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The Whole



Dog Journal™

A monthly guide to natural dog care and training

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FEATURES

3 Is Cancer Prevention Possible?

Holistic practitioners suspect that if it is possible to prevent canine cancer, the key will be found in a robust immune system.

8 Way to Stay

How to produce a completely dependable “stay” in your dog, no matter what the distraction. (Hint: It takes a lot of practice!)

12 Heartworm: Don't Take It Lightly

This is one aspect of canine healthcare for which conventional medicine offers the best – and perhaps the only truly reliable – prevention and treatment protocols.

16 The Shape of Things to Come

This training technique can be used to get your dog to do just about anything. The best part is, it's really fun for you and your dog!

20 Brains of the Operation

The Tour of the Dog is electrified by a look into the central nervous system.

*All systems
are go . . .
page 20*



*Stay as long
as you want
... page 8*



*Use this or something like it
... page 12*

ALSO IN THIS ISSUE

- 2 Editor's Note
- 24 Product and Expert Resources

Prevention Plus

It's simple; sometimes conventional medicine is best.

BY NANCY KERNS

Readers may be surprised to learn from “Heartworm: Don’t Take It Lightly,” page 12, that we recommend the use of conventional heartworm preventative drugs. Our usual suggestion is to minimize the use of pesticides, vaccines, artificial food additives, and toxic chemicals on or around dogs, so one might guess that we’d also be opposed to heartworm preventatives.

One can readily find numerous anecdotal reports about raw-fed, holistically supported dogs who successfully resist heartworm infection without the benefit of preventatives, or even dogs who live well into their senior years while hosting a small population of heartworms. Some holistic practitioners believe this is the natural state of a healthy dog. A properly fed dog with a vibrant immune system, they say, should be able to live in a state of relative health and balance with parasites.

Challenge studies have demonstrated that if dogs who were never previously exposed to heartworm were deliberately infected with 100 heartworm larvae, between 60 and 75 adult worms will develop in about 90 percent of the dogs. This suggests that dogs do have some small amount of natural resistance to the parasites. But we think it’s folly to bet your dog’s life on the notion that you can build his resistance to heartworm solely with a natural diet and holistic healthcare – particularly in areas where heartworm disease is prevalent.

That’s because we’ve also heard stories from people like Christie Keith, a Scottish Deerhound breeder and longtime advocate of raw diets and holistic healthcare for dogs. Keith opted not to administer conventional heartworm preventatives to her dogs for 16 years –

but was converted to their use after *two* of her raw-fed dogs developed heartworm infections. We’ve heard other heartworm tragedies, but Keith’s story is particularly resonant. If such an experienced and dedicated proponent of holistic healthcare wasn’t successful in a low-risk environment at preventing infection in her dogs, perhaps it just can’t be done. It may well be that dogs were never meant to have to resist year after year of repeated exposure to the parasites.

However, we *have* determined that there are a number of ways that you can minimize your use of the conventional preventatives and still fully protect your dog. Researcher Mary Straus brings these findings to light on page 12.

TRAINING TIPS

We also have two really great training articles in this issue: Mardi Richmond’s “Way to Stay” on page 8 and Pat Miller’s “The Shape of Things to Come” on page 16. Both articles offer detailed instruction on fun, positive methods for producing a happy, well-behaved dog who is highly motivated to figure out what you want and do it.

There is, however, a catch – one that should be apparent from the length of the articles: you have to actually practice with your dog to achieve your training goals! Try it! You’ll be amazed at what you and your dog can accomplish in just a few minutes of positive training a day – *every day.*



NK

MISSION STATEMENT: WDJ’s mission is to provide dog guardians with in-depth information on effective holistic healthcare methods and successful nonviolent training. The methods we discuss will endeavor to do no harm to dogs; we do not advocate perpetrating even minor transgressions in the name of “greater good.” We intend our articles to enable readers to immediately apply training and healthcare techniques to their own dogs with visible and enjoyable success. All topics should contribute to improving the dog’s health and vitality, and deepening the canine/human bond. Above all, we wish to contribute information that will enable consumers to make kind, healthy, and informed decisions about caring for their own dogs.

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Is Cancer Prevention Possible?

If so, experts are certain the key will lie in a healthy immune system.

BY CJ PUOTINEN

What could be better than curing your dog's cancer? That's easy! How about avoiding the illness in the first place?

No one has done any clinical trials or statistical studies that *prove* you can prevent cancer in at-risk dogs. "But common sense and clinical experience make a strong case for avoiding anything that exposes an animal to known carcinogens or weakens the immune system," says Stacey Hershman, DVM, a holistic housecall veterinarian in Rockland County, New York.

Just like their human companions, dogs live longer, healthier lives when they eat the right foods, get enough exercise, breathe clean air, drink clean water, and stay away from harmful substances. They may also be helped by immune-boosting herbs, supplements, special foods, and a few things you might not have thought of. Here's a review

of recommendations from holistic veterinarians and other experts.

Good genes

An important first step in selecting a puppy or adult dog is learning everything you can about the immediate family – parents, grandparents, siblings, aunts, uncles, cousins, etc. Some breeds are notoriously prone to cancer, and some lines within those breeds reinforce the trend. Look for good genes and good health when selecting puppies or adopting adult dogs.

Of course, rescued dogs seldom come with this documentation, and even the best-bred dog can develop cancer. But starting with good raw material can reduce the risk – and if you know that your dog may be prone to certain types of cancer, do what you can, starting today, to make that diagnosis less likely.

Spaying/neutering

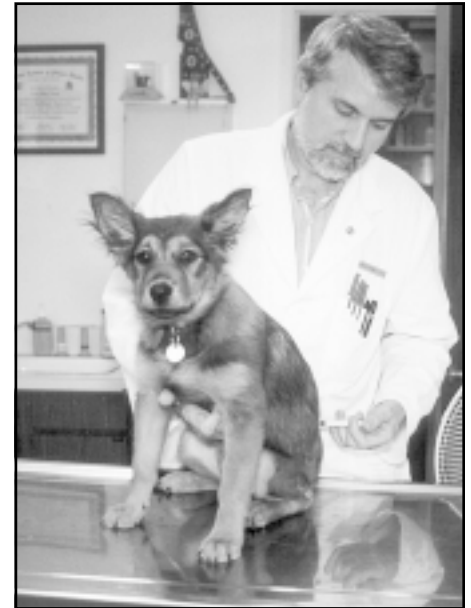
The statistics are convincing: female dogs have a significantly lower risk of developing mammary tumors if they are spayed before coming into season for the first or second time, and testicular cancer is obviously not a problem in neutered males.

But while early spaying reduces the risk of mammary cancer, it quadruples the risk of developing cardiac hemangiosarcomas (vascular tumors) compared to intact females. In addition, a study of 3,218 dogs neutered before one year of age showed that both males and females had a significantly increased chance of developing osteosarcoma (bone tumors) compared to intact males and females.

Understanding your dog's inherited risks can help you make informed decisions about whether and when to schedule surgery.

Vaccinations

For Dr. Hershman and most holistic veterinarians, routine vaccinations top the list of things to avoid. "Vaccines really disrupt the immune system," she says, "especially com-



A minimal vaccination protocol is recommended by holistic vets and veterinary colleges. Increasingly, overvaccination has been identified as a health risk.

bination vaccines that are given annually." Like many holistic veterinarians, she recommends a single-dose parvovirus vaccination at age 10 to 12 weeks, followed by a single-dose distemper vaccination four weeks later and a rabies vaccination after age six months.

"I check the effectiveness of these shots with blood titer tests," she says. "If immunity is strong, there's no need to revaccinate. If it's weak, I repeat whatever the puppy needs for protection."

Label directions warn veterinarians not to vaccinate a sick animal; Dr. Hershman includes injured or stressed animals in that caution. "Vaccinating a dog who's being spayed, neutered, or treated for an injury is totally irresponsible," she says. "You want the animal to be healthy, with a strong vital force, not in a weakened, vulnerable state, when you introduce substances designed to challenge the immune system."

Responding to decades of research by

The Whole Dog Journal™



WHAT YOU CAN DO . . .

- Study your dog's breed and line for cancer risk factors.
- Avoid unnecessary vaccinations and symptom-suppressing drugs.
- Work with a holistic vet to find alternatives that work.
- Improve your dog's immune system with diet and supplements.
- Protect your dog from environmental toxins, lawn chemicals, second-hand smoke, and pesticides.

immunologists, veterinary textbooks and colleges no longer recommend annual vaccinations for dogs, but most veterinary clinics continue to prescribe them. "They routinely prescribe antibiotics, steroids, and other symptom-suppressing drugs, too," says Dr. Hershman, "and those take a toll on the immune system. Whenever you can use nutrition, homeopathy, acupuncture, medicinal herbs, or other natural therapies instead of symptom-suppressing drugs, you strengthen the dog's immunity. A strong immune system is the best defense against cancer."

The right diet

Advocates of home-prepared diets for dogs have long claimed that their animals are healthier than they would be on commercial pet food. Beth Taylor and Steve Brown, authors of *See Spot Live Longer*, agree. They blame dry and canned dog foods for a host of problems because they usually contain inferior-quality proteins, fats, and carbohydrates, a variety of toxins, highly processed grains, chemical preservatives, allergens, and other questionable ingredients.

Many veterinarians blame grain-based pet foods for diabetes, digestive problems, and other canine disorders. After all, the canine digestive tract evolved on a diet of prey animals, consisting mostly of meat and bones, not wheat and corn.

Every few years, aflatoxin, which grows on corn, rice, and other grains, contaminates pet foods and kills dogs (see "Yes, Dog Food Can Kill," February 2006). In addition to causing liver damage, aflatoxin is a potent carcinogen, so even "safe" levels that

don't cause obvious disease outbreaks can contribute, over time, to cancer.

Another carcinogen found in grain-based foods is acrylamide, once believed to exist only in industrial waste. However, acrylamide has recently been found almost everywhere in the human diet. This tasteless, invisible by-product is formed when high-carbohydrate foods are fried or baked at high temperatures. French fries and potato chips contain the highest concentrations, but acrylamide occurs in breads and breakfast cereals as well.

The U.S. Environmental Protection Agency (EPA) considers acrylamide so dangerous that it set the "safe level" for human consumption at almost zero, with the maximum safe level in drinking water set at 0.5 parts per billion. A small serving of French fries contains over 400 parts per billion. No one has tested pet foods, but any processed foods that contain carbohydrates, especially those extruded at high temperature like grain-based kibble or canned under high heat and pressure, pose a risk.

"Considering how ubiquitous these carcinogens are," says San Francisco-area dog health researcher Mary Straus, "and considering that cancer cells thrive on carbohydrates, avoiding grains altogether may be one way to help lower the risk of cancer."

In addition to reducing levels of carbohydrates and carcinogens, feeding a home-prepared diet of pasture-fed, organically produced ingredients (see "Upgrading to Pasture-Fed," July 2003) insures that your dog will not ingest pesticide and drug residues. Food prepared at home from conventionally farmed ingredients may not be free of pesticide residues, but it is unlikely to contain chemical preservatives, artificial colors or flavors, or the by-products of high-heat processing.

In his book, *Work Wonders: Feed Your Dog Raw Meaty Bones*, Australian veterinarian Tom Lonsdale observes, "We need more information about the cancer epidemic in domestic dogs. However, basic nutritional and medical principles tell us that diet is the likely main factor.

Without waiting for extra information,

and because cancer often takes years to develop, it's best to start puppies on a cancer-prevention diet early. From the whelping box to the grave, let 'Prevention, not treatment' be our motto."

Dietary supplements

Antioxidant supplements, which help protect the body from damage by free radicals, have many health benefits, including cancer protection. Best-selling antioxidant supplements include vitamins A, C, and E, beta carotene, lycopene, and the mineral selenium. Bear in mind that some alternative cancer treatments, such as artemisinin, are not compatible with antioxidants.

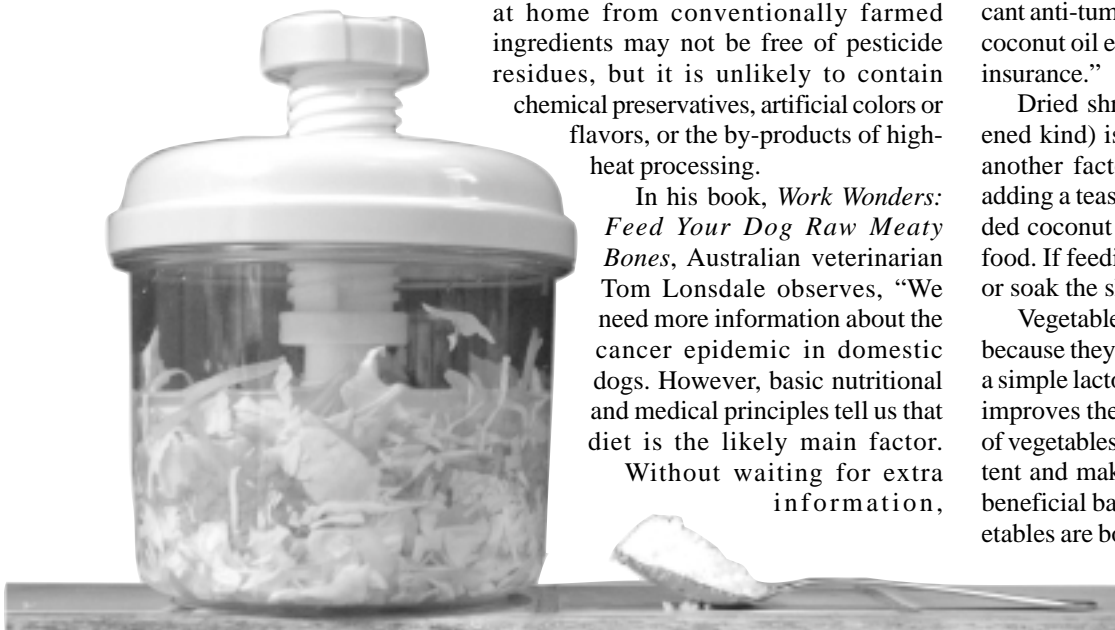
Food-source antioxidants, vitamins, and other nutrients derived from whole foods are recommended by many holistic veterinarians because they are recognized as food by the body and are more easily assimilated than synthetic vitamins grown in a laboratory. The words "whole food" or "food source" indicate natural rather than synthetic ingredients.

One of the simplest cancer-resisting supplements you can add to your dog's food, according to Bruce Fife, ND, is coconut oil. Dr. Fife, the author of several books about coconut's health benefits, recommends feeding dogs 1 teaspoon of coconut oil per 10 pounds of body weight per day in divided doses. That's 1 tablespoon (3 teaspoons) for a 30-pound dog and 2 tablespoons for a 60-pound dog. (See "Crazy About Coconut Oil," October 2005.)

"The medium-chain fatty acids in coconut oil help treat or prevent all kinds of illnesses," he says, "and they have significant anti-tumor properties. Giving your dog coconut oil every day is inexpensive health insurance."

Dried shredded coconut (the unsweetened kind) is an excellent source of fiber, another factor in cancer prevention. Try adding a teaspoon to a tablespoon of shredded coconut to your dog's home-prepared food. If feeding dry food, add a little water or soak the shredded coconut first.

Vegetables are controversial ingredients because they're hard for dogs to digest. But a simple lactofermentation process not only improves the digestibility and assimilation of vegetables, it increases their vitamin content and makes them a valuable source of beneficial bacteria. In fact, the treated vegetables are both a prebiotic (food that feeds beneficial bacteria) and probiotic (food that contains beneficial bacteria). In Eu-



rope, lactofermented vegetables are the key ingredient in a popular cancer treatment.

To make lactofermented vegetables (see “It’s All in How You Make It,” March 2001), simply grate, shred, or puree carrots and other vegetables, add 1½ teaspoons unrefined sea salt per quart (4 cups) of vegetables, add the contents of a probiotic supplement such as acidophilus, and press everything in a bowl or glass jar until juice covers the vegetables. (The task is made considerably easier with a Japanese salad press like the one seen on page 4; see “Cancer Prevention Resources,” page 6, for purchasing information.)

Close the jar tightly or, if using a bowl, cover vegetables with a plate weighted by a jar filled with water. Let stand at room temperature until the vegetables give off a vinegar-like fragrance; this will usually take two to three days, depending on their consistency and room temperature. Refrigerate. Use to replace vegetables in any home-prepared recipe, or add 1 tablespoon to ¼ cup lactofermented vegetables to each meal.

Environmental factors

Take two individuals from the same litter of puppies of a breed or family that has a high cancer risk. Place one with a family of heavy smokers who live next to a busy highway, use lawn chemicals, drink fluoridated tap water, and have high-current power lines in the backyard. Place the other pup on a pristine organic farm. Feed both the same diet and let several years go by. You don’t have to be an oncologist to know which dog is more likely to develop cancer.

Second-hand smoke is a serious problem for pets, especially those who spend hours every day at the feet of their smoking companions. “I tell all my clients who smoke that they’re putting their dogs’ health at risk,” says Dr. Hershman. “I saw it happen in my own family, and it breaks my heart. Second-hand smoke is as dangerous to dogs as it is to infants.”

Busy highways, driveways, parking lots, and areas where trucks and cars idle are dangerous for dogs because of gas and diesel exhaust. A dog’s nose is much closer to the ground – and exhaust pipes – than the human nose, so dogs are more likely to inhale damaging particles.

Lawn treatments and agricultural chemicals are known to cause cancer in animals (see “Canine Cancer Crisis,” November 2005). Dogs pick up pesticides, herbicides, and other chemicals through their feet and, when they sniff the ground, through their

noses. Keep your dog off the grass in chemically treated neighborhoods, and explore organic alternatives for your own lawn and garden.

Even household chemicals pose a threat to our canine companions. According to the U.S. Consumer Product Safety Commission, more than 150 chemicals found in the average home are linked to birth defects, cancer, and psychological abnormalities. If labels carry a “keep away from children and pets” warning, or if product labels suggest they should be used only in well-ventilated areas, look for alternatives.

Fluoride has gotten such good press over the decades that most Americans think it’s essential for healthy teeth. It’s even added to some canine toothpastes. But in many countries, fluoride is considered a hazardous industrial waste, and its use in water supplies is prohibited. In September 2005, eleven unions representing more than 7,000 scientists and researchers at the EPA called for a national moratorium on the fluoridation of America’s drinking water, citing cancer risks.

A December 2005 analysis of more than 22 million tap water quality tests, most of which were required under the federal Safe Drinking Water Act, found that water suppliers across the U.S. detected 260 contaminants in public tap water. Of the 141 unregulated contaminants detected in water supplies between 1998 and 2003, 52 are linked to cancer, 41 to reproductive toxicity, 36 to developmental toxicity, and 16 to immune system damage. Water contaminated with 83 agricultural pollutants, including pesticides and fertilizer ingredients, flows through the taps of over 200 million Americans in 41 states.

Installing a water filter or using uncontaminated, unfluoridated bottled water sounds like a very good idea! So does avoiding fluoridated toothpaste.

Regarding sources of electromagnetic radiation, a study published in 1995 in the *American Journal of Epidemiology* compared dogs treated at a veterinary teaching hospital for histologically confirmed lymphoma. Electric wire codes and magnetic fields were measured at the homes of 93 diagnosed cases and 137 controls, and a correlation was found between magnetic fields emitted by power lines and electrical appliances and the incidence of lymphoma. Dogs living in homes with very high current codes had the highest risk, while dogs living in homes with buried or underground power lines had a lower risk.



Use topical pesticides only as often as absolutely necessary – for dogs who regularly hike in tick-infested woods or brush, for example. Don’t apply monthly; use only as needed to protect your dog.

Immunologist and veterinarian Richard Pitcairn, DVM, PhD, author of *Dr. Pitcairn’s Complete Guide to Natural Health for Dogs & Cats*, considers all sources of radiation (including repeated diagnostic X-rays) dangerous because their effects are cumulative in the body. He recommends that dogs not be allowed to rest near a color TV set. Fortunately, the new flat-screen TVs and computer monitors emit much lower levels of electromagnetic radiation than older cathode ray tube models. In general, the fewer electrical appliances in close proximity to pets, the better.

Topical pesticides

Anyone who lives where fleas, ticks, or mosquitoes are a problem knows what a challenge they can be. Unfortunately, topical and systemic pest-control products contribute to a host of health problems, including increased cancer risks.

A well-balanced raw diet can help a dog repel parasites, but sometimes the attack is overwhelming.

“I definitely prefer natural alternatives to pesticide sprays or products like Frontline, which make the entire dog toxic to biting parasites,” says Dr. Hershman. “But alternatives don’t always work. One of my patients is a raw-fed Search and Rescue dog who often picked up more than 200 ticks

on training weekends. He's a German Shepherd Dog, so finding and removing them all was a time-consuming, stressful challenge. After his owner tried every natural repellent we could find, none of which solved the problem, he now applies K9 Advantix, a systemic pesticide that repels fleas, ticks, and mosquitoes, on a reduced dosage schedule only when needed.

"When it comes to cancer prevention," she says, "the less often you use conventional pesticides, the better. A good diet and natural repellents are always worth trying first."

Cancer preventives

Several holistic cancer treatments, such as those described in "What Are the Alternatives?" (February 2006), can be used to help healthy dogs remain cancer-free. The thinking here is that cancer cells develop all the time, even in healthy bodies, but they don't create problems until conditions encourage their growth. Preventive treatments disrupt cancer cells before they take up residence in vulnerable parts of the body.

Henry Lai, PhD, the University of Washington researcher who first tested artemisinin (an extract of *Artemisia annua*, or annual wormwood) on dogs with cancer, takes artemisinin as a preventive himself and

has tested it on laboratory animals.

"It is hard to recommend a protocol for cancer prevention," he says, "but, based on studies on rats, a good dose could probably be somewhere between 8 milligrams of artemisinin per kilogram of body weight per day at the high end and 10 mg/kg once per week at the low end. I take 100 mg per day for 10 days each month. Even though this approach hasn't been tested yet on humans or canines, I think it makes sense."

Following Dr. Lai's example, a dog weighing 60 to 75 pounds could take 50 mg artemisinin for 10 days each month, and the amount could be increased or decreased as needed for larger and smaller dogs.

The antioxidant Protocol, also discussed in last month's article, can be used in a similar way.

According to Illinois veterinarian Dan King, DVM, "This should be effective because Protocol works on early cancer cells as an antimetastatic. That is, it deals with individual cells and prevents them from spreading and growing. Because it works slowly, I would use Protocol on a preventive maintenance schedule of ¼ teaspoon twice per day for a dog weighing 50 to 75 pounds for three months on and six months off. Small dogs could take ⅛ teaspoon twice per day for the same length of time."

Medicinal herbs

Ask a dozen experts about their favorite herbs for cancer prevention and you'll generate a list too long to publish here. But a few herbal products are so effective that they are recommended by almost everyone.

"Many mushrooms have anti-tumor and immune-stimulating activity," says Carol Falck, VMD, of Pompano Beach, Florida. "They have been used medicinally for thousands of years in China and Japan, and they work very well for dogs."

Dr. Falck often uses Myco-Immune by Thorne Research, which is a liquid extract of seven medicinal mushrooms, including cordyceps, reishi, shiitake, maitake, and turkey tail. "This combination stimulates the immune system in several ways, helping it resist the growth of cancer."

She also recommends a green tea extract (G.T.-Ex by Thorne Research) because green tea enhances cellular immune function, increases natural killer cell activity, and may inhibit some cancer cell lines.

Another favorite supplement for dogs at risk of cancer is curcumin, says Dr. Falck. "Curcumin is the yellow pigment in turmeric, the spice that gives curry its distinctive color. Both turmeric and curcumin have been shown to inhibit tumor growth. I also like astragalus, an herb with

Cancer Prevention Resources

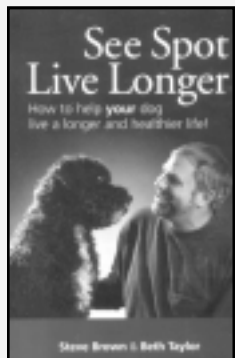
BOOKS

All You Ever Wanted to Know about Herbs for Pets, by Mary Wulff-Tilford and Gregory Tilford. Bow-Tie Press, 1999

Complete Herbal Handbook for the Dog and Cat, by Juliette de Bairacli Levy. Sixth edition, Faber & Faber, 1991

Dr. Pitcairn's Complete Guide to Natural Health for Dogs & Cats, by Richard H. Pitcairn, DVM, PhD, and Susan Hubble Pitcairn. Third edition, Rodale, 2005

Health and Light: The Extraordinary Study That Shows How Light Affects Your Health and Emotional Well-Being, by John N. Ott. Ariel Press, 1976



Holistic Aromatherapy for Pets, by Kristen Leigh Bell. Findhorn Press, 2002

Work Wonders: Feed Your Dog Raw Meaty Bones, by Tom Lonsdale. Revetco, 2005

See Spot Live Longer, by Beth Taylor and Steve Brown. Creekobear Press, 2004

PRODUCTS MENTIONED IN THIS ARTICLE

Astragalus for Animals, Buck Mountain Botanicals. buckmountainbotanicals.com

Tap water information from Environmental Working Group. ewg.org/tapwater/findings.php.

Fluoride Action Network, fluoridealert.org

Bioprin, Florenz, Liver Terrain from Marina Zacharias' Natural Rearing. naturalrearing.com, (541) 899-2080

Myco-Immune, from Modern Herbalist. modernherbalist.com, (831) 624-2773

G.T.-Ex, from Thorne Research, Inc. thorne.com, (208) 263-1337

Japanese salad press (for making lacto-fermented vegetables). Gold Mine Natural Food. goldminenaturalfood.com, (800) 475-FOOD

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strong immune-stimulating properties. I use several Chinese herbal formulas containing astragalus, depending on the patient, including Astragalus for Animals by Buck Mountain Botanicals.”

Garlic is well known and often used for its cancer-inhibiting properties. Small amounts of fresh minced garlic or aged garlic extract can be added to any dog’s dinner. Garlic is an ingredient in Herbal Compounds tablets created by Juliette de Bairacli Levy, whose Natural Rearing philosophy pioneered home-prepared diets and alternative medicine for animals.

“This formula is very antiseptic,” says Natural Rearing advocate Marina Zacharias, who imports the product from England. “It definitely helps the immune system.”

For patients at high risk, Zacharias likes a Chinese formula called Bioprin for its antiviral, antibacterial, antifungal, and anti-tumor properties. “I also use a probiotic called Florenz and, over the animals’ life span, a form of liver support given to match their needs, such as homeopathic Liver Terrain.”

Zacharias says she has seen good results from prevention efforts taken to protect individual dogs in high-risk families. “Of course, there is no empirical evidence to say that these measures prevented cancer, but when we see a good-quality, healthy life, it’s evidence that the efforts are warranted. We all have to die from something, but when we see cancer in a naturally raised dog, it’s usually when the dog is older, at the end of its natural lifespan.”

Closely related to herbal medicine is aromatherapy. San Diego holistic veterinarian Stephen Blake recommends massaging the paw pads of at-risk dogs once or twice per day with a drop of blended frankincense, sandalwood, and Douglas fir essential oils. For best results, use organic or wildcrafted oils from reputable distributors as described in “Essential Information” (January 2005). “These essential oils are great for detoxification and for supporting the immune system,” he says.

Exercise

Although few of us appreciate the important role it plays, the lymph system is a key factor in cancer prevention. Lymph is a clear fluid, similar to blood but lacking red blood cells. It contains the immune system’s lymphocytes (T-cells and B-cells) and circulates through channels that carry waste to the



All dogs can benefit from access to the full-spectrum light found outdoors, which activates the hypothalamus and keeps the endocrine system balanced.

lymph nodes, filtering bacteria and other toxins.

The more lymph circulation is impaired, the less efficiently the body removes toxins and the more favorable conditions are for the growth of cancer. Lymph circulation improves with active exercise and deep, diaphragmatic breathing. Gentle to vigorous brushing that moves from the feet to the heart is a simple addition to daily grooming that also stimulates lymph circulation.

“Exercise is so important,” says Dr. Falck. “Exercise stimulates the immune system and releases endorphins, and an added benefit of consistent exercise is increasing gastrointestinal motility, which helps normalize stools and eliminate toxins from the body. It also facilitates weight management, which is important because obesity is a risk factor for some types of cancer.”

Malillumination

You probably haven’t thought about light as a cancer preventive, but it may well be. Not just any light, though. Unfiltered natural light, Mother Nature’s full-spectrum light, activates the hypothalamus and keeps the entire endocrine system balanced.

When photobiologist and time-lapse photography pioneer John Ott began to photograph living plants, he discovered that depriving them of unfiltered natural light

interfered with their normal growth and reproduction.

He soon learned that the health of fish, birds, reptiles, and other animals (including humans) is adversely affected by insufficient light and by the wrong kind of light, especially fluorescent light. Ott coined the term “malillumination” to describe the phenomenon, which is now known to suppress immune function and contribute to skin damage, cancer, and other problems.

Light enters the eyes not only to facilitate vision but also to activate the hypothalamus. This region of the brain, in turn, controls the nervous and endocrine systems, which regulate functions throughout the body.

Exposure to natural light, preferably for several hours daily, is necessary for your dog’s health. A shady screened porch, the shelter of a tree, even an open window or doorway can give the dog’s body what it needs. Some plastics allow the transmission of full-spectrum natural light, but glass windows, windshields, and sunglasses (which we hope your dog doesn’t wear) do not.

Emotional well-being

For many healthcare experts, emotional well-being is as important to cancer prevention as diet and exercise.

“I believe strongly that emotions are linked to general health via the immune system,” says Dr. Falck. “We can support our pets emotionally by encouraging social interaction with people and other animals, by providing a safe and loving environment with balanced opportunities for play and rest, and by minimizing stress.”

Dr. Blake strongly stresses the importance of positive thinking.

“Never talk to an animal as though he or she is a tumor instead of a spiritual being,” he says. “Negative thoughts generate negative energy, which feeds the disease and weakens the patient’s vital force. No matter how serious the risk of cancer, it’s important to picture your dog as well and happy, not sick, and to engage him or her in meaningful conversation and meaningful activities every day.”

A long-time contributor to WDJ and author of The Encyclopedia of Natural Pet Care, Natural Remedies for Dogs & Cats, and other books, CJ Puotinen lives in New York with her husband, a Lab, and a tabby cat.

Way to Stay!

Produce a dependable “stay” in your dog, no matter what the distraction.

BY MARDI RICHMOND

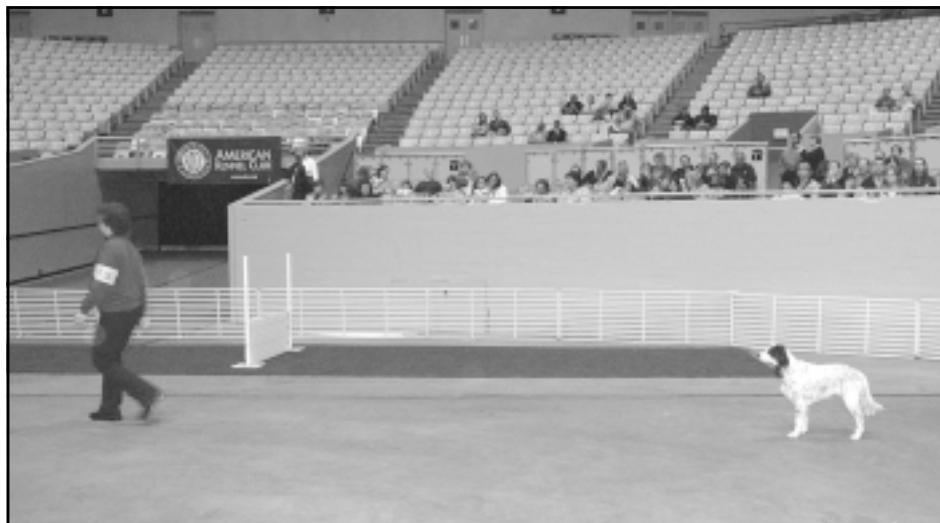
I remember a day several years ago when I put my dogs’ “stay” to the test.

We were on our usual morning neighborhood walk. All of a sudden, three children on bikes sped past us on the sidewalk, racing each other on the way to school. The faster and older children raced around the corner, leaving the younger bicyclist in their dust. Just then, the young biker skidded to the side and landed hard on the concrete about 20 feet in front of me.

The boy started crying. I quickly told my dogs to down and stay, and raced up to the child to see if he needed help.

I was not sure what my dogs would actually do. Would they stay as we had trained and practiced? Would they follow me down the street to see the crying boy? Would they venture into the neighbor’s yard after a rogue cat? All seemed very possible – after all, they were rowdy young dogs and the stay behavior, while practiced regularly, had never been really put to the test.

But they did stay for several minutes, just as we’d practiced over and over. I have to admit that I was a little more than sur-



You may not need to instill a formal, show-ring stay in your dog, but the ability to expect your dog to reliably stay in one place while you attend to something else is incredibly useful.

prised and impressed! (By the way, the boy was fine. His hands and knees were slightly skinned, but after a few short minutes, he hopped back on his bike and raced off to school.)

That day taught me what an important foundation behavior stay can be. Obviously, in a minor emergency, a stay is extremely helpful. But a solid stay can make a difference in other facets of life, too:

■ It can be a life-saving behavior. For example, a good stay can prevent a dog from racing into the street.

The many faces of stay

What exactly is a stay? It means different things to different people. In fact, there are many “versions” of stay. You’ll need to identify the different ways you will use stay and train for each.

Stay can apply to different positions or places. For example, you may have a sit/stay, a down/stay, and a stand/stay. You may also teach your dog to go to his bed and stay, or to stay in a certain spot while you prepare his food.

Stay can also apply to a mind-set. Many people use stay to mean, “Relax and hang out.” Others such as agility competitors may use stay to mean, “Don’t move, but be alert for the next cue.”

Here are some common stay variations:

■ **The basic stay:** I teach the basic stay as the dog remaining in position and place (sit, down, or stand) until released. For example, when asked to sit or sit/stay, the dog

■ Stay is a very useful behavior in everyday situations, like when you’re walking and need to tie your shoe, or if at a pet supply store and need to sign a charge slip.

■ Stay helps develop your dog’s self-control and helps a dog settle during exciting times such as when you are fixing dinner or when you are gathering the leash and treats for a walk.

■ Stay can be useful at the vet and during grooming.

■ It is an essential behavior for dog sports such as competitive obedience and agility.

The Whole Dog Journal™



WHAT YOU CAN DO . . .

- **Make “stay” a rewarding exercise for your dog, not an endurance contest.**
- **Practice, practice, practice! Keep the behavior fresh in your dog’s mind – and rewarding! – by using stay at least once daily.**
- **Don’t correct your dog when he doesn’t “hold” the stay. Lower the criteria until he is more reliably successful before you “up the ante” again.**

will put his bottom on the ground and remain there until I say “Okay.”

■ **Wait:** While stay is a behavior that asks the dog not to move out of position or place, wait is a more casual version that can mean “hang out patiently for a moment or two, but stay alert because your turn is coming.” I use wait at doorways, for example.

■ **Go relax or go to bed:** This type of stay is less about position and more about place and mind-set. Teach the dog to go to his or her bed or other place and hang out there. This can be taught with or without a distinct release.

■ **Dog sport stay:** For those who play agility or obedience, a ritualized stay behavior is part of both sports. Using a specific cue, signal, or body language to initiate the stay and a specific and unique release cue can aid in a reliable dog sport stay.

Getting a reliable stay can be a challenge, and one of the reasons is that the variations are often taught in a blur – the dog is sometimes asked to stay in one position, sometimes asked to stay in one place, sometimes allowed to leave the position or place without the release, sometimes required to stay in the position until the release, sometimes released to a verbal cue, sometimes released to a hand signal . . . no wonder the dog becomes confused!

Before you start training the stay, develop a distinct picture in your mind of the

behavior you are training. For the rest of this article, I’ll use “stay” for the basic stay described above: When you are asking your dog to put her body in a certain position (sit, down, stand) and stay in place until she is formally released.

The controversial cue

When you ask a dog for a stationary behavior (like sit, down, or stand) the expectation is that the dog will stay in that position until released. Essentially, the sit cue means, “Sit and stay there.” So do you need or use a separate stay cue?

While it may seem unnecessary, having a distinct cue for stay can be advantageous in certain situations:

■ If you have trained different types of stays, using a distinct cue for each can help your dog understand what is expected.

■ Using a stay cue or word can act as a back up or reassurance for your dog in difficult or emergency situations. For example it can mean, “Keep on sitting. You are doing great.”

■ If you use the word “stay” with several positions (sit, down, and stand, for example), you may be able to easily transfer it to new or unique positions. For example, if the vet needs your dog to lie on his side, you can gently turn him to the side and then give the “stay” cue to help him know that you would like him to remain in that position while the vet pokes and prods.

■ If you are not as consistent as you should be about using a distinct release from a sit or down, having a stay cue can be helpful clarification for you and your dog.

Consider getting the best of both worlds. Teach your dog that sit, down, and stand mean hang out in that position until you are released, and later, once the dog knows the behavior, you can add in a secondary cue or hand signal for stay.

Training the stay

When you first teach your dog to sit, you “mark” her performance of the desired behavior with a click! of a clicker or word such as “Yes!” and give her a treat the moment her bottom hits the ground. Most dogs will quickly place their bottoms on the ground, and then pop up the minute they hear the click! Here’s how you move from a brief sit (or down or stand) to a solid sit/stay:

1. When you ask your dog to sit, gradually extend the time between the dog placing his bottom on the ground and when you click or “yes.” For example, the dog sits and you count a half a second, then click or “yes” and treat; the dog sits, you count one second, then click and treat; the dog sits, you count two seconds then click and treat. Work up to 10 seconds.

2. At this point, alternate longer and shorter times between treating. For example click or “yes” and treat for 10 seconds, 3 seconds, 7 seconds, etc.



It is a good idea to use different cues for distinct “stay” behaviors such as “Go lie down and relax on your bed while I’m cooking dinner” and “Remain in the sitting position until I release you.”



Once your dog understands that there is a difference between “Sit” and “Sit in the same place until I release you” – that is, “Stay” – you can add a separate cue for the “Stay.”

3. If your dog pops up, don't stress! In the process of learning to stay in position, your dog may experiment a little. He may pop out of the position, come up to you, and wonder if it's treat time. With most beginning behaviors, like sit, down, or come, the dog gets the reward when he is near you or when he comes up to you. So it is understandable that he might give that a try while he is learning to stay.

What can you do? Simply ask your dog to try again and make your criteria easier! *This is critical.* If your dog breaks the stay twice in a row, or if you are getting fewer than four out of five correct responses, make it easier and build up slower.

In addition, be patient and don't use verbal scolding or "corrections." Correcting a dog for leaving a stay may backfire, making him insecure and less likely to succeed the next time.

When he can successfully hold the sit at least four out of five times in a training session, *then* you can make it a little harder by extending the time you ask him to stay. Over the course of several training sessions, gradually increase the time until your dog can comfortably hold the sit for 30 seconds.

4. Don't worry if your dog pops up after the click. If you would like your dog to stay until you give a distinct release, try this:

Click and immediately place the treat right under the dog's nose so that he doesn't need to get up to eat the treat. This placement of the treat will reinforce the position. In fact, if you follow the click with several treats in a row, your dog will learn to stay in position to see what is coming next! Follow the click and treat with a distinct release such as "Okay!"

5. At this point, you can also add in a hand signal or verbal cue for "stay." Ask your dog to sit, say "stay" or give your hand signal, and continue practicing as noted above.

The three D's

When training the stay, it can be very helpful to work on the three D's: duration, distance, and distractions – separately. By consciously building the three D's into your training, your dog's stay will become increasingly reliable.

Duration is simply how long your dog is doing the behavior. You've already been working on teaching your dog to hold the sit/stay for 30-second durations. Think about how long you would ideally like your dog to hold a stay. For a sit position, I sug-

Practicing Stay in Everyday Life

Here are a few fun, everyday exercises to strengthen your dog's stay.

- Ask your dog to sit or down and stay while you prepare your dog's dinner. Release and reward with his meal.
- When you play tug with your dog, periodically stop the action and ask your dog to sit or down. Gradually build up to longer sit/stays or down/stays, with you moving away from or walking around your dog before resuming the game.
- Ask your dog to sit or down and wait before you toss the ball. As with the tug game, build up to longer stays before releasing. At first, release the dog with "Okay!" and then toss the ball as the reward. Later, as a more advanced exercise, practice having your dog stay while you toss the ball, release him to retrieve after the ball has landed.
- Practice wait or stay at the doorways each time you leave the house or let your dogs out of the car.
- Practice stay once or twice on daily walks.
- Practice longer down/stays or "go to bed" while you watch TV in the evenings.



Practice stay on walks by having your dogs take turns staying while you snap a leash on or off of the other. If you can, in a safe environment for off-leash play, occasionally release your dogs for a fun, social romp as the reward for staying.

gest one to three minutes; for a down position, 2 to 5 minutes.

Note: Some people like to train their dog's to hold a down for up to 30 minutes. I personally believe this is too long to comfortably be in one position *without moving*. If you would like your dog to be able to stay for 15, 20, or 30 minutes, consider teaching him to "go to bed," where he can stay in a place for a longer period of time, but move his body position for comfort!

Distance refers to both how far away you are from your dog when he is staying. Along with training your dog to stay while

you move away, teach your dog to understand that stay means to stay even when *your* body is in a different position, such as if you turn away, kneel down, or step to the side.

When your dog can hold the sit for 10 to 30 seconds, start varying your distance from him and body position. Take a half step back, turn your body to the side, step slightly to your dog's side, move your head, lower your body, etc. As your dog becomes more confident, you can gradually increase the distance. At advanced levels, you can teach your dog to stay while you step out of sight.

In the early stages of training, work on distance and duration separately. For example, if you are training for duration, work on increasing the time but keep the distance and your body position within your dog's comfort level. If you are working on distance, move away from your dog, but only stay at a distance for a few seconds before returning. As your dog's skill increases, you can combine the two with ease.

Note: To prevent your dog's anticipation of the release (and his consequently breaking the stay and running to you for a treat) go back to your dog and click and treat while he is still in the position.

Distraction training is equally important. Once your dog has the basics of sit/stay, begin training in different locations. Each location has different distractions, so you will need to lower your criteria.

For example, if your dog can sit/stay for two minutes in your living room, expect to

begin with just three or four seconds in a new location. Start with easy locations, such as your kitchen, living room, and backyard. As your dog's ability to succeed improves, practice on your daily walks and other places you visit frequently.

At first, add only distractions you can control, so you can stop the distraction if it is setting your dog up to fail. Start small, by waving your arms or jumping up and down, for example, and build slowly.

Eventually, you may need to practice with the things that tend to distract your dog most, such as people walking near your dog, other dogs moving by, or a ball bouncing across the ground. Again, for the best chance of success, set up situations in which you can control the distractions until your dog consistently succeeds at that level. With enough practice, your dog will learn to stay even in the face of the toughest "real-world" distractions.

The secrets of success

The secrets to a successful and reliable stay: Be realistic! Be consistent!

Work with your dog's stay training at a level he or she can realistically handle. Pushing your dog past his abilities (so that he breaks the stay) is the fastest way for the behavior to fall apart. The more this happens, the harder it will be for your dog to have the confidence needed for a reliable stay. So if your dog breaks his stay, make it easier and build on successes!

Be very consistent when you are training the stay. If your dog is having trouble with the training, make it easier and move forward more gradually. For obvious reasons, calm, confident dogs may progress more quickly. But with patience and consistency, even high energy and insecure dogs can develop a rock-solid stay! 🐾

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Wait and Stay in the Multidog Household

If you live with two or more dogs, you know that it can be hard to get all of the dogs to stay at once. These tips will help.

- Work with each dog individually before trying to train them in a group.
- Once each of the dogs knows the beginning of stay, you can start working all your dogs together at that beginning level.
- Keep building their skill levels individually, and then adding on to their group skills.
- If one dog breaks the stay, immediately reward those who have remained in the stay to reinforce their appropriate behavior. Then ask the dog who got up to return to the stay, and make it easier so that he or she can be successful, too.
- If all the dogs break the stay, make the exercise easier. Decrease the distractions or go back to basics with the individuals.



Practice group stays in a low-distraction environment at first, such as a small, fenced yard or your living room. It may help to have all the dogs in the same stance: stand, sit, or down.

- Remember that as a group, they may not be able to work at the same level as they can individually, at least not at first.
- Have a "group" release word such as "Okay!" and individual releases. You can use the dog's name for the individual release, a hand signal such as a finger point, or choose a unique word for each dog.



If one of the dogs breaks the stay, immediately reward the other dogs. Then, ask the offender to return and stay, and make it easier for him to succeed.

Heartworm: Don't Take It Lightly

Conventional preventatives are still the best way to protect your dog.

BY MARY STRAUS

People have learned of the benefits of a natural diet and limited vaccinations, and have seen the health improvements in their dogs from these changes. Now, many want to know if they can discontinue administering heartworm preventatives to their dogs, or whether those can be replaced by natural options.

Heartworm preventatives can cause serious side effects in some dogs, including depression, lethargy, vomiting, anorexia, diarrhea, dilation of the pupil, loss of balance, staggering, convulsions, and hypersalivation. Some dogs are especially prone to side effects from ivermectin, the main ingredient in one of the most widely used heartworm preventatives. Also, some of the preventatives are combined with drugs aimed at killing other pests such as fleas, mites, roundworms, and hookworms.

On the other hand, heartworm can be a devastating disease. Dogs with moderate or severe infestations display a chronic cough and can't engage in much activity, as worms choke their heart and major blood vessels, reducing their blood (and thus oxygen) supply. The disease often leaves its victims

incapacitated, incapable of doing much more than a slow walk without gasping for air, and kills many dogs. Even the treatment for heartworm disease can be deadly, regardless of which method is used, so it is important to understand the risks that you take if you choose not to give your dog heartworm preventative.

In fact, most (certainly not all) holistic veterinarians consider the use of pharmaceutical preventatives to be less harmful than a heartworm infection.

Some argue, but . . .

As the co-moderator of an e-mail list on dog health and nutrition, I frequently see people allege that as long as you have a healthy dog, feed a raw diet, and do not over-vaccinate, your dog will not get heartworms. If only this were true! These measures may help to some degree, but they are not foolproof. The only way to know *for sure* that your dog is protected is to give heartworm preventatives.

Christie Keith, who lives in an area of Northern California where heartworm is relatively uncommon and has raised Scottish Deerhounds naturally for over 19 years, learned this the worst way.

"I went 16 years not using any form of allopathic preventative on my dogs. At the end of that 16-year period, on routine testing, I found that two of my dogs were heartworm-positive," says Keith. "One of the positive dogs was Raven, a Deerhound I bought from another breeder. She came to me at 17 weeks with bad ear infections and severe allergies, and no one could argue that Raven was healthy or had a normal immune system.

"In contrast, my dog Bran



WHAT YOU CAN DO . . .

- Limit the months that you give your dog heartworm preventatives based on the environmental temperatures in your area.
- Use a decreased dosage of Interceptor if you're not concerned about protecting against intestinal parasites.
- Have your dog tested for multidrug sensitivity if he belongs to any of the breeds commonly affected by this condition.

was a third-generation, naturally reared dog of my own breeding. He was unvaccinated other than minimally for rabies. He was raw-fed. His mother and her mother were raw-fed and unvaccinated other than minimally for rabies. He was, by any definition available, extremely healthy and robust. He had never been sick a day in his life."

Christie successfully treated both her dogs, though Raven almost died of a pulmonary embolism during treatment. Bran became heartworm-free after months of using the "slow kill" method of heartworm treatment, with no sign of any adverse effects. Unfortunately, Bran died of acute renal failure not long after that. Necropsy results were inconclusive, showing that Bran had glomerulonephritis, but not why.

In her research to try to find the cause of her dog's death, Christie discovered that glomerulonephritis is a potential side effect of heartworm infection. Although she and her vets eventually came to the conclusion that Bran's renal failure was caused by Lyme

COURTESY OF GINA SPADAFORI



COURTESY OF CHRISTIE KEITH



Scottish Deerhounds Raven (above) and Bran (left) were raw-fed, minimally vaccinated, and holistically raised in a part of California where a low prevalence of heartworm is reported, but both became infected with the parasites.

Facts About Heartworm Disease

WHAT IT IS

Heartworm disease is caused by an infestation of a parasite, *Dirofilaria immitis*, commonly called heartworm, with an elaborate life cycle. It starts in an infected animal; more than 30 species, including dogs and wild animals such as coyotes, foxes, and ferrets act as “reservoir” species. Adult worms, residing in the host animal’s heart, lungs, and associated blood vessels, mate and the females release their young (called microfilariae). These circulate in the host animal’s blood for up to two years. They develop into their next stage of life, L1 (for first larval stage) only if ingested by a mosquito during a mosquito’s blood meal.

It takes the L1 larvae 8 to 28 days, depending on environmental temperatures, to develop into their third stage (L3), when they migrate from the mosquito’s stomach to its mouth. The L3 larvae enter their next host through the mosquito’s next bite.

As many as 10 to 12 L3 larvae can be transmitted to a dog in a single mosquito bite. The L3 larvae molt and migrate through the dog’s tissues in search of major veins, which they infiltrate and use as a path to reach the heart. It takes them about 90 to 100 days to develop into L5, the form that breaches the circulatory system. Only ivermectin affects them (and not all of them) once they have reached the L5 form or beyond. However, all the drugs affect the L3 and L4 forms, which is why it’s important to administer a preventative drug at least every 45 days during heartworm “season.” (Note: DEC must be given *every day* during heartworm season.)

If no preventatives are used, the larvae continue to develop to sexual

1: Adult worms in an infected animal mate and produce microfilariae



2: Microfilariae are consumed in blood by mosquito; larvae develop in mosquito

3: Infected mosquito bites dog; transmits larvae through bite



4: Larvae migrate through dog’s tissues to circulatory system and to the heart

5: Larvae reach adulthood and take up residence in dog’s heart, lungs, and associated blood vessels. They mate and produce microfilariae, starting cycle all over again. Adult worms may live for 3-5 years.



maturity. If both sexes are present, they can mate and produce microfilariae about six to seven months after the infective mosquito bite that put them in the dog. Adult heartworms can live three to five years, with males attaining a length of 17 cm (about 6¾ inches) and females a whopping 27 cm (more than 10½ inches).

SYMPTOMS OF INFECTION

Mild disease: Cough

Moderate disease: Cough, exercise intolerance, abnormal lung sounds

Severe disease: Cough, exercise intolerance, difficulty breathing, abnormal lung sounds, enlargement of the liver, temporary loss of consciousness due to poor blood flow to the brain, fluid accumulation in the abdominal cavity, abnormal heart sounds, death

nephritis rather than heartworm disease, it was disturbing to realize that heartworms can affect more than the heart and lungs.

“I have *no* intention of ever living through what I lived through with Raven and Bran. I can’t keep silent when I see people starting to believe that healthy animals don’t get heartworm and that we can blithely forgo using preventatives if we don’t overvaccinate and feed raw. It’s just not so. And it’s not realistic to rely on the health and natural disease resistance of our dogs to protect them from a threat that they are exposed to frequently, as is the case in heartworm-endemic areas.

“No creature is in a static state of health 24 hours a day, 7 days a week. If our dogs are frequently exposed to an infectious parasite, eventually they may well succumb to it, no matter how healthy they are normally.”

“Alternative” preventatives?

Some holistic practitioners recommend various herbal or homeopathic preparations for heartworm prevention, and anecdotal evidence from some dog owners can be found on many discussion lists devoted to natural dog care. However, consumers should be aware that none of these alternatives have been studied for safety or efficacy, nor are there any studies indicat-

ing that they are effective at protecting against heartworm infection. In addition, some herbal dewormers, such as wormwood and black walnut, are potentially toxic when used at dosage levels needed to control intestinal parasites.

Some homeopathic practitioners advocate the use of homeopathic nosodes for heartworm prevention. Again, there are no studies indicating that they are effective. In his book, *Homeopathic Care for Cats and Dogs*, Don Hamilton, DVM, says, “I do know of some cases where the nosode did not protect, however. I believe it does offer some protection, though it may be incomplete. . . . If you decide to try the nosode, you must understand that its effectiveness is currently unknown.”

What *is* known, is that conventional heartworm preventatives are the best form of protection currently available. Fortunately for those of us who worry about the side effects of using the conventional drug preventatives, there are numerous ways you can minimize their use and still protect your dog. I’ll discuss these methods after introducing the most common preventatives.

Conventional preventatives

The two most common (and generally considered safe) heartworm preventative

ingredients used today are ivermectin (used in **Heartgard** by Merial, and other products) and milbemycin oxime (used in **Interceptor** by Novartis).

There is also an older, daily heartworm preventative available, **diethylcarbamazine** or DEC. For many years, this drug was available from Pfizer as “Filaribits.” Though Filaribits has been discontinued, you can still find generic versions of DEC.

DEC is very safe in terms of side effects, but can be life-threatening if given to a heartworm-infected dog with circulating microfilariae, due to the risk of a rapid die-off of the microfilariae and resulting anaphylactic reaction. Also, missing just one or two days of medication can allow your dog to become infected. If you use DEC, it is essential that you test for heartworms before starting this drug, and every six months while using it. (Avoid Filaribits Plus, which has oxybendazole added to control intestinal parasites and has been known to cause liver damage.)

There are other heartworm products that include drugs for other purposes. **Heartgard Plus** adds pyrantel to control intestinal parasites, including roundworms and hookworms. Adult dogs rarely have problems with roundworms, but if your yard has been infested with hookworms, this product

might be good to use until the hookworms have been eliminated.

Sentinel is a combination of the products Interceptor and Program (lufenuron). Lufenuron is a medication that acts to prevent fleas from reproducing; it's not a pesticide and does not kill fleas or keep them from biting your dog. This may be helpful for a short time if you have a flea infestation, and employ several nontoxic methods to get the flea problem under control, such as diatomaceous earth to treat the house and nematodes to treat the yard.

I'm less enthusiastic about selamectin (found in **Revolution** by Pfizer), a more recent entry to the market. Selamectin is a topical product that is also indicated for fleas, one kind of tick, ear mites, and the mites that cause sarcoptic mange. While this may well be great if your dog *had* mange, fleas, ticks, and ear mites, I strongly prefer drugs with a minimal and targeted action over ones with broad-spectrum activity.

The injectable product moxidectin (**ProHeart 6** by Fort Dodge) has been withdrawn from the U.S. market due to numerous reports of adverse effects, including death. I do not recommend the use of injectable heartworm preventatives at all, as there is no way to remove them from your dog's system if there is a bad reaction, and the time release drug will continue to affect your dog for months.

Temperature and timing

So, how can you reduce your dog's exposure to conventional heartworm preventative drugs, without decreasing his protection from the nasty parasite?

First, it is not necessary to give heartworm preventatives year-round in most parts of the country. Heartworm development in the mosquito is dependent upon environmental temperatures. Heartworm larvae cannot develop to the stage needed to infect dogs until temperatures have been over 57 degrees Fahrenheit (14 degrees Centigrade), day and night, for at least one to two weeks. The amount of time it takes will vary depending on how warm it is; the warmer the temperatures, the faster the heartworm larvae develop.

If temperatures drop below that point at any time during the cycle, development may be prevented, but I wouldn't rely on this. Temperatures can vary according to where the mosquito lives, and may be warmer under the eaves of houses or in other protected areas than the general ambient temperature.

Heartworm preventatives work by kill-

Ivermectin Toxicity

Ivermectin has a bad reputation among some dog owners, but not all dog owners need to worry unduly about the drug's toxicity. Ivermectin toxicity is genetic, and there is now a test available to determine whether a dog is sensitive to ivermectin and other drugs. (Dogs with ivermectin toxicity may also be sensitive to loperamide [Imodium], cyclosporin



[Atopica], acepromazine, digoxin, butorphanol [Torbutrol/Torbugesic], and several chemotherapy drugs.

Breeds known to be affected include Collies, Australian Shepherds, Shelties, Border Collies, Old English Sheepdogs, English Shepherds, McNabs, Long Haired Whippets, and Silken Windhounds. To learn more about this test, see the following Web site on multidrug sensitivities: www.vetmed.wsu.edu/depts-VCPL/

ing heartworm larvae that have already infected the dog, but before they can mature into adult worms that cause damage. When you give your dog heartworm preventative, you are killing any larvae that have infected your dog within the last one to two months. Any larvae that have been in your dog longer than 60 days are more likely to survive the treatment and go on to mature into adult worms.

Also, your dog may become infected the day after you give heartworm preventative; the drugs do not provide any *future* protection at all.

If your goal is to provide full protection for your dog with minimal drug administration, you'll have to monitor the temperatures in your area. Mosquitoes may be capable of transmitting heartworm larvae to your dog around two weeks after your local temperature has stayed above 57 degrees Fahrenheit day and night.

Give the season's first dose of preventative four to six weeks after that to destroy any larvae that infected your dog during that time. Thus, the first dose should be given six to eight weeks after daytime and nighttime temperatures first exceed 57°F. Continue to give the preventative every four to six weeks, with the last dose given after temperatures drop below that level on a regular basis.

For some parts of the country, this can mean giving preventatives only between July and October, while in others, where temperatures remain mild all year, they may have to be given year-round.

If you do not give your dog heartworm preventatives (because the area you live in is very low risk or because the temperatures are not right for heartworms to develop), and then take your dog to an area where heartworm is a problem, you must treat him

with heartworm preventative upon your return to protect him.

Dosage amounts

With at least one drug, you can give your dog less than the recommended dosage of preventative, without compromising safety.

Milbemycin oxime, the active ingredient in Interceptor, has been approved by the FDA at one-fifth the regular dosage to kill heartworms only, without controlling intestinal parasites, including roundworms, whipworms, and hookworms. Novartis has a product, "SafeHeart," with this lowered dosage of milbemycin, but has not yet marketed it. (You can read the FDA approvals showing that milbemycin oxime will control heartworm at one-fifth the dosage found in Interceptor on the FDA's Web site; see "Resources," page 24).

The actual recommended dosage of milbemycin oxime for heartworm prevention only is 0.05 mg per pound of body weight (0.1 mg per kg). Contrast this with the recommended dosage of Interceptor for control of heartworm and intestinal parasites: 0.23 mg milbemycin oxime per pound (0.5 mg/kg) of body weight. Heartworm can be prevented at a much lower dose than that needed to control intestinal parasites.

SafeHeart contains 2.3 mg of milbemycin oxime for dogs from 2 to 50 pounds, and 5.75 mg for dogs 50 to 125 pounds. Interceptor contains 2.3 mg for dogs up to 10 pounds, and 5.75 mg for dogs 11 to 25 pounds. So if your dog weighs more than 50 pounds, you can give the Interceptor for dogs 11 to 25 pounds; otherwise you can use the one for dogs up to 10 pounds.

Frequency of preventatives

It may not be necessary to give heartworm preventatives every month. The monthly

dosage schedule was devised to make it easy for people to remember when to administer the drugs, and to ensure that dogs would still be protected if a dose were somehow not swallowed or later vomited before being absorbed.

The FDA approvals cite studies showing that Heartgard, Interceptor, and Revolution provide protection beyond 30 days. If you are very good about remembering to give medications, and you can watch your dog after administering the pill to be sure that it is not spit out or later vomited, it may be safe to use heartworm preventatives less frequently than every 30 days. Dosing your dog every 45 days is a conservative way to safely stretch your dog's dosage schedule.

The drug manufacturers' pre-approval tests indicate that even longer dosing schedules may convey protection from heartworm – but I wouldn't stake *my* dogs' well-being

on dosage schedules extending beyond a somewhat arbitrary 45 days.

The original FDA approval for Heartgard states, "The target dose of 6 mcg per kilogram of bodyweight was selected from titration study 10855 as the lowest dose providing 100 percent protection when the dosing interval was extended to 60 days to simulate a missed-dose circumstance."

The original FDA approval for Interceptor states, "Complete (100 percent) protection was achieved in dogs treated at 30 days post-infection, with 95 percent protection at 60 and 90 days." This does not apply to SafeHeart, which was tested only at a 30-day dosing interval.

The original FDA approval for Revolution states, "Selamectin applied topically as a single dose of 3 or 6 mg/kg was 100 percent effective in preventing the maturation of heartworms in dogs following inoculation with infective *D. immitis* larvae 30 or

45 days prior to treatment, and 6 mg/kg [the recommended dosage amount] was 100 percent effective in preventing maturation of heartworms following inoculation of infective larvae 60 days prior to treatment."

Splitting pills

The issue of splitting heartworm pills comes up frequently. I have spoken to representatives from Merial (maker of Heartgard) and Novartis (maker of Interceptor). Both said that their active ingredients are mixed into their products before the pills are formed, and therefore should be evenly distributed (though they cannot guarantee this). However, both manufacturers advise against pill splitting.

Splitting pills is inexact and may result in the dog getting less or more of the medication. If you do decide to split the pills, use a pill splitter (available at any drug store) and do not try to give the minimum dosage, as you cannot be certain that your dog will get enough of the medication.

No guarantees

It is important to realize that, if you do decide to modify the way these medications are given – by splitting pills, giving pills less often than monthly, or using reduced dosages – the guarantees provided by the manufacturers will be invalidated. Under normal usage, if your dog develops a heartworm infection while on one of these heartworm preventatives, the company will pay for treatment, but this is not true if you are using the drugs other than as directed on the label.

It is important to understand the risk that heartworm infection poses to your dog. Rather than relying on unproven alternative methods of heartworm prevention, or the unreliable method of depending on your dog's health to keep him from getting infected, all of the methods discussed above will offer you ways of safely reducing your usage of conventional heartworm preventatives, while still giving your dog complete protection from heartworm infection. 🐾

Next month, we'll discuss treatment – what you can do if your dog's heartworm test comes back positive.

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Heartworm Testing

When heartworm preventatives were first introduced, the only product available used DEC and was given on a daily basis. DEC is extremely dangerous if given to a dog infected with adult heartworms, as it can cause a rapid die-off of any microfilariae, resulting in an anaphylactic reaction. For this reason, it is important to never give DEC without first testing to be sure that your dog is free of heartworms before beginning treatment and every six months to a year thereafter.

The newer heartworm drugs are less dangerous to dogs who are infected with adult heartworms. They can even be used to kill the microfilariae produced by the adult worms in the body, and have some effect against the adult worms.

Heartworm testing is still recommended before administration of these drugs. It's best to know ahead of time whether there are microfilariae present, so you can be ready to treat the dog for an anaphylactic reaction caused by the microfilariae's rapid die-off, and to choose the safest preventative to use if the dog is infected. Ivermectin (Heartgard) is safer in this regard than milbemycin oxime (Interceptor), which has a much stronger effect against the microfilariae. Next month's article, on treatment for heartworm infection, will have more information on this topic.

The most common current method of heartworm testing is called antigen testing. This type of test can identify only adult female heartworms, and therefore will not show a positive result until about five to seven months after the dog has been infected, the time needed for the larvae to develop into adult worms in the body. For this reason, it is no use doing a heartworm test on any dog younger than five months. Heartworm tests are very sensitive, but they are not 100 percent reliable. They are highly specific, with very few false positives, but they are not always able to detect very low heartworm burdens, or infections with only male heartworms.

It is generally recommended to do a heartworm test on any dog over the age of six months before initially starting preventatives. If you give preventatives only part of the year, you may want to do a heartworm test before restarting the medication in the spring or summer, especially if there is any question about the timing of starting and stopping the drugs the previous year.

If you give preventatives year round, it is still recommended to test for heartworm infection every two to three years, just for added security, particularly if you use minimal dosage amounts or increased time between doses. Note that your dog needs to have a yearly veterinary exam in order to get a prescription for preventatives, even if your dog does not need to be tested for heartworm.

The Shape of Things to Come

This fun training technique can be used to teach your dog anything.

BY PAT MILLER

Yard sales and flea markets are some of my favorite places to shop for dog training equipment. A couple of years ago I picked up a classic “Wizard of Oz” picnic basket with a lid that flips open – the kind Toto jumped out of while being dognapped on the Wicked Witch’s bicycle. That basket sat in a corner of my training center for quite some time while I pondered what to do with it.

Finally one day while waiting for a client to arrive, I set about shaping my Scottie, Dubhy, to flip the basket lid open with his nose. It took less than five minutes – and once again I was reminded how powerful this sometimes overlooked dog training technique can be.

Shaping, or as it’s formally known, “shaping by successive approximations,” simply means breaking down a behavior into tiny increments, and reinforcing the dog



Shaping can be used to help a dog come into increasing contact with something that previously scared him. Slowly increase the difficulty or complexity of what you are asking him to do before he gets rewarded, and backtrack if he gets “stuck.”

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WHAT YOU CAN DO . . .

- **Experiment with the different shaping techniques to see how you might apply them to your dog’s training program.**
- **When you decide to teach your dog a new behavior, take a few moments to ponder how you might shape it, and then decide if that’s the approach you want to use for the new behavior – or not.**
- **Invite friends over to play shaping games with their dogs. Create informal competitions to see who can shape their dog to do _____ (fill in the blank with a behavior) the fastest.**

at each incremental step until you’ve achieved the full behavior. Some trainers believe that shaping is the ultimate approach to operant training, and that any steps that stray off the pure shaping path are detrimental to ultimate results. Others incorporate shaping as I do – as valuable part of a multifaceted training program.

The science behind it

The shaping process works because behavior is variable. In any series of repetitions of a behavior, your dog will give you variations in the manner that the behavior is performed – faster/slower, bigger/smaller, higher/lower, harder/softer, etc. If you wanted to shape your dog for a perfect obedience competition sit – straight, fast, and in proper heel position — you’d break the behavior known as “Sit” into those three components and work on them one at a time, capitalizing on the variability of your dog’s behavior for each one.

Perhaps you choose to start with speed. Your dog’s average sit time might be three

seconds. Your goal is a one-second sit. In any given number of repetitions of “Sit,” some will be faster than three seconds, some will be slower, and some will be right on the three-second mark.

If you were to be scientific about your shaping program, you’d time the sits with a stopwatch, only click and treat (mark and reward) those that were three seconds or faster, and keep a written journal of your progress.

If you are less rigorous, you’d guesstimate the times and strive to click the faster sits. Over time, your dog’s average elapsed sit speed time would decrease, perhaps to two seconds, as he realized that only faster sits get clicked, and deliberately tried to sit faster to make you click more often.

Now you raise the bar – only sits that are two seconds or faster get clicked. By breaking your goal of fast sits into smaller increments of time, you gradually shape your dog to do that lightning-fast one-second show-ring sit that you covet.

Shaping is not just for the show ring. It

has a number of important applications and benefits for all kinds of training, including:

- Accomplishing a behavior that your dog finds physically difficult or confusing, such as a teaching a Greyhound to sit.
- Encouraging your dog to perform a behavior that he finds mentally difficult or confusing, such as teaching a crate-wary dog to enter his artificial doggie den.
- Fine-tuning a behavior your dog can already do, such as teaching fast, straight, close sits.
- Helping your dog learn how to offer behaviors, try new things, and think creatively in order to solve problems, through shaping games such as 101 Things to Do With a Box.

Shaping techniques

There are several ways to shape a behavior. You can use “lure/prompt shaping” as a sort of hybrid technique: you’re still showing the dog what you want him to do by luring with a treat, or prompting with a target or other body language, and reinforcing increments of progress to the final behavior.

Shaping “purists” tend to scoff at lure/prompt shaping, but it can be very effective at getting behaviors more quickly, although slower at teaching dogs to think creatively and offer behaviors freely. Dogs in basic good manners classes are often taught the “Down” with lure-shaping, by luring the dog’s nose toward the floor with a treat, clicking and rewarding as the dog makes



“Lure/prompt” shaping can be used to quickly get a new behavior; however, it doesn’t require the dog to figure out for herself what exactly it is that you want.

any progress toward the floor with his nose or other body parts.

You can use “basic shaping,” where you have a goal behavior in mind and, without any prompting, reinforce small increments that the dog offers, such as described above for a faster sit. And you can “free shape” – by doing training exercises without any preconceived notion of where you want the behavior to go. Free shaping is the most difficult concept for novice trainers, who are often legitimately perplexed by the idea of training without knowing what behavior you’re trying to train.

Lure/prompt shaping

Greyhounds are notoriously difficult to teach to sit. Theories abound as to why this is so; one theory has to do with the Greyhound’s unique anatomy – a body shape that makes sitting an uncomfortable position. Whatever the reason, it does seem that while most dogs offer sits easily, these long, lean, muscular dogs are somewhat reluctant to do it.

To lure-shape a sit in a reluctant sitter, hold a treat at the tip of your dog’s nose and lift it up slightly. If he lifts his nose to follow the tidbit, click and treat. Repeat this step, lifting the treat slightly higher and a little bit back over the head.

When each step seems easy for the dog, progress a little farther, continuing to move the treat back over the head. At the same time, watch for a bend in the hind legs. Be sure to click the slightest bend in the hocks, and when you start getting a consistent bend in the hocks, even a small one, keep luring, but only click the leg bend, not the head



This dog is learning to flick a light switch. At first, she’s rewarded for merely sniffing or licking it. Next she’ll have to actually flick the switch before she gets a treat.

lifts. Reinforce gradually deeper bends in the legs until the dog is sitting.

Why not just push the dog into a sit, or “tuck” him into a sit by pressing in gently above the hocks? Certainly, some trainers do, and teach the sit successfully in this manner. However, some dogs are reluctant to sit due to back or joint pain, and need to learn to find a way to move into a sit that doesn’t hurt; your push may cause excruciating pain.

Other dogs resent being physically manipulated. That may or may not be the reason I had a recent client whose Scottish Terrier caused serious injuries to his prior trainer when she tried to push him into a sit. He resisted her first two push-sit attempts, and on the third try went up her arm with his teeth.

But other dogs may have other reasons for failing to catch on quickly. A case in point is a shelter dog I saw in my Intern Academy last summer – a beautiful English Pointer who had been purchased for hunting trial work but disqualified from competition due to a minor congenital rib deformity. At age four, he had never been asked to sit, and just didn’t seem to understand what we were asking of him.

In fact, he was the classic example of a shut-down dog – unwilling to offer any behavior at all. It took four days of the six-day academy, but on Thursday when his trainer finally got him to sit, the whole class applauded wildly. Best of all, the dog got it! His eyes lit up, and he proudly offered sit after sit after sit. In the remaining two days of the course he and his trainer caught up on all the lessons that had been on hold



Perhaps the largest benefit of shape-training is that, through this technique, dogs learn to engage and offer novel behavior when put in new situations.

while they worked on the sit, and both graduated with flying colors and big smiles.

Basic shaping

Some trainers profess to teach their entire entry-level classes using basic shaping only. I'll admit I'm not that brave, but we do introduce the concept of basic shaping with our "Go to Your Place" exercise. I explain to my class that shaping is a Zen exercise – it takes patience and close observation, and that we'll be *splitting* behavior rather than *lumping*. Lumping means to reinforce large chunks of behavior – capturing a sit, for example. In contrast, splitting means to look for the tiniest piece of movement, click and reinforce that, and build toward the final behavior. Splitting is the essence of shaping.

To shape a "Go to Your Place" behavior, set out a carpet square, dog bed, or blanket to designate "Place." You can actually do this without a physical object to mark the place, but it's easier for canines and humans to succeed with a visual marker – and then you can generalize the behavior easily by moving the marker to another spot.

Now stand back several feet from the carpet square and watch your dog very closely. You're going to click and treat the tiniest motion toward "Place" – one step, a turn of the head, a flick of the ear . . . it doesn't even have to be directly toward the spot – "in the general direction" will do.

If you've already reinforced your dog consistently for offered behaviors, he'll probably catch on quickly. As he starts repeatedly making deliberate movements toward the rug to get clicked, you'll hold out slightly longer to build more behavior. Just slightly! You want him to get a little frustrated and try harder (harder = bigger behavior), but if you hold out too long he may give up and quit offering behavior altogether.

As he gets closer to the mat you can move forward with him in order to keep delivering treats – but not ahead of him – that would be luring or prompting!

When he's reached the mat, reset. Move yourself and your dog several feet back and start again. The goal is to shape him to *go* to the mat, not just to *be* on the mat. When he offers to go to the mat easily, start shaping him to lie down on it. The value of this exercise is to be able to park your dog there for a while. When he's consistently offering to go lie down on his mat, you can add the verbal "Go to Your Place!" cue.

If your dog doesn't offer behaviors easily, it may take longer to shape the Place behavior. Be patient, and remember to split – look for the tiniest of movement to reinforce. If he wants only to gaze adoringly into your eyes, look at the rug instead of him. If he just lies down at your feet for a snooze, invite him back to his feet, reposi-

tion him, and look for movement to reinforce as he repositions. The more you can find to reinforce, the less likely he is to lie down for another nap.

Dedicated shapers may write out their complete shaping plan, considering each potential step in the process, and measuring their progress against the written plan. Less scientifically disciplined trainers may work with just a mental picture of their shaping plan. You can do each shaping session for as long or as short as you like. Assuming your dog is happy to play the game, you can keep on playing! As with all training, try to end the session while your dog is still enthusiastic and successful.

Free shaping

Free shaping is great for encouraging a dog who is somewhat shut down to offer behaviors, because he can't be wrong. *Anything* he does that even remotely relates to the exercise gets clicked and treated. Once the dog is easily offering random behaviors, then you can, if you choose, switch to basic shaping with a goal behavior. Here are a couple of free shaping exercises you can experiment with:

■ **101 Things to Do With a Box** – You can use any old cardboard box for this, or it doesn't even have to be a box! You can play "101 Things to Do With Anything."

Dubhy's Picnic

I decided to shape Dubhy to flip open a picnic basket with his nose. I could have used pure basic shaping, in which case the steps in our shaping plan might have looked something like the one below. Because I'm doing basic shaping with a behavior goal in mind, not free shaping, I wouldn't click random offered behaviors that aren't in the shaping plan.

Note that I would click and treat several times at each step, unless, of course, Dubhy took a quantum leap over several steps, in which case I'd be prepared to leap with him.

1. Looks at basket
2. Moves toward basket
3. Sniffs basket
4. Sniffs basket closer to basket lid corner where opening is
5. Sniffs basket at basket lid corner
6. Nudges lid corner (here I might need to hold out to wait for stronger behavior to get the nudge)
7. Nudges lid corner harder
8. Nudges hard enough to move lid corner
9. Nudges hard enough to lift up lid corner
10. Nudges hard enough to lift lid corner higher
11. Nudges hard enough to flip lid open

When I put my plan into action and began training Dubhy to flip open the basket, I chose to take a shortcut and do a little prompting with a target stick. That allowed us to skip steps 1-4 and go directly to step 5, sniffing the basket lid corner. From there, it only took a few minutes for Dubhy to repeatedly offer a strong, reliable "open the basket" behavior.

Now that we have reliability with the goal behavior of opening the basket, I could incorporate it into a trick routine – perhaps packing picnic supplies into the basket, or unpacking them and laying them out on a waiting picnic blanket. Or perhaps he could find a small "lost" dog who was trained to lie quietly hidden in the basket. Or...?



Every piece of furniture is now a potential prop for Dubhy!

Your dog can be on leash, or off, if he'll stay and keep working with you. Set a chair a few feet back from the box or object, sit in the chair, and wait. As with the "Place" exercise, you're looking for tiny pieces of behavior to click and treat – *any behavior* that relates to the box – a look, a step, a sniff, a push . . . only this time you have no specific goal in mind, and you don't have to build up to a behavior – random behaviors are fine.

If your dog gets hung up on one particular behavior you can stop clicking that one and wait for something else. The more confident your dog is about offering behaviors, the more easily you can just quit clicking one thing and wait for another. At some point, if you wish, you can decide on a goal behavior based on the ones your dog has offered, and shape it into something specific – front feet only in the box; hind feet only in the box; all four feet in the box; turn the box over; fetch the box; or...?

■ **Body Parts** – Body Parts shaping helps your dog learn to offer behavior, and it also helps *you* realize how precise this process can be for shaping the tiniest of movements.

Sit in a chair with your dog facing you, and watch your dog closely for a movement in one of his body parts. Even a tiny movement will do. For example, you could watch for a flick of his ear, a turn of his head, the lift of a paw, or a tongue flicker.

When you have captured one of these movements with your click and treat, that's the one you'll continue to focus on. Sit and wait for another movement of that same body part. Click and treat. Your goal is to reinforce that accidental behavior until your dog begins deliberately offering it. When he does, you can name it, incorporate it into a trick routine, or keep working with it to shape it into something bigger if you choose.

I really came to appreciate the power of shaping when I first purchased agility equipment, set it up in the backyard, and ran to get Dubhy, to see what he'd do with it. To my delight, as I introduced him to each piece of equipment, he immediately started *doing stuff* – sniffing it, pawing at it, biting it, jumping on it, just trying out different things to see what he needed to do to get me to click. Made training a breeze! 🐾

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Karen Pryor's 10 Laws of Shaping

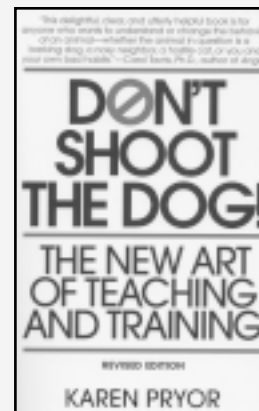
In her landmark book, *Don't Shoot the Dog*, behavioral biologist and past dolphin trainer Karen Pryor says, "...a well-planned shaping program can minimize the required drilling and can make every moment of practice count, thus speeding up progress tremendously." She also tells us that the successful application of shaping principles makes the difference between shaping that is frustrating, slow, boring, and disagreeable, and shaping that is happy, fast, and successful.

Here are the 10 principles that Pryor suggests you follow for the most enjoyable and successful training:

1. Raise criteria in increments small enough that the subject always has a realistic chance for reinforcement.
2. Train one aspect of any particular behavior at a time; don't try to shape for two criteria simultaneously.
3. During shaping, put the current level of response onto a variable schedule of reinforcement before adding or raising the criteria.
4. When introducing a new criterion, or aspect of the behavioral skill, temporarily relax the old ones.
5. Stay ahead of your subject. Plan your shaping program completely so that if the subject makes sudden progress, you are aware of what to reinforce next.
6. Don't change trainers in midstream; you can have several trainers per trainee, but stick to one shaper per behavior.
7. If one shaping procedure is not eliciting progress, find another; there are as many ways to get behavior as there are trainers to think them up.
8. Don't interrupt a training session gratuitously; that constitutes punishment. (Author's note: For example, you're in the middle of training and the phone rings. You drop what you're doing and run to answer the phone. This is "negative punishment," because the dog may perceive that whatever he did made a good thing [you/training] go away. Instead, take time to gracefully end what you're doing with the dog to attend to an interruption. I use an "all done" cue that lets the dog know the training session is over.)
9. If behavior deteriorates, "go back to kindergarten." Quickly review the whole shaping process with a series of easily earned reinforcers.
10. End each session on a high note, if possible, but in any case quit while you're ahead.



Every move is a winning one when playing "101 Things to Do With a Box."



For more discussion on shaping and other useful training concepts, read *Don't Shoot the Dog*, by Karen Pryor, Bantam Books/Simon & Schuster, 1984 and 1999, softcover, 202 pages, \$13.

Brains of the Operation

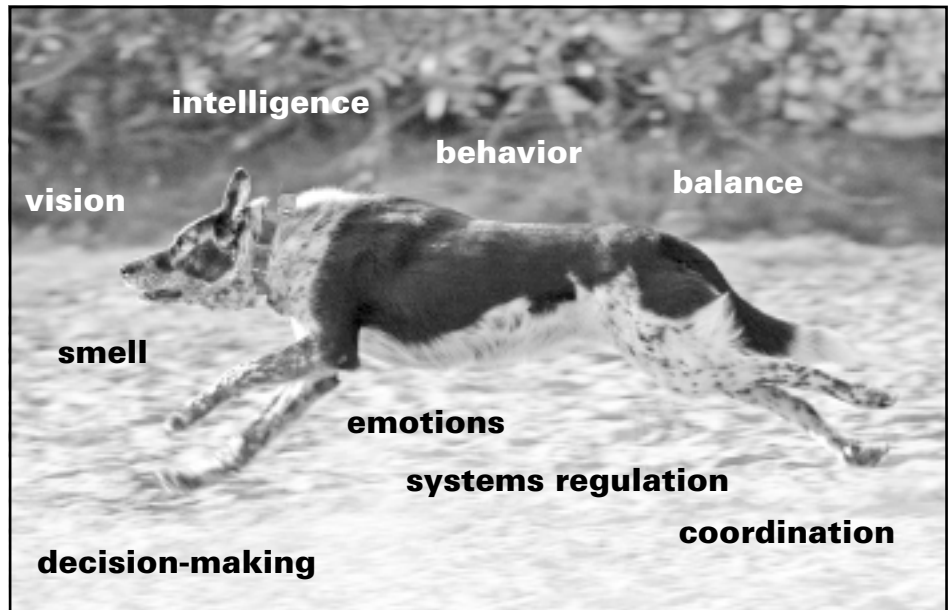
Why a healthy central nervous system is so important.

BY RANDY KIDD, DVM, PHD

What's on your dog's mind? You may never know, but it can be helpful to know at least a little something about his brain – and the rest of his central nervous system (CNS). The CNS describes the system of neurons formed by the spinal cord, brain stem, cerebellum, and cerebrum. This month's installment of the Tour of the Dog focuses on the CNS, its diseases and disorders, and treatments for those ailments. The peripheral nervous system (PNS), comprised of the cranial and spinal nerves (specialized nerves that carry information to the brain stem or spinal cord), are beyond the scope of this article.

Macroanatomy

The CNS “organ system” includes nerve cells (neurons) as well as tissues and cells that support the function and health of the nerve cells. The brain itself lies within a protected vault, encased by the protective



Daily exercise is critical to maintain the vibrant health of the central nervous system. Activity helps maintain the physical structures that support the CNS, and the stimulation helps invigorate the function of nerve transmission and reception.

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WHAT YOU CAN DO . . .

- **Quickly have your vet investigate any sign of CNS problems, such as seizures, loss of balance or coordination, confusion, or changes in mood or behavior.**
- **Also review the chemicals your dog has been in contact with; many pesticides and herbicides can cause CNS problems.**
- **Look for a qualified veterinary chiropractor to add to your canine healthcare “team.” Her diagnostic and treatment skills will be invaluable in case of brain or nerve problems.**

“headgear” of the cranial bones. Extending backward from the brain is the brain stem, and continuing on from this stem is the spinal cord. The spinal cord extends inside the protective coverings of the spinal vertebrae to just beyond the bones of the pelvis, providing branching motor and sensory nerves to the limbs and organ systems along the way.

A connective tissue called the meninges acts as a protective outer membrane surrounding the CNS tissues. It's actually a collection of three layered membranes: the dura, arachnoid, and pia maters. The outer, dura mater (literally, *tough mother*) is a tough and fibrous outer covering. Internal to the dura is a thin meninge called the arachnoid mater, and its cobweblike structure (thus the term arachnoid, or spider) unites the dura with the pia mater. The pia mater is a thin and highly vascular membrane adhering closely to the surface of the brain.

Note: When we consider the moving

animal, it is important to appreciate that the meninges extend from the fibrous capsule they form around the brain, backward along the length of the spinal cord. The meninges thus offer a resilient membrane that gives elastic support to the flexing, contracting, rotating spine.

In addition, since it is continuous, whenever a spinal vertebra is “stuck,” that “stuckage” will be reflected at other point(s) along the spine. This means that a chiropractic adjustment necessary in the lumbar region, say, probably will also necessitate additional adjustments somewhere else along the spine – say, in the neck region.

Cerebral spinal fluid (CSF), produced by large ventricles that lie within the inner part of the brain, circulates in the subarachnoid space. The CSF helps maintain a constant environment for the neurons and glia by transporting metabolites from the blood and removing by-products of brain metabolism. It also helps connect the brain to rest of the body's immune system, and creates a fluid

cushion for the brain to float in. A sample of CSF fluid can be collected and examined as a diagnostic aid.

Slice into the main part of the brain and you will see that most of its innards are white, with a thin outer layer, the cerebral cortex, that fits over the white matter like a glove. The cerebral cortex (*cortex* is Latin for “bark”) is extensively folded, which allows for much more surface area than would be available on a flattened surface. This increased surface area makes room for more cells; theoretically, the more intensely folded the cortex, the smarter the animal.

The brain is physically divided into a left and right hemisphere, and the hemispheres are connected at their base by a horn-shaped structure called the hippocampus. For many years it was thought that the functions of the left brain (the logical, linear, focused-thinking brain) and right brain (emotional, global-thinking) were entirely separated, and each hemisphere was solely responsible for its designated function. Today’s research, however, indicates that there are many more connections and cross-overs between the hemispheres than originally thought.

Thus, even when a human is engaged in linear, logical thought, the emotional brain is always tuned in, meaning that even the most logical of thoughts are being processed, at least to some extent, in an emotional fashion. Realizing this to be true, recent brain science has led to an extended appreciation of the mind/body connection.

Archeology of the brain

The brain has evolved over eons, with certain anatomical parts (and thus certain functional capacities) of the brain developing more in some animals than in others.

The brainstem is the oldest part of the brain. It evolved more than 500 million years ago, and because it resembles the entire brain of a reptile, it is often referred to as the reptilian brain. It determines the general level of alertness and warns the organism of important incoming information, and handles basic bodily functions necessary for survival, breathing and heart rate, as examples.

The cerebellum is attached to the rear of the brainstem. Among other functions, the cerebellum maintains and adjusts posture and coordinates muscular movement. Memories for simple learned responses may also be stored here.

The limbic system is the group of cellular structures located between the brainstem

and cortex. Two key parts of the system are the hypothalamus and pituitary gland. Although it is only about the size of a small pea, the hypothalamus regulates eating, drinking, sleeping, waking, body temperature, balance, and many other functions. It also directs the pituitary gland, the gland many consider the “master gland” of the body.

The limbic system evolved sometime between 200 and 300 million years ago. Because it is most highly developed in mammals, it is often called the mammalian brain. In addition to its other functions, the limbic system is involved in the emotional reactions that have to do with survival.

The cerebrum is the largest part of the dog’s (and other mammals’) brain. It is divided into two halves, or hemispheres, each of which controls its opposite half of the body. The hemispheres are connected by a band of nerve fibers, called the corpus callosum. The corpus callosum is the largest fiber pathway in the brain – a “bridge” of several hundred million nerve fibers.

Covering each hemisphere is a thin layer of intricately folded nerve cells called the cerebral cortex. The cortex is the area of the brain where we and our dogs are able to remember, communicate, understand, and create.

The cerebrum’s cortex first appeared in mammals about 200 million years ago. It is the part of the brain that is more highly developed in the human species than in any other animal.

The cerebral cortex is further divided into several lobes, each with its own function. (“Mapping” of the brain is an ongoing process, and most of the work has been done in humans using a variety of electrical-, chemical-, and heat-based ways to analyze areas that are active during the time that specific activities or thoughts are being undertaken by the experimental subject.)

The frontal lobe is primarily involved in decision-making and purposeful behavior. The parietal lobe, located just behind the frontal lobe, represents the body and its actions. The temporal lobe lies beneath parts of the parietal and frontal lobe; some of its functions include processing of auditory sounds, perception, and memory. The occipital lobe lies behind and beneath the parietal lobe and just above the cerebellum; its function is concerned with vision.

Note that the importance of understanding at least some of the functions of the various brain parts is that it makes it easier to localize a lesion if one occurs.

Microanatomy of the CNS

Neurons are the cells that conduct nerve impulses. They are responsible for relaying sensory input (such as pain, pleasure, and the senses of smell, hearing, seeing, etc.); for proprioception (knowing where the body parts are at any time); and for transmitting impulses to the muscles to incite them to action.

However, about 90 percent of the cells of the CNS are termed *glial* cells (meaning glue). There are several types of glial cells, each with its own function. *Astrocytes* and *microglia* provide physical and nutritional support for neurons; *oligodendroglia* and *Schwann cells* provide insulation to neurons; and *satellite cells* offer physical support for neurons.

The brain, like the rest of the body, bathes in a soup of biochemicals that, when activated, create a variety of reactions that are essential for life. Neurons function by moving electrical impulses from one area of the body to another, and the chemicals responsible for this movement across nerve connections (synapses) are called neurotransmitters. Included in this category are epinephrine, norepinephrine, serotonin, histamine, and glutamate. Each of these is a protein that requires certain amino acids for its production; each has its specific function, and many have a specific target organ in which the function occurs.

Recent evidence demonstrates that the health of neurotransmitters can be enhanced in several ways: good balanced nutrition, exercise, hand-to-fur contact such as massage, and living in a household full of love.

The neurological exam

Indicators for the possibility of neurological disease include behavioral changes, seizures, tremors, stumbling, or paresis or paralysis of one or more limbs.

A complete neurological exam can be an extensive (and expensive) process, and, in the end, the diagnosis often resorts to simple deductive reasoning to narrow a large list of possibilities to a smaller list of more probable causes.

Information about the time of onset, the course, and the duration of the complaint can be helpful.

Congenital and familial disorders are most common in purebred animals at birth or within the first few years of life. Inflammatory, metabolic, toxic, and nutritional disorders can occur in any species, breed, or age. They tend to have a rapid onset and are usually progressive. Traumatic and vas-

cular injuries have an acute onset, and they rarely become worse after the first 24 hours. Most degenerative and neoplastic disorders occur in older dogs; they tend to have a slow and gradual onset, and the symptoms often become worse over time.

A complete physical may reveal nerve-related conditions. For example, a generalized bacterial infection may extend into the brain, meninges, or spinal cord; tumors may originate in one organ system and metastasize to nervous tissues; chronic inflammatory diseases may reside in organ systems, including nervous tissues; and metabolic problems that affect nerves also usually affect other organ systems.

A neurologic exam should include an examination of the head, neck, thorax and thoracic limbs, lumbar and pelvic areas, pelvic limbs, anus and urethral sphincter, tail, and the animal's gaits. Often, a veterinary chiropractor can thoroughly evaluate these areas, and, while the evaluation is in process, adjust the joints that feel "stuck" back into their normal range of motion.

If the neurological deficiency is localized, the site of the lesion along the spine (or in the limb) may be evident. For example, a front limb dysfunction may be due to a lesion along the spine anywhere from the first cervical vertebra to one of the first two thoracic vertebrae. Or it may be caused by a lesion somewhere along the length of the limb, including the paws and toes.

In addition to evaluating the dog's posture and gaits (walking, trotting, turning, backing, etc.), there are many specific neurologic tests that are designed to evaluate isolated parts of the nervous system.

Further tests may also be helpful. Clinical pathology may reveal a generalized infection, liver or kidney dysfunction, or hormonal or metabolic conditions that also affect the nervous tissues. Blood test results may reveal the presence of certain toxins that have caused a problem. For example, a particularly low level of serum cholinesterase suggests acute organophosphate (a common ingredient in anti-flea and tick products) toxicity.

An evaluation of the cerebrospinal fluid may be helpful, especially for infections or inflammation. Radiographs can be used to detect fractures and some tumors. Computed tomography (CT) or magnetic resonance imaging (MRI) may be used to detect smaller lesions.

An electroencephalogram (EEG) records the electrical activity of the cerebral cortex, and it is a good aid for detecting



When this middle-aged Lab is lying down, only his head-tilt identifies him as a stroke survivor. He also lost some balance and coordination – but still enjoys walks and playing fetch. His stroke was scary for his family, but fortunately they sought immediate treatment and dedicated themselves to his very successful rehabilitation.

hydrocephalus, meningoencephalitis, head trauma, and cerebral neoplasia. Interestingly, the EEG is not especially proficient at diagnosing many of the more common forms of epilepsy.

Diseases of the brain

As you'd expect when dealing with an organ system that has a variety of cell types and a multitude of functions, there are many diseases and causes of diseases of the CNS, making diagnosis a real challenge.

Almost every part of the CNS can be affected by any number of disease processes: congenital or familial, nutritional, metabolic, infectious or inflammatory, toxic, traumatic, vascular, parasitic, neoplastic, immunological, degenerative . . . or iatrogenic (resulting from the activity of the health practitioner) or idiopathic (of unknown origin).

A diagnostic approach for any potential disease of the nervous system will entail a multidimensional approach. Often, an accurate diagnosis will depend on correlating several factors into one final picture.

A clinical evaluation will assess the totality of clinical symptoms. Are the symptoms diffuse or focal; symmetric or asymmetric; painful or nonpainful; progressive, regressive, or static; mild, moderate, or severe? An anatomic location of the lesion may be evident from the prevailing signs. Potential mechanisms of the disease are considered (from the entire list above), and hopefully a short list of the most likely possibilities can be generated.

Congenital disorders are most common

in purebred animals at birth or shortly thereafter. Some familial disorders cause a progressive degeneration of neurons in the first year of life, while others (such as inherited epilepsy) may not manifest for several years.

Trauma is a major cause of neurologic dysfunction due to physical damage, hemorrhage, edema, and progressive formation of oxygen-containing free radicals. Traumatic conditions have a rapid onset of symptoms, and the damage is generally complete within 24 to 48 hours. In other words, clinical signs will usually not get worse than they are one or two days after the traumatic event; whether the signs gradually improve depends on the extent of the original damage and the success of the treatment given.

Infections (*meningitis* – infection of the meninges, and *encephalitis* – infection of the brain) can be caused by any of many agents including bacteria, viruses, fungi, protozoa, prions (a minute particle of a virus), and algae. Rabies and canine distemper are two examples of viral diseases that have a serious nervous system component.

The most common neurological toxicities in dogs are caused by insecticides (such as those found in many flea and tick products), but the list of neurotoxins in the environment is almost endless.

Metabolic alterations that result in nervous signs include hypoglycemia, hepatic dysfunction, uremia (kidney failure), and alterations in mineral metabolism. Both hypo- and hyperthyroidism can cause neurological signs, as can hypoadrenocorticism

(Addison's disease) or hyperadrenocorticism (Cushing's disease). Vitamin deficiencies can cause ataxia, stupor, coma, and/or seizures.

Vascular lesions are usually due to septicemia or bacterial embolism within the CNS. Unlike their human counterparts where cerebrovascular disease from arteriosclerosis (thickening and loss of elasticity of the arterial walls) and hypertension (high blood pressure) are fairly common, these two are rare diseases in dogs.

Nervous system neoplasias (tumors) are reported more often in dogs than in other domesticated species. Overall frequency of tumors reported varies considerably, depending on the survey – from almost 3 percent of all dogs examined at necropsy to less than 0.02 percent of the examined dogs.

One survey found that the most common sites for neoplasia in young dogs were located in the hematopoietic (blood forming) system, the brain, and the skin. Brachycephalic breeds – such as Boxers, English Bulldogs, and Boston Terriers – are at increased risk for developing certain tumors of the brain tissues.

Each and every one of the many cell types present in the CNS can be altered to grow into its own tumor types – for example astrocytes, oligodendrocytes, and glial cells, respectively producing astrocytomas, oligodendrogliomas, and gliomas. Furthermore, each tumor type has its own propensity for growth or its ability to spread and become malignant. It is therefore an extreme challenge to accurately diagnose nerve tissue tumors and to offer a prognosis for how they will perform in the future.

Holistic approach

Given the difficulty of accurately diagnosing and adequately treating a disease of the nervous system, it is important that we think in terms of prevention of CNS disorders rather than cure. And while the CNS is all-inclusive in terms of its impact on the whole body, there are some general ways to help your dog maintain a healthy CNS.

■ At the top of the list is **exercise**. In the case of the CNS, we are referring to whole body/mind/spirit and heart exercise. Daily, moderate exercise will bathe all the body's nerves with health-sustaining nutrients, and activity helps to keep all systems in balance.

But the nervous system also needs to have its thinking, reasoning, creativity "worked" on a daily basis. Dogs (and people) who are exposed to novel experi-

ences and whose day-to-day activities require creative reasoning are able to maintain healthier brains well into old age. Take your dog for a walk, meet new people and other animals, continue basic training and add "tricks" that stimulate the brain – all good prescriptions for a healthy brain.

■ **Nutrition.** While good nutrition is absolutely essential for a healthy nervous system, sometimes I think we make it too difficult. The basic keys to nutrition are easy: a balanced diet of good, high quality ingredients; absence of potentially toxic substances; species-appropriate foods (grass and grain for horses; meats with some veggies for dogs); and moderation.

The older I get, the more I believe that a really balanced diet (lots of choices during the week's meals) may be most important. You cannot beat fresh, organic, unprocessed, unpreserved foods for a truly top-quality diet.

■ **Supplements.** Use supplements if you have a compelling reason to do so; in some cases they can be helpful. But keep in mind that evidence is mounting that supplements given in the form of pills or capsules are not nearly as effective as their counterparts found in natural foods. And, out-of-balance supplements or those given in excess may be more problematic than helpful.

Examples of nerve-enhancing supplements include antioxidants such as vitamins A, C, and E; a balanced vitamin B supplement; and magnesium (given in a format that balances it with other minerals). Ginkgo (*Ginkgo biloba*) improves nerve function, possibly due to its ability to enhance oxygen flow to the brain. Other herbs such as hawthorn berries (*Crataegus* species) enhance blood flow, and most herbs contain high levels of antioxidants.

■ **Socialization.** In today's crowded world, dogs absolutely need to be socialized. Any dog that hasn't learned to stay out of the street (or that isn't being walked on a leash), or that has not learned how to approach other dogs without inciting a fight, is a trauma case waiting to happen.

■ **Chiropractic.** There is nothing better for health and healing, especially for the nerves that come from the spinal cord and supply peripheral body parts, than periodic chiropractic adjustments. A "well-oiled" spine is an essential component for overall health, allowing for a full range of pain-free

movement and creating a flow of healthy nervous input to dependent muscles and organs. Conversely, "stuck" joints often create irritated nerves, which then adversely affect the organs and muscles they supply.

■ **Homeopathy and acupuncture** are two powerful medicines that may be helpful for treating many nervous system diseases. Many practitioners have had good success treating epilepsy with acupuncture, and particular homeopathic remedies seem to fit some of the symptoms of a variety of nervous system diseases. The protocol for using either of these medicines will vary with the disease symptoms, as they are presented.

Don't be surprised if the way of diagnosing and the approach to providing alternative therapies differ from the way conventional Western medicine typically approaches disease and healing.

■ **Tincture of time.** It was once thought that nerve cells did not regenerate and that animals did not generate new nerve cells, but recent evidence clearly shows this to be wrong. Damaged nerve cells can regenerate, and nerve cells continue to develop as long as we stimulate the need for them (i.e., as long as we stimulate the brain to think and act). Often, especially after a traumatic event, all that is needed for healing is to be patient and wait for it to happen.

■ **Heart to head connection.** Consider your dog's emotional health as an integral part of her/his nervous system. A little loving contact goes a long toward creating and maintaining a healthy CNS.

The recent advances into the science of the brain indicate that it may truly be the body's inner health maintenance organization. When the brain is emotionally relaxed, satisfied, and happy, it sends the message to all other body parts that everything is under control, that homeostasis has been achieved. On the other hand, however, putting the animal under emotional stress alters the biochemical messages being generated by the brain, and the result is that all other body parts are also stressed. ❁

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RESOURCES

TRAINING AND INSTRUCTION

Pat Miller, CPDT, Peaceable Paws Dog and Puppy Training, Hagerstown, MD. Train with modern, dog-friendly positive methods. Group and private training, Rally, behavior modification, workshops, intern and apprentice programs. Call her at (301) 582-9420 or see peaceablepaws.com

The Association of Pet Dog Trainers (APDT) has references to member trainers in your area. Write to 150 Executive Center Drive, Box 35, Greenville, SC 29615, or call (800) 738-3647. The APDT database of member trainers can be seen at apdt.com

HOLISTIC VETERINARIANS

American Holistic Veterinary Medical Association (AHVMA), 2214 Old Emmorton Road, Bel Air, MD 21015. (410) 569-0795. Send a self-addressed, stamped envelope for a list of holistic veterinarians in your area, or search ahvma.org

HEARTWORM

FDA Center for Veterinary Medicine Freedom of Information Summaries:
www.fda.gov/cvm/FOI/foidocs.htm
 See Section 1: NADA 138-412 for Heartgard, and Section 2: NADA 140-915 for SafeHeart and Interceptor and NADA 141-152 for Revolution.

Timing Heartworm Preventatives:
www.citadeltn.com/Heartworm.html (US) and
www.heartworm-hotline.org/ (California only)

Canine Heartworm Disease:
www.heartwormsociety.org

Adverse Reactions:
www.dogsadversereactions.com/

BOOKS

WDJ Training Editor Pat Miller is author of two books: *The Power of Positive Dog Training* and the brand-new *Positive Perspectives: Love Your Dog, Train Your Dog*. Both books are available from DogWise, (800) 776-2665 or dogwise.com

The Encyclopedia of Natural Pet Care and *Natural Remedies for Dogs and Cats*, by WDJ contributor CJ Puotinen, are available from DogWise, (800) 776-2665 or dogwise.com. Puotinen is also author of several books about human health including *Natural Relief from Aches and Pains*, available from your favorite bookseller

Dr. Kidd's Guide to Herbal Dog Care and *Dr. Kidd's Guide to Herbal Cat Care* are published by Storey Books, (800) 441-5700 or storeybooks.com

Ruffing It: A Complete Guide to Camping With Dogs by Mardi Richmond (Alpine Pubs, 1998), is also available from DogWise, (800) 776-2665 or dogwise.com

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WHAT'S AHEAD

Bully for You

Is your dog a bully when it comes to playing with other dogs? What you should do to prevent "playground" trauma.

End of Life Decisions

How to help your dog the most in his final days.

Giardia

This waterborne parasite can cause many troubling and varied symptoms in your water-loving dog.

Behavioral White Flags

Can you recognize the signs that indicate that your dog is trying super hard to please you?

Wow! A Safe Anti-inflammatory

An herbal formula that really works to relieve joint pain and stiffness.

Helping Your Shy Dog

This is more important than you might think. Without intervention, "shy" dogs are more likely to bite, often without warning.

Still to Come:

- Commercial frozen raw diets
- The best leashes