By Sue M. Copeland

# RELUCTANT TO VACCINATE YOUR DOG? LEARN WHY THAT COULD PUT HIM - AND YOU - AT RISK.

DEBATE

ACCINATE?

The virus came in deadly silence. One by one, it stalked its victims. There was no immunity against it. Clinics and hospitals around the U.S., and the world, soon were overwhelmed with patients; fatality rates soared. Sound familiar? It should: the canine parvovirus outbreak in the late 1970s did to dogs what the 2020 coronavirus (covid-19) outbreak is doing to humans.

"When parvovirus first occurred in the U.S., veterinary hospitals were completely overwhelmed, just as human hospitals have been this year with covid-19," says Edward B. Breitschwerdt, DVM, DACVIM, professor of medicine and infectious disease at North Carolina State University's College of Veterinary Medicine. "They had wards of dogs with bloody diarrhea; many of them were dying. It was a serious disease because there literally was no immunity amongst the dog population. It spread across the country in a matter of weeks to months, just as the coronavirus is doing worldwide in the human population."

By 1979, a vaccine had been developed that helped end the parvovirus outbreak. Ironically today, a growing number of dog owners and breeders are opting out of the parvovirus vaccine, as well as other vaccines that have helped protect dogs—and humans—in years past.

#### WHY VACCINE "HESITANCY"?

The current movement away from vaccines by some humans and pet owners has been called "vaccine hesitancy." The World Health Organization (WHO) listed this movement in its 2019 list of "Top 10 Threats to Global Health."

That's because the decline is real. For example, a 2019 British survey of 5,036 dog and cat owners, the PDSA Animal Well-

Being (PAW) report, found only 66 percent of pets received primary vaccines when young, versus 84 percent in 2016. About one-third of those pets weren't receiving regular boosters for longer-term protection.

Also mentioned in the PAW report: 98 percent of veterinarians have been questioned by their clients about the need for vaccines. Why the trend? "Anti-vaxxers," those who rigidly oppose vaccines, allege that vaccinations do more harm than good. Reasons cited by this small but vocal group generally include their belief that vaccines are ineffective, contain toxic substances, and cause the illnesses they are supposed to prevent. Some may assert that "Big Pharma" (pharmaceutical companies), and medical and veterinary professionals only promote vaccines to make money.

There are also anti-vaxxers who push the misconception that vaccines in humans are linked to autism. People who hesitate to get vaccines for themselves or their children are generally unlikely to vaccinate their dogs.

"The problem with the anti-vaccine situation," says Dr. Breitschwerdt, "is there are a lot of diseases we don't understand in veterinary and human medicine. Many of them fall into the category of autoimmune and immune-mediated diseases. When you don't understand something, you want something to blame it on. So for parents of autistic children, people suffering from multiple sclerosis, and many autoimmune diseases that we don't understand, vaccines have become a target for blame. That's created one of the major backlashes against vaccines."

Adds veterinary infectious disease specialist Jason Stull, VMD, MPVM, PhD, DACVPM, "The studies that suggested a link between human vaccines and autism have been disproved; these incorrect findings occurred from misanalyzing the data. But that inaccurate information seeps into the dog world."

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## THE "VACCINATE?" DEBATE

"That's unfortunate," he continues. "People who are old enough to have seen how vaccines can control disease generally understand their benefit. People who haven't seen these diseases in their lifetime can become complacent. Social media can add to this by spreading misinformation. Plus, for some dog owners, whether or not to vaccinate can also be a monetary decision."

And, he says, "Improvements in technology and knowledge surrounding vaccines can also lead to incorrect assumptions by the public. Some canine vaccines, such as rabies, now are given less frequently than in the past. That makes people think, 'Maybe my dog can get it even less frequently than my vet recommends.' The ability to use *titers*, which measure your dog's antibodies to diseases that we vaccinate against, can also make pet owners think there is less need for vaccinations." (See, "Titer Talk," to the right.)

According to Dr. Breitschwerdt, "On the companion animal side, pharmaceutical companies may recommend that owners and breeders vaccinate every year, or every three years. Historically, there has been no incentive for companies to prove that a vaccine lasts for, say, six years. The problem is veterinary medicine is a small profession, particularly from a research-dollars standpoint. As well as I've been able to ascertain, 98 percent of our national annual research budget goes to investigation of human illnesses. The other two percent goes mostly toward food-animal research. That means research that could answer these and other questions of great importance to dog owners is left to foundations such as the AKC Canine Health Foundation (akcchf.org)."

Says Dr. Stull, "There is a need for veterinarians to further develop a level of trust with their clients. This allows for increased opportunities to educate and communicate risks and benefits. We have to remind pet owners about *why* we should vaccinate our dogs."

Anti-vax beliefs can also have a cultural overlap with belief in alternative medicines, such as homeopathy. Explains Dr. Breitschwerdt, "There is no homeopathic preventive for distemper or rabies. The fact is, the most important medical intervention that exists for animals and humans is vaccination to prevent infectious diseases."

He adds, "In the face of the current pandemic, if there was a coronavirus vaccine out there that was safe and effective, I doubt there would be people who'd opt not to take it."

#### LACK OF DATA, NOT RESULTS

One barrier to veterinarians being able to convince clients of the need to vaccinate is the fact that, in the U.S., companion animals such as dogs lack a central disease-tracking authority.

"We have the Centers For Disease Control and Prevention (CDC) for human disease surveillance and outbreaks, including rabies, because it can be transmitted to humans." says Dr. Breitschwerdt. "And we've got the U.S. Department of Agriculture (USDA) to do that for production animals (livestock). Yet we basically have nothing for tracking most diseases in companion animals."

This is particularly important not only due to the vaccine-hesitancy trend, but also because of the increased risk for such infectious diseases as parvovirus, distemper, rabies, and others due to the unregulated importation of dogs.

Says Dr. Stull, "If I wanted to tell you how many dogs are diagnosed with parvovirus in the U.S. each year, I couldn't do that. Un-

#### TITER TALK

According to the American Veterinary Medical Association (AVMA), an antibody titer is a measure of the concentration of antibodies in your dog's blood.

"When your dog is vaccinated, the vaccine stimulates his immune system so that it provides what are called 'memory immune cells," explains Dr. Stull. "Afterward, when your dog comes in contact with that disease, the memory cells recognize the attacking microorganism for faster antibody production. The antibodies then fight the disease."

Titers are typically used to determine a dog's current vaccination-protection status. This can be for importing or exporting dogs, or by owners who are reluctant to vaccinate at the recommended frequency. To get a titer, your veterinarian will draw blood to be checked for antibody levels. If the titer comes back as "protective," it means if the dog were to come in contact with the disease being tested for, he *should* be able to fight it off.

While titers are becoming increasingly popular with some dog owners in lieu of regularly scheduled vaccinations, questions remain. "Different companies have produced titer tests. Titers typically have been validated for a few diseases, including parvovirus and distemper, but they still have to be run correctly, and read correctly," says Dr. Stull. And, titers can't predict antibody levels a few months down the line. Your dog's resistance levels can change due to a variety of factors including stress, pregnancy, medications, and disease.

Another issue: "A titer is not always considered proof of vaccination in your dog," advises Dr. Stull. Some groups, such as boarding facilities, may not accept titers in lieu of current vaccination records.

For rabies vaccines, which most states require, having only a titer, rather than proof of vaccination, can have serious consequences. "If your dog were to get into a fight with wildlife, or to bite another dog—or worse, a human—that titer won't be legal proof of vaccination," he explains. "Your dog would be taken into extended quarantine, or worst case, be euthanized."

Something else to consider with titers is cost. A titer test can cost over \$100. A parvovirus vaccine usually costs about \$25; low-cost clinics often charge only \$10 to \$15 each for vaccines.

like with humans, most canine diseases are not reportable to a regulatory body. This lack of data leads people to question, 'Why vaccinate?' based on anecdotal information."

"As an infectious-disease specialist," says Dr. Breitschwerdt, "it's disconcerting when you try to provide evidence for some of the practices we do, such as vaccinations. Companion animals are the largest group of animals in the U.S. They also share our environments—and sleep in our beds."

But a lack of data doesn't negate history. "It's very clear that many of us are living much longer as humans because of vaccinations," he continues. "Although it's difficult to quantitate that for cats and dogs, it's clearly true for them as well. When I was growing up on a farm, you didn't see many dogs that lived to be over 10 years of age. Now, occasionally I'll see a dog in his/her 20s. That's because we've protected them from some of the most devastating diseases that kill dogs earlier in their lives."

"For instance," he continues, "the last case of infectious canine

hepatitis that I saw was decades ago when I was a young faculty member at Louisiana State University. As well as I can tell, with *herd immunity* (see, "Join The Herd...Immunity" to the right), we've eventually vaccinated that particular infectious agent—that killed 100 percent of affected dogs—out of existence."

"Canine distemper would be another recent example of a canine vaccination success story," adds Dr. Breitschwerdt. "Veterinarians still occasionally see distemper, which is almost uniformly fatal, but it's in unvaccinated dogs that have been exposed to, say, infected covotes or raccoons. At North Carolina State University, if we were ever to get a dog referred to us that had classical distemper, we'd make an announcement and get every veterinary student in the college there to see it. That's because it's unlikely they'll ever see it in their future practices. Early in my career, I saw distemper frequently. It's a terrible disease that's been controlled with safe and effective vaccines."

#### JOIN THE HERD...IMMUNITY

Herd immunity, also referred to as "community immunity" with humans, happens when a high percentage of a population is immune to a disease through vaccination and/or prior infection by that disease, which makes the disease's spread from dog to dog, or human to human, unlikely.

"From a population standpoint, you don't have to vaccinate every dog or human in a population to reduce the percentage of disease," explains Dr. Stull. "You just have to vaccinate enough individuals to keep an infection from exploding." Epidemics such as the one that occurred with parvovirus in dogs in the 1970s, and pandemics such as covid-19 in humans, happen when there is no herd immunity.

"Right now, herd immunity has greatly protected our U.S. dog population," says Dr. Stull. "Enough people vaccinate their dogs regularly that the chance of large outbreaks has been reduced. That has given owners and breeders a false sense of security."

"If you decrease herd immunity, you deal with outbreaks," states Dr. Breitschwerdt. "For instance, in your neighborhood, if a single dog hasn't been vaccinated for an infectious disease such as parvovirus, and he gets sick, you need all the other neighborhood dogs to have been vaccinated so you don't have a neighborhood epidemic. If not enough dogs in the surrounding region are vaccinated, the epidemic spreads. As we've seen with coronavirus in humans, an infectious disease for which there is no herd immunity can spread fast."

The bottom line: "If enough people quit vaccinating their dogs," warns Dr. Stull, "we will lose herd immunity." In the case of rabies, for example, this will have fatal consequences for both dogs and humans.

Another terrible, uniformly fatal disease that's been controlled with a vaccine is rabies.

#### THE HUMAN PRICE

Worldwide, about 59,000 people a year die from the rabies virus, mostly in Asia and Africa. In these cases, 99 percent are the result of dog-bite transmission from unvaccinated dogs. According to the WHO, about 40 percent of those victims are children.

Says Dr. Breitschwerdt, "When I learned how many people

#### VACCINES: CORE VERSUS NON-CORE

According to the American Animal Hospital Association (AAHA; aaha.org), the purpose of a vaccine is to mimic an infection, so your dog's immune system is introduced to the pathogens that will cause protective immunity without causing clinical disease. The purpose of revaccination, or "boosters," is to maintain your dog's immune system's "memory" of that pathogen, so he continues to mount an attack with every exposure. That way, exposure to the infectious agent doesn't result in disease. Timing for boosters will vary depending on the infectious agent.

Vaccines are generally divided into "Core" and "Non-Core." Core vaccines are recommended for all dogs. Non-core vaccines, or optional vaccines, are recommended based on your dog's lifestyle and relative risk. (To determine what non-core vaccines around the world were dying each year of dog-bite transmitted rabies, and that the majority were children, I was appalled. It's incomprehensible to me. If that doesn't make you want to vaccinate your dog, I don't know what will. This disease is highly preventable if dogs are vaccinated."

According to the CDC (cdc.gov), canine rabies vaccination programs in the U.S. have halted the natural spread of rabies among domestic dogs; dogs are no longer considered a rabies reservoir here in the United States. But each year, 60 to 70 U.S. dogs (and around 250 cats) are reported as rabid—these are unvaccinated dogs that are bitten by infected wildlife.

Asks Dr. Breitschwerdt, "How many people is it going to take in the United States to continue this anti-vax trend to the point that we don't have enough animals protected here, so we start seeing more dogs with rabies, and the resulting transmission to humans? It's

disconcerting that people would decrease vaccinating against such diseases as rabies, and take the chance of a child dying from it in this country."

"The coronavirus is going to help our younger generation," he continues, "who've never seen the damage diseases such as rabies, parvovirus, and distemper can do, understand that there are infectious agents that can turn their world (and/or their pet's world) upside down regardless of how much time they spend on the internet looking for alternative cures."

Another disease that can spread from canine to human

are appropriate for your dog, check out the AAHA website's lifestyle-based vaccine calculator, *and* talk to your veterinarian.)

- *CORE VACCINES:* Rabies, canine distemper, parvovirus, and canine adenovirus (CAV)—CAV-1 causes infectious canine hepatitis; CAV-2 is part of the kennel cough complex.
- *NON-CORE VACCINES:* Bordetella; canine influenza virus (CIV); canine parainfluenza; leptospirosis; and Lyme disease (borreliosis).

For more information on vaccines, including an in-depth description of each, and a recommended schedule, go to https://www.aaha.org/aaha-guidelines/vaccination-canine-configuration/vaccination-canine/ (which is called *zoonosis*) is leptospirosis. Explains Dr. Breitschwerdt, "Leptospirosis is transmitted through contaminated urine and contact with the bacterial organism. Unlike a lot of infectious agents, where you must have a break in your skin to become infected, leptospirosis doesn't require that—it can actually penetrate intact skin. From a zoonotic standpoint, in the U.S. today, leptospirosis and rabies would be the two infectious agents that would be the most rational to vaccinate for, to try to keep humans from becoming infected."

Adds Dr. Stull, "If people aren't experiencing massive outbreaks of diseases such as leptospirosis, it can be hard for a veterinarian to convince owners of the risk to their dogs, and to themselves, and thus the need to vaccinate. That's why we need the infrastructure to track canine diseases in the U.S."

The decision to vaccinate, or not, should include a risk versus reward metric, says Dr. Stull. The reward is the ability to protect your dog, your family, and your community from potentially fatal diseases.

"Vaccines are the cheapest and most cost-effective way to keep your pet safe," he says. "For instance, look at the parvovirus and leptospirosis vaccines. Both are safe and inexpensive. The risk if your unvaccinated dog were to become infected would be treatment that could cost thousands of dollars, and that may not be successful."

Most dogs respond well to vaccines, says Dr. Stull. "Reactions can occur, but are *extremely* uncommon. A lot of 'reaction' talk is anecdotal. There are so many factors to consider: Are you giving one vaccine, or many, at a time? Is your dog healthy?"

If they happen at all, reactions tend to be shortterm and minimal. They can include localized swelling at the injection site, low fever, and decreased appetite. More serious, but less common side effects include an allergic reaction, which can occur within minutes or hours after vaccination and can be a medical emergency.

Some adverse responses may be due to underlying health issues in a seemingly healthy dog. "For instance, if your dog has an undiagnosed, early stage disease, and has a reaction to the vaccine that results from that disease, the vaccine will be blamed," explains Dr. Breitschwerdt. "It's association versus causation; I've seen such cases at North Carolina State University. And I think a lot of the negative attitudes about vaccines are caused by association, not by causation."

Adds Dr. Stull, "Vaccines don't cause disease, they help prevent it. It's like looking both ways before you cross the street. If you don't look, it won't guarantee getting hit by a car, but it'll greatly increase your risk. So looking acts as a preventive. That's exactly what vaccines do for your dog."

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Dr. Breitschwerdt is professor of medicine and infectious disease, and the Melanie S. Steele Distinguished Professor of Medicine at North Carolina State University (NCSU) College of Veterinary Medicine. He is also adjunct professor of medicine at Duke University Medical Center, and a Diplomate of the American College of Veterinary Internal Medicine (ACVIM).

He directs the Intracellular Pathogens Research Laboratory in the Comparative Medicine Institute at NCSU and co-directs the Vector Borne Diseases Diagnostic Laboratory, and is the director of the NCSU-CVM Biosafety Level 3 Laboratory. A DVM graduate of the University of Georgia, he completed an internship and residency in Internal Medicine at the University of Missouri. Dr. Breitschwerdt's clinical interests include infectious disease, immunology, and nephrology. His research group has contributed to research in the areas of animal and human bartonellosis. He is currently the principal investigator on several AKC Canine Health Foundation (CHF) grants:

- Grant 02550: The Role of Bartonella spp. Exposure and Cardiac Genetic Variation on the Clinical Expression of Arrhythmogenic Right Ventricular Cardiomyopathy in the Boxer Dog
- Grant 02519: Prevalence of Bartonella spp. Infection in Dogs with Cardiac and Splenic Hemangiosarcomas within and between Geographic Locations
- Grant 02787-E: Clinician-Scientist Fellowship

Dr. Breitschwerdt has authored numerous book chapters and proceedings, and published more than 350 manuscripts in peer-reviewed scientific journals. His long list of prestigious awards includes the AKC Canine Health Foundation Asa Mays, DVM Excellence in Canine Health Research Award.

#### JASON STULL, VMD, MPVM, PhD, DACVPM

Dr. Stull is an Assistant Professor at Atlantic Veterinary College in Prince Edward Island, Canada, and Ohio State University College of Veterinary Medicine. He holds a veterinary medical degree from the University of Pennsylvania, a master's degree in Preventive Veterinary Medicine from the University of California at Davis, and a PhD in veterinary infectious disease from the University of Guelph.

Over the past 15 years, he has been involved in controlling and preventing veterinary infectious disease. His research focuses on veterinary disease epidemiology, with an emphasis on preventing canine leptospirosis and canine Lyme disease. Dr. Stull has received several research grants from CHF:

- Grant 02128-A: Redefining the Recommendations for Prevention of Infectious Disease at Dog Shows and Other Areas Where Dogs Meet and Compete
- Grant 02380-A: Estimating Prevalence and Identifying Risk Factors for Canine Leptospirosis in North America
- Grant 02284-A: Lyme Disease in Dogs: Prevalence, Clinical Illness, and Prognosis
- and Grant 02532-A: Canine Influenza: Occurrence, Spatial and Temporal Trends and Identifying Modifiable Factors to Reduce Transmission at Events in the United States.

For more information on AKC Canine Health Foundation-funded canine health research, go to akcchf.org/research.