K74 Analysis of Synthetic Cannabinoids Using Disposable Micropipette Extraction Tips and LC/MS

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After attending this presentation, attendees will be able to evaluate the effectiveness of disposable micropipette tips for the extraction of synthetic cannabinoids from biological samples, relative to traditional liquid/liquid extraction.

This presentation will impact the forensic science community by describing a rapid drug screening technique for a class of drugs that is becoming increasingly popular. This technique can aid in the regulation of these "legal high" products and identify their role in criminal activity or death investigations.

This project was designed to evaluate the applicability of the use of solid phase micropipette extraction tips for the isolation of synthetic cannabinoids from biological samples.

Synthetic cannabinoids are a rapidly growing class of drugs that have similar effects to those of marijuana. The scope of this class of drugs is fast-growing because their structures are easily manipulated, but can still produce cannabis-like effects. The chemical constituents of these synthetic marijuana products change frequently as attempts to regulate them evolve. Being able to detect these various drugs in biological samples has significant forensic toxicology applications. Previously, liquid/liquid extraction procedures have been performed to isolate the drugs prior to analysis by Liquid Chromatography Tandem Mass Spectrometric (LC/MS/MS) analysis; however, liquid/liquid extractions can be very time consuming, generate large amounts of waste, and involve multiple manipulations, resulting in reduced recovery.

This study describes the development of a rapid method to screen for the model synthetic cannabinoids AM-1248, AM-2201, JWH-122, JWH-210, and XLR-11using disposable micropipette extraction tips. Disposable micropipette extraction is a novel technique based on solid phase extraction. The pipette tips contain a sorbent material that binds to the sample as the solution is aspirated and expelled through the frit in the tip. These tips are advantageous over traditional liquid/liquid extraction because they are more efficient, rapid, and require lower solvent volume. Reduced solvent waste is an environmental benefit of this approach. Once extractions are performed, samples are analyzed LC/MS/MS.

Variables such as time for extraction, total solvent volume, and sample volume were evaluated as part of this assessment. A previously reported liquid/liquid extraction method was evaluated for comparison to the proposed extractions with disposable micropipette tips. The liquid/liquid extraction is performed using 1mL of sample which is acidified and extracted with chloroform/isopropanol/n-heptane, 50/17/33. Liquid/liquid extractions from serum demonstrated R^2 values above 0.98 with a linear range of 0.1 – 15 ng/mL.

Preliminary results show that the individual 10 ng/mL standards can be extracted from the micropipette tips with a significant increase in abundance when compared to liquid/liquid extractions of the 10ng/mL standards. Abundances for the micropipette tips were almost five times greater than that of liquid/liquid extractions of samples of the same concentration. Extractions with the tips also proved to be less time consuming. To prepare calibrators and perform extractions with the tips takes 2 hr as compared to 4 hr with liquid/liquid extractions. Solvent and sample volume are also decreased when utilizing the tips. The micropipette tips use 2.25mL of solvent and 0.50mL of sample volume while liquid/liquid extractions use 4.20mL of solvent and 1 – 2mL of sample volume.

Based on the work described above, disposable micropipette tips successfully extract standards of AM-1248, AM-2201, JWH-122, JWH-210, and XLR-11. The micropipette tip extraction thus far proves to have higher extraction efficiency while utilizing less sample and solvent volume.

Cannabinoids, Pipette Tip Extracts, Designer Drugs

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