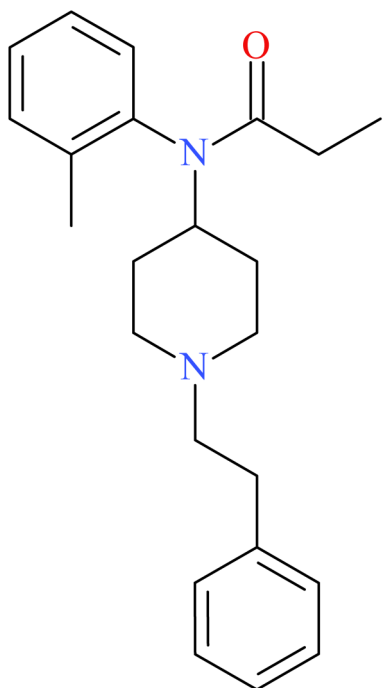




ortho-Methylfentanyl



NPS SUBCLASS	Opioid
REPORT DATE	December 20, 2023
SAMPLE RECEIVED	November 13, 2023
SAMPLE TYPE	Toxicology

Preferred Name	ortho-Methylfentanyl
Synonyms	o-Methylfentanyl, ortho-Methyl Fentanyl
Formal Name	N-(o-tolyl)-N-[1-(2-phenylethyl)-4-piperidyl]propanamide
InChI Key	DPAJFOSXYXNYMA-UHFFFAOYSA-N
CAS Number	1443-53-4
Chemical Formula	C ₂₃ H ₃₀ N ₂ O
Molecular Weight	350.50
Molecular Ion [M ⁺]	350
Exact Mass [M+H] ⁺	351.2431

Characterization & Intelligence

The following information was compiled in December 2023 and is subject to change as new research is conducted and as new information becomes available:

Description: *ortho*-Methylfentanyl is a novel synthetic opioid bearing structural resemblance to fentanyl. In November 2023, *ortho*-methylfentanyl was detected for the first time at our laboratory. "Methylfentanyl" exists in three isomeric forms: *ortho*-, *meta*-, and *para*-methylfentanyl. The position of the methyl group was confirmed during analysis in comparison to standard reference materials acquired for *ortho*-methylfentanyl, *ortho*-methyl 4-ANPP (its precursor/intermediate and suspected metabolite), and others.

Sample Source: Provincial Toxicology Centre (British Columbia), NMS Labs – Toxicology Laboratory

Sample Appearance: Blood specimens

Pharmacology: *In vitro* pharmacological data suggest that *ortho*-methylfentanyl is an active mu opioid agonist with potency similar to or slightly less than that of fentanyl.¹

Toxicology: *ortho*-Methylfentanyl has been detected in four toxicology cases at the CFSRE.

Drug Materials: *ortho*-Methylfentanyl has not been identified in drug materials to date at the CFSRE.

Demographics / Geographics: Toxicology specimens originated from British Columbia, Canada. In two cases, *ortho*-methylfentanyl was identified alongside the NPS benzodiazepine bromazolam.

Legal Status: *ortho*-Methylfentanyl is a Schedule I drug in the United States (21 CFR 1308).

References:

- ▶ Cayman Chemical: [ortho-Methylfentanyl](#)
- ▶ ¹Hassanien *et al.* (2020) [In vitro pharmacology of fentanyl analogs at the human mu opioid receptor and their spectroscopic analysis](#)

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 in forensic casework and related disciplines, and should not be used for confirmatory purposes alone.

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

Acknowledgements: This report was prepared by Alex J. Krotulski, Aaron Shapiro, Sandrine Mérette, Sara E. Walton, Donna M. Papsun, Melissa F. Fogarty, and Barry K. Logan at the Center for Forensic Science Research and Education (CFSRE) at the Fredric Rieders Family Foundation. The authors acknowledge scientists at the CFSRE and NMS Labs for their involvements and contributions. For more information, contact npsdiscovery@cfsre.org or visit www.npsdiscovery.org.

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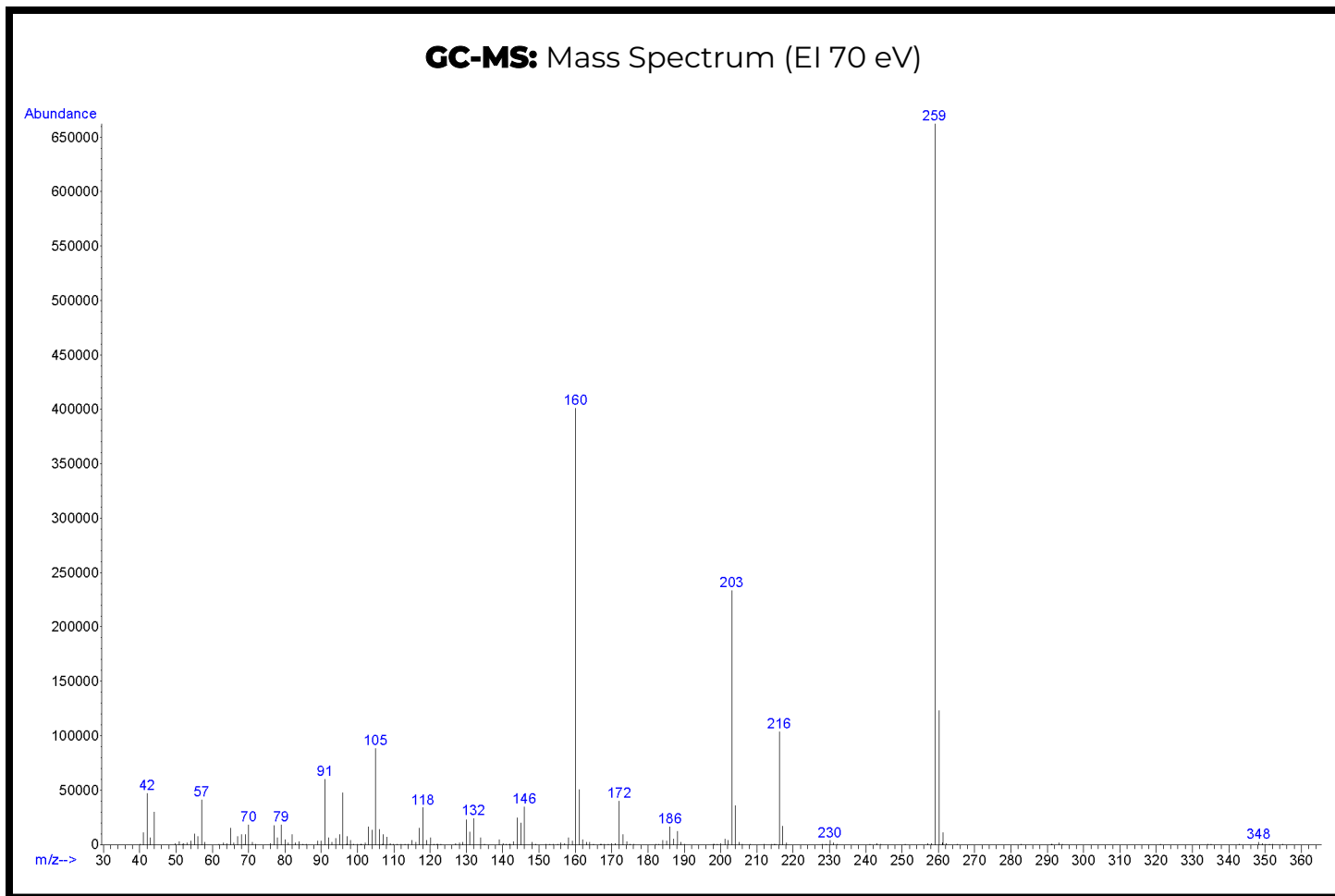
Gas Chromatography Mass Spectrometry (GC-MS)

Laboratory: Center for Forensic Science Research and Education (CFSRE, Willow Grove, PA, USA)

Instrument: Agilent 5975 Series GC/MSD

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

Sample Preparation: Standard diluted in methanol



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

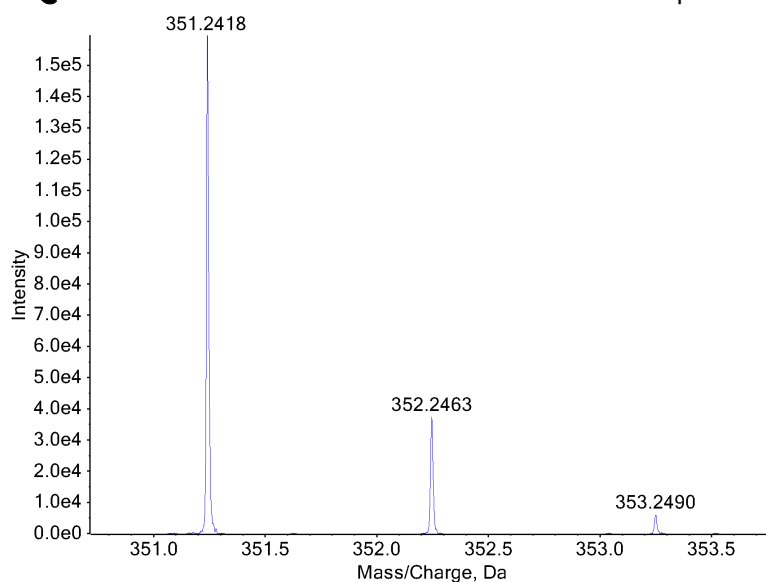
Laboratory: Center for Forensic Science Research and Education (CFSRE, Willow Grove, PA, USA)

Instrument: Sciex X500R LC-QTOF-MS

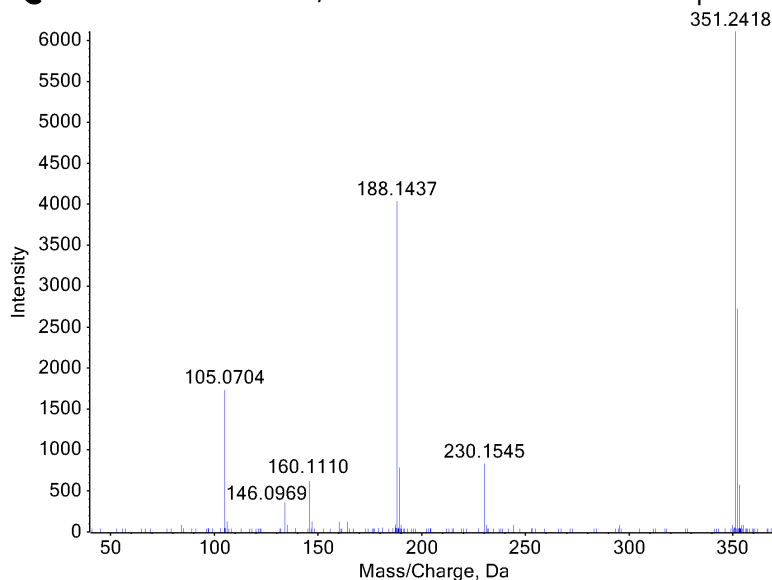
Methods: [LC-QTOF-MS Method Details](#) & [Monographs](#)

Sample Preparation: Liquid-liquid extraction

LC-QTOF-MS: TOF-MS Precursor Ion Mass Spectrum



LC-QTOF-MS: TOF-MS/MS Product Ion Mass Spectrum



Confirmation Using Drug Standard: Reference material (Batch: 0509212-6) was purchased from Cayman Chemical (Ann Arbor, MI, USA). The analyte was confirmed to be ortho-methylfentanyl based on retention time (sample: 6.43 min vs. standard: 6.45 min) and mass spectral data comparisons.