

Overview

Useful For

Second-tier test when newborn screening results with reduced beta-glucosidase (GBA) activity are identified

Diagnosis and monitoring of patients with Gaucher disease using whole blood specimens

Supporting the biochemical diagnosis of Gaucher disease

Monitoring a patient's response to treatment

This test is **not useful for** identifying carriers of *GBA* variants.

Genetics Test Information

Gaucher disease is an autosomal recessive lysosomal storage disorder caused by deficient beta-glucosidase activity.

There are 3 described types of Gaucher disease with varying clinical presentations generally distinguished based on whether there is central nervous system involvement.

Glucopsychosine (glucosylsphingosine: lyso-GL1) is elevated in symptomatic patients and supports a diagnosis of Gaucher disease.

Testing Algorithm

For more information see:

- [Newborn Screen Follow-up for Gaucher Disease](#)
- [Newborn Screening Act Sheet Gaucher Disease: Decreased Acid Beta-Glucosidase](#)

Special Instructions

- [Biochemical Genetics Patient Information](#)
- [Newborn Screening Act Sheet Gaucher Disease: Decreased Acid Beta-Glucosidase](#)
- [Newborn Screen Follow-up for Gaucher Disease](#)

Method Name

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

NY State Available

Yes

Specimen

Specimen Type

Whole blood

Ordering Guidance

This test is also available as a part of panel; see HSMWB / Hepatosplenomegaly Panel, Blood. If this test (GPSYW) is ordered with either CTXWB / Cerebrotendinous Xanthomatosis, Blood or OXYWB / Oxysterols, Blood, the individual tests will be canceled and HSMWB ordered.

Specimen Required

Container/Tube:

Preferred: Lavender top (EDTA)

Acceptable: Green top (sodium heparin, lithium heparin) or yellow top (ACD B)

Specimen Volume: 1 mL

Collection Instructions: Send whole blood in original vial. Do not aliquot.

Forms

1. [Biochemical Genetics Patient Information](#) (T602)
2. If not ordering electronically, complete, print, and send a [Biochemical Genetics Test Request](#) (T798) with the specimen.

Specimen Minimum Volume

0.25 mL

Reject Due To

Gross hemolysis	OK
Gross lipemia	OK
Gross icterus	OK

Specimen Stability Information

Specimen Type	Temperature	Time	Special Container
Whole blood	Refrigerated (preferred)	72 hours	
	Ambient	48 hours	

Clinical & Interpretive

Clinical Information

Gaucher disease is an autosomal recessive lysosomal storage disorder caused by a deficiency of the enzyme, beta-glucosidase, which facilitates the lysosomal degradation of glucosylceramide (glucocerebroside) and glucopsychosine (glucosylsphingosine: lyso-GL1). Gaucher disease is caused by variants in the *GBA* gene and presents with a markedly variable phenotype, ranging from a perinatal lethal disorder to mildly symptomatic. It has historically been categorized into 3 types (GD1, GD2 and GD3) based on the presence and progression of neuropathic features. All types of Gaucher disease include hepatosplenomegaly and hematological abnormalities.

Gaucher disease type I is the most common form, representing more than 90% of cases. It is generally characterized by bone disease, hepatosplenomegaly, anemia and thrombocytopenia, coagulation abnormalities, lung disease, but no central nervous system involvement. Gaucher disease types II and III are characterized by the presence of primary neurologic disease, although in practice, assigning a type in infancy can sometimes be challenging due to overlapping clinical features. In addition, type II typically presents with limited psychomotor development, hepatosplenomegaly, and lung disease, resulting in death usually between 2 and 4 years of age. Individuals with Gaucher disease type III may present prior to 2 years of age, but the progression is not as rapid, and patients may survive into the third and fourth decade. Additional subtypes of Gaucher disease include a perinatal lethal form associated with skin abnormalities and nonimmune hydrops fetalis, and a cardiovascular form presenting with calcification of the aortic and mitral valves, mild splenomegaly, corneal opacities, and gaze impairment.

Treatment is available in the form of enzyme replacement therapy and substrate reduction therapy for types I and III. These treatment options have generally made bone marrow transplantation obsolete. Currently, only supportive therapy is available for type II because of the inability of enzyme provided by replacement therapy to cross the blood-brain barrier.

The incidence of Gaucher disease type I ranges from 1 in 30,000 to 1 in 100,000 in the general population but is much more frequent among the Ashkenazi Jewish population with an incidence of approximately 1 in 900. Types II and III both have an incidence of approximately 1 in 100,000 in the general population.

A diagnostic workup for Gaucher disease may demonstrate the characteristic finding of Gaucher cells on bone marrow examination, other hematologic abnormalities, and hepatosplenomegaly. The diagnosis can be confirmed by the demonstration of reduced or absent acid beta-glucosidase activity in leukocytes (GBAW / Beta-Glucosidase, Leukocytes), or dried blood spots (PLSD / Lysosomal and Peroxisomal Storage Disorders Screen, Blood Spot) and molecular genetic analysis of the *GBA* gene (GBAZ / Gaucher Disease, Full Gene Analysis, Varies). Lyso GL-1 is a sensitive and specific biomarker for Gaucher disease, and an elevation of lyso GL-1 in blood supports the diagnosis. Lyso GL-1 has also been shown to be helpful in monitoring mildly symptomatic individuals for disease progression and in determining treatment response.

### Reference Values

Cutoff: < or =0.040 nmol/mL

### Interpretation

An elevation of glucopsychosine (glucosylsphingosine: lyso-GL1) is indicative of Gaucher disease.

### Cautions

Some patients with Gaucher disease may have normal concentrations of glucopsychosine (lyso-GL1).

### Clinical Reference

1. Pastores GM, Hughes DA: Gaucher disease. In: Adam MP, Everman DB, Mirzaa GM, et al, eds. GeneReviews [Internet]. University of Washington, Seattle; 2000. Updated June 21, 2018. Accessed December 28, 2022. Available at [www.ncbi.nlm.nih.gov/books/NBK1269/](http://www.ncbi.nlm.nih.gov/books/NBK1269/)
2. Kaplan P, Baris H, De Meirleir L, et al: Revised recommendations for the management of Gaucher disease in children. *Eur J Pediatr*. 2013 Apr;172(4):447-458
3. Grabowski GA, Petsko GA, Kolodny EH: : Gaucher disease. In: Valle DL, Antonarakis S, Ballabio A, Beaudet AL, Mitchell GA, eds. *The Online Metabolic and Molecular Bases of Inherited Disease*. McGraw-Hill Education; 2019. Accessed

December 28, 2022. Available at <https://ommbid.mhmedical.com/content.aspx?sectionid=225546056&bookid=2709>

4. Murugesan V, Chuan WL, Liu J, et al: Glucosylsphingosine is a key biomarker of Gaucher disease. Am J Hematol. 2016 Nov;91(11):1082-1089

5. Saville JT, McDermott BK, Chin SJ, Fletcher JM, Fuller M: Expanding the clinical utility of glucosylsphingosine for Gaucher disease. J Inherit Metab Dis. 2020 May;43(3):558-563

6. Daykin EC, Ryan E, Sidransky E: Diagnosing neuronopathic Gaucher disease: New considerations and challenges in assigning Gaucher phenotypes. Mol Genet Metab. 2021 Feb;132(2):49-58. doi: 10.1016/j.ymgme.2021.01.002. Epub 2021 Jan 9. PMID: 33483255; PMCID: PMC7884077

### Performance

#### Method Description

Whole blood is spotted on filter paper and dried overnight. A 3-mm dried blood spot is extracted with internal standard. The extract is subjected to liquid chromatography tandem mass spectrometry (LC-MS/MS) analysis. The MS/MS is operated in the multiple reaction monitoring positive mode to follow the precursor to product species transitions for each analyte and internal standard. The ratio of the extracted peak areas to internal standard determined by the LC-MS/MS is used to calculate the concentration of in the sample.(Unpublished Mayo method)

#### PDF Report

No

#### Day(s) Performed

Tuesday

#### Report Available

3 to 9 days

#### Specimen Retention Time

Whole blood: 7 days; Dried blood spot: Normal results: 2 months; Abnormal results: Indefinitely

#### 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

82542

LOINC® Information

Test ID	Test Order Name	Order LOINC® Value
GPSYW	Glucopsychosine, B	92751-7

Result ID	Test Result Name	Result LOINC® Value
BA4357	Interpretation (GPSYW)	59462-2
BA4356	Glucopsychosine	92751-7
BA4358	Reviewed By	18771-6