

Overview

Useful For

Determination of heroin use in urine specimens handled through the chain-of-custody process

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

Testing for adulterants will be performed on all chain of custody urine samples per regulatory requirements.

Method Name

Gas Chromatography-Mass Spectrometry (GC-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 6MAMU / 6-Monoacetylmorphine Confirmation, Random, 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: 10 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.

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

2.1 mL

Reject Due To

Gross hemolysis	OK
Gross icterus	OK

Specimen Stability Information

Specimen Type	Temperature	Time	Special Container
Urine	Refrigerated (preferred)	14 days	
	Frozen	14 days	
	Ambient	72 hours	

Clinical & Interpretive

Clinical Information

Heroin (diacetylmorphine) is a semisynthetic opiate that is closely related to morphine. It is no longer used clinically in the United States, though elsewhere it is used for rapid relief of pain.(1) Like morphine and other opiates, its relaxing and euphoric qualities make heroin a popular drug of abuse. Heroin is commonly injected intravenously, although it can be administered by other means such as snorting, smoking, or inhaling vapors.

Heroin shares the core structure of morphine, with the addition of 2 acetyl groups, which are thought to enhance its permeation into the central nervous system.(2,3) Heroin is metabolized by sequential removal of these acetyl groups; loss of first acetyl group converts heroin into 6-monoacetylmorphine (6-MAM) and loss of the second acetyl group converts 6-MAM to morphine, the dominant metabolite of heroin.(2,3) Heroin is rarely found intact in urine, since only 0.1% of a dose is excreted unchanged. 6-MAM is a unique metabolite of heroin, and its presence is a definitive indication of recent heroin use. Like heroin, 6-MAM has a very short half-life and detection window.

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. This includes a record of the disposition of a specimen to document the personnel 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

Cutoff concentrations:

6-MAM

<5 ng/mL

Interpretation

The presence of 6-monoacetylmorphine (6-MAM) in urine is definitive for recent heroin use. However, the absence of 6-MAM does not rule out heroin use because of its short half-life. 6-MAM is typically only detectable within 24 hours of heroin use. 6-MAM is further metabolized into morphine, which may be detected 1 to 2 days after 6-MAM is no longer measurable. Morphine will typically be found in a specimen containing 6-MAM.(2,3)

Cautions

While 6-monoacetylmorphine (6-MAM) is metabolized to morphine, the presence of morphine alone is not sufficient evidence to prove heroin use. 6-MAM is the only definitive metabolite of heroin.

Clinical Reference

1. Giovannelli M, Bedforth N, Aitkenhead A: Survey of intrathecal opioid usage in the UK. *Eur J Anaesthesiol* 2008;25:118-1122
2. Principles of Forensic Toxicology. Second edition. AACC Press, 2003, pp 187-205
3. Hardman JG, Limbird LE, Gilman AG: Goodman and Gilman's. The Pharmacological Basis of Therapeutics. 10th edition McGraw-Hill Book Company, 2001 pp 590-592
4. Principles of Forensic Toxicology. Fourth edition. AACC Press, 2013
5. Langman LJ, Bechtel LK, Meier BM, Holstege C: Chapter 41: Clinical Toxicology. *In* Tietz Textbook of Clinical Chemistry and Molecular Diagnostics. Edited by N Rifai, AR Horvath, CT Wittwer. Sixth edition. Elsevier, 2018 p 872

Performance**Method Description**

6-Monoacetylmorphine is extracted using solid phase extraction techniques. The eluent is evaporated, reconstituted in organic solvent, and then derivatized. It is then analyzed by gas chromatography-mass spectrometry using selected ion monitoring.(Unpublished Mayo method)

PDF Report

No

Day(s) Performed

Tuesday, Wednesday

Report Available

3 to 7 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. This test has not been cleared or approved by the US Food and Drug Administration.

CPT Code Information

80356

G0480 (if appropriate)

LOINC® Information

Test ID	Test Order Name	Order LOINC® Value
6MAMX	6-MAM Confirmation, CoC, U	19593-3

Result ID	Test Result Name	Result LOINC® Value
36118	6-Monoacetylmorphine by GC/MS	19593-3
36119	6-MAM Interpretation	69050-3
36120	Chain of Custody	77202-0