A92 Analysis of Illicit Tablets by Ultra-High Performance Liquid Chromatography

Emily C. Miller, BS, Drug Enforcement Administration Mid-Atlantic Laboratory, 1440 McCormick Drive, Largo, MD 20774*

After attending this presentation, attendees will understand how Ultra-High Performance Liquid Chromatography (UHPLC) can be used effectively in the analysis of illicit tablets, pharmaceutical tablets, and drug mixtures of forensic interest. In particular, it will be demonstrated that those tablets and mixtures containing phenethylamines and other compounds which can be difficult to separate by Gas Chromatography (GC) can be easily analyzed using UHPLC.

This presentation will impact the forensic science community by highlighting some of the potential uses of this new technology in forensic drug analysis, including the ability of UHPLC to separate and fully resolve compounds that cannot easily be resolved by many of the commonly used GC methodologies. This allows for more efficient analysis, more accurate drug identification, and more precise quantitation.

Many phenethylamines and other compounds typically encountered in illicit tablets can be difficult to fully resolve using the GC screening methods typically utilized in forensic drug laboratories. High performance liquid chromatography (HPLC) provides alternate mechanisms of separation and selectivity than GC. However, HPLC's lower peak capacity makes the length of time needed to adequately separate all compounds too time-consuming to use for general screening. However, the development of UHPLC instrumentation and the availability of columns containing sub-2-µm particles have made this technique more appealing for forensic drug screening. The number of theoretical plates achievable with sub-2-µm particle UHPLC columns approaches those possible with capillary GC columns. UHPLC provides a complementary method for screening these types of tablets quickly and efficiently with a high degree of selectivity.

A UHPLC method will be presented which can separate many of the common components of illicit tablets, including 3,4- methylenedioxymethamphetamine (MDMA) and related compounds (including MDA, MDMMA, and MDEA), methamphetamine, amphetamine, ephedrine, pseudoephedrine, N-benzylpiperazine (BZP), 1-(3-trifluoromethylphenyl)-piperazine (TFMPP), and caffeine. Several other non-controlled adulterants which may be present in illicit tablets (including diphenhydramine, aspirin, guaifenesin, lidocaine, procaine, and others) will also be shown to be well resolved using this method. Analysis of tablets containing BZP, MDMA, and TFMPP by both GC and UHPLC will be compared. A normal-phase UHPLC screening method for BZP will also be introduced, as well as an ion-pairing UHPLC method for the quantitation of BZP. The benefits and limitations of each method will be discussed. The applicability of UHPLC screening to many compounds of forensic interest that are at least somewhat soluble in water and possess a chromophore will be shown. Examples of analysis of controlled and non-controlled pharmaceuticals by UHPLC will also be presented along with the analysis of illicit tablets containing unusual components (such as cocaine). The sensitivity of the technique (with ultraviolet (UV) detection) will be demonstrated, and sample preparation will be discussed.

UHPLC is a powerful new technique which can be of great value to a forensic drug analysis laboratory. Many mixtures which can prove

difficult to analyze by traditional techniques benefit from the unique retention mechanisms in liquid chromatography and can be better resolved by UHPLC. In addition, exhibits containing multiple units (such as illicit tablets or pharmaceutical tablets) can be quickly and efficiently analyzed with no requirement for any additional sample preparation steps that might be necessary for GC analysis (such as derivitization, basic extraction, or further dilution). This technology has the potential to make forensic drug analysis laboratories more efficient through faster screening, easier sample preparation, and less reanalysis of multiple- unit submissions.

UHPLC, BZP, Phenethylamine

 ** Presenting Author*