

Recreational Drug Use Trends and Emerging Analytes Identified in Blood, Urine, and/or Oral Fluid from Attendees at an Electronic Dance Music Festival

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Introduction

Electronic Dance Music (EDM) is a popular music genre in Europe and the United States and has a strong association with various types of drug use, especially novel psychoactive substances (NPS), which is documented by surveys with EDM attendees and is reflected in online discussion groups associated with EDM culture. EDM festivals within the United States have recently been a focus of media attention due to drug-related deaths and mass hospitalizations or medical aid calls, which have caused cancellations of the events. The use of these novel and potentially toxic drugs within these venues makes EDM festivals an important site to collect information regarding recreational drug use and potentially characterize emerging analytes. This project was designed to obtain information regarding what new drugs are on the market, their prevalence, identification of their metabolites, and correlations between their presence in blood, urine and oral fluid specimens, allowing insight into patterns of use within the United States.

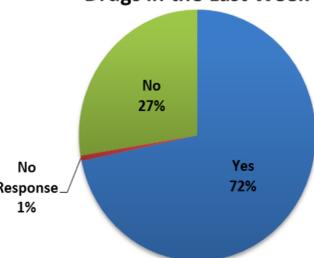
Methods

Participants were verbally recruited during an EDM festival in Florida during the Spring of 2014. Potential participants were approached on their way to the festival and given a brief overview of the project. After obtaining informed consent, participants were asked questions regarding their prescription and recreational drug use history within the last week and asked to donate blood, urine, and two oral fluid samples. Participants were not required to donate all specimens, but those who donated all specimens were given a \$20.00 gift card. Each participant was given a unique identification number that linked the samples and survey information to one another, but not to a specific individual in order to protect each participant's anonymity.

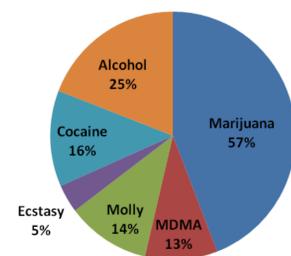
Demographic and Survey Data

Gender	76 males, 60 females (9 did not indicate M/F)
Average Age	23.7 (±6.4)
Age Range	18-57 years old
Total number of subjects	145
Number of Urine Samples	105
Number of Blood Samples	65
Number of Oral Fluid Samples	125 screened with the Alere™ DDS2® 136 collected with the Immulysis Quantisal™

Used Recreational or Prescription Drugs in the Last Week



Classes of Drugs Admitted To



Oral Fluid On-Site Screening Results

Samples were screened with the Alere™ DDS2® Mobile System Oral Fluid Field Test

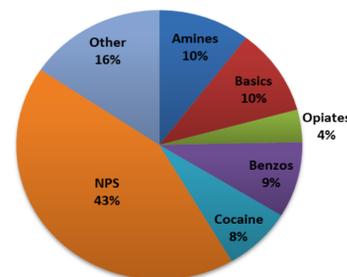
- 125 oral fluid samples were screened on-site after participants had left the study area
- Device screens for common drugs of abuse

Analyte	Cutoffs (ng/mL)	% Positive
Amphetamine	50 (Amp)	2.46%
Benzodiazepines	20 (Temazepam)	0.82%
Cannabis	25 (THC)	22.13%
Cocaine	30 (BZE)	9.84%
Methamphetamine	50 (mAmp)	2.46%
Opiates	40 (Morphine)	0%

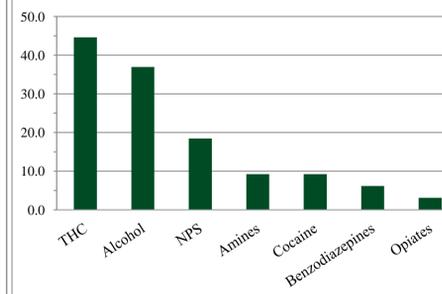
Blood Sample Analysis and Results

- 66 blood samples were screened using Waters ACQUITY UPLC® I Class Waters Xevo® G2-S QTOF using a basic liquid liquid extraction
- 73% (48 subjects) of the blood samples screened positive for a common drug of abuse/metabolite or NPS
- Of the 16 subjects screening positive for an NPS, 75% confirmed positive for at least one NPS

Blood Screening Results



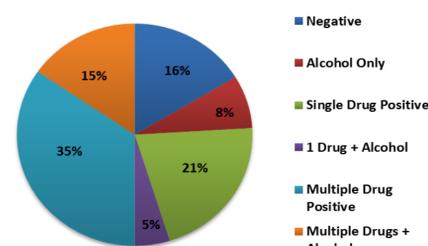
% Positive Rate in Blood Samples



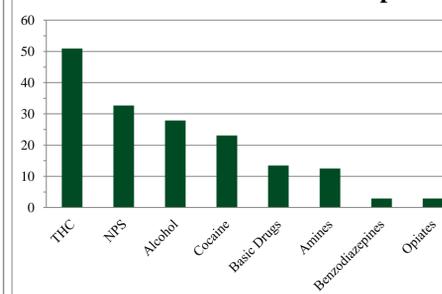
Urine Sample Analysis and Results

- 105 urine samples were screened via several analytical techniques including: Immunoassay, GC-MS, LC-QTOF, and RapidFire tandem mass spectrometry
- 35% of the urine samples confirmed positive for one or more drugs
- 33% of the urine samples confirmed positive for an NPS

Summary of Urine Analysis



% Positive Rate in Urine Samples



NPS Drugs

- Of the 104 participants who reported medicinal or recreational drug use within the last week, 29% had reported taking MDMA, Ecstasy, or "Molly"
- None of the participants reported taking alpha-PVP, however, alpha-PVP was detected in samples from individuals who admitted to taking "Molly" and MDMA
- Samples from subjects admitting "Molly" use contained: MDMA, alpha-PVP, methylone, ethylone, or butylone
- Samples from subjects admitting MDMA use contained: MDMA, alpha-PVP, methylone, dimethylone, ethylone
- Self-reported dosages:
 - MDMA: 0.3 grams up to 25 grams
 - "Molly": 0.2 mg up to 2.3 grams

NPS	Number of Positive Blood Samples	Number of Positive Urine Samples
4-FA	1	4
Alpha-PVP	6	13
Butylone	-	6
Ethylone	-	9
Dimethylone	4	10
MDMA	3	9
Methylone	7	23

Conclusion

Paired blood, urine and oral fluid samples were collected from 145 participants attending an EDM festival. Seventy-two percent of participants had indicated they had used medicinal or recreational drugs within the last week with the most common response being THC (57%). Several participants also indicated the use of NPS drugs like "Molly" (14%) and traditional party drugs like MDMA (13%). Blood and urine samples collected demonstrated high levels of NPS use among this population of EDM festival attendees. Next to THC, the next highest class of drugs confirmed in both blood and urine samples was NPS. In terms of NPS use, participants reported taking MDMA or "Molly," however these subjects samples often contained NPS drugs like alpha-PVP or methylone. Many of the participants are unknowingly ingesting highly potent substances with severe adverse effects, which creates a significant public health concern. Additionally, the majority of subjects who test positive for drug use are poly-drug cases increasing the likelihood of having an adverse event associated with drug use.

Acknowledgements

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