

# ANIMAL REHABILITATION

## SPECIAL INTEREST GROUP

### MARK YOUR CALENDARS!

CSM 2012 is coming soon! It is being held in Chicago, IL, February 8-11. Narelle Stubbs, PT, PhD, BApp, ScPT, MAnSt, will be presenting “**Equine Physiotherapy Research Update, Clinical, Pathological, Imaging and Exercise-based Rehabilitation Studies**” on Saturday, February 11, from 8-12, with the ARSIG business meeting immediately following.

The ARSIG held its semi-annual conference call on October 17th. The topics discussed included the practice analysis, the legislative survey, programming for the combined sections meeting and the independent study course. The practice analysis work is ongoing; one of the issues is the length of time that has passed since some of the information was obtained from members. It was discussed that perhaps a new practice analysis be given so the information is accurate, as our practice has grown and evolved a lot in the past several years. The plan is to have a “rough draft” of the analysis done around the time of CSM, so that it may be discussed during the business meeting. The results of the legislative survey are in, and a statistical analysis of the data has begun. The SIG plans to use the results of the survey to assist them in writing a position statement. The Orthopaedic Section has approved the SIG to produce an independent study course to be used for CE credits. It will be a 3-monograph course, including “Evaluation of the Canine Patient” written by Lisa Bedenbaugh, PT, CCRP, and Evelyn Orenbuch, DVM, CAVCA, CCRT, CVA (pending); “Evaluation of the Equine Patient” written by Narelle Stubbs, PT, PhD, BApp, ScPT, MAnSt, and Melissa King, DVM, PhD (candidate); and “Zoonoses/Red Flags” written by Mike Lappin, DVM, PhD. The course will be published in 2013.

Charles Evans, MPT, CCRP, has graciously submitted information on Degenerative Myelopathy to share with ARSIG members. This handout is suitable for teaching owners more about the disease and management strategies.

## DEGENERATIVE MYELOPATHY

With a disease like Degenerative Myelopathy, which has no cure, one of the most important coping mechanisms is information. It was with this in mind that this document was created. There are many decisions that have to be made at each stage involving not only your dog’s quality of life but the owner/caregiver’s quality of life. At the end of each stage presented below, we will list the problems to be confronted and, if available, the means and/or decisions to be made to deal with these problems.

Canine degenerative myelopathy (DM) is a progressive disease of the spinal cord and ultimately the brain stem and cranial nerves which, at its end stages, results in complete paralysis and death. The closest human equivalent may be Amyotrophic Lateral Sclerosis, or ALS, also known as Lou Gehrig’s disease. The same gene mutation is implicated in both diseases.

Degenerative myelopathy was first described as a specific neurological disease in 1973. The cause of the disease is not

known although recent research has found a possible genetic link. The mutated gene has been found in 100 breeds including Cardigan and Pembroke Welsh Corgis, Chesapeake Bay Retrievers, Irish Setters, Boxers, Collies, German Shepard Dogs, and Rhodesian Ridgebacks. In a recent study, 2% of German Shepard dogs were identified as having the disease. Only 0.19% of dogs in general have the condition.

The disease typically appears between 5 and 14 years of age depending on the breed of dog. Both sexes appear to be equally affected.

### What is Actually Happening?

Degenerative myelopathy begins in the spinal cord in the thoracic or chest region. The white matter of the spinal cord, which contains the nerve fibers responsible for transmitting movement commands from the brain to the limbs and sensory information from the limbs to the brain, degenerates. One theory for the cause of DM is that the immune system itself attacks the nervous system causing the degeneration. The degeneration consists of demyelination of the nerves and actual loss of nerve fibers. If you think of the nerve fibers as an electric wire, the myelin (a white fatty material that surrounds the nerve fibers) would be the insulating coating on the outside of the wire. Without this coating, nerve impulses cannot be transmitted.

According to Dr. Joan R. Coates ([www.vmeth.missouri.edu/coates\\_joan.htm](http://www.vmeth.missouri.edu/coates_joan.htm)), one of the leading experts in this condition, DM is not an inflammatory disease. She states that DM is similar to oxidative stress that characteristically has a release of free radicals resulting in cell degeneration.

### Symptoms/Warning Signs

Degenerative myelopathy has a slow, insidious onset with a slow progression of weakness. It is not uncommon for the signs to progress slowly, then plateau, and then start to progress again. These symptoms often begin in one rear leg and then eventually involve both rear legs as the disease progresses or it might affect both rear legs at the same time. This condition is NOT painful. As a result, with appropriate physical therapy and nursing care, patients with DM can still have a good quality of life for a significant length of time.

### Early signs (3-6 months)

Degenerative myelopathy initially affects the rear limbs. At first you may notice rear limb weakness and muscle loss, decreased coordination, loss of balance, difficulty with transferring from lying down or sitting to standing, and/or inability to climb stairs or jump into the car or onto furniture. These symptoms are also typical of other conditions, such as arthritis and hip dysplasia and other spinal diseases (eg, disk protrusion/herniation). If you are seeing these signs you should contact your veterinarian and have your dog examined.

### Problems:

- Loss of balance

- Assistance needed for transferring
- Damage to the feet and nails of the hindlimb

#### Helpful Tools:

- There are a number of harnesses and/or slings made for supporting the hindquarters. These will enable you to assist your dog in transferring from lying down or sitting to standing and they will allow you to help with balance/stumbling or weakness on walks. The harness may also help to prevent damage occurring to the feet from scuffing.
- Booties – There are a number of foot protection boots in the marketplace. We can help you with recommendations tailored to your dog's needs.
- Physical therapy – Exercise modification can be important at this stage to prolong your dog's function. Shortening the walks but taking more walks daily is one solution. Swimming or walking in the water is also very effective in maintaining muscle mass. Check with a physical therapist that is certified in canine rehabilitation for further information on home programs.

**Note:** The solutions to the problems at this stage are fairly inexpensive and not too time consuming. But the walks with your dog will be much more intense experiences since you will be counted on to help provide some mobility. You should check your dog's feet daily for damage to the skin or nails.

**Note:** Degenerative Myelopathy has a slow onset and is NOT painful. If these early symptoms occur suddenly or if your dog is in pain, you are most likely not dealing exclusively with DM. Make sure that your veterinarian, or a veterinary neurologist, examines your dog for other conditions that may involve the spine. **DM does not come on suddenly.** Other disorders such as disk disease, disk herniation, spinal cord tumors, and FCE (a "stroke" in the spinal cord) can also cause symptoms similar to DM, but with a much more rapid onset.

#### Next phase (3-6 months)

The next stage of symptoms are knuckling or walking on the tops of their feet (loss of conscious proprioception), limp tail, crossing of the hindlimbs under the body (scissoring), or a rear leg drag. Check the two middle toes of the feet to see if there is unusual toe nail wear. The middle two toes are the main weight bearing digits of the foot.

As the symptoms progress, you will begin to see worsening signs of weakness and dragging the hindlimbs on the ground or floor. Urinary and/or fecal incontinence occur very late in the course of the disease. You may also note a hoarseness or loss of volume to the bark.

#### Problems:

- Increasing difficulty with walking
- More extensive damage to the feet
- Loss of mobility
- Incontinence
- Quality of life issues

#### Helpful Tools:

- A combination front and rear harness will help as the paralysis increases.
- A wheelchair or cart will significantly improve a dog's mobility and quality of life.

- Aquatic therapy is very effective at this stage for maintaining forelimb muscle mass and quality of life.
- You will have to learn how to either express your dog's bladder or catheterize the bladder daily.
- You will have to check your dog and his bed daily to avoid urine scalding since they may not be able to avoid voiding on themselves or their bed.
- This would be the first stage at which, because of quality of life issues (for both you the owner and the dog), euthanasia might be considered.

#### End stage (3-6 months)

In the very late stages of the disease, progression is more rapid and you will see forelimb involvement with muscle mass loss to the shoulders and forelimbs. As the disease progresses, your dog will develop weakness in all 4 legs. Eventually, your dog will be unable to stand or walk. There may be residual head movement at this stage and they will not be able to remain sternal (on their belly) without assistance. The disease will then progress to the brain stem and eventually to the cranial nerves that may affect breathing.

The nervous system's spinal cord and brain stem are the only structures affected by DM. However weakness from DM can have secondary effects such as decubitus ulcers (pressure sores), systemic infections, and urinary tract infections due to urine retention. There can be kidney, lung, and heart failure. Death from DM results from multisystem failure.

#### Problems:

- Immobility
- Incontinence
- Systemic infections
- Decubitus ulcers
- Quality of life issues

#### Helpful Tools:

- At this stage, a forelimb and hindlimb harness is essential to move your dog around.
- There are quadriplegic carts or wheelchairs available that will allow you to move your dog around outside for walks.
- Constant vigilance will be required to prevent decubitus ulcers (turning schedules), urine scalding, and sores or infections on the paws.
- Awareness of systemic problems such as bladder infections must be monitored.
- Euthanasia will become a higher consideration.

#### Treatment

- Exercise will help to prolong your dog's muscle mass and mobility.
- Aquatic therapy of either walking or swimming can even be more useful than walking. To date, professional canine rehabilitation (physical therapy) is the only treatment that has been shown to improve quality of life and longevity.
- Increased awareness of the level of nursing care necessary to prevent secondary complications such as decubitus ulcers, urinary tract infections, and foot damage is also very important.
- The use of harnesses to assist in your dog's mobility and also increase your ability to move your dog

around are also considerations.

- A cart or a progression of carts will not only improve your dog's mobility but his quality of life.
- Dr. Roger M. Clemmons, an associate professor of veterinary neurology and neurosurgery at the University of Florida's College of Veterinary Medicine, suggests that a combination of "diet, exercise, supplements, and medications" may "slow or stop the progression of the clinical signs." These statements have not been confirmed by peer-reviewed, controlled studies. Anecdotally, we have seen no significant difference in patients that were given these supplements/medications compared to those patients that did not receive them.

### Diagnosis

Degenerative myelopathy is a diagnosis of exclusion, meaning that other diseases with similar clinical signs must first be excluded. At this time, there is no test that will definitively diagnose DM other than autopsy. However, a combination of tests can help provide a presumptive diagnosis of DM.

### Physical and Neurological examination

- Used to determine whether or not a patient has neurological disease and if the clinical signs are compatible with a diagnosis of DM.

### MRI or Myelogram

- Normal in patients with DM.
- Used to rule out other diseases with similar clinical signs, such as disk herniation, cancer, and inflammation/infection.

### Lumbar cerebral spinal fluid (CSF)

- CSF protein may be elevated.
- CSF cell count should be normal.
- Infectious disease tests would be negative.
- Cholinesterase levels in CSF may be elevated.

### DNA test

- Available through OFA (Orthopedic Foundation for Animals; [www.offa.org](http://www.offa.org)).
- Not necessarily diagnostic but if your dog has 2 mutated copies of the SOD1 gene he is at greater risk from the disease. See additional information below.
- Available to veterinarians, breeders and owners.
- Requires Q-tip swab of cheek.
- Link – [www.caninegeneticdiseases.net/DM/testDM.htm](http://www.caninegeneticdiseases.net/DM/testDM.htm)

### DNA testing

There can be a fairly high percentage of dogs in some breeds for a mutation in the SOD1 gene. So far (testing through February of 2011) the gene mutation is present in over 70% of the Boxers, Pembroke Welsh Corgis, and Wire Fox Terriers. The percentage of the gene mutation is over 40% in another 10 breeds. This test is most useful to breeders and potential dog owners if the breeding stock is DNA tested and used as an evaluative and decision making tool.

The mutation in the gene that causes DM comes in two forms. The "N" and the "A" allele. The "N" allele is found in dogs that seldom or never get DM. The "A" allele is found more often in dogs that have clinical signs of DM. The results of the test reveal 3 possible outcomes: (1) two "N" alleles that could be considered normal or at very low risk of developing DM, (2) one "N" and one "A" allele that would be considered a carrier, and (3) two "A" alleles that would be indicative of a dog at risk or affected by DM. In all but two of the dogs tested so far with autopsy-confirmed DM, the DNA test result was of the double "A" alleles.

### What Does the SOD1 Gene Test Tell Us?

This test is recommended primarily for breeding programs. The test tells us whether your dog is AT RISK for developing DM. It DOES NOT mean that your dog WILL develop DM. There are likely other genes involved in this condition, and researchers have not entirely ruled out a combination of hereditary and environmental factors. See the information below from the OFA Web site regarding breeding. If your dog currently has signs of DM, the test can be used to help presumptively diagnose the condition, but must be used in combination with other tests (eg, MRI) to rule out other diseases that require other treatments, such as surgery for a herniated disk.

From the OFA website: ([www.offa.org](http://www.offa.org))

"GUIDELINES FOR BREEDING DOGS WHO ARE CARRIERS OR AT RISK FOR DM"

"Owners with dogs testing as Carriers (A/N), or At-Risk (A/A) are strongly encouraged to share these results with their attending veterinarian and seek genetic counseling when making breeding decisions."

"The "A" (mutated) allele appears to be very common in some breeds. In these breeds, an overly aggressive breeding program to eliminate dogs testing A/A or A/N might be devastating to the breed as a whole because it would eliminate a large fraction of the high quality dogs that would otherwise contribute desirable qualities to the breed. Nonetheless, DM should be taken seriously. It is a fatal disease with devastating consequences for the dog, and can be a trying experience for the owners that care for them. A realistic approach when considering which dogs to select for breeding would be to treat the test results as one would treat any other undesirable trait or fault. Dogs testing At-Risk (A/A) should be considered to have a more serious fault than those testing as Carriers (A/N). Incorporating this information into their selection criteria, breeders can then proceed as conscientious breeders have always done: make their breeding selections based on all the dog's strengths and all the dog's faults. Using this approach and factoring the DM test results into the breeding decisions should reduce the prevalence of DM in the subsequent generations while continuing to maintain and improve upon positive, sought after traits."

"We recommend that breeders take into consideration the DM test results as they plan their breeding programs; however, they should not over-emphasize the test results. Instead the test result should be one factor among many in a balance breeding program."