

Overview

Useful For

Monitoring urine methylphenidate and ritalinic acid concentrations to assess compliance in patients

Method Name

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

NY State Available

Yes

Specimen

Specimen Type

Urine

Additional Testing Requirements

If urine creatinine is required or adulteration of the sample is suspected, also order ADULT / Adulterants Survey, Random, Urine. For more information, see ADULT / Adulterants Survey, Random, Urine.

Specimen Required

Supplies: Sarstedt 5 mL Aliquot Tube (T914)

Collection Container/Tube: Plastic urine container

Submission Container/Tube: Plastic, 5-mL tube

Specimen Volume: 5 mL

Collection Instructions:

- 1. Collect a random urine specimen.
- 2. No preservative.

Additional Information:

- 1. No specimen substitutions.
- 2. STATS are **not** accepted for this test.

Forms

[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	OK
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hemolysis	
Gross icterus	OK

Specimen Stability Information

Specimen Type	Temperature	Time	Special Container
Urine	Refrigerated (preferred)	10 days	
	Frozen	28 days	

Clinical & Interpretive

Clinical Information

Methylphenidate (MPH) is utilized for the treatment of attention deficit hyperactivity disorder (ADHD) and narcolepsy. MPH has two chiral centers and is marketed as a racemic mixture and as the active d-enantiomer of racemic methylphenidate. Although the exact mechanism of its action has not been fully defined, it blocks the reuptake of norepinephrine and dopamine into the presynaptic neuron thus increasing the concentrations of these monoamines in the extraneural space. Methylphenidate is extensively metabolized to ritalinic acid, which is an inactive metabolite.

Reference Values

Negative

Cutoff concentrations:
Methylphenidate by LC-MS/MS: 10 ng/mL
Ritalinic Acid by LC-MS/MS: 50 ng/mL

Interpretation

Methylphenidate has an oral bioavailability of 22% to 100% with peak concentrations occurring around 2 hours for instant release and approximately 5 to 6 hours for extended release formulations. The half-life of methylphenidate is 2 to 4 hours. Methylphenidate is extensively metabolized to ritalinic acid, which is an inactive metabolite. The half-life of ritalinic acid is about 3 to 4 hours. Only small quantities (<1%) of unchanged methylphenidate appear in the urine as most of the dose (60%-86%) is excreted in the urine as ritalinic acid. The presence of methylphenidate or ritalinic acid in the urine indicates the patient has taken methylphenidate in the past 1 to 2 days.

Cautions

No significant cautionary statements.

Clinical Reference

1 .Kimko HC, Cross JT, Abernethy DR: Pharmacokinetics and clinical effectiveness of methylphenidate. Clin Pharmacokinetics. 1999 Dec;37(6):457-470. doi: 10.2165/00003088-199937060-00002

2. Ramos L, Bakhtiar R, Tse FL: Liquid-liquid extraction using 96-well plate format in conjunction with liquid chromatography/tandem mass spectrometry for quantitative determination of methylphenidate (Ritalin1) in human plasma. Rapid Commun Mass Spectrom. 2000;14(9): 740-745. doi: 10.1002/(SICI)1097-0231(20000515)14:9<740:AID-RCM938>3.0.CO;2-C

3. Paterson SM, Moore GA, Florkowski CM, George PM: Determination of methylphenidate and its metabolite in urine by liquid chromatography/tandem mass spectrometry. J Chromatogr B Analyt Technol Biomed Life Sci. 2012 Jan 15;881-881:20-26. doi: 10.1016/j.jchromb.2011.11.007

4. Mulet CT, Arroyo-Moro LE, Leon LA, Gnagy E, DeCaprio AP: Rapid quantitative analysis of methylphenidate and ritalinic acid in oral fluid by liquid chromatography triple quadrupole mass spectrometry. JChromatogr B Analyt Technol Biomed Life Sci. 2018 Aug 15;1092:313-319. doi: 10.1016/j.jchromb.2018.06.025

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; 2018:1323-1324

Performance

Method Description

The urine sample is centrifuged, diluted with internal standard and clinical laboratory reagent water, and then analyzed by liquid chromatography-tandem mass spectrometry.(Unpublished Mayo method)

PDF Report

No

Day(s) Performed

Monday, Wednesday, Friday

Report Available

2 to 4 days

Specimen Retention Time

14 days

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

80360
G0480 (if appropriate)

LOINC® Information

Test ID	Test Order Name	Order LOINC® Value
MPHNU	Methylphenidate and Metabolite, U	In Process

Result ID	Test Result Name	Result LOINC® Value
608882	Methylphenidate by LC-MS/MS	20548-4
608883	Ritalinic Acid by LC-MS/MS	72790-9
608884	Methylphenidate Interpretation	69050-3