



B119 Analysis and Extraction of Fentanyl in Seized Heroin Samples

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The goal of this presentation is to create an extraction procedure which can isolate fentanyl and identify compounds from heroin samples.

This presentation will impact the forensic science community by presenting a proposed extraction procedure that will assist in the determination of various fentanyl compounds present in heroin samples; this will prove helpful as fentanyl-laced heroin samples are being encountered with higher frequency.

The availability and demand of heroin has increased in the United States due to abusers switching from controlled prescription drugs to heroin.¹ Many factors may have contributed to this such as heroin's affordability, higher potency, and availability. These circumstances can lead to greater predicaments when individuals desire a stronger euphoria, thereby creating a demand for adding designer drugs to heroin. Though fentanyl is a Schedule II controlled substance, its readily synthesizable analogues are either Schedule I or not scheduled at all. As a result, issues in laboratory analyses can arise from similarities found in mass spectra and the lack and/or differing of scheduling pertaining to some analogues. Some consider fentanyl a "designer drug," regardless of its prevalence in medical practice. According to the Drug Enforcement Agency, some analogues may be considered as "controlled substance analogs"; however, "any substance...not intended for human consumption..." is considered an "exemption," allowing them to circumvent the law.²

This study is a response to an increase of fentanyl analogues (fentanyl-types) in seized heroin samples appearing in Manatee County, FL. Within the past two years, Manatee County has experienced an increase in heroin usage.³ The two most encountered fentanyl-types were discovered to be acetylfentanyl and β -hydroxythiofentanyl. Acetylfentanyl, a known impurity of fentanyl synthesis, was normally found accompanied by fentanyl.⁴ Currently, it is being considered for temporary scheduling by the Department of Justice as a Schedule II designer drug. The other analogue, β -hydroxythiofentanyl, was seen often accompanied by dimenhydrinate (Dramamine®) or cetirizine, possibly to counteract undesired effects and to lower fentanyl potency. The presence of β -hydroxythiofentanyl is of concern because of its lack of scheduling in the state of Florida and similar mass spectrum to fentanyl.

β -hydroxythiofentanyl produces a similar mass spectrum to fentanyl and therefore needs additional confirmation such as retention-time comparison. The identification of acetylfentanyl can be difficult owing to similarities to acetylfentanyl-4-methylphenethyl; however, a standard was not procured and no retention time comparisons could be made. Instead, Attenuated Total Reflectance/Infrared (ATR/IR) spectrophotometry was conducted on extracts of confirmed heroin samples containing fentanyl-types. Extractions were conducted using a liquid extraction method based upon fentanyl and heroin solubility and an online purification method.

The extracts were analyzed first using Gas Chromatography coupled with Mass Spectrometry (GC/MS) to confirm the success of an extraction and then using ATR/IR spectroscopy to determine final composition of the compound. The method was successful in isolating the fentanyls; however, extractions were unable to separate fentanyl-types from each other or other cutting agents. The concomitants did not pose any issues due to lower concentrations than the target analogue. The analysis of five extracts and 406 chromatographs of seized heroin samples qualitatively confirmed that the main analogues present in Manatee County were acetylfentanyl and β -hydroxythiofentanyl in lieu of other analogues

Reference(s):

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Fentanyl, Fentyl Analogues, Heroin

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