MAYO CLINIC LABORATORIES

Test Definition: FENTS

Fentanyl and Metabolites, S

Overview

Useful For
Monitoring fentanyl therapy

Method Name
Liquid Chromatography-Tandem Mass Spectrometry (LC-MS/MS)

NY State Available
Yes

Specimen

Specimen Type
Serum Red

Specimen Required
Collection Container/Tube: Red top (Serum gel/SST **are not** acceptable)

Submission Container/Tube: Plastic vial

Specimen Volume: 2.3 mL

Collection Instructions: Centrifuge and aliquot serum into plastic vial within 2 hours of collection.

Forms
If not ordering electronically, complete, print, and send a Therapeutics Test Request (T831) with the specimen.

Reject Due To

Gross hemolysis	OK
Gross lipemia	OK
Gross icterus	OK

Specimen Minimum Volume
1.25 mL

Specimen Stability Information

Specimen Type	Temperature	Time	Special Container
Serum Red	Frozen (preferred)	28 days	
	Refrigerated	14 days	
	Ambient		

Clinical & Interpretive

Clinical Information

Fentanyl is an extremely fast acting synthetic opioid related to the phenylpiperidines.(1,2) It is available in injectable as well as transdermal formulations.(1) The analgesic effects of fentanyl is similar to those of morphine and other opioids(1): it interacts predominantly with the opioid mu-receptor. These mu-binding sites are discretely distributed in the human brain, spinal cord, and other tissues.(1,3)

Fentanyl is approximately 80% to 85% protein bound.(1) Fentanyl plasma protein binding capacity decreases with increasing ionization of the drug. Alterations in pH may affect its distribution between plasma and the central nervous system (CNS). The average volume of distribution for fentanyl is 6 L/kg (range 3-8).(3,4)

In humans, the drug appears to be metabolized primarily by oxidative N-dealkylation to norfentanyl and other inactive metabolites that do not contribute materially to the observed activity of the drug. Within 72 hours of intravenous (IV) administration, approximately 75% of the dose is excreted in urine, mostly as metabolites with less than 10% representing unchanged drug.(3,4)

The mean elimination half-life is:(1-3)

-IV: 2 to 4 hours

-Iontophoretic transdermal system (Ionsys), terminal half-life: 16 hours

-Transdermal patch: 17 hours (range 13-22 hours, half-life is influenced by absorption rate)

-Transmucosal:

-Lozenge: 7 hours

-Buccal tablet

-100 to 200 mcg: 3 to 4 hours

-400 to 800 mcg: 11 to 12 hours

In clinical settings, fentanyl exerts its principal pharmacologic effects on the CNS. In addition to analgesia, alterations in mood (euphoria, dysphoria) and drowsiness commonly occur.(1,3) Because the biological effects of fentanyl are similar to those of heroin and other opioids, fentanyl has become a popular drug of abuse.

Reference Values

Not applicable

Interpretation

Both fentanyl and norfentanyl are reported.

Tolerant individuals may require many-fold increases in dose to achieve the same level of analgesia, which can greatly complicate interpretation of therapeutic drug monitoring results and establishment of a therapeutic window.

Concentration at which toxicity occurs varies and should be interpreted in light of clinical situation.

Cautions

Specimens collected in serum gel tubes are not acceptable becuase the drug can absorb on the gel and lead to falsely decreased concentrations.

Clinical Reference

1. Gutstein HB, Akil H: Opioid analgesics. In: Brunton LL, Lazo JS, Parker KL, eds. Goodman and Gilman's: The Pharmacological Basis of Therapeutics. Vol 11. McGraw-Hill Companies; 2006:chap 21

2. Kerrigan S, Goldberger BA: Opioids. In: Levine B, eds. Principles of Forensic Toxicology. 2nd ed. AACC Press; 2003:187-205

3. DURAGESIC (fentanyl transdermal system). Package insert: Janssen Pharmaceutica Products, LP; 2006

4. Baselt RC: Disposition of Toxic Drugs and Chemicals in Man. 10th ed. Biomedical Publications; 2014

Performance

Method Description

Fentanyl is isolated from serum using a liquid/liquid extraction. The solvent is dried and the analytes are reconstituted with mobile phase. Analysis is performed by liquid chromatography-tandemmass spectrometry using selected ion

monitoring.(Unpublished Mayo method)

PDF Report
No

Specimen Retention Time
14 days

Performing Laboratory Location
Rochester

Fees & Codes

Test Classification
This test was developed, and its performance characteristics determined by Mayo Clinic in a manner consistent with CLIA requirements. This test has not been cleared or approved by the US Food and Drug Administration.

CPT Code Information
80354

G0480 (if appropriate)

LOINC® Information

Test ID	Test Order Name	Order LOINC Value
FENTS	Fentanyl and Metabolites, S	81275-0

Result ID	Reporting Name	LOINC®
31829	Norfentanyl	11074-2
31830	Fentanyl	3636-8
31832	Chain of Custody	77202-0