

Neuromuscular Disease

Loss of muscle function or strength in animals may be the result of neuromuscular disease. Because of recent advances in veterinary medicine, it is now easier to identify the various causes of disease and determine the best course of treatment.

Every component of the complex neuromuscular system must work properly for signals to be sent and received accurately. While the brain is the control center for all neurological messages, the rest of the neurological information highway must be intact and operating normally for the neuromuscular system to function properly.

When the brain sends an impulse to a muscle, that signal travels down the spinal cord, then along the peripheral nerves and across the neuromuscular junction (area of contact between the nerve and muscle) to make the muscle contract. In order for the brain to receive a message, the sequence is reversed: the impulse is initiated by a receptor, and then sent up the peripheral nerve and through the spinal cord of the brain (fig. 1).

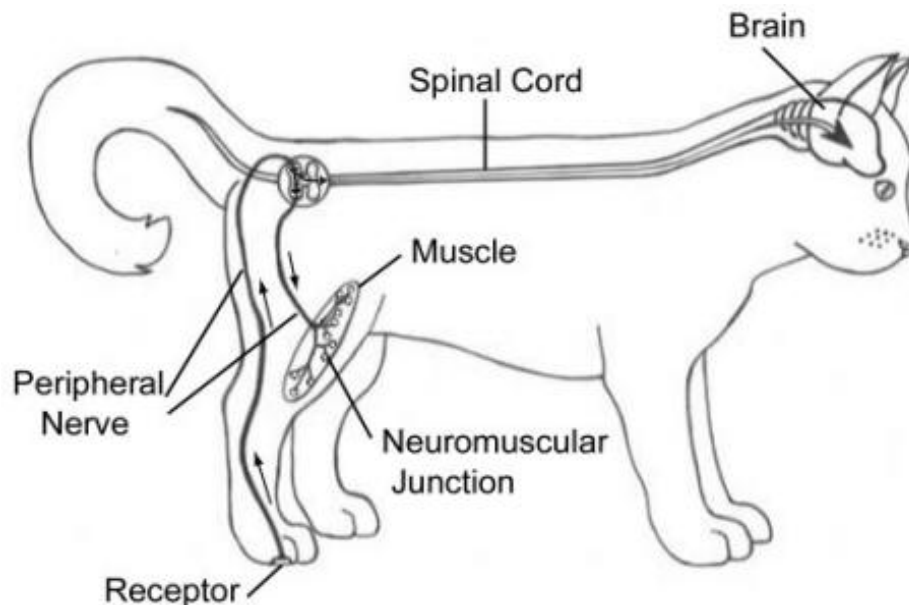


Fig. 1

Disruptions can occur at any point along the neuromuscular system resulting in inappropriate or inadequate function of those parts of the body relying on accurate message transmission.

Known diseases affecting the **peripheral nerves** of dogs include hypothyroid neuropathy, diabetic neuropathy, and immune mediated neuropathy, among others. There are many peripheral nerve diseases of unknown cause as well (idiopathic neuropathy).



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Known diseases affecting the **neuromuscular junction** include botulism, tick paralysis, and myasthenia gravis among others. Diseases affecting the **muscles** include myositis, myotonia, muscular dystrophy, and metabolic myopathies. Diseases that affect the sensory receptors of the body have been documented as well, albeit rarely in small animals.

Because a wide variety of diseases affect the peripheral nerves, neuromuscular junction, and muscles of animals, a thorough evaluation of symptoms and abilities is necessary before proper diagnosis can be made and treatment initiated.

Diagnostic Exams

If an animal is suspected of having a neuromuscular problem, a thorough workup to evaluate the entire neuromuscular system is necessary. A variety of specialized exams are available to help veterinarians pinpoint the exact location of trouble along the neuromuscular pathway.

General anesthesia is required for these tests. Therefore, if you anticipate scheduling the test at the time of your initial consultation, please remember that your pet's food should be withheld from midnight and water from 6 a.m. on the day of a scheduled test. Otherwise, the test will need to be re-scheduled.

Electrodiagnostics

The health of muscles can be evaluated by placing needles into them and observing their electrical activity, a technique called **electromyography**. Peripheral nerves can be evaluated by stimulating them to "fire" by the administration of a small electrical impulse. During these tests, the veterinarian will evaluate various aspects of these impulses including intensity, speed of transmission, and muscle response. When nerves, muscles, and the neuromuscular junction are not working properly, the source of the problem can often be pinpointed with the aid of these tests.

Because the tests involve the insertion of multiple fine needles into various muscle groups and require complete muscle relaxation of the area being tested, animals need to be anesthetized. Generally, the tests take between 30 and 60 minutes to perform accurately and thoroughly.

Nerve and Muscle Biopsy

If the electrodiagnostic testing reveals problems with the neuromuscular system, a nerve and muscle biopsy is often needed to accurately determine the cause and extent of your pet's problem. During a sterile surgery, a small piece of nerve and muscle is removed from your pet's leg. This biopsy is sent to a specialized laboratory for evaluation, which takes about 14 days. When the results are returned, we will discuss the findings and make further recommendations for treatment.

CSF Tap and Myelography

If the diagnosis remains uncertain following electrodiagnostic testing, a spinal tap and myelogram may be needed to confirm the exact location and cause of your pet's problem. These



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tests are useful when it is possible that both the central nervous system (brain and spinal cord) and the neuromuscular system have been affected by the same disease.

During a CSF tap, a long thin needle is inserted into the spinal canal to collect some Cerebral Spinal Fluid. This fluid is sent to the laboratory where it is examined for evidence of inflammation or infection in the nervous system. Then, a myelogram is performed by injecting a contrast dye around the spinal cord to outline it for better visibility on radiographs. This specialized radiographic procedure allows your veterinarian to pinpoint the area of difficulty in the spinal cord.

While myelograms pose some risk to your pet, we believe the benefits of a conclusive diagnosis from the myelogram generally outweigh the risks involved. In human medicine, CAT scans and MRI's have become popular, and these tests are also available for your pet, should they be needed.

Recovery

Your pet will be discharged from the hospital when it has awakened sufficiently from the anesthesia and can be safely transported home for aftercare. If your pet had a nerve and muscle biopsy, a follow-up visit is scheduled in two weeks to remove the stitches. During this recovery time, you can expect your pet to have a sore leg. Once the stitches have been removed, normal activity can be resumed and prior function should return.

Following a myelogram, many animals will show limb weakness for one to two weeks before regaining their prior function. Rarely, they can have more lasting side effects.

You will receive complete instructions for the care of your pet following these special diagnostic examinations.

Conclusion

The purpose of specialized neuromuscular diagnostic exams is to determine precisely where in the nerve and muscle conduction system your pet's problem lies. Once the problem has been pinpointed, the chances of helping or curing your pet should be known.

VCA Animal Specialty Group has worked with family veterinarians since 1982, providing consultations and thorough evaluations of the many diseases that affect the neuromuscular function of animals.