# Prevalence of Concurrent Detection of Novel Psychoactive Substances and Antipsychotics Treatment

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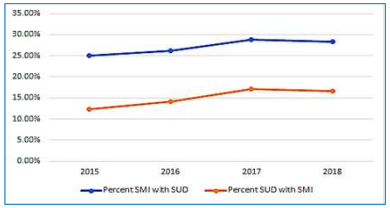
## Introduction

- Drug abuse and related overdose are globally alarming situations. Illicit substance use remains an ongoing struggle for policy-makers and countries worldwide.
- Novel psychoactive substances (NPS) are considered to be any new (primarily synthetic) psychotropic or neurotropic compound.
- NPS are often called "designer drugs", "legal highs" or "research drugs" and have very diverse nature and compositions.
- NPS are known to mimic averse and threatening effects of traditional illegal drugs; however, they may or may not be controlled by international drug conventions.
- The diverse nature and compositions of NPS impede detection via traditional definitive testing techniques. Hence, NPS pose a difficult challenge to clinicians and researchers, as well as a large threat to public health.
- As drug control laws evolve, the NPS are also increasingly being designed and distributed. This increase has further complicated the challenge of drug detection and the potential for abuse and/or drug overdose.
- To help clinicians better understand what NPS their patients may be using, Aegis offers NPS analysis for over 160 compounds in urine and oral fluid samples.
- Analyzed NPS classes include: Designer Opioids, Designer Benzodiazepines, Synthetic Cannabinoids, Synthetic Stimulants and other NPS (hallucinogens/ dissociatives).
- NPS use is often linked with substance use disorders (SUD). Serious mental illnesses (SMI) such as depression, schizophrenia, bipolar disorder and other mental disorders have also been linked to SUD.
- About 1 in 4 individuals with SMI also have a SUD.




Source: SAMHSA, Center for Behavioral Health Statistics and Quality, National Survey on Drug Use and Health, Mental Health
https://www.samhsa.gov/data/population-data-nsduh

- In line with SMI and SUD co-morbidity, individuals with these conditions may be predisposed to misuse illegal NPS substances, which could be a deterrent in their proper treatment.
- The present study evaluated the co-prevalence of novel psychoactive compounds and antipsychotic drugs in Chronic Pain and Behavioral Health populations.

## Methods

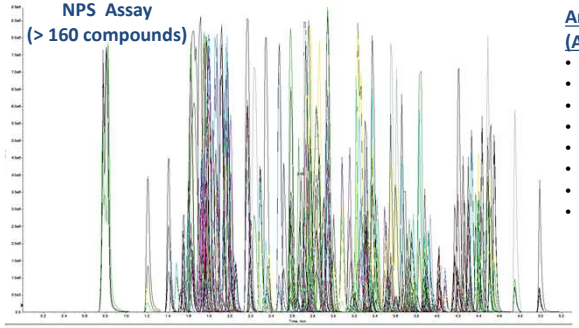
**Sample preparation**
- Hydrolysis with liquid-liquid extraction followed by evaporation and reconstitution

**Chromatographic separation**
- LC-MS/MS: reverse phase, Restek Raptor Biphenyl (100x3mm, 2.7µm) column

**Instrumentation**
- MS/MS: SCIEX API 4000/4500™

**Data Analysis/Interpretation**
- SCIEX MultiQuant™ 2.1.2

**NPS Assay (> 160 compounds)**



**Antipsychotics (APSY) Detected**
- Aripiprazole
- Brexpiprazole
- Cariprazine
- Haloperidol
- Olanzapine
- Quetiapine
- Risperidone
- Ziprasidone

## Results

177,146 patients tested for NPS (Apr 2021 through mid Feb 2022)

↓

5,168 NPS positives (2.9%) Age range 18-70 yo

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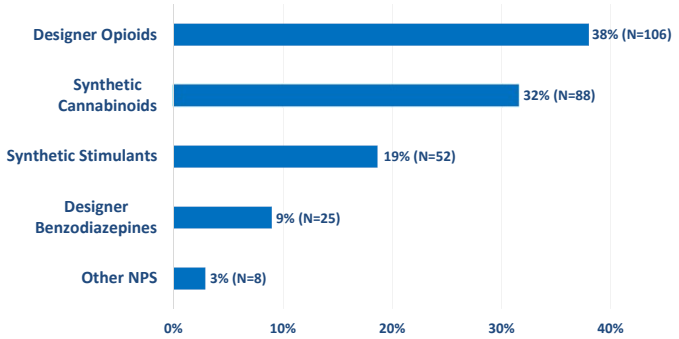
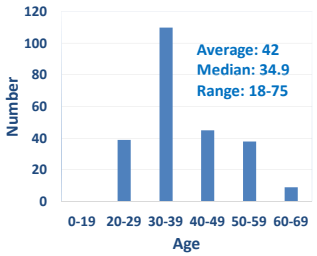
279 patients (5.4%) found co-positive for NPS and APSY

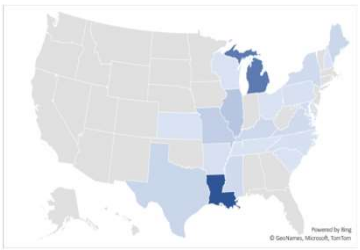
**% Co-Positivity of NPS Analytes with Antipsychotics**



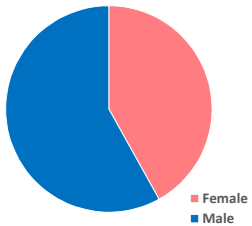

**Distribution of Results by Age**




**Geographical Distribution of Results**



**Distribution of Results by Gender**




## Conclusions

**Data Analysis**
- Out of 5,168 Novel Psychoactive Substance positive patient samples, 279 (5.4%) patients are found to have at least one NPS and one antipsychotic drug present.
- For the NPS co-positivity with Antipsychotics, Designer Opioids (38%) and Synthetic Cannabinoids (32%) found to have similar prevalence, followed by Synthetic Stimulants (19%), Designer Benzodiazepines (9%) and Other NPS (3%).

| Class | Designer Opioids | Synthetic Cannabinoids | Synthetic Stimulants | Designer Benzodiazepines |
|---|---|---|---|---|
| Most prevalent co-positive NPS identified | Fluoro-fentanyl (56%) Despropionyl FF (43%) | MDMB-4en PINACA (27%) 5F-MDMB PICA (20%) | Eutylone (80%) | Flualprazolam (37%) Bromazolam (29%) |
| Chemical Structure | Synthetic opioids | Synthetic analogs of cannabis | Synthetic analogs of cathinones | Derivatives of prescribed benzodiazepine |
| Effects | Sedative, Hypnotic, Anxiolytic | Intoxicant, Stimulants | Strong addiction, Stimulant | Sedative, Hypnotic, Anxiolytic |
| Medical/ Psychiatric Risks | Confusion, seizures, amnesia, vomiting, bradycardia, stroke, death | Paranoia, agitation, confusion, hallucination, addiction, hypertension, stroke, death | Insomnia, delirium, impulsive suicidal behavior, stroke, death | Confusion, seizures, amnesia, vomiting, bradycardia, stroke, death |

- Co-positivity of NPS and Antipsychotics are detected in patients from a variety of age groups with males being more likely to be consuming NPS with an antipsychotic drug.
- Detection is not limited to a specific geographical area, which suggests widespread usage.

**Clinical Significance**
- Detection of NPS in the presence of antipsychotics supports the concerns associated with SMI and SUD co-morbidity.
- The negative impact on medication adherence and potential overdose deaths could be major risk factors for individuals with behavioral health conditions that consume NPS drugs.
- NPS use may aggravate symptoms of mental illnesses, such as schizophrenia or bipolar disorder, and may further enhance psychiatric distress.
- NPS testing in chronic pain and behavioral health populations provides valuable information that can identify potentially problematic substance use and help clinicians improve treatment and deliver the best care.

**References**

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