

# 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
- Titin and/or striated muscle antibodies
  - Characteristic of MG
  - Not specific to MG
  - Presence in early onset MG indicates ≥95% likelihood of underlying thymoma

## 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 by CBA-IFA with Reflex to Titer, Serum 3006198](#)

**Method:** Semi-Quantitative Cell-Based Indirect Fluorescent Antibody

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

### [Acetylcholine Receptor Binding Antibody with reflex to Muscle-Specific Kinase \(MuSK\) Ab, IgG 3001868](#)

**Method:** Quantitative Radioimmunoassay (RIA)

Diagnose MG or confirm a clinical diagnosis of MG

### [Myasthenia Gravis Reflexive Panel 3001869](#)

**Method:** Quantitative Radioimmunoassay (RIA)/Semi-Quantitative Flow Cytometry

Extended panel for MG diagnosis

### [Autoimmune Neuromuscular Junction Reflexive Panel 3003017](#)

**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

- Testing may be useful
  - In conjunction with AChR antibodies in the management of individuals with MG
  - In AChR antibody-negative MG

## 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.

### Titin Antibody 2005636

**Method:** Semi-Quantitative Enzyme-Linked Immunosorbent Assay

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

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

## 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

## Additional Resources

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

Phillips LH. [The epidemiology of myasthenia gravis](#). *Ann N Y Acad Sci*. 2003;998:407-412.

## Related Information

[Myasthenia Gravis - MG](#)

## Related Tests

[Acetylcholine Receptor Blocking Antibody 0099580](#)

**Method:** Semi-Quantitative Flow Cytometry

[Acetylcholine Receptor Modulating Antibody 0099521](#)

**Method:** Semi-Quantitative Flow Cytometry

[Acetylcholine Receptor Binding Antibody 0080009](#)

**Method:** Quantitative Radioimmunoassay

