MAYO CLINIC LABORATORIES

Test Definition: VALPA

Valproic Acid, Total, Serum

Overview

Useful For

Monitoring total valproic acid in therapy

Assessing compliance

Evaluating potential toxicity

Method Name

Enzyme Immunoassay (EIA)

NY State Available

Yes

Specimen

Specimen Type

Serum

Specimen Required

Collection Container/Tube:

Preferred: Serum gel

Acceptable: Red top

Submission Container/Tube: Plastic vial

Specimen Volume: 0.5 mL

Collection Instructions:

1. Serum gel tubes should be centrifuged within 2 hours of collection.
2. Red-top tubes should be centrifuged and serum aliquoted into a plastic vial within 2 hours of collection.

Forms

If not ordering electronically, complete, print, and send 1 of the following forms with the specimen:

-Neurology Specialty Testing Client Test Request (T732)

-Therapeutics Test Request (T831)

Specimen Minimum Volume

0.25 mL

Reject Due To

Gross hemolysis	Reject

Specimen Stability Information

Specimen Type	Temperature	Time	Special Container
Serum	Refrigerated (preferred)	14 days	
	Ambient	72 hours	
	Frozen	28 days	

Clinical & Interpretive

Clinical Information

Valproic acid (valproate, Depakote, or Depakene) is an effective medication for absence seizures, generalized tonic-clonic seizures, and partial seizures, when administered alone or in conjunction with other antiepileptic agents.

Valproic acid is initially dosed at 15 mg/kg/day, with dosage increases over time to a maximum of 60 mg/kg/day. The volume of distribution of valproic acid is 0.2 L/kg, and its half-life is 10 to 14 hours in adults but is shorter in children. It is approximately 90% protein bound.

Hepatic failure and a Reyes-like syndrome associated with administration of valproic acid at therapeutic levels have been reported. Careful monitoring of liver function during the first 6 months of therapy is required. Major side effects such as central nervous system depression, thrombocytopenia, and hepatic dysfunction are likely to be experienced if the peak level is regularly above 125 mcg/mL.

Analysis of free valproic acid levels may be useful in delineating the cause of toxicity when the total concentration is not excessive.

Valproic acid exhibits substantial effects on the pharmacology of phenytoin, whereas phenytoin exhibits only a limited effect on valproic acid. This is due to the relative abundance of the 2 drugs in the body. Valproic acid is present at a 2- to 3-fold mass excess and a 5- to 7-fold molar excess.

Reference Values

Therapeutic: 50 (trough)-125 (peak) mcg/mL
Critical value: > or =151 mcg/mL

Interpretation

The generally acceptable range for total valproic acid used as a reference to guide therapy is 50 to 125 mcg/mL. Peak levels should not exceed 125 mcg/mL.

Because the concentration of valproic acid fluctuates considerably depending on the time from last dose, interpretation of the clinical significance of the valproic acid concentration must take into consideration the timing of the blood specimen. For this reason, 2 collections are sometimes made to assess the trough and peak concentrations.

Cautions

No significant cautionary statements

Clinical Reference

1. Cotariu D, Zaidman JL: Valproic acid and the liver. Clin Chem. 1988 May;34(5):890-897
2. 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; 2018:832-887
3. Milone MC, Shaw LM: Therapeutic Drug Monitoring. In: Rifai N, Horvath AR, Wittwer CT, eds. Tietz Fundamentals of Clinical Chemistry and Molecular Diagnostics. 8th ed. Saunders; 2019:549
4. Patsalos PN, Zugman M, Lake C, James A, Ratnaraj N, Sander JW. Serum protein binding of 25 antiepileptic drugs in a routine clinical setting: a comparison of free non-protein-bound concentrations. Epilepsia. 2017 Jul;58(7):1234-1243. doi: 10.1111/epi.13802

Performance

Method Description

The assay is based on a homogeneous enzyme immunoassay technique used for the quantitative analysis of valproic acid (free and protein-bound) in human serum or plasma. 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 is 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: ONLINE TDM Valproic Acid. Roche Diagnostics; 02/2024)

PDF Report

No

Day(s) Performed

Monday through Sunday

Report Available

Same day/1 to 2 days

Specimen Retention Time

1 week

Performing Laboratory Location

Mayo Clinic Laboratories - Rochester Main Campus

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 cleared, approved, or is exempt by the US Food and Drug Administration and is used per manufacturer's instructions. Performance characteristics were verified by Mayo Clinic in a manner consistent with CLIA requirements.

CPT Code Information

80164

LOINC® Information

Test ID	Test Order Name	Order LOINC® Value
VALPA	Valproic Acid, Tot, S	4086-5

Result ID	Test Result Name	Result LOINC® Value
VALPA	Valproic Acid, Tot, S	4086-5