K37 Synthetic Cathinone Stability in Blood Using Liquid Chromatography/Quadrupole Time-Of-Flight/Mass Spectrometry (LC/qTOF/MS)

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After attending this presentation, attendees will better understand the stability of synthetic cathinones in blood stored at various temperatures over a period of 30 days.

This presentation will impact the forensic science community by increasing attendees' knowledge regarding the stability of cathinone designer drugs in blood.

Understanding drug stability under various storage conditions is crucial to toxicological data interpretation. While the stability of many drugs of abuse are known, information pertaining to the stability of cathinone designer drugs is relatively limited. Previous literature has described stability for a select few cathinones. This research presents a systematic evaluation of the stability of 22 synthetic cathinones in blood stored at four temperatures over a period of 30 days.

Solid phase extraction and LC/qTOF/MS equipped with a Poroshell 120 EC-C18 column were used to identify and quantify 22 synthetic cathinones. Blood was fortified with analytes at high (1,000ng/mL) and low (100ng/mL) concentrations and stored at four temperatures (32°C, 20°C, 4°C, and -20°C) for up to 30 days. Quantitative analyses were performed at various time points (hours, days, and weeks) throughout the course of the study. The following cathinones were included in the study: methcathinone, ethcathinone, pentedrone, buphedrone, 3-Fluoromethcathinone (3-FMC), 4-Fluoromethcathinone (4-FMC), 4-Methylethcathinone (4-MEC), 4-Ethylmethcathinone (4-EMC), mephedrone, methedrone, 3,4-Dimethylmethcathinone (3,4-DMMC), ethylone, methylone, butylone, pentylone, eutylone, Methylenedioxypyrovalerone (MDPV), 4-Methylpyrrolidinobutiophenone (MPBP), 3,4-Methylenedioxypyrrolidinobutiophenone (MDPBP), alpha-Pyrrolidinopentiophenone (alpha-PVP), pyrovalerone, and naphyrone. A total of nine deuterated internal standards were used. The LC/qTOF/MS analytical procedure was validated according to the Scientific Working Group for Forensic Toxicology (SWGTOX) Standard Practices for Method Validation. Limits of detection and quantitation ranged from 1ng/mL to 5ng/mL. Accuracy ranged from 94%-111% and intra-/inter-assay precision ranged from 0-9% and 3%-7%, respectively. Cathinones were considered stable if concentrations were within 20% of the expected concentration.

The stability of synthetic cathinones was highly temperature dependent. Considerable degradation was observed in blood stored at 32°C and 20°C (60%-100% loss at 32°C for all cathinones). The ring substituted and unsubstituted secondary amine cathinones were the least stable, with a select few reaching 100% loss within 30 days at 32°C. Among the secondary amine, 3-FMC was the least stable and was undetectable within the first 48 hours at 32°C and 20°C. The methylenedioxy-pyrrolidine type synthetic cathinone (MDPBP and MDPV) were the most stable. Although MDPBP and MDPV experienced a 60% and 84% loss at 32°C, no significant degradation was observed at or below 20°C.

Synthetic cathinone stability in blood was highly dependent on temperature and drug structure (secondary/tertiary amines and benzylic substituents). Some drugs within this class experienced dramatic losses within hours at

room or elevated temperatures. Conditions under which samples have been transported (to the laboratory) or stored must be considered if quantitative results are to be reliably interpreted.

Synthetic Cathinones, Stability, LC/qTOF/MS