CFSRE's NPS Discovery – A No-Cost Resource for Tracking and Confirming the Presence of Novel Psychoactive Substances in Forensic Samples from Medicolegal Death Investigations

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Introduction: As the recreational drug supply becomes more volatile and dynamic in the United States, it is now critical to conduct comprehensive postmortem toxicology testing in cases where drug overdose is suspected. Ideally, practitioners should seek testing using novel and innovative methods with up-to-date scopes of analysis that include traditional drugs, novel psychoactive substances (NPS), and adulterants. New synthetic drugs continue to appear in medicolegal death investigations, and it is increasingly common to encounter NPS used in combination with traditional drugs (e.g., fentanyl) to elicit more customized pharmacological effects, a phenomenon that has been confirmed though drug material testing and forensic toxicology analysis.

Methods: The Center for Forensic Science Research and Education (CFSRE) – a non-profit, federally funded, state-of-the-art forensic laboratory – conducts drug testing and drug market surveillance using liquid chromatography quadrupole time-of-flight mass spectrometry and liquid chromatography tandem quadrupole mass spectrometry. In 2018, the CFSRE launched NPS Discovery – an open access drug early warning system – to provide no-cost testing resources focused on new and emerging drugs to forensic practitioners. The primary goal is to disseminate actionable new drug data to various stakeholders in public health and safety. The CFSRE maintains a battery of novel testing workflows to confirm the presence of specific drug substances emerging in forensic casework, including the latest novel benzodiazepines, opioids, stimulants, hallucinogens, and cannabinoids.

Results: In 2022, the CFSRE analyzed nearly 2,000 forensic toxicology samples. Fentanyl (63%) was the most commonly detected drug, found in combination with NPS benzodiazepines (etizolam 24%, flualprazolam 19%, and bromazolam 8%). Fluorofentanyl (19%) was the most frequently detected NPS opioid, but, when excluded, nitazene analogues (e.g., metonitazene, isotonitazene) comprised the most detections. Dimethylpentylone (5%) was the most encountered NPS stimulant. Synthetic cannabinoid positivity was low compared to previous years, and MDMB-4en-PINACA and ADB-BINACA were the two most detected. Xylazine (11%) was commonly detected alongside fentanyl.

Discussion: The year-over-year drug landscape has differed greatly since 2018. Today, apart from fluorofentanyl, fentanyl analogues have been largely eradicated from the recreational opioid supply, replaced by novel nitazene analogues often accompanied by NPS benzodiazepines. The combination of opioids (traditional and/or novel) with NPS benzodiazepines has increased significantly as "benzo-dope" use is now common, but still less than "tranq-dope" (xylazine-fentanyl) use in most jurisdictions. Synthetic cannabinoid related fatalities decreased in our dataset due to control measures in China; however, deaths involving these drugs continue. Specific and detailed case examples will be included in this presentation.