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MAYO CLINIC LABORATORIES

Test Definition: COKMX

Cocaine and Metabolite Confirmation, Chain of Custody, Meconium

Overview

Useful For

Detecting in utero drug exposure up to 5 months before birth handled through the chain of custody process

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

Ordering Guidance

This test is for situations that require the chain-of-custody process. For testing **not** requiring chain of custody, order COKEM / Cocaine and Metabolites Confirmation, Meconium

Specimen Required

Supplies: Chain of Custody Meconium Kit (T653) includes the specimen containers, seals, and documentation required.
Specimen Volume: 1 g (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.

Specimen Minimum Volume

0.3 g (approximately 1/4 teaspoon)

Reject Due To

Grossly bloody	Reject; Pink OK
Stool specimen	Reject
Specimen in a diaper	Reject

Specimen Stability Information

Specimen Type	Temperature	Time	Special Container
Meconium	Frozen (preferred)	21 days	
	Ambient	72 hours	
	Refrigerated	21 days	

Clinical & Interpretive

Clinical Information

Cocaine is an alkaloid found in *Erythroxylon coca*, which grows principally in the northern South American Andes and, to a lesser extent, in India, Africa, and Java.(1) Cocaine is a powerfully addictive stimulant drug. Cocaine abuse has a long history, is rooted in the drug culture in the United States,(2) and is one of the most common illicit drugs of abuse.(3,4) Cocaine is rapidly metabolized primarily to benzoylecgonine, which is further metabolized to m-hydroxybenzoylecgonine (m-HOBE).(1,5) Cocaine is frequently used with other drugs, most commonly alcohol, and the simultaneous use of both can be determined by the presence of the unique metabolite cocaethylene.(4)

Intrauterine drug exposure to cocaine has been associated with placental abruption, premature labor, small for gestational age status, microcephaly, and congenital anomalies (eg, cardiac and genitourinary abnormalities, necrotizing enterocolitis, and central nervous system stroke or hemorrhage).(6)

The disposition of drug 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.(7) 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.(8) 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.(7)

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 liquid chromatography tandem mass spectrometry (LC-MS/MS) result.

Cutoff concentrations for LC-MS/MS testing:
Cocaine: 20ng/g
Benzoylecgonine: 20 ng/g
Cocaethylene: 20 ng/g
m-Hydroxybenzoylecgonine: 20ng/g

Interpretation

The presence of any of the following: cocaine, benzoylecgonine, cocaethylene, or *m*-hydroxybenzoylecgonine, at 20 ng/g or more is indicative of in utero drug exposure up to 5 months before birth.

Cautions

No significant cautionary statements

Clinical Reference

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4. Isenschmid DS. Cocaine-effects on human performance and behavior. Forensic Sci Rev. 2002;14(1-2):61-100
5. Kolbrich EA, Barnes AJ, Gorelick DA, Boyd SJ, Cone EJ, Huestis MA. Major and minor metabolites of cocaine in human plasma following controlled subcutaneous cocaine administration. J Anal Toxicol. 2006;30(8):501-510
6. Kwong TC, Ryan RM. Detection of intrauterine illicit drug exposure by newborn drug testing. National Academy of Clinical Biochemistry. Clin Chem. 1997;43(1):235-242
7. Ostrea EM Jr, Brady MJ, Parks PM, Asensio DC, Naluz A. Drug screening of meconium in infants of drug-dependent mothers: an alternative to urine testing. J Pediatr. 1989;115(3):474-477
8. Ahanya SN, Lakshmanan J, Morgan BL, Ross MG. Meconium passage in utero: mechanisms, consequences, and management. Obstet Gynecol Surv. 2005;60(1):45-74
9. Baselt RC. Disposition of Toxic Drugs and Chemical in Man. 12th ed. Biomedical Publications; 2020
10. Langman LJ, Bechtel LK, Holstege CP. Clinical toxicology. In: Rifai N, Chiu RWK, Young I, Burnham C-AD, Wittwer CT, eds. Tietz Textbook of Laboratory Medicine. 7th ed. St Louis, MO: Elsevier; 2023:chap 43

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 spectrometry.(Unpublished Mayo method)

PDF Report
No

Day(s) Performed
Monday through Sunday

Report Available
2 to 3 days

Specimen Retention Time
2 weeks

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
80353 (if appropriate for select payers)
Clinical Toxicology CPT Code Client Guidance

LOINC® Information

Test ID	Test Order Name	Order LOINC® Value
COKMX	Cocaine and metabolite Conf, CoC, M	69008-1

Result ID	Test Result Name	Result LOINC® Value
36166	Cocaine	69009-9

36167	Benzoylecgonine	69010-7
36168	Cocaethylene	69011-5
36169	m-Hydroxybenzoylecgonine	69012-3
36170	Interpretation	69050-3
36171	Chain of Custody	77202-0