K64 Forensic Toxicology Findings in 101 Cases of Drug-Facilitated Sexual Assault (DFSA) in the United States

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After attending this presentation, attendees will better understand the number and variety of substances encountered in DFSA cases in 17 different states and one territory in the United States.

This presentation will impact the forensic science community by providing data on sociological and toxicological statistical information, such as gender, age, concentrations of drugs, prevalence, and the amount of biological specimens collected.

DFSA involves the act of slipping a drug into a beverage to incapacitate without consent and the subsequent practice of sexual assaults. In 2015, 10,035 rapes were reported to law enforcement, according to the Federal Bureau of Investigation (FBI) Uniform Crime Reports.

The most common substances used in DFSA cases include: ethanol, GHB, benzodiazepines, opioids and opiates, Z-drugs, antihistamines, barbiturates, and traditional drugs of abuse, such as cocaine, cannabinoids, and amphetamines.

The data from 101 DFSA cases submitted to NMS Labs in 2016 were reviewed. All positive results from screening (Enzyme Immunoassay (EIA)) were verified by High-Performance Liquid Chromatography/Tandem Mass Spectrometry (HPLC-MS/MS), headspace Gas Chromatography (GC), or Gas Chromatography/Mass Spectrometry (GC/MS). In cases in which gender was available, 84 were female with an average age of 25.6 years (median 22, range 14-53 years) and two were male with an average age of 17.5 years (median 17.5, range 13-22 years). Blood and urine were collected from the alleged victims. Urine was submitted in 77.2% of the cases, and blood was submitted in 63.3% of the cases. Both matrices were collected in 40.5% of the cases.

Overall, 40 substances were found positive in blood and 67 substances were found positive in urine. There were no differences in the drugs detected in blood and urine for subjects for whom both samples were submitted. The most prevalent substances identified overall in blood and urine samples from the cases reviewed are listed in Table 1 below. Sixty-seven other substances were detected in less than 10% of the samples. The mean concentration of the most common drugs in blood were ethanol (116.77mg/dL); Δ^9 carboxy THC (19.55ng/mL); Δ^9 THC (2.07ng/mL); amphetamine (43.20ng/mL); and methamphetamine (367.50ng/mL). The drugs most frequently found in combination with alcohol were: ethanol + THC/metabolites (19.8%); ethanol + amphetamine/methamphetamine (13.86%); ethanol + antidepressants (12.87%); ethanol + benzodiazepines (11.88%); ethanol + antihistamines (8.91%); and ethanol + cocaine/metabolites (4.95%). Benzodiazepines and GHB are frequently reported as being associated with DFSA. In this series, benzodiazepines were found in a total of 15 cases: lorazepam (five cases); clonazepam/7-amino clonazepam (four cases); alprazolam/α-hydroxyalprazolam (four cases); midazolam/1-hydroxymidazolam (one case); and oxazepam/temazepam (one case). GHB was found in three urine samples at concentrations of 4.3mg/L, 4.5mg/L, and 6.0mg/L. Cut-off concentrations of 5mg/L or 10mg/L have been proposed to distinguish endogenous from exogenous GHB. This study demonstrates the variety of substances that are commonly encountered in alleged DFSA victims in the United States. The absence of alcohol and drugs in some cases may represent a time delay in collecting samples. The purpose of this research is to contribute to a better understanding regarding the factors involved in DFSA.

Table 1. Most common substances in DFSA cases.

Overall		Blood		Urine	
	%		%		%
Ethanol	36.6	Ethanol	35.9	Ethanol	33.3
Δ^9 Carboxy THC	33.6	Δ^9 Carboxy THC	23.4	Δ^9Carboxy THC	30.7
Amphetamine	14.8	Δ^9 THC	15.6	Amphetamine	8.9
Methamphetamine	10.8	Amphetamine	15.6	ß-phenethylamine	7.6
Δ^9 THC	9.9	Methamphetamine	12.5	Methamphetamine	6.4

DFSA, Ethanol, Forensic Toxicology