MAYO CLINIC LABORATORIES

Test Definition: HCQWB

Hydroxychloroquine, Blood

Overview

Useful For
Monitoring whole blood hydroxychloroquine concentrations, assessing compliance, and adjusting dosage in patients

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

NY State Available
Yes

Specimen

Specimen Type
Whole Blood EDTA

Specimen Required
Container/Tube: Lavender top (EDTA)

Specimen Volume: 1 mL

Collection Instructions:

1. Collect specimen immediately before next scheduled dose.
2. Send whole blood specimen in original tube. **Do not aliquot.**

Specimen Minimum Volume
0.5 mL

Reject Due To

Gross hemolysis	OK
Gross lipemia	OK
Gross icterus	OK
Clotted specimens	Reject

Specimen Stability Information

Specimen Type	Temperature	Time	Special Container
Whole Blood EDTA	Refrigerated (preferred)	28 days	
	Ambient	28 days	
	Frozen	28 days	

Clinical & Interpretive

Clinical Information

Hydroxychloroquine is used to treat symptoms of acute or chronic rheumatoid arthritis and lupus erythematosus. Adult doses range from 400 mg/week for suppressive therapy to 1200 mg/day for acute malaria attacks. Typical daily doses of 200 to 600 mg are used for lupus and rheumatoid diseases. Hydroxychloroquine has a long terminal elimination half-life in blood (>40 days), which exceed those in plasma. The oral bioavailability averages 79%.

Hydroxychloroquine accumulates in several organs, especially melanin-containing retina and skin. Mild to moderate overdose can result in gastrointestinal effects (ie, nausea, vomiting, and abdominal pain), headache, visual/hearing disturbances, and neuromuscular excitability. Acute hepatitis, cardiotoxicity, and retinopathy may occur with therapeutic doses. The effects of over dosage with hydroxychloroquine include headache, drowsiness, visual disturbances, convulsions, cardiovascular collapse and respiratory arrest. Toxic retinopathy has also been associated with higher doses and longer duration of use.

Reference Values

> or =200 ng/mL

Interpretation

For systemic lupus erythematosus, therapeutic target whole blood concentrations of hydroxychloroquine of 1000-2000 ng/mL have been proposed.(1-3)

An effective therapeutic reference range of whole blood hydroxychloroquine concentrations of 750 to 1200 ng/mL was associated with 71% lower odds of active lupus and maintaining levels within this range reduced odds of flares by 26%.(4)

Whole blood hydroxychloroquine concentrations below 200 ng/mL denote noncompliance and risk of flare in lupus.(1) Concentrations of 500 ng/mL or higher are consistent with adherence.(2) Whole blood hydroxychloroquine monitoring is more stable, precise, and better correlated to efficacy than serum/plasma concentrations.(5)

Cautions

Specimens that are obtained from serum gel tubes are not acceptable, as the drug can absorb on the gel and lead to falsely decreased concentrations.

Clinical Reference

1. Costedoat-Chalumeau N, Houssiau F, Izmirly P, et al. A prospective international study on adherence to treatment in 305 patients with flaring sle: assessment by drug levels and self-administered questionnaires. Clin Pharmacol Ther. 2019;106(2):374-382. doi:10.1002/cpt.1194
2. Durcan L, Clarke WA, Magder LS, Petri M. Hydroxychloroquine blood levels in systemic lupus erythematosus: clarifying dosing controversies and improving adherence. J Rheumatol. 2015;42(11):2092-2097. doi:10.3899/jrheum.150379
3. Costedoat-Chalumeau N, LE Guern V, Piette JC. Routine hydroxychloroquine blood concentration measurement in systemic lupus erythematosus reaches adulthood. J Rheumatol. 2015;42(11):1997-1999. doi:10.3899/jrheum.151094
4. Garg S, Chewning B, Hutson P, Astor BC, Bartels CM. Reference range of hydroxychloroquine blood levels that can reduce odds of active lupus and prevent flares. Arthritis Care Res (Hoboken). 2024;76(2):241-250. doi:10.1002/acr.25228
5. Petri M, Elkhalifa M, Li J, Magder LS, Goldman DW. Hydroxychloroquine blood levels predict hydroxychloroquine

retinopathy. Arthritis Rheumatol. 2020;72(3):448-453
6. Soichot M, Megarbane B, Houze P, et al. Development, validation and clinical application of a LC-MS/MS method for the simultaneous quantification of hydroxychloroquine and its active metabolites in human whole blood. J Pharm Biomed Anal. 2014;100:131-137. doi:10.1016/j.jpba.2014.07.009
7. Wang LZ, Ong RY, Chin TM, et al. Method development and validation for rapid quantification of hydroxychloroquine in human blood using liquid chromatography-tandem mass spectrometry. J Pharm Biomed Anal. 2012;61:86-92
8. Blanchet B, Jallouli M, Allard M, et al. SATO188 Whole blood versus serum hydroxychloroquine levels for drug monitoring of patients with systemic lupus erythematosus: preliminary results of a pharmacological study. Ann Rheum Dis. 2019;78(2):1168-1169.
9. Tett SE, Cutler DJ, Day RO, Brown KF. A dose-ranging study of the pharmacokinetics of hydroxy-chloroquine following intravenous administration to healthy volunteers. Br J Clin Pharmacol. 1988;26(3):303-313

Performance

Method Description
Reagent is added to the whole blood sample following the addition of deuterium-labeled internal standard. The mixture is centrifuged, and a portion of the supernatant is diluted with mobile phase for analysis and detection by liquid chromatography tandem mass spectroscopy.(Unpublished Mayo method)

PDF Report
No

Day(s) Performed
Tuesday, Thursday

Report Available
3 to 7 days

Specimen Retention Time
14 days

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

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Hydroxychloroquine, Blood

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

80220

LOINC® Information

Test ID	Test Order Name	Order LOINC® Value
HCQWB	Hydroxychloroquine, B	95921-3

Result ID	Test Result Name	Result LOINC® Value
623295	Hydroxychloroquine, B	95921-3