

Expert information on medicine, behavior, and health in collaboration with a world leader in veterinary medicine

## THIS JUST IN

### Big Heart Surgery On a tiny dog at Cornell

**T**iny Buttercup was born with patent ductus arteriosus (PDA), a vessel that is normally open (patent) in the developing fetus and closes at or soon after birth. In utero, this vessel provides a developing puppy with oxygenated blood, but if it doesn't close (i.e., remains patent, a common congenital defect), it can lead to congestive heart failure.

This defect is commonly fixed by surgically placing an occlusion device within the patent ductus via a catheter that is placed in the femoral artery. Unfortunately, 6.4-lb. Buttercup's femoral artery was too small for the procedure. The common alternative is open heart surgery to tie off the ductus, which means opening the chest cavity and a more prolonged recovery than the catheter-based method.

However, Dr. Romain Pariaut, associate professor and section chief of cardiology at Cornell University's College of Veterinary Medicine, and cardiology resident Dr. Christophe Bourguignon suggested a rarely used, difficult technique that involved placing an occluding device via a catheter in the femoral vein, which has a larger diameter than the femoral artery. The rarely utilized surgery successfully closed the ductus, and at her three-month checkup, Buttercup was doing well. ■

<https://news.cornell.edu/stories/2021/05/tiny-dogs-big-heart-procedure-first-its-kind-cornell>

#### INSIDE THIS ISSUE

Diet and Acquired Megaesophagus.....	2
Defending Against Ehrlichia Bacteria.....	2
FDA Solution for Drug Shortage.....	2
A Primer: Canned or Dry? .....	3
Hypothyroidism in Dogs .....	4
Getting Through Chemotherapy.....	5
RSS and Urinary Crystals .....	7
The Benefits of Dog Ownership.....	7
Rescue-Dog Aggression Issues.....	8
Happening Now .....	8

## Oh Skunk!

### How to deskunk your dog

**D**ebra M. Eldredge, DVM, Cornell class of 1980, recommends a popular and effective de-skunk recipe:

- ▶ 1 quart of 3% hydrogen peroxide
- ▶ ¼ cup of baking soda
- ▶ 1 teaspoon of liquid dishwashing soap

Dr. Eldredge recommends making a fresh batch each time your dog gets skunked and not trying to keep it premixed, as it creates a reaction that can rapidly expand and explode, making a huge mess.

To use this mixture:

- ▶ Dab any oil from the skunk's spray that is on your dog's coat. Paper towels work well to absorb it and remove it.
- ▶ Mix the hydrogen peroxide, baking soda, and dish soap. It will fizz!
- ▶ Use rubber gloves to apply the mix to your dog as soon as possible. Do not get it in the eyes.
- ▶ Rub the mixture into your dog's coat and leave on for approximately five minutes.
- ▶ Rinse thoroughly. Leaving the mixture on too long can bleach the hair.

You can purchase commercial premade de-skunk shampoos, too, of course, but always read the directions closely beforehand. Some products may need to be diluted before use, while others may work best when applied to a dry coat. Do not mix multiple products together unless they are intended to be used that way, as solutions can react in unexpected and sometimes harmful ways.

Depending on how close your dog was to the skunk, it may take multiple rounds of treatment to completely clear the odor. Some dogs may continue to have a slight skunk smell when wet for a week or so afterward even if they do not have a detectable odor when dry. Don't worry—it will improve over time! ■



The Humane Society says skunks warn before spraying by stamping their front feet, raising the tail, hissing, making short forward charges, and twisting their hind end around in your direction. Apparently, most dogs do not know this.

## CDC Ban on Importing Dogs

### Rabies is the reason for the order

**I**n July, the Centers for Disease Control and Prevention (CDC) placed a year long ban on importing dogs from 113 countries that are classified as high risk for rabies. This includes any dogs that have been in one of those countries during the previous six months. The CDC estimates 6% of all dogs imported into the United States arrive from countries at high risk for dog rabies.

There will be limited options for personal dogs returning to the United States or being brought in by a private owner and no guarantee an individual dog will be allowed entry. No rescue groups or adoption or resale groups may bring dogs in.

In an interview with NPR, Dr. Emily Pieracci said the CDC discovered more than 450 dogs arriving with falsified or fraudulent rabies certificates, a 52% increase compared with the previous two years. A recent example involved a dog imported from Azerbaijan that flew into Chicago with 32 other dogs and a cat in June. The dog was placed with a family in Pennsylvania. When he showed unusual behavior, he was found positive for rabies. At least 12 people were exposed. Now, the other animals from that shipment need to be traced and evaluated for any potential signs of rabies. ■

<https://www.cdc.gov/importation/bringing-an-animal-into-the-united-states/high-risk-dog-ban-frn.html>





## Diet and Acquired Megaesophagus

### Outbreaks in Latvia and Australia

The esophagus is a muscular tube that runs from the mouth to the stomach. Its job is to efficiently move food into the stomach. Megaesophagus (AIME) is an enlarged, or stretched out, esophagus. As a result, the esophagus can no longer efficiently move the food, which can accumulate in the esophagus. When this occurs, dogs may aspirate food or regurgitate it back up. This can lead to aspiration pneumonia, which can be fatal.

While surgical, medical, and management techniques—such as feeding affected dogs standing in an upright position on two legs—can help, they cannot cure the problem.

Recently, outbreaks of AIME were identified in Latvia from 2014 to 2016 and then in Australia from 2017 to 2018. In Latvia, mainly pet dogs were affected, while in Australia it was among working dogs.

Two different commercial diets (not sold in the United States) were seen in both outbreaks but affected dogs did have a high likelihood of eating a specific diet. No toxins or severe deficiencies have been identified. In Australia, some concern centered around a new source for some of the diet's ingredients.

At this time, the increase in cases of megaesophagus remains idiopathic (unknown cause). The correlation with the diets eaten suggests some relationship, but it has not been established yet. ■

*JAVMA Jul15 2021 Vol259 No. 2 A comparative analysis of two unrelated outbreaks in Latvia and Australia of acquired idiopathic megaesophagus in dogs fed two brands of commercial dry dog foods: 398 cases*

## Defending Against Ehrlichia Bacteria

### Nanobodies from llamas, alpacas, and camels may be key

Ehrlichia bacteria are tough to kill as they live inside cells that normally fight infections. They are serious pathogens for people and other mammals. Ehrlichia is one of the tick-borne illnesses tested for in the four-way screening test done annually for dogs.

Yasuko Rikihisa, PhD, from Ohio State University, identified proteins essential to the survival of this pathogen and proteins that can block them. The question was, however, how to get them to the Ehrlichia. Fortunately, scientists knew that llamas, alpacas, and camels can create small, single-chain antibodies, called nanobodies, which can get into cells and attach to antigens with their binding sites, thereby preventing infection. Jeffrey Lakritz DVM PhD, also at Ohio State, was able to immunize a llama to create nanobodies against Ehrlichia. So far, the nanobodies have been tested only in mice, but the research is still a breakthrough. ■

<https://news.osu.edu/using-nanobodies-to-block-a-tick-borne-bacterial-infection/>

## FDA Solution for Drug Shortage

### Allows temporary import of approved pimobendan

Pimobendan is a widely used medication for dogs with dilated cardiomyopathy and/or congestive heart failure secondary to valvular insufficiency. The drug increases the strength of heart muscle via calcium sensitization and promotes vasodilation. A recent shortage of pimobendan (Vetmedin) prompted the Food and Drug Administration to allow “the temporary importation of Vetmedin capsules and Vetmedin chews by Boehringer Ingelheim Animal Health USA, Inc., from Canada, the United Kingdom, and Ireland to immediately increase the availability of Vetmedin in the United States.” The products have the same primary active ingredient, pimobendan, and are approved where manufactured and under the regulations of those countries. Compounded versions of pimobendan are not FDA approved. ■

[https://www.fda.gov/animal-veterinary/cvm-updates/fda-helps-improve-availability-vetmedin-critical-heart-dog-dogs-united-states?utm\\_medium=email&utm\\_source=govdelivery](https://www.fda.gov/animal-veterinary/cvm-updates/fda-helps-improve-availability-vetmedin-critical-heart-dog-dogs-united-states?utm_medium=email&utm_source=govdelivery)



#### EDITOR IN CHIEF

William H. Miller, VMD, Dipl ACVD,  
Emeritus, Professor, Clinical Sciences

#### EXECUTIVE EDITOR

Cynthia Foley

#### TECHNICAL EDITOR

Debra M. Eldredge, DVM

#### ADVISORY BOARD

James A. Flanders, DVM, Dipl ACVS, Emeritus,  
Associate Professor, Clinical Sciences

Katherine A. Houpt, VMD, Ph.D., Dipl ACVB,  
Emeritus, Professor of Behavior Medicine

Joseph Wakshlag, MS, DVM, Ph.D., Dipl ACVN,  
Associate Professor, Clinical Nutrition

Kelly R. Hume, DVM, DACVM  
Associate Professor, Oncology

Meredith L. Miller, DVM, Dip ACVIM  
Lecturer, Small Animal Medicine

Leni K. Kaplan, MS, DVM  
Lecturer, Community Practice Service

#### CONTRIBUTING WRITERS

Eileen Fatcherich, DVM  
Katherine Basedow, LVT

DogWatch is an independent newsletter  
produced in collaboration with Cornell  
College of Veterinary Medicine



Cornell University  
College of  
Veterinary Medicine

For information on pet health, visit the Cornell  
University College of Veterinary Medicine,  
website at [vet.cornell.edu](http://vet.cornell.edu)

#### Send questions and letters to the editor:

DogWatch

535 Connecticut Ave.

Norwalk, CT 06854-1713

[dogwatcheditor@cornell.edu](mailto:dogwatcheditor@cornell.edu)

Subscriptions: \$39 per year (U.S.) • \$49  
per year (Canada). For subscription and  
customer service information, visit  
[www.dogwatchnewsletter.com/cs](http://www.dogwatchnewsletter.com/cs)  
or write to: DogWatch, P.O. Box 8535,  
Big Sandy, TX 75755-8535. 800-829-5574



DogWatch® (ISSN: 1098-2639) is  
published monthly for \$39 per  
year by Belvoir Media Group, LLC,  
535 Connecticut Ave., Norwalk,  
CT 06854-1713. Robert Englander,  
Chairman and CEO; Timothy H.  
Cole, Chief Content Officer; Philip L.

Penny, Chief Operating Officer; Greg King, Chief  
Marketing Officer; Ron Goldberg, Chief Financial  
Officer; Tom Canfield, Chief Circulation Officer.  
©2021 Belvoir Media Group, LLC.

Postmaster: Send address corrections to  
DogWatch, P.O. Box 8535, Big Sandy, TX 75755-8535.

Express written permission is required to  
reproduce, in any manner, the contents of this  
issue, either in full or in part. For more information:  
Permissions, DogWatch, 535 Connecticut Ave.,  
Norwalk, Connecticut 06854-1713.



# A Primer: Canned or Dry?

*Either is fine, as long as it meets AAFCO standards*

All quality manufactured pet foods follow the same nutrient standards—those from the American Association of Feed Control Officials (AAFCO)—so your dog can have a nutritionally adequate complete diet with just canned food or just dry food, provided you choose the appropriate level for your dog.

Standards include gestation/lactation (pregnancy and nursing), growth (puppies), maintenance (adults), and all life stages, which literally covers all life stages. However, you may want to understand a little better what you get when you choose canned vs. dry food.

## Canned Food

Canned foods, by their very nature, contain more water than kibble, making them more expensive per calorie in most cases. However, that extra fluid can be important for some dogs, especially those who need more water intake. Canned foods must be refrigerated after opening.

Canned foods can be useful in weight-control diets, as the extra fluid helps your dog feel full without added calories. They're also less calorie dense, meaning you can usually feed a bit more volume when feeding canned than you can with dry food.

Canned food tends to have fewer preservatives than kibble and won't grow stale on the shelf. Canned foods also usually have more meat protein and fat and fewer carbohydrates.

Dogs recovering from jaw injuries or dental procedures are often happier eating canned food, at least at first.

Picky eaters can be enticed more readily with canned food as well. Canned foods tend to offer more odors to attract a dog. If you warm it up, you get even

*Both kibble and canned dog food are nutritionally balanced, and that's what matters.*



more smells to attract a picky eater or a dog recovering from an illness or injury.

Senior dogs also often opt for canned over dry food. Actually, almost any dog will prefer canned food, so it's worth giving some consideration. Some dog owners feed a canned-dry mix.

## Dry Foods

Dry foods are less expensive by the pound and are convenient. Dry foods can be stored for longer periods if kept in a cool, dry location. They don't require refrigeration. If you free feed (not a recommended practice!), dry is the optimal choice as it will not spoil after being left out for a few hours.

Some kibble is treated to help with dental problems—canned food cannot do that—and may be a plus for dogs prone to tartar and plaque formation (if you're considering this option for your dog's teeth, be sure you look at the Veterinary Oral Health Council's approved foods list at [vohc.org](http://vohc.org)).

If your dog is a voracious eater or needs some mental enrichment, dry foods can be put into food puzzles and snuffle mats. These options slow down the rate of eating plus give your dog some work and entertainment as he earns his food. Wet food is far too messy for these.

Both dry and canned foods, or a combo, can be used to stuff chew toys like Kongs for enrichment.

## Choices

Dogs tend to be as omnivorous as carnivorous, so they adapt quickly to eating food in any form from roadkill to deluxe pet food. Most dogs will adapt to canned versus dry easily over a few days' time, although many people choose to feed a little of both, which helps encourage eating in picky dogs (yes, there are some!).

Always read the label on your dog's food, looking for the AAFCO statement to be sure it's adequate for your individual dog (people with multiple dogs often have to feed more than one type of food).

Both canned and dry foods can provide a balanced and complete diet for your dog. You may need to experiment to find which form of food your dog prefers, although many dogs do very well with a combination of the two. ■

## Are You a Math Person?

One important calculation that you might need to do yourself is to compare nutrients on a "dry matter basis." Otherwise, the added fluid in canned food can skew your concept of how nutritious a food might be.

Let's look at protein. Your canned food might say 8% on the guaranteed analysis label. That does not seem like much! Now, look at the moisture content. The label is often around 75% moisture. That means you have 25% dry matter.

Your first math step is to divide the percent protein by the actual dry matter percentage. In our example, 8 divided by 25 equals 0.32. You now multiply that by 100. That gives you the protein on a dry matter basis of 32%. Much more impressive than your original thought based on the straight guaranteed analysis with no correction.

You can do the same calculations for any nutrient and to compare a dry food against a canned food. Dry food also has some moisture, but much less than the canned, so the guaranteed analysis is generally close to the actual dry matter content. These calculations can be important if your dog is on a specialized diet to help battle a health problem.

## BPA in Dog-Food Cans

BPA, bisphenol A, is an industrial chemical that can disrupt endocrine functions and used to be widely used for lining cans until research showed that the BPA would migrate into the food. A study from University of Missouri-Columbia showed that dogs who ate only canned food had increased serum BPA concentrations. Those concentrations correlated with gut microbiome and metabolic changes. They also noted that an increase in BPA may reduce one bacterium that can metabolize BPA and related environmental chemicals. If you're not sure the can your dog's food is in is BPA-free, it may be wise to check the website or call the manufacturer, especially for lower-quality food choices.



# Hypothyroidism in Dogs

## Obesity, lethargy, and skin problems are signs

**H**ypothyroidism is a common endocrine disorder in dogs that usually shows up in affected dogs before 6 years of age.

Female dogs are at greater risk than males and, according to several studies, neutered and spayed dogs are at the greatest risk of developing the disease. An analysis published in *Cornell Vet* stated: "Spayed female dogs displayed a significantly higher risk when compared to intact females . . . male castrated dogs had 30% more hypothyroidism compared to their intact counterparts."

Hypothyroidism is often seen in Golden Retrievers, Doberman Pinschers, Dachshunds, Shetland Sheepdogs, Irish Setters, Airedales, and Cocker Spaniels, but any breed or mix can be affected. Note: Some sighthounds (Greyhounds, Irish Wolfhounds, Borzoi, Whippets) may have lower normal thyroid hormone blood levels.

### What's Going On?

The thyroid gland helps regulate overall metabolism and influences many body systems. Low thyroid hormone production tends to be associated with skin problems, but it can affect many areas of the body causing a variety of clinical signs.

"The signs of thyroid disease are many and varied. Lethargy, weight gain, abnormal bark, muscle weakness, and, of course, skin and ear disease. Obviously, in my clinic, skin and ear disease are the primary reason for presentation," says William H. Miller Jr VMD, DACVD, Cornell University College of Veterinary Medicine Emeritus Professor of Dermatology.

"If the dog and its owner do agility,

the muscle weakness might be recognized first because the dog doesn't jump as well as it had in the past. Thyroid disease is often found in seniors when their annual bloodwork shows an elevated cholesterol. When the dog is supplemented, its activity picks up, and it returns to its normal self. The owners had attributed the slow down to age and not thyroid disease," says Dr. Miller (see "Signs of Hypothyroidism").

### Causes

There are two main causes of hypothyroidism in dogs. The first is an autoimmune condition called lymphocytic thyroiditis, which is responsible for about half the cases of canine hypothyroidism. This is a genetically inherited disease.

While there is no direct gene test, screening for autoimmune thyroiditis can be done. The blood test will pick up dogs from early onset to full-blown disease. Onset is usually 2 to 6 years of age. Most dogs with autoimmune thyroiditis will have autoantibodies present by 3 or 4 years of age, even if they don't have any clinical signs. The Orthopedic Foundation for Animals keeps a registry with thyroid test results for breeders. Dogs with clear-cut autoimmune thyroiditis should not be bred.

The second primary cause is idiopathic thyroiditis, which means the exact cause is unknown. This accounts for about 45% of the cases. These dogs start off with a normal thyroid. Then, usually between 2 to 5 years of age, the thyroid cells start to atrophy.

Thyroid cancer is possible but not common in dogs. Pituitary cancers may cause secondary hypothyroidism.

### Diagnosis

Diagnosing hypothyroidism can be involved. Up to 75% of dogs with a thyroid problem will show an increase in cholesterol, and the veterinarian may see cholesterol deposits on the cornea and dry eye or lack of tearing. In addition, dermatologic conditions can mimic the clinical signs of hypothyroidism and complicate diagnosis.

## Hypothyroid Signs

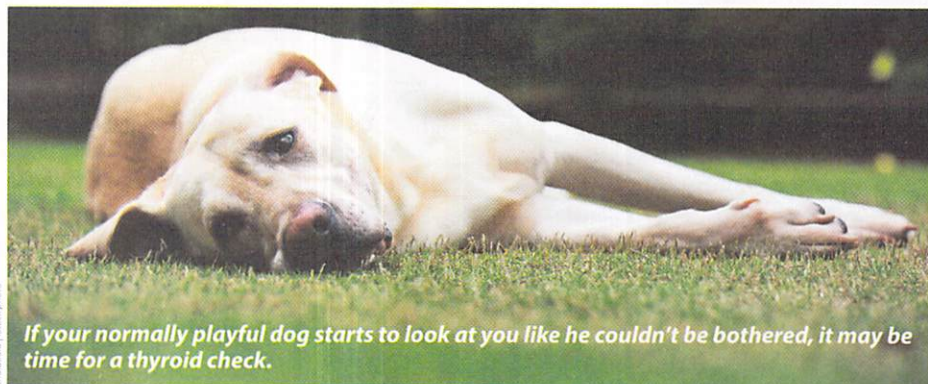
Owners of sport/performance dogs may notice a change in weight and energy early on, while those who own pet dogs may not realize something's amiss until the dog's harness, collar, or coat becomes tight. However, weight gain alone is not necessarily a symptom of hypothyroidism in dogs. "I like to tell people with overweight dogs that the dog has an overactive mouth and not an underactive thyroid," says Dr. Miller.

Signs worth investigating include:

- ▶ Weight gain without increased appetite or extra food
- ▶ Less activity (lying around, not wanting to exercise or play)
- ▶ Dry, dull, brittle hair coat that sheds easily with poor regrowth
- ▶ Alopecia (hair loss)
- ▶ Darkened, thickened patches of skin
- ▶ Frequent skin and ear infections
- ▶ Intolerance to cold temperatures
- ▶ Slow heart rate
- ▶ Muscle and/or overall weakness
- ▶ Loss of libido, infertility, miscarriages, irregular heat cycles

These signs are also sometimes associated with hypothyroidism:

- ▶ Laryngeal paralysis
- ▶ Low (but normal) levels of thyroid hormones
- ▶ Seizures
- ▶ Neurological signs, like dragging their feet, head tilt, drooping lips



*If your normally playful dog starts to look at you like he couldn't be bothered, it may be time for a thyroid check.*



Sometimes liver enzymes will be slightly elevated. Also, up to 40% of hypothyroid dogs may have a mild anemia. Your veterinarian will consider testing for various thyroid hormone components: T4 (thyroxine), FT4 (a subset of thyroxine, called “free T4”), TSH (thyroid stimulating hormone), and T3 (triiodothyronine).

A simple T4 level is included in many bloodwork panels. A low level should be followed up with a complete thyroid diagnostic panel. Tests for T4 are quite sensitive with estimates of 90 to 100%. Unfortunately, up to 60 to 70% of the thyroid tissue must be damaged before blood results reflect the decreased levels of hormone.

Once you start looking at specific thyroid panels, it can get complicated. Finding the right combination of tests to determine if the dog truly is hypothyroid and, if possible, the cause can become costly and confusing. Usually, the TSH is the determining factor, although other illnesses can affect thyroid hormones.

A measurement of free-T4 may be useful in differentiating dogs with true hypothyroidism from dogs with reduced thyroid function for other reasons, such as due to chronic illness, drug administration, or malnutrition.

Dogs who are on some medications may have falsely decreased levels of thyroid hormones. Commonly used medications that can affect thyroid levels include prednisone, phenobarbital, some nonsteroidal anti-inflammatory drugs (NSAIDs), and trimethoprim-sulfamethoxazole (Bactrim).

### Treatment Options

Treatment for hypothyroidism is usually basic: Give the affected dog levothyroxine sodium (ThyroTabs) to replace the missing T4 hormone. It can take a few months to get the exact dose established using bloodwork. Usually, your dog will start on a once-a-day dose, but some dogs need twice a day dosing.

Monitoring helps to determine the correct level and avoids overdosing, which can lead to thyrotoxicosis. Dogs getting too high a dose will pant, act anxious and/or hyper, drink (and urinate) more than usual, and may show gastrointestinal signs such as vomiting and diarrhea. If this happens, stop the medication, and contact your veterinarian to get the dose adjusted.

Your veterinarian may want two blood samples initially, one before

medicating for that day and then a second sample about six hours later after giving the pill. Once a good dose has been established, levels should still be checked on your dog’s annual exam unless problems arise earlier.

A few dogs will not show full response to therapy unless they also receive a T3 supplement. These dogs can more easily go thyrotoxic, however, so more frequent monitoring is important to establish the correct dose.

Dr. Miller says that if your dog has skin disease, a return to a normal coat can take 12 to 16 weeks. It may take longer to regrow a full show coat. During this time, regular brushing and bathing are indicated. Depending on how bad the coat is, once or twice weekly grooming may be necessary for the first month of supplementation. After that, the frequency of grooming treatment can decrease as the coat improves. Most other signs will show a response in a month or less such as an increase in activity levels.

### When It Works

Thyroid function is critical to good

## Individual Normals

Some dogs will test “equivocal” on thyroid evaluation testing. If that testing is repeated with no changes, it is felt that those results are “normal” for that dog. Dogs in breeding programs should have annual or biannual thyroid screenings.

health. Some owners are surprised at how much more active their senior-citizen dogs become once their thyroid hormones are properly regulated.

“When the dog is supplemented, its activity picks up and it returns to its normal self. The owners often attribute the slow down to age and not thyroid disease. I had an elderly patient with coat issues that resolved with supplementation. At the recheck the owner, a senior citizen, told us that he was going to stop the supplement because the dog became so puppy-like and strong that he couldn’t control the dog any longer!” says Dr. Miller. ■

## Interpreting Thyroid Tests in Dogs

The Cornell Animal Health Diagnostic Center offers advice for deciphering the results of canine thyroid blood tests: Measurement of free-T4 may be useful in differentiating dogs with true hypothyroidism from dogs with reduced thyroid function due to other chronic illness, drug administration, and malnutrition. TSH is normal in many abnormal dogs, so they recommend measuring it in combination with other thyroid function tests. Thyroglobulin autoantibody (TgA) testing is recommended for dogs with a breed predilection for autoantibody problems or those with unexpectedly high T3 or T4 values.

Total T4	Total T3	Free-T4	TSH	Possible Interpretation
low	low	low	normal/high	primary hypothyroid
low	normal/low	normal/high	normal	sick euthyroid
low	normal/high	low	normal	primary hypothyroid (early stage)
low	high	low	normal/high	T3 autoantibody & hypothyroid
low	normal/low	low	normal	secondary hypothyroidism
normal	normal	normal	normal	euthyroid
normal	low	normal	normal/high	euthyroid
normal	normal	low	normal/high	not diagnostic for hypothyroidism
high	normal/low	high	normal	T4 autoantibody/T4 supplementation
high	normal/low	low	normal/high	T4 autoantibody & hypothyroid
high	high	high	normal	functional thyroid tumor
high	high	low	normal/high	T3 & T4 autoantibody; hypothyroid



# Getting Through Chemotherapy

*The scoop on how to handle the ups and downs*

**C**anine cancer is stressful, but when the oncologist mentions “chemotherapy” anxiety often escalates. It shouldn’t. Dogs handle chemo better than people. Dogs live in the moment. They avoid the mental anguish human cancer patients endure. As you go through chemo with your dog, remind yourself that your goal when choosing this cancer therapy is remission with a good quality of life. Realistically, you’re adding a few years or so at the most, but it’s worth it.

The goal of chemotherapy is to kill or disable rapidly dividing cells that are typical of neoplasms. Most chemo drugs are nondiscriminatory, which means normal cells that divide frequently will be affected, too. Classic examples are hair follicles, bone marrow, and gastrointestinal cells, however, specific side effects will vary with the chemotherapy medications used.

**Hair Loss.** When it comes to hair, dogs with continuously growing coats such as Poodles will be most obviously affected. Expect the hair loss and look beyond it. Your dog could not care less about what he looks like! Areas that have been shaved tend to grow back slowly, and the coat may have a different color or texture. Your dog doesn’t care about that, and neither should you.

**Blood Changes.** Bone marrow effects are more serious. Many chemotherapy drugs cause a drop in platelets (the cells responsible for clotting) and white blood cells (the infection fighters) about a week after treatment. This is the window when your dog becomes more susceptible to clotting problems and potential infections due to a drop in immune fighting cells like neutrophils.

For this reason, your dog will have an appointment scheduled to check his blood cell counts a week or so after a chemotherapy treatment. If the counts are very low, your veterinarian may recommend avoiding other dogs, such as at classes or activities like day care. He or she may advise you to check your dog’s temperature daily because a fever might indicate an infection that requires antibiotics. The chemotherapy schedule may be adjusted to allow your dog’s body to recover and catch back up.

**Gastric Upset.** Gastrointestinal (GI) side effects are the most common and

## You Should Know

If you are administering any chemotherapy drugs at home, such as oral pills or capsules, be sure to follow the directions exactly. Wear gloves, wash your hands thoroughly and dispose of pet waste as directed. These are potent toxic drugs!

can range from fairly severe to very mild. Nausea, loss of appetite, vomiting, and diarrhea may all occur, usually one to five days post treatment. For most dogs, this will be mild and will self-correct in a day or two.

Treatment can include anti-nausea medications and antiemetics such as the injectable maropitant (Cerenia) or mirtazapine. For diarrhea, metronidazole is commonly dispensed. If your dog has a gastrointestinal reaction, your veterinarian may dispense medications prophylactically at the next treatment. She may recommend skipping a week or a treatment while your dog “resets.” This is perfectly acceptable.

Many dogs can handle the gastrointestinal chemo effects with

standard care for any GI upset. Withhold food for 24 hours. Leave the dog ice cubes to lick to help with hydration but try to avoid your dog gulping water. Small amounts of bland food such as boiled chicken or hamburger can tempt a fussy eater and make great foods to get your dog back to normal.

Note: You may see the terms “MTD,” which stands for maximal tolerated dose, and “metronomic” used with chemotherapy protocols. MTD is the all-out, big-bang attack on the cancer cells. This version may have the greatest results but may also come with a greater risk of side effects. Metronomic therapy is aimed at controlling tumor growth and spread, not so much reducing the primary cancer. Side effects tend to be less, but survival times may also be less.

## Supplements: Save Your Money

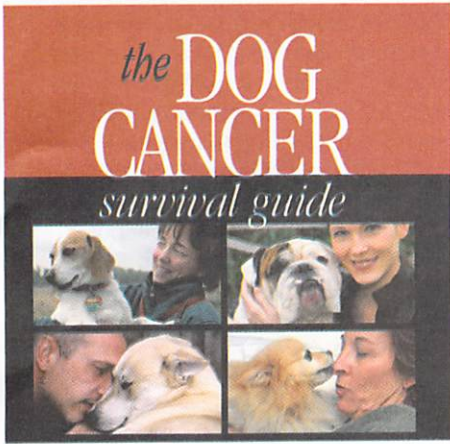
The market is full of supplements and additives that are touted to help your dog through his chemotherapy journey, and of course we want to do everything we can to make this easier on our dogs. Well, if that is truly the case, do not spend a dime on any of these products without first checking with your veterinarian. Some of these hope-building extras—whether they’re organic, natural, vitamins, etc.—are just a waste of money, but others can interfere with the effectiveness of treatment.



*Remember that dogs do not suffer the mental anguish that human cancer patients battle.*

Alamy.com/Photo





**Dr. Demian Dressler, DVM**  
with Dr. Susan Ettinger, DVM, Dip. ACVIM (Oncology)

Full Spectrum Treatments to Optimize Your Dog's Life Quality and Longevity

An excellent resource for anyone whose dog has cancer is "The Dog Cancer Survival Guide" ([dogcancerbook.com](http://dogcancerbook.com)). The authors, Dr. Demian Dressler and Dr. Susan Ettinger, both graduated from Cornell University's College of Veterinary Medicine. Although published in 2011, this book provides support for anyone dealing with canine cancer.

For example, antioxidants are good, right? They fight those damaging free radicals that wreak havoc on the body. Right? Well, if you give antioxidants at the same time as the chemotherapy drugs are active, you will decrease the chemo's action on the tumor cells, which is the last thing you want to do.

Cannabis receives a great deal of attention for its purported effects on cancer, nausea, and pain. But marijuana and its side products like cannabis are not approved for use in pets. Veterinarians cannot legally prescribe them and, in some states, cannot even discuss them. Research may change this in the future, but for now, it's wise to avoid them. Medicinal mushrooms are helpful to some dogs with cancer including counteracting unwanted side effects of chemotherapy. If you want to try this option, your veterinarian can guide you to ethical companies and safe options.

**Stay Positive**

Most dogs undergoing chemotherapy have a good quality of life, and usually the benefit of treating the cancer outweighs side effects. For an older dog and/or one with other medical conditions, however, cancer treatment may not be the best option. As always, have a frank discussion with your veterinarian about what's best for your dog. ■

# RSS and Urinary Crystals

*This lab test looks at minerals in the urine*

If you have a dog who has suffered from urinary crystals or bladder stones, you may have seen the initials RSS, which stands for Relative Super Saturation, meaning the minerals in the urine.

Super saturation may take you back to high school chemistry. You have a beaker of solution (in your dog's case, urine). You add things until crystals form on the bottom of the beaker. For your dog, the additions are minerals like calcium and magnesium. These simply dissolve in the fluid until certain conditions are met. You can adjust how much you can add of certain minerals without crystals forming by changing the pH of the fluid or by adding more fluid.

RSS involves three sets of conditions. One is urinary specific gravity or concentration. If urine is dilute, it can handle greater amounts of minerals without crystals or stones forming in most cases. This is why your veterinarian encourages you to get dogs and cats prone to urinary problems to drink more. That may mean fresh water replaced multiple times a day, a drinking fountain, water added to meals, or switching to canned foods due to the higher water content.

The second condition is the actual amounts of some minerals your dog may be consuming on a daily basis. These minerals include magnesium ammonium phosphate (for struvite problems) and calcium oxalate for oxalate problems. Your dog might do best on a diet that limits the amounts of these minerals.

The third condition is the urinary pH. Minerals will settle out to varying degrees influenced by the pH (acidity or alkalinity) of the urine. Depending on the type of crystals your dog tends to have in the urine, it can be adjusted to more acidic or more alkaline to help prevent crystal formation.

With prime conditions for RSS, crystals will settle out of the urine and eventually stones may form. The exact type of stone will be determined by the pH of the urine and the minerals present.

RSS values are calculated using various computer software programs after looking at the variables mentioned above. Dog food manufacturers use RSS values when formulating diets, especially for any prescription diets for dogs with urinary problems. An RSS under 1 means low likelihood of any crystal formation. For struvite, an RSS between 1 and 2.5 is generally OK. For oxalate, RSS values of 1 to 10 should be fine. Any RSS calculated above those limits means a higher risk of crystal formation.

RSS values can be calculated both to prevent any crystal or stone formation but also to try to dissolve already formed stones through dietary management. For stone dissolution, the ideal RSS is under 1. ■

5 THINGS

## The Benefits of Dog Ownership

*Dogs make good things happen in our lives*



- 1 **Dogs give us a sense of purpose.** We all need to be needed. A dog needs you to care for him, and in return, he gives you love, loyalty, and protection.
- 2 **Dogs are scientifically proven to relieve stress.** Research shows interactions with dogs lower cortisol (the stress hormone) and raise oxytocin (feel-good hormone).
- 3 **Dogs make us exercise.** They have to be walked, and we need to go with them, whatever the weather.
- 4 **Dogs increase our social circle.** By going to dog parks, training classes, or dog sports, our dogs help us meet people with shared interests.
- 5 **Dogs make us healthier.** A Harvard study showed dog owners have a lower risk of heart disease than those without canine companionship. ■



# Rescue-Dog Aggression Issues

## Showing serious aggression as an adult dog

**Q** I rescued a 2-year-old male Labrador mix a couple of years ago. I was told he was given up because of chasing the neighbor's chickens. I don't know how much he was socialized, walked, or taken on car rides.

He is very dog-reactive on walks on leash, in the backyard, or in the car. He jumped out of the car while I was trying to attach his seat belt and attacked two Huskies walking by. The owners filed a police report, and we avoided charges by paying the \$1,000 worth of medical bills of the owner and dog.

He is good with our cat in the house, but he reacts to neighbor cats on walks. He has done OK at the dog park playing with other dogs, including Huskies.

I don't know if he's reacting out of fear of being attacked himself, actual aggression, or just not knowing how to properly greet another dog due to not being socialized as a young dog. What do I do to prevent his aggression?

**A** First, good for you for using a seat belt for your dog. Dogs shouldn't ride loose in cars.

You were kind to adopt a rescue dog. Unfortunately, as a rescue, he may not have been properly socialized or he may have been socialized but as an adult began to show the serious aggression you are seeing and was given up for adoption.



*If you properly train your dog to accept a basket muzzle, he will fully accept wearing it.*

There are several things you can do to reduce his aggression. Ideally, you would take him to a veterinary behaviorist for advice specific to your individual dog (go to the American College of Veterinary Behaviorists at [dacvb.org](http://dacvb.org) to find a veterinary behaviorist near you).

Your regular veterinarian can help you by prescribing medication such as sertraline (Zoloft) or fluoxetine (Prozac) to reduce aggression.

Many dog-training places offer "Reactive Dog" classes that are meant for dogs like yours. If you can't find a class, try to find a good professional dog trainer who uses only positive training methods (that means no shock collars!).

Your dog should wear a muzzle in

public to protect other dogs and their owners. A muzzle isn't any more cruel than a collar or harness. Lots of good YouTube videos are available to show you how to train the dog to love the muzzle.

Select a basket muzzle like the Company of Animals Baskerville Ultra Muzzle. Follow website instructions on fit or ask your veterinarian to help you select a muzzle. Be sure to select a basket muzzle, which allows your dog to drink water and pant. Sleeve muzzles are for temporary use, such as during a veterinary procedure.

Your dog certainly exhibits actual aggression. What we really want to know is his motivation for the serious aggression he is demonstrating. I don't think it is fear because he is attacking, not reacting. His behavior in the car and in your yard is probably territorial aggression.

I think he should be better than OK at the dog park. He should be perfect, even when a strange dog enters the park. If not, he should not go to the park and spoil it for other dogs. You don't want another \$1,000 bill either.

Meanwhile, limit his time in the yard or obscure his view of passing dogs because he will become increasingly confident as he chases away dogs that were passing anyway. During a walk, keep a handful of treats in your pocket and the minute you see another dog pop a treat in your dog's mouth. The idea is to teach him that approaching dogs mean good things, not frightening or challenging things. Good luck. ■

### Do You Have a Behavior Concern?

Send your behavior questions to Cornell's renowned behavior expert Katherine Houpt, VMD, Ph.D., shown here with Yuki, her West Highland White Terrier. Email to [dogwatcheditor@cornell.edu](mailto:dogwatcheditor@cornell.edu) or send by regular mail to DogWatch, 535 Connecticut Ave., Norwalk, CT 06854-1713.



### Coming Up ...

- ▶ Calluses on Your Dog's Joints
- ▶ Ways to Handle the Reactive Dog
- ▶ Facts Behind the Spay/Neuter Controversy
- ▶ When the Cancer Is Hemangiosarcoma

### ©HAPPENING NOW ...

**Ankle Replacement**—A surgeon at the University of Florida replaced an arthritic dog's ankle with a prosthetic implant known as the TATE Ankle, developed by BioMedtrix. The surgeon, Stanley Kim, BV.Sc, is one of only 12 worldwide able to perform this surgery.

**Divorce Decisions**—According to *Smart Briefs*, laws regarding pet ownership during a divorce are changing. Alaska, California, and Illinois have enacted laws granting judges the power to treat pets more like children and less like property. New York has a bill pending.

**Royal Pets**—Queen Elizabeth has launched a line of pet products on the website [royalcollectionshop.co.uk](http://royalcollectionshop.co.uk) (click on gifts, then gifts for pets). A Hunting Stewart tartan pattern Buckingham Place Dog Coat Small is 35 pounds, which is about \$48.68 in U.S. dollars. ■

### World Rabies Day

World Rabies Day, which began in 2007, is celebrated each year on September 28, which is the anniversary of Louis Pasteur's death. Pasteur and his colleagues developed the first effective rabies vaccine. According to the Centers for Disease Control and Prevention, more than 59,000 people worldwide die from rabies each year. ■

