K40 Driving Under the Influence (DUI) of Methamphetamine/Amphetamine (mAMP/AMP) and Cannabinoids in the City and County of San Francisco

Eric A. Ingle, BA, 1965 Pleasant Hill Road, Pleasant Hill, CA 94523; Mariya Mayevskaya, BA, OCME, Forensic Lab Division, 850 Bryant Street, Hall of Justice, N Terrace, San Francisco, CA 94103; and Nikolas P. Lemos, PhD, UCSF, University of California, San Francisco, Dept of Lab Medicine, 584 Castro Street, Box 522, San Francisco, CA 94114*

After attending this presentation, attendees will possess the necessary knowledge to interpret mAMP/AMP and cannabinoid blood concentrations in DUI cases based on a seven-year review of such cases in San Francisco, CA.

This presentation will impact the forensic science community by demonstrating the need for and usefulness of comprehensive drug testing in DUI cases, irrespective of the driver's alcohol concentration.

In the City and County of San Francisco, the American Board of Forensic Toxicologists (ABFT) -accredited Forensic Laboratory Division (FLD) of the Office of the Chief Medical Examiner (OCME) performs all forensic toxicology testing, including postmortem as well as human performance forensic toxicology cases. A retrospective review of all suspected DUI cases submitted to the FLD between January 2, 2009, and January 28, 2016, was undertaken in order to better understand and characterize the incidence of mAmp/Amp in DUI cases in San Francisco.

Prior to August 1, 2014, DUI specimens were only screened for drugs by immunoassay and/or gas chromatography/mass spectrometry if drug testing was specifically requested by the police or if the blood ethanol was ≤0.10% weight by volume (w/v). Since August 1, 2014, all DUI specimens are screened for drugs regardless of the driver's blood alcohol concentration, and the testing protocol used is in compliance with *Recommendations for Toxicological Investigation of Drug-Impaired Driving and Motor Vehicle Fatalities*.[1]

Examination of digital and physical records revealed that in the seven-year period of interest, the FLD has performed analyses in 5,715 DUI cases (562 felonies; 5153 misdemeanors). Of these, 75 cases (1.3%) had mAmp/Amp and cannabinoids in blood and within this group, mAmp/Amp and cannabinoids were the only drugs found in 42 blood specimens; 59 of the 75 drivers with mAmp/Amp and cannabinoids were male (78.6%) and 34 of the 42 drivers with only mAmp/Amp and cannabinoids in their blood were male (80.9%). Whites, Hispanics, and Blacks comprised the three most common race groups among the 75 drivers with mAmp/Amp in their blood and among the 42 drivers with only mAmp/Amp and cannabinoids in their blood. The mean and median age of the 75 drivers with blood mAmp/Amp and cannabinoids was 36 and 33 years, respectively, but in the 42 cases with only mAmp/Amp and cannabinoids in their blood, they were 39 and 35 years, respectively.

In the 75 cases with blood mAmp/Amp and cannabinoids, the mean and median concentrations were as presented below:

(ng/mL)	mAMP	AMP	THC	THC-COOH	THC-OH
Mean	266	49	3.2	43	3.1
Median	190	37	2	19	2

In the 42 cases with only mAmp/Amp and cannabinoids in their blood, the mean and median concentrations were as presented below:

(ng/mL)	mAMP	AMP	THC	THC-COOH	THC-OH
Mean	297	47	3.3	40	1.75
Median	245	40	2	26	1.5

In the 33 cases with other substances detected, the most common were benzodiazepines (*n*=13; 17.3%), ethanol (*n*=11; 14.6%), and cocaine and/or its metabolites (*n*=7; 9.3%). Other compounds detected included MDMA/MDA, methadone, morphine/codeine/6-MAM, hydrocodone, oxycodone, zolpidem, and mirtazapine.

Analysis of Variance demonstrated statistically significant differences ($p<0.05$) when the concentrations of mAMP found in the male drivers (458ng/mL, *n*=54) was compared to that found in the female drivers (228ng/mL, *n*=12).

Initial incident times and time of blood draw were provided in 37 of the 75 cases and yielded mean and median times between the two events of 130.8 minutes and 120 minutes, respectively.

This retrospective review of mAmp/Amp and cannabinoid DUI cases in San Francisco clearly demonstrates that polysubstance DUIs remain an issue in this jurisdiction and comprehensive drug screening beyond alcohol in DUI cases is justified in the interest of public safety.

Reference(s):

1. Barry K. Logan, Kayla J. Lowrie, Jennifer L. Turri, Jillian K. Yeakel, Jennifer F. Limoges, Amy K. Miles, Colleen E. Scarneo, Sarah Kerrigan, Laurel J. Farrell. Recommendations for Toxicological Investigation of Drug-Impaired Driving and Motor Vehicle Fatalities. *Journal of Analytical Toxicology.* 2013;37:552–558 doi:10.1093/jat/bkt059.

mAMP/AMP Cannabinoid, Toxicology, DUID