MAYO CLINIC LABORATORIES

Test Definition: AMPMX

Amphetamine-Type Stimulants Confirmation, Chain of Custody, Meconium

Overview

Useful For

Detecting in utero drug exposure 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: 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

Specimen Stability Information

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

Clinical & Interpretive

Clinical Information

Several stimulants and hallucinogens chemically related to phenylethylamine are referred to collectively as the amphetamine-type stimulants (amphetamines). Generally, this refers to the prescription and illicit amphetamines including amphetamine; methamphetamine; 3,4-methylenedioxymethamphetamine (MDMA, Ecstasy); 3,4-methylenedioxyamphetamine (MDA); and 3,4-methylenedioxyethylamphetamine (MDEA).(1) Methamphetamine has become a drug of choice among stimulant abusers because of its availability and ease of production.

The metabolism of amphetamine consists of hydroxylation and deamination followed by conjugation with glucuronic acid. Methamphetamine is metabolized to amphetamine; both should be present in urine after methamphetamine use. Both MDMA and MDEA are metabolized to MDA.(1)

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.(2) The first evidence of meconium in the fetal intestine appears at approximately the 10th to 12th week of gestation, and slowly moves to the colon by the 16th week of gestation.(3) Therefore, the presence of drugs in meconium has been proposed to be indicative of in utero drug exposure up to 5 months before birth, a longer historical measure than is possible by urinalysis.(2)

Intrauterine drug exposure to amphetamines has been associated with maternal abruption, prematurity, and decreased growth parameters, such as low birthweight.(4) Some intrauterine amphetamine-exposed infants may develop hypertonia, tremors, and poor feeding and abnormal sleep patterns.(5)

Chain of custody is a record of the disposition of a specimen to document who collected it, who handled it, and who 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:
Amphetamine: 20 ng/g
Methamphetamine: 20 ng/g
3,4-Methylenedioxyamphetamine: 20 ng/g
3,4-Methylenedioxyethylamphetamine: 20 ng/g
3,4-Methylenedioxymethamphetamine: 20 ng/g

Interpretation

The presence of any of the following: amphetamine; methamphetamine; 3,4-methylenedioxyamphetamine; 3,4-methylenedioxymethamphetamine; or 3,4-methylenedioxyethylamphetamine at more than 20 ng/g is indicative of in utero exposure up to 5 months before birth.

Cautions

No significant cautionary statements

Clinical Reference

1. Baselt RC: Disposition of Toxic Drugs and Chemical in Man. 8th ed. Biochemical Publications; 2008:83-86; 947-952; 993-999
2. Ostrea EM Jr, Brady MJ, Parks PM, Asensio DC, Naluz: Drug screening of meconium in infants of drug-dependent mothers: an alternative to urine testing. J Pediatr. 1989 Sep;115(3):474-477
3. Ahanya SN, Lakshmanan J, Morgan BL, Ross MG: Meconium passage in utero: mechanisms, consequences, and management. Obstet Gynecol Surv. 2005 Jan;60(1):45-56
4. Kwong TC, Ryan RM: Detection of intrauterine illicit drug exposure by newborn drug testing. National Academy of Clinical Biochemistry. Clin Chem. 1997 Jan;43(1):235-242
5. Dixon SD: Effects of transplacental exposure to cocaine and methamphetamine on the neonate. West J Med. 1989 Apr;150(4):436-442
6. 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.(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
Rochester

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
80324
80359
G0480 (if appropriate)

LOINC® Information

Test ID	Test Order Name	Order LOINC® Value
AMPMX	Amphetamines Confirmation, CoC, M	69021-4

Result ID	Test Result Name	Result LOINC® Value
36136	Amphetamine	26959-7
36137	Methamphetamine	69022-2
36138	3,4-methylenedioxyamphetamine	69023-0
36139	3,4-methylenedioxyethylamphetamine	69024-8
36140	3,4-methylenedioxymethamphetamine	69025-5
36141	Interpretation	69050-3
36142	Chain of Custody	77202-0