MAYO CLINIC LABORATORIES

Test Definition: GAES

Ganglioside Antibodies Evaluation, Serum

Overview

Useful For

Supporting the diagnosis of an autoimmune neuropathy

Profile Information

Test Id	Reporting Name	Available Separately	Always Performed
GAESI	Ganglioside Antibodies Interp, S	No	Yes
GQ1ES	GQ1b-IgG ELISA, S	Yes	Yes
IGG_D	IgG Disialo. GD1b	No	Yes
IGM_D	IgM Disialo. GD1b	No	Yes
IGG_M	IgG Monos. GM1	No	Yes
IGM_M	IgM Monos. GM1	No	Yes

Reflex Tests

Test Id	Reporting Name	Available Separately	Always Performed
IGDTS	IgG Disialo GD1b Titer, S	No	No
IMDTS	IgM Disialo GD1b Titer, S	No	No
IGMTS	IgG Monos GM1 Titer, S	No	No
IMMTS	IgM Monos GM1 Titer, S	No	No

Testing Algorithm

Screening tests are performed for IgG and IgM antibodies to gangliosides GM1 and GD1b. If positive, the appropriate titer will be performed at an additional charge.

For more information see:
-Ganglioside Antibody Panel Algorithm.
-Acquired Neuropathy Diagnostic Algorithm

Special Instructions

- Ganglioside Antibody Panel Algorithm
- Acquired Neuropathy Diagnostic Algorithm

Method Name

GQ1ES, IGG_D, IGM_D, IGG_M, IGM_M, IGDTS, IMDTS, IGMTS, IMMTS: Enzyme-Linked Immunosorbent Assay (ELISA)
GAESI: Technical Interpretation

NY State Available

Yes

Specimen

Specimen Type
Serum

Specimen Required
Patient Preparation: For optimal antibody detection, specimen collection is recommended to occur prior to initiation of immunosuppressant medication or intravenous immunoglobulin treatment.
Supplies: Sarstedt Aliquot Tube, 5 mL (T914)
Collection Container/Tube:
Preferred: Red top
Acceptable: Serum gel
Submission Container/Tube: Plastic vial
Specimen Volume: 1 mL
Collection Instructions: Centrifuge and aliquot serum into a plastic vial.

Forms
If not ordering electronically, complete, print, and send a Neurology Specialty Testing Client Test Request (T732) with the specimen.

Specimen Minimum Volume
0.5 mL

Reject Due To

Gross hemolysis	Reject
Gross lipemia	Reject
Gross icterus	Reject

Specimen Stability Information

Specimen Type	Temperature	Time	Special Container
Serum	Refrigerated (preferred)	28 days	
	Ambient	72 hours	
	Frozen	28 days	

Clinical & Interpretive

Clinical Information
Neuropathy patients have variable sensory disturbance (loss or exaggerated sensation including with pain), weakness, and autonomic involvements (sweat abnormalities, gastrointestinal dysfunction, and lightheadedness on standing).

These symptoms are a result of injury to the distal nerves, roots, and ganglia or their gathering points (nerve plexus in the thighs and arms). Patients may have symmetric or asymmetric involvement of the extremities, trunk, and head, including extraocular muscles. Subacute onsets and asymmetric involvements favor inflammatory or immune causes over inherited or metabolic forms. Depending on the specific inflammatory or immune-mediated causes, other parts of the nervous system may also be affected (brain, cerebellum, spinal cord). Nerve conduction studies and needle electromyography can help classify the neuropathy as primary axonal, primary demyelinating, or mixed axonal and demyelinating.

Among the immune-mediated peripheral neuropathies, autoantibodies to gangliosides represent an important class of noncancer-associated autoimmune peripheral neuropathies. Gangliosides are glycosphingolipids that contain sialic acid and are present in many cell types, most abundantly within neural tissues along their linings (myelin). Depending on the specific ganglioside autoantibody found and the antibody titer, in the appropriate clinical context these findings may be supportive of a specific clinical diagnosis and may also be prognostic for treatment response.(1,2)

Specifically, in multifocal motor neuropathy (MMN) and multifocal acquired demyelinating sensory and motor (MADSAM) neuropathy, also known as Lewis-Sumner syndrome or multifocal chronic immune demyelinating polyradiculoneuropathy, the presence ganglioside autoantibodies, particularly high-titer GM1 IgM autoantibodies, may be supportive of the diagnosis in the correct clinical context. Furthermore, ganglioside seropositivity has been associated with favorable response to immunotherapy among patients suspected to have MMN during the initial clinical evaluation.(1)

Additionally, the presence of ganglioside antibodies may support a diagnosis of Guillain-Barre syndrome (GBS) in the appropriate clinical context.(3) GBS is a class of autoimmune peripheral neuropathies that comprises a spectrum of disorders, including acute inflammatory demyelinating polyradiculoneuropathy, acute motor axonal neuropathy, and acute motor and sensory axonal neuropathy. This class of autoimmune neuropathies is generally characterized by an acute onset. Although the diagnosis of these disorders is dependent on clinical evaluation and electrophysiologic studies, assessment of ganglioside antibodies can further support the diagnosis.

Reference Values

GQ1b-IgG ELISA: Negative
IgG Disialo. GD1b: Negative
IgM Disialo. GD1b: Negative
IgG Monos. GM1: Negative
IgM Monos. GM1: Negative

IgG Disialo GD1b Titer: <1:2000
IgM Disialo GD1b Titer: <1:2000
IgG Monos GM1 Titer: <1:2000
IgM Monos GM1 Titer: <1:4000

Interpretation

High titers (>1:8000) favor the diagnosis of multifocal motor neuropathy or multifocal acquired demyelinating sensory and motor (MADSAM) neuropathy over motor neuron disease. About 30% to 50% of patients with these clinical syndromes or the pure motor variant of chronic inflammatory demyelinating polyneuropathy have ganglioside autoantibodies. High-antibody titers appear to be a specific, but not sensitive, marker of these related disorders.

Cautions

Positive titer values less than 1:16,000 may be found in motor neuron disease, monoclonal gammopathy of uncertain significance, and healthy individuals. High titers are very specific of an autoimmune neuropathy.

This test is not diagnostic and should be interpreted in the appropriate clinical context.

This test does not include testing for ganglioside GD1a autoantibodies.

Clinical Reference

1. Martinez JM, Snyder MR, Ettore M, et al. Composite ganglioside autoantibodies and immune treatment response in MMN and MADSAM. Muscle Nerve. 2018;57:1000-1005. doi:10.1002/mus.26051
2. Taylor BV, Gross L, Windebank AJ. The sensitivity and specificity of anti-GM1 antibody testing. Neurology. 1996;47:951-955
3. Kaida K, Ariga T, Yu RK. Antiganglioside antibodies and their pathophysiological effects on Guillain-Barre syndrome and related disorders-a review. Glycobiology. 2009;19:676-692. doi:10.1093/glycob/cwp027

Performance

Method Description

Ganglioside Antibodies IgG/IgM Disialo, GD1b; IgG/IgM Monos, GM1 Enzyme-Linked Immunosorbent Assays:
Antiganglioside antibodies are detected by enzyme-linked immunosorbent assays (ELISA). Microwells are precoated with GM1 or GD1b antigen. The calibrator, controls, and diluted patient samples are added to the wells, and autoantibodies recognizing GM1 or GD1b bind during the first incubation. After washing the wells to remove all unbound proteins, purified alkaline phosphatase-conjugated antihuman IgG or IgM is added. The conjugated secondary IgG or IgM binds to the captured human autoantibody, and the excess unbound conjugated IgG or IgM is removed by a further wash step. The bound conjugated IgG or IgM is visualized with 4-nitrophenyl phosphate substrate, which gives a yellow reaction product, the intensity of which is proportional to a concentration of autoantibody in the sample. A base is added to each well to stop the reaction, and the final product is read at 405 nm. For screening assays, patient results are calculated by dividing the optical density (OD) of patient samples or controls by the average OD of the calibrator. Any sample with a ratio of patient to calibrator OD greater than 2.0 is considered positive. Any positive sample on screening is then titered. For titer assays, patient samples are diluted and the last dilution where the ratio of patient to calibrator OD greater than 2.0, is reported as the end-point titer.(Unpublished Mayo method)

Ganglioside GQ1b Antibody IgG ELISA:
Microwells are precoated with GQ1b antigen. The calibrator, controls, and diluted patient samples are added to the wells, and autoantibodies recognizing GQ1b bind during the first incubation. After washing the wells to remove all unbound proteins, purified horseradish peroxidase-labeled anti-human IgG conjugate is added. The conjugated IgG binds to the captured human autoantibody, and the excess unbound conjugated IgG is removed by a further wash step. The bound conjugated IgG is visualized with 3,3',5,5'-tetramethylbenzidine substrate, which gives a blue reaction product, the intensity of which is proportional to a concentration of autoantibody in the sample. Acid is added to each well to stop the reaction. This produces a yellow end-product color, which is read at 450 nm. Patient results are calculated as a cutoff index (COI) by dividing the OD of patient samples or controls by the average OD of the calibrator. Any sample with a COI greater than or equal to1.0 is considered positive. Any sample with a COI less than 1.0 is

considered negative. Results are reported qualitatively as positive or negative.(Unpublished Mayo method)

PDF Report
No

Day(s) Performed
Monday, Wednesday, Friday

Report Available
5 to 8 days

Specimen Retention Time
28 days

Performing Laboratory Location
Mayo Clinic Laboratories - Rochester Main Campus

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
83516 x5
83520 x4 (if appropriate)

LOINC® Information

Test ID	Test Order Name	Order LOINC® Value
GAES	Ganglioside Antibodies Eval, S	82455-7

Result ID	Test Result Name	Result LOINC® Value
4416	IgG Disialo. GD1b	94868-7
4412	IgG Monos. GM1	63243-0
4417	IgM Disialo. GD1b	94870-3
4413	IgM Monos. GM1	63247-1
621107	GQ1b-IgG ELISA, S	63254-7
621109	Ganglioside Antibodies	69048-7

	Interpretation, S	