MAYO CLINIC LABORATORIES

Test Definition: OPTMX

Opiate Confirmation, CoC, M

Overview

Useful For

Detection of maternal prenatal opiate/opioid use up to 5 months before birth

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 under the control of personnel involved with testing the specimen at all times; this control implies that the opportunity for specimen tampering would be limited. Since the evidence of illicit drug use during pregnancy can be cause for separating the baby from the mother, a complete chain of custody ensures that the test results are appropriate for legal proceedings.

Additional Tests

Test Id	Reporting Name	Available Separately	Always Performed
COCH	Chain of Custody Processing	No	Yes

Method Name

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

NY State Available

Yes

Specimen

Specimen Type

Meconium

Specimen Required

Supplies: Chain of Custody Meconium Kit (T653) includes the specimen containers, seals, and documentation required.

Specimen Volume: 1g (approximately 1 teaspoon)

Collection Instructions: Collect entire random meconium specimen.

Additional Information:

1. Specimen that arrives with a broken seal does not meet the chain of custody requirements.
2. The laboratory recommends sending chain-of-custody specimens by overnight shipment.

Forms

1. Chain-of-Custody Request is included in the Chain-of-Custody Meconium Kit (T653).
2. If not ordering electronically, complete, print, and send a Therapeutics Test Request (T831) with the specimen.

Reject Due To

Grossly bloody	Reject; Pink OK

Specimen Minimum Volume

0.3 g (approximately 1/4 teaspoon)

Specimen Stability Information

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

Clinical & Interpretive

Clinical Information

-Codeine is a naturally occurring opioid agonist often incorporated into formulations along with acetaminophen or aspirin to increase its analgesic effect.(2) Codeine is metabolized to morphine and subsequently undergoes glucuronidation and sulfation.
-Morphine is an opioid receptor agonist that is used for major pain analgesia.(2) It has been shown to distribute widely into many fetal tissues,(3) and has been detected in meconium.
-Hydrocodone is a semisynthetic analgesic derived from codeine. Hydrocodone is 6 times more potent than codeine and is prescribed for treatment of moderate-to-moderately severe pain.(2) Hydrocodone undergoes O-demethylation in vivo, forming hydromorphone.
-Hydromorphone, a semisynthetic derivative of morphine, is an opioid analgesic. It is 7 to 10 times more potent than morphine, its addiction liability is similar to morphine.(2)
-Oxycodone, a semisynthetic narcotic derived from thebaine. It is metabolized by O-demethylation, forming oxymorphone.(2)
-Oxymorphone is a semisynthetic opioid derivative of thebaine and is indicated for moderate-to-severe pain.(2)
-Heroin, a semisynthetic derivative of morphine, is rapidly deacetylated in vivo to the active metabolite 6-monoacetylmorphine (6-MAM), which is further hydrolyzed to morphine.(2)
Opiates have been shown to readily cross the placenta and distribute widely into many fetal tissues. Opiate use by the mother during pregnancy increases the risk of prematurity and small size for gestational age. Furthermore, heroin-exposed infants exhibit an early onset of withdrawal symptoms compared to methadone-exposed infants. These infants demonstrate a variety of symptoms including irritability, hypertonia, wakefulness, diarrhea, yawning, sneezing, increased hiccups, jitteriness, excessive sucking, and seizures. Long-term intrauterine drug exposure may lead to abnormal neurocognitive and behavioral development as well as an increased risk of sudden infant death syndrome.
The disposition of opiates and opioids in meconium, the first fecal material passed by the neonate, is not well understood. The proposed mechanism is that the fetus excretes drug into bile and amniotic fluid. Drug accumulates in meconium either by direct deposition from bile or through swallowing of amniotic fluid. The first evidence of meconium in the fetal intestine appears at approximately the 10th to 12th week of gestation, and slowly moves into the colon by the 16th week of gestation. Therefore, the presence of drugs in meconium has been proposed to be indicative of in utero drug exposure during the final 4 to 5 months of pregnancy, a longer historical measure than is possible by urinalysis.
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
Positives are reported with a quantitative liquid chromatography-tandem mass spectrometry (LC-MS/MS) result.

Cutoff concentrations for LC-MS/MS testing:
Codeine: 20 ng/mL
Hydrocodone: 20 ng/mL
Hydromorphone: 20 ng/mL
Morphine: 20 ng/mL
Oxycodone: 20 ng/mL
Oxymorphone: 20 ng/mL

Interpretation

The presence of any of the following opiates (codeine, morphine, hydrocodone, hydromorphone, oxycodone, oxymorphone) at 20 ng/g or more or 6-monoacetylmorphine at 10 ng/g or more indicates the newborn was exposed to opiates/opioids during gestation.

Cautions

Since the evidence of illicit drug use during pregnancy can be cause for separating the baby from the mother, a kit is available that includes all the materials necessary to complete chain of custody to ensure that the test results are appropriate for legal proceedings.

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. 11th edition. McGraw-Hill Companies Inc, 2006. Available at www.accessmedicine.com/content.aspx?aID=940653
2. Baselt RC, ed. Disposition of Toxic Drugs and Chemical in Man. 10th ed. Biomedical Publications, 2014
3. Szeto HH: Kinetics of drug transfer to the fetus. Clin Obstet Gynecol. 1993;36:246-254
4. Ahanya SN, Lakshmanan J, Morgan BL, Ross MG: Meconium passage in utero: mechanisms, consequences, and management. Obstet Gynecol Surv. 2005;60:45-56
5. Langman LJ Bechtel LK, Meier BM, Holstege C: Clinical toxicology. In: Rifai N, Horvath AR, Wittwer CT, eds. Tietz Textbook of Clinical Chemistry and Molecular Diagnostics. 6th ed. Elsevier; 2018:832-887

Performance

Method Description

Meconium is mixed with internal standard and extracted with methanol. The methanolic extract is further processed by solid phase extraction. The extract is analyzed by liquid chromatography tandem mass spectroscopy (LC-MS/MS).(Unpublished Mayo method)

PDF Report

No

Specimen Retention Time

2 weeks

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

80361
80365
G0480 (if appropriate)