MAYO CLINIC LABORATORIES

# Test Definition: MPHNU

Methylphenidate and Metabolite, Random, Urine

## Overview

### Useful For

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

### Special Instructions

- Clinical Toxicology CPT Code Client Guidance

### 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.

### Specimen Required

**Supplies:** Sarstedt Aliquot Tube 5 mL (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. STAT requests are **not accepted** for this test.
3. Submitting less than 1 mL will compromise the ability to perform all necessary testing.

### Forms

If not ordering electronically, complete, print, and send a Therapeutics Test Request (T831) with the specimen.

### Specimen Minimum Volume

0.5 mL

### Reject Due To

| | |
|---|---|
| Gross hemolysis | OK |
| 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 and narcolepsy. MPH has two chiral centers and is marketed as a racemic mixture and as the active d-enantiomer of racemic MPH. Although the exact mechanism of its action has not been fully defined, it blocks the reuptake of norepinephrine and dopamine into the presynaptic neuron therefore increasing the concentrations of these monoamines in the extraneural space.

### Reference Values

Negative (Positive results are reported with a quantitative result.)

Cutoff concentrations by liquid chromatography tandem mass spectrometry:
Methylphenidate: 10 ng/mL
Ritalinic Acid: 50 ng/mL

### Interpretation

Methylphenidate (MPH) has an oral bioavailability of 22% to 100% with peak concentrations occurring around 2 hours for immediate release and approximately 5 to 6 hours for extended-release formulations. The half-life of MPH is 2 to 4 hours. MPH 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 MPH appear in the urine as most of the dose (60%-86%) is excreted in the urine as ritalinic acid. The presence of MPH or ritalinic acid in the urine indicates the patient has taken MPH 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;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;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. J Chromatogr B Analyt Technol Biomed Life Sci. 2018;1092:313-319. doi:10.1016/j.jchromb.2018.06.025
5. 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

## 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
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.

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## 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
80360 (if appropriate for select payers)
Clinical Toxicology CPT Code Client Guidance

## LOINC® Information

| Test ID | Test Order Name | Order LOINC® Value |
|---|---|---|
| MPHNU | Methylphenidate and Metabolite, U | 104676-2 |

| 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 |