MAYO CLINIC LABORATORIES

# 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 determined of thiopurine metabolite values by liquid chromatography-tandem mass spectrometry. Values are utilized to calculate and report a final result (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.

### Special Instructions

- Ulcerative Colitis and Crohn Disease Therapeutic Drug Monitoring Algorithm

### 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 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 |

### 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).

### Clinical Reference

1. Goel RM, Blaker P, Mentzer A, Fong SCM, Marinaki AM, Sanderson JD: Optimizing the use of thiopurines in inflammatory bowel disease. Ther Adv Chronic Dis. 2015 May;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 Feb: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 Jul 9;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 Jun:35(3):313-321

## 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
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

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 |