K80 Development of an LC/MS/MS Method for 30 Synthetic Cannabinoids and Metabolites

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After attending this presentation, attendees will: (1) understand the challenges of testing for synthetic cannabinoids; (2) obtain knowledge on the effects of matrix on synthetic cannabinoid testing; and, (3) understand the differences in platform for synthetic cannabinoid testing

This presentation will impact the forensic science community by providing needed information for the detection of several synthetic cannabinoids that are currently being missed by laboratories.

Synthetic cannabinoids have been a topic of much discussion since their popularity as a legal high started in 2004 in Europe. To date, several states have moved to ban the use and sell of synthetic cannabinoids. However, most state and federal law makers have banned specific compounds, not structural moieties, allowing for similar compounds to come onto the market. As such, the detection of synthetic cannabinoids has always been mostly reactive.

Laboratories who generally rely on a screen-confirm methodology for their testing were further hampered until immunoassays for these compounds were developed. And, to date, most of the immunoassays developed are limited and some are already outdated. In order to remain current with the compounds on the market, based on seizures and blogs, Western Slope Laboratory developed a drug-monitoring method using liquid chromatography-online sample extraction-tandem mass spectrometry with full scan orbitrap. This method allows for targeted analysis as well as unknown compound elucidation.

With this methodology, testing is available for 30 synthetic cannabinoid compounds including metabolites. Included in the method are markers for JWH-018, JWH-073, JWH-200, JWH-019, AM-2201, JWH-122, JWH-398, JWH-022, JWH-210, JWH-015, JWH-081, JWH-020, JWH-250, HU-210, AM-694, STS-135, and XLR-11. The method tests for synthetic cannabinoids in urine and saliva.

The method is validated in concentration range of 100pg/mL – 1,000ng/mL with a Lower Limit of Detection (LLOD) below 100pg/mL and a Lower Limit of Quantification (LLOQ) at 100pg/mL. The method is linear in the aforementioned quantification range. The method was tested for matrix suppression and enhancement and none was seen in the quantification window as defined as ±25%. Imprecision has a specification limit of ±20% for all compounds; however, repeated injections (n=10) were under ±10%. Similarly, inaccuracy has a specification limit of ±20%. The method was tested to be accurate at three concentrations (low=250pg/mL, medium=50ng/mL, and high=650ng/mL) for repeated injections (n=10).

Urine samples are hydrolyzed, spiked with internal standards, and injected on the turbulent flow column. Saliva samples are spiked with internal standards, filtered, and injected onto the turbulent flow column. Standards are purchased from Cayman Chemical and Cerilliant. Mobile phase was water and methanol with ammonium formate and ammonium acetate additives. All samples were run on a Transcend TLX-2 (Thermo Scientific) coupled to a Exactive Orbitrap (Thermo Scientific). Run time for the method was under 8 min.

This method is comparable to the quantitative method previously developed at Western Slope Laboratory for synthetic cannabinoid confirmatory services. The drug-monitoring method was able to compare to the confirmatory method for the eight compounds in the confirmatory method; those compounds are JWH-200, JWH-018, JWH-018 N-pentanoic acid, JWH-073, JWH-073 N-Butanoic Acid, AM-2201, AM-694, and HU-210. The quantifiable results were similar (±10%).

In conclusion, a drug-monitoring method was developed to allow for detection of 30 synthetic cannabinoid compounds and metabolites to help in the fight against the use of these compounds. This method allows for both confirmatory testing as well as unknown identification. With this type of methodology, laboratories can now be more proactive.

Synthetic Cannabis, LC/MS/MS, Urine and Saliva

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