K45 An Investigation Into the Analysis of Fentanyl in Postmortem Blood Using Biocompatible Solid-Phase Microextraction (BioSPME).

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After attending this presentation, attendees will better understand how BioSPME can be an alternative extraction method for fentanyl in postmortem blood.

This presentation will impact the forensic science community by providing an extraction method that is faster than current analytical methods. BioSPME coupled with Gas Chromatography/Mass Spectrometry (GC/MS) and Liquid Chromatography/Tandem Mass Spectrometry (LC/MS/MS) allowed for minimal sample collection, preparation, and shorter analysis time in the analysis of postmortem blood samples from overdose victims.

The abuse of opioids, particularly fentanyl, has become a slow-motion mass disaster over recent years in the United States. Due to the frequent abuse of opioids, there has been an increase in drug-related deaths.[1] Forensic pathologists are responsible for collecting various postmortem samples that are then sent to a toxicology laboratory to be analyzed for drugs, such as fentanyl. This process can be time consuming and may result in a backlog, which could hinder a criminal investigation. A solution could be BioSPME using coated fibers that can be directly injected into a biological matrix and absorb any drug present without the interference of macromolecules, thus allowing for a faster analysis time.

A method has been developed to analyze fentanyl in postmortem blood using BioSPME followed by GC/MS and LC/MS/MS analysis. BioSPME fibers were conditioned, directly injected into blood, washed, filtered, desorbed into solution, dried down, and reconstituted. The extracted samples were screened by GC/MS and subsequently analyzed by LC/MS/MS. GC/MS was performed using splitless injection on a Rxi-5Sil MS column (30.0m x 0.25mm, 0.25μm) in the Selected Ion Monitoring (SIM) mode. Samples were confirmed using an AB SCIEX™ 3200 QTRAP® triple quadrupole MS with an Electrospray Ionization (ESI) source in the positive ion mode. LC was performed on a Shimadzu® LC system using an Ascentis® Express Biphenyl column (50mm x 2.1mm, 2.7µm) with the weak mobile phase of 0.1% (volume/volume (v/v)) formic acid in water and the strong mobile phase of 0.1% (v/v) formic acid in acetonitrile. The flow rate was 0.30mL/min, column temperature was 30ºC, injection volume was 1μL, and an analysis time of seven minutes per sample. This method was developed using bovine blood, then applied to 43 postmortem blood samples from overdose victims from the Lehigh County Coroner's Office in Allentown, PA.

In conclusion, the use of BioSPME as an extraction method allows for minimal sample preparation and collection for the detection of fentanyl in postmortem blood.

Reference(s):

1. U.S. Drug Enforcement Administration, Office of Diversion Control. National Forensic Laboratory Information System Special Report: Opiates and Related Drugs Reported in NFLIS, 2009-2014. Springfield (VA): U.S. Drug Enforcement Administration.

BioSPME, Forensic Toxicology, Fentanyl

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