



K66 A Fatal Mono-Intoxication With 4-Fluoroisobutyrylfentanyl

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Learning Overview: After attending this presentation, attendees will understand the need to share and publish postmortem toxicological data on new psychoactive substances such as fentanyl analogs for toxicological interpretation in new casework.

Impact on the Forensic Science Community: This presentation will impact the forensic science community by providing toxicological data on the presence and concentration of 4-fluoroisobutyrylfentanyl, a new psychoactive substance, in various biological samples.

During the past decades, there has been an increase in the appearance of fentanyl analogs as new psychoactive substances. Fentanyl is a synthetic narcotic opiate with strong analgesic properties and is about 100 times more potent than morphine. Because of its high potency, fentanyl and fentanyl derivatives are misused and abused and may cause death. Limited toxicological data are available on these new fentanyl derivatives. In this presentation, new toxicological data of a fentanyl derivative in a postmortem case are presented. The goal was to explain the cause of death of a 35-year-old man who was encountered in need of resuscitation in his bathroom. He died shortly afterward. Drug paraphernalia (including a base pipe) and a small amount of rough material were found near the victim.

At the Drugs Department, the rough material was investigated using Gas Chromatography/Mass Spectrometry (GC/MS), Infrared (IR) spectroscopy, and Nuclear Magnetic Resonance (NMR). At the Toxicology Department, the body material obtained from autopsy was investigated for toxic substances following the standard screening protocol on ethanol, drugs, medicines, and pesticides using Headspace/Gas Chromatography/Flame Ionization Detection (HS/GC/FID), Liquid Chromatography/Time-Of-Flight/Mass Spectrometry (LC/TOF/MS), GC/MS, and Ultra-Performance Liquid Chromatography/Diode-Array Detection (UPLC/DAD). Furthermore, 4-Fluoroisobutyrylfentanyl (4-FIBF) was subsequently identified and quantified using Liquid Chromatography/Tandem Mass Spectrometry (LC/MS/MS).

Toxicological analysis on the body material showed the presence of 4-FIBF. With the chromatographic method, the separation of the 2, 3, and 4-fluorobutyrylfentanyl and 2, 3, and 4-fluoroisobutyrylfentanyl isomers could not be confirmed. However, the fentanyl derivative was identified in the rough material as almost pure 4-FIBF. Therefore, it is very likely that the derivative found in the body material was 4-FIBF. Concentrations of 4-FIBF were measured in various biological samples, including femoral blood, heart blood, vitreous humor, brain tissue, liver tissue, and urine. The measured concentrations were respectively 0.030mg/L; 0.12mg/L; 0.067mg/L; more than 0.081mg/kg; 0.44mg/kg, and between 0.0010 and 0.025mg/L. No other compounds were found.

In literature, only two cases were found with toxicological data on 4-FIBF. In a publication by M. Rojkiewicz et al. in 2017, the concentrations of 4-FIBF measured were higher compared to this case although it was not clear whether the analyzed blood was peripheral blood or heart blood.¹ Based on the toxicological results, it was concluded that the measured concentrations of 4-FIBF could have contributed to or possibly explain the cause of death if no other plausible cause was found. The additional role of heart muscle inflammation seen at autopsy could not be completely excluded.

In conclusion, this case showed a fatal intoxication of 4-FIBF. The presence and concentration of 4-FIBF was measured in various biological samples. Because only two other cases with data on 4-FIBF were published, these additional postmortem toxicological data on this new psychoactive substance are very useful for the toxicological interpretation.

Reference(s):

1. M. Rojkiewicz, M. Majchrzak, R. Celiński, P. Kuś, M. Sajewicz. Identification and physicochemical characterization of 4-fluorobutyrylfentanyl (1-((4-fluorophenyl)(1-phenethylpiperidin-4-yl)amino)butan-1-one, 4-FBF) in seized materials and the postmortem biological samples. *Drug Test. Anal.* 2017, 9, 405.

4-Fluoroisobutyrylfentanyl, Fatal Intoxication, Postmortem