MAYO CLINIC LABORATORIES

Test Definition: ACMFS

Acetylcholine Receptor Modulating Antibody, Flow Cytometry Assay, Serum

Overview

Useful For

Diagnosis for autoimmune myasthenia gravis (MG) in adults and children

Distinguishing autoimmune from congenital MG in adults and children or other acquired forms of neuromuscular junction transmission disorders.

This test is a qualitative assay and **should not be used** for monitoring purposes.

Method Name

Only orderable as part of a profile. For more information see:
MGLE / Myasthenia Gravis/Lambert-Eaton Myasthenic Syndrome Evaluation, Serum
MGMR / Myasthenia Gravis Evaluation with Muscle-Specific Kinase (MuSK) Reflex, Serum
PAVAL / Paraneoplastic, Autoantibody Evaluation, Serum

Flow Cytometry

NY State Available

Yes

Specimen

Specimen Type

Serum

Ordering Guidance

Typically, physicians will order acetylcholine receptor (AChR) binding, blocking, and modulating antibodies. Mayo Clinic Laboratories' (MCL) tests are not named in that manner; instead these are offered as myasthenia gravis (MG) evaluations. MGMR / Myasthenia Gravis Evaluation with Muscle-Specific Kinase (MuSK) Reflex, Serum is the testing of choice in most cases.

AChR blocking antibody testing is no longer offered individually as it offers no added-value to the diagnosis and management of MG.

Specimen Required

Only orderable as part of a profile. For more information see:
MGLE / Myasthenia Gravis/Lambert-Eaton Myasthenic Syndrome Evaluation, Serum
MGMR / Myasthenia Gravis Evaluation with Muscle-Specific Kinase (MuSK) Reflex, Serum
PAVAL / Paraneoplastic, Autoantibody Evaluation, Serum

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.

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
Fatigable weakness due to impaired postsynaptic transmission at the neuromuscular junction is characteristic of myasthenia gravis (MG). A clinical diagnosis should be supported by electrodiagnostic testing, ie, clinical-electrodiagnosis (EDX). Positive autoimmune serology increases certainty of MG diagnosis but needs to be interpreted in the proper clinical-EDX context with response to anticholinesterase medications supporting the diagnosis. Most cases are autoimmune and are caused by IgG autoantibodies binding to critical postsynaptic membrane molecules (nicotinic muscle acetylcholine receptor [AChR] or its interacting proteins, such as muscle-specific kinase [MuSK]). Serologically, the detection of AChR binding antibody provides the best diagnostic sensitivity. However, the presence of both AChR binding and modulating activity improves diagnostic accuracy. Autoantibody detection frequency is lowest in patients with weakness confined to extraocular muscles (72% are positive for AChR binding antibodies) and highest in patients with generalized weakness due to MG (92% are positive for AChR binding antibodies). In adults with MG and AChR antibodies, approximately 20% will have thymoma and very rarely (<1%) extrathymic cancers. Computed tomography (CT) imaging of the chest is considered the standard of care to evaluate for thymoma.

These results should only be interpreted in the appropriate clinical and electrophysiological context and are not diagnostic in isolation.

Note: Single antibody tests may be requested in the follow-up of patients with positive results previously documented in this laboratory.

Reference Values

Only orderable as part of a profile. For more information see:
MGLE / Myasthenia Gravis/Lambert-Eaton Myasthenic Syndrome Evaluation, Serum
MGMR / Myasthenia Gravis Evaluation with Muscle-Specific Kinase (MuSK) Reflex, Serum
PAVAL / Paraneoplastic, Autoantibody Evaluation, Serum

Negative

Interpretation

This assay shows strong qualitative concordance with the previous modulating assay.

Positive results in this antibody evaluation are indicative of autoimmune myasthenia gravis (MG). These results should be interpreted in the appropriate clinical and electrophysiological context.

The presence of acetylcholine receptor (AChR) modulating antibodies along with AChR binding antibodies as compared to AChR binding antibodies alone, improves the diagnostic accuracy for MG.

In the presence of AChR modulating antibodies, a paraneoplastic basis should be considered with thymoma being the most commonly associated tumor with MG.

Negative results do not exclude the diagnosis of MG. If clinical suspicion remains and symptoms persistent or worsen consider re-testing.

Cautions

Positive results are found in some patients with Lambert-Eaton syndrome (LES), paraneoplastic central nervous system (CNS) and peripheral nervous system (PNS) autoimmune disorders and in healthy individuals.

Hemolysis, muscle-relaxant drugs used in the course of general anesthesia, or serum exposed to high ambient temperature can cause false-positive results.

Clinical Reference

1. Lozier BK, Haven TR, Astill ME, Hill HR: Detection of acetylcholine receptor modulating antibodies by flow cytometry. Am J Clin Pathol. 2015 Feb;143(2):186-192
2. Keefe D, Hess D, Bosco J, et al: A rapid, fluorescence-based assay for detecting antigenic modulation of the acetylcholine receptor on human cell lines. Cytometry B Clin Cytom. 2009 May;76(3):206-212

Performance

Method Description

This method uses flow cytometry to measure the loss of acetylcholine receptors (AChR) expressed on the surface of live cells. The cell line used is an immortalized human rhabdomyosarcoma cell line that expresses endogenous muscle-type nicotinic AChR on its surface. Cells are plated in a 96-well plate and cultured prior to the addition of patient serum, which is then incubated on the cells to enable antibody-mediated internalization of AChR (modulation).

Subsequently, modulation is then stopped and the amount of AChR on the cell surface is measured by flow cytometry. The detection of receptors is performed using a recombinant rat monoclonal antibody specific for the human alpha-subunit of the AChR followed by a secondary goat anti-rat IgG antibody conjugated with allophycocyanin (APC). The amount of AChR on the cell surface is proportional to the median fluorescence intensity (MFI) of APC. To calculate the amount of modulation (ie, % loss of AChR), the APC MFI is compared between cells treated with patient serum and cells treated with serum lacking AChR modulating antibodies. Background signal is established in each experiment utilizing cells stained with secondary antibody alone (no patient sera). The percent loss of AChR is calculated as 1-([Patient MFI-Background MFI]/[Negative calibrator MFI-Background MFI]*100%).(Unpublished Mayo method)

PDF Report
No

Day(s) Performed
Monday, Wednesday, Saturday

Report Available
5 to 8 days

Specimen Retention Time
2 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
86043

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LOINC® Information

Test ID	Test Order Name	Order LOINC® Value
ACMFS	AChR Modulating Flow Cytometry, S	99062-2

Result ID	Test Result Name	Result LOINC® Value
610029	AChR Modulating Flow Cytometry, S	99062-2