Overview

Useful For

Investigating patients with suspected or proven thymoma, whether or not symptoms or signs of myasthenia gravis (MG) are present

Serially monitoring patients for recurrence or metastasis after removal of thymoma

Providing a quantitative autoantibody baseline for future comparisons in monitoring a patient's clinical course and the response to thymectomy and immunomodulatory treatment

Assessing the likelihood of occult thymoma in a patient with an acquired disorder of neuromuscular or autonomic transmission

Evaluating bone marrow transplant recipients with suspected graft-versus-host disease, particularly if there is evidence of weakness

Confirming that a recently acquired neurological disorder has an autoimmune basis (eg, MG or dysautonomia)

Profile Information

Test ID	Reporting Name	Available Separately	Always Performed
MGETI	MG Thymoma Interpretation, S	No	Yes
ARBI	ACh Receptor (Muscle) Binding Ab	Yes	Yes
ARMO	ACh Receptor (Muscle) Modulating Ab	No	Yes
STR	Striational (Striated Muscle) Ab, S	Yes	Yes
CRMWS	CRMP-5-IgG Western Blot, S	Yes	Yes
GANG	AChR Ganglionic Neuronal Ab, S	No	Yes
VGKC	Neuronal (V-G) K+ Channel Ab, S	No	Yes
GD65S	GAD65 Ab Assay, S	Yes	Yes

Testing Algorithm

Recommended for investigation of: 1) a patient with suspected or proven thymoma, whether or not symptoms or signs of myasthenia gravis (MG) are present (also of value for serially monitoring patients after removal of thymoma; a rising autoantibody titer may herald tumor persistence or recurrence), or emergence of an unrelated neoplasm and 2) a bone marrow transplant recipient with suspected graft-versus-host disease, particularly if there is evidence of weakness.

See Myasthenia Gravis: Thymoma Diagnostic Algorithm in Special Instructions.

Special Instructions

- Myasthenia Gravis: Thymoma Diagnostic Algorithm

Method Name

ARBI, ARMO, GANG, GD65S, VGKC: Radioimmunoassay (RIA)

STR: Enzyme Immunoassay (EIA)

CRMWS: Western Blot

NY State Available

Yes

Specimen

Specimen Type

Serum

Specimen Required

Container/Tube:

Preferred: Red top

Acceptable: Serum gel

Specimen Volume: 3 mL

Additional Information: Patient should have no general anesthetic or muscle-relaxant drugs in the previous 24 hours.

Forms

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

Specimen Minimum Volume

2 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	
	Frozen	28 days	

Specimen Type	Temperature	Time	Special Container
	Ambient	72 hours	

Clinical and Interpretive

Clinical Information

Myasthenia gravis (MG) is an acquired disorder of neuromuscular transmission caused by the binding of pathogenic autoantibodies to muscle's postsynaptic nicotinic acetylcholine receptor (AChR). Synaptic transmission fails when these pathogenic autoantibodies cause a critical loss of the AChR cation channel protein, which is required to activate the muscle action potential.

It is estimated that approximately 20% of adult patients have a paraneoplastic basis for MG. Thymoma is the most common neoplasm, often occult at the onset of MG, its diagnosis may precede MG onset. Thymoma is thought to be an endogenous source of muscle and neuronal antigens that drive production of characteristic autoantibodies. Other autoimmune neurological disorders sometimes accompany thymoma, with and without MG, including neuromuscular hyperexcitability, autonomic neuropathy, especially gastrointestinal dysmotilities encephalopathy, subacute hearing loss, or polymyositis.

MG can affect children as well as adults, but a paraneoplastic context is rare in children (neuroblastoma or thymoma are sometimes found).

Some of the antibodies in this profile are not pathogenic (eg, antibodies directed at cytoplasmic epitopes accessible in solubilized ion channels, or sarcomeric proteins that constitute the striational antigens).

Autoimmune serology is indispensable for initial evaluation and monitoring the course of patients with acquired MG. The neurological diagnosis depends on the clinical context, electromyographic findings, and response to anticholinesterase administration. MG is confirmed more readily by the individual patient's serological profile than by any single test.

See Myasthenia Gravis: Thymoma Diagnostic Algorithm in Special Instructions.

Reference Values

ACh RECEPTOR (MUSCLE) BINDING ANTIBODY

< or =0.02 nmol/L

ACh RECEPTOR (MUSCLE) MODULATING ANTIBODIES

0-20% (reported as __% loss of AChR)

STRIATIONAL (STRIATED MUSCLE) ANTIBODIES

<1:120

CRMP-5-IgG WESTERN BLOT

Negative

AChR GANGLIONIC NEURONAL ANTIBODY

< or =0.02 nmol/L

NEURONAL (V-G) K+ CHANNEL AUTOANTIBODY

< or =0.02 nmol/L

GAD65 ANTIBODY ASSAY

< or =0.02 nmol/L

Interpretation

A patient's autoantibody profile is more informative than the result of any single test for predicting the likelihood of thymoma, and for supporting a diagnosis of myasthenia gravis (MG) or other paraneoplastic neurological complication.

Muscle acetylcholine receptor (AChR) and striational autoantibodies are characteristic but not diagnostic of MG in the context of thymoma. One or more antibodies in the MG/thymoma evaluation are positive in more than 60% of nonimmunosuppressed patients who have thymoma without evidence of any neurological disorder.

Titers of muscle AChR and striational antibodies are generally higher in MG patients who have thymoma, but severity of weakness cannot be predicted by antibody titer. A rising antibody titer (or appearance of a new antibody specificity) following thymoma ablation suggests thymoma recurrence or metastasis, or development of an unrelated neoplasm.

Antibodies specific for the alternative muscle autoantigen of MG, muscle-specific receptor tyrosine kinase, are not associated with thymoma.

Cautions

Because the autoantibody profile may change with tumor recurrence, single autoantibody testing is not recommended for follow-up after thymoma treatment.

A positive result in the myasthenia gravis (MG)/thymoma evaluation is not per se diagnostic of MG. Positive values for muscle acetylcholine receptor (AChR) and striational antibodies occur in 59% of patients with neurologically uncomplicated thymoma, 13% of Lambert-Eaton syndrome (LES) patients (Note: P/Q-type calcium channel antibodies are not found in MG, except for rare non-thymomatous paraneoplastic cases), 40% of patients with autoimmune liver disorders, approximately 10% of patients with lung cancer, and in patients with graft-versus-host disease, and recipients of D-penicillamine.

False-positive results occur most frequently in the bioassay for AChR modulating antibody; serum redraw will be requested when only this assay yields a positive result.

This test should not be requested in patients who have recently received radioisotopes, therapeutically or diagnostically, because of potential assay interference. The specific waiting period before specimen collection will depend on the isotope administered, the dose given and the clearance rate in the individual patient. Specimens will be screened for radioactivity prior to analysis. Radioactive specimens received in the laboratory will be held 1 week and assayed if sufficiently decayed, or canceled if radioactivity remains.

The presence of alpha-bungarotoxin antibodies may interfere with the ACh receptor (muscle) binding antibody assay.

Clinical Reference

1. Cikes N, Momoi MY, Williams CL, et al: Striational autoantibodies: quantitative detection by enzyme immunoassay in myasthenia gravis, thymoma and recipients of D-penicillamine and allogenic bone marrow. Mayo Clin Proc 1988

May;63(5):474-481

2. Lennon VA: Serological profile of myasthenia gravis and distinction from the Lambert-Eaton myasthenic syndrome. Neurology 1997;48(Suppl 5):S23-S27

3. Vernino S, Lennon VA: Autoantibody profiles and neurological correlations of thymoma. Clin Can Res 2004;10:7270-7275

4. Hoch W, McConville J, Helms S, et al: Auto-antibodies to the receptor tyrosine kinase MuSK in patients with myasthenia gravis without acetylcholine receptor antibodies. Nat Med 2001 Mar;7(3):365-368

5. Chan K-H, Lachance DH, Harper CM, Lennon VA: Frequency of seronegativity in adult-acquired generalized myasthenia gravis. Muscle Nerve 2007;36:651-658

Performance

Method Description

Muscle acetylcholine receptor (AChR) binding (IgG and IgM) are quantitated by immunoprecipitation assays. Fetal and adult, detergent-solubilized, acetylcholine receptors (extracted from cultures of rhabdomyosarcoma [RD] cells) labeled with (125)I-alpha-bungarotoxin are incubated with patient serum. AChR modulating antibody is detected in a bioassay: following 14-hour incubation with patient's serum, viable, noninnervated, monolayer cultures of human muscle cells are probed with (125)I-bungarotoxin to quantitate percent loss of surface AChR. Striational antibodies (IgG, IgM, and IgA) are detected by EIA using as antigen a mixture of sarcomeric proteins extracted from healthy adult rat skeletal muscle.(Griesmann GE, Kryzer TJ, Lennon, VA: Autoantibody profiles of myasthenia gravis and Lambert-Eaton myasthenic syndrome. In Manual of Clinical and Laboratory Immunology. Sixth edition. Edited by NR Rose, RG Hamilton, B Detrick, Washington, DC, ASM Press, 2002, pp 1005-1012)

CRMP-5-IgG is detected by Western blot assay using recombinant human collapsin response-mediator protein-5 as antigen.(Yu Z, Kryzer TJ, Griesmann GE, et al: CRMP-5 neuronal autoantibody: marker of lung cancer and thymoma-related autoimmunity. Ann Neurol 2001 February;49[2]:146-154)

PDF Report

No

Day(s) and Time(s) Test Performed

ACh receptor (muscle) binding antibody:

Monday through Friday; 11 a.m., 6 p.m., 10 p.m.

Saturday; 6 a.m.

Sunday; 6 a.m., 10 a.m.

ACh receptor (muscle) modulating antibodies:

Monday through Thursday; 2 p.m.

Saturday; 8 a.m.

Striational (striated muscle) antibodies:

Monday through Friday; 4 a.m., 3 p.m.

Saturday; 6 a.m.

CRMP-5-IgG Western blot:

Monday, Wednesday, Friday; 8 a.m.

AChR ganglionic neuronal antibody:

Monday through Friday; 11 a.m., 6 p.m.

Saturday; 6 a.m.

Sunday; 6 a.m.

Neuronal (V-G) K+ channel autoantibody:

Monday through Friday; 11 a.m., 6 p.m.

Saturday; 6 a.m.

Sunday; 6 a.m.

GAD65 antibody assay:

Monday through Friday; 6 a.m., 4 p.m.

Analytic Time

3 days

Maximum Laboratory Time

7 days

Performing Laboratory Location

Rochester

Fees and 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 Regional Manager. For assistance, contact Customer Service.

CPT Code Information

83519 x 4-ACh receptor (muscle) binding antibody

83520

84182

86341

LOINC® Information

Test ID	Test Order Name	Order LOINC Value
MGT1	MG Evaluation, Thymoma	90231-2

Result ID	Test Result Name	Result LOINC Value
8338	ACh Receptor (Muscle) Binding Ab	11034-6
8879	ACh Receptor (Muscle) Modulating Ab	30192-9
83107	CRMP-5-IgG Western Blot, S	47401-5
84321	AChR Ganglionic Neuronal Ab, S	94694-7
81596	GAD65 Ab Assay, S	94345-6
8746	Striational (Striated Muscle) Ab, S	94817-4
89165	Neuronal (V-G) K+ Channel Ab, S	94816-6
34274	MG Thymoma Interpretation, S	69048-7