MAYO CLINIC LABORATORIES

Test Definition: ITCON

Itraconazole, Serum

Overview

Useful For

Verifying systemic absorption of orally administered itraconazole

Patients with life-threatening fungal infections

Patients considered at risk for poor absorption or rapid clearance of itraconazole

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:
Preferred: Red top (serum gel/SST are **not** acceptable)
Acceptable: None
Submission Container/Tube: Plastic vial
Specimen Volume: 1 mL
Collection Instructions: Within 2 hours of collection, centrifuge and aliquot serum into a plastic vial.

Forms

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

Specimen Minimum Volume

0.18 mL

Reject Due To

Gross hemolysis	OK
Gross lipemia	OK
Gross icterus	OK

Specimen Stability Information

Specimen Type	Temperature	Time	Special Container
Serum Red	Ambient	29 days	
	Refrigerated (preferred)	29 days	
	Frozen	29 days	

Clinical & Interpretive

Clinical Information

Itraconazole is a synthetic triazole antifungal drug approved for treatment and prophylaxis of a variety of fungal infections. Its activity results from inhibition of fungal synthesis of ergosterol, an integral component of fungal cell membranes.

Concerns about adequate absorption and drug interactions are some of the major indications for therapeutic drug monitoring. Mean oral bioavailability approximates 55% but is highly variable; absorption can be enhanced by food or acidic drinks. Hepatic enzyme inducers can cause low serum itraconazole levels, and coadministration of these drugs has been associated with itraconazole therapeutic failure.

Itraconazole therapeutic efficacy is greatest when serum concentrations exceed 0.5 mcg/mL for localized infections or 1.0 mcg/mL for systemic infections. An active metabolite, hydroxyitraconazole, is present in serum at roughly twice the level of the parent drug. These concentrations refer to analysis by high-performance liquid chromatography; quantitation by bioassay generates considerably higher apparent drug measurements due to reactivity with the active metabolite.

Reference Values

ITRACONAZOLE (TROUGH):
>0.5 mcg/mL (localized infection)
>1 mcg/mL (systemic infection)

HYDROXYITRACONAZOLE:
Hydroxyitraconazole is an active metabolite; no defined therapeutic range has been established.

Interpretation

A lower cutoff concentration has not been defined that applies in all cases. The serum concentration must be interpreted in association with other variables, such as the nature of the infection, the specific microorganism, and minimal inhibitory concentration results, if available. Localized infections are more likely to respond when serum itraconazole is more than 0.5 mcg/mL (by high-performance liquid chromatography); systemic infections generally require drug concentrations more than 1.0 mcg/mL. Consider target of more than 1.5 mcg/mL for itraconazole plus hydroxyitraconazole. Therapeutic drug monitoring should be done at steady state, which usually occurs in about 7 days. Timing of the serum collection is not as critical due to the drug's long half-life, but trough collections are recommended.

Cautions

Enteropathy, H2-histamine receptor blockers, hepatic enzyme inducers, and other variables can result in low to non-detectable serum levels with concomitant high risk of therapeutic failure.

Patients with AIDS and organ transplant recipients receiving immunosuppressive therapy tend to have lower serum itraconazole levels on standard doses and are thus at high risk of therapeutic failure.

Clinical Reference

1. 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
2. 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
3. Milone MC, Shaw LM. Therapeutic drugs and their management. In: Rifai N, Chiu RWK, Young I, Burnham CAD, Wittwer CT, eds. Tietz Textbook of Laboratory Medicine. 7th ed. Elsevier; 2023:420-453

Performance

Method Description

Itraconazole and hydroxyitraconazole are extracted by mixing serum samples with acetonitrile to precipitate proteins. The supernatant is removed and analyzed by an in-house developed liquid chromatography-tandem mass spectrometry method.(Unpublished Mayo method)

PDF Report

No

Day(s) Performed

Monday through Friday; Saturday

Report Available

1 to 3 days

Specimen Retention Time

2 weeks

Performing Laboratory Location

Rochester

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

80189

LOINC® Information

Test ID	Test Order Name	Order LOINC® Value
ITCON	Itraconazole, S	10989-2

Result ID	Test Result Name	Result LOINC® Value
81247	Itraconazole, S	10989-2
5122	Hydroxyitraconazole	18337-6