Test Definition: THIO

Thiopurine Metabolites, Whole Blood

Overview

Useful For

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

Testing Algorithm

A red blood cell (RBC) count is performed followed by determination of thiopurine metabolite values by liquid chromatography tandem mass spectrometry. Values are utilized to calculate and report the final results (unit of measure: pmol/8 x 10[8] RBC) for 6-thioguanine nucleotides and 6-methylmercaptopurine derivative analyte.

For more information see:
-Ulcerative Colitis and Crohn Disease Therapeutic Drug Monitoring Algorithm
-TPMT Testing in the Treatment of Inflammatory Bowel Disease Algorithm

Special Instructions

- Ulcerative Colitis and Crohn Disease Therapeutic Drug Monitoring Algorithm
- TPMT Testing in the Treatment of Inflammatory Bowel Disease Algorithm

Method Name

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

NY State Available

Yes

Specimen

Specimen Type

Whole Blood EDTA

Ordering Guidance

This specimen **cannot** be shared with any other testing, including tacrolimus, cyclosporine, sirolimus or everolimus. Additional testing must be ordered separately and separate specimen submitted.

Shipping Instructions

Specimen **must** be shipped refrigerated.

Specimen Required

Container/Tube: Lavender top (EDTA)
Specimen Volume: 3 mL
Collection Instructions: Send whole blood specimen in original tube. **Do not** aliquot, centrifuge, or freeze.

Forms

If not ordering electronically, complete, print, and send Gastroenterology and Hepatology Test Request (T728) with the specimen

Specimen Minimum Volume

1.5 mL

Reject Due To

Gross hemolysis	Reject
Moderate hemolysis	Reject
Gross lipemia	OK
Gross icterus	OK
Clotted	Reject
Specimens that have been aliquoted or centrifuged	Reject

Specimen Stability Information

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

Clinical & 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 and 6-thioguanine nucleotides in erythrocytes.

Reference Values

6-Thioguanine Nucleotides (6-TGN): 235-450 pmol/8x10(8) red blood cell (RBC)
6-Methylmercaptopurine (6-MMP): Less than or equal to 5700 pmol/8x10(8) RBC

Interpretation

Target 6-thioguanine concentrations are 235 to 450 pmol/8x10(8) red blood cell (RBC) with lower levels suggesting

suboptimal dosing and higher levels associated with increased risk of myelotoxicity and leukopenia. High 6-methylmercaptopurine levels (greater than 5700 pmol/8x10[8] 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 (eg, complete blood cell count, liver function tests).

Final concentrations are reported per the red blood cell (RBC) count (unit of measure =pmol/8 x 10[8] RBC) for the 6-thioguanine nucleotides and 6-methylmercaptopurine derivative analytes. Therefore, any significant lysis of the RBCs will lead to an artificially lower RBC count that could falsely increase the final concentrations. Due to this, moderately hemolyzed samples are rejected.

Clinical Reference

1. Goel RM, Blaker P, Mentzer A, Fong SC, Marinaki AM, Sanderson JD. Optimizing the use of thiopurines in inflammatory bowel disease. Ther Adv Chronic Dis. 2015;6(3):138-146
2. Shipkova M, Armstrong VM, 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
3. Boulieu 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 Biomed Sci Appl. 1999;730(2):273-276
4. Kirchherr H, Shipkova M, von 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
5. Sherwood RA, Walsham NE. Gastric, intestinal, and pancreatic function. In: Rifai N, Chiu RWK, Young I, Burnham CAD, Wittwer CT, eds. Tietz Textbook of Laboratory Medicine. 7th ed. Elsevier; 2023:chap 52

Performance

Method Description

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

PDF Report

No

Day(s) Performed

Monday, Wednesday, Friday

Report Available

2 to 4 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

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

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