Test Definition: CAFF

Caffeine, Serum

Overview

Useful For

Monitoring caffeine therapy in neonates

Assessing caffeine toxicity in neonates

Method Name

Enzyme Multiplied Immunoassay Technique (EMIT)

NY State Available

Yes

Specimen

Specimen Type

Serum

Specimen Required

Supplies: Sarstedt Aliquot Tube, 5 mL (T914)
Collection Container/Tube:
Preferred: Serum gel
Acceptable: Red top
Submission Container/Tube: Plastic vial
Specimen Volume: 0.5 mL Serum
Collection Instructions:
1. Within 2 hours of collection, centrifuge the specimen.
2. For serum gel tubes, serum may sit on the gel or be aliquoted into a plastic vial.
3. For red top tubes, aliquot serum into a plastic vial immediately after centrifugation.

Forms

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

Specimen Minimum Volume

Serum: 0.25 mL

Reject Due To

Gross hemolysis	Reject

Specimen Stability Information

Specimen Type	Temperature	Time	Special Container
Serum	Frozen (preferred)	28 days	
	Ambient	72 hours	
	Refrigerated	72 hours	

Clinical & Interpretive

Clinical Information

Caffeine is used to treat apnea of prematurity that occurs in newborn infants, the most frequent complication seen in the neonatal nursery.

In neonates, caffeine has a half-life that ranges from approximately 3 to 4 days, which is much longer than in adults (typically 4-6 hours) due to the immaturity of the neonatal liver. This requires that small doses be administered at much longer intervals than would be predicted based on adult pharmacokinetics.

The volume of distribution of caffeine is 0.8 to 0.9 L/kg (infants) or 0.6 L/kg (adults) and the drug is approximately 36% protein bound.

Toxicity observed in neonates is characterized by central nervous system and skeletal muscle stimulation and bradycardia. These symptoms are seen in adults at lower levels than in neonates, suggesting that neonates have much greater tolerance to the drug.

Reference Values

Therapeutic: 8.0-20.0 mcg/mL
Critical value: > or =30.0 mcg/mL

Interpretation

Optimal pharmacologic response occurs when the serum level is in the range of 8.0 to 20.0 mcg/mL.

Toxicity in neonates and adults may be seen when the serum level is above 20.0 mcg/mL.

Cautions

This assay is not intended to detect levels in adults.

Clinical Reference

1. Milone MC, Shaw LM. Therapeutic drugs and their management. In: Rifai N, Chiu RWK, Young I, Burnham C-AD, Wittwer CT, eds. Tietz Textbook of Laboratory Medicine. 7th ed. Elsevier; 2023:420-453.e9
2. Brunton LL, Knollmann BC, eds. Goodman and Gilman's: The Pharmacological Basis of Therapeutics. 14th ed. McGraw-Hill Education; 2023
3. Ou CN, Frawley VL. Concurrent measurement of theophylline and caffeine in neonates by an interference-free liquid-chromatographic method. Clin Chem. 1983;29:1934-1936

Performance

Method Description
The enzyme-multiplied immunoassay technique assay is a homogeneous enzyme immunoassay technique used for the analysis of specific compounds in biological fluids. The assay is based on competition between drug in the sample and drug labeled with the enzyme glucose-6-phosphate dehydrogenase (G6PD) for antibody binding sites. Enzyme activity decreases upon binding to the antibody, so the drug concentration in the sample can be measured in terms of enzyme activity. Active enzyme converts oxidized nicotinamide adenine dinucleotide (NAD) to NADH, resulting in an absorbance change that can be measured spectrophotometrically. Endogenous serum G6PD does not interfere because the coenzyme functions only with the bacterial (Leuconostoc mesenteroides) enzyme employed in the assay.(Package insert: Caffeine Reagent. Seimens Healthcare Diagnostics, Ltd; 10/2024)

PDF Report
No

Day(s) Performed
Monday through Saturday

Report Available
Same day/1 to 2 days

Specimen Retention Time
2 weeks

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 has been modified from the manufacturer's instructions. Its performance characteristics were 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
80155

LOINC® Information

MAYO CLINIC LABORATORIES

Test Definition: CAFF

Caffeine, Serum

Test ID	Test Order Name	Order LOINC® Value
CAFF	Caffeine, S	In Process

Result ID	Test Result Name	Result LOINC® Value
8754	Caffeine, S	3422-3