Test Definition: GPSYP

Glucopsychosine, P

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 plasma specimens

Documentation of an elevated glucopsychosine (glucosylsphingosine: lyso-GL1) level supports 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.

Method Name

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

NY State Available

Yes

Specimen

Specimen Type
Plasma

Ordering Guidance
This test is available separately as well as a part of HSMP / Hepatosplenomegaly Panel, Plasma. If this test is ordered with either CTXP / Cerebrotendinous Xanthomatosis, Plasma or OXNP / Oxysterols, Plasma, the individual tests will be canceled and HSMP ordered.

Specimen Required
Collection Container/Tube:

Preferred: Lavender top (EDTA)

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

Submission Container/Tube: Plastic vial

Specimen Volume: 0.3 mL

Collection Instructions:

1. Centrifuge at 4 degrees C, if possible

2. Aliquot plasma into plastic vial, taking care not to disturb or transfer the buffy coat layer.

3. Send frozen

Forms
If not ordering electronically, complete, print, and send a Biochemical Genetics Test Request (T798) with the specimen.

Reject Due To

Gross hemolysis	OK
Gross lipemia	OK
Gross icterus	OK

Specimen Minimum Volume
0.25 mL

Specimen Stability Information

Specimen Type	Temperature	Time	Special Container
Plasma	Frozen (preferred)	65 days	

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 mutations in the *GBA* gene. There are 3 described types of Gaucher disease with varying clinical presentations and age of onset from a perinatal lethal disorder to a mildly symptomatic type. Features of all types of Gaucher disease include hepatosplenomegaly and hematological abnormalities.

Gaucher disease type I is the most common, 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. 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 Ashkenazi Jews 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 (BGL / Beta-Glucosidase, Leukocytes), or dried blood spots (PLSD / Lysosomal and Peroxisomal Storage Disorders Screen, Blood Spot) and molecular genetic analysis of the *GBA* gene (GAUP / Gaucher Disease, Mutation Analysis, *GBA*, Varies; or GBAZ / Gaucher Disease, Full

Gene Analysis, Varies). Lyso-GL1 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

GLUCOPSYCHOSINE

Cutoff: < or =0.003 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, Ardinger HH, Pagon RA, et al, eds. GeneReviews. University of Washington, Seattle; 2000. Updated June 21, 2018. Accessed September 28, 2020. Available at 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. 2019. Accessed February 4, 2021. Available at https://ommbid.mhmedical.com/content.aspx?sectionid=225546056&bookid=2709

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

5. Arkadir D, Dinur T, Revel-Vilk S, et al: Glucosylsphingosine is a reliable response biomarker in Gaucher disease. Am J of Hematol. 2018 Jun;93(6):E140-E142. doi: 10.1002/ajh.25074

6. 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

Performance

Method Description

An internal standard is added to an aliquot of plasma, which is then subjected to protein precipitation. Following centrifugation, the supernatant 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 is determined by LC-MS/MS is used to calculate the concentration of in the sample.(Unpublished Mayo method)

PDF Report

No

Specimen Retention Time

2 months

Performing Laboratory Location

Rochester

Fees & Codes

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 US Food and Drug Administration.

CPT Code Information

82542

LOINC® Information

Test ID	Test Order Name	Order LOINC Value
GPSYP	Glucopsychosine, P	92750-9

Result ID	Reporting Name	LOINC®
BA4375	Interpretation (GPSYP)	59462-2
BA4373	Glucopsychosine	92750-9
BA4374	Reviewed By	18771-6