

Overview

Useful For

Detecting drug use involving benzodiazepines such as alprazolam, chlordiazepoxide, clonazepam, diazepam, midazolam, oxazepam, temazepam, clobazam, flunitrazepam, flurazepam, lorazepam, prazepam, triazolam, and zolpidem

Method Name

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

NY State Available

Yes

Specimen

Specimen Type

Urine

Ordering Guidance

For situations where chain of custody is required, a Chain-of-Custody Kit (T282) is available. For chain-of-custody testing, order BNZX / Benzodiazepines Confirmation, Chain of Custody, Random, Urine.

Additional Testing Requirements

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

Specimen Required

Supplies: Urine Tubes, 10 mL (T068)

Container/Tube: Plastic, 10-mL urine tube

Specimen Volume: 10 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.

Forms

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

Specimen Minimum Volume

5 mL

Reject Due To

| | |
|-----------------|--------|
| Gross hemolysis | Reject |
| Gross icterus | Reject |

Specimen Stability Information

| Specimen Type | Temperature | Time | Special Container |
|---------------|--------------------------|---------|-------------------|
| Urine | Refrigerated (preferred) | 7 days | |
| | Frozen | 14 days | |

Clinical and Interpretive
Clinical Information

Benzodiazepines are any of a group of compounds having a common molecular structure and acting similarly as depressants of the central nervous system. As a class of drugs, benzodiazepines are among the drugs most commonly prescribed in the western hemisphere because of their efficacy, safety, low addiction potential, minimal side effects, and high public demand for sedative and anxiolytic agents.

Reference Values

Negative

Cutoff concentrations:

Alprazolam by LC-MS/MS: 10 ng/mL

Alpha-Hydroxyalprazolam by LC-MS/MS: 10 ng/mL

Chlordiazepoxide by LC-MS/MS: 10 ng/mL

Clonazepam by LC-MS/MS: 10 ng/mL

7-Aminoclonazepam by LC-MS/MS: 10 ng/mL

Diazepam by LC-MS/MS: 10 ng/mL

Nordiazepam by LC-MS/MS: 10 ng/mL

Midazolam by LC-MS/MS: 10 ng/mL

Alpha-Hydroxy Midazolam by LC-MS/MS: 10 ng/mL

Oxazepam by LC-MS/MS: 10 ng/mL

Temazepam by LC-MS/MS: 10 ng/mL

Clobazam by LC-MS/MS: 10 ng/mL

N-Desmethyclobazam by LC-MS/MS: 10 ng/mL

Flunitrazepam by LC-MS/MS: 10 ng/mL

7-Aminoflunitrazepam by LC-MS/MS: 10 ng/mL

Flurazepam by LC-MS/MS: 10 ng/mL

2-Hydroxy Ethyl Flurazepam by LC-MS/MS: 10 ng/mL

Lorazepam by LC-MS/MS: 10 ng/mL

Prazepam by LC-MS/MS: 10 ng/mL

Triazolam by LC-MS/MS: 10 ng/mL

Alpha-Hydroxy Triazolam by LC-MS/MS: 10 ng/mL

Zolpidem by LC-MS/MS: 10 ng/mL

Zolpidem Phenyl-4-Carboxylic acid by LC-MS/MS: 10 ng/mL

Interpretation

Benzodiazepines are extensively metabolized, and the parent compounds are not detected in urine. This test screens for (and confirms) the presence of:

Alprazolam

Alpha-hydroxyalprazolam (metabolite of alprazolam)

Chlordiazepoxide

Clonazepam

7-Aminoclonazepam (metabolite of clonazepam)

Diazepam (separate prescribable drug and metabolite of medazepam)

Nordiazepam (metabolite of clorazepate, halazepam, prazepam, diazepam and medazepam)

Midazolam

Alpha-hydroxy midazolam (metabolite of midazolam)

Oxazepam (separate prescribable drug and metabolite of clorazepate, halazepam, prazepam, medazepam, temazepam, and diazepam)

Temazepam (separate prescribable drug and metabolite of medazepam and diazepam)

Clobazam

N-Desmethyloclobazam (metabolite of clobazam)

Flunitrazepam

7-Aminoflunitrazepam (metabolite of flunitrazepam)

Flurazepam

2-Hydroxy ethyl flurazepam (metabolite of flurazepam)

Lorazepam

Prazepam

Triazolam

Alpha-hydroxy triazolam (metabolite of triazolam)

Zolpidem

Zolpidem phenyl-4-carboxylic acid (metabolite of zolpidem)

The clearance half-life of long-acting benzodiazepines is more than 24 hours. It takes 5 to 7 half-lives to clear 98% of a drug dose. Therefore, the presence of a long-acting benzodiazepine greater than the limit of quantification indicates exposure within a 5 to 20-day interval preceding specimen collection. Following a dose of diazepam, the drug and its metabolites appear in the urine within 30 minutes. Peak urine output is reached between 1 and 8 hours. See Mayo Clinic Laboratories Drugs of Abuse Testing Guide at www.mayocliniclabs.com/test-info/drug-book/index.html for additional information including metabolism, clearance (half-life), and approximate detection times.

Cautions

No significant cautionary statements

Clinical Reference

1. Gudín JA, Mogali S, Jones JD, Comer SD: Risks, management, and monitoring of combination of opioid, benzodiazepines, and/or alcohol use. *Postgrad Med.* 2013;125(4):115-30. doi: 10.3810/pgm.2013.07.2684
2. Manchikanti L, Abdi S, Atluri S, et al: American Society of Interventional Pain Physicians (ASIPP) guidelines for responsible opioid prescribing in chronic non-cancer pain: Part 2-guidance. *Pain Physician.* 2012;15(3 Supp):S67-116
3. Barkin RL: In: Baselt RC, ed. *Disposition of Toxic Drugs and Chemicals in Man.* 8th ed. Biomedical Publications; 2008
4. 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; 2018:1328-1333

Performance

Method Description

Benzodiazepines are extensively metabolized by the liver and subsequently exist in the urine primarily as conjugated

esters (-glucuronides). The conjugated metabolites are cleaved during a mild hydrolysis utilizing the enzyme glucuronidase. Stable isotope forms of the compounds are added as internal standards to account for extraction losses. An aliquot of the hydrolyzed sample is diluted and the analytes are separated by liquid chromatography tandem mass spectroscopy (LC-MS/MS) and analyzed by multiple reaction monitoring. (Unpublished Mayo method)

PDF Report

No

Day(s) Performed

Tuesday through Saturday

Report Available

2 to 6 days

Specimen Retention Time

14 days

Performing Laboratory Location

Rochester

Fees and 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 Regional Manager. 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 U.S. Food and Drug Administration.

CPT Code Information

80347

80339

80368

G0480 (if appropriate)

LOINC® Information

| Test ID | Test Order Name | Order LOINC Value |
|---------|---------------------------------|-------------------|
| BNZU | Benzodiazepines Confirmation, U | 90890-5 |

| Result ID | Test Result Name | Result LOINC Value |
|-----------|------------------------|--------------------|
| 608256 | Alprazolam by LC-MS/MS | 59615-5 |



| Result ID | Test Result Name | Result LOINC Value |
|-----------|---|--------------------|
| 608257 | Alpha-Hydroxyalprazolam by LC-MS/MS | 16348-5 |
| 608258 | Chlordiazepoxide by LC-MS/MS | 20522-9 |
| 608259 | Clonazepam by LC-MS/MS | 16229-7 |
| 608260 | 7-aminoclonazepam by LC-MS/MS | 51776-3 |
| 608261 | Diazepam by LC-MS/MS | 16227-1 |
| 608262 | Nordiazepam by LC-MS/MS | 16228-9 |
| 608263 | Midazolam by LC-MS/MS | 16233-9 |
| 608264 | Alpha-Hydroxy Midazolam by LC-MS/MS | 59590-0 |
| 608265 | Oxazepam by LC-MS/MS | 16201-6 |
| 608266 | Temazepam by LC-MS/MS | 20559-1 |
| 608267 | Clobazam by LC-MS/MS | 59635-3 |
| 608268 | N-Desmethyloclobazam by LC-MS/MS | 97160-6 |
| 608269 | Flunitrazepam by LC-MS/MS | 20528-6 |
| 608270 | 7-aminoflunitrazepam by LC-MS/MS | 51777-1 |
| 608271 | Flurazepam by LC-MS/MS | 16231-3 |
| 608272 | 2-Hydroxy Ethyl Flurazepam by LC-MS/MS | 97159-8 |
| 608273 | Lorazepam by LC-MS/MS | 17088-6 |
| 608274 | Prazepam by LC-MS/MS | 17479-7 |
| 608275 | Triazolam by LC-MS/MS | 16232-1 |
| 608276 | Alpha-Hydroxy Triazolam by LC-MS/MS | 49876-6 |
| 608277 | Zolpidem by LC-MS/MS | 72770-1 |
| 608278 | Zolpidem Phenyl-4-Carboxylic acid by LC-MS/MS | 72768-5 |
| 608448 | Benzodiazepines Interpretation | 16195-0 |