

Non-Pharmaceutical Fentanyls Encountered by the Alabama Department of Forensic Sciences (ADFS)

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Background/Introduction: In recent years, fentanyl and non-pharmaceutical fentanyls (NPFs) overdoses are on a rise in the United States. CDC indicated fentanyl encounters increased 160% from 2014 to 2015. It is difficult to measure the true extent of NPF use as these compounds are often excluded from routine toxicology screens. Moreover, when a new molecule is identified and scheduled, manufacturers are often quick in introducing a new analogue to the market, forcing agencies into an endless chase. At ADFS, unconfirmed presumptive positive fentanyl cases are analyzed by QTOF LC/MS to investigate the presence or absence of NPFs.

Objective: To highlight and investigate NPF cases received by the Alabama Department of Forensic Sciences.

Methods: Drug screenings were performed by enzyme-linked immunoassay using a Randox Evidence Analyzer and LC/MS using an Agilent 6545 QTOF. Confirmation or quantification of presumptive positive cases were performed in-house via liquid-liquid extraction followed by GC/MS analysis or by National Medical Services Labs via LC/MS/MS analysis.

Results: The results for 16 NPFs related cases received by ADFS from September 30, 2016 to April 12, 2017 were 4-ANPP (n=10), U-47700 (n=7), Methoxyacetyl Fentanyl (n=5), FIBF (n=2), Furanyl Fentanyl (n=1), and Acryl Fentanyl (n=1). *Case 1:* A 30 year old male was found dead at home by his children. His wife was found unresponsive in the bedroom but was later recovered at a hospital. The grandmother stated that the decedent's wife made a stop to "obtain drugs" after work. She also stated that, "This was their first time. They do not have any needle marks." Toxicology results reported: 22 ng/mL of morphine, 0.18 ng/mL of Furanyl Fentanyl, 0.20 ng/mL of 4-Anilino-N-Phenethylpiperidine (4-ANPP), 0.91 ng/mL of Acryl Fentanyl, and 0.52 ng/mL of U-47700. *Case 2:* A 30 year old female was found unresponsive and not breathing by her sister at 0100. She became responsive after her sister slapped her, threw water, and performed CPR on her. 5 hours later, she became unresponsive again. The decedent was transported to a hospital and was pronounced dead. There were visible needle track marks on her right arm. It was stated that she had been using heroin laced with fentanyl. Toxicology results reported: 4-ANPP present, U-47700 present, 60 ng/mL of methamphetamine, and 24 ng/mL of amphetamine. COD: Multiple drug intoxication MOD: Accident. *Case 3:* A 29 year old male and a female friend received an unmarked black box at the post office. Upon arrival at a friend's residence, they stayed outside. The female friend returned to the residence and began having a breathing episode. Narcan (naloxone) was administered and she recovered. The male decedent was found unresponsive on the roadway with fresh needle track marks on his arms. He was known to have a history of substance abuse. Toxicology results reported: 4-ANPP present, 55 ng/mL of methamphetamine, 35 ng/mL of amphetamine, and 69 ng/mL of alprazolam. COD: Multiple drug overdose MOD: Accident

Conclusion/Discussions: In ADFS, there was a 54% increase in fentanyl overdoses from 2014 to 2015. Additionally, we identified 16 NPFs positive cases with the first appearing on September 30, 2016. The most encountered NPFs in ADFS were 4-ANPP, methoxyacetyl fentanyl, FIBF, furanyl fentanyl, and acryl fentanyl along with U-47700. U-47700, commonly known as PINK, is a novel synthetic opioid with approximately 7.5x more potency than morphine. Law enforcement should be informed of the rapid rise of NPFs use among substance abusers. Fentanyl-related overdoses are similar to overdoses induced by other opioids, which are characterized by respiratory depression, stupor and miosis. Toxicology laboratories should enhance their screening methodology to include analysis for NPFs.

Keywords: Fentanyl Analogues, 4-ANPP, U-47700