



K27 Fatal Intoxication with Acetyl Fentanyl

Susan M. Cunningham, MCJ, WV OCME, 619 Virginia Street, W, Charleston, WV 25302; Kristen M. Bailey, MS*, OCME, 619 Virginia Street, W, Charleston, WV 25302; Christina L. Newsome-Sparks, BS, 619 Virginia Street, W, Charleston, WV 25302; Myron A. Gebhardt, MS, OCME, 619 Virginia Street, W, Charleston, WV 25302; David J. Clay, BA, OCME, 619 Virginia Street, W, Charleston, WV 25302; Susan E. Venuti, MD, OCME, 4312 District Drive, Raleigh, NC 27518; Nabila A. Haikal, MD, PO Box 75027, Charleston, WV 25375; and James C. Kraner, PhD, OCME, 619 Virginia Street, W, Charleston, WV 25302*

After attending this presentation, attendees will better understand the postmortem toxicology investigation involving the recreational use of acetyl fentanyl, one of a new group of psychoactive compounds being recreationally abused in the United States.

This presentation will impact the forensic science community by providing useful information pertaining to acetyl fentanyl, an opioid drug rarely encountered in forensic casework.

Among the new psychoactive substances encountered in forensic investigations in the United States is the anilidopiperidine class opioid, acetyl fentanyl. Abuse of this compound has resulted in more than 50 fatalities in the United States since 2013.

A 28-year-old male was found unresponsive on the bathroom floor at a residence he shared with a roommate, who had last known him to be alive approximately 12 hours earlier. A tourniquet fashioned from a belt was secured around his arm and a syringe was found nearby. The decedent, who had a history of substance abuse, including the use of anabolic steroids, was pronounced dead at the scene. External examination revealed needle track marks along the inside of the arm and foamy secretions at the mouth. Autopsy revealed marked pulmonary edema and mild diffuse cerebral edema, with no contributory natural disease or physical injury identified.

Immunoassay of urine for a panel of drugs of abuse gave a positive presumptive result for fentanyl alone. The presence of acetyl fentanyl was confirmed through Gas Chromatography/Mass Spectrometry (GC/MS) analysis of urine and Liquid Chromatography/Time-of-Flight/Mass Spectrometry (LC/TOF/MS) analysis of subclavian blood. Acetyl norfentanyl and its putative metabolite N-phenyl-1-(2-phenylethyl)piperidin-4-amine were detected in the blood, liver, and urine. An existing Liquid Chromatography with Tandem Mass Spectrometry (LC/MS/MS) procedure for fentanyl and norfentanyl confirmation and quantitation was modified in order to determine acetyl fentanyl in autopsy blood, urine, vitreous fluid, and liver. LC was performed using a Waters® ACQUITY® Ultra-Performance Liquid Chromatograph (UPLC); and tandem MS analysis was performed using a Waters® TQ-D detector with ionization in electrospray positive mode. Method validation consisted of examining bias, calibration model, carryover, and matrix effects. Acetyl fentanyl was detected in subclavian blood, liver, vitreous fluid, and urine at concentrations of 235ng/mL, 59.6ng/gm, 131ng/mL, and 234ng/mL, respectively. Tadalafil was present at 79ng/mL. Urine was analyzed for a panel of anabolic steroids revealing the presence of testosterone at 34.7ng/mL and epitestosterone at 2.5ng/mL, with oxandrolone also present in the urine. Acetyl fentanyl was detected by GC/MS analysis in a methanolic rinse of a syringe found at the scene.

Currently, limited information indicates that acetyl fentanyl acts as a mu-opioid receptor agonist with potency less than that of fentanyl, but greater than morphine. Taking into consideration of comparable average acetyl fentanyl blood concentration of 213ng/mL in three other forensic cases evaluated by a private forensic toxicology laboratory, the cause of death in this case report was determined to be acetyl fentanyl intoxication and the manner was deemed to be accidental.

Along with meager recent reports addressing a host of emerging novel opioid analogs, this case underscores the need for awareness and consideration of the potential involvement of such drugs when investigating apparent recreational drug-related deaths.

Forensic Toxicology, Acetyl Fentanyl, Postmortem