOC); phencyclidine; and, lysergic acid.

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This case was consistent with the suspicion that this was an acute drug exposure. The cause of death was ruled toxic metabolic encephalopathy due to mixed drug intoxication. The manner of death was ruled as accidental.

Desoxypipradrol (2-DPMP), 2,5-dimethoxyamphetamine (DOC), Designer Drugs

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