



## Young Forensic Scientists Forum—2020

### Y30 Methamphetamine Confirmation Analysis After Controlled Vicks® VapoInhaler™ Injection Into Oral Fluid

Julia N. Canello\*, Pittsburgh, PA 15220; Stephanie J. Wetzel, PhD, Duquesne University, Pittsburgh, PA 15282; Frederick W. Fochtman, PhD, MolecularDx, LLC, Windber, PA 15963-1300

**Learning Overview:** The goal of this presentation is to further investigate false-positive assay testing for methamphetamine after a common nasal decongestant has been applied to neat oral fluid samples using Liquid Chromatography/Tandem Mass Spectrometry (LC/MS/MS).

**Impact on the Forensic Science Community:** This presentation will impact the forensic science community by exploring enantiomer concentrations of methamphetamine after positive assay results using oral fluid, a matrix not commonly used for routine assay testing. This study will also allow attendees to understand the relationship between enantiomeric compounds, such as methamphetamine, and how their effects can be used for very different outcomes.

Methamphetamine, a Schedule II stimulant of the Amphetamine family, is currently the second most widely abused illicit drug in the country.<sup>1</sup> Methamphetamine is sought for its extensive psychoactive stimulant effects that include instant subtle psychosis, attention deficit, and decreased motor skill ability.<sup>2</sup> Two isomers of the drug, dextro- (D-) and levo- (L-), form its composition; however, each produce very different effects when active. For example, many over-the-counter nasal decongestants contain both isomers but only produce the vasoconstriction qualities of L-methamphetamine (L-MAMP). As a result, false positive assays for methamphetamine have consistently been an issue in the forensic community for years. Specifically, drug assay screenings have been known to read positive for methamphetamine use after Vicks® VapoInhaler™ (and other nasal decongestants) intake using various matrices, resulting in a false positive for the illegal substance D-Methamphetamine (D-MAMP). The unfortunate results propose an increased need for confirmatory methods after such occurrences. This research aims to identify false positive assay results for methamphetamine associated with Vicks® VapoInhaler™ injection into neat oral fluid samples.

Previous research has been conducted in order to recover D-MAMP after Vicks® intake using matrices such as urine and blood, but has only scarcely been investigated using oral fluid. Current research used a Molecular Devices SpectraMax® i3x Plate Reader to measure absorbances of oral fluid samples that were spiked with varying concentrations of Vicks® products. An Immunalysis™ Methamphetamine Assay Kit was used to test the amount of D-MAMP present in such samples at a range of 0-100ng/mL. The Limit Of Quantification (LOD) cutoff of this test was found to be 50ng/mL, a concentration that can prove comparable to workplace assay kits. Solid Phase Extraction (SPE) was used for samples that provided a positive assay to prepare for LC/MS/MS using a positive pressure manifold and Strata™-X strong cation Phenomenex® SPE cartridges. The quantity of D-MAMP was detected and confirmed using the Agilent® Technologies 6460 LC/Triple Quadrupole/MS operating in positive mode.

It has been hypothesized that the oral fluid samples that have been injected with higher concentrations of Vicks® products will produce false positive assay results for the illegal substance D-MAMP. Method validation for the SPE and LC/MS/MS parameters for extracting methamphetamine from varying oral fluid samples has proven to work successfully. Proof of concept using the SpectraMax® i3x has been completed using both positive control samples and spiked oral fluid samples with D-MAMP, L-MAMP, and D/L-MAMP standards, showing a subtle yet consistent decrease of absorbances in increasing D-MAMP concentrated samples.

Detecting exact concentrations of both D-MAMP and L-MAMP isomers in these Vicks® products can eventually lead to more specific immunoassays that will produce fewer false positives. The use of oral fluid can provide law enforcement and workplace testing facilities an easier collection method for drug screening. Nasal decongestants such as Vicks® VapoInhaler™ are used in many people's everyday lives across the nation, so it is vital that the forensic science community understand the process and work toward a solution to reduce false positive results.

#### Reference(s):

1. Marilyn A. Huestis, Edward J. Cone. Methamphetamine Disposition in Oral Fluid, Plasma, and Urine. *HHS Author Manuscripts*, 2007, doi:10.1196/annals.1384.038.
2. National Institute on Drug Abuse. 2019. *DrugFacts: Methamphetamine*.

#### Methamphetamine, LC/MS/MS, Drug Screening