K34 A Death Due to the Use of the Novel Psychoactive Substances (NPS) (2-Aminopropryl) Benzofuran (APB) and N-Methyl Derivative (MAPB)

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After attending this presentation, attendees will be informed of the potential need to reevaluate previously collected mass spectrometry data as new designer drug data becomes available. The forensic science community will also become educated regarding the effects of APB and MAPB and their potential contributions to death.

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

New designer drugs that have been developed with slight chemical modifications to known and/or controlled drug structures are being synthesized and abused on a continuing basis. The challenge to stay ahead of the curve of detecting these novel drugs is an ongoing problem in forensic pathology and toxicology. This presentation discusses the novel psychoactive drugs, APB and MAPB, so that they may be accurately sought after and detected in a case of drug abuse or overdose in which suspected drugs are not immediately identified by routine drug screening.

APB and MAPB are novel psychoactive benzofurans that share structural and psychoactive properties with Methylenedioxyamphetamine (MDA) and methylenedioxymethamphetamine (MDMA) and also with amphetamine and methamphetamine. They are classified as NPS and were first noted to be used in 2010 in the United Kingdom. Due to several deaths in the United Kingdom and other countries, these drugs are currently illegal in some countries. Though they are not scheduled under the United States. Controlled Substances Act, they fall into the Federal Analogue Act. The Federal Analogue Act allows any chemical with a high potential for abuse that is "substantially similar" to a Schedule I or II drug to be treated as such under the law. The effects of these drugs are classic for stimulants and nearly identical to that of MDMA, including tachycardia, hypertension, hyperthermia, hallucinations, seizures, insomnia, and anxiety. The pharmacologic mechanism of these drugs is via inhibition of dopamine, noradrenaline, and 5-Hydroxytryptamine (5-HT) serotonin transporters. They also act as ligands of 5-HT2A and 5-HT2B. Due to the novelty and possible lack of identification of these drugs, deaths in the United States associated with the use of APB and MAPB are sparse in the literature.

This case study highlights the unfortunate death of a 15-year-old Caucasian female with a prior history of alprazolam and marijuana use who was observed snorting/inhaling an unknown powdered drug with subsequent hallucinations and seizure activity prior to becoming unresponsive. She was transported to the hospital where she was pronounced deceased.

At autopsy, pulmonary edema and petechiae of the epicardial aspect of the heart and thymus were identified. An edematous brain was identified, with no evidence of herniation. A preliminary drug screen performed on heart blood revealed the presence of lidocaine, acetaminophen, and amphetamines. No amphetamines were determined upon confirmation testing; no bath salts, cannabinoids, or other stimulant designer drugs were identified on select panels. While ethanol was not detected, the presence of lidocaine and naloxone are likely attributed to resuscitation

efforts. Although acetaminophen is not typical of resuscitative efforts, it can be seen with opiate use. No opiates were identified in this case.

Given the history of drug use immediately followed by hallucinations, seizures, and death, and negative confirmatory toxicology, the cause of death was originally listed as "complications of inhalation of an unknown drug" and manner of death was accident.

Nearly a year later, the toxicology results were reviewed due to a law enforcement request for laboratory records on the case. The case was reevaluated utilizing the Scientific Working Group for the Analysis of Seized Drugs (SWGDRUG) Gas Chromatography/Mass Spectrometry (GC/MS) electronic library that contains spectra for hundreds of legally confiscated drugs. Two peaks matching APB and MAPB were identified and later confirmed by tandem mass spectrometry. The cause of death was amended to be APB and MAPB intoxication. The structural similarities of APB and MAPB to amphetamine and methamphetamine explained the preliminary positive drug screen for amphetamines. This case highlights the importance of keeping GC/MS and Liquid Chromatography/Mass Spectrometry (LC/MS) libraries up to date, so that when a novel drug is suspected, a timely detection can be made. This can also help keep the forensic pathologist up to date with the proper classification of drug-related deaths.

APB, MAPB, Amphetamine