K42   The Incidence of Drugs and Alcohol in More Than 18,000 Drivers Using the Recommendations of a 2013 Consensus Study

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After attending this presentation, attendees will better understand the incidence and concentration of impairing drugs detected in Driving Under the Influence of Drugs (DUID) cases and the frequency of mixed drug and alcohol use.

This presentation will impact the forensic science community by providing an assessment of the current incidences and concentrations of impairing drugs in a large driving population based on a consensus-derived scope. In addition, recommendations for additional analytes are suggested, based on expanded testing.

Introduction: In 2013, a report was published that examined the capabilities of laboratories performing toxicological investigations of drug-impaired driving and motor vehicle fatalities cases.[1] This report included a consensus scope of analytes to be tested as well as proposed screening and confirmation cut-off concentrations. NMS Labs adopted these analytes in its ProofPOSITIVE® DUID/Drug Recognition Expert (DRE) drug testing panels. The results of more than 18,000 cases performed in the last year ending June 30, 2016, are described.

Methods: Drug screening was performed using standard Enzyme-Linked Immuno-Sorbent Assay (ELISA) protocols for the following drug classes and cutoff concentrations: (1) 500ng/mL — carisoprodol/meprobamate; (2) 40ng/mL — barbiturates; (3) 25ng/mL — methadone; (4) 20ng/mL — amphetamine/methamphetamine, benzodiazepines, cocaine/metabolites, and opiates; (5) 10ng/mL — oxycodone and phencyclidine; and, (6) 5ng/mL — zolpidem.

Panels could be ordered with or without a two-column Gas Chromatography/Flame Ionization Detector (GC/FID) headspace volatile panel (ethyl alcohol cut-off: 0.02g%). Confirmatory testing was performed either by Liquid Chromatography/Tandem Mass Spectrometry (LC/MS/MS) or Gas Chromatography/Mass Spectrometry (GC/MS). Volatile confirmations were performed by headspace GC/FID using a second aliquot.

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Results and Conclusions: A total of 18,321 cases were analyzed of which 10,776 were run with the volatile component. A summary of positive findings are noted in the table below.

ANALYTE	INCIDENCE	RL	MEAN	MEDIAN	RANGE
	% Reported +	NG/ML			
THC-COOH	43.9	5.0	45	29	5 - 1600
THC	40.7	0.5	5.8	3.7	0.5 - 110
11-OH-THC	24.9	1.0	3.4	2.5	1 - 38
ALPRAZOLAM	12.4	5.0	63	42	5 - 880
MORPHINE	11.1	5.0	54	30	5 - 3800
AMPHETAMINE	8.5	5.0	64	38	5 - 2500
BENZOYLECGONINE	8	50	651	360	50 - 5200
CLONAZEPAM	6.8	2.0	27	19	2 - 510
OXCODONE	6.8	5.0	69	38	5 - 1000
7-AMINOCLONAZEPAM.	6.7	5.0	38	26	5 - 490
METHAMPHETAMINE	5.2	5.0	263	150	5.2 - 3600
CODEINE	3.8	5.0	22	8.1	5 - 820
COCAINE	3.7	20	84	55	20 - 1000
NORDIAZEPAM	3.3	20	252	110	20 - 3300
6-ACETYLMORPHINE	3.2	1.0	6.1	2.3	1 - 760
METHADONE	2.9	20	264	210	20 - 2000
LORAZEPAM	2.7	5.0	60	35	5 - 920
DIAZEPAM	2.6	20	267	130	20 - 5900
HYDROCODONE	2.5	5.0	39	24	5 - 630
OXYMORPHONE	2.4	1.0	5.1	2.8	1 - 65
EDDP	1.8	20	54	45	20 - 330
MEPROBAMATE	1.5	1000	12719	10000	1000 - 49000
ZOLPIDEM	1.5	4.0	196	120	4.3 - 1400
CARISOPRODOL	1.4	200	4414	3400	220 - 19000
COCAETHYLENE	1.2	20	44	37	20 - 210
ALPHA-OH ALPRAZOLAM	0.96	5.0	8.9	7.5	5 -29
TEMAZEPAM	0.86	20	167	51	20 - 2500
OXAZEPAM	0.66	20	149	43	20 - 4400
HYDROMOPRHONE	0.62	1.0	5.5	2.1	1 - 83
PCP	0.62	5.0	48	46	8.1 - 120
DIHYDROCODEINE	0.51	5.0	9.2	7.8	5 - 27

Table 1: Positive Tier 1 analytes (with an incidence exceeding 0.50%)

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Ethanol was detected in 62% of cases tested with mean and median concentrations of 0.16g% and 0.15g%, respectively (range: 0.02g%-0.44g%). At least one drug was present in addition to alcohol in 56% of alcohol-positive cases. The majority of drug-positive cases were positive for more than one drug as shown in Table 2. Some of the most popular combinations will be presented.

# DRUGS	N	%
1	6545	35.7
2	2608	14.2
3	1789	9.8
4	1075	5.9
5	539	2.9
6	286	1,6
7	134	0.73
8	78	0.42
9+	42	0.23

Table 2: Summary of the number of drugs or metabolites present in all drug-positive cases, excluding alcohol (Cannabinoids were considered a single analyte.)

A total of 1,853 cases were tested for an expanded panel of nearly 200 drugs by Liquid Chromatography/Time-Of-Flight (LC/TOF). Of these, excluding caffeine, the most common drugs detected were buprenorphine (N=121, 6.5%) and fentanyl (N=106, 5.7%). These results suggest that consideration be given to add these compounds in future Tier 1 scopes, particularly due to the increase in fentanyl and designer fentanyl substitution to the current heroin supply.

Reference(s):

1. Logan et al. Recommendations for Toxicological Investigation of Drug-Impaired Driving and Motor Vehicle Fatalities. Journal of Analytical Toxicology 37: 552-8, 2013.

DUID, Drug-Impaired Driving, Incidence of Drugs

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