

What Are Titers? Can They Show What Vaccinations a Dog Needs?

Some say antibody titers can determine whether a dog needs certain vaccines. What's the truth?

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Vaccination is one of the most perennially controversial subjects in veterinary medicine. There is no absolute consensus on when, how often, and even whether dogs need certain vaccines. The subject is complex, and although vaccination guidelines are published by leading sources, a strong caveat is always made by the publisher that the guidelines are not *rules*; each dog's needs should be considered individually.

I have written about vaccines dozens of times. For as long as I can remember I have included titers in every discussion. And for as long as I can remember some troll has always left a comment haranguing me for "not even mentioning titers." We will see whether anyone makes such a claim in the comments section today, because today's entire article is dedicated to titers.

What is a titer? To understand titers, one must understand a bit about the immune system. Remember as a starting point that the immune system is really, really, incredibly, phenomenally complex. People who spend six years getting doctorate degrees in immunology are able to scratch the surface. What follows is an incredibly simplified version of vaccination immunology, but it should suffice for our purpose.

The immune system's job is to recognize the difference between "self" and "foreign." Self consists of anything that belongs in the blood or tissues of the body. Foreign consists of anything, such as viruses, bacteria, fungi, and non-living debris or material that does not.

When something foreign enters the blood or tissues of the body, the immune system reacts. The first step is to identify the foreign thing, and then to produce antibodies to it. This process can take many days or weeks. Once antibodies are produced, they bind to the foreign thing. Cells in the immune system are then able to recognize the antibody-bound thing and kill it or digest and remove it.

Here is the problem: As I mentioned, it can take several days or even weeks for the body to begin cranking out antibodies. If the foreign thing is a strongly pathogenic organism such as parvovirus, the dog might die from the infection before sufficient quantities of antibodies can be created.

That is where vaccination comes in. Vaccines use non-pathogenic versions or fragments of dangerous disease organisms to stimulate the body to produce antibodies and be primed for action in the event of exposure to the pathogen in question. The pathogen is then eliminated before it can cause disease.

This brings us to titers. Titers are quantitative measures of antibodies in the bloodstream. They are reported as “dilutions” because of the complex way in which they are measured. All you need to remember is that titers measure antibody levels and therefore in theory measure the immune system’s preparedness to fight infection. Key words: in theory.

Here is the problem with titers: They don’t give insight into the other steps that are necessary to fight disease. First, the blood levels of titers tell us nothing about a dog’s ability to produce *more* antibodies — something that is crucial — if exposed to a pathogen.

Second, remember that antibodies — which is all that titers measure — by themselves are not sufficient to prevent an infection. After the antibodies bind to the pathogen, cells generally must kill or destroy it. An animal with an insufficiency in this so-called cell-mediated immunity might be at risk even if his antibody titer is sky high.

In fact, there is only one way to determine whether an animal is immune to a disease: a pathogen challenge. In other words, the only way to test definitively whether your dog is immune to parvo is to have him snuff up a bunch of active parvovirus. If he doesn’t get sick, he’s immune. If he gets sick, he’s not immune (and he might die as a consequence). This test, for obvious reasons, is not performed outside of research settings.

Titers can be considered at best an approximation of the immune system’s ability to protect against disease. But that’s not the last word on them. Recent research has been able to offer some idea of how accurate the approximation is for different diseases. The use of titers appears to be more appropriate for some diseases than for others.

The good news is that titers appear to offer relatively accurate pictures of immunity for three of the four most dreaded canine diseases. A dog with sufficient titers against parvovirus, distemper virus, and adenovirus (infectious hepatitis) will probably not become ill if exposed to any of these pathogens. Revaccination of dogs with adequate titers to these diseases is not likely to lead to improvement in immunity. It is therefore reasonable to measure titers prior to boosters of the DAP (distemper-adenovirus-parvovirus) vaccine in adult dogs, and to skip the vaccine in dogs with good titers.

And there is more good news: Even dogs with low or “negative” titers might still have adequate immunity. Previously vaccinated dogs often have immune systems with strong “memory.” This means that they can almost immediately create antibodies in response to pathogen exposure. Nonetheless, revaccination is generally recommended for dogs with low titers against any of these three diseases.

The outlier among the dreaded diseases is rabies. Although titers against rabies are possible (and in humans are believed to offer a reasonable approximation of immunity), they are not readily or rapidly available for dogs. Rabies vaccination is required by law in most jurisdictions, and generally authorities are not willing to substitute a titer for revaccination.

Finally, there are many so-called “non-core” vaccines available for dogs. Commercial titers are not yet readily available for *Bordetella*, leptospirosis, rattlesnake venom, and so forth. My

understanding of the pathology of *Bordetella* and leptospirosis implies that titers might never offer a reasonable picture of immunity to these diseases. However, time will tell, and other means of immune system measurement might be developed in the future. Meanwhile, recommendations for non-core vaccinations will, as I have always said, need to be based upon a dog's age, lifestyle, geographic location, and individual life circumstances.