

## Overview

### Useful For

Monitoring both total and free valproic acid levels in therapy

Assessing compliance

Evaluating potential toxicity

### Profile Information

| Test Id | Reporting Name         | Available Separately | Always Performed |
|---------|------------------------|----------------------|------------------|
| VALPF   | Valproic Acid, Free, S | Yes                  | Yes              |
| VALPA   | Valproic Acid, Tot, S  | Yes                  | Yes              |

### Method Name

VALPA: Immunoassay

VALPF: Ultrafiltration Followed by Immunoassay

### 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:** 2 mL

#### Collection Instructions:

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

### Forms

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

### Specimen Minimum Volume

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1 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.

The valproic acid that circulates in blood is 85% to 90% protein-bound under normal circumstances. In uremia or during concomitant therapy with other drugs that are highly protein-bound (such as phenytoin), valproic acid is displaced from protein, resulting in a higher free fraction of the drug circulating in blood.

Since neurologic activity and toxicity of valproic acid are directly related to the unbound fraction of drug, adjustment of dosage based on knowledge of the free valproic acid concentration may be useful in the following: concomitant use of highly protein-bound drugs (usually >80% bound), hypoalbuminemia, pregnancy, [kidney or liver failure, and in older adults](#). In these situations, the total valproic acid concentration in the blood may underestimate the disproportionately higher free valproic acid fraction.

**Reference Values****VALPROIC ACID, TOTAL**

Therapeutic: 50 (trough)-125 (peak) mcg/mL

Critical value: > or =151 mcg/mL

**VALPROIC ACID, FREE**

Therapeutic: 5-25 mcg/mL

Critical value: >30 mcg/mL

**Interpretation**

The generally acceptable range for total valproic acid used as a reference to guide therapy is 50 to 125 mcg/mL. The corresponding range of free valproic acid concentration for clinical reference is 5 to 25 mcg/mL.

Low free valproic acid concentration relative to these ranges may suggest inadequate dosing, whereas a high free

valproic acid concentration may be associated with toxic effects.

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**

Specimens subjected to significant heat or other factors that could cause protein denaturation would demonstrate an artificially increased free valproic acid.

### **Clinical Reference**

1. Cloyd JC, Fischer JH, Kriel RL, Kraus DM: Valproic acid pharmacokinetics in children: Effects of age and antiepileptic drugs on protein binding and intrinsic clearance. *Clin Pharmacol Ther.* 1993;53:22-29
2. Wagner ML, Graves NM, Leppik IE, et al: The effect of felbamate on valproic acid disposition. *Clin Pharmacol Ther.* 1994;56:494-502
3. Dasgupta A, Volk A: Displacement of valproic acid and carbamazepine from protein binding in normal and uremic sera by tolmetin, ibuprofen, and naproxen: presence of inhibitor in uremic serum that blocks valproic acid-naproxen interactions. *Ther Drug Monit.* 1996;18:284-287
4. Moyer TP: Therapeutic drug monitoring. In: Burtis CA, Ashwood ER, eds. *Tietz Textbook of Clinical Chemistry*. 4th ed. WB Saunders Company; 2005:1237-1285
5. Patsalos PN, Spencer EP, Berry DJ: Therapeutic drug monitoring of antiepileptic drugs in epilepsy: A 2018 update. *Ther Drug Monit.* 2018 Oct;40(5):526-548. doi: 10.1097/FTD.0000000000000546

### **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<sup>+</sup>) 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: Valproic Acid reagent. Roche Diagnostics; 04/2018)

### **PDF Report**

No

### **Day(s) Performed**

Monday through Sunday

### **Report Available**

Same day/1 day

**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 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**

VALPA-80164

VALPF-80165

**LOINC® Information**

| Test ID | Test Order Name                  | Order LOINC® Value |
|---------|----------------------------------|--------------------|
| VALPG   | Valproic Acid, Free and Total, S | 57775-9            |

| Result ID | Test Result Name       | Result LOINC® Value |
|-----------|------------------------|---------------------|
| VALPA     | Valproic Acid, Tot, S  | 4086-5              |
| VALPF     | Valproic Acid, Free, S | 4087-3              |