

Overview

Useful For

Aids physicians in dose adjustments, minimizing dose-dependent toxicity, and monitoring compliance of thiopurine drug therapy

Testing Algorithm

Red blood cell (RBC) count is first performed and then the thiopurine metabolites' values are determined by liquid chromatography-tandem mass spectrometry (LC-MS/MS). Values are utilized to calculate and report a final result (unit of measure: pmol/8 x 10⁸ RBC) for 6-thioguanine nucleotides and 6-methylmercaptopurine derivative analyte.

Method Name

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

NY State Available

Yes

Specimen

Specimen Type

Whole Blood EDTA

Shipping Instructions

Specimen **must** be shipped refrigerated.

Specimen Required

Container/Tube: Lavender top (EDTA)

Specimen Volume: 3 mL

Collection Instructions: Send specimen in original tube. **Do not** aliquot, centrifuge, or freeze.

Forms

[If not ordering electronically, complete, print, and send a Gastroenterology and Hepatology Client Test Request \(T728\)](#) with the specimen.

Specimen Minimum Volume

1.5 mL

Reject Due To

Gross hemolysis	Reject
Gross lipemia	Reject
Gross icterus	Reject
Clotted	Reject

Specimen Stability Information

Specimen Type	Temperature	Time	Special Container
Whole Blood EDTA	Refrigerated (preferred)	8 days	
	Ambient	24 hours	

Clinical and Interpretive

Clinical Information

This test is primarily used to verify compliance, optimize therapy, and identify elevated metabolite concentrations that may result in toxicity after initiation of thiopurine drug therapy for the treatment of inflammatory bowel disease. Recommended time points for monitoring include: 4 weeks after starting treatment to verify patient compliance and look for early risk of toxicity; 12 to 16 weeks after starting therapy when 6-thioguanine nucleotides have reached steady-state; and annually.⁽¹⁾ It may also be ordered in patients who do not respond to therapy as expected or as needed for dose changes, flare-ups, signs of toxicity, or suspicion of noncompliance. The test will measure 6-methylmercaptopurine (6-MMP) and 6-thioguanine nucleotides (6-TGN) in erythrocytes.

Reference Values

6-Thioguanine Nucleotides (6-TGN): 235-450 pmol/8x10⁸ RBC

6-Methylmercaptopurine (6-MMP): Less than or equal to 5700 pmol/8x10⁸ RBC

Interpretation

Target 6-thioguanine (6-TGN) concentrations are 235 to 450 pmol/8x10⁸ RBC with lower levels suggesting suboptimal dosing and higher levels associated with increased risk of myelotoxicity and leukopenia. High 6-methylmercaptopurine (6-MMP) levels (greater than 5700 pmol/8x10⁸ RBC) suggest an increased risk for hepatotoxicity and potentially "thiopurine hypermethylation."

Cautions

This test cannot be used to predict optimal starting dose. It is sensitive to hemolysis and transport conditions. This test does not replace monitoring of patients using other laboratory tests (ie, CBC, liver function tests).

Clinical Reference

- Goel RM, Blaker P, Mentzer A, et al: Optimizing the use of thiopurines in inflammatory bowel disease. *Ther Adv Chronic Dis.* 2015;6(3):138-146
- Shipkova M, Armstrong V, Wieland E, Oellerich M. Differences in Nucleotide Hydrolysis Contribute to the Differences between Erythrocyte 6-Thioguanine Nucleotide Concentrations Determined by Two Widely Used Methods. *Clin Chem.* 2003;49(2):260-268
- Bouliou R, Dervieux T: High-performance liquid chromatographic determination of methyl 6-mercaptopurine nucleotides (Me6-MPN) in red blood cells: analysis of Me6-MPN per se or Me6-MPN derivative? *J Chromatogr B.* 1999;730:273-274
- Kirchherr H, Shipkova M, Ahsen N: Improved Method for Therapeutic Drug Monitoring of 6-Thioguanine Nucleotides and 6-Methylmercaptopurine in Whole-Blood by LC/MSMS Using Isotope-Labeled Internal Standards. *Ther Drug Monit.* 2013;35(3):313-321

Performance

Method Description

Red blood cell (RBC) count is first performed and then the thiopurine metabolites values are determined by mass spectrometry. (Unpublished Mayo Method)

PDF Report

No

Day(s) and Time(s) Test Performed

Monday through Friday, 2:30 p.m.

Saturday, 10 a.m.

Analytic Time

Same day/1 day

Maximum Laboratory Time

4 days

Specimen Retention Time

14 days

Performing Laboratory Location

Rochester

Fees and 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 Regional Manager. 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. This test has not been cleared or approved by the U.S. Food and Drug Administration.

CPT Code Information

80299

LOINC® Information

Test ID	Test Order Name	Order LOINC Value
THIO	Thiopurine Metabolites, B	82869-9

Result ID	Test Result Name	Result LOINC Value
49580	6-Thioguanine Nucleotides	32660-3
49581	6-Methylmercaptopurine	32654-6