

Myasthenia Gravis Testing

The presence of acetylcholine receptor (AChR) antibodies that block or destroy receptors for the neurotransmitter acetylcholine traditionally defined myasthenia gravis (MG), an autoimmune disease caused by antibodies to neuromuscular and intramuscular elements impairing function and leading to muscle weakness and fatigue. However, this definition has expanded to include the presence of other autoantibodies, including muscle-specific kinase antibodies (MuSK).

DISEASE OVERVIEW

Incidence

3-30 per million/year

Prevalence

14-20/100,000 in U.S.

Age of Onset

- Mean age of onset
 - Females: 28 years
 - Males: 42 years
- Individuals <50 years: female predominance
- Individuals >60 years: no gender predominance
- Incidence rate increases with age for both genders

Symptoms

Main symptom: sporadic, fatigable muscle weakness

- Begins with mild weakness in limited muscle groups
 - Initially and most severely affects in ocular and bulbar muscles
 - 40% of individuals only experience weakness in ocular muscles initially
- Almost always progresses to weakness of multiple muscle groups within first year
 - 16% of individuals only experience weakness in ocular muscles after first year
 - Most serious condition results when respiratory muscles are affected, which may result in myasthenic crisis

Diagnostic Issues

- AChR antibody
 - Specific for MG
 - Presence does not correlate with disease severity
 - Detected in ~85% of patients with MG
 - Not detected in ~15% of patients (predominantly female) with MG who
 - Experience weakness in respiratory and bulbar muscles
 - Have antibodies against other neuromuscular junction proteins
- MuSK antibodies
 - Detected in ~6% of patients with MG
 - Should be assessed when patient is seronegative for AChR antibodies

TESTS TO CONSIDER

[Acetylcholine Receptor Antibody Reflexive Panel 2001571](#)

Method: Quantitative Radioimmunoassay/Semi-Quantitative Flow Cytometry

Diagnose MG or confirm a clinical diagnosis of MG

Preferred reflexive panel for MG diagnosis

[Acetylcholine Receptor Antibodies and Striated Muscle Antibodies Reflexive Panels, and Titin Antibody 2005639](#)

Method: Quantitative Radioimmunoassay/Semi-Quantitative Enzyme-Linked Immunosorbent Assay/Semi-Quantitative Indirect Fluorescent Antibody/Semi-Quantitative Flow Cytometry

Acceptable panel for MG diagnosis

[Muscle-Specific Kinase \(MuSK\) Antibody, IgG 3001576](#)

Method: Quantitative Radioimmunoassay

Secondary diagnostic testing for patients with generalized or ocular MG and no detectable antibodies to AChR

Secondary Tests

[Autoimmune Neuromuscular Junction Reflexive Panel 2005640](#)

Method: Quantitative Radioimmunoassay/Qualitative Radiobinding Assay/Semi-Quantitative Flow Cytometry/Semi-Quantitative Indirect Fluorescent Antibody

Acceptable panel for the differential diagnosis of acquired neuromuscular junction (NMJ) disorders

[Striated Muscle Antibodies, IgG with Reflex to Titer 0050746](#)

Method: Semi-Quantitative Indirect Fluorescent Antibody

Secondary diagnostic testing for MG Order if the primary tests are negative Differential evaluation of NMJ

[Titin Antibody 2005636](#)

Method: Semi-Quantitative Enzyme-Linked Immunosorbent Assay

- Titin and/or striated muscle antibodies
 - Characteristic of MG
 - Not specific to MG
 - Presence in early onset MG indicates $\geq 95\%$ likelihood of underlying thymoma.
 - Testing may be useful
 - In conjunction with AChR antibodies in the management of individuals with MG
 - In AChR antibody-negative MG

Secondary diagnostic testing for MG
Order if the primary tests are negative
Screen for presence of thymoma in patients with MG

See [Related Tests](#) for individually orderable tests.

TESTING STRATEGY

- Acetylcholine Receptor (AChR) Antibody Reflexive Panel tests for binding and blocking antibodies and reflexes to modulating antibody, and is the most cost-effective testing algorithm for the diagnosis of MG.
 - AChR testing should not be performed for patients who recently received radioisotopes for diagnostic or therapeutic reasons, due to the potential for false-positive results.
- Muscle-specific kinase (MuSK) antibody should be considered for patients who are AChR antibody seronegative.

TEST INTERPRETATION

Sensitivity

Combination of binding and blocking AChR antibody testing identifies 99.6% of population possessing AChR antibodies and is

- Positive in up to 90% of individuals with generalized MG
- Positive in 50-70% of individuals with purely ocular MG

Results

Paraneoplastic disease is likely when positive AChR modulating antibody is in conjunction with

- Striated muscle antibody titer of $\geq 1:80$
- Titin antibody index value of 0.72
- Both antibodies (which usually indicates thymoma)

Limitations

Negative result does not rule out a diagnosis of MG

REFERENCES

Howard JF. [Clinical Overview of MG](#). Myasthenia Gravis Foundation of America. [Accessed: Apr 2019]

Phillips LH. [The epidemiology of myasthenia gravis](#). Ann N Y Acad Sci. 2003; 998: 407-12. PubMed

RELATED INFORMATION

[Myasthenia Gravis - MG](#)

RELATED TESTS

[Acetylcholine Receptor Binding Antibody 0080009](#)

Method: Quantitative Radioimmunoassay

[Acetylcholine Receptor Blocking Antibody 0099580](#)

Method: Semi-Quantitative Flow Cytometry

[Acetylcholine Receptor Modulating Antibody 0099521](#)

Method: Semi-Quantitative Flow Cytometry