



Toxicology Section - 2016

K65 Postmortem Findings in Deaths Related to Synthetic Cannabinoids

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After attending this presentation, attendees will be able to describe and categorize the different groups of synthetic cannabinoids based on their structures, as well as recognize the diversity of synthetic cannabinoids and identify postmortem signs and findings from synthetic cannabinoid intake.

This presentation will impact the forensic science community by adding comprehensive postmortem and toxicological data from a series of synthetic cannabinoid-related deaths.

Background: Synthetic cannabinoids have been in existence for 30 or more years but rather recently, they have emerged among the new psychoactive substances used as recreational drugs and are being encountered in forensic toxicology case work in both the living and the deceased. Even though the synthetic cannabinoids share one mechanism of action with cannabis itself, there seems to be side effects not encountered after smoking cannabis. Acute kidney failure as well as cardiovascular complications from the smoking of synthetic cannabinoids has been reported. In addition to reports of non-fatal intoxications from synthetic cannabinoids, there have been a number of reports of deaths during recent years; however, the pathology and toxicology is not well understood. During the autumn of 2014, Sweden experienced a series of intoxications from synthetic cannabinoids, some of which resulted in death.

Goal: The goal of this study was to closely investigate the postmortem findings and circumstances of the deaths in which a synthetic cannabinoid had contributed to death.

Methods: The study population consisted of all autopsy cases in which the analysis of synthetic cannabinoids had been requested during 2014. The analysis was based on an Ultra High-Performance Liquid Chromatography/quadrupole-Time-Of-Flight (UHPLC/qTOF) method that included 107 analytes and was performed on postmortem femoral blood. The thresholds for positive result were between 0.1ng/g and 0.2ng/g. In some cases, a quantification of the analytes was performed using Ultra High-Performance Liquid Chromatography/Tandem Mass Spectrometry (UHPLC/MS/MS) and compared to data from living recreational users.

Results: In total, 134 cases were screened and 24 of those were positive for one or several synthetic cannabinoids. The synthetic cannabinoids found were BB-22, AB-FUBINACA, THJ-018, THJ-2201, 5F-PB-22, AKB-48, FUB-AKB-48, AB-CHMINACA, FUB-AMB, and MMB-CHMINACA.

In seven cases, synthetic cannabinoids were considered the cause of death or a contributing factor to death. The deaths occurred from August 2 to December 12, 2014. The deceased were all males between 18 years and 56 years of age. All deaths except one were unwitnessed. The autopsy findings were generally few with unspecific findings of pulmonary congestion (three cases), lung emphysema (four cases), and one case with bronchopneumonia. The lungs weights were high (1,214-1,928 grams with a median of 1,348 grams) compared to normal cases (<1,100).

In two cases, the only toxicological finding in femoral blood was MMB-CHMINACA, but in the other five cases, other drugs of abuse, medications, or ethanol were detected. The MMB-CHMINACA concentrations were 1.0ng/g and 3.0ng/g and in the same range as those of recreational users.

Conclusion: In 18% of the suspected cases, one or several synthetic cannabinoids were detected and in 30% of those cases, the medical examiner considered synthetic cannabinoids as the cause of death or that it had contributed to death. There were few specific postmortem findings that could explain the deaths and the concentrations found were not extraordinary. The synthetic cannabinoids seem unpredictably toxic and the mechanisms for their toxicity remain unclear.

Synthetic Cannabinoids, Spice, Psychoactive Substances