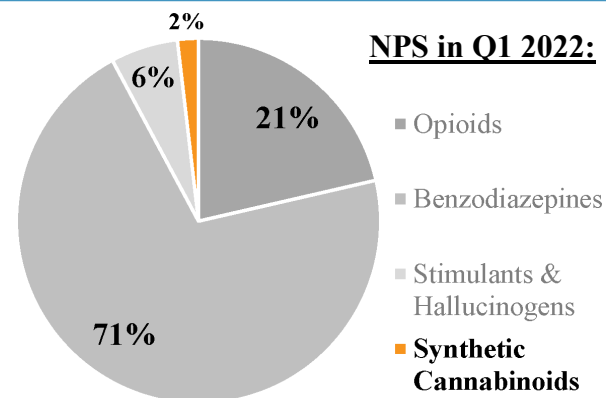


**Purpose:** This report provides up-to-date information regarding the status of synthetic cannabinoid prevalence and positivity within the United States.

**Overview:** Novel psychoactive substances (NPS), including synthetic cannabinoids, continue to pose 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, requiring comprehensive analytical methodologies and reference materials for identification(s).

**Objective:** Our laboratory utilizes novel approaches for the analysis of drugs in biological samples and seized materials using comprehensive non-targeted data acquisition by gas chromatography mass spectrometry (GC-MS) and liquid chromatography quadrupole time-of-flight mass spectrometry (LC-QTOF-MS). The scope of analysis contains more than 900 drugs, including a vast majority of NPS and their metabolites. This approach allows for real-time identification of novel synthetic cannabinoids and further data analysis of important trends. This project was conducted in collaboration with the toxicology and criminalistics laboratories of NMS Labs. Forensic case types linked to these results include illicit drug investigations, medicolegal death investigations, and/or driving under the influence of drugs (DUID) investigations. The results in this report represent the total number of NPS identifications at the CFSRE during this quarter, including those from sample-mining, data-mining, and/or esoteric testing.

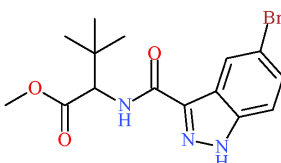
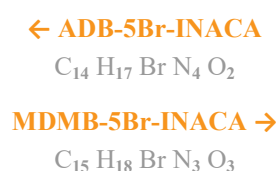
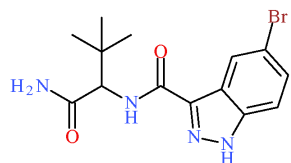
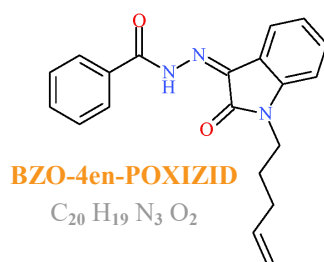
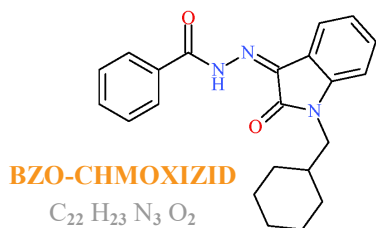
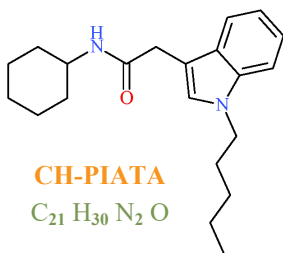


## NEWLY EMERGING SYNTHETIC CANNABINOIDS

The synthetic cannabinoid landscape continues to evolve rapidly following foreign control efforts. As a result, new structural variants of the synthetic cannabinoid class are emerging at a rapid pace, which is challenging current forensic and analytical workflows.

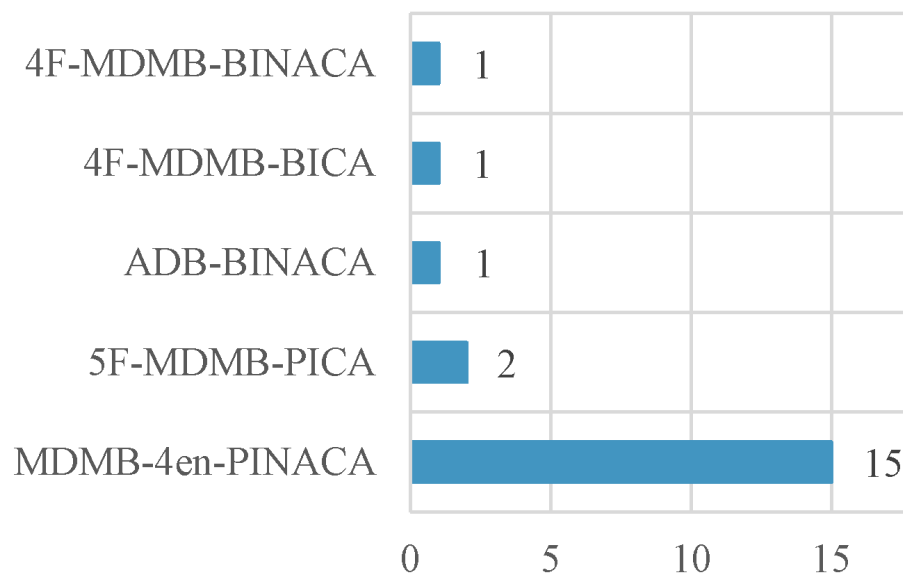
The CFSRE has observed a significant shift in the discovery and proliferation of new synthetic cannabinoids away from indole carboxamides and indazole carboxamides included under a Chinese class-wide ban. The synthetic cannabinoids below have been tentatively identified in drug materials at our laboratory and confirmation is pending.

For more details on this topic, visit our NPS Discovery website for a new presentation titled: [“Explanation and Impacts of a Class-Wide Ban on Synthetic Cannabinoids: What Does the Future Hold for this Already Challenging NPS Subclass?”](#)



## SYNTHETIC CANNABINOIDS IDENTIFIED

■ Toxicology ■ Drug Material



**Acknowledgements:** This report was prepared by Alex J. Krotulski, PhD; Sara E. Walton, MS; Amanda L.A. Mohr, MSFS, D-ABFT-FT; and Barry K. Logan, PhD, F-ABFT at the Center for Forensic Science Research and Education (CFSRE) at the Fredric Rieders Family Foundation. NPS Discovery would like to acknowledge scientists at CFSRE and NMS Labs for their involvements and contributions. For more information about our programs and reports, please contact NPS Discovery at [npsdiscovery@cfsre.org](mailto:npsdiscovery@cfsre.org) or visit our website at [www.npsdiscovery.org](http://www.npsdiscovery.org).

**Funding:** NPS Discovery at the CFSRE is supported in part by the National Institute of Justice, Office of Justice Programs, U.S. Department of Justice (Award Number 2020-DQ-BX-0007, “Real-Time Sample-Mining and Data-Mining Approaches for the Discovery of Novel Psychoactive Substances (NPS)”). The opinions, findings, conclusions and/or recommendations expressed in this publication are those of the author(s) and do not necessarily reflect those of the Department of Justice.