

Whitepaper:

Whether to Test for Fentanyl or Norfentanyl

Introduction:

Fentanyl and norfentanyl are compounds associated with opioids, each carrying distinct implications for medical and forensic analysis. Given the prevalence of opioid-related abuse, illicit distribution, and overdose, it is important to determine accurate and efficient detection methods. This whitepaper provides insights into the differences between fentanyl and norfentanyl, their respective detection methodologies, and recommendations for utilizing cutting-edge detection technologies to discern between the two compounds effectively.

Q: What is the difference between fentanyl and norfentanyl?

A: Fentanyl, a potent synthetic opioid, serves primarily in pain management, pre- and post-surgery, and for severe pain relief. Norfentanyl is the major metabolite of fentanyl and does not have significant analgesic effects itself. The term “total fentanyl” is sometimes used to refer to the combined amounts of fentanyl and norfentanyl in a sample.

Q: Why detect fentanyl?

A: Detection of fentanyl in urine signifies recent ingestion indicating a potential risk of drug overdose, particularly when consumption surpasses safe levels under medical supervision. Fentanyl overdose can induce severe respiratory depression or fatality, necessitating prompt intervention. Just 2mg of fentanyl can be lethal depending on a person’s body size, tolerance, and past usage. Because of its potency and low cost, drug dealers have been mixing fentanyl with other drugs including heroin, methamphetamine, and cocaine, increasing the likelihood of a fatal interaction.¹

Q: Why detect norfentanyl?

A: Because fentanyl rapidly metabolizes in the body, detection of the major metabolite norfentanyl indicates fentanyl ingestion at some point in the past. According to a post-surgical study cited by the US National Institutes of Health, fentanyl was undetectable in all subjects within 72 hours of dosage whereas norfentanyl was detected in all subjects at 48 hours.² Due to its lower pharmacological activity, the presence of norfentanyl alone is not typically considered an emergency medical situation. Nevertheless, the detection of norfentanyl suggests historical drug exposure or prolonged usage, valuable for assessing long-term drug habits or environmental exposure.

Q: The advantage of fentanyl detection over norfentanyl detection.

A: Choosing between fentanyl and norfentanyl detection hinges on factors like drug abuse patterns, pharmacokinetics, and methodological performance. While both are pertinent, detecting fentanyl often holds greater urgency due to its association with acute overdose risks. Conversely, norfentanyl detection aids in understanding long-term drug usage patterns.

Optimized Detection Procedures:

For rapid, precise fentanyl detection, the Fentanyl Urine Screening Test on the Immunofluorescence Analyzer RYAN™ from Carolina Liquid Chemistries stands out. Its specificity for the active parent compound fentanyl can help distinguish acute overdose situations or drug abuse, facilitating tailored medical and legal responses. Critically the RYAN analyzer offers a low cutoff concentration of 1ng/mL which is paramount due to the high potency of fentanyl; even very small doses can be lethal. The RYAN also provides results at the point-of-care in under 6 minutes whereas it can take much longer to receive results when sending samples out to a separate laboratory.

For laboratories needing higher volume testing, Carolina Liquid Chemistries offers a variety of FDA-cleared fentanyl reagents for use on clinical chemistry analyzers such as the benchtop Diazyme DZ-Lite™ c270.

For norfentanyl assessment, the Medica EasyRA® benchtop clinical chemistry analyzer is an excellent choice. Its capabilities allow for reliable identification of norfentanyl, aiding in monitoring long-term drug usage or environmental exposure.

For a more thorough assessment, a sample could be screened for norfentanyl on the EasyRA and for fentanyl on the RYAN or DZ-Lite c270. Comparing the two results could help physicians better understand the timing of fentanyl exposure.

The tests described above provide only a preliminary analytical test result. A more specific alternate chemical method must be used in order to obtain a confirmed analytical result. Gas Chromatography/ Mass Spectrometry (GC-MS) or Liquid Chromatography / Mass Spectrometry (LC/MS) is the preferred confirmatory method.

Conclusion:

In the face of escalating opioid-related challenges, precise detection of fentanyl and norfentanyl is imperative. Leveraging advanced detection methodologies tailored to each compound's characteristics enables healthcare professionals and law enforcement agencies to make informed decisions swiftly, safeguarding public health and safety effectively.

For more information on the testing equipment mentioned above:

Fentanyl Urine Detection Test on the Immunofluorescence Analyzer RYAN™

<https://www.carolinachemistries.com/products/fentanyl-urine-detect-on-clc-ryan-analyzer/>

Medica EasyRA® benchtop clinical chemistry analyzer

<https://www.carolinachemistries.com/products/easyra-benchtop-chemistry-analyzer/>

Diazyme DZ-Lite™ c270 benchtop clinical chemistry analyzer

<https://www.carolinachemistries.com/products/dz-lite-c270-benchtop-chemistry-analyzer/>

Sources:

1. <https://www.dea.gov/resources/facts-about-fentanyl>
2. <https://pubmed.ncbi.nlm.nih.gov/8452277/>