A138 Development of a Rapid Screening Method for Differentiation of the Traditional and Emerging Amphetamine Type Stimulants (ATS)

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The goal of this presentation is to make attendees aware of how presumptive test methods can be when applied to Ampethamine Type Stimulants. It provides a programmed approached to drug screening not previously described.

This presentation will impact the forensic science community by giving them the opportunity, for the first time, for law enforcement officers and forensic scientists to screen for new ATS drugs in both the field and the laboratory. This allows for instant informed decision-making concerning which samples to subject to further analytical testing. Prior to this method, such decisions were not possible.

Over the last decade there has been an enormous increase in the number of 'designer drugs' entering the illicit drug market. Many of these compounds are amphetamine type stimulants (ATS's). According to the recently published annual reports by the European Monitoring Centre for Drugs and Drug Addiction (EMCDDA), in 2008 some 13 new substances were reported; in 2009, 24 were reported, and, in 2010, 41 new substances were described.[1] Alongside this, there have been well-documented decreases in the purity of these drugs in addition to an increase in the complexity of the drug mixtures. This emphasizes the need for a rapid, selective, and sensitive screening technique to be implemented.

In the United Kingdom there has been a move toward rapid action in law enforcement under the Misuse of Drugs Act, 1971 and its amendments involving these new designer compounds. Similar actions occur in the United States. In response to this, the clandestine chemists rapidly shift synthesis to analogues and derivatives of controlled drugs and continue to search for new alternatives to avoid prosecution.

Uncontrolled analogues and derivatives of well-known drugs of abuse are popular due to their diverse range of biological activities.[2] The use of and demand for these designer compounds is becoming increasingly popular due to their internet sales and and regular advertisement as "legal highs." In controlling possession of these compounds, the ability to detect new designer drugs, alongside commonly occurring amphetamines in locations other than analytical laboratories, has still not been thoroughly evaluated. Presumptive tests for controlled substances, for example the Marquis reagent for identification of opiates, amphetamines and ring substituted amphetamines, are occasionally used by forensic scientists and law enforcement officers on site. They are heavily used as screening methods in the laboratory setting.[3] The need for a rapid screening method for commonly occurring drugs, as well as those newly used, is increasingly urgent as the number of drugs on the market increases exponentially.

The method described here uses a two stage approach in order to discriminate between a variety of ATS and precursor chemicals used in the synthesis of drugs of abuse. The initial stage involves the use of a series of seven presumptive test reagents that provide differentiation between compounds dependent on the functional groups present in the target molecules which include 14 examples of phenylethylamines, cathinone derivatives, ring substituted- and beta keto- amphetamines.

The second stage involves the use of thin-layer chromatography to provide further discrimination between the drugs. Samples were chromatographed on silica gel plates, developing the chromatogram in a chloroform-methanol solvent system (9:1 v:v). After development, separated compounds were visualised under UV light (254nm) and subsequently sprayed with 0.5M NaOH following by 1% Fast Black K Salt in distilled water which was applied directly to the plate. A range of colors were obtained with molecules from different classes.

The limit of detection using the presumptive tests lies in the low microgram range. TLC is more sensitive with visualisation of compounds possible between 0.625 and 10µg on plate. Successful validation of the method was performed in the form of blind trial testing after which the contents of the drug mixtures were confirmed by Gas Chromatography - Mass Spectrometry (GC/MS). This method allows non-specialists to make informed decisions concerning whether further laboratory analysis is required on suspected drug seizures.

References:

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3. Brandt, S.D, Freeman, S. Sumnall, H.R, Measham, F and Cole, J – 'Analysis of NRG 'Legal Highs' in the UK: Identification and Formation of Novel Cathinones'. Drug Testing and Analysis, Sept 2010

ATS, Presumptive Testing, Drug Screening

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