



The Status Of Degenerative Myelopathy In German Shepherd Dogs

by Peter Kunasz

Published May, 2013

It is unfortunate that due to genetic makeup, many canine breeds are prone to certain diseases. Two examples are Labs that are predisposed to joint dysplasia and Goldens that have high rates of cancer and epilepsy. With regard to German shepherd dogs, degenerative myelopathy (DM) is a highly recurring disease that appears to directly affect over 17% of the GSD population and is the cause of great concern to owners and those who care about the breed. DM is not confined to GSDs--it is now known that Corgis (highest percentage), Boxers, Chesapeake Bay Retrievers, Rhodesian Ridgebacks, and Great Pyrenees are among other breeds that are susceptible to DM.

The goal of this article is to provide an overview of degenerative myelopathy, discuss a recent advance in DNA testing, and examine the symptoms, treatments and care that owners should be aware of if they suspect their dog might have the onset of DM. The information in this article is directed to owners of GSDs, but is applicable to any breed or mixed breed dog that may suffer from DM.

Physiologically, DM is a degeneration of the myelin sheath surrounding the spinal cord. The myelin sheath acts as a pathway for signals from the brain to the limbs and sensory information from the limbs to the brain. This degeneration consists of both demyelination (stripping away the insulation of these fibers) and axonal loss (loss of the actual fibers), and interferes with the communication between the brain and limbs.

CAUSE AND DIAGNOSIS The exact etiology of Degenerative Myelopathy, also referred to as CDRM or Chronic Degenerative RadiculoMyelopathy (so named in 1975 by researchers Griffiths and Duncan) is still unclear. However, a recent discovery (2009)



that a mutant gene in a DNA structure signals the *probability* that a dog now has, or will have, DM in the future, is a big step forward in understanding DM. While controversy may still exist as to a specific identifiable cause(s), it is generally agreed that DM is a neurological disease that presents with a set of symptoms easily defined and recognized by most vets. The disease is sex independent and can develop in dogs of almost any age, but is usually seen in dogs six years and older. DM is a progressive disease and sadly there is no cure.

One of the first symptoms that may signal DM is a dog dragging his rear feet (or one foot) in such a way that the two center nails on both rear feet scrape and are often worn down to the point of bleeding. (**NOTE: When used in general terms, "his" is used to represent both "his" and "her" .**) In time, the dog's back end begins to sway as weight is no longer well supported. Unintended crossing of the rear legs is another sign, and indicates a lack of spacial awareness of the hind legs.



A veterinarian who suspects DM (or other neurological problems) may test for neurological symptoms of DM by turning/folding a dog's rear foot under, then releasing and waiting to see if the dog immediately corrects the posture and goes back to standing on its pad, or whether it remains standing on the top of its foot. The dog's owner can also perform this test, as well as

crossing one hind leg behind the other and seeing how long it takes for the dog to correct. Again, it demonstrates that the dog may not have proper self-awareness of exactly where his hind legs are and what they are doing.

As late as 2010, DM was an elusive disease, difficult to pin down because there was no definitive test to diagnose it--any diagnosis of DM was purely presumptive. Lisa Muench, in an article published on her web site, <http://www.gsr-sp.com>, accurately stated what was the catch-22 of trying to diagnose this disease: "*Essentially, DM is a diagnosis of exclusion – ruling out other causes of the symptoms until the logical conclusion is that the dog suffers from DM. Similar neurological symptoms can be caused by a disc or nerve compression, by certain spinal deterioration, by a tumor, etc. The only way to determine whether one of these OTHER problems is causing the*

symptoms is to have an MRI and/or a myelogram performed on the dog. Both of these tests are expensive (probably ranging from \$1,000 to \$1,500) and neither really confirms absolutely that a dog has DM, even if a tumor or disc/nerve problem is ruled out. It simply rules out other likely causes of the same symptoms.

*The other difficulty (besides cost) in subjecting your dog to either of these tests, is because it will likely result in stress, **and stress, above all else, is thought to be one of the biggest aggravators of DM, frequently causing an irreversible worsening of the symptoms.***"

Therefore, it was a tough decision whether to have these tests performed or not. Additionally, surgery to correct any operable problem found through testing is another stress, which can aggravate DM if it is also present. So even the decision to test or not became difficult.

Recently, however, a new genetic DNA test for DM has been established that can predict with a high level of confidence that a dog will fall into one of three categories:

1. Normal / Normal (N/N, or 'clear'): The dog does not have the mutation and is **extremely unlikely to develop** degenerative myelopathy.

2. Normal / Abnormal (N/A or 'carrier'): The dog has one mutated copy of the gene (is heterozygous) and is a carrier but **probably will not have active** degenerative myelopathy. It will be possible for it to pass the mutation to offspring. A thorough examination of the dog's pedigree and DNA testing should be undertaken prior to breeding a dog with this result.



3. Abnormal / Abnormal (A/A or 'affected'): The dog has two copies (is homozygous) for the mutation and is **at risk** for degenerative myelopathy.

(See <http://kerschberger.com/healthdm.htm> for breeding risks.)

The test determines whether the mutated copy of SOD1 is present in the DNA sample submitted. Mutations in SOD1 are also associated with familial [amyotrophic lateral sclerosis](#) (Lou Gehrig's disease) in people. Known causes of spinal cord dysfunction should be excluded before accepting the diagnosis of degenerative myelopathy; disc disease (protrusions) or spinal cord tumors can cause compression of the spinal cord with signs similar to degenerative myelopathy (Wikipedia, 2013).

Further information states: *"The mutation that is tested for, a single-nucleotide missense mutation in SOD1, greatly increases an individual dog's risk of developing DM, although a small minority of dogs that carry two copies of the mutation may remain free of clinical signs associated with the condition during their lifetime. It is suspected that there are additional mutations and/or environmental factors that modify the effects of the DM mutation and explain why some dogs remain healthy"* (Awano et al. [2009](#)).

If a dog tests A/A, but never shows signs of DM, then that dog is considered a "false positive". This is a hard statistic to measure, as DM symptoms generally present at an older age, and many dogs die of unrelated medical problems before DM might have occurred.



You may read more about this test at:

<http://www.caninegeneticdiseases.net/DM/mainDM.htm> (Please click on all the links listed on the left side for a full briefing.) The test costs \$65 and the owner can order a test kit directly from the Orthopedic Foundation For Animals. A vet appointment is not necessary. Go to: <http://www.offa.org>. If your dog is exhibiting DM-like symptoms, the cost is reduced. Please see the OFA site for details.

How reliable is this new DNA test? I spoke with Liz Hansen, who coordinates sample collections at the University of Missouri, College of Veterinary Medicine, where the testing analysis takes place. She relates that

as of April 2013, they have tested over 33,500 dogs, of which 6,458 were GSDs. Of those GSDs, 1400 (20%) have tested active (A/A) for DM. In another follow up, 69 of 70 GSDs who previously tested "abnormal/abnormal" (A/A) have now shown clinical signs of DM. (One dog is being re-tested as the lab analysis of his spinal fluid is unclear.) Ms. Hansen relates that the test is highly predictive, and the University will soon publish a journal article to support their findings. (If a dog tested N/N or A/N, but was later proven to have DM, then that dog would be labeled a "False Negative".)

An interesting statistic can be found on the OFA web site (http://www.offa.org/stats_dna.html?dnatest=DM) which gives data for all breeds tested. For GSDs, this data shows 3094 were tested, 1590 (51%) were clear, 991 (32%) were carriers, and 512 (17%) were at risk. The percentages may change slightly as the database expands. Please remember that if your dog tests abnormal/abnormal for DM, ***there is a chance that he will remain asymptomatic for his entire life (false positive)***. Why this occurs is not yet fully understood. It may be due to environmental factors and/or to additional genetic mutations that need further study.

Some argue that DNA testing an asymptomatic dog is not necessary, and if the test comes back A/A (about a 17% to 20% risk), that might result in an overly protective lifestyle and perhaps an avoidance of needed but stressful surgery. However, I believe that the benefit of adding to the scientific database, as well as (possibly) being forewarned outweigh those risks.

While this new genetic testing does nothing yet to cure the disease, hopefully it will have the future effect of reducing or eliminating the genetic pool of positive carriers for DM if responsible breeders and owners will test their dogs prior to breeding them. Of course this will take years to have an effect, but for the first time in history there is hope for curbing this terrible disease.



RESEARCH and DR. CLEMMONS

When you research DM in German shepherds, you will find many web references to Dr. Roger M. Clemmons, a veterinarian at the University of Florida. His theory is that DM is an *autoimmune disease* that occurs when the dog's own immune system attacks its body, particularly the myelin sheathing that insulates nerve fibers and the axons that carry signals from the

Dr. Clemmons

nerves to the muscles. However, due to Dr. Clemmons' use of (some say) questionable scientific testing protocols and without any known reproducible results, as well as the lack of any published scientific studies that test the efficacy of his treatment regimen, Dr. Clemmons' methods are held in dubious repute among some of his peers.

According to Ms. Hansen, as well as a research report entitled "CANINE DEGENERATIVE MYELOPATHY" by Drs. Coates and Wininger, published April, 2010, Dr. Clemmons' beliefs regarding his own genetic testing procedures, his theory that DM is an autoimmune disease, and his holistic treatments are no longer valid. Dr. Coates and Dr. Wininger's findings, based on a DNA molecular genetics analysis, show that DM is related to human ALS disease, not an autoimmune disease like multiple sclerosis as Dr. Clemmons has advocated. According to sources, Dr. Clemmons has been asked to provide data that supports his theories, but has declined to do so. I wrote to Dr. Clemmons inviting him to share his views, but did not receive a response.

TREATMENT AND TESTING What can a responsible GSD owner do when confronted with DM symptoms? The consultation of a caring, experienced and unbiased vet should be obtained when looking down the road. This is the first and by far the most important step. As in human medical care, the competency and viewpoints of veterinarians vary widely. I strongly suggest that the owner search for a neurologist who has experience with DM in German shepherds.

Consider getting a referral to a specialty hospital like Veterinary Specialty Hospital in San Diego (<http://www.vshsd.com>) or a similar clinic in your local area.



FTA Card after cheek swab has been applied

In my opinion the new DNA test administered by the OFA is the first test that should be made (if not already accomplished). Please see: <http://www.offa.org/dnatesting/dm.html> to order a test kit. **What an owner does going forward should depend on what this test shows.**

In consultation with your vet, the decision to do *additional* testing is the next decision point. For example, consider two dogs that both have symptoms consistent with DM:



Swimming exercise report.

First dog-- this dog has been DNA tested and is At Risk (A/A) for DM. Since it appears very likely that DM is the cause it may be more harmful than helpful to subject the animal to stress inducing imaging tests or surgeries. However the owner can and should consider different treatment and lifestyle options as discussed later in this

Second dog--this dog tests NEGATIVE (N/N or N/A) for ACTIVE DM. In this case, further testing with an MRI or myelogram is *more likely* to show a problem that is operable because the probability that the symptoms are caused by DM is very low. And because in this example the odds are very favorable that the dog does NOT have DM, then an MRI can be done *without* the risk of making the symptoms worse. Stress is no longer a factor.

One of the exercises that is most strongly advocated for dogs with DM is swimming, as it allows the dog to maintain muscle tone while exercising in a manner unlikely to cause any injuries. Vets emphasize that the likelihood of positive results from this activity are far better if begun when the dog first shows symptoms. Veterinarians agree that this is an excellent therapy, and the Coates report backs this up by saying that data shows *dogs that receive physical therapy have significantly longer survival times with slower disease progression than those that do not*.

Survival time in the majority of DM cases is defined to be when the dog can no longer support himself. At this point, many owners give in to euthanasia, but as this article shows, **there are other very reasonable options to explore**.

OUR EXPERIENCE WITH DM Several years ago our ten-year old GSD, Yukon, exhibited classic DM symptoms.



Dr. R. Tugend

After consulting with our veterinarian, Dr. Robert Tugend of VCA Main Street Animal Hospital in San Diego, as well as several neurologists, we elected not to put Yukon through further stressful testing that would require anesthesia, which we were afraid would aggravate his symptoms. (This was before reliable DNA testing was available.) It was a very hard decision to

make. The medical consensus was that he likely was suffering from DM, or a spinal compression or stenosis of some type, which would probably be inoperable.

As Yukon's disease progressed, we went through the heart wrenching experience of caring for him. Of course, dealing with DM is far from an ideal lifestyle, but we found that, with a positive attitude and a willingness to accommodate our dog's disability, Yukon's life was extended in a reasonably happy and fulfilling way. Please visit:

<http://www.k9cartinfo.com>

When Yukon could no longer fully support his hindquarters, we used

straps to assist him. After some time this was no longer practical, and we elected to use a dog cart for support, which worked very well until, some months later, arthritis in his front legs prevented him from pulling himself in his cart. At that stage we reverted to a small pull wagon and made many auto trips all over the West, pulling Yukon along with us when we took walks. Yukon loved it, and he received a lot of attention from everyone he met. It is amazing how well dogs adapt to their situation, and how well we can adapt along with our pet.

Everyone has different responsibilities and time constraints, so what we were able to do may not be possible for all. However, remember that just because your dog becomes disabled, it does not mean that his life is over. There are choices and opportunities.



A PERSONAL OPINION

What would I do if our adopted rescue dog, Cody, were to exhibit classic signs of DM?



Cody

1. If I had not already done DNA testing through the OFA organization, I would do that, and would confirm the presumptive DM diagnosis with my vet and an experienced neurologist. If there were a reasonable chance that his symptoms could be caused by something other than DM, (for example, as shown by an x-ray and a *negative* DNA test) I would explore that possibility.

2. I would elect stressful imaging tests only if there were sufficient medical evidence to warrant such testing. That is, negative genetic tests for DM and a good chance that the imaging tests would reveal an operable solution.



3. Should an operable solution be found by a myelogram, MRI or similar imaging, I would consider surgery only if the risk were low and the probability for success high. I would NOT go on a surgical fishing expedition-- the risks of furthering the problem are too great.

4. I would do everything I could to help my dog lead a comfortable and happy life: recommended diet, exercise, water therapy, acupuncture and a positive attitude. I would consider a canine cart and/or if necessary, a pull wagon, provided his overall health was good and he was not in pain.

5. Would I use Dr. Clemmons' holistic program? We did for Yukon with no definitive benefit, but this time, based on current testing, I would not. We all want to do everything we can for our canine companions, but there is no evidence to warrant hope that Dr. Clemmons' program would be beneficial. However, I know of no harm in trying his remedies.

Space does not permit a more in-depth analysis of the topics covered. The reader is encouraged to research all treatments available, to obtain the opinions and experiences of other owners, and to discuss the appropriateness of each with his/her vet. Always be aware that science marches on. Stay abreast of new developments as they become known and be aware that much information on the web is out of date or inaccurate.

The advent of an easy, inexpensive, non-invasive and reliable DNA testing for DM is a very exciting advance. Please take the time to read more about it at the web sites listed in this text and strongly consider having your dog tested now, regardless of his current health. This will give a larger database for further research, and hopefully give the owner peace of mind. But should the test should come back A/A active, the owner can watch for DM symptoms, start any recommended treatment earlier, and avoid expensive and stress producing MRI scans and the like. Discuss this test with your vet, and be comfortable with his/her opinions. If in doubt, get another opinion.

SUMMARY

1. DM is a disease that affects many breeds, but in large breeds, primarily the GSD. There is no sex predilection and onset usually occurs after age six with a mean age of nine. It has no cure.
2. Up until 2009, there was no test available to determine DM--it was a diagnosis made by excluding other possibilities, and then called a presumptive diagnosis. MRI image testing could cause stress, which would worsen the symptoms with no operable benefit.
3. In 2009 a new DNA test became available to determine if a dog was clear of DM, was a carrier (but not active) of DM, or was active for DM. This test has shown to be reliable with over 35,000 dogs tested, is inexpensive and requires only a cheek swab, but your vet may not be aware of its existence.
4. Dr. Clemmons' autoimmune theories and holistic approaches have been shown by this testing to be inaccurate and not beneficial (reference further testing by Drs. Coates and Wininger as cited above).



Diana and Yukon in Oregon

5. If a dog has DM, there are options for the owner to extend his dog's life in a way that is rewarding for the owner and the pet. Physical therapy, especially swimming, has shown to be very beneficial in decreasing disease progression and is strongly recommended, as is general stress reduction.

6. By being able to predict the specific carriers of DM in GSDs and other breeds, selective breeding can reduce the future occurrence of the disease. But with a genetic potential transfer rate of over 50% in GSDs, care will have to be taken not to reduce the overall gene pool too much. While we advocate adopting Rescue dogs and do not encourage over breeding, if the reader is interested in the statistics of breeding dogs with different DM DNA results, this website presents a very clear analysis:

<http://kerschberger.com/healthdm.htm>

7. Medical knowledge changes. Information provided here may be modified by new data, so please keep up to date.

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References to Dr. Clemmons are the opinions of the author and are based on current information from professional medical sources.

ABOUT:

Peter Kunasz is a retired military pilot and airline captain, and for the past ten years has worked as a commercial photographer and freelance writer. He and his wife, Diana, have owned four German shepherds, and currently

volunteer for GSD rescue groups in Southern California. Pete, Diana and Cody travel to scenic western locales, adding to Pete's photographic portfolio, *Images Of The West*. (<http://www.pbkimages.com>)

Comments may be sent to:
<mailto:kunasz@roadrunner.com>

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