



## *Myasthenia Gravis Fact Sheet*

Myasthenia Gravis (MG) literally means grave (gravis) muscle (my-) weakness (asthenia). It is a common cause of generalised weakness in dogs and occasionally cats.

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### **What is Myasthenia Gravis?**

Each muscle in the body is controlled by its own nerve, but this nerve does not connect directly to the muscle. At the junction between the nerve and the muscle (also known as the neuromuscular junction) there is a small gap. Signals travel along the nerve as an electrical current. When the electrical nerve impulse reaches the end of the nerve, the signal must be conveyed across the gap to the muscle.

A chemical messenger called acetylcholine bridges this gap. This messenger is released from the end of the nerve, flows across the gap and fixes itself to a specific receptor (acetylcholine receptor) on the muscle. The acetylcholine attaches to the receptor (like a key fitting into a lock) and triggers a signal, which causes the muscle to contract. In Myasthenia Gravis (MG) there is abnormal transmission of the message between the nerves and the muscles.

If the muscles are unable to contract properly they become weak. Muscle weakness can affect the limbs so that animals are unable to stand or exercise normally but it can also affect other muscles in the body. The muscles of the oesophagus (the pipe carrying food from the mouth to the stomach) are often weak in dogs with MG and this means that affected animals may have problems swallowing and often bring back food after eating. In severe cases the muscles involved with breathing can also be affected.

There are two forms of MG in dogs: congenital (a disease the animal is born with) and acquired (a disease that develops during the animal's lifetime). The most common type of MG in dogs is the acquired form. This is seen most commonly in Akitas, terrier breeds, German Shorthaired Pointers, German Shepherd dogs and Golden retrievers, Abyssinians and a close relative, Somalis. A rare congenital form has been described in Jack Russell terriers, Springer Spaniels and Smooth-haired Fox terriers.

### **What causes Myasthenia Gravis?**

Animals with congenital MG are born with too few acetylcholine receptors. The acquired form is caused by a faulty immune-system. The main role of the immune system is to protect the body against infection or foreign invaders, and this is often done by the production of antibodies. In acquired MG, the immune system produces antibodies (called anti-acetylcholine receptor antibody or AChR antibody) which attack and destroy the acetylcholine receptor. No-one really knows why the immune system should suddenly decide to attack these receptors in some dogs.

In rare cases, Myasthenia Gravis in dogs and cats can be triggered by cancer, be associated with other immune diseases affecting the nerves or muscles, or be related to an under-active thyroid gland.

Whatever the reason, when the number of receptors is reduced, acetylcholine cannot fix itself to the muscle to produce muscle contraction and muscle weakness results.

### **How would I know if my pet has Myasthenia Gravis?**

A dog or cat with Myasthenia Gravis will typically present with severe weakness after only a few minutes of exercise. This weakness might affect all four legs or only affect the back legs. It is frequently preceded by a short stride stiff gait with muscle tremors. As soon as an affected animal rests they regain their strength and can be active for a brief period before exercise-induced weakness returns.

Other signs of Myasthenia Gravis in dogs and cats are related to effects on the muscles in the throat and include regurgitation of food and water, excessive drooling, difficulty swallowing, laboured breathing and voice change. In the most severe form, the animal can be totally floppy and unable to support its weight or hold its head up. Muscle disease (myopathy) or nerve disease (neuropathy) can mimic signs of MG and should be considered in the diagnosis.

### **How would my vet diagnose Myasthenia Gravis in my pet?**

Sometimes the diagnosis of MG can be simple but in other animals it is not straightforward. The best test to diagnose acquired MG in dogs and cats is a blood test which looks for antibodies directed toward the acetylcholine receptor. (anti-AChR antibody titre).

Your vet may need to do other tests to re-enforce their suspicion of MG. One of these is the 'Tensilon test'. In this test a short-acting antidote to MG (tensilon) is injected into a vein. In affected animals, there will be a dramatic increase in muscle strength immediately after injection and collapsed animals may get up and run about. However, the effects wear off after a few minutes.

Another test used to help make a diagnosis of MG is an electromyogram (EMG). An EMG machine can be used to deliver a small electrical stimulation to an individual nerve or muscle in an anaesthetised animal. Using an EMG machine, a vet can evaluate how well the muscles respond to stimulation from the nerves. The machine is used to create an electrical impulse in the nerve

Diagnosis of the rare congenital form of MG in dogs and cats is based on a special analysis of a muscle biopsy.

Other investigations may be required to look for underlying causes of the disease, particularly in older animals. Chest X-Rays can be indicated to look for cancer in the chest cavity, to evaluate possible involvement of the oesophagus and to detect pneumonia secondary to inhalation of food.

### **Can Myasthenia Gravis be treated?**

Specific treatment of MG is based on giving a form of long-acting antidote. This improves the transfer of the signal from the nerves to the muscle. Depending on individual circumstances, it may be necessary to give drugs that will suppress the system to stop it attacking the receptors. If your dog has pneumonia your vet will want to treat that first (with antibiotics and other drugs) before suppressing the immune system.

### **Will my pet get better?**

Prognosis is generally good for a complete recovery unless severe pneumonia, severe difficulty eating or underlying cancer is present. Treatment of MG in dogs and cats usually lasts many months and your vet will need to re-examine your pet on a regular basis to check that they are improving. Repeated blood tests to measure anti-AChR antibody levels will also be required.

Myasthenia Gravis can be a very serious disease. However, with an early diagnosis and a high level of care, your pet may make a full recovery.

*If you are concerned about the health of your pet you should contact your veterinary surgeon.*

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