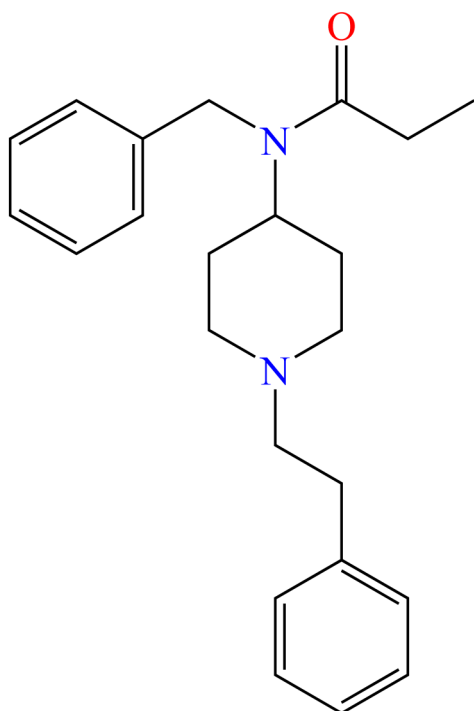




## Fentanyl Methylene Homolog



NPS SUBCLASS	Opioid
REPORT DATE	March 26, 2026
SAMPLE RECEIVED	February 27, 2026
SAMPLE TYPE	Drug Material

Preferred Name	Fentanyl Methylene Homolog				
Synonyms	N/A				
Formal Name	N-benzyl-N-(1-phenethylpiperidin-4-yl)propionamide				
Chemical Formula	C <sub>23</sub> H <sub>30</sub> N <sub>2</sub> O				
Molecular Weight	350.5	Molecular Ion [M <sup>+</sup> ]	350	Exact Mass [M+H] <sup>+</sup>	351.2431

**About:** In collaboration with medical examiner and coroner offices, crime laboratories, clinical partners, and other stakeholders, the Center for Forensic Science Research and Education (CFSRE) is documenting first confirmations of NPS through analysis of drug materials and/or toxicology samples. These reports are generated using comprehensive analytical techniques (e.g., GC-MS, LC-QTOF-MS, NMR) and include available information about the new substances identified at the time of reporting, as well as the analytical data generated during testing. Our new drug monographs are intended to assist with the rapid identification of NPS, and should not be used for confirmatory purposes alone.

**Funding:** CFSRE's NPS Discovery is supported by the National Institute of Justice, Office of Justice Programs, U.S. Department of Justice (Award Number 15PNJ-24-GK-00981-COAP, "Novel Psychoactive Substance Discovery, Education, and Reporting Institute"). The opinions, findings, conclusions and/or recommendations expressed in this publication are those of the author(s) and do not necessarily represent the official position or policies of the U.S. Department of Justice.

**Analytical Notes:** All identifications were made based on evaluation of analytical data (GC-MS and LC-QTOF-MS) in comparison to analysis of acquired reference material.

**Acknowledgements:** This report was prepared by Brianna N. Stang, Nicole Lattanzio, Kyle Brown, Melanie Liston, Branden Brunner, Sara E. Walton, Nicholas Khorozov, Max T. Denn, Alexis D. Quinter, Angel McDowell, Joshua S. DeBord, Barry K. Logan, and Alex J. Krotulski at the Center for Forensic Science Research and Education (CFSRE) at the Fredric Rieders Family Foundation. The authors acknowledge scientists at the CFSRE for their involvements and contributions. For more information, contact [npsdiscovery@cfsre.org](mailto:npsdiscovery@cfsre.org) or visit [www.npsdiscovery.org](http://www.npsdiscovery.org).

**Suggested Citation:** Stang BS, Lattanzio N, Brown K, Liston M, Brunner B, Walton SE, Khorozov N, Denn MT, Quinter AD, McDowell A, DeBord JS, Logan BK, Krotulski AJ. (2026) *Fentanyl Methylene Homolog* — NPS Discovery New Drug Monograph, Center for Forensic Science Research and Education, United States.

## Characterization & Intelligence

The following information was compiled in March 2026 and is subject to change as new research is conducted and as new information becomes available:

**Description:** Fentanyl methylene homolog is a novel synthetic opioid characterized as a fentanyl analogue and bears structural similarity to other fentanyl analogues (e.g., methylfentanyl, butyrylfentanyl). There is little data in the literature investigating the potency and pharmacology of fentanyl methylene homolog; however, it has been reported to have antinociceptive activity in rats.<sup>1</sup> Fentanyl methylene homolog is not currently scheduled in the United States. Fentanyl methylene homolog has been detected in one drug material to date at the CFSRE and has not yet been identified in toxicology specimens. Fentanyl methylene homolog was identified in a purple solid material from Mississippi and was detected alongside fentanyl, *ortho*-methylfentanyl, medetomidine, cocaine, and heroin.

### References:

- ▶ Cayman Chemical: [Fentanyl Methylene Homolog](#)
- ▶ <sup>1</sup>Casy et al. (1988) [Structure-activity studies of fentanyl](#)

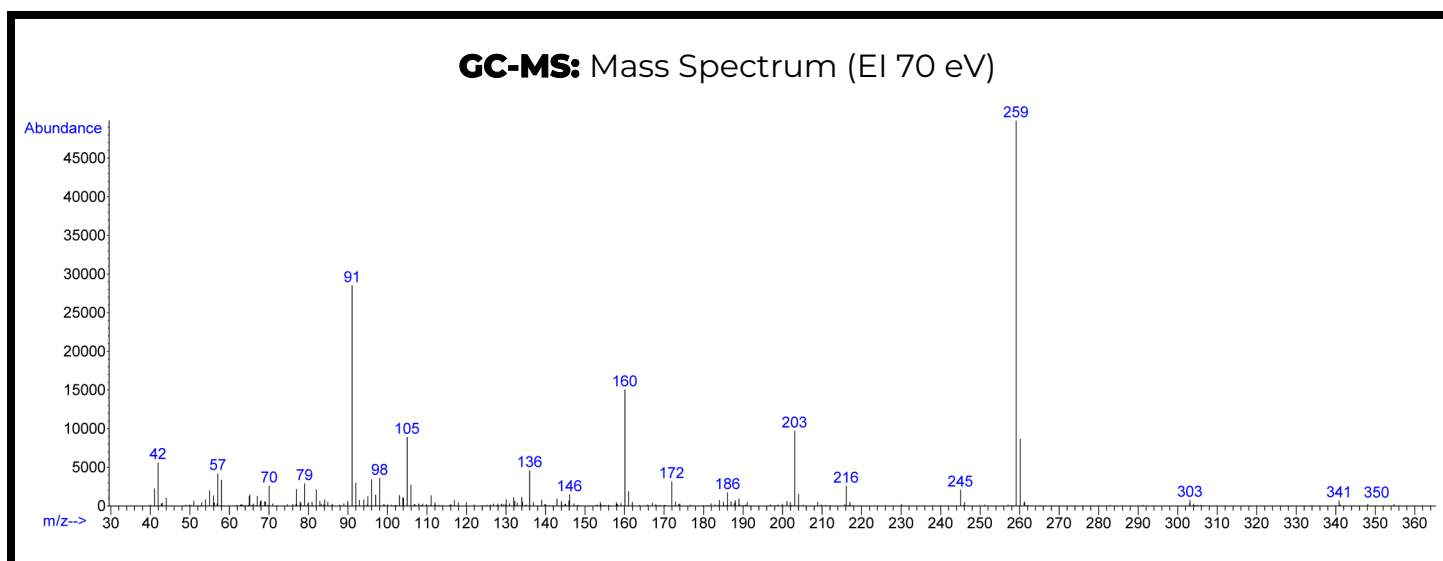
## Gas Chromatography Mass Spectrometry (GC-MS)

**Laboratory:** Center for Forensic Science Research and Education (CFSRE, Horsham PA, USA)

**Instrument:** Agilent 5975 Series GC/MSD

**Methods:** [GC-MS Method Details](#) & [Monographs](#)

**Sample Preparation:** Acid-base extraction



**Confirmation Using Drug Standard:** Reference material for fentanyl methylene homolog (Batch: 0803501-6) was purchased from Cayman Chemical (Ann Arbor, MI, USA). The analyte was confirmed to be fentanyl methylene homolog based on retention time (sample: 8.05 min vs. standard: 8.08 min) and mass spectral data comparisons.

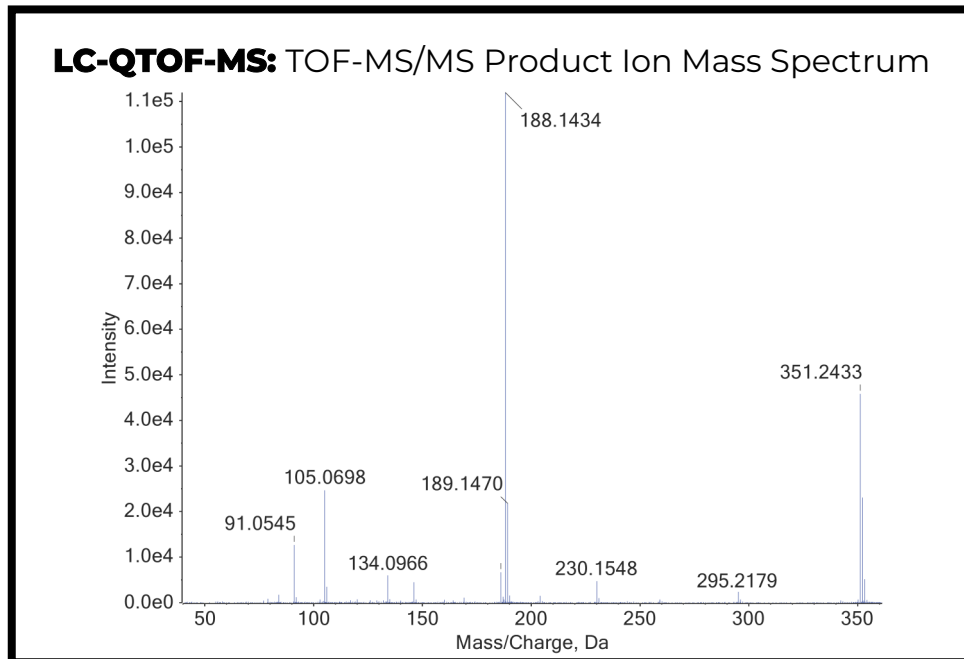
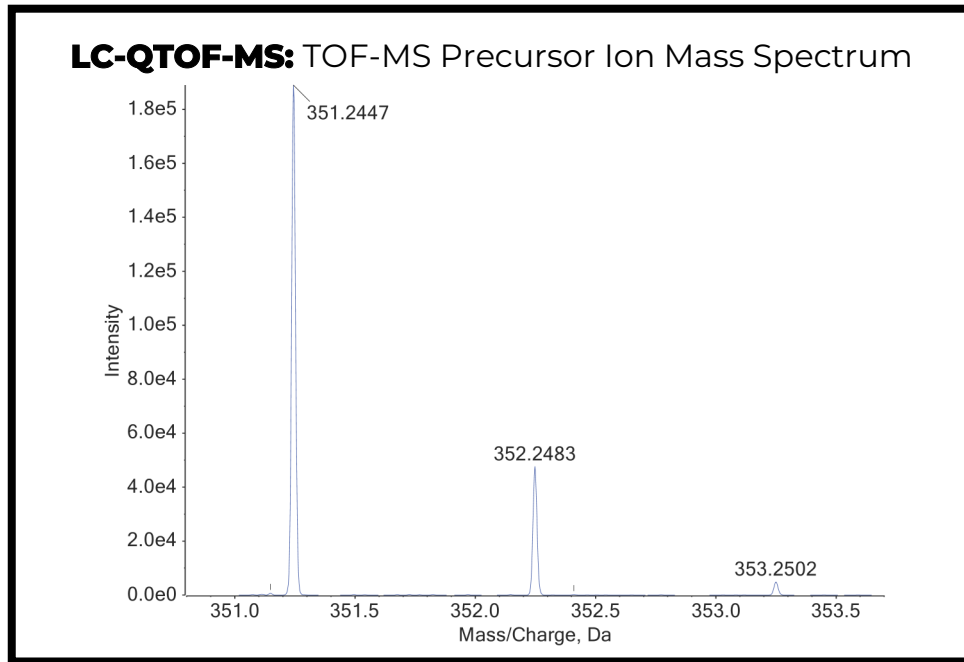
## Liquid Chromatography Quadrupole Time-of-Flight Mass Spectrometry (LC-QTOF-MS)

**Laboratory:** Center for Forensic Science Research and Education (CFSRE, Horsham, PA, USA)

**Instrument:** Sciex 5600+ LC-QTOF-MS

**Methods:** [LC-QTOF-MS Method Details](#) & [Monographs](#)

**Sample Preparation:** Dilution in mobile phase



**Confirmation Using Drug Standard:** Reference material for fentanyl methylene homolog (Batch: 0803501-6) was purchased from Cayman Chemical (Ann Arbor, MI, USA). The analyte was confirmed to be fentanyl methylene homolog based on retention time (sample: 6.38 min vs. standard: 6.39 min) and mass spectral data comparisons.