

# SOFT 2020

## Abstract Submission Form

Due by May 1, 2020

\*\*\*Do not exceed 600 words including tables and charts.\*\*\*

**TITLE:** Keeping Current With Ever-Changing NPS Landscapes – Evaluating Trends and Connecting Case Histories

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### ABSTRACT:

**Background/Introduction (5,000 characters):** The emergence and proliferation of novel psychoactive substances (NPS) continue to challenge forensic toxicologists, drug recognition experts, medical examiners, and coroners. The frequency of NPS involvement in forensic investigations is relatively low compared to cases involving traditional drugs of abuse, however, investigations involving NPS are typically more time consuming and analytically complex. Not maintaining a current scope for NPS testing can result in unexplained impairment or autopsy findings, in turn leading to the possibility of inaccurate or under reporting.

**Objectives (5,000 characters):** The 2020 NPS landscape looks different than that from 2019 and before. The goal of our program ([www.npsdiscovery.org](http://www.npsdiscovery.org)) is to target the early appearance of emerging NPS in the United States and to subsequently monitor positivity and prevalence through an extensive battery of continually updated analytical workflows. Results and new information are then culminated and widely disseminated to stakeholders. This approach allows for evaluation of risk by examining NPS identifications, concentrations, and drug combinations to create the most comprehensive picture of use patterns.

**Methods (5,000 characters):** Biological samples (or sample extracts) from forensic and clinical toxicology investigations with suspicion of NPS use or ingestion were submitted for testing. Samples were prepared by liquid-liquid extraction (LLE) or solid phase extraction (SPE), depending on the non-targeted or targeted nature of the assay. Identifications of NPS, drugs of abuse, and other relevant substances were conducted using a SCIEX TripleTOF® 5600+ quadrupole time-of-flight mass spectrometer coupled with a Shimadzu Nexera XR ultra high performance liquid chromatograph (LC-QTOF-MS). Quantitative confirmations were conducted using a Waters Xevo TQ-S micro tandem mass spectrometer coupled with a Waters Acquity ultra performance liquid chromatograph (LC-MS/MS).

**Results (5,000 characters):** The majority of NPS identified through May 2020 resulted from postmortem investigations. Isotonitazene was the most commonly encountered NPS opioid, commonly found in combination with piperidylthiambutene and NPS benzodiazepines. 2-Methyl AP-237 was quantitatively confirmed in two drug overdose cases, fatal and non-fatal, but a marked difference in concentrations was noted (e.g. 35 ng/mL vs. 5,800 ng/mL, respectively). 5F-MDMB-PICA was the most commonly

encountered NPS synthetic cannabinoid, however, the prevalence of MDMB-4en-PINACA continued to increase both in combination with 5F-MDMB-PICA and/or 4F-MDMB-BINACA and absent of other synthetic cannabinoids. Flualprazolam positivity continued to increase among NPS benzodiazepines, however, etizolam remained the most prevalent substance in this class. Eutylone largely displaced previously prevalent NPS stimulants, but other stimulants (e.g. N-ethyl pentedrone) were also commonly encountered among this very diverse class. NPS hallucinogen identifications (e.g. MeO-PCP) were the least commonly encountered among all classes.

**Conclusion/Discussion (5,000 characters):** The NPS opioid landscape has evolved significantly over the last year and since the Drug Enforcement Administration (DEA) enacted core structure scheduling of fentanyl in 2018 to combat the proliferation of new synthetic analogues. Fentanyl analogues have largely disappeared, replaced by the emergence of new non-fentanyl derived synthetic opioids. The most common synthetic cannabinoids have remained consistent over the last year, however, the turnover of second tier substances remains an area of concern for forensic toxicologists. The diversity of NPS benzodiazepines remained low, but recent activity suggested that this market could expand in future months. NPS benzodiazepine combinations with opioids appeared to be increasing in frequency and remain an area of concern as their combined use can result in death. The combined NPS stimulant and NPS hallucinogen markets are the most diverse in terms of number of substances, but their turnover is typically dominated by a singular substance. Forensic toxicologists must remain aware of trends in the NPS landscape and consider further testing when case histories do not match analytical findings. The use of continually updated analytical workflows should be explored.