Medical Center, New York), Michelle Norgard (Washington State University), Alan W. Spier, Allison Lamb, Shianne L. Koplitz and Ryan D. Baumwart (all from Ohio State University); Dr. Spier is now with the Florida Veterinary Specialists and Dr. Koplitz is now affiliated with Wisconsin Veterinary Referral Center. Funding was supplied by the AKC Canine Health Foundation and the Morris Animal Foundation.

A Close Look At The Disease In Dobermans

In medical terms, "dilated" means the enlargement of an organ; "cardio" means heart and "myopathy" refers to a disorder of any muscle or muscle tissues. Dilated cardiomyopathy is therefore a heart muscle disease. Dr. Meurs characterized it as "myocardial (heart muscle) dysfunction, cardiac arrhythmias (abnormal heart rhythm), and congestive heart failure." It begins with erratic heart rhythms and can be followed by enlarged heart chambers; leaking heart valves; weak contractions and inadequate pumping ability which all end in certain death.

There are two recognized manifestations of the disease which always proves fatal: (1) sudden death without clinical warning and (2) a slow deterioration with congestive heart failure. It has been reported that for every dog which dies of congestive heart failure, there are five or six which die suddenly.

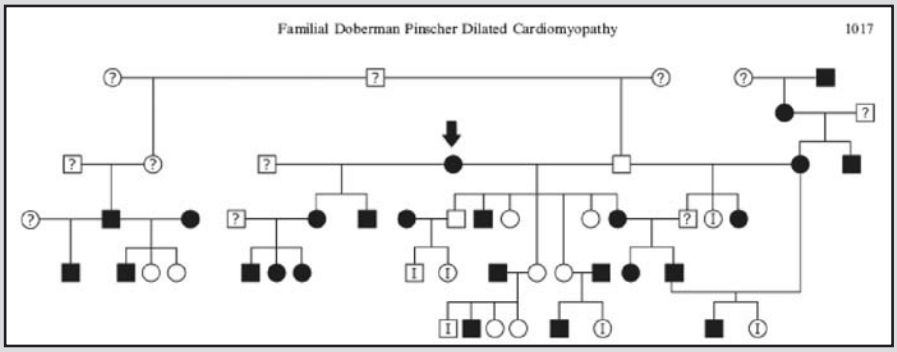
As mentioned earlier, medical reports have placed the death range at 2.5 to 14.5 years with the highest percentage – about 70 percent — from 6 to 10 years. Dr. Meurs said the median in her study was 7.5 years at diagnosis. I have read unscientific studies which place the Doberman's average life expectancy at between 8.5 and 9.2 years which fits the parameters of the DCM studies.

Dr. Clay Calvert, an award winning scientist who pioneered much of the research of dilated cardiomyopathy, especially in Dobermans, explained the two manifestations in a published article, saying that it all starts with a disturbance of the heart rhythm resulting from instability of the linings of individual heart muscle cells.

Dr. Calvert said that in some dogs the heart rhythm disturbance is severe from the beginning and results in sudden death. He said that the heart rate becomes very rapid – usually over 350 beats per minute – causing cardiac arrest.

When a dog collapses or faints the heart rhythm is severe, but not to the point of causing death. There is a third scenario called "occult," or undetected heart rhythm disturbance, which is less

The Genetic Pedigree Chart Published in the Study



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The text accompanying the chart included: "Pedigree from a Doberman Pinscher family with dilated cardiomyopathy and an autosomal dominant mode of inheritance. Mode of Inheritance was determined by the appearance of the disease in multiple generations, equal gender representation and evidence of male-to-male transmission. Finally, the mating of 2 affected animals produced unaffected dogs."

Dog breeders are accustomed to linear pedigrees but geneticists work exclusively with horizontal pedigrees to track diseases and traits. Breeders should also use these in their programs. Using the symbols and lines shown above and explained below, the pedigree can be built to personal specifications for any number of family dogs.

In this pedigree, the proband, the primary studied animal, is indicated with an arrow; circles represent females and squares represent males; horizontal lines link mated animals; vertical lines represent the offspring. Blackened symbols indicate a dog affected by DCM, while open symbols show clear animals. The letter "I" inside a symbol classifies that animal as "indeterminate." A question mark represents animals "not available for evaluation."

For example, the proband was bred to two males, one clear and the other unavailable for evaluation. The clear dog was also bred to an affected female.

In an autosomal recessive pedigree, symbols for a "carrier" would be half shaded or contain a simple "dot." Geneticists will often strike a line through a symbol to indicate a deceased dog. Others will number dogs; place the year next to mated animals; some place symbols within the symbols to represent structural parts, etc. If a pedigree overflows a page some will place a particular symbol for a female and link it with a similar symbol to start a following page.

severe and causes no immediate symptoms. Dogs which collapse or faint or have the occult form eventually die of congestive heart failure.

"Sudden death most often occurs in apparently healthy, active, vigorous dogs that have had no prior evidence of heart disease. Affected dogs drop dead, without warning, while exercising or while at rest. In some instances death occurs during sleep. Affected dogs may suddenly collapse and die while eating, walking in the house or yard, or while playing, retrieving, or running vigorously. In some instances, the dogs are observed to appear normal one minute and are then discovered dead a few minutes later. Affected dogs may cry out once when they collapse and then gasp a few times. It is important to note that affected dogs manifest no signs of disease prior to sudden death," he wrote.

"Congestive heart failure results from gradual deterioration of the heart muscle. This process of deterioration leading to enlargement and weakness of the heart occurs over an unknown period of time, but which is at least 15 months in duration and probably longer. Outward signs of heart weakness, however, occur only during the end stage of the disease. As the heart muscle becomes weaker, less blood is pumped into the system and a decrease in exercise tolerance eventually occurs. At the same time, since less blood is pumped into the system, blood begins to back up into the lungs, which leads to lung congestion, causing coughing and difficulty breathing – congestive heart failure."

It is also this writer's experience that there is a fluid buildup in the abdomen (ascites) and, because the heart can no longer provide sufficient blood to the brain, animals sometimes become disoriented, suffer fainting spells (syncope) and bump into objects.

Dr. Calvert said these clinical signs usually develop over a period of several weeks, "However, subtle decreases in exercise tolerance or activity, mild coughing, and mild difficulty breathing are not always observed by the owners…thus, the owners sometimes are aware of these problems only for one or several days prior to seeking help from a veterinarian. Weight loss of 5-15 pounds usually occurs within several weeks following the onset of coughing or difficulty breathing."

Dr. Meurs said in her study that the disease in the Doberman "appears particularly aggressive. There is no definitive treatment and therapy is, at best, palliative."

Traditional diagnosis of the disease has been done by stethoscope; chest X-rays; echocardiogram (ultrasound) and electrocardiograms (EKG or ECG which records electrical activity). In more recent years, the holter monitor which is strapped to the dog for a 24-hour EKG analysis during an animal's normal activity, has proven to be very effective in detection.

The problem for breeders has long been that all these methods – apart from being expensive — need to be performed every year because they do not necessarily pick up the early stages of the disease. Potential breeding stock may not have the disease diagnosed until four, five, six, or even more years down the road which can sometimes be way beyond the peak breeding years.

There is news of a blood test which the manufacturer claims has potential for early detection. It is called the "BNP test," which measures brain naturetic peptide. It was first used in humans and has been modified for canines.

Dr. Jeff Grognet, announcing the test in the October issue of the AKC Gazette, wrote: "If the heart is struggling to pump blood forward and the ventricle is enlarging beyond normal limits, the muscle stretches and releases BNP. Thus an elevated BNP level in the blood suggests the heart is stressed. A disease like cardiomyopathy can be detected in a high-risk dog (for example, a dog whose sire developed the disease), before the dog is used for breeding."

I raised the question of the BNP test when I interviewed Dr. Meurs and she was obviously not excited about its promise as a panacea for early detection of DCM. She said she had read all the information on the test and thought it had very limited application to help breeders in their battle with DCM.

Positively identifying affected dogs is a major problem, not only because affected dogs die of some other cause and the breeder is totally unaware that he or she had a problem dog; or that affected older dogs which die suddenly are filed away as dying of old age; but because necropsies are often "inconclusive." Most of the time it is because the veterinarian is not a cardiac specialist.

DCM in the Doberman "appears particularly aggressive. There is no definitive treatment and therapy is, at best, palliative"

When I asked Dr. Meurs about "inconclusive" cardiomyopathy necropsies she was quite aware of the problem and was adamant that the heart had to be dissected and diagnosed by a pathologist who is an expert in the field of cardiology because of the intricacies of the disease and its manifestations.

When a breeder suspects that a dog which died of say, cancer, also had DCM and may impact a breeding program with that disease, it will require sending the heart to an institution, maybe some distance away, to have it properly examined by a cardiac pathologist. Dr. Meurs told me that even in her study some owners were not prepared to do a post mortem on the heart of a beloved animal.

AUTOSOMAL DOMINANT AND A LITTLE PRACTICAL GENETICS 101

Autosomal dominant and autosomal recessive modes of inheritance…primary genes and modifiers… what does it all mean for the dog breeder?

I think it is important that I preface this section by declaring that I am not a geneticist. Nor have I played one on television. In fact, I did not even go to college. (My high school in Australia bid me a not-too-fond farewell when I was 17. They said very openly to all who would listen that I would amount to nothing. I sent them a copy of my first book, a best seller, which I wrote before my 25th birthday, with a tongue-in-cheek note asking for it to be prominently displayed in the school library as testament to the school's excellent education system. The only higher education has been at the University of Life).

As an old-fashioned dog breeder of more than 40 years, I realized way back in the beginning – when there seemed to be more emphasis on the principles of animal husbandry in the dog world — that I was tinkering in genetics and supplanting natural selection (survival of the fittest which operates in the wild) and needed to gain practical knowledge of the subject.

In my early sports writing days, an American cosmetics billionaire and tennis sponsor I was interviewing told me about his passionate hobby in purebred dogs. To achieve top quality winners he said he paid professional geneticists to visit his home with chalk and blackboard to teach him.

Without the luxury of in-house geneticists — and using skills learned from the University of Life – I simply read a lot. I devoured books, articles and studies by experts such as Hutt, Willis, Calvert, Padgett, Meurs, Battaglia, et al. I have an insatiable appetite for the subject and sometimes wonder if I was involved in biology in a previous life! Who else would give a whit and ponder about how exciting it must have been when, at the same time in history in the 19th century, Darwin was espousing his theory of evolution, mortifying theologians, and Mendel was discovering genetics in his pea garden, boring other scientists who took 35 years to discover the importance of his work?

I soak up the written word and surf the internet where genome web sites, including a federal government site, keep the world abreast of the latest developments in the frenetic race to unlock every mystery of man's evolution and existence. I am sure it is not a dinner table topic of conversation, but did you know that evolutionary anthropologists recently estimated, after DNA testing two varieties of lice – one of which is known to live in clothes – that man first donned clothing 114,000 years ago? Who knew?

With the sequencing of the human, animal, plant and bacteria genomes, we are closing in on the complete recipe for reproduction of a human and other organisms. We are living in a historic time, right up there with man's conquest of space and walking on the Moon, and I want to be swept along with the wave.

All breeders should have a basic working knowledge of genetics but I know from experience that few truly understand — or maybe even care — what happens when they put dog to bitch. For too many it is all about the beauty aspects and as long as the quest for the Holy Grail of best-in-shows and all kinds of rankings is not interrupted, and the puppy sales and the stud fees keep coming, then the "unfortunate by-products" — dogs affected by problems which are kept out of sight or eliminated — are tolerated.

Some even go so far as to falsify death announcements to fend off the perceived "stigma" of having DCM or some other disease in their kennel. When it comes to prominent animals who die young, I am always wary of bloat, choke, brain aneurysms and those hit by a truck.

There is also the state of denial of many breeders who will not face clear genetic facts or will palm off problems on lack of scientific evidence or somebody else's bloodline or stud.

All of the above has allowed the problem of DCM in Dobermans to go virtually unchecked for some 50 years and we have now reached a real crisis point.

This is not a scientific study on genetics, merely a passionate layman's overview to try to help breeders understand what is at stake and how to possibly tackle the problem. For some it will be like preaching to the choir because they will understand it from their professional lives or biology classes. But by discussing the genetics I thought it may help some, and nudge others, into looking at this important issue and other breeding matters with a more searching and professional eye.

Genome Sequencing

Scientists completed the monumental task of sequencing the human genome in 2001(first the rough draft and then the finished product) and the canine genome in 2003 and 2004 (first a Standard Poodle and then a Boxer were used to sequence). A question that I am often asked: "As there is now a genome sequence,