K45 Validation of a High Performance Liquid Chromatography Tandem Mass Spectrometry Method for the Detection of Opioids in Hair

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After attending this presentation, attendees may evaluate the validation of an HPLC/MS/MS method for the detection of opioids in hair, and whether application of this method in their own laboratories may enhance their investigative capabilities.

This presentation will impact the forensic science community by providing another technique for the screening and confirmation of an important drug class in hair, particularly useful for the investigation of drug facilitated sexual assaults.

The detection of drugs in hair specimens poses a unique set of analytical challenges for the forensic toxicologist: limited sample amount, often vague target lists, and instrumental characteristics all impose limitations on the types of exams that may be performed upon the hair matrix. A well-validated method for the detection of opioids in hair can then serve as yet another technique for determining an individual's possible exposure to a drug, perhaps most meaningfully in drug- facilitated sexual assault (DFSA) cases.

While benzodiazepines are commonly associated with DFSA case, opioids are also used to render victims unconscious or less able to resist. In developing a full panel of DFSA examinations, opioids should not be overlooked when the type of drug used is less clear.

The validation of an HPLC/MS/MS method for the detection of opioids in hair is presented. The method is adapted from an existing standard operating procedure previously validated by the FBI Laboratory for matrices such as blood, urine, and tissue. The adaptations necessary for the preparation of the hair matrix are discussed. The types of hair matrices included in the validation as well as various sample trial sample pretreatments are also discussed. Optimization of the HPC/MS/MS parameters is described.

The procedure allows for the screening and confirmation of morphine, codeine, hydromorphone, hydrocodone, oxymorphone, oxycodone, 6-acetylmorphine, normorphine, norcodeine, noroxycodone, dihydromorphine, and dihydrocodeine. Hair specimens are qualitatively screened and quantitated if necessary. The hair is pulverized using a freezer mill cooled by liquid nitrogen, rendering the hair to a fine powder like consistency. The specimens are mixed with buffer and internal standards, and extracted using mixed mode hydrophobic/cation exchange solid phase extraction cartridges. Target drugs are eluted using a mixed solvent system of methylene chloride, isopropanol, and ammonium hydroxide. The eluent is taken to dryness and reconstituted prior to analysis by HPLC/MS/MS.

Case studies will be presented in which the laboratory's drug screening standard operating procedures were useful in an investigation. **LC/MS/MS, Opioids, Hair**

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