

Your complete guide to natural dog care and training

Whole Dog Journal™



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The New Normal

Modern tricks for old dogs (and even older dog owners).

September is when we editors are expected to write “back to school” pieces. Dog magazine editors tweak the usual parenting advice about helping kids adjust to school hours, offering tips on how to help our dogs adjust to the autumn absence of kids (at least during the day). This year, of course, all forms of “usual” are useless. This helps explain why the first article in this issue discusses how to increase our dog’s (and our own) enjoyment of our own back, side, and/or front yards; it doesn’t look like many of us are taking our dogs many places for a while.



Speaking of changing with the times, our *next* article, written by our Training Editor Pat Miller, discusses a few of the significant ways that we have changed our minds about dog training and dog gear over the past 23 years that WDJ has been in existence. Change is a good thing! If you think all your methods and gear are perfect, you’ve stopped learning – and that’s a shame. We think we’ve found a few ways to improve on older technology; check it out on page 6.

Another article in this issue is also custom-tailored for the times. North Carolina veterinarian and frequent contributor Dr. Catherine Ashe has written a brief but informative piece about canine viruses. Truthfully, reading about the viruses that can affect dogs helped me understand some bits of information I’ve been curious about regarding the virus that’s so much in the news. (I think you know the one.) Test your knowledge of today’s prevalent dog viruses on page 16.

There’s a quite long piece at the back of this issue. A new contributor to WDJ, Joanne Osburn, has written about stem cell therapy for dogs. Not only that, she took photos of almost every step in the process of harvesting a dog’s fat (that’s where the stem cells come from), extracting and enriching the stem cells, and preparing them for reintroducing them to the same dog in a powerful new form. How did she manage to take all those photos? She’s a lab technician in a veterinary clinic that uses this technology to help dogs heal after surgeries, regain mobility after years of pain and inactivity due to arthritis, and other medical marvels. As the owner of a rapidly stiffening senior dog who is nearly 13 years old, I am highly interested in this new therapy. It’s pricey, but I’d pay nearly any price to see Otto romp and play for as many years as he can, especially if it means we can delay the introduction of daily medications, which always seem to have some side effect when administered over the long term.

I hope you enjoy the issue.



Five Ways to Make Your Dog's Yard Safe and Fun

Your dog's home should offer more than just containment.

Given the sensible advice to socially distance, what better time to create a safe, at-home haven for your dog? Here are five ways you can increase your dog's (and your own!) enjoyment of your yard.

1 Invest in a good fence. A secure fence is the most critical element of a safe place for your dog to potty, play, train, and just hang out. Sometimes a dog owner will tell me, "We don't need a fenced yard; we have a large property for the dog to run on." I explain that while my husband and I live on about 300 acres, we have fenced a much smaller area next to our home so we have an *absolutely* safe place for them to be outdoors without supervision.

What type of fence? There are many to choose from, including chain link or other wire fencing, wood, composite, or plastic. It's up to your budget, your aesthetic preferences, your location (homeowner's associations may limit your options), and your dog.

Why do I include "your dog" on the list of factors that will affect your choice of fencing? The height of the fence is most obvious; if you have small dogs, you may not need a six-foot fence. But if you've got leggy dogs known for their interest in chasing game (ahem, hounds),



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a six-foot fence might not be secure without an inwardly angled section or "coyote rollers" at the top.

Height isn't all there is to it, however. Some dogs enjoy their ability to see through a wire fence, and never get excited by passers-by on bikes, skateboards, or on foot. Other dogs might lose their minds when faced with this much stimuli. Also, if there are dogs next door, their presence and/or behavior on the other side of the fence may be frustrating for your dog. In these instances, a solid privacy fence may be advisable.

A "viewport" in the fence is perfect for this senior gentleman, who wouldn't dream of barking at every passerby. But it could cause real problems for a dog who is more reactive to passing joggers, bicyclists, and dog-walkers.

Just Say No to "Fenceless Fences"

Note that when I say fence, I do mean a real, *physical* fence. Electric fences (a.k.a. "shock fences") may keep your dog in but can't keep other animals out – that is, critters who could harm your pet, aggressive stray dogs, or even a human who could steal or harass your dog).

Also, if your dog is motivated sufficiently to chase something, she could go through and then likely would not return, scared to try to cross the boundary now that she's not overstimulated by chasing something.

Last but not least, a dog that gets zapped for coming close to the boundary to investigate a passing jogger, bicyclist, or other dog is likely to begin to associate those with punishment and may develop fear and/or aggression related to those previously neutral stimuli.

Need more convincing? See these past WDJ articles:

- "Pros & Cons of Electric Underground Fences," 5/2001
- "Electric Dog Fences: Are They Safe?" 2/2003
- "Why We Don't Recommend Electric Fences," 9/2016

If your dog is a digger, you may need to bury wire fencing along your fence line, or build the fence on a concrete pad or path. Digging out may not occur to some dogs ever, but others may detect any sign of light under the fence and get to work digging out immediately!

Think carefully about the type of gate that is used to access the area. It should be easy for you to open (especially when you have only one hand free, with a leash in the other) but not at all easy for your dog to open.

2 Consider the flora. Are there parts of your yard that you don't want to be disturbed? In this case, a lower level of decorative fencing may make the most sense – and keep you from tensing up every time you see your dog approach your award-winning roses or dahlias.

A couple of our dogs used to enjoy raiding the vegetable garden just when the cucumbers or strawberries ripened! That made me smile so I made no effort to cordon off the area.

If you haven't already planted a garden, consider your dog's current pattern of uses before planting. Note where your dog spends the most time so you can design accordingly; don't put plants where he's created well-worn patrol paths, for example. Consider sacrificing those areas and putting down some river rock, permeable pavers, sand, or bark mulch.

When choosing plants for your yard, keep in mind that many of the options found in your local garden supply stores can be toxic for your dog. One that is distressingly common to see is the sago palm; just a few nibbles on the leaves or roots of this plant can cause liver damage and

even death. For an exhaustive list of plants that are toxic and non-toxic to dogs, see the ASPCA's website: aspc.org/pet-care/animal-poison-control/dogs-plant-list.

Don't forget to research the mulch you are considering for use in your yard; mulch made from cocoa beans, in particular, is toxic for our canine friends!

3 Designate a potty spot and train your dog to use it. You'll thank me later for this one. Even if you've had your dog or puppy for a while, it's worthwhile to spend the time to teach him to potty in the same area. This saves time when you're cleaning up (no hunting for the poop in the dark or rain) – and prevents squishy surprises!

Some people want their dog's potty area to be located close to the house for quick access; others might want it to be hidden from view of the places in the yard where you spend time. Either way, make sure it's in reach of a hose. An area that is layered with at least three inches of 3 absorbent sand, covered with pea gravel or small river rock, will be easy to keep clean and odor-free with an occasional hosing.

To teach your dog or puppy to use the potty, pretend you are starting house-training all over again. Accompany your pup on leash to this area several times a day and handsomely reward him or her upon elimination until this habit is deeply ingrained. Be sure to pick up the poop and hose down the area regularly.

4 Add enriching "playground" equipment. Our yards should be about more than just containing our dogs; ideally, they are also



a super fun place to play with our dogs and to let them play.

Many dogs like to climb or to have a raised platform of some kind where they can survey their terrain (obviously, away from the fence). My Boxer-mix, Petey (seen above), loves to hang out on a homemade A-frame we built out of scrap lumber and covered with artificial grass carpet. Make sure to apply something to prevent slipping – whether you paint the surface with a paint to which sand has been added, or you apply rubber or sand-textured non-slip adhesive-backed strips.

A recent WDJ article ("The Play Way," June 2020) promoted the power of play to help fearful dogs gain confidence. Our family's new addition, a rough-coated Jack Russell Terrier, Archie, had very little socialization during his first year of life and is fairly fearful. We engage him in tug, chase, and fetch play sessions in the house, but Archie is also enjoying climbing and playing on the A-frame.

Many of us dream of having a lush garden and a dog who respects the garden boundaries – but some of us end up with uprooted vegetable beds "planted" with buried dog toys and half-chewed bones. A separate fence for the garden might be needed.



We are seeing a new dog emerging!

I recently took Petey to a friend's home where she has fenced about an acre for her dogs. Petey thoroughly enjoyed this space, not only for its size, but also because they had left many natural features like tree stumps and boulders for the dogs to explore and look for varmints. Consider leaving some natural features in your yard for your dog to sniff and hunt.

One of the most enriching things you can add to any dog's yard is a digging box – a place where they can dig to their heart's content, without getting in trouble! You can buy a child's sandbox or build a basic frame, fill it with sand, and hide some doggy toys and bones for your pooch to seek out. In hot weather, keep the sand wet, and in no time at all, you'll find your dog hunkered down in a freshly dug, cool, damp hole.

Most dogs will also appreciate a variety of lounging surfaces – lush grass, cool (or warm, depending on the season) concrete, and perhaps a raised cot-style bed – and move from one surface to the other throughout the day.

5 Install yard lights so you can visually scan for critters, or go out with your dog and check the yard before every night-time potty excursion. How many of you have a dog who got skunked when you put him out for a late-night potty? I'd

Home Field Advantage

I'm a huge fan of allowing compatible dogs to play together – but not at all a fan of dog parks. Not every dog at a public park is playful, and not every owner is super attentive, able to read their dog's body language, and ready to intervene to keep the peace. A better alternative, if you have a playful, social dog and a secure yard, is to create your own mini dog park. Help your dog cultivate friendships with dogs who have a similar play style and set up play dates with their owners!

A safely fenced yard is also a fantastic place to train your dog! Inside your home is the best place to start training *new* behaviors to keep the distraction level low, but as your dog gains competence, take the practice out into your fenced yard. The distraction level outdoors will be just a bit higher, but not as high as the wider outside world. Practice there until his responses to your cues are solid; only then should you practice his new behaviors in the face of even more distractions.

A fun and safe dog yard is a beautiful thing – and for some of my elderly or handicapped dog-training clients, given their strength and mobility issues, a required tool for giving their dogs a chance to potty, exercise, and relax outdoors. Design yours so it meets your and your dog's needs and have a blast!

guess a pretty high percentage of us have experienced this, whether we live in the country or a suburb.

Skunks aren't the only type of animal to look out for before allowing your dog to enter the yard at night, however. Depending on where you live, your yard just may be visited at night by a fox, raccoon, coyote, bob-

cat, badger, mountain lion, or bear. Turning on a light before sending your dog outside will send most of these animals back over the fence and keep your dog safe.

The tendency of dogs to chase anything perceived as prey – deer, bunnies, stray cats, etc. – is another reason to check the yard each time before you allow your dog out there. Turning on the lights and clapping your hands can warn any critters that they have just a few seconds to vamoose!

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WDJ Editor Nancy Kerns' senior dog, Otto, spends the better part of every hot day in the sandbox built and maintained just for him. A patio umbrella keeps the shade constant (and keeps leaves out of the sand). Nancy wets the sand daily to keep it cool.





Be a Change Agent!

*Don't be afraid of change, especially when it's progress!
Over the past 23 years, we've changed our minds about a few dog-related terms, training methods, and pieces of gear.*



I say it. I sometimes look back at something I wrote years ago and cringe when I realize that, as much as there may have been general agreement with it in the profession then (whatever it is), there is growing or widespread agreement now that it isn't really so. Here are some examples of things about which I have changed my mind over the years:

■ The importance of putting reinforcers on an intermittent schedule of reinforcement.

Early on, when using treats in training was somewhat revolutionary, we “foodies” took a lot of heat for our use of treats. As a result, in the past, we put a lot of emphasis on moving the dog from a *continuous schedule* (in which he gets reinforced every time – very important when he is first learning a new behavior) to an *intermittent schedule* of reinforcement, which means he learns to offer the behavior multiple times when asked and gets reinforced only occasionally. Continuous reinforcement, we thought, would make dogs *and* humans dependent on the presence of the treat in order to get the behavior to happen.

We have come to realize that it's not all that important to use intermittent reinforcement *unless* you need the behavior to be durable – resistant to extinction. There is absolutely nothing wrong with reinforcing the behavior every time it happens. And I pretty much do! The Miller dogs are generally on a continuous schedule of reinforcement, even if it's sometimes just a cheerful “Good dog!”

Remember, “reinforcement” doesn't have to mean a treat. While I almost always have treats in my pockets, I can also use praise, a toy, petting (for dogs who love to be petted), opening a door to go outside, the opportunity to perform another behavior the dog loves – or anything else the dog finds reinforcing, in place of a treat.

We do know that a behavior extinguishes over time if it is not reinforced and that behaviors that are intermittently reinforced are more durable than others. But how many

Reinforce your dog frequently and generously when he's doing what you want him to do. In most cases, it's less productive to randomize the reinforcement “schedule” than it is to make sure you reinforce the behavior you desire frequently enough for him to understand what you want him to do!

There's an old saying: “The more things change, the more they stay the same.” Fortunately for our beloved dogs, that's not necessarily the case in the world of dog training and behavior. Granted, there are still far too many professionals who cling to old-fashioned methods that employ the use of force, pain, and coercion. For them, things do seem to stay the same. However, the corps of enlightened training professionals that routinely read about, absorb, and apply innovations of behavior science grows daily, and I'm proud to consider myself one of these.

Of course, that means from time to time I have occasion to change what I say and how

of us are often in environments with our dogs where we can't reinforce behavior every time, or most of the time? I can think of a few – a dog in an American Kennel Club obedience trial, a canine actor on stage in a play, a working dog who, by nature of his job, has to work at a distance from his handler . . . not all that many!

In the real world, few owners “over-reward” and end up with dogs who refuse to work unless a treat is shown to them first. More

commonly, I see owners who fail at “catching their dogs doing something right” – that is, fail to frequently reinforce their dogs for the behaviors they like to see. Lacking reinforcement, and thus, experience that teaches them which behaviors will reliably result in enjoyable consequences produced by their owners, dogs will find things to do that please themselves!

That's why I *now* advise you to reinforce your dogs any and *every* time you see behaviors you like – looking at squirrels out the window without barking, going to her mat when the family sits down to dinner, checking in with you on a walk, greeting friends at the door with all four paws on the floor. And reinforce these terrific behaviors with *anything* your dog finds enjoyable – a treat, a cheerful word, a belly rub, a favorite toy, or a rousing game of tug o' war.

■ Rules for playing tug o' war with your dog.

Speaking of tug, I've considerably lightened up on my recommended “rules for tug o' war” with dogs. Again, sensitive to criticism from the old-fashioned trainer crowd, we used to dictate strict rules for playing tug with your dog. Playing tug even under these rules used to be considered dangerous by many old-school trainers, who warned owners that tug could make their dogs aggressive. I wouldn't ever go that far – though I certainly wouldn't advise an inexperienced owner to casually play tug with an



Use a toy that's long enough to keep his teeth away from your hands – and call for a “Trade!” every so often.

already aggressive dog or one who is known to guard resources.

Many dogs love to play tug with their owners, so it has a ton of potential for use as a mutually enjoyable and fantastically reinforcing game. To get the most out of the reinforcing nature of the game, ask your dog to play by some basic rules; to keep yourself safe, play with a few safety guidelines in place. Here are my current rules and guidelines for playing tug:

- Use a toy that's long enough to keep your dog's teeth far away from your hands and that's comfortable for you to hold when he pulls.
- Hold up the tug toy. If your dog lunges for it, say “Oops!” and quickly hide it behind your back. He needs to be polite when he plays tug with you.
- When he'll remain sitting as you offer the toy, tell him to “Take it!” and encourage him to grab and pull. If he's reluctant, play gently until he learns the game. If he's enthusiastic, go for it!
- Randomly throughout tug-play, ask him to “Trade!” Offer him a yummy treat, which he can take after he relinquishes the tug toy to you. Then, offer the toy and tell him to “Take it!” again.
- While you are playing, if his teeth creep up the toy toward your hands, say “Oops! Too bad!” in a cheerful

voice, have him give you the toy, and put it away briefly. (This is for safety reasons. You can get it out and play again after 15 seconds or so.)

- If your dog's teeth touch your clothing or skin, say “Oops! Too bad!” and put the toy away for a minute (again, for safety reasons).
- Children should not play tug with your dog unless and until you are confident they can play by the rules. If you do allow children to play tug with your dog, always directly supervise the game.
- Only tug side to side, not up and down (up and down tugging can injure your dog's spine) and temper the vigor of your play appropriately to the size and age of your dog. (You can play tug more vigorously with an adult Rottweiler than you can with a Rottie puppy or a little terrier.)

Here are the rules for tug that I have discarded or modified:

- Keep the tug toy put away. Bring it out only when you want to play tug. (There is no logical justification for keeping the tug toy away from the dog at other times.)
- Ignore the dog if he invites you to play tug. You get to decide when tug happens. (What does it hurt if your dog asks you to play? You can always say, “No thanks! Not now!”)

- You should “win” most of the time – that is, you end up with possession of the toy, not your dog. (As long as you allowed the dog to take the toy, and he didn’t take it in an aggressive manner, there is no harm in letting him have it sometimes, or even frequently. In fact, some dogs quickly learn that playing with the toy by themselves is nowhere near as much fun as playing with you.)

- When you are done playing, put the toy away until next time. You control the good stuff. (Playing with you is the *really* good stuff! It’s fine to let the dog trot off with the toy when you’re done, as long as it’s safe for him to have.)

As you can see, I’ve removed all the rules that insist you always have to be in total control of the game – the ones that were based in the old-fashioned thinking that if you weren’t in total control your dog would take advantage of you and perhaps even become aggressive. We know better now. Happy tugging!

■ Leave It/Walk Away

Many of us teach our dogs a cue to “Leave it!” (also known as “Off!”) for use in those situations when you see something you don’t want your dog to mess with – whether it’s a pile of cat poo, a discarded chicken bone, a cat crossing the sidewalk, or a snake. I still teach that cue for use when I want the dog to understand “Whatever you are coveting or considering going toward, I want you to leave it alone.” But I *also* teach an alternative cue, “Walk away,” which means “Whatever you are looking at, I want you to do a 180-degree spin and run away with me.”

While there are many situations where the two cues could be used interchangeably, and some cases where “Leave it” is still the more appropriate choice, I find that dogs respond much more reliably to the “Walk away” cue, simply because we teach them that it’s a fun game. Given the choice, it’s my much-preferred behavior to ask for.

We’ve found that most dogs find the “Walk away!” behavior to be much more fun (and thus, easy to remember to do when they hear the cue) than “Leave it!” or “Off!” At least part of the reason for this is the emphasis on doing something, rather than not doing something.



I first discovered this with my Cardigan Corgi, Lucy. She had learned “Leave it!” in her adolescence and responded reasonably reliable to that cue. When she was 10 years old, I learned about New Jersey trainer Kelly Fahey’s “Walk away” protocol, and taught it to Lucy.

Then I did an experiment. I set a bowl of tasty food on the floor, and as Lucy walked toward it, I said, “Leave it!” She took two more steps and started eating. Then I said, “Walk away!” and she spun away from the bowl and ran away from it with me.

The moral of the story and a good reminder: We are almost always more successful asking our dogs to *do* something (run away with me!) than *not* to do something (don’t eat that!). It’s one of the basic tenets of positive reinforcement-based dog training.

For complete instructions on teaching “Walk away” to your dog, see the “Walk Away!” sidebar in the “Frustrated on Leash?” article in the October 2019 issue of WDJ.

■ Head halters can help – or hurt.

Just like almost every other positive trainer, I was enthusiastic about head halters when they first made the training scene around 1995. They helped many people prevent their dogs from dragging them around on walks, without the use of painful yanks from choke chains or pinching prong collars. With a regular collar, the leash is attached at the dog’s neck; with a head halter, the leash

attachment is right under the dog’s head, making it very difficult for him to brace against the leash and pull. Gentle pressure on the leash from the handler turns the dog back toward the handler.

But the more we saw halters used, the more it became clear that the majority of dogs *hated* them, even after fairly thorough efforts were made to desensitize and counter-condition dogs to wearing them.

Then front-clip harnesses came along and fulfilled much of the same function: giving us a significant degree of control over dogs who pulled hard. It was easy to switch my allegiance to these new products (and we described all the reasons for this in the February 2005 issue of WDJ).

Most dogs accept harnesses without protest, and they are far less



Some dogs find head halters highly aversive, even after desensitization and counter-conditioning efforts have been made with the intention of associating them with good things.

likely to do damage to a dog’s neck or spine if they hit the end of the leash hard. (I occasionally come across a dog who finds front-clip harnesses aversive, and I don’t use them with those dogs.)

For a review of front clip harnesses, see “Harness the Power,” WDJ April 2017.

■ Modified recommendations for crating your dog.

Some people believe that confining your dog in a crate – *ever* – is cruel. Never fear: I am still a strong advocate for crating. There are a couple of things regarding crates, however, that I do differently now than I did years ago.

I used to be on board with this common caveat to owners: “If your dog/puppy is crying in his crate, ignore him until he stops crying, or you will reinforce his vocalizations.” I shudder now to think of that.

Okay, granted, if your dog barks a few times, it’s still good advice to ignore it so you don’t reinforce him for barking. But anything beyond that – ongoing, emotional vocalization – needs to be addressed behaviorally. Leaving a dog to cry in his crate for long periods increases his stress and gives him an even *more* negative association with being crated.

A dog who is stressed about crating but still needs confinement for management purposes needs a gradual program of habituation (a few seconds at first with you right there, then longer and longer, with you gradually removing yourself), or needs alternatives to crating (an exercise pen or a dog-proofed room).

My other change having to do with crates regards size. I used to say that a dog’s crate should be just big enough for him to stand up, lie down, and turn around. That is still true if you’re houstraining – you don’t want the crate to be big enough that he can soil one end and sleep dry and comfortably in the other.

But *after* he is houstrained, if he still needs to be crated, there’s no reason to continue to deprive him of more spacious quarters.

UPDATED LANGUAGE

As behavior science and training techniques advance, the language we use to discuss the concepts often has to change and advance, too. It’s a good thing!

TERMS I USED TO USE	UPDATED TERM	REASON
“Command” (the thing we do to elicit a behavior we want from the dog)	“Cue”	“Command” harks back to old-fashioned training – When I command you to do something, the implication is: “Do it or else!” A cue is simply an invitation to perform a behavior for which you are likely to get reinforcement, and my job is to figure out how to get you to want to do it.
“Give” (when I want something the dog has)	“Trade”	“Trade” is the cue I use when I want my dog to give me something that he has; it’s friendlier and implies cooperation, not coercion.
“Pack” (a group of dogs you live with)	“Family”	A genuine “pack” of dogs are generally related to each other, and members live together by their own choice. Wolves in the wild live in packs – mom, dad, pups, and adolescents who stay with the pack until they mature and leave to start their own families. Ethologists tell us that even groups of feral dogs aren’t true packs, but rather are loose collections of random dogs. The dogs that most of us bring into our families are a far cry from a true pack.
“Prey drive”	“Predatory behavior”	“Drive” implies a fixed, immutable characteristic, when in fact it’s just behavior that the dog finds highly reinforcing – and behavior is modifiable.

THE GOOD NEWS

In general, the positive dog training world has made a quantum shift from, “I will *make* the dog do what I want him to do ... I bought him so I could compete with him in agility and he’s damn well going to do it!” to “I will explore options with my dog to see what he would like to do. I’ll be really happy if he wants to do agility, since I love agility, but if he tells/shows me that he would prefer to do nosework, or rally obedience, or canine freestyle, I’m good with that, too.”

Personally, I have also made a quantum philosophical shift. I used to be fiercely competitive with my dogs. My wonderful terrier-mix (and “crossover dog”) Josie had multiple obedience titles and was one of the first 26 dogs in the world to earn a rally obedience title through the Association of Professional Dog Trainers (APDT). I no longer need my dogs to be precise competitors, doing perfectly straight sits in perfect heel position; just being who they are is good enough. Today, while I respect

those who find joy in mutual partnership and competition with their dogs, I just want to be with mine, doing barn chores, hiking on the farm, and sharing and enjoying our life together.

As I read through my past writings to find things that I now disagree with, I was pleased to find there weren’t as many as I thought there might be. I went through my articles all the way back to *Whole Dog Journal’s* inception in 1998, and didn’t find anything horrendously objectionable. Yes, I found some things I would do or say differently now, but nothing that would get me kicked out of the force-free trainer club. It’s always good, though, to remind ourselves that when we know better, we do better. 🐾

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Puppy Needs New Food!

Here are the most critical things to look for when shopping for your puppy's food.

Puppies require more calories per pound of their body weight than adult dogs do; they also require higher levels of protein, fat, calcium, phosphorus, and a few more minerals. Feeding them food that is labeled for "adult maintenance" will leave them nutritionally deficient.

Michael Pollan, author of the best-selling books on diet *The Omnivore's Dilemma*, *In Defense of Food*, and *Food Rules*, once came up with the world's most succinct guide for a healthy human diet: "Eat food. Not too much. Mostly plants."

If only we could come up with something that simple for puppies! The advice could start in a very similar fashion: "Feed food. Not too much...." But in order for the slogan to be nutritionally sound, the next part would be far too complicated to put on a book cover or tote bag: "Mostly quality sources of animal protein, delivered at adequate levels. Same goes for fat. Not too much calcium, but enough, depending on the expected adult size of the puppy..."

There's more, but you get the idea. There are a lot of factors that have to be carefully considered when feeding puppies – that is, if you want them to grow into healthy and sound adult dogs.

On the other hand, I don't want to scare anyone; feeding puppies isn't rocket science. But there are a few little details that you need to attend to in order to make sure your pup grows at an appropriate rate – things that aren't as critical with an adult dog.

STANDARD ISSUE

The differences between the nutrient requirements for puppies and those for adult dogs are laid out in tables developed by the Association of American Feed Control Officials (AAFCO); these are called the AAFCO Dog Food Nutrient Profiles, and they include the standards for what comprises the legal definition of "complete and balanced" diets for dogs. One lists the nutrient levels required for the "maintenance" of adult dogs only; the other lists the nutrient levels that meet the needs of breeding animals, pregnant or nursing females, and growing puppies. The latter is often referred to as the "growth and reproduction" nutrient profile.

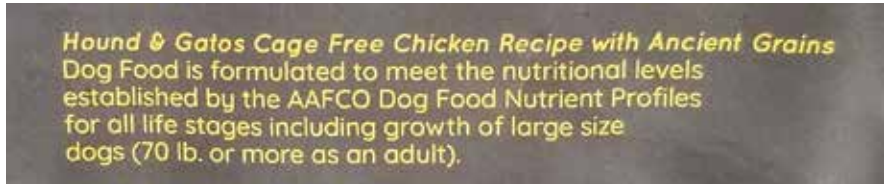
These tables differ in notable ways. Puppies need higher amounts of protein (including higher amounts of many specific amino acids that contribute to the food's total protein), fat, calcium, phosphorus, and several other minerals than the amounts needed by adult dogs. This is why you must make sure that the food you buy for your puppy (any dog less than a year old) is formulated to meet the standards for complete and balanced nutrition for growth.

Often, dog food labels say that the food contained in the package meets the standards for dogs "of all life stages." This implicitly includes puppies. If a food is labeled as either meeting the nutrient



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Always look for the AAFCO (or nutritional adequacy) statement to make sure the product you are considering is intended for puppies – and puppies of the size you expect your pup to be as an adult.



levels or passing a feeding trial for dogs of “all life stages,” it *has* to meet the “growth” requirements.

Often – *but not always* – food that is formulated to meet the needs of puppies has the word “puppy” in the name of the food. Again, if the label indicates that it’s “complete and balanced for dogs of all life stages,” it has met the AAFCO standards for growth (puppies). But if the label says it is “complete and balanced for adult maintenance,” it is *not* suitable for puppies.

Where will you find this information? This is where things get weird: This statement is *the* most important thing to check on the label of your puppy’s food, and I will almost guarantee that it will be printed on the bag or can in teeny, tiny type. Scan the label carefully for the words “AAFCO Nutrient Profiles” or “AAFCO Feeding Trial.” The block of text containing one of these phrases will probably appear on the back or even the side of the package, and it will reference either “growth” (great!), “dogs of all life stages” (super!), or “adult maintenance” (womp, womp, no!).

CHECK THE SIZE

All puppy foods used to be formulated to meet the same nutrient standards. In recent years, however, animal nutrition experts came to understand that large-breed puppies should receive less calcium than puppies of smaller breeds to prevent their bones from growing too quickly. Excessively fast growth can result in the development of bone and joint abnormalities in large-breed puppies. So, in 2016, AAFCO began to require food makers to explicitly state whether their products contained calcium at an appropriate level for large breed puppies (defined as those pups expected to reach an adult weight of more than 70 pounds).

If the AAFCO statement says the

food is for growth/all life stages “*including growth of large-size dogs (70 pounds or more as an adult),*” it is safe to feed to large breed pups.

If the statement says the food is for growth/all life stages “*except for growth of large-size dogs (70 pounds or more as an adult),*” it should *not* be fed to large-breed puppies.

To be safe, if you have a large-breed puppy, or a mixed-breed pup who looks like he may grow to more than 50 or 60 pounds, you should choose foods with the “including growth of large-size dogs” statement. Smaller-breed puppies can be safely fed foods with either statement.

OUR USUAL CRITERIA

Once you are confident that you can identify foods that are appropriate for puppies of the size you expect your pup to be, you can search among those products for diets that meet our usual selection criteria (listed in the box below) and that are in your price range.

Check the protein and fat content

of the food you are feeding your pup right now. If his weight and energy are good, try to buy only those foods that contain similar levels of protein and fat. Be aware that these levels range *widely*. If you start feeding him a product with double or half the protein or fat content of the food you are giving him now, you *will* see changes in him; his appetite, weight, stool quality, and/or energy may be affected.

Finally, don’t be afraid to try different foods. Pet food companies want to win your loyalty, but the fact is, variety is actually good for your puppy. The more you change foods, the more accustomed his digestive tract will become to a wide variety of ingredients. Also, because each manufacturer’s products contain different levels of each required nutrient (within the AAFCO specifications), by routinely switching products, you are sure to provide “balance over time” and prevent him from suffering ill effects of any potentially excessive or deficient nutrient levels. 🐾

DOG FOOD SELECTION CRITERIA

HALLMARKS OF QUALITY

- ✓ Lots of *animal* protein at the top of the ingredients list. Plant-sourced protein is less appropriate than animal protein.
- ✓ When a fresh meat is first on the ingredients list, there should be a named animal-protein meal immediately or closely following the meat.
- ✓ Whole vegetables, fruits, grains, and/or carbohydrate sources (as opposed to food “fractions”).

DISQUALIFIERS

- ✗ Meat byproducts, poultry byproducts, meat byproduct meal, and poultry byproduct meal.
- ✗ “Generic” fat sources (e.g., “animal fat”).
- ✗ “Animal plasma” or blood meal as a protein source.
- ✗ Added sweeteners.
- ✗ Artificial colors, flavors, or preservatives (such as BHA, BHT, ethoxyquin).



BEHAVIOR

Ignore at Your Peril

Owners are frequently advised to “ignore” their dogs’ unwanted behaviors, such as jumping and barking. Effectively stopping those behaviors takes more than just turning your back!

Ignoring should work, right? One of the first bits of behavior science that we pick up as dog trainers is that behavior is driven by consequences.

- If something good happens after a behavior, that behavior is likely to be repeated.
- If something bad happens, the behavior may diminish.
- And if nothing happens at all after a behavior, there’s often no point to the behavior. It may well fade away.

Those are all true statements. So if a dog greets us by jumping in the air and pounding us with his front feet, or barks demandingly as we prepare his meal, how come he doesn’t quit when we ignore the naughtiness?

KEYS TO UNDERSTANDING

When seeking to change behavior, we start by identifying and describing the behavior. Then we seek to identify the consequence that is driving the behavior. We identify *antecedents*: We note the situations and environments in which the behavior is likely to occur. We then create a plan to change the consequences and/or the antecedents in order to change the behavior.

I’m going to describe five reasons why “ignoring” may fail as a strategy; each corresponds to failures in a behavior-change plan. They may occur because we fail to identify the consequences that could be driving the behavior. They may occur because we misidentified the emotional state of the dog (an error in identifying an antecedent). Or they may fail because our plan was not complete or we just couldn’t carry it out. Here are five common ways the “ignoring” plan can fail:

1 OTHER REINFORCERS ARE PRESENT. A very common reason why ignoring fizzles as a strategy is that paying attention to the dog is not the reinforcer of the undesired behavior in the first place, or it is not the *only* reinforcer.

The classic example of this is the behavior of jumping to greet. Surely part of the reason a dog jumps on his owner or arriving visitors is to interact with them. It is so tempting to assume that if we remove that interaction – if we look away, turn away, and don’t speak to him – he will quit that annoying jumping. Good luck with that, though; it rarely works by itself.

The dogs who continue to jump when ignored – what are they getting out of it? One consequence is that they get closer to our faces. We are vertical creatures and it takes a good jump to get up to where the action is!

Also, we have to consider that the behavior just may feel good to the dog, even when he’s being ignored. It’s fun for dogs to use humans as a backstop or a launching pad!



Training ourselves (and our family and friends) to stop reinforcing our dogs’ unwanted behaviors is a significant part of the challenge.

Jumping may also be driven by anxiety or over-arousal.

If we use ignoring for the dog who barks demandingly for his meal, we are even more off-track. What is the ultimate reinforcer that results from meal preparation? Food!

Wise trainers pay close attention to what their dogs are doing for the period before such a big reinforcer. Barking, twirling, head butting, hand nuzzling, getting underfoot in the kitchen, and jumping can all be beautifully maintained by the presentation of a meal's worth of food at the end of it all. You can get any of those behaviors without paying any attention to the dog. Consequently, removing the attention does nothing to decrease the behaviors.

2 PEOPLE ARE CONFUSED ABOUT WHAT, EXACTLY, CONSTITUTES "IGNORING." It's difficult to define and hard to carry out! Ignoring *might* work in a few more cases – if only we really knew how to do it. Also, it's hard to define the term "to ignore" without using negatives; you don't do this; you don't do that . . .

What you *do* is to proceed as if the dog, with her annoying behavior, is not there. That's hard, especially if the dog is making physical contact with you. And there's some truth to the "don'ts" in the common definition. It can take as little as a quick glance from us to connect with our dog. They are the world's best noticers! That quick look, that "Oof" noise, that lurching body movement you might make – all those can be responses to the dog. They affected your behavior and they noticed!

And then there are the things we sometimes try to get them to stop. Turning our backs just gives them a clearer vertical surface to carom off of. Pushing them away – what a fun game! For some dogs, even being yelled at is more enjoyable than being truly ignored.

There are some dogs out there for whom certain behaviors are so driven by attention that ignoring *could* work. But a good trainer would use it as only *part* of a strategy for be-

havior change – and it still has to be done correctly. A great trainer friend of mine teaches her clients a targeting behavior when she implements that plan for dogs who jump. But the behavior is not for the dog; it's for the person! She teaches her human clients to make eye contact with her (if she is present) or read a magazine (if the client is home alone). It gives them an alternative behavior so they don't look at the dog.

But that is only a part of the training plan. The dog is learning a behavior, too. She and her client are working on reinforcing a more acceptable behavior that doesn't include knocking down visitors.

3 WE DON'T IGNORE THE DOG FOR A SUFFICIENTLY LONG PERIOD.

Even in situations where ignoring might work, we have a hard time sticking with it long enough.

Here's a different behavioral example: Let's say your tiny dog has learned to get attention by pawing at your leg. Perhaps she gets picked up, petted, spoken to, or even fed from the table when she does that. How many hundreds of times has that worked for her in your life together?

Now turn it around. How many hundreds of times have *your* responses to *her* been reinforced? Hundreds! Dogs are masters of negative reinforcement. They learn to bug us until we do something, then stop (for a while). That's how your *own* habit of response got built and firmed up.

It's jarring for some of us when we realize that to change our dog's behavior, we have to change our own. After all those repetitions, how are you going to remember never again to respond to the adorable paw-on-the-leg behavior? Perhaps you'll blow it when you are talking on the phone or messing around on social media. There's that little foot. You reach down and – darn! You kept the behavior alive.

Even if you are an expert at chang-

ing your own behavior, if you can make a plan and stick to it – how about the rest of your family and acquaintances? How are you going to prevent *them* from reinforcing the dog for that little pawing motion?

This is the situation in which we need to be careful about variable reinforcement. It may not be the best solution for building strong, reliable, cued behaviors in training, but it is fantastic for keeping annoying day-to-day behaviors alive. Variable reinforcement makes a behavior resistant to extinction. So when your dog has nothing else to do, why shouldn't she revert to something that used to work for attention? Why not try that little paw scratch one more time? You are back where you started if you respond!

One more thing about extinction: The behavior we are trying to extinguish will generally worsen before it gets better. It will typically get more frequent or intense in what is called an extinction burst. How many times



do you punch the button for a "walk" signal at an intersection you want to cross? How many times will you click on the "OK" box on the error message on

your computer, even as nothing happens, before realizing your computer has frozen up? When that happens, do you ever treat your keyboard rather roughly?

When reinforcement for a behavior is abruptly removed, it can be frustrating. So with our little dog, the paw scratching may get more frequent or harder. The dog may start adding a whine. That's often when we cave, and that has bad consequences. We just reinforced a long behavior chain of undesirable behavior instead of one little scratch.

4 THE DOG DOESN'T KNOW WHAT TO DO INSTEAD; WE'VE LEFT HER IN A BEHAVIORAL VACUUM.

Let's say we have correctly identified that the sole reinforcer of an annoying behavior is attention. We

have learned how to ignore the behavior and been consistent at that. We have convinced every other person in the dog's life to do the same. We still have a problem, though. We have left the dog with a void. There used to be *something* she could do to gain reinforcement and it's gone. What behavior will take the place of the one we have discouraged?

Left to her own devices, the dog may come up with something worse – and who can blame her? Being ignored is hard for members of a social species. And performing a behavior that has successfully served a purpose for years without getting the expected outcome is unpleasant for anyone.

In my opinion, this can be especially hard on dogs who are otherwise untrained. Let's say a pet owner reads an article that she should just "ignore the bad behavior" and gives it a try. But she has never used positive reinforcement in the form of food or play to train her dog. Trained dogs usually have default behaviors – behaviors they can fall back on that are desirable to humans and will earn the dog some reinforcement. They have at least some clues about what to try. But dogs who get the "ignoring" treatment when they don't have a clue what to do instead are in an unfair, even pitiable position.

The outcome won't likely be great for the owner, either. Since she hasn't trained the dog to chill on a mat or crate or sit to ask for something, the dog will likely come up with a natural doggie behavior to fill the void. And it may be even less acceptable than the first one. Well-designed plans for behavior change include the teaching and reinforcing of new behaviors.

5 THE DOG MAY BE TOO UPSET TO CARE THAT YOU ARE IGNORING HIM. If he's worked up about something, he may not be *able* to change his behavior at that moment.

Until now, I've been discussing situations where the dog is not scared or overwrought. But there are whole classes of behaviors wherein the dog is undergoing a sympathetic nervous system fight or flight response.

Thankfully, it's uncommon for people to recommend that we just ignore our dogs if they lunge or pounce at another dog on-leash or stalk humans who are strange to them. But there is a common, emotion-driven behavior where ignoring is sometimes recommended: barking.

Dogs bark for so many apparent reasons. Certainly they bark purely for attention sometimes, especially if they and their owners have developed a little reinforcement cycle for it. But dogs also bark in excitement, as part of territorial aggression, and for many other reasons – including fear.

Fear barking (which mostly coincides with what people call reactivity) can be hard for we humans to identify. We may think the dog is being protective of us. Or we think that it is "fun" for a dog to run through the house to bark at the mail carrier at the door or delivery trucks on the street. We say, "It's the highlight of her day!"

It took me two or three years to realize that my dog who used to bark in a frenzy when a delivery truck was in the neighborhood was *afraid*. During those couple of years of my ignorance, her triggers expanded to include a host of sounds. These included the truck engine sound, the truck doors sliding open or slamming closed, the delivery person walking onto the porch, the noise of the mailbox lid or a box hitting the porch, and (the frosting on the cake) the voice of the particular mail carrier who had loud conversations on his Bluetooth headset as he delivered our mail.

None of her barking was for attention. I know from my webcams that she did it when I was not home. And I have observed that the barking was negatively reinforced. She barked all through these scary stimuli, then the truck engine would start up or rev (another trigger) and the truck would finally leave. The aversive things were gone, and she stopped.

Since then I have helped my dog with her fear and barking via

classical conditioning. But I haven't been able to completely eliminate it, since I am not always home when trucks come by. In any case, ignoring her barking had no part in our plan.

MAKE A PLAN

I can't present a plan that will decrease *all* annoying dog behaviors across the board – nobody can! That's the problem with "ignore the dog." It's a one-size-fits-all solution that fits almost no situation. But we can decrease most of those nuisance behaviors with a good training plan: We need to identify the reinforcer of the behavior, identify what sets the stage for it, and aim our interventions with full knowledge of those things.

This isn't always easy. Consider booking a lesson with a force-free trainer to keep from wasting time on non-solutions such as "just ignore the dog"! 🐾

This article was first published in Clean Run – The Magazine for Dog Agility Enthusiasts.

Dog trainer Eileen Anderson writes about behavior science, her life with dogs, and training with positive reinforcement on her blog (eileenanddogs.com). Her book, Remember Me? Loving and Caring for a Dog with Canine Cognitive Dysfunction, won a Dog Writers Association of America Maxwell Award for 2016. See page 24 for book purchasing and contact information.



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Going Viral

Now seems like a good time to talk about the viruses that can affect dogs and how to protect your dog from them.

Canine viruses have existed for thousands of years. Today we have tools to combat and prevent many of the diseases they cause. But despite this, viruses linger and mutate in wildlife and domestic dog reservoirs, so it's important to understand how they work and how to prevent them.

Viruses are not actually living organisms. Containing only one piece of genetic information – either DNA or RNA – they require a host cell to survive and reproduce.

Once in the body, the virus hijacks normal cells and uses them to reproduce. Eventually, the host cells become overwhelmed with new particles and explode, releasing more virus into the bloodstream. The cycle continues. Every system in the body, from the skin to the brain, can be affected by viruses.

Viruses are spread by a variety of mechanisms. In dogs, these include aerosolized droplets from barking, coughing, and sneezing; saliva transmission via bite wounds; and the fecal-oral route (this occurs when a dog eats or licks the feces of an infected host). Urine, ocular, and nasal discharge can also lead to exposure in some cases. Fomites (inanimate surfaces such as bowls, beds, crates, kennel walls and doors, leashes, and grooming equipment) also play an important role in transmission of disease.

Once exposed to a virus, it can take anywhere from a day to weeks for symptoms to manifest, depending on the particular virus.

PREVENTION

There are many ways to prevent infection. Keeping your dog healthy and fit with regular exercise and an excellent diet is the best way to promote a robust immune system. It's also important to keep up with routine treatments that prevent infections by parasites, such as gastrointestinal worms, heartworms, fleas, and ticks, since the burden of parasites can sap the dog's health and vitality.

Avoiding social situations where dogs with illness may be present is another good idea.

When considering boarding and daycare facilities, choose one with strict sanitation policies and vaccine requirements. Since many canine viruses can be transmitted via infected bodily fluids such as feces and urine, as well as on fomites like water and food bowls, cleanliness is important in limiting spread of disease.

It's also critical to keep your dog home if she manifests any signs of illness.

Vaccines are a safe and effective way to protect your dog and are available for almost all of the major canine diseases caused by viruses. Vaccinations are not “one size fits all,” and you should work closely with your veterinarian to determine which vaccines are most needed for your dog.

All puppies should receive a series of vaccines until they are 16 weeks of age. Vaccines are generally given again a year later, and, according to the most commonly accepted canine vaccination guidelines, every three years after that.

Some dogs should *not* be vaccinated on this schedule. This includes dogs with immune-mediated diseases, like hemolytic anemia and dogs with a history of severe vaccine reactions. Some vaccines may be discontinued for senior dogs after a certain age, depending on lifestyle. Titers are another method that has been utilized to determine when vaccination is necessary. (See “Taking the Titer Test,” WDJ June 2014.)

WHY RISK IT?

Prognosis and recovery from a virus is highly dependent on the causes. The rabies virus, for instance, is universally fatal. Other viruses, like parainfluenza (a mild, often asymptomatic upper respiratory tract infection), may never cause any illness.

As always, an ounce of prevention is worth a pound of cure with regard to viruses. 🐾

After nine years in emergency medicine, Catherine Ashe, DVM, now works as a relief veterinarian in Asheville, NC.



A vaccination that protects against a virus may contain a killed (inactivated) strain of the virus or a live but weakened (attenuated) strain of the virus. The latter are also called modified live virus (MLV) vaccines. Often, several virus antigens are combined in one “shot,” and vaccines are available that contain varying number of antigens in many different combinations. Some contain as many as nine disease antigens! – and not all of them are necessary to protect all dogs.

A GUIDE TO CANINE VIRUSES

VIRUS	TRANSMITTED BY	AFFECTED SYSTEMS	SYMPTOMS
Adenovirus (canine infectious hepatitis)	Aerosolized droplets, infected urine and feces	Respiratory, liver	Coughing, sneezing, lethargy, fever; liver disease (jaundice, lethargy, abdominal distention, vomiting, diarrhea, fever, clotting abnormalities); death
Canine distemper virus	Infected bodily fluids (urine/feces); aerosolized droplets (coughing, sneezing)	Respiratory, gastrointestinal, neurologic	Coughing, sneezing, nasal discharge; vomiting, diarrhea, loss of appetite; muscle tics (myoclonus), change in mentation, seizures, coma; thickened footpads and nose; death
Parainfluenza (Not considered “core,” yet is included with core vaccines in many combination vaccine products)	Aerosolized droplets, fomites	Upper respiratory	Mild or no symptoms; sneezing, nasal discharge, mild cough possible
Parvovirus	Infected feces (direct or indirect exposure), fomites	Gastrointestinal, bone marrow/immune system, cardiac	Vomiting, hemorrhagic diarrhea, loss of appetite, weakness, low blood sugar, low white blood cell count, fever, sepsis; acute death or fading puppy syndrome due to myocarditis
Rabies	Direct contact of saliva from infected mammal, from a bite or in an open wound	Neurologic	Behavior changes (dull, listless, twitching, aggression, reluctance to drink); seizures, stupor, coma; death
Two of the viruses described below can be prevented with a vaccine. These are considered “noncore” or “lifestyle” vaccines, given only to dogs whose environment or lifestyle put them at risk for those viruses.			
Canine coronavirus “Canine coronavirus” is just one variety of coronavirus; it doesn’t affect humans.	Oral contact with infected feces, fomites	Gastrointestinal	Usually mild or no symptoms; can cause vomiting, diarrhea, lack of appetite, abdominal discomfort/pain
Canine influenza (H3N2, H3N8)	Aerosolized droplets, fomites	Upper and lower respiratory tract	Usually mild (coughing, sneezing, nasal discharge, fever, lethargy); occasionally severe (pneumonia)
Papillomavirus	Direct contact with warts in another dog’s mouth, fomites	Oral cavity	Wart-like growths in the mouth (along gums, cheek)

TREATMENT	VACCINE?	CONVENTIONAL VACCINATION PROTOCOL
None usually needed for respiratory disease; hepatic support (IV fluids, Denamarin, plasma transfusions)	Yes	Vaccine series as a puppy until 16 weeks, then at 1 year of age, then every 3 years
Supportive care (antibiotics for secondary bacterial infections, hospitalization for IV fluids as needed); care of GI signs (antiemetics, gastro-protectants); medication for seizure control	Yes	Vaccine series as a puppy until 16 weeks, then at 1 year of age, then every 3 years
None usually needed	Yes	Often included in a combination vaccination with adenovirus, distemper, parvo; alternatively, may be administered with vaccine for <i>Bordetella bronchiseptica</i> , a bacterial vaccination
Aggressive care (usually in hospital with intravenous (IV) antibiotics, IV fluids, IV dextrose to maintain normal blood sugar, nutritional support); in mild cases, outpatient support can work (antibiotics, antiemetics, and subcutaneous fluids)	Yes	Vaccine series as a puppy until 16 weeks, then at 1 year of age, then every 3 years
None (universally fatal)	Yes	First vaccine at 12 to 16 weeks, then at 1 year of age, then every 1 to 3 years depending on state law

“CORE”

Supportive care, treatment of any other concurrent illnesses	Yes, but . . .	Vaccination is not recommended on the grounds that infection causes only mild or subclinical disease, generally occurs in dogs 6 weeks of age and younger, and is typically self-limiting
Supportive care	Yes	Two initial doses, two to four weeks apart; a single dose each year afterward
Condition will usually regress without treatment in one to two months; if it does not, treatment may be recommended. This may include azithromycin and/or stimulating the dog’s immune system by crushing one of the lesions	No	N/A

“NONCORE”



HEALTH

Canine Stem Cell Therapy

This exciting treatment is safe and effective for treating many health issues, including arthritis, tendon or ligament injuries, hip or elbow dysplasia, and more.



The two syringes on left contain a very small amount of antibiotic. The large syringe is for intravenous (IV) administration of stem cells. It contains about one quarter of the total stromal vascular fraction (SVF) diluted in sterile saline. The four syringes on the right contain a combination of platelet-rich plasma (PRP) and SVF and will be injected into joints and intervertebral spaces.

At this time last year I didn't know stem cell therapy for animals was a thing. While searching for a job where I could use my biology background and love of animals, I found a posting for a stem cell technician at a local veterinarian's office. I got the job! – and have found that there are few things as thrilling as having a part in changing a dog who had been in so much pain she could hardly move to become one who's able to trot around and enjoy life again.

Stem cell therapy is a powerful tool in treating degenerative or other diseases as well

as injury. It's an effective way to regenerate damaged or diseased tissue using cells from the dog's own body. It was first used in a veterinary context in 2002 for tendon and ligament repair for horses.¹ Since severe leg injuries can be detrimental for horses, particularly for those involved in sports of racing and jumping, stem cell therapy was a game changer. The results were remarkable – most of the treated horses were able to return to their previous activity.

Eventually stem cell therapy was utilized in treating companion animals, primarily for the same issues of tendon or ligament repair but has largely become focused on arthritis. While not a cure-all, stem cell therapy is a low-risk approach to treating injuries and degenerative diseases, providing our dogs with a better quality of life without dependence on medications.

STEM CELL BASICS

What is a stem cell? It's not quite as simple a question as it sounds. There are different types of stem cells, but the first main characteristic of a stem cell (SC) is that it can become one of a number of different cell types (called differentiation), giving rise to different tissues. Stem cells are also very proliferative, meaning they quickly divide and produce more cells, but at varying rates depending on the type of SC.

There is a difference between embryonic and adult stem cells. Embryonic stem cells (ESCs) are responsible for embryonic development. They are pluripotent, which means they can develop into any type of cell in the adult body. And they are vastly proliferative, more so than adult SCs. ESCs do not exist in the organism after birth.

An embryo develops from a single cell into a complex organism composed of multiple tissues. The course of development involves many stages, but in short, a few cells proliferate and eventually develop specialized cells that compose all the various tissues of

the body. ESCs in the early embryo proliferate, or divide, to produce more cells very quickly. They are *pluripotent*, which means they are capable of becoming any cell type in the organism. As development proceeds cells eventually become more specialized and less proliferative. There are many stages or levels as SCs move toward specialization.

Early in development, ESCs differentiate into one of three germ layers, each of which gives rise to certain parts of the fetus. The endoderm (*endo* = inner) gives rise to many internal organs, including the lungs, pancreas, stomach, and liver. The mesoderm (*meso* = middle) gives rise to bone, cartilage, tendons, ligaments, muscle, heart, fat, and some nervous tissue. The ectoderm (*ecto* = outer) gives rise to neurons, outer layers of the skin and hair. As ESCs divide they produce new SCs that are specialized to one of these layers. Those SCs produce more SCs as well as “progenitor cells,” the precursors to specialized cells that compose distinct tissues.

The mesoderm lineage produces mesenchymal stem cells (MSCs) which are the cells used for therapy. The MSCs are considered *multipotent* (as opposed to pluripotent) because they can give rise to a limited number of tissues. MSCs and SCs from the other two lineages are present in the fully developed organism but are

Non-controversial

Upon hearing what I now do for a living, friends sometimes ask me: Isn't stem cell therapy controversial? In our context, no! The controversy involves the use of embryonic stem cells. There are objections to their use in humans from ethical and religious points of view. Also, from a clinical perspective, ESCs have proven to be difficult to employ properly and in some cases hazardous. Because of their highly proliferative nature they can actually replicate too much. This can lead to mutations in the cells which can result in cancer.

What we use are adult stem cells. There are no ethical concerns because the cells can be extracted from a living organism with minimal risk. For SC therapy in the veterinary context the cells are taken from the same animal who will use them for therapeutic purposes. And because adult stem cells are less “hot” in terms of proliferation their genome remains much more stable essentially eliminating the concern of developing cancer.

dormant or inactive until they are needed. They are activated by injury or disease at which time they begin proliferating and differentiating.

PUTTING STEM CELLS TO THERAPEUTIC WORK

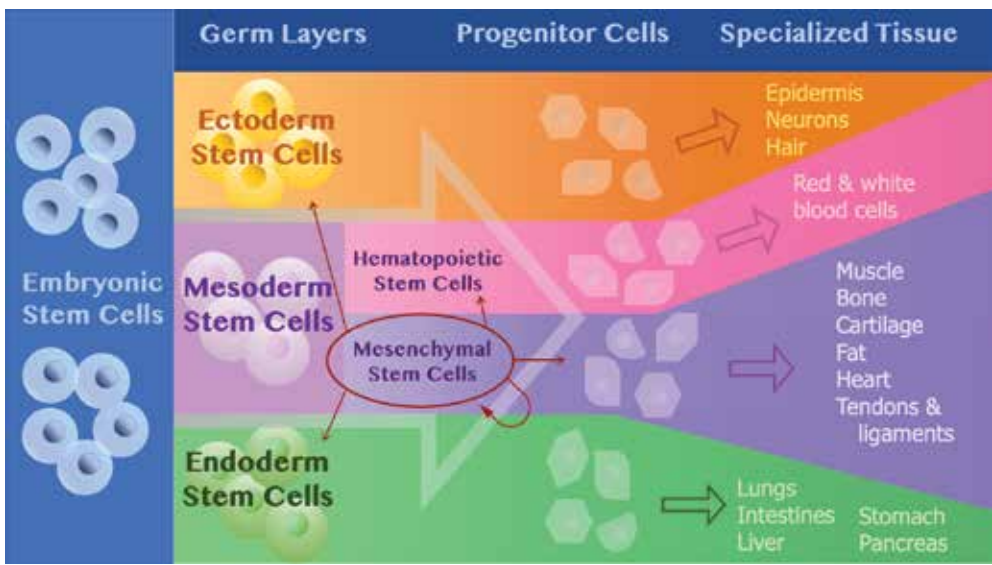
There are plenty of adult SCs in an adult organism. They are typically dormant and become activated in response to tissue damage or disease, which begins a complex cascade of cellular and chemical signals. The local SCs become activated and migrate to the specific area and proliferate to

create more stem cells as well as progenitor cells to replace specialized cells (like cartilage or bone) that have been impaired.

Importantly, MSCs can be used to treat tissues to which they do not give rise; their main function in those cases is to activate the SCs in that tissue. SCs also modulate the immune system, decreasing the inflammatory response. The primary function of the stem cells used for therapy is to directly (in the case of tissues of the mesoderm lineage) or indirectly (for endoderm or ectoderm lineages) regenerate healthy tissue to replace what is damaged or diseased.

So, in cases of arthritis or dysplasia where there is damage to bone or cartilage, the MSCs produce and become those cells; in cases of ligament damage they produce ligament cells. In cases of the other two lineages the MSCs stimulate the SCs of that lineage to produce new cells, such as liver cells or skin cells. Since it causes the body to regenerate new, healthy cells, SC therapy is often referred to as regenerative medicine.

To undertake stem cell therapy we must first extract the MSCs, concentrate them, and then get them to the area of injury or disease. The closer the cells can be placed to the



specific site of trouble the better. For cases of arthritis the MSCs are injected into the diseased joint; for areas or organs where injection is not possible MSCs are administered intravenously. As the SCs travel through the blood to reach various organs they are available to respond to specific areas of distress in those tissues.

Most dogs who receive SC therapy will need to receive multiple treatments. The time between treatments depends on the individual. Repeat treatments are given anywhere from one to two months to a year or so apart. In my work I've seen a few cases where the problem has ceased after one treatment. This is not common, but it does happen.

TREATMENT PROCESS

For SC therapy, MSCs are extracted from the body of the animal to be treated. They are present in tissue such as bone, fat, skin, brain, and heart.² Initially SCs were extracted from bone marrow. However, there is a greater abundance of MSCs in adipose (fat) tissue, and this tissue is less traumatic to harvest, so this is the source used most frequently.

There are a few sources of adipose tissue in a dog. Some vets take fat from the scapular (shoulder) area. Others, including the veterinarian I work for, Dr. Robert Hagler in Lafayette, California, prefers to use fat from the umbilical area. This is a relatively simple procedure, but does require general anesthesia.

After removal, the fat is processed to extract the stem cells from the tissue (that's my job!). The tissue goes through several mechanical and chemical digestion and separation steps. After a few hours the output is the stromal vascular fraction (SVF), which has concentrated mesenchymal SCs as well as other cells and components that support the action of the MSCs. Depending on the veterinarian, the SVF may be extracted on-site, in which case the dog is treated the same day (at the clinic where I work, we do the processing in-house). The majority of vets send the fat off to be processed and the SVF is returned for treatment on the second day following harvest at which time it is administered to the dog.



Fat harvest from a French bulldog. The incision is in his abdomen. This is about 10 grams of fat – a small amount relative to other harvests.



The fat is minced and chemicals are added to digest the tissue over the course of about an hour, while the tube is kept warm in a water bath.



You can see the difference as the tissue has been digested after about an hour.



Centrifuging separates the tissues into layers; the top two (oily and white) are discarded. The red fluid and grey mass at the bottom are removed to a new tube.



The stromal vascular fraction (SVF) extracted from 10 grams of fat. It contains the mesenchymal stem cells (MSCs) and other support cells. About a third is used for the initial treatment; the rest is stored.



Blood that has been centrifuged. The clear portion on top is plasma. It is removed to a different tube where platelets and growth factors are concentrated to create the platelet-rich plasma (PRP).



Stromal vascular fraction (SVF) combined with platelet-rich plasma (PRP). This will be divided into four syringes.



The small white mass in the bottom of this tube is the SVF that had been stored and is enough for one treatment. It contains a little less than 100 million mesenchymal stem cells and supporting cells.

Usually, there are plenty of cells from the fat harvest for multiple treatments, depending on the condition being treated. The SVF needed for the initial treatment is slightly diluted in sterile saline and divided up to accommodate the number of injections to be made. Platelet-rich plasma (PRP, more on this below) is usually added to the SVF to further support the stem cell response. We usually save a small portion of SVF to be given intravenously. Extra fat containing cells for future treatments is sent off to be processed and the cells cryogenically frozen.

In most cases the dog is sedated for injection. If you've ever had an injection into a joint, you know that they are quite painful and that it is much easier on the dog to be sedated. If MSCs are administered only via IV, sedation is typically not necessary. Once the injections are complete, the sedation is reversed, and the dog can go home once he has fully recovered.

Future treatments are simpler, since the fat harvest and cell extraction has already been completed. In our office the dog comes to the office in the morning and has blood drawn for PRP. The blood is processed to obtain the PRP while thawed SVF goes through steps to wash and activate the MSCs. Once both components are prepared, they are administered as described above.

For joint injections, the first few days following treatment can be more painful than pre-treatment. The time for positive results to be evident varies from dog to dog. The average is a matter of weeks, but in some cases we've seen positive results in a few days, and there are times where it takes a month or two.

PLATELET-RICH PLASMA

Many vets accompany the MSCs with platelet-rich plasma. This substance helps amplify the signals from the injured or damaged area and directs the MSCs to that area. It helps to get the most out of the MSCs that are used. PRP also uses the dog's own tissue – in this case, blood, which is drawn on the day of treatment. It is

Rocco's Transformation

Rocco is a 10-year-old black Labrador Retriever. Thirteen months ago he had his first stem cell treatment to address a number of issues including arthritis in both hips and a neurological issue causing weakness in his rear end. The pain from his hips combined with the rear end weakness made it increasingly difficult for him to get around. Rocco's owner, Vicki, says that he would squat to urinate and couldn't get back up.

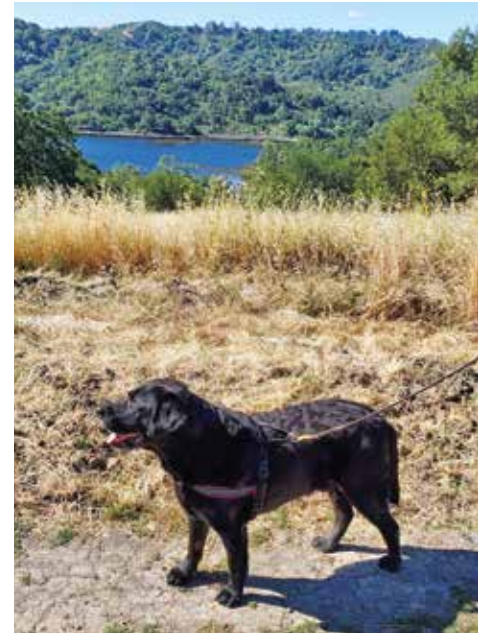
He also had masticatory myositis – an autoimmune condition that causes the muscles involved in chewing to become inflamed and very painful. Rocco was unable to open his mouth without terrible pain. To add to that he had neurological problems that affected his head and neck resulting in laryngeal paralysis. He had such a smorgasbord of neurological symptoms it was difficult to give him a definitive diagnosis.

Before he was hindered by his conditions Rocco was an active dog with a lot of pep. He loved his long walks at a local park. He let his family know he was ready for a walk by picking up his leash in his mouth. He caught treats that were tossed to him. And he would jump up onto the couch to hang out with his family. Vicki describes the heartbreak of seeing Rocco so impaired by pain that he wasn't able to pick up his leash or jump up to the couch, and when they arrived at their favorite walking spot Rocco wouldn't get out of the car. Because of the loss of musculature of his head, he looked very different, like his eyes were sunken in. She describes him looking like a skeleton. Rocco was on medications for pain and prednisone for the masticatory myositis but was getting little relief. Vicki was afraid this was the end of Rocco's life.

She and Dr. Hagler decided to try stem cell therapy, and the results were amazing. Rocco received injections in both hips, intervertebral injections in his lumbar and sacral spine, and stem cells via IV for his head, jaw, and neck. The day after his treatment he was frisky and happy. He returned to his usual exuberance about his daily walks. And, his masticatory myositis and laryngeal paralysis resolved, and have not been apparent since.

While not necessarily one of the targets of his SC therapy, Rocco also had a long history of digestive issues. Despite years of trying to identify and treat the problem, nothing seemed to help. Rocco had diarrhea about every other week. He hasn't had an episode of diarrhea since his SC treatment. Added to the success for the symptoms that were targeted this was an unexpected and wonderful surprise!

Rocco just came back in for a follow-up treatment, as Vicki had noticed some of the signs of his hip pain and rear end weakness returning. Again, he received injections in his hips and between vertebrae, and stem cells via IV. The next day Vicki described him as "super spunky" for the walk they had just been on. She describes Rocco's experience being "like a miracle" and is so thankful to have her happy dog back, noting that Rocco's improved health has been therapeutic for the whole family.



Ten-year-old Rocco out on a walk two days after his second stem cell treatment. He's seen great benefits from stem cell therapy, including less pain, more energy, improvements in his musculature, and a decrease of this medications.

processed using a series of separation steps to concentrate platelets and a number of growth factors present in blood, and then the PRP is activated. It is combined with the SVF and administered with it in the injection.

In our office we sometimes use PRP outside of SC therapy to help promote healing. The most striking example of its efficacy I've seen was when two dogs had tibial plateau leveling osteotomy (TPLO) surgery for a ruptured ACL on the same day. Both had previous TPLO surgery on the other rear leg. PRP was administered to the surgical site once the procedure was complete. According to the owners and Dr. Hagler, both dogs had shorter recovery times compared to their previous surgeries and were using the surgical legs much sooner.

RISKS

Stem cell therapy is very safe. The MSCs used for therapy are autologous, meaning they come from the same dog who will receive them, so there is no risk of rejection. There are essentially no side effects from the treatment itself. The treatment process is rooted in the biology of the animal utilizing the natural healing properties of his or her own cells.

The most significant risk of the therapy has to do with the general anesthesia required in order to surgically remove some fat from the dog. There is always some risk in surgical procedures requiring anesthesia – more so for older or frail dogs. In addition, there is some risk of infection, since injections are often given into joints. To mitigate this risk, injections of MSCs are often accompanied by a small dose of antibiotic.

EXPECTATIONS

As I mentioned, SC therapy has been used most often in the treatment of arthritis, and with significant improvement in pain levels, range of motion, and functional mobility. Our practice has also used it in many cases of hip or elbow dysplasia, with excellent results in very young dogs with severe dysplasia.

One example is Tugboat, a

chocolate Lab who was debilitated by elbow dysplasia when he was just four months old. His owner tried everything, including costly surgery, pain meds, therapy, etc.

Searching for other options she decided to try SC therapy. Following treatment, Tugboat is a different dog! He could hardly tolerate walking before, but now walks over an hour a day and plays at the beach. He comes in for repeat treatments every six months or so, when he starts showing signs of pain and decreased mobility, and soon returns to his normal activities.

MSCs are also used to treat damaged tendons and ligaments. SC therapy is helpful for partial tears, but not if the ligament is completely ruptured; there is simply not enough material to bridge a complete tear. At the clinic where I work, we have used SCs to treat degenerative myelopathy with good results. There have been a number of small scale (n=10 or less in most cases) studies that found SC therapy improved the condition of dogs with arthritis, dysplasia, intervertebral disc disease, perianal fistulas, inflammatory bowel disease, and keratoconjunctivitis sicca.³

Some dogs show improvement very early after treatment; others take longer, and the degree of improvement varies. However, says Dr. Hagler, "I've never seen a dog that didn't have some improvement."

Overall, the literature³ concurs that SC therapy is effective, though many studies or reports are anecdotal, based on practitioners' data and experience; few clinical trials have

yet been completed, though the companies whose technology is used to extract the SCs have studies in the works.

THE FUTURE OF STEM CELL THERAPY

The exciting possibilities for future directions of stem cell therapy mainly concern the source of cells used to treat patients. Currently the dog being treated must be the source of the cells used for treatment – otherwise the treatment would be legally considered a drug and must first gain approval from the U.S. Food and Drug Administration (FDA).

Having a stem cell "bank" would be a great help in the cases of dogs who lack enough fat to harvest or dogs who are too frail to undergo general anesthesia for surgical fat harvesting. Just as dogs can be universal recipients of blood, they can also safely receive stem cells that came from another dog. One study even found that MSCs can be extracted from *human* adipose tissue and transplanted into dogs.⁴ (Anyone have some fat you'd like to donate?)

Transplantation of MSCs from another animal would be a game changer. There are cases where the dog with banked cells doesn't need them anymore, either because they've stopped doing therapy or because they are deceased. It would be ideal if the dog's owner could make the banked cells available to other dogs. Currently this is not legal.

It's possible to grow MSCs (but not supporting cells) in a lab to increase their numbers, reducing the

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¹ Fortier LA, Travis AJ. "Stem cells in veterinary medicine." *Stem Cell Research & Therapy* 2011; 2:9.

² Markoski MM. "Advances in the use of stem cells in veterinary medicine: From basic research to clinical practice." *Scientifica* 2016; 2016: 4516920.

³ Hoffman AM, Dow SW. "Concise review: Stem cell trials using companion animal disease models." *Stem Cells* 2016; 34: 1709-1729.

⁴ Lee SH, Setyawan EMN, Choi YB, et al. "Clinical assessment after human adipose stem cell transplantation into dogs." *J Vet Sci* 2018; 19(3): 452-461.

need to harvest fat more than once; one company does that now.

CONSIDERATIONS BEFORE PROCEEDING

There are some cases where SC therapy is contraindicated. Because of the proliferative and immune-modulating effects of SCs, therapy should not be done for dogs who are known to have or suspected of having cancer. Neither should dogs who have an active infection receive therapy.

SC therapy may also not be an option for dogs who are lacking sufficient fat (until there is a stem cell bank for dogs!) or dogs who are too frail to withstand general anesthesia.

Stem cell therapy is not inexpensive; the cost for the initial treatment, including adipose harvest, is in the neighborhood of \$2,500. Follow-up treatments can run \$500 to \$1,000. These numbers will vary from vet to vet. The good news is that many pet insurance plans now cover SC therapy. Even without insurance it is substantially less costly and less invasive than more drastic measures like joint replacement.

SC therapy is not a panacea and getting the greatest benefit requires basic but sometimes overlooked actions. It's important to support the health of the whole dog: Keep his nails trimmed so they don't interfere with walking. Feed a quality diet that supports overall health. Take precautions to prevent infection following surgery. Keep up with follow-up treatments in a timely manner to minimize the amount of pain or dysfunction the dog experiences. Supporting the dog's overall health and providing him with quality care is imperative in getting the most out of treatment. 🐾

Joanne Osburn is the stem cell technician at Mt. Diablo Veterinary Medical Center in Lafayette, CA. After working for nine years as a biology tech at a government laboratory, she is delighted to be working in the veterinary field where she can help improve the lives of pets. She lives in the San Francisco Bay area with her husband Paul and super silly dog Guster.

Getting Started with Stem Cells

You may be thinking that this sounds like something that may help your dog. Here are the next steps.

The first is to find a veterinarian who offers SC therapy. All veterinarians who provide this therapy work with one of two companies that provide the equipment, reagents, processing, and storage of cells: VetStem Biopharma and MediVet Biologics. The details of how services are offered depend to some degree on the company with which the vet's office works.

VetStem has been doing SC therapy for animals for the longest time. VetStem currently cultures the animal's MSCs, while MediVet does not, although they are working in that direction. VetStem does all the processing at their own facility.

MediVet provides training, equipment, and reagents to vet hospitals that choose to process cells in-house. Not all hospitals working with MediVet choose to do this, so in those cases, MediVet does the processing. The beauty of doing the processing onsite is that the fat harvest and initial therapy can be done in the same day. If you have to travel a distance to a vet for SC therapy, it certainly isn't ideal to have to make multiple trips within a few days of each other for the initial therapy.

PRP can also be done onsite. VetStem does not incorporate PRP into their SC therapy.

Both companies store SCs for future use and can bank cells even before treatment is needed. If your dog is undergoing anesthesia for another procedure, like a spay or neuter, your veterinarian can harvest fat at that time and ship it to the company, so they can extract and freeze the cells for any future use your dog may need. If you have the foresight (and funds) to do this, it could eliminate the need to put your dog through fat-harvesting surgery later, when he may be less able to tolerate general anesthesia. When I am ready to have my dog neutered I will likely do this.

Depending on where you are located the choice of which company to utilize for the SC processing may be narrowed down for you simply by the vets who offer SC therapy in your area. Check with your veterinarian. You can also check the VetStem and MediVet websites; they can put you in contact with one of their partner veterinarians near you.

COMPANY	PROS AND CONS
VetStem vetstem.com	Cultures your dog's own cells to expand them. Will process and bank cells before they're needed. In-house processing not available. PRP not available.
MediVet medivetbiologics.com	In-house processing may be available. PRP available. Will process and bank cells before they're needed. Culturing of cells not yet available.



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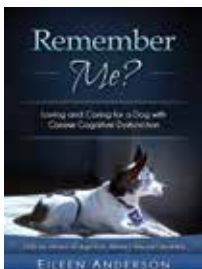
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