B20 A Validation Study of the Synthetic Cannabinoid 5-Fluoro PB-22

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Learning Overview: The goal of this presentation is to educate attendees on the growing problem of synthetic cannabinoids.

Impact on the Forensic Science Community: This presentation will impact the forensic science community by illustrating how dangerous and prominent synthetic cannabinoids are becoming as well as by providing a method by which 5-fluoro PB-22 can be identified in samples using Gas Chromatography/Mass Spectrometry (GC/MS) analysis.

Background/Introduction: The first synthetic cannabinoid was developed in the late 1980s by chemist John W. Huffman in an effort to understand the two cannabinoid receptors (CB_1 and CB_2). The cannabinoid receptors are not only involved in the high experienced by marijuana users, but also in the control of appetite, pain, and sleep. While the development of synthetic cannabinoids led to a greater understanding of the cannabinoid receptors, it also precipitated an entirely new drug market. Clandestine chemists hijacked scientific research, using published scientific articles to synthesize cannabinoids for distribution in the gray market. Products containing synthetic cannabinoids were marketed as Spice, herbal blends, or incense. The products are labeled "to be used as incense" and "not for human consumption" in an effort to circumvent drug laws and regulations. Spice products can contain more than a dozen synthetic cannabinoids of varying concentrations.

Objective: The focus of this project is to develop and validate a method for the analysis of the synthetic cannabinoid 5-fluoro PB-22, which first appeared in 2014. 5-fluoro PB-22 has high affinities for both cannabinoid receptors, which is significant because Δ9-Tetrahydrocannabinol (THC) is only a partial agonist for both of the cannabinoid receptors.

Methods: This validation includes studies determining the Limit Of Detection (LOD), the accuracy of identification, and specificity of the assay. In addition, a GC/MS program has been developed to differentiate between 5-fluoro PB-22 and 13 of its isomers. The isomers of 5-fluoro PB-22 that were examined included five hydroxyquinoline isomers, five hydroxyisoquinoline isomers, and three N-(fluoropentyl) isomers. Finally, casework was simulated using previously confiscated samples submitted by law enforcement to the Alabama Department of Forensic Sciences.

Results: The LOD for 5-fluoro PB-22 is 20µg/mL using the developed method. The method provided reproducible results over the course of three different days. Two different isomers, 5-fluoro PB-22 4-hydroxyquinoline isomer and 5-fluoro PB-22 5-hydroxyquinoline isomer, are the only isomers that resulted in interference with the target drug. 5-fluoro PB-22 5-hydroxyquinoline interfered with library matches as well as ion ratios. 5-fluoro PB-22 4-hydroxyquinoline isomer had a retention time interference with the target drug. Additionally, three additional synthetic cannabinoids (JWH 081, AKB48 N-(4-fluorobenzyl) analog, and 5-fluoro THJ) were also found to interfere with the library matches to the target drug as well as ion ratios. The method was able to identify 5-fluoro PB-22 in ten simulated case samples with concentrations of the drug ranging from 75µg/mL to 500µg/mL.

Conclusion/Discussion: The LOD falls within an acceptable range for the purpose of the assay. The developed method has provided reliable and reproducible results in the analysis of the target drug. The method has also provided reliable results in identifying the drug in simulated case samples. Of the 145 synthetic cannabinoids tested, two isomers of 5-fluoro PB-22 have caused interference with the analyte. Currently, separation of 5-fluoro PB-22 from the two interfering isomers has not been achieved, but work is ongoing.

Synthetic Cannabinoid, Clandestine Chemistry, Spice

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