Synthetic Drug Threats in the United States: 2018 Update

JILL M. HEAD
SPECIAL TESTING AND RESEARCH LABORATORY
DRUG ENFORCEMENT ADMINISTRATION
Objectives

1. Overview of the DEA Emerging Trends & Reference Materials Programs
2. Emerging Threat Report data for CY2017
3. Synthetic opioid seized drug composition
4. Drug Monograph and FTIR Instrument Library Updates
Emerging Trends and Reference Material Programs

1. Analysis of domestic and foreign drug seizures
2. Research and method development for identification and quantitation
3. Authentication of reference materials
4. Structural Elucidation of unknown drugs
5. Authors SWGDRUG monographs
6. Monitors past/current trends to predict future needs
7. Publishes Emerging Threat Report
Emerging Threats

New Psychoactive Substances (NPS)

- A new narcotic or psychotropic drug, in pure form or in preparation, that is not controlled by the UN drug conventions, but which may pose a public health threat

ategorizes:

- Synthetic Cannabinoids
- Substituted Cathinones
- Hallucinogens
- Synthetic Opioids
- Benzodiazepines
- Plant-Derived Highs
Forensic Chemistry Analysis

**WHAT IT IS**

<table>
<thead>
<tr>
<th>Seized drug samples</th>
<th>Parent drug</th>
</tr>
</thead>
</table>

**WHAT IT IS NOT**

- Biological samples
- Toxicological samples
- Metabolites
Data Sources

DEA Reporting
- Laboratory Information Management System (LIMS)
- Seized: 01/01/2017 – 12/31/2017, Analyzed by 12/31/2017

Considerations
- Backlogs
- Availability of reference materials
- Excludes analyses performed at DEA Special Testing and Research Laboratory
Synthetic Cannabinoids Seized and Identified by DEA between January 1, 2017 to December 31, 2017

- 922 synthetic cannabinoid identifications
- FUB-AMB was the most reported synthetic cannabinoid (51%)
- 21 different substances seized and identified
- One new substance identified

Notes:
1) This data was compiled from analytical results from the DEA laboratory system. It encompasses exhibits seized 01/01/2017 through 12/31/2017 that were analyzed by 12/31/2017. The data was retrieved on 01/08/2018.
Notes:
1) This data was compiled from analytical results from the DEA laboratory system. It encompasses exhibits seized 01/01/2017 through 12/31/2017 that were analyzed by 12/31/2017. The data was retrieved on 01/08/2018.
Synthetic Opioids Seized in 2015

- Valeryl fentanyl: 1
- 4-ANPP: 8
- β-Hydroxythiofentanyl: 12
- Butyrylfentanyl: 15
- Acetylfentanyl: 132
- Fentanyl: 524

Notes:
1) This data was compiled from analytical results from the DEA laboratory system. It encompasses exhibits seized 01/01/2015 through 12/31/2015 that were analyzed by 12/31/2016. The data was retrieved on 01/04/2017.
Fentanyl-type substances

Acetyl fentanyl
Fentanyl
Butyryl fentanyl
Valeryl fentanyl (Pentanoyl fentanyl)
Synthetic Opioid Synthesis

4-ANPP Precursor

Acetyl fentanyl  Fentanyl  Butyryl fentanyl  Valeryl fentanyl (Pentanoyl fentanyl)
Synthetic Opioid Synthesis

4-ANPP Precursor

- 4-ANPP
- Propionyl chloride
- Fentanyl

- 4-ANPP
- 2-Furoyl chloride
- Furanyl Fentanyl
Opioid & “Fentanyl-like” CY 2016 Identifications

- 15 different substances seized and identified in 2016
- ~60% of these substances were seized and reported for the first time in 2016

Notes:
1) This data was compiled from analytical results from the DEA laboratory system. It encompasses exhibits seized 01/01/2016 through 12/31/2016 that were analyzed by 12/31/2016. The data was retrieved on 01/04/2017.
Synthetic Opioid Synthesis

Modified 4-ANPP Precursor

NPP + Aniline → 4-ANPP + Propionyl chloride → Fentanyl

Modified NPP + Aniline → Modified 4-ANPP + Propionyl chloride → 3-Methyl fentanyl
Synthetic Opioids Seized and Identified by DEA in CY2017

- ~117% increase in identifications in CY2017
- 18 different substances seized and identified
- 7 substances seized and identified for the first time

Notes:
1) This data was compiled from analytical results from the DEA laboratory system. It encompasses exhibits seized 01/01/2017 through 12/31/2017 that were analyzed by 12/31/2017. The data was retrieved on 01/08/2018.
Synthetic Opioids
A LOOK AT SEIZED DRUG MIXTURES
Mid-Atlantic Region: 17 synthetic opioid identifications

- Fentanyl (15)
  - Fentanyl only (6)
- Fentanyl and heroin (9)
  - with tramadol (3)
  - with methamphetamine (1)
  - with 4-fluoroisobutyryl and 2-furanyl fentanyl (1)
- Other synthetic opioids (2)
  - 2-furanyl fentanyl (1)
  - 2-methoxyacetyl fentanyl (1)

Notes:
1) This data was compiled from analytical results from the DEA laboratory system. It encompasses exhibits analyzed 10/15/2017 through 10/28/2017.
Southeastern Region:
12 synthetic opioid identifications

- Fentanyl (11)
  - Fentanyl only (1)
  - Fentanyl and 2-methoxyacetyleftentany (1)

- Fentanyl and heroin (9)
  - Fentanyl and heroin only (2)
  - with ketamine (3) ➔ also with tramadol (2)
  - with acetylfentanyl and gabapentin (1)
  - with U-47700 (1)
  - with an unconfirmed substance (1)

- Other synthetic opioids (1)
  - 2-furanyl fentanyl and heroin

Notes:
1) This data was compiled from analytical results from the DEA laboratory system. It encompasses exhibits analyzed 10/15/2017 through 10/28/2017.
North Central Region:
18 synthetic opioid identifications

Fentanyl (17)
- Fentanyl only (6)

Fentanyl and heroin (11)
- Fentanyl and heroin only (8)
  - with ketamine (1)
  - with cocaine (1)
  - with acrylfentanyl (1)

Other synthetic opioids (1)
- 2-furanyl fentanyl, heroin, carfentanil

Notes:
1) This data was compiled from analytical results from the DEA laboratory system. It encompasses exhibits analyzed 10/15/2017 through 10/28/2017.
Northeastern Region:
*76 synthetic opioid identifications*

### Fentanyl (63)
- Fentanyl only (31)
- with tramadol (5) → also with acetylfentanyl (1); also with ketamine (1)
- with 4-ANPP (2)
- with methorphan (1)

### Fentanyl and heroin (24)
- Fentanyl and heroin (12)
- with tramadol (7) → also with ketamine (1); also with cocaine (1)
- with cocaine (1)
- with acetyl fentanyl (1)
- with U-47700 and 2-furanyl fentanyl (1)
- with methamphetamine (1)
- with butyryl fentanyl, 2-furanyl fentanyl, U-47700, and ADB-FUBINACA (1)

### Other synthetic opioids (13)
- 4-fluoroisobutyryl fentanyl (4) → also with heroin (2)
- 2-furanyl fentanyl (4)
- acetylfentanyl (3) → also with fentanyl (1)
- Cyclopropyl fentanyl (1)
- Butyryl fentanyl (1)

Notes: This data was compiled from analytical results from the DEA laboratory system. It encompasses exhibits analyzed 10/15/2017 through 10/28/2017.
Southwestern Region:
6 synthetic opioid identifications

<table>
<thead>
<tr>
<th>Classification</th>
<th>Count</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fentanyl</td>
<td>5</td>
</tr>
<tr>
<td>Other</td>
<td>1</td>
</tr>
</tbody>
</table>

- Representing ~19kg
- 4-ANPP (1)

Notes:
1) This data was compiled from analytical results from the DEA laboratory system. It encompasses exhibits analyzed 10/15/2017 through 10/28/2017.
Southwestern Region:
20 synthetic opioid identifications

- Fentanyl only (16)
- with Tramadol (3)
- with Heroin (1)

Other synthetic opioids (0)

Notes:
1) This data was compiled from analytical results from the DEA laboratory system. It encompasses exhibits analyzed 11/12/2017 through 11/25/2017.
DRUG ENFORCEMENT ADMINISTRATION
SPECIAL TESTING AND RESEARCH LABORATORY
EMERGING TRENDS PROGRAM

Benzodiazepines

- Phenazepam: 3
- Diclazepam: 3
- Flubromazolam: 4
- Flubromazepam: 9
- Etizolam: 43

Benzofurans

- 5-MAPB: 7
- 5-EAPB: 8
- 6-APB: 1

Tryptamines

- 5-MeO-MiPT: 1
- 4-AcO-DMT: 1
- 5-MeO-DMT: 2
- 4-OH-MET: 2

Hallucinogens

- DOB: 1
- 2C-B: 2
- 25C-NBOMe: 2
- DOC: 4
- 25I-NBOMe: 4

Notes:
1) This data was compiled from analytical results from the DEA laboratory system. It encompasses exhibits seized 01/01/2017 through 12/31/2017 that were analyzed by 12/31/2017. The data was retrieved on 01/08/2018.
“Other” Substances Seized and Identified in CY2017

<table>
<thead>
<tr>
<th>Substance</th>
<th>Count</th>
</tr>
</thead>
<tbody>
<tr>
<td>Substance Unconfirmed</td>
<td>53</td>
</tr>
<tr>
<td>3-Methoxy-PCP</td>
<td>17</td>
</tr>
<tr>
<td>Mitragynine</td>
<td>10</td>
</tr>
<tr>
<td>3-Fluorophenmetrazine</td>
<td>7</td>
</tr>
<tr>
<td>Methoxetamine</td>
<td>7</td>
</tr>
<tr>
<td>Deschloroketamine</td>
<td>6</td>
</tr>
<tr>
<td>DMAA</td>
<td>4</td>
</tr>
<tr>
<td>2-Oxo-PCE</td>
<td>3</td>
</tr>
<tr>
<td>Methoxphenidine</td>
<td>3</td>
</tr>
<tr>
<td>4-FA</td>
<td>2</td>
</tr>
</tbody>
</table>

Notes:
1) This data was compiled from analytical results from the DEA laboratory system. It encompasses exhibits seized 01/01/2017 through 12/31/2017 that were analyzed by 12/31/2017. The data was retrieved on 01/08/2018.
299 Drug Monographs created by the Special Testing and Research Laboratory

Newer monographs will only include references used in the authentication of that reference material (no links to external sites)

41 new monographs published in 2017:

<table>
<thead>
<tr>
<th>Drug</th>
<th>Reference Material</th>
<th>Substance Name</th>
<th>Reference Material</th>
</tr>
</thead>
<tbody>
<tr>
<td>Deschloroketamine</td>
<td>N-Methyl-1-(6-methylpyridin-2-yl)propan-2-amine</td>
<td>Midazolam</td>
<td>4-estren-3,17-dione</td>
</tr>
<tr>
<td>Flubromazolam</td>
<td>3-deoxy-3,4-methylenedioxyprovalerone</td>
<td>5-Fluoropentyl-3-pyridinoylindole</td>
<td>Nandrolone undecanoate</td>
</tr>
<tr>
<td>N-tert-butyl-3,4-methylenedioxythionone</td>
<td>4-Methyl-alpha-ethylaminopentiophenone</td>
<td>Tetrahydrofuran fentanyl</td>
<td>para-fluorobutyl fentanyl</td>
</tr>
<tr>
<td>alpha-ethyltryptamine</td>
<td>Yangonin</td>
<td>Isobutryl fentanyl</td>
<td>Hexanoyl fentanyl</td>
</tr>
<tr>
<td>ADB-FUBINACA</td>
<td>EMB-FUBINACA</td>
<td>3-Bromomethcathinone</td>
<td>Diclazepam</td>
</tr>
<tr>
<td>3-Chloromethcathinone</td>
<td>6-methoxy methylene</td>
<td>Phenylpiracetam</td>
<td>Phenmetrazine</td>
</tr>
<tr>
<td>4-Fluoromethylphenidate</td>
<td>N-ethyl-N-methyl-1,2-diphenylethanamine</td>
<td>N-(2-Methoxyethyl)-3,4-methylenedioxyamphetamine</td>
<td>4-Fluoropentedrone</td>
</tr>
<tr>
<td>4-Methoxy-phencyclidine</td>
<td>Barbital</td>
<td>Testosterone Caproate</td>
<td>alpha-PPP</td>
</tr>
<tr>
<td>Bupropion</td>
<td>N,N-Dimethylpentylone</td>
<td>3-Fluorophenmetrazine</td>
<td>Crotonyl fentanyl</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>benzoylbenzyl fentanyl</td>
</tr>
</tbody>
</table>
SWGDRUG FTIR Instrument Library: Update

Version 1.6 - Updated in December 3, 2017

Over 200 compounds
  ◦ All compounds are authenticated RMs from DEA
  ◦ Mostly emerging drug type compounds
  ◦ Addition of all classes of controlled substances in the future

Downloadable library available in different formats
Thank You!

Jill M. Head
Supervisory Chemist
United States Drug Enforcement Administration
Special Testing and Research Laboratory
Jill.M.Head@usdoj.gov
703-668-3349