



Early NPS Case Involving New Synthetic Cannabinoids

Society of Forensic Toxicologists (SOFT) Annual Meeting – Tuesday October 31, 2023

Workshop 11: Forensic Interpretation of Novel Psychoactive Substances in Challenging Cases

Alex J. Krotulski – Center for Forensic Science Research and Education (CFSRE)



DISCLOSURES

- I have no conflicts of interest to disclose.
- I am a scientist and employee of FRFF / CFSRE, a 501(c)(3) non-profit research and educational facility.
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 - The opinions, findings, conclusions and/or recommendations expressed in this presentation are those of the author(s) and do not necessarily represent the official position or policies of the U.S. Department of Justice.



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CASE #1



CASE #1 – JULY 2020

- **Circumstances:**

- ~35-year-old female, found down at train station
- Taken to hospital, pronounced dead in ED



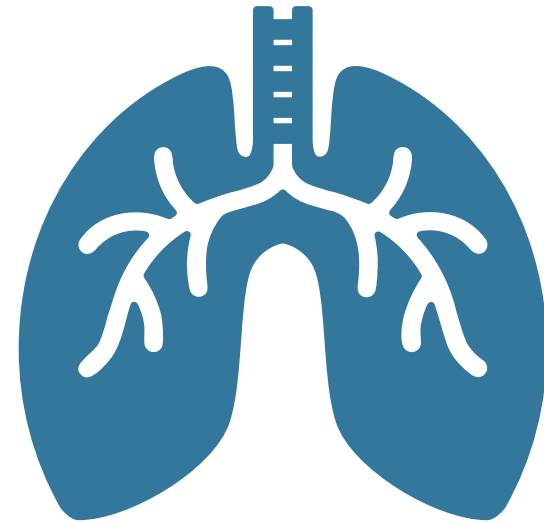
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- **Autopsy Findings:**

- Pulmonary congestion and edema, with visceral congestion
- Status post remote bilateral tubal ligation and separation
- No significant blunt trauma or penetrating injuries
- Minor wounds on knees and legs



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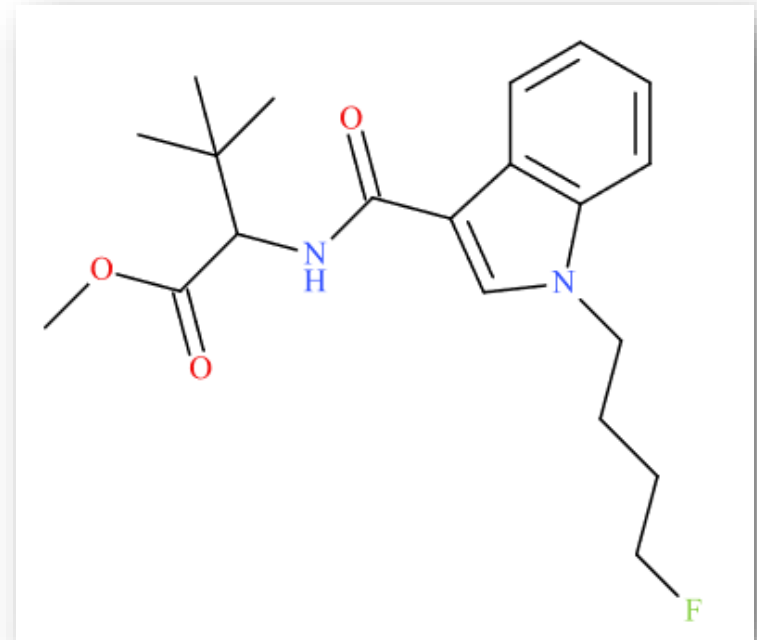
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▪ Toxicology (Blood):

- NMS Labs – THC (0.71 ng/mL), naloxone, cotinine
- **CFSRE – 4F-MDMB-BICA (qual. only)**



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 - *Case 1 reported Sept. 2020*
- **Pharmacology data?**
 - Comparison to other drugs?

CASE #1 – JULY 2020

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ACS Chemical
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Synthesis and *in Vitro* Cannabinoid Receptor 1 Activity of Recently Detected Synthetic Cannabinoids 4F-MDMB-BICA, 5F-MPP-PICA, MMB-4en-PICA, CUMYL-CBMICA, ADB-BINACA, APP-BINACA, 4F-MDMB-BINACA, MDMB-4en-PINACA, A-CHMINACA, 5F-AB-P7AICA, 5F-MDMB-P7AICA, and 5F-AP7AICA

Annelies Cannaert, Eric Sparkes, Edward Pike, Jia Lin Luo, Ada Fang, Richard C. Kevin, Ross Ellison, Roy Gerona, Samuel D. Banister*, and Christophe P. Stove*

Cite this: *ACS Chem. Neurosci.* 2020, 11, 24, 4434–4446

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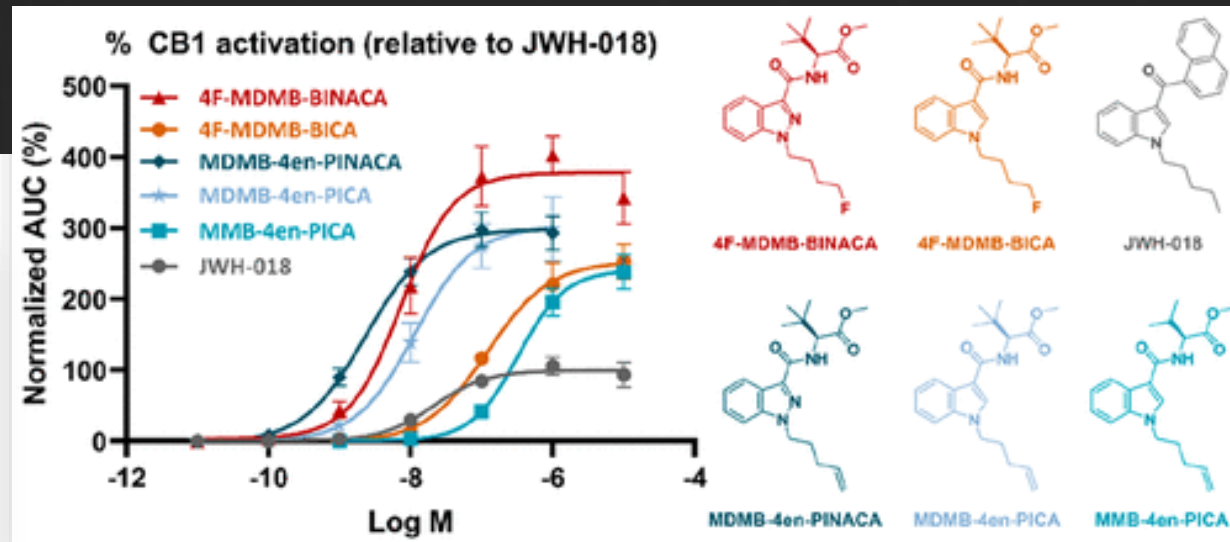
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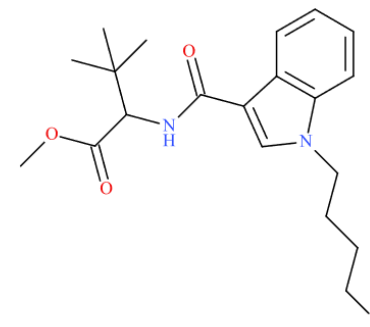
4F-MDMB-BICA

Sample Type: Seized Material

Latest Revision: July 1, 2020

Date Received: May 14, 2020

Date of Report: July 1, 2020



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- **NPS Discovery issued new drug monograph July 2020**
 - *Case 1 reported Sept. 2020*
- **Pharmacology data?**
 - Comparison to other drugs?
- **Death Certificate:**
 - MOD – Accident
 - **COD – Acute 4F-MDMB-BICA (Synthetic Cannabinoid Receptor Agonist (SCRA)) Intoxication**



CASE #2



CASE #2 – JANUARY 2023

- **Circumstances:**

- 57-year-old male, discovered unresponsive after taking shallow breaths
- Possible drug paraphernalia was observed
- CPR performed, pronounced dead on the scene



CASE #2 – JANUARY 2023

▪ Circumstances:

- 57-year-old male, discovered unresponsive after taking shallow breaths
- Possible drug paraphernalia was observed
- CPR performed, pronounced dead on the scene

▪ Autopsy Findings:

- No evidence of significant antemortem injury
- Mild coronary atherosclerosis and liver steatosis
- Pulmonary edema and cerebral edema



CASE #2 – JANUARY 2023

■ Circumstances:

- 57-year-old male, discovered unresponsive after taking shallow breaths
- Possible drug paraphernalia was observed
- CPR performed, pronounced dead on the scene

■ Autopsy Findings:

- No evidence of significant antemortem injury
- Mild coronary atherosclerosis and liver steatosis
- Pulmonary edema and cerebral edema

■ Toxicology (Central Blood):

- NMS Labs – Naloxone, Lamotrigine (5.6), Aripiprazole (50), Citalopram (730)
- **CFSRE – MDMB-4en-PINACA (0.75 ng/mL)**



CASE #2 – JANUARY 2023

- “Old” synthetic cannabinoid
 - First emerged in September 2019
 - Literature available – toxicology, cases, etc.

Received: 22 June 2020 | Revised: 18 September 2020 | Accepted: 21 September 2020
DOI: 10.1002/dta.2935

RESEARCH ARTICLE

WILEY

The next generation of synthetic cannabinoids: Detection, activity, and potential toxicity of pent-4en and but-3en analogues including MDMB-4en-PINACA

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²Laboratory of Toxicology, Department of Bioanalysis, Faculty of Pharmaceutical Sciences, Ghent University, Ghent, Belgium
³Toxicology Department, NMS Labs, Horsham, PA, USA

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Alex Krotulski, Center for Forensic Science Research and Education, Fredric Rieders Family Foundation, Willow Grove, PA, USA.
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Abstract
A new class of synthetic cannabinoids has emerged as new psychoactive substances (NPS). Similar in structure to JWH-022, these substances contain alkene modifications to the tail region of the synthetic cannabinoid core structure, and nomenclature denotes these new analogues as pent-4en or but-3en species. Internationally, two analogues from this new series recently emerged: MDMB-4en-PINACA and MMB-4en-PICA. Previously, data regarding activity and potential toxicity were not available. *In vitro* assessment of cannabinoid receptor 1 (CB1) activation via the β -arrestin 2 recruitment was studied for three (3) pent-4en analogues, one (1) but-3en analogue, and one (1) principal metabolite. MDMB-4en-PINACA (2.47 nM, 239%),

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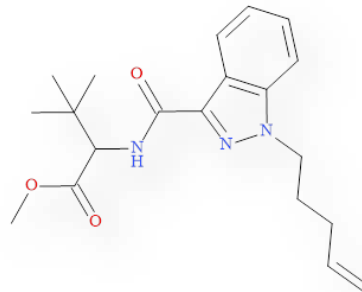
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- “Old” synthetic cannabinoid
 - First emerged in September 2019
 - Literature available – toxicology, cases, etc.
- Pharmacology → potent CB1 agonist
- What does the quantitative value mean?
 - **MDMB-4en-PINACA (0.75 ng/mL)**
 - Cardiac blood
 - Known SCRA instability
 - No reference ranges



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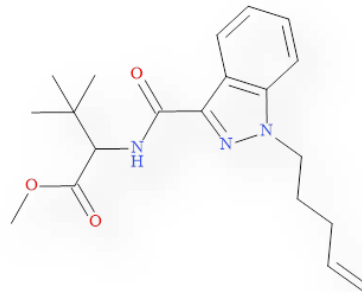
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■ Death Certificate:

- MOD – Accident
- **COD – MDMB-4en-PINACA toxicity**



CONCLUSIONS



ACKNOWLEDGEMENTS

- **CFSRE Team**
 - Barry Logan, Sara Walton, Alyssa Reyes, Brianna Stang, others
- **NMS Labs**
 - Donna Papsun
- **MEC Collaborators**
 - Montgomery County and Cook County
- **National Institute of Justice (NIJ)**



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THANK YOU! **QUESTIONS?**



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Program Manager – NPS Discovery
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