The Whole Dog Journal

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Puppy Vaccines: Why Your Puppy Needs So Many Shots

Ever wonder why puppies need multiple “shots” in order to become fully immunized? Here are the reasons behind puppy vaccine schedules and how best to strategize your puppy's immunizations.

By Nancy Kerns (/db/fdc.collector?client_id=wholedogjournal&form_id=maileditform&link_id=20)

The first rule of puppy vaccinations is that there are no hard and fast rules for puppy vaccinations; the best way to make sure a puppy is fully immunized against the most common contagious diseases totally depends on the health and past history of the puppy's mother, his age, and his environment. A puppy being raised by a responsible breeder may require only one combination vaccination in order to become immunized; whereas a puppy raised in a shelter might be given as many as six or seven combination vaccinations before being declared fully protected.

There are several reasons why puppy vaccination protocols vary so wildly, but the most important one to understand is that every puppy is an individual, presenting a unique and unpredictable immunological history to his veterinarian. If you understand the reasons that veterinarians recommend multiple "puppy shots," you will be better prepared to both protect your puppy from risky exposure to contagious diseases and, possibly, help reduce the number of vaccinations the puppy receives on the road to becoming fully immunized.

Few new dog owners understand why puppies need multiple “shots." Most veterinarians recommend that puppies are vaccinated for distemper, parvovirus, and adenovirus (hepatitis) a number of times, starting when they are about four to six weeks old, and again every three or four weeks, with their last “puppy vaccination” given after they are about 16 to 20 weeks old. The most common guesses as to why puppies need all those vaccinations?

A) Because it takes at least four vaccinations for full immunity.

B) Each shot “boosts” the immunity from the first shot.

The actual answer would be C) Neither of these. Repeated puppy vaccines do not increase or "boost" the immunity in any way. Vaccines are repeated in order to make sure the puppy receives a vaccination as soon as his immune system is able to respond as we want it to – to respond by developing antibodies to the disease antigens in the vaccines. Let's do a bit of review, to make sure all the terms used here are understood.

Dog Vaccination Terminology

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An **antigen** is a substance that induces a response from a body's immune system. In this discussion, when we talk about antigens, we mean a form of the diseases that commonly infect puppies and dogs.

A **vaccine** is a form of disease antigen that has been altered in some way so that his immune system will recognize it as a foreign invader and respond to it by destroying substances that resemble that antigen in the future. Some vaccinations are made with "killed" viruses; some are genetically altered so they resemble the disease antigen but cannot make the animal ill ("modified live"); and still others are highly weakened, live strains of the disease.

Antibodies are the immune system protective substances that recognize and destroy the agents of disease (antigens).

When we administer a vaccine to a puppy, we are in effect training his immune system to recognize the disease antigen and mount an immune response to it – to form antibodies that will recognize and destroy those antigens whenever the dog comes into contact with them again.

When a puppy has been vaccinated and his immune system has formed antibodies to the disease antigens in the vaccines he received, he is considered **immunized** against those diseases.

How Maternal Interference Affects Puppy Immunization

Immunizing puppies is a tiny bit more complicated due to a mechanism called **maternal interference**.

All puppies who are nursed adequately by their mother in the first two or three days after birth receive some of her protective antibodies from drinking her "colostrum" – the yellowish substance that the mother produces before she starts actual milk production.

The mother's antibodies protect the puppies for a highly variable amount of time – anywhere from about three weeks to about 12 weeks. These antibodies gradually "fade" from the puppies' systems as the puppies' own immune systems develop.

When a puppy is vaccinated during the period of time that his mother's antibodies are still active in his system, those maternal antibodies will detect and destroy the disease antigen in the vaccine, rendering that particular vaccine useless to the puppy. He can't develop his own antibodies to disease antigens until his mother's antibodies have faded from his system. Also, while some puppies may have received a whopping dose of antibodies from their mom, others may have received few or none. If the mother was never vaccinated herself, and never came into contact with those disease antigens, she would have none of these antigens to pass along to the pups in her colostrum.

So, should puppy owners just wait to vaccinate puppies, until the time when any amount of maternal antibodies are sure to have faded (12 to 14 weeks is generally considered as the outer limit of any maternal interference)? The answer is NO, because we don't know when any given puppy's maternal immunity is going to fade, and he would have no protection from disease in the period between the fading of his mom's antibodies and receiving his first vaccination.

A mother's antibodies might fade when he's three weeks old, when he's 12 weeks old, or any time in between. If the protection he got from his mom fades at three weeks, and we don't vaccinate him until he's 14 weeks old, he is vulnerable and without any protection whatsoever, until at least a few days after his vaccination. That's too long to go without protection, unless you plan to raise him in a sterile bubble. And there are many compelling reasons having to do with his behavioral development to not just keep him home.

Why Puppies Might Receive Excess Shots

Instead, we give the puppy a series of vaccinations, about three to four weeks apart, starting when the puppy is four to six weeks old. The idea is to try to reduce the size of the "window of opportunity" when the mom's antibodies fade (leaving the puppy unprotected) and the next vaccine is given, to reduce the chances that he comes into contact with disease antigen when he is unprotected.

It might be that the mother's antibodies faded early, and the first vaccine was given at four weeks, and he developed his own protective antibodies. In this case, he doesn't actually need any further vaccines, but we don't know that, so he is given additional vaccinations every three to four weeks until he's about 20 weeks old. It's more than he needs, but at least he was protected.

Or it might be that the puppy was vaccinated at five weeks, again at eight weeks, and again at 11 weeks, but his mother's antibodies were still circulating until he was about 12 weeks old. The mom's antibodies would have neutralized all those first vaccines, so when the antibodies finally faded, he was left without protection from disease until his next vaccine was received at 14 weeks. This is actually the worst-case scenario, because many puppy owners are taking their pups into high-risk environments at this age, thinking, no doubt, "He's had three shots already; he must have at least some immunity by now!"

There is no practical way to know whether the mother's antibodies are still circulating in a puppy's body or when they have faded. And each mother and each puppy is an individual; she will pass along a variable amount of antibodies, and these will fade at different times in each puppy. So we vaccinate several times, until we are past the point in time when any maternal antibodies can interfere with proper immunization.

Dog Shelter Vaccination Protocols May Vary

Puppies who have been bred and raised by a professional, responsible breeder are likely to be given far fewer vaccines than puppies who came from a shelter environment. In a professional breeding program, the mother dog's vaccination status will be known, and her first nursing session will be observed, so better assumptions can be made about how much protection the puppies will receive from her maternal antibodies. Further, the breeder will likely have experience with keeping the puppies from being exposed to disease antigens, by requiring visitors to remove their shoes, wash their hands, and so on. These protections may allow the breeder to administer the first puppy vaccines at eight weeks or later, and perhaps just one or two more vaccines (with the last one given after 16 or 18 weeks).

Puppies who have the misfortune to be born in or surrendered to a shelter after birth may not receive any antibodies from their mothers; if their mothers were not vaccinated or otherwise exposed to the core diseases, they wouldn't have antibodies to pass along. Also, puppies may not have had sufficient access to colostrum. In addition, shelters are often teeming with infectious disease agents. For all of these reasons, puppies who are born and/or raised in a shelter environment may be vaccinated much more aggressively – some might say excessively – than puppies who were born with more advantages.

Shelters often vaccinate puppies for the first time at just four to six weeks of age. At four weeks, the puppies' immune systems are just barely mature enough to develop antibodies following exposure to disease antigens; this is done in an effort to immunize puppies who didn't receive any maternal antibodies as quickly as possible.

Another vaccination protocol common in shelters is vaccinating every three weeks until the puppies are 16 to 18 or even 20 weeks of age. In this case, it's the possibility that the puppies received far more than the usual amount of maternal antibodies than usual that causes shelters to take this tack.

If an unvaccinated dog contracts and then survives a disease like parvovirus, she actually develops far stronger immunity to the disease than she would had she been vaccinated against the disease in the first place – and she will pass along this very robust protection to her puppies (as long as they receive an adequate amount of her colostrum). Her antibodies will likely take the longest amount of time to fade in her puppies, so her puppies need to have their final vaccines a bit later in order to prevent this strong maternal antibody interference.

Finally, there is the sad fact shelter staffers often have to guess at the age of the puppies in their care. Shelter immunization protocols are usually designed with enough overlap to ensure that a puppy has every possible chance of receiving adequate protection from contagious disease.

Finishing Your Puppy's Vaccinations

A puppy is considered fully immunized against the "core" (the most common, and most problematic) diseases of adenovirus (hepatitis), distemper, and parvovirus when he has received a vaccination for these diseases after the age of 16 to 18 weeks. (Note: Until recently, the "puppy shots" were considered complete when the last one was given at 16 weeks. New research states that final puppy parvovirus vaccine should be at or after 18 weeks of age.)

Rabies is another "core" vaccination, but it is not given to puppies before 12 weeks of age. A puppy can receive his first rabies vaccine at 12 weeks (but no sooner), and should be given another rabies vaccine a year later. A vaccination is required by most states every three years afterward. (This is a matter of state law, put in place for the protection of human health; a dog who has received two or more rabies vaccines is likely protected from that disease for life.)

Until the final "puppy" vaccines are given at 16–18 weeks, the puppy should be protected from potential exposure to disease antigens, but this doesn't mean he shouldn't ever leave the house until the time of his final "puppy shot." It just means that his exposure to the outside world should be carefully considered. Do bring him to the homes of relatives and friends whose dogs are demonstrably healthy, vaccinated, and friendly. Do not take the puppy for walks in places that are highly trafficked by unknown dogs, such as sidewalks, parks (especially dog parks), pet supply stores, and so on.

Also, if someone in your home has tracked through places that are likely to be covered with agents of contagious disease – such as a dog park or veterinary clinic – keep their shoes outside the front door, and ask them to wash their hands before they play with the puppy.

If you attend puppy training or socialization classes, be sure the instructor takes the following precautions:

- The puppy school should require each puppy's vaccine records, to make sure all the puppies are in the process of receiving veterinary care and proper protection from either catching or spreading disease
- A puppy with any signs of illness (such as lethargy, vomiting, diarrhea, and/or an increased temperature) should be disallowed from attending class.
- There should be equipment on hand so that every "accident" that a puppy has in class can be quickly cleaned up with a proper antibacterial solution.

Passing the Puppy Titer Test

The vast majority of puppies will be successfully immunized after the series of vaccinations described here, but a tiny percentage will be what are called "non responders" – incapable of developing protective antibodies in response to vaccines. These dogs will be vulnerable to infection by these diseases, no matter how many times they are vaccinated, and thus should be protected from high-risk environments (wherever a lot of dogs congregate).

There is a way to determine whether the final vaccination (at least) that was administered to your puppy triggered his immune system to develop protective antibodies for the "core" diseases he was vaccinated for. At least two weeks after what is hoped will be the puppy's final vaccination – at approximately 18 to 20 weeks of age – you can ask your veterinarian for a "vaccine titer test." A blood sample is taken, sent to a laboratory, and tested for the presence of antibodies that protect the puppy against parvovirus and distemper. If these antibodies are detected, he's done with his core vaccinations.

However, if the vaccine titer test comes back with a negative result, it's recommended that the puppy be vaccinated one more time, perhaps with a different brand of vaccine than was used previously. Two weeks later, the vaccine titer test should be repeated. If the result is still negative, the puppy will be considered a non-responder, vulnerable to contracting any of the core diseases he may be exposed to.

Vaccine titer tests are being increasingly used by knowledgeable owners who want confirmation that their puppy is protected from disease, but there are still many veterinarians who are unfamiliar with the tests, and/or skeptical of their usefulness. Some clinic managers may be unable to quote a price for this test, or unsure of what test to order from the laboratory they use. We've heard of clinics charging as much as $200 for the test, which is ridiculous. In contrast, highly progressive clinics may offer a SNAP (in-office) test that will reveal the results within a half-hour.

Alternatively, ask your veterinarian to take a blood sample, and send it to the Dr. Ronald D. Schultz Laboratory at the University of Wisconsin (Madison) School of Veterinary Medicine. This lab charges just $25 for the test (though you will need to pay for the blood to be drawn and shipping the to lab). See Dr. Schultz's website (http://www.vetmed.wisc.edu/lab/schultz/) for instructions and an order form.

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