

Your complete guide to natural dog care and training

Whole Dog Journal™



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Don't Be Loyal

Not to a brand, anyway.

*And don't be lazy! Switch foods –
and switch brands, often!*

For about 18 months, I've been reading everything I can get my hands on about canine dilated cardiomyopathy (DCM). I started right after the FDA published its first announcement, in July 2018, that it was investigating a possible increase in the number of canine DCM cases and they suspected a link to the diets the affected dogs had been eating.



Following the topic is like reading a mystery, with lots of possible solutions, some red herrings, and, tragically, some deaths – dogs getting sick, dogs dying, but no one knows for sure yet what's making them ill. All anyone can do is keep gathering information about the confirmed cases and try to figure out what the cases have in common.

Long-time WDJ contributor Mary Straus also has been studying this mystery. Like the dogged and disciplined researcher she is, when we supplied her with a spreadsheet containing information about every food mentioned in the reports taken by the FDA of dogs with confirmed cases of DCM, she started collecting information about the foods: their ingredients, their guaranteed analyses. She's identified some attributes about the products named in these cases that I haven't seen mentioned anywhere else, and, based on those observations and years of study of canine nutrition, we've developed some guidelines for feeding that we hope will prevent any other dogs from developing diet-related DCM. The article describing this work starts on page 3 – and even more detail than what we could fit in the print edition appears in the online version at WholeDogJournal.com.

Here's one of the most fascinating things that I've read regarding these cases: the accounts from the owners of the affected dogs of what they have been feeding their dogs. In case after case, the owners report that their dogs have been eating Food X for a year, two years, five years – or the entire lifetime of the dog.

Why do so many people still feed the same food – or even different products from the same company – for months and years on end? When I press friends or family about why they feed the same food forever, they almost always say, “Well, doesn't it upset a dog's tummy when you change their foods?” My answer: “NO! Not if you accustom them to variety!” Unless your dog has *proven* allergies to a number of ingredients, the more you change foods (*and* brands!), the better off your dog will be. Otherwise, if there is *anything* that's less than perfect, nutritionally speaking, about the food you feed for *months* and *years*, that issue *will* have a long-term affect on your dog! A tiny excess or deficiency of a mineral? An ingredient that interferes with absorption of a vital nutrient? Your dog will literally *embody* that problem – even if it's one that no one has yet identified – if that's all he has eaten for years on end. Switch it up!

NK



Diet, Dogs, and DCM

The FDA and many others are trying to determine if there is a link between cases of canine DCM and the affected dogs' diets. Here's our take – and suggestions for feeding your dogs.

Food reviews have been a standard feature of WDJ for 22 years, so it's not a surprise we are asked for dog food recommendations. The inquiries multiply whenever there is any bad news about dog food – and the ongoing mystery about a possible connection between dog diets and a serious heart disease, canine dilated cardiomyopathy (DCM), is definitely bad news.

Depending upon which news outlets you follow, you may be worried about feeding your dog a food that is grain-free, one that contains peas or other legumes, or one that is “boutique” or made with “exotic” ingredients.

If you haven't been following *any* of the news, you can catch up by reading our past coverage of the issue, which we have linked in the online version of this article. Suffice to say here that in July 2018, the United States Food & Drug Administration (FDA) announced that it was looking into reports of a possible link between DCM in breeds of dogs that are not considered at genetic risk of the disease and diets containing “peas, lentils, other legume seeds, or potatoes as main ingredients.”

A year later, the FDA published an update to its original announcement, which included detailed data about the cases they were investigating but still offered no guidance regarding how owners could feed their dogs in order to protect them from developing DCM.

We have been analyzing the data that has been released about the diets that were named in the 515 reports being investigated by the FDA. From this analysis, we have developed recommendations that can help you make feeding choices that we believe could protect your dogs from this disease. In the online version of this article, we have included links that will take you to more detailed explanations, should you wish to know more about how we came to our conclusions.

Before we go on, though, please note: Anything you read, including here and in articles written by veterinary nutritionists, is con-

jecture. No one knows for sure what might explain a link between certain types of diets and DCM in some dogs – or whether there even *is* a link – although we believe there is.

IS YOUR DOG AT RISK?

It's important to keep in mind that the vast majority of dogs who are fed the diets named in the FDA's reports do not develop DCM! On the other hand, we know that there are more cases of DCM than those that have been reported (or even diagnosed). So how concerned should you be?

The risk of diet-related DCM is not the same for all dogs. Certain breeds of dogs (or lines within breeds) are susceptible to DCM due to taurine insufficiency, where the amount of taurine (or its precursors, methionine and cysteine) in the diet is enough for most dogs, but not for them. These breeds include the American Cocker Spaniel, English Setter, Golden Retriever, Labrador Retriever, Newfoundland, and Saint Bernard. If your dog belongs to one of these breeds, then you should be more concerned about what you're feeding than the average pet owner.

Other breeds are genetically prone to DCM that is *not* linked to taurine deficiency, including Boxers, Doberman Pinschers, Great Danes, and Irish Wolfhounds. These dogs may be at no greater risk of diet-related DCM, but since we don't know for sure, owners may want to be more cautious with these breeds than with others.

Large and giant breed dogs are more susceptible to DCM than smaller dogs are. If you have a large dog, you should be more concerned about what you feed than those with small dogs. One of the factors that

In the wake of the FDA's news that certain types of dog foods may be linked to the development of a deadly heart disease, owners are scared, confused, and desperate for clear direction as to what's safe to feed their dogs. Though no one knows for sure what has caused the DCM cases that the FDA is investigating, we have some suggestions for how to feed your dog until more is known.



drew the attention of veterinary cardiologists, however, was seeing DCM in some smaller dogs as well, so even people with small to medium dogs may want to take precautions. Dogs who eat less than would be expected for their size (older or inactive dogs, or those who get too many calories from treats) also may be at increased risk of dietary insufficiencies, including taurine, which might help explain why some small dogs are affected.

Another risk factor is dogs who eat the same food for long periods of time. The initial FDA report stated, “Early reports from the veterinary cardiology community indicate that *the dogs consistently ate these foods as their primary source of nutrition for time periods ranging from months to years* [emphasis ours].”

The longer you feed the same food, the more likely your dog is to be affected by any nutritional deficiencies or excesses it contains. Those who rotate foods regularly, particularly those who rotate between different brands of foods with different primary ingredients, have less cause for concern than those who always feed the same food to their dogs.

FOCUS ON TAURINE

All of our recommendations are based on the assumption that the issue linking diet and DCM is related to taurine deficiency. There are two very good reasons for this. The first is the link between taurine and DCM in cats that was discovered in the 1980s. The second is the link between taurine and DCM in certain dogs being

fed lamb and rice diets that first came to light in the 1990s. Because we know that a lack of sufficient taurine or its precursors can cause DCM in otherwise healthy dogs of all breeds and mixed breeds, it appears to be the most likely culprit in this current situation.

Some of the affected dogs in the FDA reports were found to have low blood taurine levels; however, the majority have normal blood taurine levels. Despite this, most dogs diagnosed with what is suspected to be diet-related DCM are given taurine supplementation, regardless of their taurine blood levels, as well as being switched to a different diet and prescribed heart medications. Some dogs improve, others do not. At this time, it’s impossible to know which factors lead to improvement and which are unnecessary.

Until we know more, our recommendations center on avoiding taurine deficiency by increasing the bioavailability of taurine and its precursors, even for dogs who do not appear to be taurine-deficient.

In general, we recommend avoiding the potential at-risk food categories identified below, or at least limiting them to less than half of your dog’s total diet (if you feed more than two types of food). If you cannot avoid these food categories, then we recommend that you look for foods with added taurine, and/or consider supplementing your dog with taurine yourself (see “Supplementing Taurine,” page 6), particularly if your dog is at higher risk of developing DCM, as described above.

FOOD CATEGORIES OF CONCERN

We identified 293 different foods in the 515 reports being investigated by the FDA. We looked at the ingredients and guaranteed analysis of each of these foods, and, just as the FDA’s researchers were no doubt doing, looked for patterns or categories of products to study separately.

We identified four categories of products that might be linked to DCM in at least some dogs. All four

THIS INVOLVES MORE THAN JUST “GRAIN-FREE” DIETS

We know that much of what you have read or heard before concerned “grain-free” diets, and we aren’t specifically making recommendations about this category of foods. Why? Because almost all of the reported grain-free diets fall into one or more of the categories of concern that we identified. Only eight out of 272 reported categorizable diets involved grain-free foods that did not meet any of the criteria we discuss in this article. Three of those were high in flaxseed, which is high in protein and fiber similar to legumes, and so might possibly lead to similar issues, though there are too few data to draw conclusions.

There is nothing about grains themselves that would protect against DCM. Grains are not a source of taurine, which is found only in animal products. While nothing is known for certain yet, we would bet our shirts that any issue with DCM has nothing to do with the absence of grains. We believe that the inclusion of legumes rather than the exclusion of grains is a more likely cause of a link between diet and DCM.

Adding grains to a grain-free diet won’t help to prevent DCM and could actually make the situation worse. Since taurine and its precursors come primarily from animal sources, replacing part of a complete diet with grains will decrease the amount of these amino acids in the overall diet. If you want to add foods to a commercial diet, always look to add animal proteins, such as meat, fish, and eggs.

We have long argued that there is no need to avoid grains in your dog’s diet unless your dog has a problem with a specific grain (food allergy or intolerance leading to itching and scratching or digestive upset). Our dogs eat rice, oatmeal, quinoa, barley, and other grains. We do avoid corn and wheat in non-human-grade dog foods, as feed-grade corn and wheat are more likely to be contaminated with molds and their toxins, which are not destroyed during the processing used to create pet food.

start with the letter “L,” which can help to remember them.

■ **Legumes.** The FDA reported that 93% of all products involved in the reports they were investigating contained peas and/or lentils. Our analysis confirmed that 89% of the reported foods appeared to contain *significant* amounts of these ingredients (generally appearing before the first fat or in multiple combinations, sometimes with other legumes).

■ **Lamb.** Lamb-based diets are a known risk factor for taurine-deficient DCM. Our analysis found that more than 20% of the foods named in the FDA’s reports were lamb-based.

■ **Limited-ingredient.** We were a little surprised to find that limited-ingredient diets were also overrepresented in these reports and we therefore consider them another potential risk factor.

■ **Low-protein.** Diets with low protein levels are a known risk factor for DCM. Normal-protein diets that rely on plant proteins, such as from legumes, also appear to pose a higher risk.

Let’s look at each of these “L” food categories of concern.

Legume-rich diets

The FDA found that the vast majority of reported products (93%) contained peas and/or lentils. It seems likely that something about peas and lentils is impacting the availability of taurine or its precursors in the body. This could be due to incomplete plant proteins replacing animal proteins, or fiber from peas and lentils blocking absorption of nutrients, or some other anti-nutritional factors we don’t fully understand.

Peas are a relatively new ingredient whose popularity has exploded in the last 10 years. The fact that so many foods today contain significant amounts of peas (and other legumes)

and the increase in the number of dogs that are reportedly developing DCM (especially those in categories not typically associated with this disease) seems significant. Remember, however, that correlation does not equal causation; again, we are speculating, as *no one* knows the cause at this time.

Legumes are defined as plants whose fruit (seeds) is enclosed in a pod. Legumes found in dog food include peas, lentils, beans (e.g., pinto beans, navy beans, kidney beans, lima beans, fava beans) and chickpeas (garbanzo beans). Pulses, another term commonly used, are the dry, edible seeds of plants in the legume family, including dried peas, beans, lentils and chickpeas. All pulses are legumes but not all legumes are pulses. Because dog foods may contain fresh peas as well as dried, we

Who Can You Trust?

Just because a company produces foods that were named in the reports being investigated by the FDA – even many reports – does not mean that company cannot be trusted. The FDA’s investigation found that nearly all the reported products were nutritionally complete based on current guidelines. Whatever is going on is not something that any company could have been reasonably expected to predict. We are far less interested in what has happened in the past than in how companies respond to the information that certain diets may be causing DCM in some dogs.

One of the things we expect responsible companies to begin doing right away is to add taurine to all of their high-legume diets. This is something that can be done quickly, safely, and with relatively little expense. The best companies will add taurine not only to high-legume foods, but also to diets that fall into other at-risk categories, including lamb-based diets, limited-ingredient diets, and diets that are relatively low in protein. ALL companies should already add taurine to their lamb and rice diets; not doing so is a red flag that the company is either unaware of the risk of taurine deficiency for some dogs eating these diets, or doesn’t care.

Pay attention to how companies respond to this issue. One of the ways to do so is to look for added taurine in the ingredient lists of their foods. Note that more than half the Purina foods reported to the FDA were lamb and rice diets without added taurine.

Another important factor that should help to determine how much you can trust a company is how they respond to your inquiries. Don’t put your trust in any company that does not respond to an inquiry, is unable to answer your questions, or refuses to provide the information you requested, especially when asking for nutritional information other than the guaranteed analysis. The best companies will be open and honest, and will make sure your questions are addressed properly, including referring them to the right person to respond when needed.

use “legumes” rather than “pulses” to define this category.

Pulses are high in protein and fiber and low in fat. High-fat legumes such as soybeans and peanuts do not appear to be involved in the DCM issue.

Bottom line on legumes: We recommend avoiding diets with legumes listed high in the ingredient list (before the first fat or oil) or that include several legumes, even if they appear lower in the ingredient list. If you do feed such a diet, it should not have any of the other “L” traits (be lamb-based, limited-ingredient, or contain less than about 30% protein on a dry matter basis [27% as fed, per the guaranteed analysis, for dry foods]). If you feed high-legume foods as a major part of your dog’s diet, look for foods with added taurine, or consider supplementing with taurine yourself.

Lamb-based diets

Nutritionists have known for more than 20 years that certain breeds of dogs were prone to developing DCM when fed lamb and rice diets. Studies indicate this likely has to do with low bioavailability of taurine's precursors, methionine and cysteine, in lamb meal. Responsible companies began adding taurine to their lamb and rice diets long ago.

Our analysis of foods named in the FDA reports found that more than 20% of these reports involved diets where lamb was the primary meat source; this included several of the foods with the most reports. The FDA's analysis found lamb was the second-most common animal protein in reported foods (after chicken). Both of these appear to indicate that lamb is overrepresented in the named foods.

We expect that reliable companies

already add taurine to their lamb and rice diets. We also would expect that by now they are in the process of adding taurine to their lamb-based diets that also contain legumes.

Bottom line on lamb: We advise avoiding lamb-based diets without added taurine. If you do feed a lamb-based diet, it should not be high in legumes, limited-ingredient, or low in protein. In addition, we would avoid all foods from any company that sells a lamb and rice diet without added taurine (if they hadn't already been getting that right, we just wouldn't trust them at all).

Note: We found several diets where *lamb meal* was listed second in the ingredient list, following a fresh protein such as beef or bison, which was usually the name used on the label. Because dry lamb meal weighs less than fresh meats, these foods con-

tain more lamb than whatever was named first and would be considered lamb-based diets. Pay attention to ingredient lists, not just the name on the package!

Limited-ingredient diets

The first response from a veterinary nutritionist to the initial FDA report about a possible link between diet and DCM warned against "exotic" ingredients, but her list included both lamb and peas, neither of which would be considered exotic these days (see "We Won't BEG," next page). Instead, what we found was an overrepresentation of limited-ingredient diets, many of which contained no ingredients that most people consider exotic. Almost 40% of all reports received by the FDA involved limited-ingredient diets.

The great majority of these diets included peas and/or lentils, but since that was true for all foods, not just limited-ingredient diets, it doesn't explain why limited-ingredient diets were named in such a large percentage of reports.

We do not recommend feeding limited-ingredient diets to most dogs, as we believe feeding a variety of ingredients is more likely to meet your dog's nutritional needs. If you feed a limited-ingredient diet due to your dog's severe food allergies or digestive issues, avoid foods high in legumes or that are lamb-based or relatively low in protein.

As a general rule we also recommend that you avoid feeding most exotic proteins, anything other than beef, chicken, turkey, lamb, and maybe fish. Exotic proteins (such as kangaroo, venison, duck, bison, rabbit, and so on) should be reserved for potential food allergy testing and/or treatment in the future.

Bottom line on limited-ingredient foods: Until we know more, we feel that companies that make limited-ingredient diets should start adding taurine to these foods. If you feel you must feed a limited-ingredient diet that does not include added taurine, we would suggest supplementing your dog with taurine.

SUPPLEMENTING TAURINE

Not everyone can follow the dietary guidelines we offer. Dogs with severe food allergies or intolerances causing serious skin or digestive issues, and those with health conditions that require a specialized diet, may need to stay on their current diet, even if it is a limited-ingredient, lamb-based, high-legume, and/or low-protein food.

In these cases, we recommend supplementing your dog with taurine, a safe and inexpensive way to address at least one suspected cause of DCM. Typical dosages used for dogs known to have low taurine levels are 250 mg twice a day for small dogs (less than 25 lbs); 500 mg twice a day for medium-sized dogs (25-50 lbs), and 1,000 mg twice a day for dogs over 50 lbs. These amounts are safe to give to dogs with normal taurine levels as well.

It is unclear whether supplementing with taurine will help dogs who do not have low blood taurine levels or who remain on a high-legume diet, but it might help and should not cause harm. Because we don't know for sure that it helps, however, taurine supplementation should not be used as a substitute for rotating through different foods for normal, healthy dogs.

Taurine can also be provided by adding fresh foods to the diet you feed your dogs. Note that taurine is found only in animal, not plant, products. Heart (e.g., beef heart, chicken hearts) has much more taurine than muscle meat or other organs. Dark poultry meat has 10 times more taurine than white meat, with beef, lamb, pork, and fish falling in between. Eggs are high in methionine and cysteine (taurine's precursors) but have little taurine.

Both cooking and freezing decrease the amount of taurine in foods. The longer a food is cooked or frozen, the more taurine is lost.

Never feed more than about 20% of your dog's daily calories in fresh foods without also adding supplements needed to make sure the diet remains complete and balanced.

One additional note: Kangaroo was the protein used in the single food reported most often to the FDA – Zignature Kangaroo Formula. This food had twice the number of reports (44) as the next food, Acana Singles Lamb & Apple Formula (both limited-ingredient diets). While no research has been done that we're aware of, it would appear that kangaroo, like lamb, may be associated with low taurine bioavailability.

Low-protein diets

Insufficient dietary protein is a known risk factor for canine DCM. Protein is needed to build lean muscle, and since the heart is a muscle, insufficient protein can also affect the heart.

We found only a small number of reports of very low-protein diets linked to DCM, but most had no other risk factors (no peas or lentils, not lamb-based or limited-ingredient). Several low-protein urinary care and renal prescription diets were reported to the FDA as being possibly linked to DCM. These diets range from 10.9% to 18.1% protein on a dry matter basis (10 to 16% as-fed).

In our opinion, these prescription diets are often fed unnecessarily. In particular, we do not recommend feeding low-protein diets such as Hill's Prescription Diet u/d to most dogs prone to forming urinary stones, or feeding diets designed for dogs with late-stage kidney disease who are not expected to live very long to dogs with *early-stage* kidney disease, who may live for years.

The longer a low-protein diet is fed, the more harm it is likely to do. See the online version of this article for links to a number of past articles we've published on this topic.

In addition, when we looked at all the named diets that did not include peas or lentils, we found a higher percentage of lower-protein diets, and some with mid-level protein but also with plant proteins in the ingredients, such as corn and wheat gluten meals, pea protein, and potato protein.

Plant proteins may be used to replace animal proteins, providing less taurine and its precursors and more

We Won't BEG

Even before the FDA's first announcement was made public, veterinary nutritionist Lisa Freeman of Cummings School of Veterinary Medicine at Tufts University had posted an article online with her take on the issue, which was summarized right there in the title: "A Broken Heart: Risk of heart disease in boutique or grain-free diets and exotic ingredients."

Dr. Freeman characterized diets with certain attributes as particularly risky: those that are "boutique, grain-free, or exotic ingredient diets," or BEG for short – an acronym that quickly became popular and continues to be in wide use today.

There are several problems with this acronym. First, only the "grain-free" part is clear – and yet, grain-containing foods have also been named in some of the canine DCM reports that the FDA is investigating.

Dr. Freeman's definition of "exotic ingredients" includes lamb, peas, and other grain substitutes. Even other veterinary nutritionists are confused by this category, describing it as "non-traditional protein sources." While kangaroo, venison, and other exotic proteins appear in the table entitled "Animal Proteins in Diets Reported to FDA" in the FDA's 2019 report, chicken, turkey, beef, and many other animal proteins commonly found in pet food also appear in the table.

Dr. Freeman uses the term "boutique" to target small pet food manufacturers, saying they "might be better at marketing than at nutrition and quality control."

While we agree that some small pet food companies fit that description, there are others with more than adequate knowledge of nutrition and manufacturing to make great food. Also, there is nothing about the size of a company nor the length of its track record that automatically keeps consumers safe. The recent spate of recalls for Hill's regular and prescription diets that were causing vitamin D toxicity – products that harmed and even killed dogs – proved this point.

Dr. Freeman and others have suggested that dog owners should buy food only from companies that conduct feeding trials – another way of recommending products from large companies, because feeding trials are so expensive that only the largest companies tend to have the money to pay for them. But feeding trials last just six months, not long enough for a diet to cause symptoms of DCM, and no testing for DCM or any other form of heart disease is done in feeding trials.

The FDA's investigation has not identified any nutritional deficiencies in reported foods, so this issue cannot be blamed on a lack of nutritional knowledge or quality control.

fiber and other factors that may interfere with taurine absorption. Avoid foods that contain corn gluten meal or wheat gluten meal; these are poor-quality, incomplete plant proteins primarily found in lower-quality foods. Pea and potato protein may be acceptable if far down in the ingredient list, but we don't believe they offer much if any nutritional benefit (we'd prefer to see added taurine instead).

Bottom line on low-protein: In general, we advise looking for foods with at least 23% protein DM (21% on the label, also expressed "as fed," for dry foods), and preferably more. If you feed a diet that contains a significant amount of legumes, or that includes beet pulp or plant proteins, increase this minimum amount of protein to about 30% dry matter (27% as fed for dry foods). If you feel you must

feed a diet with less protein than this, we advise supplementing your dog with taurine.

ADDITIONAL RECOMMENDATIONS

■ Beet pulp is known to interfere with taurine absorption. A 2016 study published in the *Journal of Animal Science and Technology* found that beet pulp may contribute to a decrease in taurine levels in dogs, both because it reduces protein digestibility (and thus the availability of the sulfur amino acids methionine and cysteine, taurine’s precursors) and because it increases fecal excretion of taurine.

Beet pulp is commonly used in dog foods as a source of fiber, but because of its effect on taurine, it would be safest to avoid this ingredient in diets with any of our “L’s” of concern (Lamb-based, Legume-rich, Low-protein, or Limited-ingredient).

■ The FDA also named potatoes and sweet potatoes as suspect ingredients, but we have our doubts about their

potential contribution to diet-related DCM. Both of these ingredients have been used in pet food for much longer than peas and other legumes, and neither is used as an alternative to or replacement source of animal protein.

Our analysis supports this hypothesis: All of the reported grain-free dry foods with significant amounts of potatoes or sweet potatoes also fell into one or more of the other at-risk categories. If these ingredients were truly a risk factor, we would have expected to see many foods reported that contained potatoes or sweet potatoes but did not contain legumes and were not lamb-based, limited-ingredient, or low in protein. At this point we do not feel that the data support avoiding foods that contain potatoes or sweet potatoes.

One ingredient in this category concerns us, however: potato protein. We don’t like to see incomplete plant proteins used to replace better quality, pricier animal proteins, or to inflate the protein percentage on the label.

REMEMBER THE FOUR “L’S”

Again, remember that we don’t know for sure if following our guidelines will help your dogs avoid developing DCM, but we believe they are your best option until more is known.

Four types of diets – those rich in **legumes** (peas, lentils, beans, chickpeas); **limited-ingredient** diets (especially those that use kangaroo); **lamb-based** diets; and diets that are **low in protein** or that rely too much on plant proteins – may be associated with low taurine bioavailability that could lead to DCM, particularly in certain breeds, large dogs, and those who eat less than expected for their size. We believe that limiting how much you feed of these types of diets, and/or supplementing your dogs with taurine, should help keep them safe. 🐾

A long-time contributor to WDJ, Mary Straus is the owner of DogAware.com. She and her mixed-breed, Willow, live in the San Francisco Bay Area.

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Good Vibrations

Collars that vibrate can be a useful tool for training deaf dogs. Here's how to use these tools – as a cue, not a consequence.

Vibration collars are frequently suggested as a good tool for communicating with hearing-impaired dogs. I hadn't had much experience with them, so when I was asked to write an article on them several months ago, I realized it was a great opportunity to expand my own education, and I jumped at the chance.

Actually, this is far from the truth. For starters, I am not much of a tech or gadget person. (There's a reason I work with animals for a living and not electronics!) Plus, my only prior experience using a vibration collar had been a failure. We had a deaf pit bull-mix in our Behavior Modification Academy a few years ago. We worked with her for five straight days, but we couldn't get her to acknowledge the vibrations even once, not even on the highest setting!

Also, a vibration collar looks very similar to a shock collar, and my negative association with shock collars is so strong it gives me the heebie jeebies (technical scientific behavioral term) to even look at the one that WDJ Editor Nancy Kerns had shipped bought on Amazon.com and had shipped to me. I dragged my heels on actually opening the box until I *had* to do it!

NO SHOCK

There are a number of remote-controlled dog collars on the market that offer a vibration mode in addition to the ability to shock the dog, and *we would never advocate buying or using those collars*. Products that are designed to shock are clearly meant to be used in an aversive manner, to startle and/or hurt the dog in order to stop him from doing something. This is not how we advocate training dogs.

Then there are collars that do not produce shock, only vibration, but that are marketed with claims that the vibration can be used as a more humane or gentler alternative to a collar that delivers shock. In our view, this is completely missing the point. A less-

unpleasant punisher is still a punisher. We advocate training without pain or fear.

This isn't just a matter of semantics; it's an entirely different training philosophy. We were looking for a product that produced a vibration that would be used only as a cue for the dog. As such, we wouldn't want a collar that could produce a vibration so strong that it resulted in a dog's fear or discomfort or avoidance.

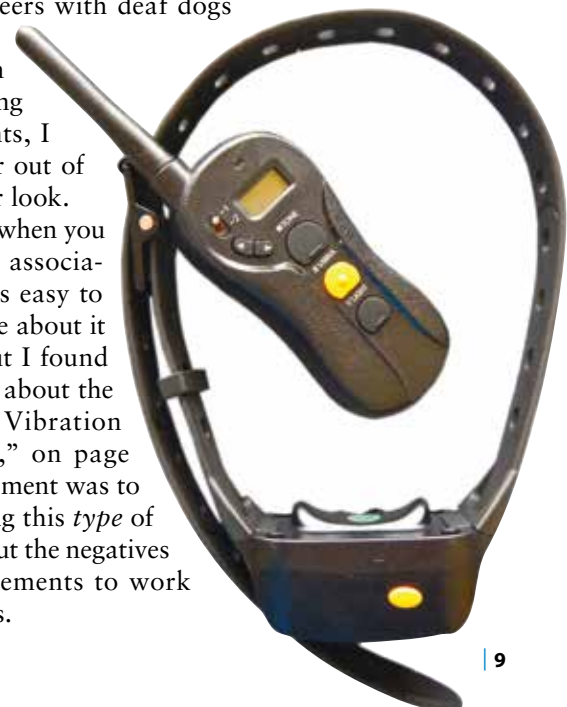
Unfortunately, the marketing of these products just isn't at all congruent with what we see as their best use. Even the collar we had the best results with, the one that came with the highest recommendation from a trainer who uses it for deaf dogs (the Wolfwill Dog Training Collar) is marketed for use as an aversive. The box itself says that with just the push of a button, your dog will "quickly learn the association between his behavior and your correction; in no time, you'll have a better-behaved pet." *Argh!*

That's not at *all* how we recommend using these collars.

Since I don't have a hearing-impaired dog of my own, I put out a call to my trainer network seeking volunteers with deaf dogs who might be interested in trying a vibration collar. While I was waiting to schedule appointments, I took the Wolfwill collar out of its box and took a closer look.

Now, I'm aware that when you already have a negative association with something, it's easy to find things you don't like about it (confirmation bias) – but I found a lot of things to dislike about the collar. (See "Wolfwill Vibration Collar: The Negatives," on page 10.) However, my assignment was to explore the value of using this *type* of collar for training, so I put the negatives aside and made arrangements to work with three different dogs.

That's a sight you never thought you'd see in WDJ, right? Never fear, it's a vibration collar, not capable of producing shock. This model is the Wolfwill Dog Training Collar. We bought it from Amazon.com for \$65. The other collar we tried, Unleashed Technology's GT-1 Gentle Trainer, costs more than \$200 and didn't seem to work as well.



COMPARING COLLARS

As it turned out, I was also able to compare the Wolfwill with another vibration collar. One of my interns, Peggy Bowers, happened to have the same collar that I had tried a few years ago: the Gentle Trainer GT-1 by Unleashed Technology. Peggy had used the collar successfully on another dog, so we decided to try it again, as well as the Wolfwill product. For these experiments, we were joined by another one of my training interns, Layne Tubby.

The three of us tested the collars on ourselves to see what we could

feel. The Gentle Trainer has prongs that are similar to those on a shock collar. But we found that its vibration wasn't really noticeable on the prongs themselves; only the receiver box itself seemed to vibrate. In contrast, the vibration on the Wolfwill is delivered via a curved plate rather than prongs, and the vibration was clearly noticeable on the plate.

The Gentle Trainer had a significant difference in intensity of vibration between the low setting (1 – barely noticeable) and the high (15). The Wolfwill was considerably stronger when set on its lowest set-

ting (1) than the other collar's lowest setting, but Layne and I could barely feel a difference between 1 and its highest setting (16) – just a longer pulse. Peggy, however, said that the highest setting on this collar sent an unpleasant sensation down her hand and arm that she found quite aversive.

The Gentle Trainer supposedly can be used with a half mile between the remote control and the collar. The Wolfwill is supposed to be capable of working at a maximum distance of about one third of a mile.

HOW WE USED THE COLLARS

I see the primary benefit of a vibration collar as an attention-getter for a hearing-impaired dog – although another valuable use could be to teach a “find me” recall. Unfortunately, I don't think it's possible to vary the vibrations enough for a dog to easily distinguish a variety of *different* cues using the collar alone. The owners agreed – their primary goal would be to have an “attention” signal.

With each of the dogs, we did a brief introduction to the collar, feeding chicken treats without vibration, feeding treats while it vibrated *near* the dog, and then feeding treats while we held it against the dog's neck. Some dogs can find a vibration aversive and I wanted to maximize our potential for having our test dogs accept it.

None of the dogs seemed concerned, so we proceeded by putting the collar on the dog. Our goals were to see if:

- The dog acknowledged the vibration when the collar was on his neck.
- The dog would begin to offer a “conditioned emotional response” (CER) to the vibration – that is, to show an awareness that the vibration meant “Chicken!” by turning toward his owner when the signal was sent.
- We could begin to establish a recall cue by having the dog move toward the owner in response to the signal at increasing distances.

Wolfwill Vibration Collar: The Negatives

I found the concept of a vibration collar potentially useful. But in practice, there were a number of things I didn't like about the Wolfwill vibration collar:

- It's marketed as an aversive. The text on the box says, “When you push on a button... He'll quickly learn the association between his behavior and your correction; in no time, you'll have a better-behaved pet.” The instruction booklet inside also describe its use as a punishment tool rather than as a positive communication tool.
- There is no instruction offered about conditioning your dog to be comfortable with the collar before you use it and nothing about it being very inappropriate to use with a dog who is “hiding or acting fearful.”
- The instruction guide is almost incomprehensible. As this product is made in China, the instructions were full of translation errors – annoying, but not insurmountable. Still, it made already difficult-to-follow instructions even more difficult. Due to the poor instructions, initially I couldn't get the two units (transmitter and receiving collar) to charge. When I contacted the company for help, they wanted to see my receipt before they would help me! I finally figured out what I was doing wrong on my own.
- The collar is supposed to be suitable for dogs 22 to 88 pounds. I wouldn't even consider putting it on Sunny, my 25-pound Pomeranian-mix, as the receiver box is quite large and the collar is way too bulky for a small dog.
- On two occasions, as I was trying to change intensity of the vibration, it kept sticking. I pressed the appropriate button repeatedly, and sometimes it would change. Sometimes it wouldn't.
- The product touts its three-function features – vibration, light, and tone (sound) – but in our opinion, only the vibration is useful. The vibration does, indeed, work well. The tone is obviously useless for a hearing-impaired dog and isn't really loud enough for the human to locate a lost deaf dog unless the dog is very close. We're not sure why you would need a tone for a hearing-abled dog when you can use your voice or a whistle. The light also seems worthless. It can't signal anything to the dog, because it's located on the dog's neck. It's too small to be seen by a human from any distance and, on many dogs, would likely be covered by the dog's fur anyway.

We realized this was quite an ambitious agenda for just one session with the collar, but we were interested to see how much we could accomplish.

TESTS WITH SPUD

Our first test dog was Spud, a two-year-old congenitally deaf French Bulldog, belonging to Jordan Cruz and referred by veterinary behaviorist Dr. Leslie Sinn. His deafness was the result of a breeding between two merle parents – dogs with a coat color pattern that consists of a typically bluish- or reddish-gray mixed with splotches of black or reddish-brown. Double-merle dogs have a very high chance of being deaf, blind, or both.

In addition to being deaf, Spud has other behavioral issues, including anxiety and potential obsessive-compulsive behaviors. It is not unusual for other neurodevelopmental disorders, including blindness and difficulty processing information, to be part and parcel of the world of a double-merle dog.

Spud showed absolutely no awareness of vibrations from the Gentle Trainer collar. He did cock his head in acknowledgment on the first test of the Wolfwill, and while he continued to show signs of awareness



A vibration collar may prove to be a useful tool for delivering cues to Livvy, who is deaf and nearly blind.

that *something* was going on when it vibrated, after 15 minutes or so of tests, he showed no indication of giving a positive CER. Rather, at that point his signs of stress appeared to be increasing, so we ended the session.

My conclusion: A vibration collar will be helpful for Spud only if future training sessions are successful in establishing a CER – a positive association between the vibration and his chicken-dispensing human.

TESTS WITH LIVVY

Livvy is a deaf three-year-old double-merle Australian Shepherd who has very limited (and declining) vision. On the recommendation of veterinary behaviorist Dr. Karen Overall, Livvy’s owner had come to me for a behavior consultation in November 2018; she wanted to learn how to reduce Livvy’s severe reactivity to moving vehicles, dogs, and other objects. Dr. Overall had diagnosed Livvy with severe visual and hearing impairment, possible panic disorder, and hyper-reactivity, especially to moving triggers and some noises.

Irene Schmalz, Livvy’s owner, had done a little work in the past with my intern Peggy Bowers with the Gentle Trainer collar. In those sessions, Livvy had acknowledged the vibration signal after about five to 10 repetitions, but had not offered any CERs.

That’s why, for these sessions, we opted to use the Wolfwill collar and skip the Gentle Trainer, as we knew we were likely to see better re-

sults with the product that vibrated more noticeably. Livvy immediately acknowledged the signal with a turn of her head and began offering consistent CERs after 20 signal repetitions.

We began increasing the distance between Livvy and her owner – ultimately to about three feet. About half the time, upon feeling the signal Livvy would go to Irene, but sometimes, she would go to Peggy instead. That’s when we realized our error of initially having Peggy feed the chicken – duh!

We took a break and started over again, triggering the vibration and then having Irene feed Livvy a piece of chicken, until Livvy was consistently showing CERs when she felt the vibration. Once it was clear she had the vibration/chicken-from-Irene association down pat, we redid the distance work with significantly better results.

Conclusion: A vibration collar could be very useful for Livvy and Irene. Livvy responded well, and with her vision impairment as well as her deafness, the collar could be very instrumental in maintaining a good quality of life for her. Despite her impairments, Livvy is independent, and being blind as well as deaf puts her at an even greater risk of getting disoriented and lost.

Irene is already doing Nosework with another excellent trainer; I suggested that Irene work with the trainer on having Livvy find her by scent. Then they could pair the “find Irene by scent” task with a vibration cue, for maximum benefit.

We also discussed the value of adding touch cues to Livvy’s repertoire – a light touch above the tail for a sit, on the shoulders for a down, etc. – as the hand signals Irene has been using to communicate to her dog will become increasingly less useful as Livvy’s sight continues to fail.

TESTS WITH MAGGIE

Our third test dog was a 13-year-old terrier-mix who is losing her hear-



Spud is a deaf double-merle French Bulldog. In our one and only testing session with him, he never developed a positive conditioned emotional response (CER) with the vibration and treats. Further, with more trials, he began to grow anxious, so we ended the testing.

ing due to her age. Maggie has the advantage of 13 years of hearing, so she already knows behaviors that her owner, Elizabeth White, has taught her over the years.

Maggie does, however, have several age- and health-related challenges, including arthritis (lameness despite pain-relief medication) and two large lipomas (fatty tumors). Elizabeth was very interested in the collar because she routinely walks her dog off-leash (so the leash doesn't interfere with Maggie's effort to ambulate without pain), and she would like to be able to get Maggie's attention when the dog gets distracted, stops to sniff, and falls behind.

Maggie immediately acknowledged the vibration with a turn of her head and was offering consistent, happy CERs after just five repetitions.

We began adding distance and found that because Maggie is so connected to her human it was hard to tell if she was responding to the collar and returning to Elizabeth, or just choosing to return because she wanted to be close to her. With Spud and Livvy, we had worked indoors only, but we decided to go outside with Maggie to see how the collar worked where she was more likely to be distracted.

Outdoors, off leash, and with more distractions, it was easier to see when Maggie was truly responding to the collar – which was most of the time (Yay!). We had about an 80 percent success rate, with just a few occasions when Elizabeth had to push the button longer to get Maggie to acknowledge and come to her, which did eventually happen in under 20



The Wolfwill collar worked well to cue Maggie to return to her owner.

Haptic Cues

I recently learned a new word: haptic. It refers to any technology involving the sense of touch, so vibration collars are technically “haptics,” and the signals you send when you press the button are “haptic cues.”

An exciting new development in the world of haptic cues is the “haptic vest” for dogs, designed by Israeli scientists at Ben-Gurion University of the Negev. In results presented this past summer at the Institute of Electrical and Electronics Engineers (IEEE) World Haptics Conference in Tokyo, the researchers reported that cues issued by gentle vibration motors in the vest were as effective as vocal cues.

The dog used for the study was Tai, a middle-aged Labrador-mix. Tai already knew four vocal cues for turn, lie down, come, and back up, so teaching him haptic cues for those behaviors was “not a large leap,” says lead author (and Tai's owner) Yoav Golan, a Ph.D. candidate in mechanical engineering at Ben-Gurion



University. The dog learned his first haptic cue – to spin, or turn in a circle – in about an hour. His second cue, to lie down, took longer to learn, partly because scientists had to adjust a motor on Tai's hip so he could better feel the vibration. A third cue, come, took 15 minutes to learn.

If it pans out commercially, the vest would be able to give much more precise cues than a vibrating collar and could be used to teach a variety of behavior cues to a hearing-impaired dog. While a long way from arriving on the commercial market, the researchers tout future possible uses for the vest, including police and military work, as well as a way for speech-impaired humans to communicate to their dogs and hearing-impaired dogs to understand their humans' communications.

You can read more about the haptic vest and see a video of Tai in action here: tinyurl.com/WDJ-haptic.

seconds. (Note: The vibration pulse shuts off after 10 seconds – you have to release, and after several seconds push the button again.) I suggested she also pair the vibration with her verbal cue while Maggie can still hear her to strengthen the association.

Conclusion: A vibration collar could be useful for Maggie, and Elizabeth has the added benefit of being able to train Maggie to make the recall association while she can still hear. Elizabeth has already ordered a Wolfwill collar for Maggie.

POSITIVE CONCLUSIONS

I have to say, I am feeling quite positive about the benefits of using a vibration collar for dogs with hearing loss. Despite my initial reservations, and

the significant flaws of both brands of collar that we worked with, it will certainly be something I recommend to owners of deaf dogs as a useful communication tool.

I want to applaud Jordan, Irene, and Elizabeth. It was heartwarming to see how connected and committed these owners are to their dogs and rewarding to be able to help explore new ways to open lines of communication between the owners and their deaf (or nearly deaf) dogs. 🐾

Author Pat Miller, CBCC-KA, CPDT-KA, of Fairplay, Maryland, is WDJ's Training Editor. Miller is also the author of many books on positive training. See page 24 for information on her classes for dog owners and trainers and book purchasing details.



Canine Dementia

It can be sad to watch our beloved companions age and grow increasingly confused – but knowing what you're up against can help you keep them happy and safe to the very end.

Mercury, my Chihuahua-mix, turned 17 years old this year, making him (by far) the oldest dog amongst all of my friend's dogs. When people see him, I'm always proud that they can hardly believe he's as old as he is. Despite his age, Mercury is still in great physical shape and maintains an active life.

Though Mercury is still very active I can tell he is slowing down and there are days when, just for a moment, he seems a bit confused. Our vets indicate that this is a normal part of aging, but it has me worried.

It's been estimated that more than 14% of pet dogs over the age of 8 show some symptoms of age-related cognitive dysfunction – and a whopping 68% of dogs aged 15 to 16 years have symptoms of cognitive impairment.

Some pet owners might joke about “doggie Alzheimer's,” but it's a real thing. The degenerative brain disease that is very similar to Alzheimer's in humans is properly called Canine Cognitive Dysfunction (CCD).

Gaemia Tracy, DVM, is a neurologist at NorthStar Vets in Washington Township, New Jersey. He says that dogs with CCD generally exhibit behavioral changes ranging from a loss of housetraining to aggression, and often appear confused or disoriented. All dogs are at an equal risk; there are no known associations between breed or size and the risk of developing CCD. Dr. Tracy notes that he generally sees signs of CCD developing in affected dogs after the age of 8 to 10.

SYMPTOMS

Dog owners are usually the first to notice that something is wrong or different with their dogs. Common symptoms to watch for include pacing, turning in circles, staring into space, or seeming lost and confused. In many cases, the dog's temperament changes. Dogs who have been generally friendly may begin to show aggression – and typically aggressive dogs may become unusually friendly!



Dogs experiencing an onset of CCD may also start to have difficulty navigating stairs or seem confused about how to get around furniture. CCD may also lead to dogs isolating and seeking out less attention, or generally become more fearful or anxious.

Veterinarians use the acronym DISHAA to describe typical symptoms of CCD. This stands for:

Disorientation – Examples include getting lost in familiar places, doing things like standing at the hinge side of the door waiting for it to open, or getting “stuck” behind furniture.

Dogs with canine cognitive dysfunction usually progress from being just a little bit “spacy” or confused to getting “lost” or “stuck” in their own homes. Dogs at this stage of the disease require extra management and supervision to keep them safe. Photo courtesy of dogdementia.com

Interactions – Changes in how or even whether the dog interacts with his people. He may withdraw from his family, and become more irritable, fearful, or aggressive with visitors. In contrast, the dog may become over-dependant and “clingy,” in need of constant contact.

Sleep – Changes in sleep patterns (such as being wakeful or restless in the middle of the night), vocalization at night.

Housetraining – Increased house-soiling and/or a decrease in signaling to go out are common. Or a dog goes outside for a while and then eliminates in the house right after coming inside, or soils his crate or bed.

Activity level – Decrease in exploration or play with toys or family members, and/or an increase in aimless pacing or wandering.

Anxiety – Increased anxiety when separated from owners, more reactive or fearful to visual or auditory stimuli, increased fear or new places.

Recently, the letter “L” was added to the end of the acronym:

Learning/memory – Decreased ability to perform learned tasks, decreased responsiveness to familiar cues, inability/slow to learn new tasks.

Dylan Fry, DVM, Diplomate American College of Veterinary Internal Medicine (DACVIM), a neurologist at NorthStar VETS, also notes that it’s important to watch for new compulsive behaviors (such as pacing) from your senior dog, as these, too, could be symptoms of CCD. If your dog is exhibiting any of the above symptoms or has developed a behavior or personality change, it’s a good idea for your dog to be seen by a veterinarian so you can discuss your concerns about CCD and rule out any other conditions like arthritis or other pain, vision, or hearing changes that may cause similar symptoms.

HOW IS CCD DIAGNOSED

Before your veterinarian can diagnose CCD, he or she will discuss the symptoms you are seeing at home and possible alternate causes. Your veterinarian is likely to do a thorough examination and blood work to rule out other causes.

“CCD is a diagnosis of exclusion,” says Laurie Bergman, VMD, Diplomate American College of Veterinary Behaviorists (DACVB), a veterinary behaviorist with New Jersey’s NorthStar VETS. “First we have to rule out possible medical causes of these changes, including endocrinopathies (thyroid disorders), pain, and changes in sensory function.”

Dr. Bergman notes that the time it takes to get a proper diagnosis can

be frustrating for dog owners, but warns that even if your dog shows what seems like clear symptoms of CCD, the symptoms could be tied to a different condition. Tumors, inflammation, and infection in the brain can mimic the symptoms of CCD; if a dog is showing symptoms of CCD that can’t be connected to other conditions, veterinarians may recommend using a magnetic resonance imaging (MRI) scan to confirm the diagnosis. MRIs can show specific changes in a dog’s brain, such as atrophy or shrinking, which can aid in the diagnosis.

PROGNOSIS

Like Alzheimer’s in humans, CCD is a progressive illness. Dogs who have CCD don’t get better, but the condition can be managed. While the condition will worsen over time, says Dr. Fry, “the speed at which this occurs is variable.” Many dogs who have CCD can continue to lead comfortable and enriched lives.

That said, dogs with CCD will require careful supervision and specific management to ensure that they are kept safe. Dr. Loenser notes that dogs with CCD are particularly prone to accidents such as falling down stairs, wandering off, or being hit by a car. “As long as the dogs are kept safe,” she says, “their prognosis is fair.”

TREATMENT

There is one medication that is widely prescribed for dogs with CCD: Anipryl (selegiline hydrochloride). It has been shown to slow the progression of CCD and may improve an affected dog’s brain function.

Your vet may also discuss additional medications to improve your dog’s quality of life. For dogs who

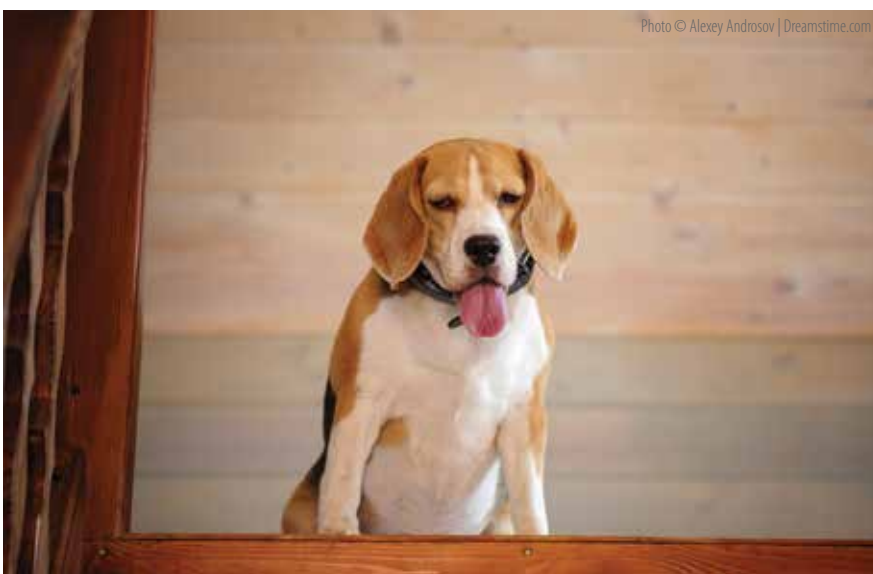


Photo © Alexey Androsov | Dreamstime.com

When senior dogs stop doing things that they have always been able to do – such as navigating stairs – they may be having a physical problem (such as back or knee pain) or it may be a cognitive issue. If it’s the latter, a gate across the stairs may be warranted, as dogs with CCD have been known to tumble all the way down stairs, resulting in traumatic injuries.



As well trained and well behaved as he is, the author's 17-year-old Chihuahua-mix, Mercury, is leashed for safety. Senior dogs – and especially those with CCD – should always be leashed in a potentially dangerous environment, since their judgement and physical abilities are likely to be impaired.

without railings, and other dangers in your yard, as she may have lost good judgment regarding heights. You'll also need to be especially attentive to your dog when on walks in order to keep her safe; she may wade too deeply into swift water, or step into the path of an oncoming bicyclist. Even if her past behavior and training has long been so good that she has been able to walk with you unleashed in the past, she may no longer have the cognitive capacity to do this safely any more.

A breakdown in housetraining is a common symptom of canine CCD. When dealing with this condition, "understanding goes a long way," Dr. Bergman says. It's important to remember that your dog isn't lazy,

struggle to maintain a normal sleep cycle, Dr. Fry encourages owners to try giving their dogs melatonin, a hormone that can be purchased over the counter in most grocery or health food stores. This can sometimes help dogs adjust their internal clock and sleep more soundly.

Additionally, anti-anxiety medications have also been shown to be helpful for some dogs with CCD. As with all supplements and medications, ask your vet whether any of these might be helpful for your dog.

WHAT TO DO AT HOME

There are a number of things that you can do at home to support your dog as her condition progresses. The most important task is managing your dog's personal and household routines to keep her comfortable and safe.

Dr. Loenser specifically advises that guardians should try to limit the amount of change in a CCD dog's life. It's really helpful to stick very closely to known routines and to be slow to make any kind of changes to those routines – including everything from who is in the home to furniture placement, mealtimes, etc.

In particular, if your dog has CCD, you need to protect her from things in your environment that can be dangerous, especially stairs, decks

Nutritional help for CCD

Food and supplements can play a part in maintaining optimal canine cognitive functioning and supporting an aging canine brain. Dr. Fry advises talking with your vet about adding antioxidant supplements that have shown benefits for the brain, such as Denosyl, which contains S-Adenosylmethionine (SAM-e), into your dog's diet. The most advantageous time to do this, he says, is in your dog's "middle age" – before she shows any signs of CCD.

In addition, Dr. Tracy advises owners to feed diets high in omega-3 fatty acids (found in fish oil) and medium-chain triglycerides (found in coconut oil), which may be neuroprotective and even decrease the likelihood that a dog will develop CCD.

Both veterinarians recommend commercially available diets such as Purina's Bright Mind 7+, Purina Pro Plan's NeuroCare, or Hill's Science Diet BD. These products include supplements and/or therapeutic levels of nutrients that studies have shown may support cognitive functioning in senior dogs.

Editor's note: The above-named products don't generally have the characteristics we look for in a quality dog food. However, if a trial of a month or more of feeding one of these foods results in any improvement in your dog's CCD, it makes sense to continue feeding the product! Or, owners may opt to discuss with their veterinarian how best to supply their dog with nutrients that may improve their senior dog's cognitive function. These may include arginine, docosahexaenoic acid (DHA, an omega-3 fatty acid), eicosapentaenoic acid (EPA, another omega-3 fatty acid), and B vitamins.

spiteful, or trying to be bad, he just doesn't know better anymore. Belly bands (for male dogs) and doggie diapers (for females) may be needed to prevent house-soiling by a dog who just doesn't realize that she's "going."

ENRICHMENT

It's tempting to pamper older dogs, but this *must* include keeping them active. Making the comparison to how it is commonly accepted that "brain games" such as crossword puzzles can slow the onset of dementia in humans, Dr. Bergman advises that regular mental enrichment may slow the progression of CCD in dogs. Any kind of training, exercise, and social engagement can support the mental fitness of aging dogs.

Of course, you should also be attentive to your older dogs' physical condition; don't push them to do anything too strenuous. Low-impact sports like scent work and trick training can be great ways to keep your senior dog's mind active.

Food-dispensing toys and puzzles are particularly good for senior dogs, who may not have as much interest in playing any more, but still enjoy their food! For older dogs at risk of CCD, Dr. Dylan suggests trying to keep them awake during the day, if possible, in order to establish and maintain a healthy sleep/wake cycle.

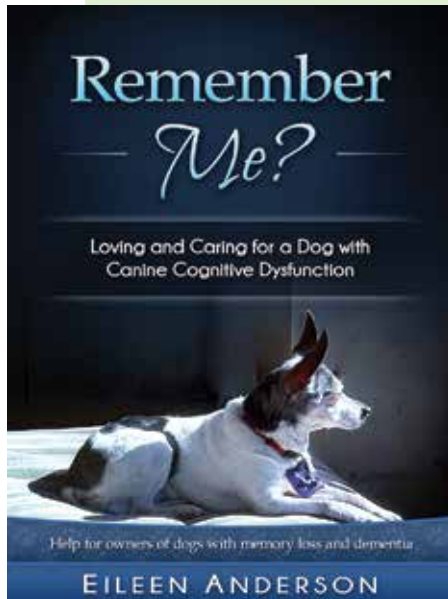
That sounds challenging – and with multiple senior dogs in my home I'm abundantly aware of exactly *how* challenging it can be to keep them healthy and safe. CCD is concerning, but it's comforting to know there are treatment options available to slow the progression of the disease. 🐾

Sassafras Lowrey is a Certified Trick Dog Instructor and author of Healing/Heeling; Bedtime Stories for Rescue Dogs: William To The Rescue (with Lili Chin), and Tricks in the City: For Daring Dogs and the Humans That Love Them. See page 24 for book purchasing information.

She Wrote the Book on CCD

Eileen Anderson is an Arkansas-based author who also maintains the Dog Dementia website (dogdementia.com), a resource for people whose dogs have been diagnosed with CCD or are displaying symptoms of the disease. Anderson's book *Remember Me?: Loving and Caring for a Dog with Canine Cognitive Dysfunction*, not only chronicles her experience caring for her dog, Cricket, who was diagnosed with CCD in 2011 at the age of 15, but also helps guide other dog owners through what they need to know to best care for their dogs with CCD.

"It breaks my heart that the vast majority of people who find my site have dogs who are in late stages," Anderson says. "These owners are usually already grappling with the oncoming choices about euthanasia. I hope that more people can learn about CCD and begin to see the signs much earlier so they can take steps to slow the process."



Anderson has developed a printable checklist that includes an extensive list of CCD symptoms, designed to help dog owners recognize the signs and then keep records of behaviors their dog may exhibit, so they can remember to bring up these with their veterinarians. The checklist includes varied symptoms to watch for, including not responding to her name, seeking less attention, getting trapped under furniture, and being frightened of once-familiar people. (The checklist can be seen here: tinyurl.com/WDJ-CCD.)

Anderson also encourages people to keep in mind that while CCD is very upsetting for dog owners to grapple with, it isn't always as traumatic for our dogs. "We remember the dog's former vibrancy," she says. "But if we take a good look, dogs who pace may not be distressed. They don't remember what they have lost. And if dogs still have pleasures in life, and guardians who are attentive and who can help provide those, they still may have good months or years ahead of them."

Keeping dogs with CCD comfortable is key. Anderson has become an expert in strategies for supporting aging dogs and ensuring their homes are safe. She has found that putting bathmats and yoga mats on floors can help dogs who are unsteady or disoriented. She also encourages people to put dog beds, food dishes, and water bowls in a number of locations in the house, so that disoriented dogs can find them while wandering. "I put water stations in corners because Cricket ended up in corners a lot," Anderson says. She also advises that owners of dogs with CCD monitor and/or remove mobility ramps as well as access to stairs because the dogs may no longer have the cognitive ability to safely navigate them.

Enrichment is key for all dogs, but especially dogs with CCD. Anderson offers the important perspective that even if activity doesn't slow the progression of CCD for a particular dog, keeping these dogs mentally and physically active will help keep their overall quality of life as high as possible.



Hemangiosarcoma

It often appears without warning. Many people only learn about this devastating disease during an emergency veterinary visit.

While a diagnosis of canine cancer is never good, there are few types worse than hemangiosarcoma (HSA). Like all cancer diagnoses, it's frightening, shocking, and devastating. Often with this form of cancer there are no warning signs or symptoms; it can hit hard and fast and there may be little time to make decisions, much less research treatment options.

HSA is a highly aggressive cancer of blood vessel cells that develops almost exclusively in canines. While the dermal form can sometimes be successfully treated, the visceral form can suddenly become evident with critical, and often fatal, symptoms.

Hemangiomas are benign clusters of blood vessels on or beneath the skin, such as the red birthmarks that occur on infants; *sarcomas* are rare cancers that develop in the bones and soft tissues, including the blood vessels. *Hemangiosarcoma* refers to a highly malignant disease that develops in the endothelial cells that line the surface membrane of blood vessels and then invades the blood vessels themselves. Because hemangiosarcoma affects blood vessels, it can develop in almost any organ, with the spleen being the most common anatomic location (40 to 50% of cases).

HSA tumors affecting the atrium and the auricle of the heart were initially thought to be a result of metastasis but are now recognized as primary tumor locations comprising anywhere from 10 to 25% of cases; HSAs are the most common cardiac tumor found in dogs. In dogs with splenic HSA, 25% will also have a heart-based HSA.

The dermal form of the disease comprises about 13 to 15% of the cases. Less common sites include liver, tongue, kidney, bladder, lung, muscle, and bone.

It is estimated that HSA accounts for 5 to 7% of all canine cancers. Any age or breed can develop the disease. It usually occurs in larger breed middle-aged and older dogs (ages 8 to 12 years), though it has been reported in dogs under one year of age. While

traditionally there has been no sex predilection, recent reports are starting to show a slight increase in prevalence in males.

THREE TYPES

HSA is classified into three types based on anatomical location: dermal, hypodermal/subcutaneous, and visceral.

■ The **dermal** (cutaneous) form of HSA develops on the skin in areas that have minimal or no fur, appearing as black or reddish growths (can be singular or multiple masses) anywhere on the body, with the abdomen, rear legs, and prepuce the most common sites.

In most cases, the cancer does not spread to the dermis tissue and can be treated (and potentially cured) with surgical removal. Because of the malignant nature of the disease, however, it can spread internally, which occurs in about one third of cases; early diagnosis and prompt treatment is vital.

This form of HSA has a predilection for dogs with light or non-pigmented skin, sparse coats, and areas of white fur, and has been linked to excessive exposure to the sun. Thus, dogs with short white fur, such as Dalmatians, are predisposed to developing this type. It is believed that limiting sun exposure in dogs with thin fur and pale skin can help to prevent this form of the disease (there is no known preventive for other types of HSA).

■ The **hypodermal** (just under the top layer of skin) form of HSA is more aggressive and invasive than the dermal form. This type is characterized by dark red to black growths just under the normal overlying skin; a soft



Owners of dogs with hemangiosarcoma (HSA) may be misled by the absence of symptoms until the disease is quite advanced. Linus, a Portuguese Water Dog, is shown here in what his owners thought was the peak of health, at an agility trial just two weeks before his sudden death from HSA.

or firm mass may be palpable (due to bleeding), and ulceration is common. Local control is challenging, as the disease may be extensive; more than 60% of these cases spread internally.

■ **Visceral** (internal) hemangiosarcoma affects the internal organs, primarily the spleen and heart. It is an invasive and rapidly spreading malignancy, often life-threatening as the tumors can break open and bleed – often without warning.

BREED DISPOSITION

Large breed dogs appear to be at an increased risk, but especially Boxers, Bully-type breeds, Dobermans, English Setters, Flat-Coated Retrievers, German Shepherds, Golden Retrievers, Great Danes, Labrador Retrievers, Poodles, Portuguese Water Dogs, Skye Terriers, and Whippets. The dermal form is overrepresented in Basset Hounds, Dalmatians, and Whippets and in dogs middle-aged (4 years) or older.

CAUSE

The cause of HSA is unknown, but the breed association suggests a genetic predisposition. The dermal form is thought to be associated with excess exposure to sunlight as it is generally found in lightly-pigmented and/or thin-coated dogs. It has also been hypothesized that local irradiation may be contributing factor. Exposure to certain chemicals may also contribute to the development of the disease; though HSA in humans is extremely

Making the Most Out of the Time You Have

Roo was a large, adventurous, mixed-breed dog belonging to my colleague and friend Tory. In August 2008, at about 13 years of age, Roo was experiencing what her veterinarian thought were small seizures. By pursuing this one seemingly small isolated symptom, further diagnostic tests revealed a mass on her spleen.

A soft tissue specialist recommended exploratory surgery with removal of the tumor, if possible; this would provide the best chance for a diagnosis and treatment. Tory was hesitant: Roo was a senior dog; surgery seemed to be a lot of trauma to put her through – especially because at that moment she was perky and happy and appeared perfectly normal. It was only upon reflection that we realized this was periodic recovery from the small bleeds that intermittently depleted her body of red blood cells.

The specialist reassured Tory that Roo was very stable and that the surgery shouldn't be too taxing on her system. The vets suspected that the mass was more than likely some kind of malignant tumor – either hemangiosarcoma (incurable with a short survival time) or hepatocellular carcinoma (curable if completely removed).

Roo underwent a successful splenectomy. The tumor itself was found to be self-contained (a good sign), but additional smaller growths were seen on the liver (a not-so-good sign). The surgeon opted not to biopsy these growths as Roo's blood pressure was fluctuating during the procedure. Furthermore, if the masses were HSA, bleeding could become a serious problem.

Sadly, the biopsy confirmed the mass was HSA and an oral metronomic chemotherapy protocol was added to her palliative treatment plan; she was also supported with supplements and special home-prepared meals.

Roo spent weekdays with us at the office. She would spend time gazing out the picture window watching the city life of downtown San Francisco. She wandered from desk to desk in search of goodies. At my desk, she became quite adept at clearing everything off of it in search of



treats. I may have contributed to this behavior. She knew when it was time for lunch; French fries were her favorite. Or maybe it was ice cream. She was enjoying life.

And then one day at about five months post-surgery, Tory noticed Roo seemed a little off. Bloodwork was promptly performed; the results were not good. Her time was nearing and she was watched very closely.

A few days later, she had an episode similar to those that occurred at the beginning of the disease. She was carried to the car by a colleague and rushed to the veterinarian. She was failing fast and nothing more could be done – except take her home and let her eat out of a gallon container of ice cream while the vet sedated her.

Tori remembers: "As she was laying there, I realized what was so special about her: She was the first being in my life to whom I was her number *one*. I was the single most important person to that dog. I'd never really experienced that before. My other dog, Scout, was kind of 'everyone's dog' and all my other dogs before had been family dogs. So I thanked her over and over for choosing me!"

rare, exposure to vinyl chloride has been implicated.

SYMPTOMS

HSA tends to progress slowly at the beginning, usually without symptoms and without pain. As a result, a dog's body can tolerate the disease until it reaches a critical stage. Symptoms may appear for only a limited duration and will depend on the type of HSA and the specific location in the body (see above for dermal form).

Internal HSAs – both the hypodermal and visceral forms – may produce any combination of symptoms from general signs of illness such as lethargy, depression, dementia, inappetence, weight loss, constipation/unusual bowel movements, lameness, and decreased stamina, to more acute symptoms of fainting or weakness, lack of coordination, partial paralysis, intermittent collapse, seizures, abdominal swelling, nosebleeds, coughing, and increased panting.

These malignancies are vascular by nature and develop their own blood supply; however, the blood vessels are formed with mutated cells, and they eventually leak blood into surrounding areas. This slow, chronic bleeding in small amounts can cause subtle transient symptoms with the dog recovering as new blood cells are produced. Eventually the tumors will rupture, resulting in a substantial hemorrhage with critical and obvious symptoms commonly involving difficulty breathing, increased heart and respiratory rates, pale mucous membranes, and collapse due to hemorrhagic/hypotensive shock requiring emergency veterinary care.

DIAGNOSIS

If HSA is suspected, your veterinarian will perform a thorough physical exam, noting in particular any of the symptoms listed above. At times, abdominal tumors can be large enough that they are felt when palpated. A number of tests will likely be performed, such as a complete blood cell count (CBC), serum biochemistry profile, urinalysis, and coagulation profile. In dogs with HSA, abnormal-

ities noted in the blood panel may include anemia, red blood cell fragmentation, low platelet count, and high number of neutrophils (the primary white blood cells that respond to bacterial infection).

The coagulation profile will determine if there are clotting abnormalities suggestive of disseminated intravascular coagulation (DIC), which is present in about half of the dogs with visceral HSA. DIC is characterized by the development of small blood clots that block the blood vessels; this depletes the platelets and clotting compounds needed to control bleeding, which in turn can cause excessive bleeding. Heart arrhythmias are commonly associated with cardiac and splenic HSAs; accordingly, an electrocardiogram may be recommended.

Diagnostic imaging using radiographs or ultrasound are useful methods for locating, identifying, and characterizing masses in the abdominal and cardiac regions as well as providing possible evidence of free fluid or blood. When a mass on the spleen is detected, it may not be possible to determine if the mass is malignant prior to removal.

A fine needle aspirate may be used to take a tissue or fluid biopsy; analysis of samples taken directly from the tumor (or from a surgically removed tumor) provides the most conclusive method for making a diagnosis. This procedure, however, is not without risk: not only does it have the potential to spread malignant cells during the process, it can also trigger bleeding of the fragile tumors.

Imaging can also assess the extent of the malignancy (staging) and determine whether metastasis has occurred. This can be challenging because there may be multiple tumors and/or the primary tumor site may be difficult to determine.

A recent study by Carloni, et al, published in the *ACVIM Journal of Veterinary Medicine* ("Prevalence, distribution, and clinical characteristics of hemangiosarcoma-associated skeletal muscle metastases in 61 dogs: A whole body computed

tomographic study," Volume 33, Issue 2, March/April 2019, Pages 812-819) found that clinical examination and traditional diagnostic imaging modalities missed the presence of skeletal muscle metastases. The authors recommend whole body computed tomography (CT) scans for accurate assessment and detection of metastasis to lungs, muscle, and other sites.

The visceral form of HSA is very aggressive and grows rapidly with local infiltration occurring early in the course of this disease. The likelihood that it has spread from the primary tumor by the time of diagnosis is very high, with about 80% of cases with metastasis upon initial presentation. The liver and lungs are common sites of metastasis, but the disease can spread to any location in the body due to its connection to the blood vessels.

Because the symptoms associated with HSA can be subtle and non-specific, many cases are not diagnosed until a ruptured tumor results in catastrophic hemorrhage. While dermal HSA tends to have a lower metastatic rate and has the potential to be cured, it is important that a comprehensive assessment also be done in these cases because this form can still metastasize.

STAGING

Clinical staging is based on the results of the various diagnostic tests performed and can provide a foundation from which to explore and make treatment decisions. Two different three-stage classification systems are traditionally used for HSA.

Visceral HSA

- Stage I: Localized tumor; no other tumors seen in imaging or at time of surgery.
- Stage II: Ruptured tumor confined to the primary site, with or without metastasis present near the site of the primary tumor.
- Stage III: Ruptured primary tumor with invasion into adjacent structures plus local or distant metastasis.

Dermal / Subcutaneous HSA

- Stage I: Primary tumor confined to the dermis.
- Stage II: Primary tumor involving the hypodermis with or without dermal involvement.
- Stage III: Primary tumor with underlying muscular involvement.

TREATMENT

Because canine HSA tends to develop undetected until it has reached an advanced stage, the disease is often resistant to most forms of treatment. The modalities of surgery, chemotherapy, and radiotherapy can potentially have some effect.

■ **Surgery.** Surgery is typically the primary option for treatment for all cases of HSA.

For the dermal type, it may be the only treatment that is necessary. Sunlight-induced and superficial dermal HSAs are sometimes considered cured following surgery; however, new tumors can develop elsewhere on the body independent of a previous occurrence. It is advised that dogs diagnosed with this form of skin cancer should avoid as much sun exposure as possible. Dermal and subcutaneous HSA surgery sites can be quite extensive due to the necessity of removing all affected tissues.

For visceral forms of the disease, surgery is usually recommended for all locations except those involving the heart. Cardiac surgery is inherently difficult, but vascular tumors are even more challenging. Depending on the size and involvement, atrial tumors may be considered for excision. Because HSA is associated with life-threatening hemorrhage and a dismal prognosis, the difficult decision of whether to pursue emergency surgery must often be made quickly at the time of diagnosis.

For dogs with splenic masses, removal of the spleen (splenectomy) is recommended, even though it may not be known in advance if the tumor is benign or malignant. It is estimated that approximately 50%

of splenic tumors are benign, but even if they are non-cancerous, the tumors can be dangerous because the spleen itself is very vascular and can rupture and cause substantial and serious bleeding. Removal of the spleen thus becomes both a diagnostic (by providing tissue for biopsy) and a therapeutic procedure. During the procedure, the entire abdominal cavity will be examined for evidence of metastasis and additional tumors with samples of any suspicious tissue taken for biopsy.

If there is time before the surgery, it can help to have a decision made and plan in place for what you want done, depending upon the findings made during the procedure.

While surgery may be the best option available and provide the highest chance of increasing survival time, there are risks and concerns. Due to the inherent nature of the disease, there is a significant risk for severe hemorrhage during the surgical procedure.

Dogs presenting with emergency HSA may already be compromised; stabilization prior to surgery usually involves fluid therapy and/or blood transfusions and intensive care monitoring. Cardiac arrhythmias can occur post-surgery and, while most occurrences resolve within 24 to 48 hours, some may require treatment.

Removal of the spleen in deep-chested dogs may create more space in the abdominal cavity; as a result the dog may be more prone to gastric torsion and gastropexy (stomach tacking) may be warranted at the time of surgery.

■ **Chemotherapy.** Given the propensity for HSA to metastasize, chemotherapy is often recommended as an adjunct treatment to surgery, especially in cases of incomplete surgical removal, or as a primary treatment for heart-based HSAs (as surgery in the cardiac area can be very difficult).

There are several chemotherapy protocols used, consisting of either a single agent or a combination of drugs; doxorubicin (Adriamycin),

vincristine, piroxicam, cyclophosphamide, and methotrexate are the most common ones. Doxorubicin appears to reduce the gravity of the disease, yet it doesn't necessarily extend the survival time beyond that of other protocols.

Metronomic chemotherapy (a constant low dose of chemotherapy given at home in oral form) is being studied as an approach that not only reduces the chances of side effects but helps control the spread of disease and thereby increase survival time. Since HSA is not curable, the intention of chemotherapy treatment is to slow the cancer progression while providing a good quality of life.

■ **Radiotherapy.** Radiotherapy (RT) has limited use in treatment of HSA because of where the disease forms in the body (sites tend not to be conducive to receiving radiotherapy) and the extremely high rate of metastasis. It may be considered as a treatment option for dermal forms where surgical removal from external surfaces did not achieve clear margins, as an adjunct to chemotherapy, and for cases with localized Stage II or Stage III disease.

As a palliative therapy, RT can be beneficial in reducing pain and possibly extending survival time. Exploration of radiotherapy as a treatment option is continuing, however, and some recent – albeit small – studies have demonstrated that RT can provide clinical benefits to dogs with HSA.

COMPLEMENTARY REGIMENS

I'm-Yunity and Yunnan Baiyao are two alternative therapeutics that have been documented as having some success in treating HSA. While the research may be limited and in the early stages (studies are continuing), veterinary oncologists are incorporating these modalities into their treatment protocols.

■ **I'm-Yunit.** This is a polysaccharopeptide (PSP) compound from the *Coriolus versicolor*

You can't help it: Reconsidering past decisions after a devastating diagnosis

It's been nearly 2 ½ years since we lost our precious dog Linus to hemangiosarcoma. He was a sweet, silly, athletic Portuguese Water Dog and was just shy of his 10th birthday.

We got up one Saturday morning in April with plans to play at the park, then give him a bath in preparation for his first therapy dog visit the next day. My husband, Paul, got up before me and I heard him say, "Hey buddy, are you okay?" Linus was laying down panting in the hallway. When we went out to the family room, Linus ambled out and dropped to the ground. We called the emergency vet to let them know we were on our way.

I had to carry Linus to the car and into the veterinary hospital because he couldn't stay on his feet. They took him back right away. After what seemed like an eternity, the veterinarian came out and said that Linus was in severe shock and appeared to be bleeding into his belly. I have a number of friends who have lost dogs to HSA, and I was terrified. I kept asking, "Do you think it's hemangiosarcoma?" I remember thinking it was so surreal to be sitting in the vet office hoping that my dog had ingested poison, because at least there may be something to do about it.

They did an ultrasound, which found multiple masses on Linus' spleen and liver.

The veterinarian reviewed our options: surgery to remove whatever tumors he could (but it was likely that Linus wouldn't survive surgery); try to slow/stop the bleeding and buy some time (likely a few days); or make no attempt at treatment and let him go. I just couldn't believe that a few hours before we were making plans for the weekend and now were contemplating how to manage Linus' final hours or, at most, days. I desperately wanted to get him home; I didn't want him to die in a vet office. We decided to try to control the bleeding to see if he could improve enough to make it home. The vet called a couple hours later to say that despite transfusions and medication, Linus' clotting function was non-existent and we needed to make a decision. We raced back.

We found Linus in so much pain and distress that we decided we needed to help him depart immediately. Another situation I never imagined – please, please hurry and euthanize my wonderful dog. Linus was gone in just a few minutes. My beautiful, funny, intelligent, loving dog who always lived life to the fullest was gone.

SECOND-GUESSING, SO HARD

I can't count the number of times I've pondered the decisions we made over the course of Linus' life. Did this or that contribute to his cancer?

Linus had allergies that began before he was a year old. We tried everything under the sun: elimination diets, frequent baths, various medications, etc. He was on Apoquel for some time; it helped significantly with his itching. Sometime later he developed a nasty skin infection, which we treated with antibiotics and increased the Apoquel. A few months after that, I found some small black growths on the skin of his elbow. We had them biopsied, and while they weren't

harmful, the dermatologist said Linus' immune system should have prevented them from growing; the Apoquel may have suppressed his immune system too much. We discontinued the drug; fortunately, what is now Cytopoint was newly available and we started that with success. Should we not have used the Apoquel? I have no idea. I do know that it gave him relief when nothing else seemed to help and made a drastic difference in the quality of his life.

Another event happened about 10 months before he died. He had ambled across a yellowjacket nest in the ground and a number of yellowjackets stung him. I've never seen anything like it. It was awful. His face puffed up like that of a prize fighter. The emergency vet treated him with antihistamines and a two-week course of steroids. Another immune suppressor – might that have opened the door to the cancer? The timing makes me think it's possible. I'm not a fan of steroids, but for his situation, I think it was necessary to help him recover.

A month or two later he seemed not quite himself – a bit less enthusiastic about things he usually loved. Then he recovered. He had his annual physical a week or two later. Everything seemed fine. I told the vet that he had this period of a few weeks where he was a little subdued. I said, "You know I'm scared to death of hemangiosarcoma." He said we could do an ultrasound if I wanted, but added that there wasn't much that could be done for HSA. In the unlikely event that we had been able to detect HSA at that point, a splenectomy and chemo might have bought us just a couple more months. His last six months of life were great, and it would have been heartbreaking for us to have spent that time dealing with the discomfort of treatment that would likely accomplish little.

On the other hand, I was comforted by the fact that for most of his life we gave Linus a raw, fresh diet. I loved making his food, and he loved eating it! I hope it helped him live longer than if he had been on a different diet.

The multitude of questions continue to swirl in my head and heart. In the end I try to remind myself that we made the best decisions we could at the time with the information we had, always with the intention of providing Linus the best life possible. And most importantly, we loved that wonderful dog and enjoyed a beautiful life with him. – Joanne Osburn



Linus waiting for a goody at a hamburger stand one week before he died. He sure didn't look like a dog who was dying of cancer.

mushroom, commonly known as the Yunzhi or turkey tail mushroom. It has been used for over two millennia in traditional Chinese medicine; Western researchers have recently begun exploring this mushroom as a possible anti-cancer agent for use in humans and canines. It has been demonstrated to have antitumor activity in tissue culture studies and can boost the body's own cancer-fighting abilities by improving the function of the immune system.

In 2012, a small (15 dogs) clinical trial at the University of Pennsylvania demonstrated the efficacy of I'm-Yunity mushroom supplements in dogs with cancer. This double-blind randomized multidose pilot study featured a high-dose of PSP, which significantly delayed the progression of metastasis and increased the reported survival times for canine hemangiosarcoma.

The data suggest that PSP, as a single agent, might offer significant improvements in morbidity and mortality. For more information, see "Single Agent Polysaccharopeptide Delays Metastases and Improves Survival in Naturally Occurring Hemangiosarcoma," in *Evidence-Based Complementary and Alternative Medicine*, Volume 2012.

■ **Yunnan Baiyao.** Yunnan Baiyao is also a Chinese herbal medicine and is known for its hemostatic (stops bleeding) and wound-healing properties. It is a protected Chinese traditional medicine and the exact formula is a trade secret, but labelling does identify its primary components.

Yunnan Baiyao is frequently used in veterinary medicine to control bleeding in dogs by improving clotting and platelet function and veterinary oncologists are prescribing it to control or stop bleeding from cancerous vessels.

In laboratory experiments, Yunnan Baiyao has been shown to kill HSA cells. Yunnan Baiyao appears to be of benefit to dogs with HSA, but documentation on efficacy and side effects is not yet available; clinical trials are still being conducted.

PROGNOSIS

HSA is a formidable disease, especially when compared to most other canine cancers. As with any form of cancer, statistics are presented as general guidelines and do not represent how an individual dog will respond to treatment.

The long-term prognosis for dogs with HSA is dismal, even when the disease is discovered at its early stages. For dogs who are receiving treatment, however, their quality of life usually remains good to excellent. Even as the disease progresses, it does not appear to cause much pain; instead, dogs may experience a return or increase of symptoms such as bleeding, anemia, or weakness.

Overall, 6 to 13% of dogs with HSA who are treated with surgery alone will be alive one year post diagnosis; of those treated with surgery and chemotherapy, the one-year survival rate increases to 12 to 20%.

- Survival time for dogs with dermal HSA that cannot be cured through treatment varies greatly and is dependent on such factors as location and stage. In cases where the dermal lesions invade the sub-cutaneous tissues, the survival times fall in the range of five to 10 months.

- The average survival time for dogs with hypodermal HSA is six months.

- Without treatment, most dogs diagnosed with HSA of the internal organs will die within one to two weeks of diagnosis, although some can survive for several months and others only a day.

- The prognosis for patients with splenic HSA treated with only surgery ranges from one to three months, while those treated with surgery and chemotherapy have an improved prognosis range of four to eight months. However, if extensive metastasis is present at the time of surgery, survival time is only about two months when followed with chemotherapy.

- Clinical stage tends to be strong-

ly associated with the prognosis for dogs with splenic hemangiosarcoma.

- The prognosis declines for dogs with splenic tumors that rupture; survival time tends to be shorter and unpredictable.

- Dogs with evident metastasis at diagnosis and who do not undergo surgery may respond to chemotherapy, which can provide a prolonged quality of life when compared with dogs who are not treated at all.

- The prognosis for dogs with tumors that involve the heart, liver, and/or other internal organs is worse than for those with splenic tumors.

- Dogs with Disseminated Intravascular Coagulation (DIC) appear to have shorter survival times than dogs without the condition.

- Unfortunately, almost all dogs with HSA will succumb to the disease from tumor rupture or metastasis to the organs.

REASON TO HOPE

HSA affects thousands of dogs every year, but investigation into it has been limited, primarily because it is almost exclusively a canine disease. Most other types of canine cancers occur in humans as well and consequently have a greater impetus for research.

It has been more than 40 years since chemotherapy was added to the standard of care for the treatment of HSA. While there has been little improvement in the prognosis for dogs since then, recent studies show promise for the development of new screening methods and early detection, which will allow for treatment to begin sooner and, we hope, a better outcome. See "On the Horizon: Hemangiosarcoma Studies" on the next page for more information about the latest research on this devastating disease. 🐾

Having lost two dogs to cancer, long-time WDJ contributor Barbara Dobbins follows cancer research news closely.

On the Horizon: Hemangiosarcoma Studies

Every veterinarian who has treated a dog with HSA wishes for better early diagnostics and more effective therapies to stop the growth of the HSA tumors. "The wish list for every veterinary oncologist starts with trying to find some way to deal with hemangiosarcoma," says Rodney Page, DVM, MS, Professor of Oncology, Director of the Flint Animal Cancer Center, and Principal Investigator for the Golden Retriever Lifetime Study. "It's a tumor that's relatively unique to dogs and has completely evaded all attempts to understand what's going on in a way that's able to be modified in the patient. It's a rapidly fatal cancer and one that desperately needs better diagnostic tools and treatments." (Quoted from "Cancer Research: Looking Back, Moving Forward," morrisonanimalfoundation.org, March 27, 2019.) Fortunately, research on HSA is taking place in many locations:

- Ethos Veterinary Health's Canine Hemangiosarcoma Molecular Profiling (CHAMP) project is a multi-faceted prospective study of canine splenic HSA. One of its first undertakings was to assess the value of personalized medicine in dogs with HSA and then validate the usefulness of a potentially prognostic test. Through a collaboration between Ethos and the Translational Genomics Research Institute (TGen), the molecular characterization of genomic alterations in HSA was recently completed. CHAMP hopes to identify dogs with distinct prognoses and develop molecularly targeted therapies for each patient.
 - Ethos Discovery (a division of Ethos Veterinary Health, LLC) is evaluating Rapamycin to determine whether it can improve treatment outcomes for dogs with HSA and to gain an understanding of which HSA genotypes may benefit most from its use. Rapamycin is known to have an immunosuppressive that provides significant anticancer activity and has been approved for use in treating several human cancers.
 - At the Flint Animal Cancer Center at Colorado State University in Fort Collins, researchers are evaluating the effectiveness of VDC-597 administered orally to dogs with Stage I and II splenic HSA who have undergone splenectomy. VDC-597 is an oral agent that has antitumor and antimetastatic activity in human and mouse cancer models as well as in canine HSA cell lines.
 - The Veterinary Clinical Investigations Center at the University of Pennsylvania in Philadelphia, in partnership with NovaVive, are in the follow-up stage of a study on the efficacy of treating canine splenic hemangiosarcoma with intravenous Immunocidin, the mycobacterial cell wall fraction derived from non-pathogenic *Mycobacterium phlei*, stimulating anti-tumor activity. It is currently approved for the treatment of mammary cancer in dogs.
 - The University of Minnesota Veterinary Medical Center, Purdue University, and University of Pennsylvania are collaborating on a study to determine whether propranolol (a blood pressure medication) used in combination with standard-of-care doxorubicin chemotherapy can improve outcomes for dogs with HSA. Propranolol can kill HSA cells in the laboratory; it has also been effective in reducing disease progression and increasing survival time in humans with angiosarcoma (which is similar to canine HSA).
- A study at the New York State College of Veterinary Medicine at Cornell University aims to find and test new drugs that can prevent tumor growth. The long-term goals of this project are to identify better procedures and drugs to treat canine HSA as well as to test the ability of newer targeted drugs in preventing tumor growth or recurrence.
 - The Shine On Project, led by Jaime Modiano, VMD, PHD, at the University of Minnesota College of Veterinary Medicine, is designed to detect HSA cells in the blood at the earliest onset by way of a new, targeted drug called eBAT. The drug was developed at the University of Minnesota with the goal of destroying the cells responsible for tumor formation, thereby stopping the formation of malignancies. The process "will use a blood test to look for the cells responsible for establishing and maintaining the disease, and then use an experimental drug treatment that attacks those same cells in order to prevent development of the tumor." Researchers at the college have been studying the biology and the behavior of HSA for more than 10 years.
 - A recent retrospective multicenter observational cohort study of 406 dogs determined that the risk of HSA diagnosis in dogs presenting with blood accumulation in the abdomen could be predicted using a simple risk score modeled on four predictors: body weight, total plasma protein, platelet count, and thoracic radiograph finding. This evaluation process could aid in identifying and treating dogs at lower risk for this diagnosis. ("Development and validation of a hemangiosarcoma likelihood prediction model in dogs presenting with spontaneous hemoabdomen: The HeLP score," Schick et al, *Journal of Veterinary Emergency and Critical Care*, Volume 29, Issue 3, 17 April 2019.)
 - Michigan-based Metta Pets is currently enrolling dogs at select referral centers around the United States for a clinical trial, "Investigation of a traditional Chinese medicine herbal therapy protocol for treatment of dogs with Stage II splenic hemangiosarcoma after splenectomy." They will evaluate the impact of a standardized bupleurum-based herbal formula administered with vitamin D supplementation, Yunnan Pai Yao, and coriolus mushroom granular extract in canine patients diagnosed with stage II splenic HSA following splenectomy. To date, no toxicities from the treatment have been noted, including one dog who received a significant repeated overdose due to client non-compliance. Preliminary data suggest improved survival times when compared to chemotherapy treatment and an increase in the number of patients living to one year or more. This study will assist in determining if these promising findings are repeatable when a larger number of patients are evaluated.

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BOOKS AND VIDEOS

Sassafras Lowrey, CTDI, is the author of the forthcoming books *Tricks in the City: For Daring Dogs and the Humans That Love Them*; *Healing/Heeling*; and *Bedtime Stories For Rescue Dogs: William to the Rescue* with illustrator Lili Chin. You can find all of her books on Amazon.com and her website SassafrasLowrey.com

WDJ Training Editor Pat Miller is author of many books on force-free, pain-free, fear-free training, including:

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The final article in our canine cancer series looks at the resources available for navigating a cancer diagnosis. We hope you never need them.
- ▶ **Eyes On Me**
How to keep your dog's attention on you on leash, even when you have to look away from him.
- ▶ **Canned Food Review**
How to identify the best canned food for your dog that's in your budget.
- ▶ **The Case of the Disappearing Teeth**
All about canine "tooth root resorption" and what can you do to stop it from taking your dog's teeth.

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