MAYO CLINIC LABORATORIES

Test Definition: BNZU

Benzodiazepines Confirmation, Random, Urine

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

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

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 drug panels and specific requests are available. Call 800-533-1710 or 507-266-5700.

Additional Testing Requirements

If urine creatinine is required or adulteration of the sample is suspected, also order ADULT / Adulterants Survey, Random, Urine in addition to this test.

Specimen Required

Supplies: Sarstedt Aliquot Tube, 5 mL (T914)
Collection Container/Tube: Plastic urine container
Submission Container/Tube: Plastic, 5-mL tube
Specimen Volume: 1 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 our 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

1 mL

Reject Due To

Gross hemolysis	Reject
Icterus	Reject

Specimen Stability Information

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

Clinical & 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 frequently 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 (Positive results are reported with a quantitative result.)

Cutoff concentrations by liquid chromatography tandem mass spectrometry:
Alprazolam: 10 ng/mL
Alpha-hydroxyalprazolam: 10 ng/mL
Chlordiazepoxide: 10 ng/mL
Clonazepam: 10 ng/mL
7-Aminoclonazepam: 10 ng/mL
Diazepam: 10 ng/mL
Nordiazepam: 10 ng/mL
Midazolam: 10 ng/mL
Alpha-hydroxy midazolam: 10 ng/mL
Oxazepam: 10 ng/mL
Temazepam: 10 ng/mL
Clobazam: 10 ng/mL

N-Desmethylclobazam: 10 ng/mL
Flunitrazepam: 10 ng/mL
7-Aminoflunitrazepam: 10 ng/mL
Flurazepam: 10 ng/mL
2-Hydroxy ethyl flurazepam: 10 ng/mL
Lorazepam: 10 ng/mL
Prazepam: 10 ng/mL
Triazolam: 10 ng/mL
Alpha-hydroxy triazolam: 10 ng/mL
Zolpidem: 10 ng/mL
Zolpidem phenyl-4-carboxylic acid: 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 medzazepam)
-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-Desmethylclobazam (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.

For additional information, including metabolism, clearance (half-life), and approximate detection times, see Optimize Urine Drug Monitoring for CNS Depressants.

Cautions

No significant cautionary statements

Clinical Reference

1. Gudin 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):115-130. doi:10.3810/pgm.2013.07.2684
2. Dowell D, Ragan KR, Jones CM, Baldwin GT, Chou R. CDC Clinical Practice Guideline for Prescribing Opioids for Pain-United States. MMWR Recomm Rep. 2022;71(No. RR-3):1-95
3. Baselt RC. Disposition of Toxic Drugs and Chemical in Man. 12th ed. Biomedical Publications; 2020
4. 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

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 and analyzed by multiple reaction monitoring.(Unpublished Mayo method)

PDF Report

No

Day(s) Performed

Monday through Friday

Report Available

2 to 6 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

G0480
80347 (if appropriate for select payers)
80339 (if appropriate for select payers)
80368 (if appropriate for select payers)
Clinical Toxicology CPT Code Client Guidance

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
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-Desmethylclobazam 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	49876-6

	LC-MS/MS	
608277	Zolpidem by LC-MS/MS	72770-1
608278	Zolpidem Phenyl-4-Carboxylic acid by LC-MS/MS	72768-5
608448	Benzodiazepines Interpretation	69050-3