Vaccinations and Titer Testing

By Hayley Grove, DVM
Trusted Friend Animal Clinic

What does vaccination mean?

Vaccinating a dog or cat means that we are injecting some of the virus, in a less virulent (aggressive) form, into the pet in an effort to cause an immune response.

What is the difference between vaccination and immunization?

The following description of events has to occur after an animal is vaccinated for him or her to become immunized. First, when a foreign invader (antigen) is detected by immune cells, they stimulate the production of antibodies (by cells called B lymphocytes). Antibodies are special proteins that bind to a foreign invader, and they are very specific to only one virus, bacteria, or antigen. When antibodies form against a virus, immune system cells (T-helper and T-killer cells) are stimulated to fight and kill the virus. Finally, memory B cells are produced, and these cells persist in the animal for years, if not for a lifetime. Their job is to "recognize" the virus if it appears again and trigger the immune system to create the correct antibodies.

When are vaccines given?

For puppies and kittens, the vaccination series begins around 8 weeks of age, depending on the pet. Boosters are given every 4 weeks until the puppy or kitten is 16 weeks of age. It is very important that the last vaccination is given between 14 and 16 weeks of age. This is the age at which maternally derived antibodies are no longer present in the animal's blood. It is critically important that the last vaccine be given when these antibodies are gone, because the animal's immune system cannot fully respond to the vaccine in their presence.[1]

For adults, revaccination is usually done 1 year following the completion of the puppy/kitten series. Only one vaccine is needed since maternally derived antibodies are gone. Revaccination is then done at 3-5 year intervals, depending on the pet's lifestyle and risk of exposure. [1]

Alternatively, titer testing can be performed to determine your pet's immunity. If immunity exists to these viruses, then revaccination is not needed. Titer testing is continued every few years to make sure immunity is still present. Revaccination depends on whether immunity is still present, because there is no benefit to vaccinating an animal that already has immunity.[1]

Core Vaccinations for Dogs

Core vaccinations provide immunity against life-threatening diseases that every dog will be exposed to. Every dog should be vaccinated against canine distemper virus (CDV), canine parvovirus (CPV-2), and canine adenovirus (CAV-2).[1] These viruses are included in the "distemper" vaccine. All dogs are required by law to be vaccinated against rabies virus.

Noncore Vaccinations for Dogs

Noncore vaccinations are only given to dogs who have a reasonable chance of being exposed to a disease-causing agent.[1] Examples include vaccines against: leptospirosis, lyme disease, kennel cough, and canine influenza. At Trusted Friend Animal Clinic, the only noncore vaccination that we recommend is the leptospirosis vaccination.

It is recommended for dogs who are at high risk for coming into contact with the urine of infected wildlife. Risk factors include:

- Swimming in ponds or lakes
- Playing in creeks
- Having known exposure to wildlife in the yard
- Going to a dog park that wildlife may inhabit

The duration of immunity for the leptospirosis vaccine is only up to a year, so annual vaccination is necessary.[2] Some dogs are more likely to experience adverse events when given this vaccine, like vomiting, diarrhea, anorexia, weakness, stiffness, and lethargy, so it is important to give this vaccine apart from others, and for puppies, give the first dose after 16 weeks of age ideally.[1,3] Two doses, 3-4 weeks apart, are needed to provide protection.[2]

The other vaccinations are not recommended due to issues of efficacy, potential for exposure, and chances for harm. For example, the lyme vaccine is not very efficacious and there can be adverse effects from the vaccine.[4] The risk of infection with canine influenza virus is low for most dogs since it takes 3-4 days of continuous exposure to an infected dog to become sick.[5] Finally, kennel cough is a syndrome that can be caused by several different viruses, in addition to the Bordetella bacteria. As such, kennel cough cannot be prevented by vaccination.[3] Moreover, kennel cough is usually a mild and self-limiting disease.[3]

Core Vaccinations for Cats

Every cat will be exposed to feline parvovirus (FPV), feline herpes virus (FHV-1), and feline calici virus (FCV), and therefore, every cat should be vaccinated against these viruses.[1] The viruses are included in the FVRCP or feline distemper vaccine. All cats are required by law to be vaccinated against rabies virus.

Noncore Vaccinations for Cats

Noncore vaccinations for cats include: feline leukemia virus (FeLV), feline immunodeficiency virus (FIV), and feline infectious peritonitis (FIP). The only noncore vaccination that we recommend for cats is the FeLV vaccine. Although some organizations recommend that all kittens be vaccinated against FeLV, this is not strictly necessary. This vaccine is appropriate for kittens who are:

- Likely to escape outdoors and come in close contact with other cats
- Going to spend a lot of time outdoors
- Living with a known FeLV positive cat
- Living in an environment with stray or foster cats who may be infected with the virus

If your kitten will stay inside only and will not be exposed to other cats who are positive for the virus, then vaccination is not necessary. Additionally, a kitten's immunity to this virus increases as he or she ages. The risk of infection is low after 16 weeks of age, and it is extremely low by 1 year of age.[3,6]

In adult cats, this vaccine is recommended for those cats who[7]:

- Spend a lot of time outdoors and are likely to fight with other cats
- Live with another cat who is positive for the virus
- Live in a household with incoming stray or foster cats who may be infected with the virus

Summary of Core/Noncore Vaccines

	Core Vaccines	Noncore Vaccines
Dog	CDV, CPV, CAV	Leptospirosis based on lifestyle/exposure risk
Cat	FPV, FHV, FCV	Feline leukemia based on lifestyle/exposure risk

What if my pet has had an adverse reaction to a vaccine in the past?

If the vaccine reaction occurred after a core vaccine was given, then a titer test is recommended over revaccinating.[3] This is because your pet is likely to have another adverse reaction if it has occurred previously. If the titer is positive, then revaccination is not necessary as your pet still has immunity to that disease.[3] If the titer is negative, there are a few options[1]:

- Give a Benadryl injection before the vaccination to minimize the likelihood of an adverse event
- Revaccinate using a vaccine produced by a different company
- Do not revaccinate if the risk or severity of an adverse reaction far outweighs the benefit. Pets with known auto-immune diseases would be included in this scenario.

If the adverse reaction occurred after a rabies vaccination, then we will discuss the options with you in detail. Rabies titers can be performed. However, it is the discretion of local government to decide whether a titer is acceptable since rabies vaccination is required by law to protect the health of the public.[3]

If the vaccine reaction occurred after a noncore vaccine was given, then the vaccine should not be given again.[3]

What is a titer test?

A titer test detects antibodies to the viruses that we have vaccinated your cat or dog against. The presence of antibody in their blood indicates that immunization has occurred.[1]

At Trusted Friend Animal Clinic, we strongly recommend performing an antibody titer on your puppy or kitten 2-4 weeks after the last distemper vaccine is given. This titer test detects antibodies to canine distemper virus and canine parvovirus for puppies and feline parvovirus for kittens.

As discussed in the immunization section above, the presence of antibodies indicates that the immune system will remember that virus (or antigen) in the future. Also, titer tests do not just give us a snap shot of the antibody level at one point in time. According to Ron Schultz, "In most animals, the titers to the core vaccines remain constant for a long period."[8]

What does a positive result mean?

A positive titer (for canine parvovirus, canine distemper virus, and feline parvovirus) indicates that your puppy or kitten is immunized (is protected from infection and will not get sick if exposed). An antibody response must be initiated for your pet to have immunity against these viruses.[1,8]

We use the Cornell University Veterinary Diagnostic Laboratory to perform our titer tests. This lab is one of only a few in the country that use a gold standard titer test which quantifies the amount of antibody present. In addition, they have done challenge studies to show what levels of antibody actually correlate with preventing disease in an animal (see studies section below).

For Puppies:

> If the titer test is positive for detection of antibody, then your puppy has immunity and does not need to have any more booster vaccinations for at least 3 years. In fact, the duration of immunity has been demonstrated to be longer[6] (see table below). Therefore, we recommend checking another titer at 3 years of age to see if antibody is still detected. If it is, then another vaccination is not necessary.

Minimum Duration of Immunity to Canine Core Vaccines

Vaccine	Minimum Duration of Immunity	Methods Used to Determine Immunity
Canine Distemper Virus (CDV)		
Rockborn Strain	7 Years/15 Years	challenge/serology
Onderstepoort Strain	5 Years/9 Years	challenge/serology
Canarypox Vectored rCDV	4 Years/5 Years	challenge/serology
Canine Adenovirus-2 (CAV-2)	7 Years/9 Years	Challenge-CAV-1/serology
Canine Parvovirus-2 (CPV-2)	7 Years/10 Years	challenge/serology
Canine Rabies	3 Years/5 Years	challenge/serology

For Kittens:

> If the titer test is positive for detection of antibody, then your kitten has immunity and does not need to have any more boosters for at least 3 years. In fact, the duration of immunity has been demonstrated to be longer, up to the life of the cat.[1] Therefore, we recommend checking another titer at 3 years of age to see if antibody is still detected. If it is, then another booster vaccination is not necessary.

Minimizing the amount of vaccinations your cat receives is extremely important because cats can develop sarcomas (aggressive tumors) under the skin where a vaccine has been given. Actually, a cat can develop this kind of sarcoma after any injection is given, not just a vaccine. The incidence of this sarcoma is between 1 in 1,000 cats to 1 in 10,000 cats.[9] In addition to minimizing the number of vaccinations given, we also try to reduce the chances of your cat developing this tumor by using non-adjuvanted vaccines. This is why we use a 1 year rabies vaccine for cats.

What does a negative result mean?

If the titer test is negative, then we know that the pet is not immunized (not protected from contracting disease).[1]

For a puppy or kitten having a titer test 2-4 weeks after the completion of the vaccination series, it could be because[1]:

- The animal failed to respond to that particular vaccine
- Maternal antibody was still present, and prevented the vaccine from producing an immune response
- The animal is a non-responder (rarely, some animals cannot produce an immune response to a certain virus)

In a case like this, it is recommended to revaccinate with a vaccine from a different manufacturer, and then recheck the titer 2-4 weeks later. If titer is then positive, the problem was with the particular vaccine initially given or maternal antibody was still interfering. If the titer is still negative, then the animal is likely a non-responder.[1]

For an adult pet, a negative titer means that we need to revaccinate your pet in order to have protection against disease.[1]

Titer Testing Summary		
	Puppy/Kitten	**Dog/Cat**
When to titer test?	• 2-4 weeks after the last vaccine at 14-16 weeks of age	• When first adopted • When boosters are due • When a pet has had a vaccine reaction in the past • At 3 years of age for pets with a positive titer after puppy/kitten series
Positive result:	• Has immunity, will not get sick	• Has immunity, will not get sick
Negative result:	• Maternal antibody interference • Particular vaccine used • Non-responder	• Immunity has waned

Have studies been performed to test the efficacy of titer tests?

Yes. In challenge studies where animals were exposed to ("challenged with") certain viruses, the antibody titer level was correlated with their ability to resist infection or development of significant disease.[10]

For some vaccines, like those against canine distemper virus, canine parvovirus, feline parvovirus, and canine adenovirus, the immunity they provide protects an animal from infection. Other vaccines, like those against feline herpes virus and feline calici virus, may not protect against infection, but they will prevent the infection from progressing to severe disease.[8]

In summary, Ron Schultz says "if antibody is there, [the virus] either can't infect, or if it infects, it can't cause disease..."[10]

How often are titer tests performed?

For Dogs:

We recommend having titers checked every 3 years until 10 years of age, at which point it is recommended to have them done annually. This is because the immune system can become weaker as your dog ages.

For Cats:

We recommend having titers checked every 3-5 years, depending on your cat's lifestyle and exposure risk. It is recommended to check titers annually starting at 15 years of age because the immune system can become weaker as your cat ages. Again, we will decide what is right for your cat based on his or her lifestyle and exposure risk.

Sources

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