

## Overview

### Useful For

Monitoring trough levels of voriconazole suggested for:

- Individuals with reduced liver function
- Individuals with cytochrome P450 (CYP) 2C19 alterations associated with poor metabolic function
- Patients taking other medications that affect CYP2C19 activity
- Patients experiencing potential toxicity

Monitoring trough levels in patients who are not responding optimally or have drug interactions that may decrease voriconazole levels or to ensure adequate oral absorption

### Method Name

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

### NY State Available

Yes

## Specimen

### Specimen Type

Serum Red

### Specimen Required

**Supplies:** Sarstedt Aliquot Tube, 5 mL (T914)

**Collection Container/Tube:** Red top (serum gel/SST **not** acceptable)

**Submission Container/Tube:** Plastic vial

**Specimen Volume:** 2 mL

**Collection Instructions:** Within 2 hours of collection, centrifuge and aliquot serum into a plastic vial.

### Specimen Minimum Volume

0.6 mL

### Reject Due To

Gross hemolysis	OK
Gross lipemia	OK
Gross icterus	OK

### Specimen Stability Information

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

## Clinical & Interpretive

### Clinical Information

Voriconazole (Vfend) is an antifungal agent approved for treatment of invasive aspergillosis and candidemia/candidiasis, as well as for salvage therapy for infections in patients refractory to, or intolerant of, other antifungal therapy. The drug inhibits the fungal enzyme 14 $\alpha$ -sterol demethylase, a critical step in ergosterol biosynthesis.

Voriconazole is metabolized in the liver primarily by cytochrome P450 (CYP) 2C19 with CYP2C9 and CYP3A4 having limited roles. The primary metabolite is voriconazole N-oxide, which has no antifungal activity. Drug clearance is primarily dependent on hepatic metabolism. The pharmacokinetics of voriconazole is highly variable and nonlinear, which results in an increased dose leading to a greater than proportional increase in serum concentration.

The bioavailability of oral voriconazole is greater than 95%. Approximately 60% of the drug in serum is protein bound. Voriconazole has a volume of distribution of 4.6 L/kg. Most (80%) of the drug is excreted in the urine, exclusively as metabolites.

Adverse effects of voriconazole include visual disturbances, skin rashes, and elevated liver enzyme levels.

### Reference Values

1.0-5.5 mcg/mL

Trough level (ie, immediately before next dose) monitoring is recommended.

### Interpretation

Trough levels above 6 mcg/mL (and especially >10 mcg/mL) have been associated with toxicity in several reports.

Trough levels below 1 mcg/mL have been associated with suboptimal response in several reports.

### Cautions

Voriconazole metabolism may be altered by coadministration of drugs that metabolically induce or inhibit cytochrome P450 2C19 or by genetic alterations that affect enzyme activity.

### Clinical Reference

- Andes D, Pascual A, Marchetti O. Antifungal therapeutic drug monitoring: established and emerging indications. *Antimicrob Agents Chemother*. 2009;53(1):24-34. doi:10.1128/AAC.00705-08
- Hope WW, Billaud EM, Lestner J, Denning DW. Therapeutic drug monitoring for triazoles. *Curr Opin Infect Dis*. 2008;21(6):580-586. doi:10.1097/QCO.0b013e3283184611
- Wilson JW, Estes LL, eds: *Mayo Clinic Antimicrobial Therapy: Quick Guide*. 2nd ed. Oxford University Press; 2011
- Donnelly JP, De Pauw BE. Voriconazole-a new therapeutic agent with an extended spectrum of antifungal activity. *Clin Microbiol Infect*. 2004;10 Suppl 1:107-117. doi:10.1111/j.1470-9465.2004.00838.x

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5. Physicians Desk Reference, (PDR) 60th edition. Medical Economics Company, 2006 update to 2008
  6. Brunton LL, ed: Goodman and Gilman's The Pharmacological Basis of Therapeutics. 11th ed. McGraw-Hill Book Company; 2006
  7. Luong ML, Al-Dabbagh M, Groll AH, et al. Utility of voriconazole therapeutic drug monitoring: a meta-analysis. J Antimicrob Chemother. 2016;71(7):1786-1799. doi:10.1093/jac/dkw099

## Performance

### Method Description

The serum sample is diluted in an acetonitrile internal standard. The protein precipitate is centrifuged and a portion of the supernatant is diluted with mobile phase 1 for detection by a tandem mass spectrometer.(Unpublished Mayo method)

### 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 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

80285

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**LOINC® Information**

Test ID	Test Order Name	Order LOINC® Value
VORI	Voriconazole, S	38370-3

Result ID	Test Result Name	Result LOINC® Value
88698	Voriconazole, S	38370-3