K16 Extraction of Methamphetamine From Postmortem Blood Samples by Molecularly Imprinted Polymers for Selective Solid Phase Extraction

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After attending this presentation, attendees will have the opportunity to learn a new way to extract methamphetamine from a complex matrix involving putrefactive amines.

This presentation will impact the forensic science community by presenting information on a new extraction method called MIP-SPE. The imprinting technique creates high affinity binding sites in MIP. The selectivity of MIP-SPE towards target molecules will be reported in this presentation.

Methamphetamine, a sympathomimetic amine, is a commonly encountered controlled substance in the forensic science community. When postmortem samples are analyzed, particularly blood and tissue, false positives may occur on the enzyme-linked immunosorbent assay (ELISA) screen, or the enzyme-multiplied immunoassay technique (EMIT), which are well known screening tests used by many forensic science laboratories. The false positive from the screen is confirmed with gas chromatography/mass spectrometry (GC/MS). One of the explanations for the occurrence of false positives is the appearance of putrefactive amines in postmortem samples, which may produce cross reactions with the ELISA test. Putrefactive amines, including 1-phenethylamine, 2-phenethylamine, putrescine, tryptamine, and tyramine, have similar chemical and physical properties as methamphetamine and are produced during putrefaction, a step in decomposition in which microorganisms breakdown proteins. Therefore, putrefactive amines have the potential to interfere with the interpretation of ELISA test results of methamphetamine. In this research, methamphetamine was extracted from known ELISA positive blood samples, some that have been treated with known putrefactive amines, putrefactive amines and methamphetamine, and methamphetamine only. The two extraction methods include a liquid-liquid extraction and a molecular imprinted polymer cartridge for solid phase extraction (MIP-SPE), which is designed to be specific towards amphetamines. Liquid-liquid extraction is a well known method for drug extractions but can be less selective and has the potential to use a large quantity of solvents. The liquid-liquid extraction of choice involves multiple washes and a back extraction, which further cleans the extract. The extracts were analyzed by GC-MS in order to determine which extraction method has a more significant specificity towards methamphetamine, which was determined through the absence or the decreased number of putrefactive amines. After attending this presentation, the attendee will know if the MIP-SPE is a more specific extraction method for postmortem blood sample. After method validation, actual postmortem samples will be collected at various postmortem intervals and evaluated with the new validated MIP-SPE method to further confirm the conclusions found in the earlier research. The removal of putrefactive amines from an analysis could reduce the potential for misinterpretation or interference when evaluating methamphetamine results from postmortem samples.

Putrefactive amines are potential interferences when methamphetamine is analyzed from postmortem samples in forensic toxicology. This research will evaluate the application of MIP-SPE for selective extraction of methamphetamine from postmortem samples. The objective is to see if MIP-SPE can successfully eliminate putrefactive amines from postmortem blood samples.

MIP-SPE is a new extraction method. The imprinting technique creates high affinity binding sites in MIP. The selectivity of MIP-SPE towards target molecules will be reported in this presentation.

Methamphetamine, MIP-SPE, Putrefactive Amines

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