K64 Analysis for Synthetic Cannabinoids in Oral Fluid Samples Obtained From a Music Festival Cohort

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After attending this presentation, attendees will be able to develop and validate an analytical method for the analysis of synthetic cannabinoid compounds in oral fluid samples using Liquid Chromatography/Tandem Mass Spectrometry (LC/MS/MS) technology and evaluate the findings from testing a cohort of subjects with high rates of Novel Psychoactive Substance (NPS) use for synthetic cannabinoids.

This presentation will impact the forensic science community by advancing the science of oral fluid testing for novel psychoactive substances and raising awareness of the latest trends in a class of potentially dangerous drugs.

Oral fluid has many advantages as a toxicological specimen, including ease of collection, which can be done in the open and without the need for privacy or a same-gender collection agent. The specimen can be collected close in time to any alleged drug impairment, without the need for transport and the associated phlebotomy, law enforcement, and medical professionals' time. In a workplace setting, the rapid collection also reduces the amount of time an employee is away from their workstation, reducing the employers' costs. From the laboratory perspective, the sample is less complex than blood or urine, simplifying sample preparation. Oral fluid sample analysis is not without its challenges, in that drug concentrations, especially for acidic compounds, may be below those in blood, sample volume is limited, and there is less data supporting correlation of oral fluid drug concentrations to likelihood of impairment than exists even for blood. Synthetic cannabinoid drugs have increasingly been implicated in motor vehicle collisions and are a growing concern in the workplace due to the fact that there is currently no routine testing for these drugs. The objective of this presentation is to describe the development and validation of a test for 27 commonly encountered synthetic cannabinoid drugs in oral fluid and the application of the test to samples collected from a drug-using cohort.

The matrix for the test was oral fluid (~1mL) mixed with 3mL of a preserving buffer containing salts and isopropanol (Quantisal®). Sample preparation was performed using Solid Phase Extraction (SPE) utilizing Oasis® HLB 60mg extraction columns. The samples were washed using deionized water, 1M ammonium carbonate buffer pH10, and hexane before elution with acetonitrile. Analysis was performed by LC/MS/MS. The method was designed to detect JWH-018, AM-2201, JWH-122, JWH-210, JWH-081, UR-144, XLR-11, AB-FUBINACA, ADBICA, 5F-ADBICA, ADB-PINACA, ADB-FUBINACA, 5F-ADB-PINACA, JWH-018 adamantyl, 5F-JWH-018 adamantyl carboxamide, JWH-018 adamantyl carboxamide, PB-22, AKB-48, 5F-AKB-48, BB-22, AM-2201 benzimidazole, THJ-2201, THJ-018, 5F-AB-001, AB-PINACA, and AB-CHMINACA. The analytical method consisted of separation using an ACQUITY® UPLC® BEH C18 (100mm x 2.1mm, 1.7-micron) column coupled with a VanGuard BEH C18 1.7-micron guard column and a gradient elution. An initial mixture of 55% mobile phase A (0.1% formic acid in water) and 45% mobile phase B (acetonitrile) was decreased to a final mixture of 5% mobile phase A, 95% mobile phase B. The total run time for the method was 6.0min on a Waters® Xevo-TQS.

Once optimized, the method was evaluated for examined precision around the decision concentration (cut-off), stability in matrix and on instrument, sensitivity and specificity, robustness, an evaluation of interfering compounds, matrix effect, and extraction efficiency. The method produced data that met the acceptance criteria for precision around the cut-off concentration and was shown to be 100% sensitive and specific in blinded spiked controls in diverse oral fluid samples mixed with the preserving buffer. The method was also shown to meet validation criteria for precision around the decision concentration, stability in matrix and on instrument, robustness, interference, matrix effect, and extraction efficiency. After the validation was completed, authentic subject samples were tested.

The samples were collected during an electronic dance music festival in Miami, FL, in March of 2015. Previous studies conducted by the same group have shown drug use rates of 60%-70% in this population, including use of novel psychoactive stimulants.

Synthetic Cannabinoids, Oral Fluid, Forensic Toxicology

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