K13 Automated and Comprehensive Analysis of Drugs in Whole Blood Using Cleanup Tips and LC/MS/MS

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The goal of this presentation is to present the development of an automated sample preparation method for the analysis of drugs in whole blood using minimal manual labor. The method is comprehensive and combines protein precipitation and "cleanup" for the analysis of acidic, basic, and neutral drugs.

This presentation will impact the forensic science community by demonstrating how automated sample preparation allows forensic labs to improve throughput, minimize sample handling, and increase confidence of results.

Recently, protein precipitated blood specimens have been analyzed directly by LC/MS/MS without additional solid-phase extraction (SPE) or cleanup procedures. In this study a comparison of samples analyzed with and without cleanup is shown. The advantages of using a cleanup procedure are: (1) the method is rapid because it does not involve condition, wash and elution steps; (2) less maintenance issues are required for the LC and MS instrumentation; (3) better sensitivity due to elimination of ion suppression and matrix effects; (4) better reproducibility for qualitative and quantitative measurements; and (5) more confidence in the screening and confirmation of drugs and metabolites.

A cleanup tip was developed that is used to simultaneously filter the proteins precipitated from whole blood and extract the sample matrix components. The extractions are performed completely automated using a dual rail GERSTEL MPS-2 instrument interfaced to an AB SCIEX 3200 Q-Trap instrument. The automation allows the analysis to be non- tedious and improves sample integrity by minimizing manual sample handling. Use of the Q-Trap permits the ability to obtain full scan mass spectral data of drugs and metabolites, even at low concentrations. The full scan capabilities gives greater confidence in compound identification, and is a great resource for unknown screening that is common in forensic toxicology.

In this study, analyses of over 60 drugs and metabolites in whole blood are shown using the cleanup tips. The drugs and metabolites include opiates, opioids, benzodiazepines, analgesics, anticonvulsants, stimulants, and hallucinogens. Recoveries are greater than 70% and RSDs less than 10%, with most recoveries being approximately 90%. Direct comparisons are shown of samples treated with and without cleanup.

Sample Preparation, LC/MS/MS, Automation

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