Test Definition: BUPMX

Buprenorphine and Norbuprenorphine, Chain of Custody, Random, Urine

Overview

Useful For

Monitoring of compliance of buprenorphine therapy

Detection and confirmation of the illicit use of buprenorphine

Chain of custody is required whenever the results of testing could be used in a court of law. Its purpose is to protect the rights of the individual contributing the specimen by demonstrating that it was always under the control of personnel involved with testing the specimen; this control implies that the opportunity for specimen tampering would be limited.

Additional Tests

Test Id	Reporting Name	Available Separately	Always Performed
COCH	Chain of Custody Processing	No	Yes
ADLTX	Adulterants Survey, CoC, U	Yes	Yes

Testing Algorithm

Adulterants testing will be performed on all chain-of-custody urine samples as per regulatory requirements.

Method Name

Immunoassay/Liquid Chromatography Tandem Mass Spectrometry (LC-MS/MS)

NY State Available

Yes

Specimen

Specimen Type

Urine

Ordering Guidance

This test is for situations that require the chain-of-custody process. For testing **not** requiring chain of custody, order BUPM / Buprenorphine and Norbuprenorphine, Random, Urine

Specimen Required

Supplies: Chain of Custody Kit (T282)
Container/Tube: Chain of custody kit containing specimen containers, seals, and required documentation.
Specimen Volume: 5 mL

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Collection Instructions: Collect specimen in the container provided, seal, and submit with the associated documentation to satisfy the legal requirements for chain-of-custody testing.

Forms

1. Chain of Custody Request is included in the Chain-of-Custody Kit (T282).
2. If not ordering electronically, complete, print, and send a Therapeutics Test Request (T831) with the specimen.

Specimen Minimum Volume

1 mL

Reject Due To

Gross hemolysis	OK
Gross icterus	OK

Specimen Stability Information

Specimen Type	Temperature	Time	Special Container
Urine	Refrigerated (preferred)	14 days	
	Ambient	14 days	
	Frozen	14 days	

Clinical & Interpretive

Clinical Information

Clinically, buprenorphine is utilized as a substitution therapy for opioid dependence and as an analgesic. Buprenorphine is a partial agonist of the mu-opioid receptor. These mu binding sites are discretely distributed in the human brain, spinal cord, and other tissue. The clinical effects of mu receptor agonists are sedation, euphoria, respiratory depression, and analgesia. As a partial mu receptor agonist, buprenorphine's clinical effects are decreased, giving buprenorphine a wider safety margin.(1) Buprenorphine has a prolonged duration of activity. The combination of decreased clinical effects and prolonged activity gives buprenorphine the added advantage of a delayed and decreased withdrawal syndrome, compared to other opioids.(1) Compared to morphine, buprenorphine is 25 to 40 times more potent.(1) As with any opioid, abuse is always a concern. To reduce illicit use of buprenorphine, it is available mixed with naloxone in a ratio of 4:1. When the combination is taken as prescribed, only small amounts of naloxone will be absorbed. However, if the combination is transformed into the injectable form, naloxone then acts as an opioid receptor antagonist.

Buprenorphine is metabolized through N-dealkylation to norbuprenorphine through cytochrome P450 3A4. Both parent and metabolite then undergo glucuronidation. Norbuprenorphine is an active metabolite possessing one-fifth of the potency of its parent. The glucuronide metabolites are inactive.(1)

The primary clinical utility of quantification of buprenorphine in urine is to identify patients that have strayed from opioid dependence therapy.

Chain of custody is a record of the disposition of a specimen to document each individual who collected, handled, and performed the analysis. When a specimen is submitted in this manner, analysis will be performed in such a way that it will withstand regular court scrutiny.

Reference Values

Negative
Positive results are reported with a quantitative result.

Cutoff concentrations:

Immunoassay Screen: 5 ng/mL

Liquid chromatography tandem mass spectrometry:
Buprenorphine: 5.0 ng/mL
Norbuprenorphine: 2.5 ng/mL

Interpretation

The presence of buprenorphine above 5.0 ng/mL or norbuprenorphine above 2.5 ng/mL is a strong indicator that the patient has used buprenorphine.

Cautions

Urine concentrations do not correlate well with serum drug levels and are not intended for therapeutic drug management.

Clinical Reference

1. Elkader A, Sproule B. Buprenorphine: clinical pharmacokinetics in the treatment of opioid dependence. Clin Pharmacokinet. 2005;44(7):661-680
2. Grimm D, Pauly E, Poschl J, Linderkamp O, Skopp G. Buprenorphine and norbuprenorphine concentrations in human breast milk samples determined by liquid chromatography-tandem mass spectrometry. Ther Drug Monit. 2005;27(4):526-530
3. Kacinko SL, Shakleya DM, Huestis MA. Validation and application of a method for the determination of buprenorphine, norbuprenorphine, and their glucuronide conjugates in human meconium. Anal Chem. 2008;80(1):246-252
4. Concheiro M, Shakleya DM, Huestis MA. Simultaneous quantification buprenorphine, norbuprenorphine, buprenorphine-glucuronide and norbuprenorphine-glucuronide in human umbilical cord by liquid chromatography tandem mass spectrometry. Forensic Sci Int. 2009;188(1-3):144-151
5. Langman LJ, Bechtel LK, Holstege CP. Clinical toxicology. In: Rifai N, Chiu RWK, Young I, Burnham CAD, Wittwer CT, eds Tietz Textbook of Laboratory Medicine. 7th ed. Elsevier; 2023:chap 43
6. Baselt RC. Disposition of Toxic Drugs and Chemicals in Man. 10th ed. Biomedical Publications; 2014:2211

Performance

Method Description

Preliminary screen is performed by immunoassay.

This assay is a homogeneous enzyme immunoassay technique and is performed semi-quantitatively. The assay is based on competition between free drug in the urine sample, and a drug labeled with the enzyme glucose-6-phosphate dehydrogenase for a fixed amount of specific antibody binding sites. Active enzyme reduces nicotinamide adenine dinucleotide (NAD[+]) to NADH, which results in an absorbance change that can be measured spectrophotometrically at 340 nm.(Package insert: Buprenorphine Urine Enzyme Immunoassay. Roche (LIN-ZHI); V 3.0, 09/2023)

Buprenorphine and its major metabolite (norbuprenorphine) are liberated from conjugation by enzyme hydrolysis. Acetonitrile is added to the sample and an aliquot of the supernatant is diluted with water. Analysis is performed by liquid chromatography tandem mass spectrometry using multiple reaction monitoring.(Unpublished Mayo method)

PDF Report

No

Day(s) Performed

Monday through Friday

Report Available

3 to 5 days

Specimen Retention Time

14 days

Performing Laboratory Location

Mayo Clinic Laboratories - Rochester Superior Drive

Fees & Codes

Fees

- Authorized users can sign in to Test Prices for detailed fee information.
- Clients without access to Test Prices can contact Customer Service 24 hours a day, seven days a week.
- Prospective clients should contact their account representative. For assistance, contact Customer Service.

Test Classification

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

CPT Code Information

G0480
80348 (if appropriate for select payers)
Clinical Toxicology CPT Code Client Guidance

LOINC® Information

Test ID	Test Order Name	Order LOINC® Value
BUPMX	Buprenorphine w/metabolite, CoC, U	69033-9

Result ID	Test Result Name	Result LOINC® Value
56644	Buprenorphine Immunoassay Screen	58359-1
65215	Buprenorphine	3415-7
48297	Norbuprenorphine	49753-7
56645	Chain of Custody	77202-0