



Researchers Getting Closer to Understanding Dietary Taurine and Heart Disease in Dogs

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September 17, 2017 – **Link between taurine deficiency and heart disease first discovered in cats**

In 1987, a remarkable article was published in the prestigious journal, *Science*. Veterinarians in the School of Veterinary Medicine at University of California, Davis, reported that a deficiency of taurine, an amino acid, was responsible for the development of dilated cardiomyopathy (DCM), a form of heart muscle disease, in cats.

The veterinary community was stunned; not only because this was a new report of a dietary nutrient and heart disease, but that the disease was reversible when taurine was added to the diet of affected cats. This makes perfect sense because taurine is an amino acid that is abundant in meat so carnivores (like cats) never developed the ability to make their own taurine and must get it from their diet. Adjustments to commercial cat diets soon followed, and since publication of the article 30 years ago, dilated cardiomyopathy in domestic cats has almost completely disappeared.

As omnivores, the story for dogs isn't quite so elegant.

Soon after the *Science* article was published, there was a flurry of research looking for a similar link between nutrition and DCM in other species, including dogs. However, it quickly became apparent to veterinary cardiologists that DCM in dogs was not going to have a tidy resolution.

Throughout the late 1980s and continuing through the 1990s, many veterinary cardiologists looked at a variety of nutrients, including taurine, in their canine patients with dilated cardiomyopathy. Scattered reports of taurine deficient dogs with heart disease appeared in the veterinary literature, but the vast majority of dogs with DCM had normal taurine levels. However, recent reports in golden retrievers have veterinary cardiologists revisiting taurine and DCM in this breed.

Dilated cardiomyopathy in dogs – the basics

The heart is a complicated organ with lots of moving parts. The heart has valves that help direct the flow of blood into and out of the heart; muscle that contracts to pump blood throughout the body; and blood vessels that supply the heart with nutrients and remove wastes. A variety of diseases can affect any of these parts. Cardiomyopathies are a group of diseases that affect the heart muscle, and DCM is one form of this type of problem.

In DCM, the heart muscle weakens. This weakening can happen for a variety of reasons, but regardless of the underlying cause, the end result is a thinning of the walls of the heart. The heart becomes more like a flabby balloon than a powerful, muscular organ. The heart simply cannot pump blood efficiently, and lots of blood remains in the heart with each beat. At first, the body can try to compensate for poor blood flow, but eventually these mechanisms are overwhelmed, and the patient develops heart failure. Medications can help control the heart failure, but therapy can't stop the relentless progression of the disease.

There are many causes of DCM, While DCM is classically thought of as an inherited disease of the heart muscle, there are many causes of heart chamber dilation and reduced heart function that can mimic DCM.

Other causes of cardiomyopathy include toxicity associated with the chemotherapeutic agent doxorubicin, and deficiencies of the nutrients taurine and carnitine.

Taurine deficiency and DCM in dogs

Unfortunately, many dog breeds with high incidence of DCM, such as the Doberman pinscher, didn't have documented taurine deficiency but rather an inherited form of this disease. However, in some breeds, a link to taurine deficiency was discovered.

In the mid-1990s, the cardiology group at University of California, Davis, spearheaded a large, multi-center study looking at DCM in American cocker spaniels. They documented low taurine levels in many of their study dogs, and they found that once taurine was supplemented in the diet, heart function improved, sometimes significantly.

In 2003, researchers reported that some Newfoundland dogs had reversible DCM associated with taurine deficiency, and in 2005, another team published a report on a family of golden retrievers with taurine-deficiency and reversible DCM. Based on these reports, veterinary cardiologists recommended that taurine levels be tested in dogs diagnosed with cardiomyopathy, particularly if they were a breed not usually associated with the disease, or were an American cocker spaniel, Newfoundland or golden retriever.

As cardiologists continued to document cases of DCM associated with low blood taurine levels, they continued to search for a common thread that tied these cases together. In many cases, diet was believed to play a major role in the disease.

The role of diet in taurine deficiency and DCM

It was logical for veterinary cardiologists to focus on diet as the root cause of DCM related to taurine deficiency. For many dogs with DCM, common dietary trends emerged that strongly correlated with the disease.

"Diet plays a huge role in this condition," said Dr. Josh Stern, a Morris Animal Foundation-funded researcher, owner of a Golden Retriever Lifetime Study participant (Lira, Hero #203), and veterinary cardiologist studying this disease. "Home-cooked diets have been implicated in this problem, as well as small batch, boutique dog foods."

Other studies have linked high fiber, lamb and rice meal, and very-low-protein diets to the condition.

Dr. Stern said veterinary cardiologists were trained to measure taurine levels in dogs diagnosed with DCM if they weren't a breed known to have a genetic link to the disease, such as Doberman pinschers or boxers. However, a recent upswing in the number of DCM cases in dogs has put veterinarians on the alert for the disease. In addition, one breed appears to have a big surge in this problem – golden retrievers.

Taurine deficiency and DCM in golden retrievers – an emerging problem?

A recent surge in the number of golden retrievers diagnosed with taurine deficiency and DCM has many golden retriever owners and breeders concerned. Although taurine deficiency DCM has been reported in the breed, some cardiologists are seeing more golden retrievers with the disease than normal.

This perceived uptick in cases spurred Dr. Stern to look more closely at this phenomenon. As a veterinary cardiologist and golden retriever owner, this disease hits close to home.

Dr. Stern has been collecting blood samples and cardiac ultrasound data from golden retrievers both with and without the disease. Although diet plays a role in the golden retrievers, Dr. Stern suspects genetic factors might be involved in increasing the risk of this conditions within the golden retrievers breed.

"I suspect that golden retrievers might have something in their genetic make-up that makes them less efficient at making taurine," said Dr. Stern.

“Couple that with certain diets, and you’ve given them a double hit. If you feed them a diet that has fewer building blocks for taurine or a food component that inhibits this synthesis, they pop up with DCM.”

Dr. Stern is gathering data and hopes to publish his initial findings soon. His hope is that he can offer scientifically based guidelines for golden retriever owners regarding diet and DCM in this breed. Dr. Stern will be [drawing blood samples for taurine measurement \(http://www.2017grcanational.org/health-clinics\)](http://www.2017grcanational.org/health-clinics) at the upcoming [Golden Retriever Club of America National Specialty \(http://www.2017grcanational.org/\)](http://www.2017grcanational.org/), and hopes to add to his already impressive database.

What’s next?

The good news is that DCM secondary to taurine deficiency has a very good long-term prognosis. Taurine supplementation often reverses the heart muscle abnormalities, and many dogs can be completely weaned off heart medications.

Veterinary cardiologists are spreading the word about taurine and DCM in dogs, and researchers such as Dr. Stern are piecing together data to get a clearer picture about this problem. Identifying a genetic abnormality associated with the disease could lead to a diagnostic test which might identify at risk dogs.

Getting the word out to owners also is important. Knowing breed dispositions for disease helps both owners and their veterinary health care team make the best decisions for each patient.

Is the [Golden Retriever Lifetime Study \(https://caninelifetimehealth.org/\)](https://caninelifetimehealth.org/) looking at taurine-deficient dilated cardiomyopathy?

Taurine is not currently measured routinely in enrolled dogs. However, banked samples are available to researchers, and the study team continually monitors disease information as it’s received. If you think your dog is at risk or clinically affected, please work with your family veterinarian to determine what’s best for your dog.

[Morris Animal Foundation \(http://www.morrisanimalfoundation.org/\)](http://www.morrisanimalfoundation.org/) has been a leader in canine heart disease research for more than 50 years. Beginning with our first grant to define what a normal canine electrocardiogram looks like to our most recent grants identifying genetic markers for heart disease, the Foundation has been deeply committed to advancing cardiovascular research in dogs. Read about our [latest research grants \(http://www.morrisanimalfoundation.org/researchers/small-animal/\)](http://www.morrisanimalfoundation.org/researchers/small-animal/) as well as our history of [heart disease research \(http://www.morrisanimalfoundation.org/vet-clinics/our-research/results.html?animalspecies=dogs&study_area=heartcardiovascular\)](http://www.morrisanimalfoundation.org/vet-clinics/our-research/results.html?animalspecies=dogs&study_area=heartcardiovascular).

[Learn more about Dr. Stern’s research and submit samples to his laboratory for taurine measurement. \(http://www.vetmed.ucdavis.edu/ccah/areas-study/genetics/stern-lab.cfm\)](http://www.vetmed.ucdavis.edu/ccah/areas-study/genetics/stern-lab.cfm)

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