WS 24: Toxic Clues: How Metabolomics Can Transform Forensic Detection – Untargeted Metabolomics and How It Can be Used in Forensic Settings

Audience Knowledge: Basic

Workshop Chairs

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Abstract

Metabolomics has emerged as a powerful analytical approach in many disciplines, including forensic toxicology, where it might offer unprecedented insights into biochemical alterations associated with drug intake or absence, poisoning, and postmortem processes.

This workshop introduces participants to the fundamental concepts, analytical platforms, and data-processing workflows central to untargeted metabolomics, with a focus on practical forensic applications. Through forensic-relevant examples, we will explore how untargeted metabolomic strategies can support the detection of xenobiotics, reveal metabolic fingerprints of drug intake or absence, and identify novel biomarkers that enhance toxicological interpretation. Participants will gain hands-on exposure to experimental design considerations, sample preparation challenges, quality control, consideration of the reuse of high-resolution mass spectrometry data acquired under routine forensic conditions, and the use of chemometric and multivariate statistical tools essential for high-dimensional data analysis.

Special emphasis will be placed on emerging applications, including elucidation of drug metabolism, identification of new biomarkers and improved interpretation, postmortem interval estimation, and cause-of-death screening. We will focus on challenging use cases and analytes such as GHB, insulin, sleepiness detection, or postmortem interpretation of opioid blood concentrations as relevant forensic examples.

By the end of the workshop, attendees will have a comprehensive overview of how metabolomics can complement classical analytical toxicology, strengthen evidential reliability, and open new avenues for research and routine forensic practice.

Speakers

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Workshop Agenda

Time	Topic	Speaker
08:00 AM - 08:30 AM	General introduction to metabolomics	Green/Steuer
08:30 AM - 09:30 AM	A Practical Guide to Metabolomics: From Samples to Data Analysis	Elmsjö
09:30 AM - 10:00 AM	Metabolomics to find new drug biomarkers	Steuer
10:30 AM - 10:50 AM	Cause-of-death screening with postmortem metabolomics	Ward
10:50 AM - 11:10 AM	Predicting the postmortem interval using metabolomics	Ward
11:10 AM - 11:30 AM	Sleepiness detection by a metabolic fingerprint	Scholz
11:30 AM - 11:45 AM	Beyond metabolomics: other omics and their forensic application	Brockbals
11:45 AM - 12:00 PM	Panel and Audience Q&A	All speakers