



MYASTHENIA GRAVIS

Myasthenia gravis is a disease which interrupts the way nerves communicate with muscles. In order to understand this disease, you must have some understanding of how things work in the normal situation.

A NEURON IS A CELL

It has a head called a “**cell body**” at one end, a long strand called an “**axon**,” and a foot piece with small branching fingers called “**foot processes**.” The neurons that myasthenia gravis involves have their cell bodies (their heads) in the spinal cord and their foot processes (their feet) in the voluntary muscles that we use to move our bodies (our “**skeletal muscles**.”) The spinal cord sends a message to move a certain muscle. The neuron receives this message and carries it to that muscle.

A NERVE IS A GROUP OF AXONS

The white fibrous structures we call nerves are actually groups of axons bundled together.

NEUROTRANSMITTERS ARE CHEMICALS

In order for a message to be transferred between neurons, a chemical is released from the foot processes of the first neuron and is taken up by one of the branches of the receiving neuron’s head (or by the muscle.) After the chemical message has been successfully transferred, an enzyme destroys the neurotransmitter molecule in order to prevent on-going stimulation. The neurotransmitter we are concerned with in Myasthenia gravis is called “**Acetylcholine**” and the enzyme which degrades it is called “**Acetylcholinesterase**.”

THE NEUROMUSCULAR JUNCTION

is the area where neuron and muscle interface. There are three types of muscle: **heart muscle, smooth (or involuntary) muscle** (the kind that moves food through your intestine, or constrict your pupils, for example), and **striated (or voluntary) muscle** (the kind you use to walk, type, sing, and control facial expression). It is the neuromuscular junction on the striated muscle which is stricken in Myasthenia gravis.

CONGENITAL MYASTHENIA GRAVIS

In this condition, the patient is born without normal neuromuscular junctions to striated muscles. There is no effective treatment. Myasthenia gravis has been described as a

recessive genetic disease in the Jack Russell terrier, the Springer Spaniel, and the Smooth Fox Terrier. The miniature dachshund gets a congenital form which actually resolves with age.

ACQUIRED MYASTHENIA GRAVIS

This is a so-called “**Autoimmune disease**,” meaning that the immune system is destroying neuromuscular junctions as if they were foreign invaders. What muscles are affected depend on which junctions have been destroyed. Therapy centers on stopping this immune reaction and prolonging what acetylcholine activity is still present. This is done with a combination of immunosuppressive agents and medications to inhibit acetylcholinesterase.

CLINICAL SIGNS / SYMPTOMS

Symptoms center on muscle weakness affecting the eyes, muscles of facial expression, throat / esophagus (in dogs), and limbs. This translates into early exercise fatigue (in about 60% of patients), megaesophagus, voice change, or difficulty swallowing.

There is an acute form which is rapidly progressive and quickly lethal. This form is associated with “**thymoma**,” a tumor of the thymus gland (located in the chest).

**Because Myasthenia gravis is so common,
any dog with general muscle weakness, difficulty swallowing,
or megaesophagus should be tested for Myasthenia gravis.**

TESTING

In older times, testing was more complicated. Muscles were biopsied. Response to rapid acting intravenous drugs (the “Tensilon test”) were examined. Nowadays, a simple (though not inexpensive) blood test can be done to check for antibodies against Acetylcholine receptors. This blood test is falsely negative in only 2% of cases. These same antibody blood levels can be used to monitor treatment progress. When antibodies drop to less than 0.6 nmol/L clinical signs generally resolve.

Once a dog or cat has been found to have Myasthenia gravis, it is important to consider that immune mediated conditions often go together. There may be other problems afoot.

A chest radiograph set should be taken to check for thymoma.

TREATMENT

Myasthenia gravis often goes into remission without treatment. In one study of 53 dogs, 89% went into remission an average of 6.4 months (and within 18 months) after diagnosis. The dogs in this study that did not go into remission all developed cancer within 3 years of their myasthenia diagnosis.

- **MEGAESOPHAGUS**

In megaesophagus, the esophagus (the tube that connects the throat and stomach and transports food) becomes flaccid and useless. Patients with this condition regurgitate their food because they cannot effectively move food into their stomachs. They lose weight because they cannot retain food. They are also highly predisposed to aspirating

(inhaling) food and saliva and developing especially intractable pneumonia as a result.

It is important that this condition be recognized quickly so as to prevent debilitating weight loss and pneumonia.

- **REMOVING THE THYMUS GLAND**

The thymus gland, located in the chest generally shrivels up after childhood/puppyhood/kittenhood. It is involved in the maturation of the immune system. In humans, tumors and excessive growths of the thymus frequently accompany the development of myasthenia gravis. Thymectomy (removal of the thymus gland) is a well accepted part of treatment for myasthenia gravis in humans but is still unproven to help in the treatment of dogs and cats.

- **ANTICHOLINESTERASES**

Pyridostigmine (brand name Mestinon[®]) is the usual medication used to prolong the action of acetylcholine. By inactivating acetylcholinesterase, the receptors that have not been destroyed by the immune system can bind acetylcholine longer. It is typically given orally 2-3 times daily and is associated with some nausea. This can be dealt with by diluting the medication or by giving medication on a full stomach. Other side effects can be excess tearing of the eyes, and drooling.

- **IMMUNE-SUPPRESSION**

Corticosteroids, such as prednisone and similar drugs can suppress the production of the antibodies that are destroying the neuromuscular junctions. In general these medications are avoided unless the anticholinesterase therapy does not yield acceptable results. Other stronger immune suppressive drugs (such as azathioprine) are only used if there are reasons that corticosteroids cannot be used due to diabetes mellitus, high blood pressure, concurrent infection etc. or if the myasthenia is especially severe.

Vaccination should be postponed, as vaccination has been shown to exacerbate active myasthenia gravis.

Early diagnosis is important to successful therapy.

If you are worried about this disease, there is nothing wrong with asking for the antibody test as long as one does not mind the expense.