



K75 Cross-Reactivity of Designer Phenethylamines With the Emit[®] II Plus Amphetamine/Methamphetamine Assay in Urine

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The goal of this presentation is to provide attendees with cross-reactivity information for 4-methylcathinone and other psychoactive phenethylamines that may aid with screening for designer drugs in postmortem and police cases. The discussion will include the parameters of the analysis as well as some specific case examples.

This presentation will impact the forensic science community by providing a fast means of screening for phenethylamine designer drugs in urine.

4-methylcathinone (4-MEC) is a designer stimulant that has been a popular drug of abuse in New Zealand. It has been sold in the United States in bath salts products and as a research chemical. It is reportedly abused for psychoactive effects, including euphoria and alertness. 4-MEC was recently indicated in the suicide death of a New Zealand teenager and is an important compound to include in forensic toxicology testing.

NMS Labs recently reported two positive results for 4-MEC in blood that also had positive amphetamine immunoassay results in urine. None of the usual amphetamines, including amphetamine and methamphetamine, were detected in the blood using Liquid Chromatography With Tandem Mass Spectrometry (LC/MS/MS). Since the structure of 4-MEC and other phenethylamines appears similar to amphetamine, it may be possible to use existing immunoassay kits to screen for this class of designer drugs.

There have been several recent reports of designer drugs producing similar positive screening results. Mephedrone was found to cross react with a methamphetamine ELISA in postmortem blood.¹ In addition, Methylenedioxypyrovalerone (MDPV) was found to cross react with PCP.²

In order to further characterize these potential false positive results, the cross-reactivities for several popular phenethylamines were determined by spiking standards into blank human urine. Analysis was performed using the Emit[®] II Plus Monoclonal Amphetamine/Methamphetamine Assay (Syva). Amphetamine, methamphetamine, cathinone, methacathinone, mephedrone, methylone, MDPV, alpha-pyrrolidinovalerophenone (alpha-PVP), 4-MEC, pentadron, buphedrone, and naphyrone were evaluated between 500 and 10,000 ng/mL. The final concentrations in urine were verified by LC/MS/MS for those compounds with a quantitative method available. The results of this cross-reactivity testing will be presented along with some case examples.

The landscape of the designer drug market has been changing rapidly, making it difficult to develop sensitive methods for detection. Structural similarities may be used as a guide to select existing screening methods that may be sensitive to emerging designer drugs. These findings also indicate that unconfirmed methamphetamine screens could potentially contain phenethylamines. While there may be many explanations for false positive screens, the possibility of bath salt ingestion should be added to the list for consideration by medical and laboratory professionals.

This is especially important considering that one of the most attractive attributes of designer drugs is their invisibility on standard drug tests. Many analytical laboratories have been developing quantitative methods that can confirm designer phenethylamines in a variety of matrices, but targeted screening with these methods is often cost-prohibitive. The Emit[®] II Plus and other immunoassay tests are readily available and inexpensive tools that can potentially be validated as designer drug screens.

References:

1. Torrance H and Cooper G, The detection of mephedrone (4- methylmethcathinone) in 4 fatalities in Scotland. *Forensic Sci Int* 2010;202(1-3):e62-63.
2. Macher AM and Penders TM, False-positive phencyclidine immunoassay results caused by 3,4-methylenedioxypyrovalerone (MDPV). *Drug Test Anal* 2012; doi: 10.1002/dta.1371.

Immunoassay, Designer Drug, 4-MEC