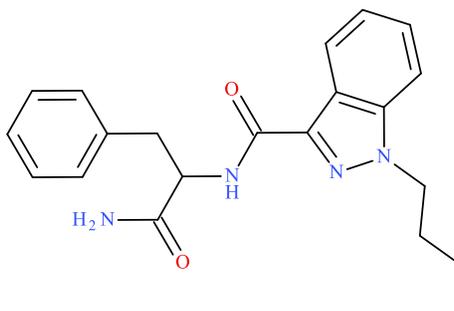


Trend Report: Q1 2019

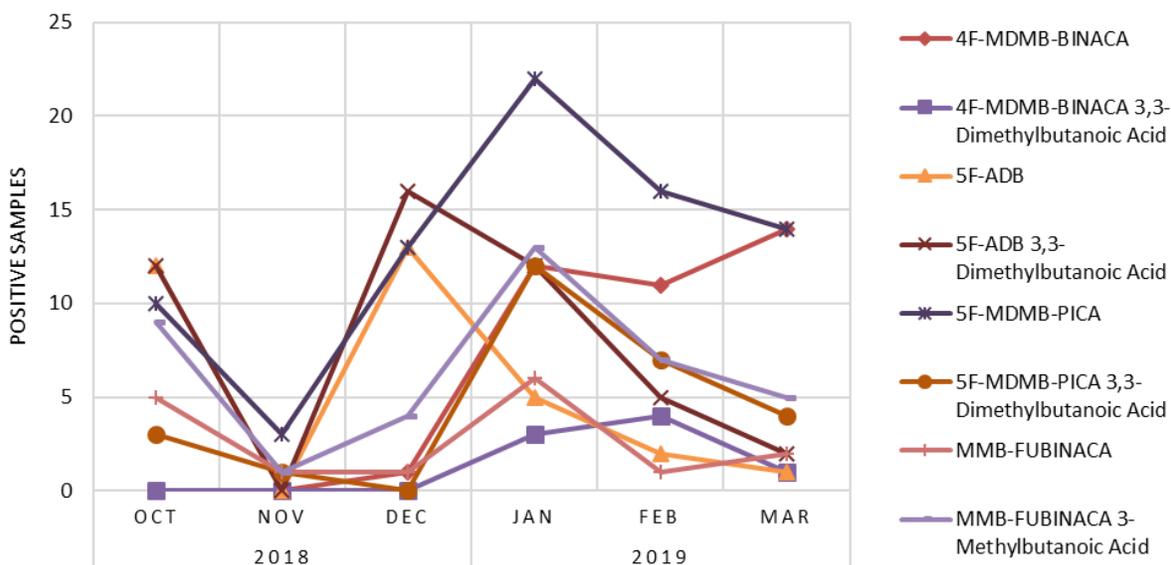
Synthetic Cannabinoids in the United States

New Synthetic Cannabinoid Identified in March 2019

APP-BINACA



Synthetic Cannabinoid Positivity: October 2018 to January 2019 (by Date Analyzed)



Purpose

The objective of this report is to provide up-to-date information regarding the status of synthetic cannabinoid prevalence, positivity, and discovery within the United States.

Project Overview

Novel psychoactive substances (NPS), including synthetic cannabinoids, continue to provide great challenges for forensic scientists, clinicians, and public health and safety personnel. Synthetic cannabinoids have been implicated in an increasing number of emergency room admissions, death investigations, and intoxication events in corrections populations. Maintaining a current scope of analysis can be challenging, often requiring availability of comprehensive analytical methodologies and reference materials for identifications.

This project employs a novel approach to analysis of biological samples and extracts by comprehensive non-targeted data acquisition using liquid chromatography high resolution quadrupole time-of-flight mass spectrometry (LC-QTOF). The scope of analysis contains more than 250 synthetic cannabinoid parent compounds and metabolites. Sample analysis and data processing occur on a weekly basis. In addition, retrospective analysis of datafiles is conducted as new synthetic cannabinoid standards become available. This model allows for real-time identification of novel synthetic cannabinoids and trend analyses.

Our laboratory has paired with various institutions to identify at-risk populations associated with synthetic cannabinoid use. Biological samples have been received from forensic laboratories, clinical partnerships, and/or correctional facilities from individuals involved in death investigations, driving under the influence scenarios, hospitalizations, and/or intoxications.

In collaboration with NMS Labs, sample extracts were received during this reporting period from forensic casework where for cause testing was directed for synthetic cannabinoids using a regularly updated panel. In total, cases were submitted from 24 states and the District of Columbia.

Acknowledgements

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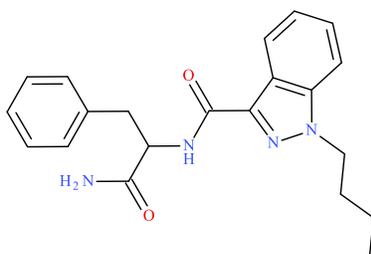
Disclaimer

All positive identifications were made based on extensive review of analytical data in comparison to acquired reference materials. Identifications of all chemically similar isobaric species may not have been achieved; therefore, reported analytes could encompass additional species not distinguishable solely by chromatographic or mass spectral features.

New Synthetic Cannabinoids

From January to March 2019, one new synthetic cannabinoid was identified in a biological sample extract; a compound that was not incorporated into the previous scope of testing and was reported during this project for the first time in the United States.

APP-BINACA



CHEMICAL INFORMATION

IUPAC Name: N-(2-amino-1-benzyl-2-oxo-ethyl)-1-butyl-indazole-3-carboxamide

CFR: Not Scheduled (04/2019)

CAS#: Not Available

Synonyms: APP-BUTINACA

SAMPLE INFORMATION

Positive Cases: 6

First Collection: 12/15/2018

First Received: 12/21/2018

Locations: IN (n=3), PA (n=1), TX (n=1), and LA (n=1)

REFERENCE

[APP-BINACA Monograph](#)

Trend Analysis for Synthetic Cannabinoids

From January to March 2019, 9 synthetic cannabinoid parent compounds and 8 synthetic cannabinoid metabolites were positively identified in 196 (12.8%) biological specimens or sample extracts after the analysis of 1,533 total samples. 5F-MDMB-PICA (n=52) was detected in the highest frequency, followed by 4F-MDMB-BINACA (n=37), MMB-FUBINACA (or FUB-AMB, n=9), and 5F-ADB (5F-MDMB-PINACA, n=8). This marks emergence of a new top synthetic cannabinoid in the United States, overtaking the multi-year reigns of MMB-FUBINACA and 5F-ADB. Several samples were positive for more than one synthetic cannabinoid, including parent compounds and/or metabolites. The following tables and figures are based on data from January 2019 to March 2019, unless otherwise noted.

Table 1: Positive Findings for Synthetic Cannabinoids (Parent)

Analyte (Parent)	Positive Samples	Positivity (%)
5F-MDMB-PICA	52	3.4%
4F-MDMB-BINACA	37	2.4%
MMB-FUBINACA (FUB-AMB)	9	0.6%
5F-ADB (5F-MDMB-PINACA)	8	0.5%
APP-BINACA	6	0.4%
ADB-FUBINACA	2	0.1%
5F-AMB	1	0.1%
4-cyano CUMYL-BINACA	1	0.1%
HU-331	1	0.1%

Table 2: Synthetic Cannabinoid Combinations

Analyte Combinations	Positive Samples
4F-MDMB-BINACA + 5F-MDMB-PICA	9
4F-MDMB-BINACA + 5F-MDMB-PICA + 5F-ADB	3
4F-MDMB-BINACA + APP-BINACA	3
4F-MDMB-BINACA + APP-BINACA + 5F-MDMB-PICA	1

Table 3: Positive Findings for Synthetic Cannabinoids (Metabolites)

Analyte (Metabolite)	Positive Samples	Positivity (%)
MMB-FUBINACA 3-Methylbutanoic Acid	25	1.6%
5F-MDMB-PICA 3,3-Dimethylbutanoic Acid	23	1.5%
5F-ADB 3,3-Dimethylbutanoic Acid	19	1.2%
4F-MDMB-BINACA 3,3-Dimethylbutanoic Acid	8	0.5%
5F-AMB 3-Methylbutanoic Acid	1	0.1%
MDMB-FUBICA 3,3-Dimethylbutanoic Acid	1	0.1%
ADB-PINACA N-Pentanoic Acid	1	0.1%
5F-NPB-22 3-Carboxyindazole	1	0.1%

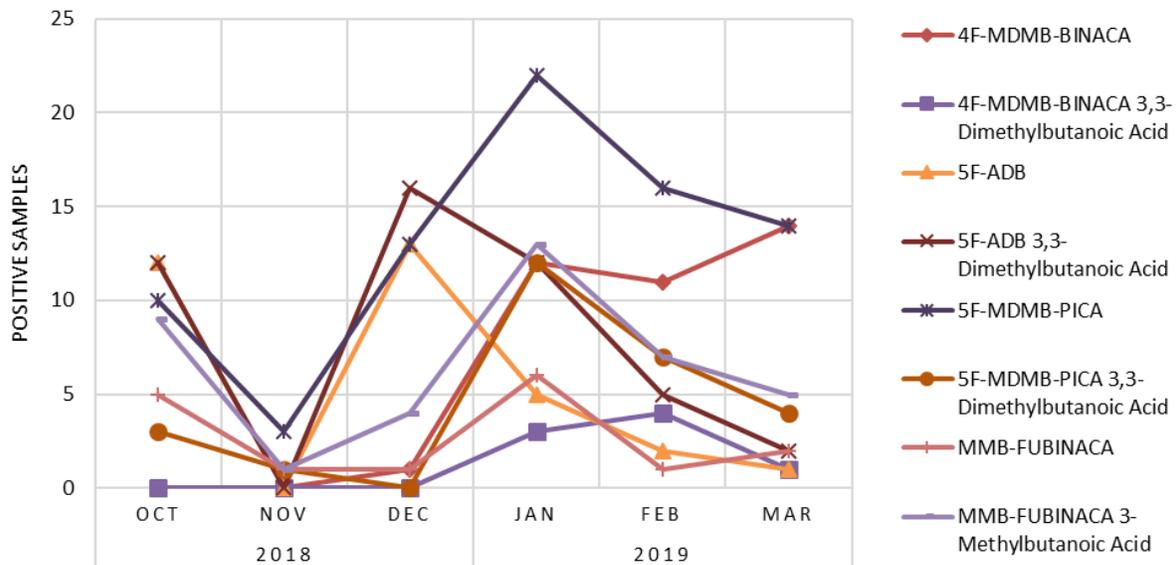


Figure 1: Synthetic Cannabinoids Positivity Trend Plot
 (Plotted by Date Analyzed; October 2018 to March 2019)

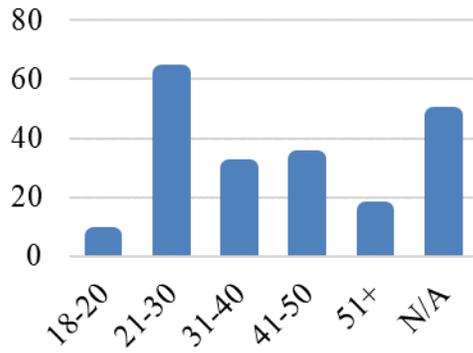


Figure 2: Age (n=196)

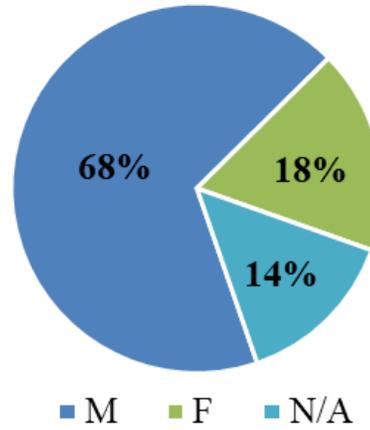


Figure 3: Sex (n=196)

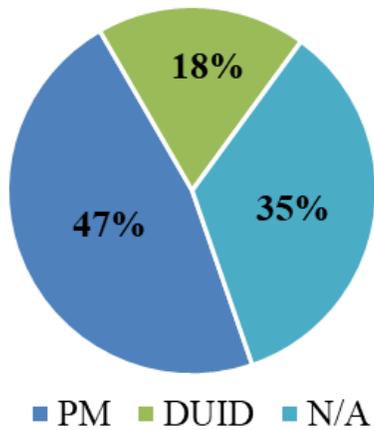


Figure 4: Case Type (n=196)

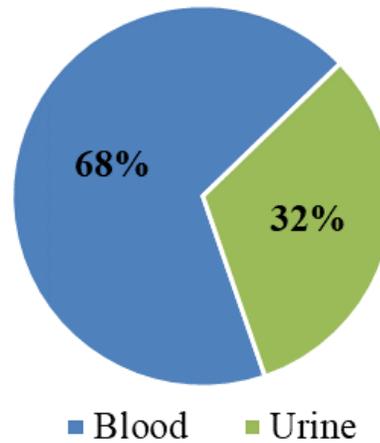


Figure 5: Matrix Type (n=194)

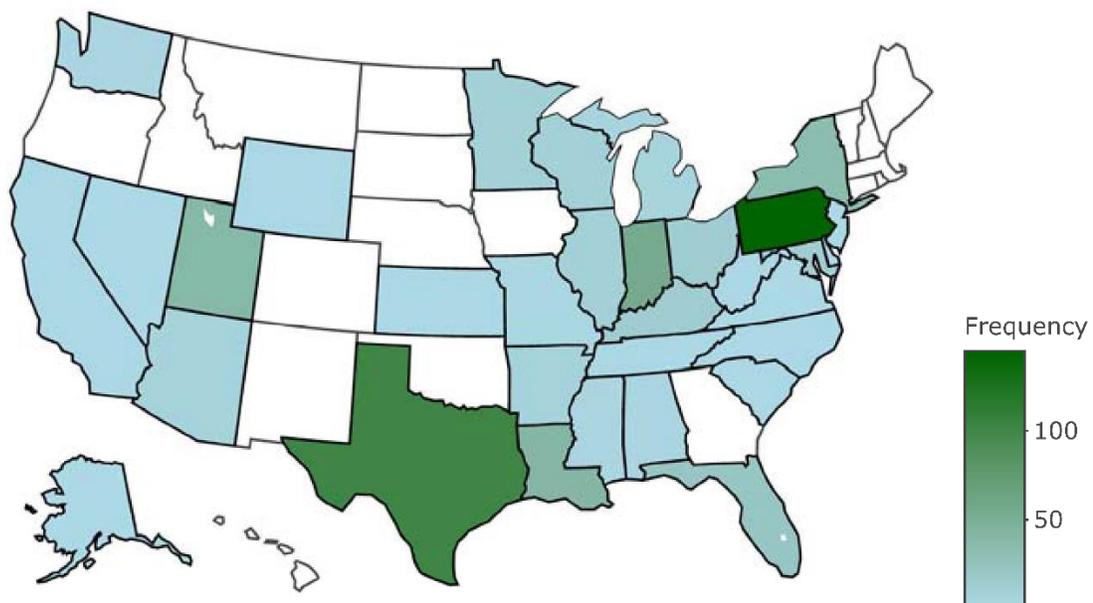


Figure 6: Heat Map of Synthetic Cannabinoid Positivity (July 2018 to March 2019)*

*Geographical distribution may be limited by location of agencies submitting samples and not necessarily representative of all jurisdictions.

Glossary of Synonyms

Reported Name	Synonym(s)
4F-MDMB-BINACA	4F-MDMB-BUTINACA
MMB-FUBINACA	FUB-AMB, AMB-FUBINACA
5F-ADB	5F-MDMB-PINACA
APP-BINACA	APP-BUTINACA
4-cyano CUMYL-BINACA	4-cyano CUMYL-BUTINACA