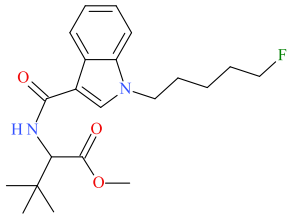
Trend Report: Q3 2018

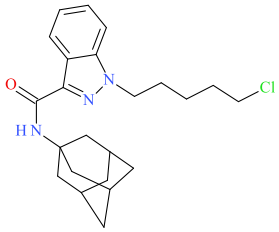
Synthetic Cannabinoids in the United States

New Synthetic Cannabinoids Identified Since January 2018

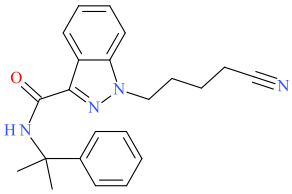
5F-MDMB-PICA



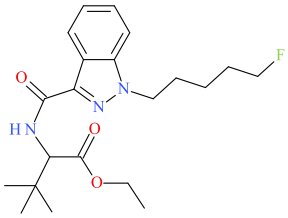
5Cl-AKB-48



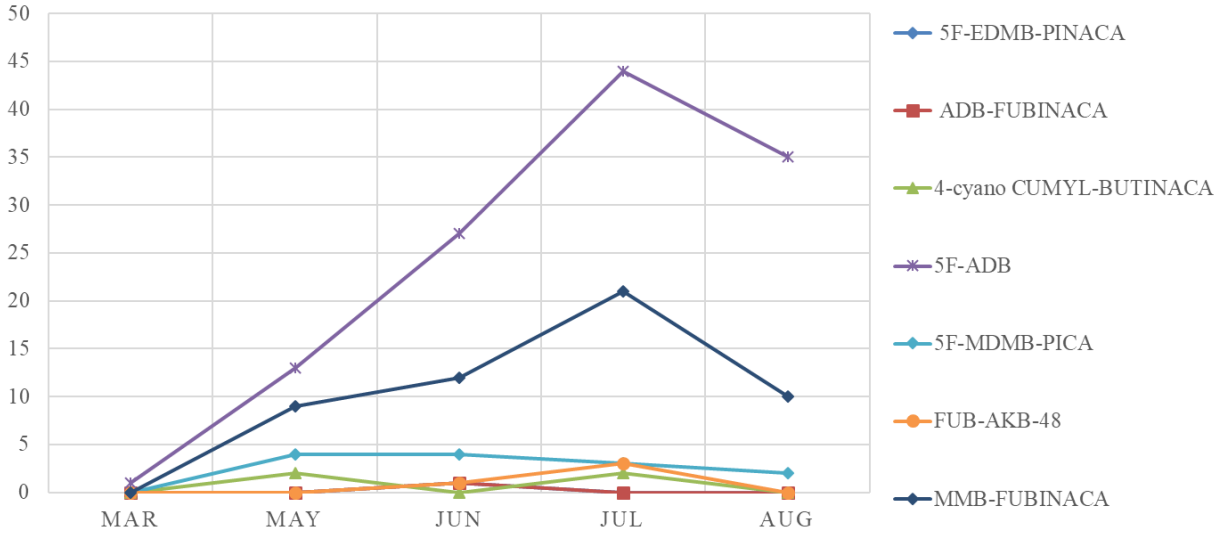
4-cyano-CUMYL-BUTINACA



5F-EDMB-PINACA



Positivity for Synthetic Cannabinoids Since January 2018



**Plot based on date received. Testing of all samples submitted in August 2018 may not be complete.*

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 (March to August 2018).

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 Colombia.

Acknowledgements

This report was prepared by Alex J. Krotulski, MSFS; Amanda L.A. Mohr, MSFS, D-ABFT-FT; and Barry K. Logan, PhD, F-ABFT at the Center for Forensic Science Research and Education at the Fredric Rieders Family Foundation.

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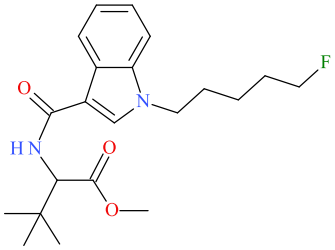
Disclaimer

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 June 2018, four new synthetic cannabinoids have been identified in biological samples or sample extracts that were not incorporated into previous scope of testing and/or have not been reported in casework in the United States.

5F-MDMB-PICA



CHEMICAL INFORMATION

IUPAC Name:	Methyl 2-[[1-(5-fluoropentyl)indole-3-carbonyl]amino]-3,3-dimethyl-butanoate
CFR:	Not Scheduled (09/2018)
CAS#:	1971007-88-1
Synonyms:	5-Fluoro MDMB-PICA, 5F-MDMB-2201, MDMB-2201

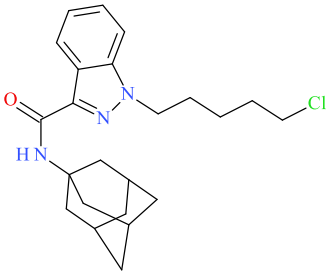
SAMPLE INFORMATION

Positive Cases:	13
First Collection:	01/07/2018
First Received:	05/22/2018
Locations:	PA (n=5), NY (n=3), MD (n=2), IN (n=1), LA (n=1), TX (n=1)

REFERENCE

5F-MDMB-PICA Monograph

5Cl-AKB-48



CHEMICAL INFORMATION

IUPAC Name:	N-(1-adamantyl)-1-(5-chloropentyl)indazole-3-carboxamide
CFR:	Not Scheduled (09/2018)
CAS#:	Not available
Synonyms:	5-Chloro AKB48, 5Cl-APINACA, 5-Chloro APINACA

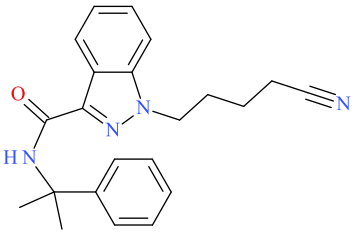
SAMPLE INFORMATION

Positive Cases:	1
First Collection:	07/11/2018
First Received:	07/09/2018
Locations:	PA (n=1)

REFERENCE

5Cl-AKB-48 Monograph

4-cyano-CUMYL-BUTINACA



CHEMICAL INFORMATION

IUPAC Name: 1-(4-cyanobutyl)-N-(1-methyl-1-phenyl-ethyl)indazole-3-carboxamide

CFR: Schedule 1

CAS#: 1631074-54-8

Synonyms: 4-CN-CUMYL-BUTINACA, CUMYL-4CN-BINACA, CUMYL-CB-PINACA, CUMYL-CYBINACA, SGT-78

SAMPLE INFORMATION

Positive Cases: 4

First Collection: 05/23/2018

First Received: 07/30/2018

Locations: PA (n=2), IL (n=2)

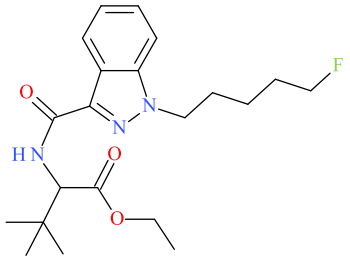
REFERENCE

Bovens et al. (2017) Structural characterization of the new synthetic...

Kuehn (2018) Synthetic Cannabidiol Poisoning.

Åstrand et al. (2018) Metabolism study for CUMYL-4CN-BINACA...

5F-EDMB-PINACA



CHEMICAL INFORMATION

IUPAC Name: Ethyl 2-[[1-(5-fluoropentyl)indazole-3-carbonyl]amino]-3,3-dimethyl-butanoate

CFR: Not Scheduled (09/2018)

CAS#: Not available

Synonyms: 5-Fluoro EDMB-PINACA

SAMPLE INFORMATION

Positive Cases: 4

First Collection: 06/03/2018

First Received: 06/01/2018

Locations: TX (n=3), NY (n=1)

REFERENCE

Liu et al. (2018) Identification and analytical characterization of six...

Trend Analysis for Synthetic Cannabinoids

From January through August 2018, 17 synthetic cannabinoids were positively identified in 179 (17.3%) biological samples or sample extracts after the analysis of 1,037 total specimens. 5F-ADB (or 5F-MDMB-PINACA, n=100) was detected in the highest frequency, followed by MMB-FUBINACA (or FUB-AMB, n=25), ADB-FUBINACA (n=13), and 5F-MDMB-PICA (n=13). Several samples were positive for more than one synthetic cannabinoid, including parent compounds and/or metabolites. These results are consistent with the national trend data reported by the National Forensic Laboratory Information System (NFLIS).

Table 1: Positive Findings for Synthetic Cannabinoids (Parent)

Analyte (Parent)	Positive Samples	Positivity (%)
5F-ADB	100	9.6
MMB-FUBINACA	25	2.4
ADB-FUBINACA	13	1.3
5F-MDMB-PICA	13	1.3
4-cyano CUMYL-BUTINACA	4	0.4
5F-EDMB-PINACA	4	0.4
FUB-AKB-48	4	0.4
5F-ADBICA	2	0.2
AB-PINACA	2	0.2
AB-CHMINACA	2	0.2
5F-AMB	1	0.1
5F-ADB-PINACA	1	0.1
5F-PB-22	1	0.1
MMB-CHMICA	1	0.1
MDMB-FUBINACA	1	0.1
5Cl-AKB-48	1	0.1
MAB-CHMINACA	1	0.1

Table 2: Positive Findings for Synthetic Cannabinoids (Metabolites)

Analyte (Metabolite)	Positive Samples	Positivity (%)
5F-ADB 3,3-Dimethylbutanoic Acid	61	5.9
MMB-FUBINACA 3-Methylbutanoic Acid	48	4.6
4-cyano CUMYL-BUTINACA N-Butanoic Acid	2	0.2

Table 3: Synthetic Cannabinoid Combinations

Analyte Combinations	Positive Samples
5F-ADB + MMB-FUBINACA	4
MMB-FUBINACA + 5F-MDMB-PICA	3
5F-ADB + 5F-EDMB-PINACA	3
MMB-FUBINACA + FUB-AKB-48	3
5F-ADB + 5F-MDMB-PICA	2
5F-ADB + MMB-FUBINACA+ 5F-MDMB-PICA	1

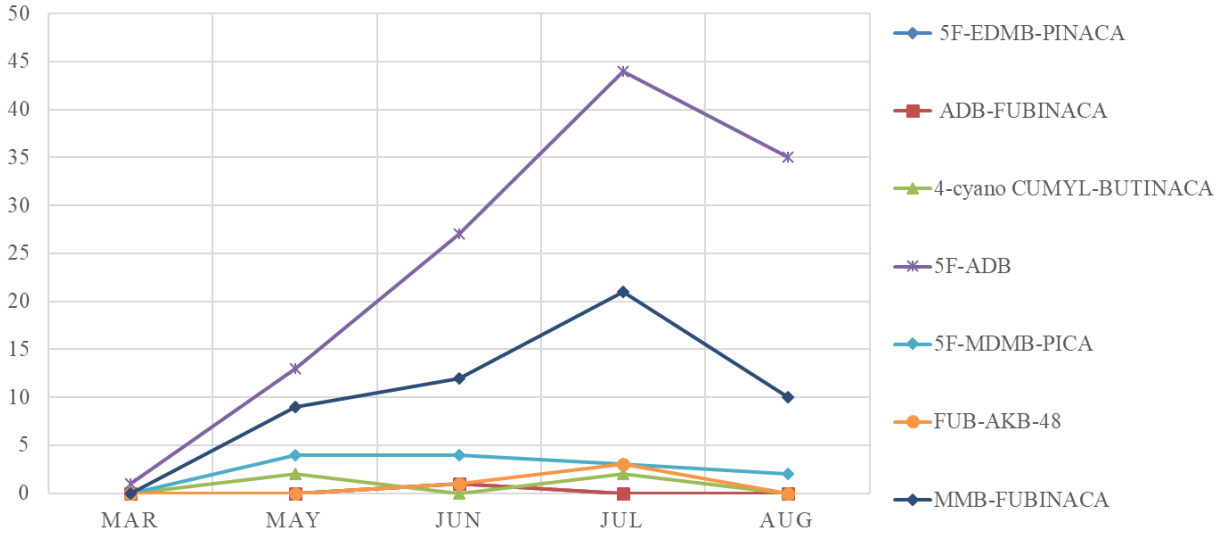


Figure 1: Synthetic Cannabinoids Positivity Trend Plot

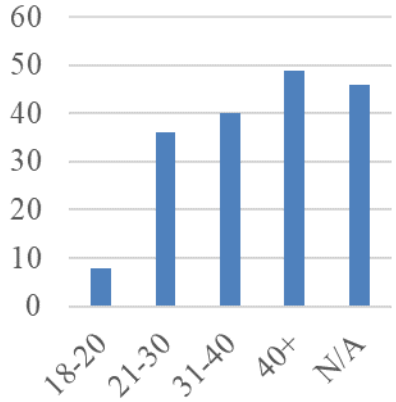


Figure 2: Age (n=179)

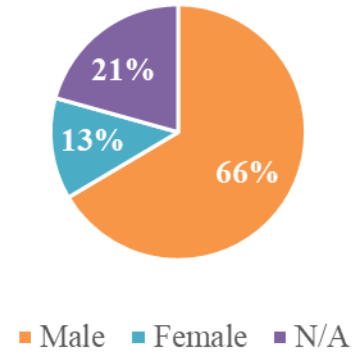


Figure 3: Gender (n=179)

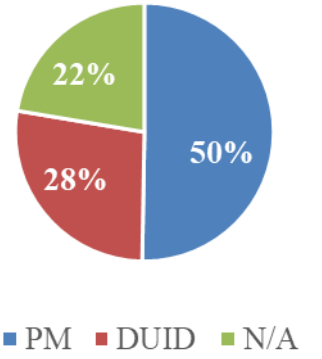


Figure 4: Case Type (n=179)

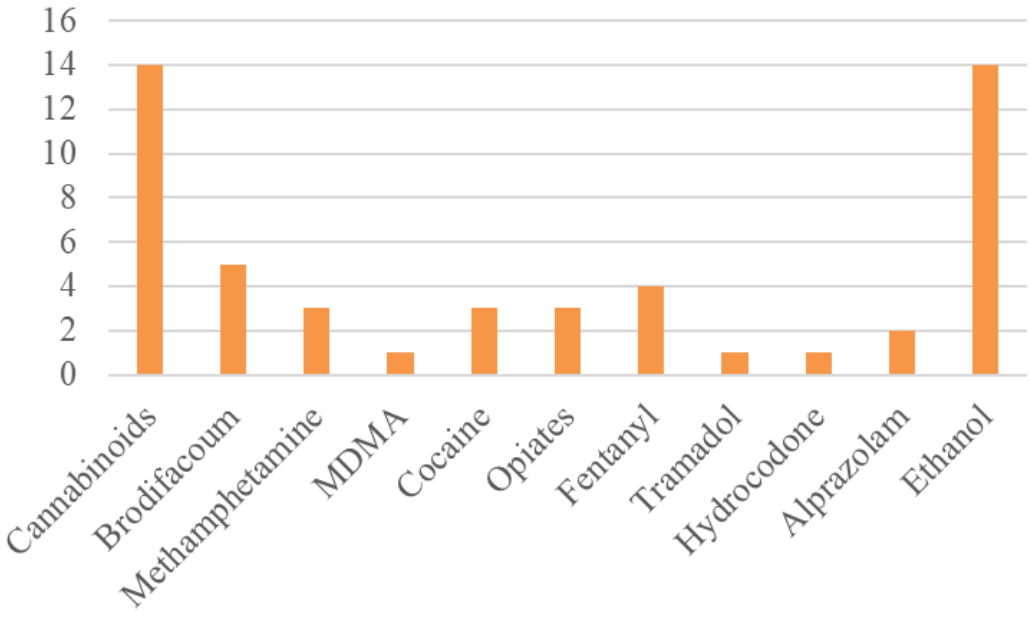


Figure 5: Other Notable Positive Findings

Glossary of Synonyms

Reported Name	Synonym(s)
5F-ADB	5F-MDMB-PINACA
MMB-FUBINACA	FUB-AMB, AMB-FUBINACA
4-cyano CUMYL-BUTINACA	CUMYL-4CN-BINACA, CUMYL-CB-PINACA, CUMYL-CYBINACA, SGT-78
FUB-AKB-48	AKB48 N-(4-Fluorobenzyl) Analogue, AFB-48, AFUBINACA, FUB-APINACA
5F-AMB	5F-AMP, 5F-MMB-PINACA
5F-PB-22	5F-QUPIC
MMB-CHMICA	AMB-CHMICA
MDMB-FUBINACA	FUB-MDMB, MDMB-Bz-F