Myasthenia gravis
Myasthenia gravis is an autoimmune disease that causes muscle weakness. The symptoms are caused by the immune system interfering with the transmission of messages from the nervous system to the muscles. There is no cure, but the symptoms can be managed. Treatment options include drugs to suppress the activity of the immune system, plasmapheresis to clear the antibodies from the blood and surgical removal of the thymus gland.

The term 'myasthenia gravis' (MG) comes from the Greek word ‘myasthenia’ meaning muscle weakness and the Latin word ‘gravis’ meaning severe. It is an autoimmune condition that causes problems with the transmission of signals from the nerves to the muscles. This results in weak muscles that get tired quickly and which improve after rest.

In the early stages, myasthenia gravis mostly affects the muscles that control eye movement, facial expression, chewing and swallowing. As the condition progresses, neck and limb muscles may also be affected, causing difficulty with holding the head up, walking upstairs and raising the arms. If untreated, breathing may be affected. Fortunately, treatment – which may include medication or surgery – is usually successful in managing the symptoms of the condition.

Myasthenia gravis affects all races and can develop at any age from childhood to old age. Women are affected nearly three times more often than men during early adulthood (under 40 years of age). After 50 years of age, more men are affected than women. It is fairly unusual for children under the age of 15 to have myasthenia gravis, except in some Asian countries where up to half of people with myasthenia gravis have symptoms beginning in childhood.

Although the condition doesn’t generally run in families, people who inherit a tendency to develop autoimmune conditions are at increased risk of developing myasthenia gravis, so a person with myasthenia gravis may have another autoimmune disease, such as diabetes, or have a relative with an autoimmune disease.

A 2009 survey found that 2,574 people in Australia were currently being treated for myasthenia gravis. This equals approximately 1.2 out of every 10,000 people.

Symptoms of myasthenia gravis

Some of the symptoms of myasthenia gravis include:

- weak muscles
- weakness that improves after resting and gets worse after physical activity
- visual disturbances such as double vision, inability to hold a steady gaze and droopy eyelids
- fatigue
- swallowing difficulties
- breathing difficulties
- shortness of breath.

Cause of myasthenia gravis

Myasthenia gravis is just one of many autoimmune diseases, which include arthritis and type 1 diabetes. Normally, the immune system produces antibodies that recognise foreign things that enter the body, such as bacteria and viruses. This leads to them being destroyed and cleared from the body. In the case of an autoimmune condition, the body’s immune system produces antibodies against things in the body that aren’t foreign. In myasthenia gravis it is the structure at the junction of the nerves and the muscles (the neuromuscular junction) that is attacked.

About 85 percent of patients with myasthenia gravis produce antibodies against a protein called the ‘acetylcholine receptor’ (AChR). This is found at the neuromuscular junction and acts as a receiver for the chemical signal ‘acetylcholine’ (ACh) that is released from the nerve to tell a muscle to contract.

The antibodies bind to the acetylcholine receptors on the surface of the muscle and greatly reduce their ability to receive the chemical signal. As a result, the person experiences muscle weakness, which becomes worse as they repeatedly try to use the same muscle.

Many people with myasthenia gravis who don’t have antibodies to the AChR, have antibodies to a protein called ‘muscle-specific kinase’ (MuSK). This protein helps organise ACh receptors on the muscle cell surface. Research is ongoing to find out what antibody is responsible in the approximately 10 percent of people who don’t have antibodies to AChR or MuSK. Recently, antibodies to a protein called ‘LRP4’ were found to be the cause for some of these people.

Scientists don’t know what triggers most autoimmune conditions, but they have a few theories. One possibility is that certain viral or bacterial proteins mimic ‘self-
Myasthenia gravis

There is no cure for myasthenia gravis, but the symptoms can be managed. Some of the treatment options include:

Treatment for myasthenia gravis

There is no cure for myasthenia gravis, but the symptoms can be managed. Some of the treatment options include:

- **Changes to lifestyle** – such as getting adequate rest every day and minimising physical exertion
- **Anti-acetylcholinesterase agents** – the most commonly prescribed anticholinesterase medication is pyridostigmine (Mestinon). These drugs prevent ACh destruction and increase the accumulation of ACh at neuromuscular junctions, improving the ability of the muscles to contract. The benefits of Pyridostigmine occur within 30 to 60 minutes, but wear off in three to four hours, so tablets should be taken at regular intervals throughout the day. Side effects include excessive salivation, involuntary muscle twitching (fasciculation), abdominal pain, nausea, and diarrhoea. Other drugs may be used with anticholinesterase medications to reduce gastrointestinal side effects
- **Corticosteroids** – such as prednisone suppress the antibodies that interfere with the function of the neuromuscular junction and may be used in conjunction with anticholinesterase medication. Corticosteroids improve symptoms within a few weeks and once improvement stabilises, the dose is slowly decreased. A low dosage may be used indefinitely to treat myasthenia gravis. However, side effects such as gastric ulcers, osteoporosis (bone thinning), weight gain, high blood sugar, and increased risk of infection may develop over the long term
- **Other immunosuppressive drugs** – such as azathioprine and mycophenolate mofetil (CellCept) may be effective with fewer side effects than corticosteroids. Cyclophosphamide and cyclosporin are considered effective against myasthenia gravis, but because of their side effects they are only prescribed as a last resort when other medications are not effective
- **Plasmapheresis** – blood is taken out and the acetylcholine receptor antibodies are removed. The “cleaned” blood is then returned to the person’s body. The results only last a few weeks, as the immune system continues to create the antibodies. Plasmapheresis is often used to help resolve a myasthenic crisis. In severe cases, a person may need plasmapheresis as a long-term treatment
- **Intravenous immunoglobulin** – is a short-term management strategy that involves an injection of nonspecific antibody (immunoglobulin), which temporarily stops the immune system’s production of its own antibodies
- **Surgical thymectomy** – surgical removal of the thymus gland is recommended for some people. The benefits of thymectomy develop gradually and most improvement occurs years after the procedure is performed, but it is believed to be the only treatment capable of producing long-term, drug-free remission.

Where to get help

- Your doctor
- Muscular Dystrophy Australia Tel. (03) 9320 9555

Things to remember

- Myasthenia gravis is an autoimmune disease that causes muscle weakness.
- The symptoms are caused by the immune system interfering with the transmission of messages from the nervous system to the muscles.
- There is no cure, but the symptoms can be managed.
- Treatment options include drugs to suppress the activity of the immune system, plasmapheresis to clear the antibodies from the blood and surgical removal of the thymus gland.

References

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- **液体保留（水肿）**
  液体保留（水肿）发生在体液没有被从身体组织中移除时，包括皮肤。原因包括身体对热的反应、高盐摄入和与激素相关的...

- **淋巴系统**
  淋巴系统管理身体的液体水平，过滤细菌并储存类型白血球...

- **淋巴水肿**
  妇女在乳腺癌治疗后特别容易患上淋巴水肿...

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  淋巴瘤是一类从淋巴系统开始的癌症...

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  脾脏可能在心力衰竭或损伤时被手术摘除而不会对人造成任何严重伤害...

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  任何导致血细胞快速分解的条件都会对脾造成很大压力并使其扩大...

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- **狼疮**
  狼疮可以是轻度的或危及生命的，取决于受影响的组织...

- **狼疮和感染**
  狼疮患者最常见的感染包括呼吸系统、皮肤和泌尿系统...

- **狼疮和药物**
  狼疮最常出现在育龄女性...

- **狼疮和怀孕**
  狼疮可以被药物控制，所以大多数受影响的女性能够生育...

**自身免疫性疾病**

- **阿狄森病**

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Most cases of Addison's disease are caused by an autoimmune response that attacks and damages the adrenal glands over time.

- **Autoimmune disorders**
  - There is generally no cure for an autoimmune disorder, but the symptoms can be managed.

- **Chronic fatigue syndrome (CFS)**
  - Myalgic encephalomyelitis, commonly known as chronic fatigue syndrome, can affect people of any age, including children.

- **Diabetes type 1**
  - Type 1 diabetes can affect anyone of any age, but is more common in people under 30 years.

- **Guillain-Barré syndrome**
  - Most people with Guillain-Barré syndrome experienced some form of viral or bacterial infection before the onset of symptoms.

- **Henoch-Schonlein purpura**
  - Henoch-Schonlein purpura causes a purple spotted skin rash which lasts around one to four weeks, and is often marked by relapses.

- **HIV**
  - In Australia, HIV is most commonly spread when having sex without a condom and when sharing needles and other injecting equipment.

- **Hughes syndrome**
  - Hughes syndrome is thickening of the blood caused by abnormal immune system cells.

- **Idiopathic thrombocytopenic purpura (ITP)**
  - Idiopathic thrombocytopenic purpura (ITP) is a rare autoimmune disorder in which a person's immune system destroys the platelets that help their blood to clot.

- **Lipoedema**
  - Lipoedema is a painful, chronic, symmetrical swelling in the legs, thighs, buttocks and sometimes arms due to the accumulation of fat in the subcutaneous tissues. The onset often occurs during puberty.

- **Myasthenia gravis**
  - Myasthenia gravis is an autoimmune disease that causes muscle weakness.

- **Polymyositis**
  - Polymyositis is hard to diagnose and may be mistaken for muscular dystrophy.

- **Reactive arthritis**
  - Reactive arthritis is a form of arthritis that occurs as a result of some bacterial infections.

- **Retroperitoneal fibrosis**
  - Retroperitoneal fibrosis is the abnormal growth of tissue on and around abdominal structures, including blood vessels and ureters.

- **Rheumatoid arthritis**
  - Early treatment of rheumatoid arthritis is important in helping you manage the condition more effectively.

- **Scleroderma**
  - The most common symptom of scleroderma is a thickening and hardening of the skin, particularly of the hands and face.

- **Sjogren's syndrome**
  - Sjogren's syndrome can be managed with medications and products such as artificial tears and saliva.

- **Thyroid - Hashimoto's disease**
  - Hashimoto's disease progresses very slowly over many years, so the symptoms may go unnoticed.

- **Thyroid - hyperthyroidism**
  - Hyperthyroidism can be diagnosed with a simple blood test that measures thyroid hormone levels.

Related Information

- **Polymyositis**
  - Polymyositis is hard to diagnose and may be mistaken for muscular dystrophy.

- **Spinal muscular atrophy (SMA)**

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Myasthenia gravis
A child with spinal muscular atrophy type 1 rarely lives beyond three years of age...

- **Muscular dystrophy**
  People affected by muscular dystrophy have different degrees of independence, mobility and carer needs...

- **Multiple sclerosis (MS)**
  Multiple sclerosis is not contagious, but it is progressive and unpredictable...

- **Raynaud's phenomenon**
  Raynaud's phenomenon can be a sign of a more serious underlying condition, so see your doctor if you experience it...

**Home**

**Related information on other websites**

- Macalester College - Management of MG
- Neuromuscular junction: Myasthenia gravis, MDA

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