

## Titers and Canine Vaccination Decisions

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<http://www.caberfeidh.com/CanineTiters.htm>

It always happens. As soon as dog owners hear that annual re-vaccination for dogs might not be necessary, they also hear about something called a titer test. "That's great," they say to themselves. "A test I can run every year to see if my dog's immunity has gotten low and needs boosting!" It seems like the perfect solution to worries about over-vaccination.

However appealing that idea might be, titer tests can't be used in this way. That's because your dog's immune system is not a gas tank, vaccines are not gas pumps, and titer tests are not gas gauges.

### What Is a Titer Test?

A "titer" is a measurement of how much antibody to a certain virus (or other antigen) is circulating in the blood at that moment. Titers are usually expressed in a ratio, which is how many times they could dilute the blood before they couldn't find antibodies anymore. If the lab was able to dilute it two times, and then didn't find any more antibodies, that would be expressed as a titer of 1:2. If they could dilute it a thousand times before they couldn't find any antibodies, that would be a titer of 1:1000.

It would be wonderful to be able to say that once this ratio dips below a certain level, it's time to give another vaccination to "boost" immunity. But that reflects an incorrect understanding of the immune response. Vaccines don't inject immunity into a dog. Instead, they stimulate the immune system to form two kinds of cells, antibodies that fight the current infection, and memory cells that remain behind after the infection has been eradicated, to pump out more antibodies if the same virus is encountered in the future.

Memory cells persist for 20 years or more, and are not increased when the animal is re-vaccinated or re-exposed to the disease. According to vaccine researcher Michael Lappin, "With modified live virus vaccines like canine parvovirus (and) canine distemper ... the virus in the vaccine must replicate to stimulate the immune system. In a patient that has been previously immunized, antibodies from the previous vaccine will block the replication of the new vaccinal virus. Antibody titers are not significantly boosted. Memory cell populations are not expanded. The immune status of the patient is not enhanced." (Lappin et al, "Use of serologic tests to predict resistance to Feline Herpesvirus 1, Feline Calicivirus, and Feline Parvovirus infection in cats," Journal of the American Veterinary Medical Association, January 2002.)

The detection of antibodies in the bloodstream, which is what a titer test does, tells us that process took place and that memory cells are present, but the absence of antibodies does not mean there are no memory cells or that the dog is not immune. Veterinary immunologist Ian Tizard writes, "You can have a negative titer and if the pet is exposed, memory cells can respond within hours to regenerate enough antibodies for protective immunity." (Tizard, Ian R., Veterinary Immunology: An Introduction, 6th Ed, Saunders 2000.)

### What Titer Tests Are Good For

If you can't "top off" your dog's immunity to viruses with booster shots, and you can't tell from the titer test if his or her immunity is waning, what could a titer test possibly be good for?

It takes up to 14 days for the immune system to complete its response to a modified live virus vaccination for canine viruses. This process is called "seroconversion," and in the vaccination stakes, it's the brass ring. This means the dog has formed both antibodies and memory cells to those viruses.

If you test the dog's titer two weeks after vaccination, you can tell if he or she formed immunity to the virus.

If, however, the dog did not seroconvert after vaccination, this lets you know that the vaccine didn't work; that is, it did not provoke the formation of immunity. This is usually because the puppy was too young, and his or her mother's immunity was still present at a high enough level to prevent successful immunization. (Puppies acquire temporary immunity from their mothers after birth.)

In an adult dog or much older puppy, the reasons that vaccination fails to provoke immunity are usually related to the use of improperly stored, handled, shipped, or administered vaccines. Very rarely, the puppy or dog has a defective immune system and is incapable of seroconverting.

Titer tests are also very useful to breeders and the owners of young puppies. They can be used to help you customize an effective but minimal vaccination program for your puppy. Although a series of vaccines is typically given to puppies, this isn't because a series is needed to produce an immune response. It's done because some puppies don't form immunity to the first vaccination, and would be unprotected if the next in the series were not administered. Puppies, like adult dogs, need just one vaccine that works, what immunologists call a "single immunizing dose." By checking your puppy's titers two weeks after the first vaccinations are given, you can determine whether or not immunity formed. This enables you to avoid giving further vaccines that will provide no benefit to the puppy if he or she is already immune, as well as let you know you need to continue to protect your puppy from exposure to these diseases if it turns out he or she did not form immunity from the first vaccinations. You do not have to wonder, worry, and guess if your puppy's shots worked; you can know.

### The Exceptions to the Rule

Titer testing is usually done in dogs for the most common and deadly canine viruses, parvovirus (CPV) and distemper (CDV). Rabies titer testing is also done, usually for purposes of travel to foreign countries that require it. Some viruses have unusual antibody patterns (such as FIP in cats or HIV in humans), but we do not have vaccines for any diseases of this type in dogs. Also, bacterial antibodies differ from viral antibodies in a number of ways, and bacterial titer testing is typically done in veterinary medicine as a means of diagnosing acute illness, not monitoring vaccine response or ongoing immunity.

### Should You Test?

So, should you test your dog's titers? Probably not. Nearly all previously vaccinated adult dogs are immune to parvovirus and distemper, and the titer test isn't going to give you any useful information. You cannot make an immune dog "more immune" to a virus with additional vaccination, as the previous immunity will wipe out the virus in the vaccine. There will be no increase in immunity and no benefit to the dog. (Schultz, Ronald D., "Current and future canine and feline vaccination programs", *Veterinary Medicine*, March 1998.) If a titer test will give you peace of mind, or help you make a vaccination decision about a puppy or a dog of unknown vaccine history, then it's worth considering. But for most owners of well-vaccinated adult dogs, neither re-vaccination nor titer testing for parvovirus and distemper are necessary.