MAYO CLINIC LABORATORIES

Test Definition: AMPHX

Amphetamines Confirmation, Chain of Custody, Random, Urine

Overview

Useful For

Confirming drug exposure involving amphetamines such as amphetamine and methamphetamine, phentermine, pseudoephedrine/ephedrine, methylenedioxymethamphetamine, and methylenedioxyamphetamine.

Providing chain-of-custody for when 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

Specimen Required

Supplies: Chain of Custody Kit (T282)
Container/Tube: Chain of custody kit containing the specimen containers, seals, and documentation required
Specimen Volume: 5 mL
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.
Additional Information: Submitting less than 5 mL will compromise the ability to perform all necessary 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)	28 days	
	Ambient	28 days	
	Frozen	28 days	

Clinical & Interpretive

Clinical Information

Amphetamines are sympathomimetic amines that stimulate central nervous system activity and, in part, suppress the appetite. Phentermine, amphetamine, and methamphetamine are prescription drugs for weight loss. All other amphetamines are Class I (distribution prohibited) compounds. In addition to their medical use as anorectic drugs, they are used in the treatment of narcolepsy, attention-deficit disorder/attention-deficit hyperactivity disorder, and minimal brain dysfunction.

Because of their stimulant effects, the drugs are commonly sold illicitly and abused. Physiological symptoms associated with very high amounts of ingested amphetamine or methamphetamine include elevated blood pressure, dilated pupils, hyperthermia, convulsions, and acute amphetamine psychosis.

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: 500 ng/mL

Liquid chromatography tandem mass spectrometry:
Amphetamine: 25 ng/mL
Methamphetamine: 25 ng/mL
Phentermine: 25 ng/mL
Methylenedioxyamphetamine: 25 ng/mL
Methylenedioxymethamphetamine: 25 ng/mL
Pseudoephedrine/ephedrine: 25 ng/mL reported as negative

Interpretation

The presence of amphetamines in urine is a strong indicator that the patient has used these drugs within the past 3 days.

Methamphetamine has a half-life of 9 to 24 hours and is metabolized by hepatic demethylation to amphetamines. Consequently, a sample containing methamphetamine usually also contains amphetamine. Amphetamine has a half-life of 4 to 24 hours.

Amphetamine is **not** metabolized to methamphetamine; absence of methamphetamine in the presence of amphetamine indicates the primary drug of abuse is amphetamine. However, trace amounts of methamphetamine can be detected in amphetamine-based prescription drugs (eg, Adderall), but the concentrations are typically less than 1% of the amphetamine concentrations.

3,4-Methylenedioxymethamphetamine (Ecstasy, MDMA) is metabolized to 3,4-methylenedioxyamphetamine (MDA).

Methylenedioxyethylamphetamine is also metabolized to MDA.

The detection interval in urine for amphetamine type stimulants is typically to 3 to 5 days after last ingestion.

This test will produce true-positive results for urine specimens collected from patients who are administered Adderall and Benzedrine (contain amphetamine); Desoxyn and Vicks Inhaler (contain methamphetamine); Selegiline, and famprofazone (metabolized to methamphetamine and amphetamine); and clobenzorex, fenethylline, fenproporex, and mefenorex, which are amphetamine pro-drugs and metabolized to amphetamine.

Cautions

Over-the-counter sympathomimetics such as ephedrine and phenylpropanolamine are occasionally detected in the screening immunoassay.

Clinical Reference

1. Baselt RC. Disposition of Toxic Drugs and Chemicals in Man. 10th ed. Biomedical Publications; 2014
2. 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
3. Principles of Forensic Toxicology. 2nd ed. AACC Press; 2003:385

Performance

Method Description

Urine is preliminarily screened for the presence of amphetamine-type stimulants by immunoassay technique.

The amphetamine assay is based on the kinetic interaction of microparticles in a solution as measured by changes in light transmission. In the absence of sample drug, soluble drug conjugates bind to antibody-bound microparticles causing the formation of particle aggregates. As the aggregation reaction proceeds in the absence of sample drug, the absorbance increases. When a urine sample contains the drug in question, this drug competes with the drug derivative conjugate for microparticle-bound antibody. Antibody bound to sample drug is no longer available to promote particle aggregation, and subsequent particle lattice formation is inhibited. The presence of sample drug diminishes the increasing absorbance in proportion to the concentration of drug in the sample. Sample drug content is determined relative to the value obtained for a known cutoff concentration of drug.(Package insert: AMPS2. Roche Diagnostics; 06/2020)

The specimen is then diluted and then analyzed by liquid chromatography tandem mass spectrometry.(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

80325
80359
G0480 (if appropriate)

LOINC® Information

Test ID	Test Order Name	Order LOINC® Value
AMPHX	Amphetamines Confirmation, CoC, U	97161-4

Result ID	Test Result Name	Result LOINC® Value
6538	Amphetamines Immunoassay Screen	19261-7
36128	Amphetamine-by LC-MS/MS	20410-7
36129	Phentermine-by LC-MS/MS	20557-5
36130	Methamphetamine-by LC-MS/MS	16235-4
36131	Pseudoephedrine/Ephedrine-by LC-MS/MS	58707-1
36132	MDA (Ecstasy metabolite)-by LC-MS/MS	20545-0
36133	MDMA (Ecstasy)-by LC-MS/MS	18358-2
36134	Amphetamines Interpretation	69050-3
36135	Chain of Custody	77202-0