



W20 Instrumental Chromatographic Separation Techniques for Forensic Analyses: Application to the Analysis of Emerging Drugs

*Ira S. Lurie, PhD**, George Washington University, Dept of Forensic Science, 2100 Foxhall Road, NW, Somers Hall, Lower Level, Washington, DC 20007; *Bruce R. McCord, PhD**, Florida International University, Dept of Chemistry, University Park, Miami, FL 33199; and *H. Chip Walls, BS**, Forensic, Analytical & Clinical, Toxicology Lab, Miami, FL 33143

After attending this presentation, attendees will be better able to evaluate and select the proper chromatographic technique(s) for separating complex mixtures that are necessary for the analysis of emerging drugs present in seized drug-evidence submissions and toxicological samples.

This presentation will impact the forensic science community by providing attendees with a respectable and fundamental understanding of the different modern separation techniques and how they have been applied to the analysis of emerging drugs in forensic exhibits. This workshop has a strong interdisciplinary focus.

The expanded availability of designer drugs on the street has resulted in a confusing array of complex and difficult problems in the determination of drug identity. Many of these drugs are positional and stereoisomers, with concomitant legal issues, and in some cases significant pharmacological and toxicological differences. Isolation and identification of these materials results in numerous technical challenges, many of which cannot be resolved even by the most advanced mass spectrometric technology. Fortunately current advances manifested in separation techniques such as gas chromatography (GC), ultrahigh performance liquid chromatography (UHPLC) and ultrahigh performance supercritical fluid chromatography (UHPSFC) provides a solution to the problem. These techniques have exceptional selectivity and separation power, and in the future they will be increasingly needed in order to distinguish these compounds by retention time as other techniques fail.

The isolation problem becomes even more complex when you consider toxicological assays. Complexity increases with the need to consider drug metabolites and isolation of these materials from complex matrices. Thus we feel that the forensic community could benefit from a series of lectures on the basics of chromatographic separations and their application to problems in the separation of emerging, designer drugs.

The basic principles of chromatography will be presented. In addition, sample preparation techniques, which are integral to successful chromatographic separation will be discussed. These include liquid-liquid extraction, solid phase extraction, and vapor phase extraction techniques. The modern forensic practice of GC, LC, and SFC will be discussed including hardware, choice of columns and methods development. A comparison of GC, UHPLC, and UHPSFC for emerging drugs such as synthetic cathinones and synthetic cannabinoids will also be presented. In the field of forensic toxicology, sample preparation, and separation technology employed for the analysis of emerging drugs and or their metabolites in urine, blood, and hair will be reviewed as well as emerging drug stability *in vitro* and *in vivo*. A discussion on future directions in separation science and emerging drugs will be discussed to include questions from the attendees regarding material related to these chromatographic separations.

Separation Techniques, Chromatography, Emerging Drugs