



## ***Saving Lives with Antibody Titer Tests – Live Webcast***

### **Audience Questions and Answers**

**By Ronald Schultz, MS, PhD, ACVM**

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#### **Cost Related Questions**

- 1) **Q: I think that antibody testing is great but with budget cutbacks in most shelters, is it really an option? For my own animals I would certainly have my animals tested.**

**A:** Budget cuts will always restrict what type of testing can be done. However, if you have an outbreak, use this link to contact my [laboratory](#) as we may be able to help through the generous support from Maddie's Fund<sup>®</sup> and also gifts of free tests from Synbiotics (now Pfizer Animal Health), Biogal Labs, and Idexx Labs to help defray the costs of testing.

- 2) **Q: Titer tests do not measure memory cells, only antibodies, which is central to determining if an adult dog needs vaccination boosting. Therefore, what is the benefit of spending money on titers when they do not confer this benefit?**

**A:** Titer tests measure memory B cells and certain aspects of cellular immunity (e.g., T helper cells). Therefore, antibody tests are the best way to determine if a dog has immunity to CDV, CPV-2, CAV and rabies virus.

- 3) **Q: Can you speak as to the cost of titer testing versus re-vaccinating?**

**A:** Revaccinating is much cheaper than titer testing in that vaccines only cost a few dollars and a small amount of personnel time. Titer testing, including time and materials, would be more expensive. You can easily vaccinate an animal for \$3 to \$10, depending on the vaccine, and you would easily be paying \$10 to \$20 to titer the animal. But the cost of titer testing is more likely to save lives in an outbreak, because you can leave those that are immune in the shelter and divert those that are entering the shelter with no immunity to foster homes or elsewhere to give them time to develop immunity. The best outbreak control requires both the use of vaccines and titers. Unfortunately, a dog or cat that is already in the shelter and not immune, will likely get infected, develop disease, and be euthanized or die from disease Laurie. Any animal coming into the outbreak that is not immune will also get infected and likely develop disease, because most shelters are not getting animals vaccinated until after they have been in the infectious zone for hours or days, thus the vaccines can't provide adequate protection.

#### **Interpretations of Titer Tests**

- 4) **Q: What does it mean when my dog's titer is always at or just below the laboratory's number for immunity on distemper, even after "boosting" (which actually made the number LOWER) and the level is sky-high for parvo?**

**A:** It means your dog is immune to CDV and CPV, but it is a low antibody responder to CDV.

**5) Q: My 4-month-old Irish setter just failed to show a response to his distemper shot. I repeated the shot and titer and still no response. What do I do now?**

**A:** How old is your Irish Setter? If he's 16 weeks or older, vaccinate him with a product (vaccine) not used previously, and send the sample to my [laboratory](#). You may have a genetic "non-responder" or "low responder."

**6) Q: Does corona virus have a valid titer?**

**A:** Coronavirus (CCV) vaccine is not recommended, and CCV doesn't cause disease. No, there is no titer test for CCV.

**7) Q: I have heard two different rules on this...Does any number on a titer mean there is immunity or does it require a certain number?**

**A:** Any number that is considered positive for the test that is being performed shows protection if the dog has been vaccinated and is 5 months of age or older.

**8) Q: Why would they be negative? I have a vaccinated dog that tested negative.**

**A:** You probably have a non-responder. If you want to check your dog using the gold standard tests, send the serum to my [lab](#).

**9) Q: Does a non-responder have immunity?**

**A:** A true non-responder has no immunity. However, some of the tests are not sensitive enough to measure small amounts of antibody. Therefore, you should perform the Gold Standard tests when you find a negative on any test other than Viral Neutralization (VN or SN) or Hemagglutination Inhibition (HI) (gold standards). When those tests are negative, the animal is a non-responder.

**10) Q: Can you please explain "low responders are protected from disease, not infection"?**

**A:** Infection is common and doesn't always lead to clinical disease. Some vaccines and some dogs are only protected from disease, but they do get infected. Some vaccines (e.g., those for Lepto, feline herpes) can't prevent infection, but hopefully they will prevent disease. CDV, CPV-2, CAV-2, FPV, and rabies can prevent infection. Most other vaccines prevent disease to some extent (partial or complete). Some vaccines, like canine coronavirus vaccine, don't do anything. Some cause disease (immune mediated) in certain animals.

**11) Q: Should I be retesting in 2 weeks to see if the dog developed immunity? If the result is still negative, does that mean the dog is a non-responder?**

**A:** You should test 2 or more weeks after last puppy dose. If the animal is negative, it means you should revaccinate and test again in two or more weeks. There are very few

non-responders – 1 per 1,000 dogs for CPV-2, 1 per 5,000 dogs for CDV. You will rarely, if ever, find a pup that is a CPV-2 and CDV non-responder (1 per 200,000).

**12) Q: Dr. Schultz, what about stress-induced parvo where dogs were stressed out of their minds and vaccinated and two days later presented with parvo.**

**A:** Stress can cause the susceptible dog to develop more severe disease, but stress doesn't cause an animal to develop parvo (canine or feline) 2 days after vaccination. Those animals were infected 4 or more days before clinical signs appeared – that's the minimum incubation period with most pathogenic parvovirus, even in severely stressed animals.

**13) Q: Have you done titer tests on animals that have never been vaccinated? Will unvaccinated animals develop natural immunity?**

**A:** Yes, some unvaccinated animals will get naturally infected and may or may not develop clinically apparent disease. That is how all dogs and cats were immunized prior to the 1950s when there were no vaccines. It's referred to as "natural immunization." All the dogs and cats that survived when there were no vaccines were naturally immunized with pathogenic viruses and bacteria. In nature, many of the "booster responses" are from natural infections. Natural immunity is excellent and lifelong after infections with CDV, CPV-2, CAV-1, and FPV. However, the natural infections often kill 25 to 75% of puppies and kittens. So efficacy of natural immunization is great; safety leaves much to be desired. Natural immunization does tend to lead to more genetically resistant animals, as the less resistant ones tend to die. All vaccination in wildlife species is natural and only the most resistant survive. Furthermore, those that develop adverse reactions also often die, so you reduce the likelihood of adverse reaction (e.g., immune mediated diseases). That reduction comes at a high cost to the species and the breeds.

**14) Q: How do we know if a puppy has a titer due to maternal antibody which may interfere with vaccine but then drop below protection during the 2 weeks prior to revaccination? Are these pups truly low risk?**

**A:** Unfortunately, pups and kittens less than 16 to 18 weeks of age may have maternal antibody and none of the tests can distinguish whether antibody is maternal (passive) or active. The passive antibody would decrease significantly, whereas the active antibody would remain the same or increase. If you are vaccinating every 2 to 3 weeks, you would get the pups that have passive antibody actively immunized, whereas those with active immunity are already immunized. Thus, those pups are low risk, especially for CDV as that vaccine provides some protection within hours after vaccination. It can take 3 or more days for CPV-2 vaccine to protect and 5 to 7 for CAV-2 protect against CAV-1. (See question 27).

**15) Q: Is there a difference between a vaccination titer and a disease titer?**

**A:** There may or may not be a difference between a vaccine induced titer and a disease (infection) induced titer. The titer is dependent on the genetics of the immune system. Just as there are genetic low antibody responders, there are high responders. However,

generally the antibody response following recovery from natural infection or disease is much higher than from the vaccine. I have seen hemagglutination inhibition (HI) CPV-2 Laurie titers from survivors of the disease; some are in the 100,000+ range, whereas a very high response to vaccines would be somewhere in the 20,000 to 40,000 range. Furthermore, high vaccine titers will quickly fall (e.g., 500 to 2,000), whereas high disease titers may remain in the 20,000 to 40,000 range. Dogs with titers of 100 are just as protected as those with one of 20,000. However, if those animals were female and passed the antibody to their pups, the pups from the bitch with a titer of 100 would be susceptible in 2 to 4 weeks; pups from the bitch with a titer of 20,000 will be immune 14 to 16 weeks, or possibly longer. That is one of the reasons we recommend pups born in shelters get their last dose of vaccine at 18 to 20 weeks instead of 14 to 16 weeks. Many of the dams in shelters were naturally immunized via infection/disease.

**16) Q: What are some of the protective titer numbers for some diseases?**

**A:** There are no numbers. If the actively immunized dog or cat is tested, and the test is considered positive, regardless of the number, the animal is immune. (See also #36) Don't try to compare numbers from different labs or different tests. You need to know if the test has detected antibody, yes or no. In fact, with some of the tests, serum is not diluted, thus it is positive or negative. Other tests require two-fold dilutions in order to get a titer. Some of the yes-or-no tests are designed to measure a certain dilution of serum. When that dilution is positive, then the animal is immune; when it's negative, the animal should be revaccinated, although it may not be a true negative or a non-responder. That is why, when you find a negative on the TiterChek or VacciCheck, you'll want to have a gold standard test, like viral neutralization, performed before you consider the animal a non-responder. Many of those dogs found negative on the yes-or-no tests are *low* responders and not *non-responders*. They're just as immune as the high responders. Very complicated, isn't it? There is nothing in immunology that is black or white – just shades of gray!

**17) Q: Skye: September 2010 distemper positive, parvo positive. August 2011 distemper negative, parvo positive. Does this mean he is not developing or holding the immunity?**

**A:** Skye had a low response to CDV in 2010 that fell below detection in 2011 whereas the CPV-2 remains at detectable levels. It means that he developed antibody to CDV, but very likely has low response to CDV; thus, it was not detected in 2011. If he was tested by the CDV gold standard test (virus neutralization), he would probably be a low responder. I have never seen a responder dog become a non-responder. All dogs and cats will have titers that go up and down, but remember a titer is the same when it is one doubling dilution above and one below the reported values. For example, a 4 titer is between 2 and 8, and a 20,000 titer is between 10,000 and 40,000. Never is a titer a single number – it's always a range between those doubling dilutions.

**18) Q: To what do you attribute positive titer tests for dogs (not puppies, necessarily) who have had no vaccines?**

**A:** Titers are due to natural infection with or without clinical disease. You can't get an active titer without infection.

**19) Q: Is it possible to test negative and still have protection if exposed? In other words, could an animal's immunity kick in if exposed to disease?**

**A:** It is possible to test negative because the test used is not as sensitive as the gold standards. However, if the gold standard tests were negative, I would revaccinate because the dogs, if infected, would likely develop disease and die (see answers to similar questions).

**20) Q: Can titer testing distinguish between infected animals and diseased animals (asymptomatic)?**

**A:** No, titer tests can't distinguish antibody in infected from antibody in diseased animals.

**21) Q: For senior indoor cats, is it really advisable to revaccinate if the titer is low? In my experience, many senior animals respond poorly to vaccines.**

**A:** If FPV titer is negative, you should vaccinate. FCV and FHV-1 (herpes) tests don't correlate with protective immunity.

**22) Q: Can you have a false positive or false negative test in antibody titer testing?**

**A:** Yes, you can have false positive and negative titer tests, just like any other test. Quality control samples (positive and negative) need to be performed every time a test is performed. People with little experience get a lot of false positive and negative results on titer tests.

**23) Q: Companion animal question. Canine 4 years old tested extremely high on a parvo titer test at 16,000, then 4,000 for the next two years. Is this extremely high number of concern? The test scale was 0-500.**

**A:** The 16,000 is of no concern and the titer didn't change much. All 16,000 tells you is that the titer is between 32,000 and 8,000; 4,000 is not much different than 8,000. There is no 0-500 test scale that I am aware of.

**24) Q: I titer tested my dog and it came back negative for immunity, but I then had it retested with the number result, and it came back with protective immunity. Why is that?**

**A:** I'm not sure; it may have been tested at a different laboratory or a different test.

**25) Q: Is the canine rabies titer as "reliable" as other titers?**

**A:** Rabies titers are very reliable (see other related questions). However, legally, they cannot be used *in lieu* of revaccination.

**26) Q: Does antibody titer testing (VN) for rabies immunity play any role in checking a cat admitted to a shelter with a questionable bite injury with no known vaccination history?**

**A:** If the rabies antibody titer for the cat with unknown vaccination history is positive, it shows that the cat has been previously vaccinated.

**27) Q: Since the titer tests are not predictive for Herpes/Calici ... is there any way to know if a booster is needed?**

**A:** Yes, if the FCV or Herpes titer is negative, revaccinate. If it is positive, the cats can still develop severe feline infectious respiratory disease complex. CIRDC and FIRDC are not vaccine-preventable diseases.

**28) Q: We have a dog with positive titers for parvo but negative for distemper...revaccinate?**

**A:** Positive titers for CPV-2 but negative for CDV: revaccinate with a CDV only, a CPV-2/CDV, a CPV-2/CDV/CAV or a CPV-2/CDV/CAV/CPI. The last is a “5-way vaccine,” and is likely to be the one your veterinarian has on hand.

### Use of Titer Tests

**29) Q: Should an animal that has received radiation for cancer one year ago still be vaccinated, regardless of titer level?**

**A:** If antibody test is positive for CDV and CPV-2, the animal does not need to be revaccinated after cancer therapy. If titers are negative, revaccinate and test 2 or more weeks later to be sure the dog can and has responded to vaccines.

**30) Q: My two dogs, 6 and 8 years old currently, have only had their puppy vaccinations and have been titer tested yearly for distemper and parvo ever since. Titer results have come back with vaccinal immunity. Do I still need to titer test them yearly?**

**A:** No, you don't. Every 3 years is often enough.

**31) Q: How often should you titer test?**

**A:** Titer the animal two or more weeks after last dose of pup/kitten vaccine, again at 1 year of age, then not more often than every 3 years. When a dog gets to be 10 to 12 years of age, or a cat reaches 12 to 14 years, the titers may decrease, but if they don't go negative, don't revaccinate. They rarely become negative; only revaccinate when they are.

**32) Q: How long after the vaccination would you titer test, both at the 14/16 week time frame and after that time frame?**



**A:** You should wait at least 2 weeks after last vaccination, titer at 1 year, then every 3 years or longer.

**33) Q: Can you use the canine parvo VacciCheck titers to detect panleukopenia titers in cats?**

**A:** Yes, you can use the CPV-2 titers to detect feline parvo (panleukopenia) virus in some, but not all, tests.

**34) Q: Is the Feline VacciCheck test good to use for disease detection?**

**A:** Feline VacciCheck is good to measure immunity to FPV. However, the titer to FCV and FHV-1 doesn't directly correlate with protection. No, the test is not useful for detection of disease.

**35) Q: With TiterChek and VacciCheck is it recommended that puppies be tested with each vaccine during the puppy series?**

**A:** The TiterChek and VacciCheck test for CDV and CPV and VacciCheck also tests for CAV.

**36) Q: At what age is the test reliable?**

**A:** The titer tests become useful (reliable) after 18 weeks of age; prior to that age, there is enough maternally derived antibody (MDA) in a small percentage of pups (<10%) to give a false positive on the tests. Titer tests do not distinguish between maternally derived antibody and actively produced antibody. Therefore, if you vaccinate a pup at 6 weeks and test at 8 weeks you wouldn't know if the positive test was maternal antibody or antibody the pup developed.

**37) Q: Could you use the titer test to test animals coming into a shelter to even see if they need that vaccine? Older animals, that may very well have been vaccinated or already have active immunity.**

**A:** Yes, you could definitely use it to test dogs older than 18 weeks coming into shelters to determine their immune status for protection from CPV-2 and CDV, or to test cats for protection from FPV.

**38) Q: In antibody shelter testing, can a batch test be done to help with costs? An example would be a queen and her kittens.**

**A:** A batch test could be done with kittens or pups, but you wouldn't know about the individual kittens or pups; thus, some of the litter may be protected and some not. Don't mix the queen or bitch serum with the kitten or puppy serum; do them separately.

**39) Q: Do you have a sense of when AAHA will change its protocols to reflect your good work? My vet's practice is a member, and they have little faith in the titer testing which I had done elsewhere (at a holistic vet who does not do surgeries).**

**A:** The AAHA and AAFP Guidelines already recommend protocols that reflect my research. In fact, they are very similar to an article Fred Scott and I published in 1978, where we recommended a 3 year vaccination program for the core vaccines in both dogs and cats. The current recommendations are to ensure the last puppy and kitten doses are given between 14 to 16 weeks or older; revaccinate at one year or within one year, then don't revaccinate more often than 3 years or longer. Longer can mean never again for the life of the animal, or at the most, every 3 years with the core vaccines. Rabies is an exception because of the laws, not because of immunity, as we already know, based on antibody titer, rabies vaccines can provide immunity that can last well beyond 3 years in many dogs and cats.

**40) Q: Do you mean to re-test at 3 years, and if positive wait 3 more years to test again?**

**A:** Titer testing, like vaccination, need only be done every 3 years or longer. You don't need to titer test yearly. Titers will almost always go down after the first year. That is not a problem unless they go negative; then you should revaccinate.

**41) Q: You mentioned titer testing for adult animals in the face of an outbreak. What about testing puppies/kittens?**

**A:** Yes, you need to test puppies/kittens and adults in the face of an outbreak, but remember the young will have passive immunity that continues to decline and adults will have active immunity that remains the same or increases. It is a very different situation between very young and older animals.

**42) Q: Are the in-clinic titer tests available in Canada?**

**A:** Yes, the on-site or in-clinic tests are available in Canada.

**43) Q: Are titer tests of value in measuring immunity of cats to FIP?**

**A:** Titers are really of no value in measuring immunity of cats to FIP. They also are of no value in diagnosis of the disease. FIP is an antibody mediated disease.

**44) Q: Our shelter doesn't have a centrifuge. Does the VacciCheck require serum or can testing be run on a lavender titer test?**

**A:** You can use serum or plasma and it doesn't have to be centrifuged.

**45) Q: Will my vet know where to send a sample for titer testing for my companion animal?**

**A:** Your veterinarian will know or you can tell him or her. We have a number of labs listed onsite in information provided to participants of the webinar, click here for the list of [laboratories](#). Unfortunately, many veterinarians don't believe in titer testing, so you may need to persuade him/her of its value. But remember, it will be more expensive. If your veterinarian doesn't want to do the titer testing, it will probably be very expensive. On the other hand, there are many veterinarians that do titer testing on every animal rather than revaccinations.



**46) Q: Can you comment on using titer tests in puppies in the face of an outbreak?**

**A:** Titer tests are very helpful in the face of an outbreak for puppies, kittens, and adults (see answers to other similar questions).

**47) Q: If a dog has had and survived parvo, does this mean they have natural immunity, or should they have titers done anyway?**

**A:** If a dog has had what was considered parvo disease, but wasn't proven by anything other than clinical signs (e.g., no SNAP, or negative SNAP, no titers after recovery), you should titer it or give it one dose of CPV-2 vaccine to ensure it is immune for a lifetime. I've seen dogs diagnosed with CPV that were never infected with the virus – it was a “look-alike” disease.

**48) Q: With regard to geriatrics: if a titer is not sufficient, how might one weigh the risk of revaccinating (i.e., adverse effects) versus risk of contracting disease?**

**A:** If the geriatric dog is antibody negative, I would revaccinate it, just as I'd revaccinate a young dog in the same situation. However, if it was positive (no matter how low), I wouldn't feel compelled to revaccinate either an old or a young dog.

**49) Q: Is Hemopet a good place to have titers tests done?**

**A:** Yes, Hemopet is a good place, as are certain diagnostic labs and commercial labs. I've found that some commercial labs often don't have people that can interpret the titers, because there are many people that can't. Titers are a very confusing topic to many.

**50) Q: What specific question should we ask our vet about the titer tests she uses? What should we ask her to consider if the method is not the gold standard?**

**A:** Ask your veterinarian where the serum is tested, what test the lab is using, and what they consider to be positive and negative. If you continue to have questions, contact me.

**51) Q: Which in-clinic titer test is more suitable for a small volume clinic?**

**A:** VacciCheck is more suitable for small volume/fewer staff.

**52) Q: So you don't recommend titer testing for any of the others in the 7-way test besides parvo, distemper, and adenovirus?**

**A:** No, there's no value in testing titers for anything other than CDV, CPV-2, FPV, CAV-2, rabies, and if you want to pay big dollars, a borreliacidal titer test would tell you if immunity to Lyme is present. All other titer tests are used to diagnose disease or infection (Lepto, FIV) or are of no value in measuring protective immunity when a serum sample is used, because immunity is local (CPI, FCV).

**53) Q: Are there in-house rabies antibody tests?**

**A:** No, there are no in-house rabies titer tests. In fact, there are only about 4 or 5 licensed labs in the US that do rabies titers. Kansas State Diagnostic Lab is the one that is used more often, and that's the lab I recommend.

**54) Q: Do all the titer tests mentioned today require refrigeration of blood samples if sent to a lab?**

**A:** No, you don't have to refrigerate the blood if it's collected aseptically. Antibody is very stable at room temperature and the only thing that causes problems is if the sample is contaminated with bacteria. That's why we recommend keeping it cool to restrict bacterial growth. Most samples collected with a syringe or vacutainer tube and needle are very clean and sometimes are sterile. Samples kept in refrigerators and sent on cold packs are likely to be in better condition and less likely to be contaminated than those kept at room temperature for long periods.

**55) Q: Titer tests for my dogs are currently being sent to Kansas State University. Will the newer tests be of the same standard?**

**A:** Did you have all your titers – CDV, CPV-2, rabies – done at Kansas State, or just rabies? The newer tests are not for rabies, only for CDV, CPV-2 and CAV-1. Yes, they will be of the same standard as the rest of the tests as it relates to protective immunity, but the gold standard are the best tests.

**56) Q: During the distemper outbreaks you mentioned, were those dogs found to be not protected held for the 6 weeks quarantine or were they euthanized?**

**A:** During the CDV outbreaks, the dogs with protective titers were not held for 6 weeks. However, the ones without titers were held if they entered the shelter. Many went to foster homes or areas separated from the outbreak. All dogs were vaccinated at entry if they didn't have antibody. No dogs were euthanized, except the ones with clinical disease.

**57) Q: Can rescue groups buy titer tests in bulk to be used by a local veterinarian?**

**A:** Rescue groups can buy tests in bulk and any other group (shelters, veterinarians, dog clubs, kennels) can buy in bulk.

**58) Q: I do consultations for pet owners about nutrition. I also want to assist them in making the right decisions about antibody titer testing. How do I assist them in finding the right vet and secondly, can vet techs handle the testing instead of a vet?**

**A:** Vet techs can perform the testing for titers but revaccination, in my opinion, should be done by the veterinarian or under the direction of a veterinarian. With that said, there is no vaccine other than rabies vaccine that legally *must* be administered. All other vaccines are available from a variety of sources and can be administered by the owner or anyone the owner allows to administer them.

**59) Q: Is the sample required about the same amount that is used for standard "snap tests" in common use in shelters now (about 1cc)?**

**A:** Yes, same or similar amount.

**60) Q: What age do you start vaccinating orphans?**

**A:** Five to six weeks.

**61) Q: A litter of pups born last night was removed from the dam after about eight hours because of serious illness of the mother. What sort of vaccination program should be followed for the puppies that are now being bottle fed?**

**A:** Hopefully, they received some colostrum from the bitch. You would be able to determine that by performing a titer test for CDV and CPV-2. If the pups have antibody, follow normal vaccination schedule (see question 55). If they don't, start program at 5 to 6 weeks, preferably with a bivalent CDV/CPV-2 only vaccine. Then at 8 to 9 weeks, you can give a 4-way CDV/CPV-2/CAV 1, 2 or 5-way (the above plus CPI). If negative for antibody and you want to provide passive immunity, you or your veterinarian can inject immune serum subcutaneously or give plasma with antibodies to CDV/CPV-2 and CAV intravenously, then follow above recommendations. This would give the antibody negative pups protection until they get vaccinated. Do not vaccinate before 4 to 5 weeks of age, as the vaccines may cause some problems in the young pups.

**62) Q: Can pet owners purchase the tests and give them at home?**

**A:** Yes, pet owners can purchase the titer tests and if you can bleed your dog, you can use them at home.

**63) Q: How do you feel about nosodes?**

**A:** Don't use nosodes to prevent any disease, like CDV/CPV-2/CAV/rabies! They don't provide protection. Nosodes provided the same protection as saline in our studies with CPV-2 nosodes and Dr. Max Appel's studies with CDV nosodes. If you want to use nosodes, then use them to revaccinate after you have given CDV/CPV-2/CAV-2/FPV, because the dog or cat will already be immune for a lifetime.

### **Titer Tests and Antibodies**

**64) Q: What is the role of Cell Mediated Immunity and Innate immunity in the young puppy or kitten in giving protection? Does the IgG alone determine the protective immunity?**

**A:** The IgG alone is what is measured but when present after vaccination, the titer shows there are memory effector B cells and cellular immunity was stimulated by the vaccine.

**65) Q: Does the health of the animal determine the quality or amount of antibodies the puppy or kitten gets from the colostrum?**

**A:** Generally, the health of the animal doesn't affect the amount of antibody a pup or kitten would receive. One disease that would affect the amount of colostrum is mastitis,

which can interfere with passive transfer and cause illness in pup or kitten from the bacteria causing mastitis.

**66) Q: Does having a litter of puppies tax or decrease the immunity of the mother?**

**A:** A litter of pups can affect the general health of the mother but her titer will not change significantly after the pups/kittens are born.

**67) Q: What about people that say the titers are inaccurate because of information being held in memory cells and not really in system.**

**A:** Memory effector B cells are present if the titer is positive.

**68) Q: Will non-responders come down with another type of illness such as autoimmune disease?**

**A:** No, non-responders will not develop autoimmune diseases, but they may develop the disease they can't develop immunity for (e.g., CPV-2 or CDV).

**69) Q: If newborns are unable to nurse for whatever reason is it recommended to give serum from an immunized adult by mouth?**

**A:** If newborns fail to nurse, give serum from the mother or a known immune donor orally as soon after birth as possible. You can make artificial colostrum that you feed the orphaned pups and kittens daily for 3 days. Artificial colostrum is one volume of milk replacer (Esbilac) to one volume of serum. It is very similar to real colostrum with regard to the antibody titer. If the pups or kittens have already suckled, then you must inject a plasma IV or plasma/serum subcutaneously to have it absorbed systemically. If you give an IV, it must be plasma, not serum! This should only be done by trained professionals.

**70) Q: Is there any testing on the horizon concerning definitive immunity to FeLV, FIV or dermatophytes?**

**A:** There are no "titer tests" that can be used to measure immunity to FeLV, FIV, or dermatophytes and they are not likely to be developed. Antibody is an index of infection with FIV, or vaccination with or without infection. It is said that antibody does not correlate with immunity to FeLV, but that isn't true! A cat with antibody to FeLV is protected because the test shows the cat has immunity. However, there are no antibody tests available for FeLV. I don't know about the value of antibody to dermatophytes.

**71) Q: If immunity has become reduced in an elder animal, will that animal respond identically to a young animal if it is revaccinated, or less well (perhaps with a shorter duration of immunity)?**

**A:** Older dogs that have been vaccinated with core vaccines maintain lifelong immunity. Old dogs and cats don't die from CDV, CPV-2, CAV-1, or FPV because they have lifelong immunity. They generally die from noninfectious disease.

**72) Q: Will there be a Lyme titer?**

**A:** Yes, there will be a Lyme titer. Currently, a Lyme titer can be used to diagnose infection. A new Lyme test from Cornell's Diagnostic Lab can test Lyme immunity, acute infection, or chronic infection.

**73) Q: What is the protocol for a pregnant feline coming into the shelter? How about kittens without moms?**

**A:** Pregnant females are vaccinated like all other adults coming into a shelter. They may abort from the vaccination, but if they get infected, they'd abort anyway. No pregnant pet dog or cat should be vaccinated from 2 weeks or more before pregnancy to 2 weeks or more after the pups/kittens are weaned; never vaccinate a pet that is pregnant!

**74) Q: Does the injection of a vaccine like Parainfluenza produce IgA against the disease? If the vaccine was intranasal, would the level of IgA be higher?**

**A:** Parainfluenza or CAV-2 vaccine administered parenterally can induce IgA, as well as IgM, IgE, and IgG. But none of the IgA is on mucosal surfaces of the respiratory tract, because it doesn't have the secretory(s) component. Local IgA production with secretory component will only be in the upper respiratory tract to provide local mucosal protection when the animal is vaccinated locally with a live vaccine.

**75) Q: I currently titer test my dogs after hearing over-vaccinating is causing autoimmune disease or even cutting the life span of our pets in half. Is this true?**

**A:** Vaccines do not truly *cause* autoimmune disease. Like infectious, environmental contaminant, drugs, and other factors, they can trigger an autoimmune or immune mediated (allergic) disease in a genetically predisposed animal. Genetics plays a key role in development of adverse reactions like autoimmunity. You should never over-vaccinate nor should you under-vaccinate. Vaccination is not responsible for cutting the lifespan of our pets in half. In fact, vaccinations and other medical advances have doubled the life of most of our pets.

**76) Q: Can a protected animal shed the virus and infect other animals after adoption**

**A:** Yes, it is possible, especially with certain viruses/bacteria, to have the protected animal shed virulent virus/bacteria.

**77) Q: I have heard that immunosuppression can occur in puppies after vaccination with adenovirus vaccine - can you comment on this?**

**A:** Immunosuppression occurs when combination vaccines containing MLV CDV and CAV and used. The suppression starts about 3 days post vaccination and can last 7 days. The combination vaccines with rCDV do not cause this suppression; only MLV vaccines do.

## **Vaccines**

**78) Q: Does injection vaccine generate IgA?**

**A:** Injecting vaccine will increase the IgM, IgG, IgA, and even the IgE (e.g., hypersensitivity reactions). However, injected vaccines will not produce secretory IgA, which is what you need to protect mucosal surfaces of GI or respiratory tracts. (See question 76).

**79) Q: Are you aware of any percentage correlation to rabies vaccine and DIC?**

**A:** No, I'm not aware of a correlation between rabies and DIC, but if a rabies vaccine causes a type III hypersensitivity, the dog may show signs of DIC.

**80) Q: I have an almost 4 month old puppy. He was vaccinated once, at 12 weeks. We did titer testing at 14 weeks and he was positive for distemper and parvo. I thought that should do it, but now you are saying pups need to be vaccinated at 14-15 weeks?**

**A:** They only need to be vaccinated at 14 to 16 weeks if they haven't developed immunity at 12 weeks. Your puppy is immune. That is the reason you performed the titer to know if the pup developed an antibody response. Most people would just give another dose of vaccine.

**81) Q: Is the dosage of vaccine modulated by the weight of the animal, or does the puppy get the same dose as the Great Dane adult?**

**A:** A dose of vaccine is based on minimum infectious dose for infectious (modified live, attenuated viral vectored recombinant) vaccines and minimum immunizing dose for noninfectious (killed, dead, inactivated) vaccines. Those factors are based on the genetics of the animal's immune system and not body mass (i.e., size and weight). It often takes as much or more antigen to immunize a mouse or puppy as it does an adult cow, horse, or elephant. Splitting doses of vaccine is not a good practice in shelters or pet animals. One of the things about certain vaccines is the vaccine virus is shed and can immunize susceptible animals. This is the case for CPV-2 and CAV-2. However, CDV vaccine is not shed; therefore, only the pups that are vaccinated develop immunity. Intranasal vaccines shed, so when you vaccinate part of the litter, the others might get free vaccination – but don't count on all the nonvaccinates getting free vaccination. It always seems to be the pick of the litter that doesn't get naturally vaccinated, gets sick, and dies. Vaccinate all animals in the litter!

**82) Q: If I have a "low responder" dog, is there any point in revaccinating? What would be the point?**

**A:** There is no reason to revaccinate a high or low responder if the animal is actively immune as a result of previous vaccination. Immunity to CPV-2, CDV, and CAV-2 in dogs, FPV in cats is lifelong. That is also true for MMR vaccines in children – these vaccines provide lifelong immunity (75+ years).

**83) Q: Please recap your companion animal puppy and kitten vaccine schedule with final titer test age.**

**A:** Puppy Vaccination (pet animal):



Start with CDV/CPV-2/CAV-2 not earlier than 6 weeks, and preferably at 8 to 10 weeks. Revaccinate with CDV/CPV-2/CAV-2 in 2 to 4 weeks, i.e., 8 weeks, 11 weeks, 14 weeks (3 doses) or 10 weeks and 14 weeks (2 doses), or 6, 9, 12, 15 weeks (4 doses). The greater the risk, the more often you should vaccinate.

The last dose should be given at 14 to 16 weeks (or older).

Puppy vaccination (shelter animal):

Vaccinate every 2 weeks (i.e., 5-6, 7-8, 9-10, 11-12, 13-15, 16-17, 18-20). When titers are done, they should be done for CDV and CPV-2 (and optionally CAV-2) 2 or more weeks after the last puppy dose.

If titers are positive, you can wait at least 3 years to revaccinate or retitle. If they're negative, revaccinate immediately and retitle to make sure they're positive. If you don't titer, revaccinate again sometime between the last puppy dose and a year of age. If you give intranasal kennel cough vaccine, you can give it anytime during the puppy vaccination program. One dose is enough, but some like to give two.

Rabies, by law, must not be given prior to 12 weeks, and many states want it done no later than 16 weeks. Owners of small breeds often wait until 20 to 24 weeks, thinking older puppies are less likely to develop an adverse reaction. A second dose of rabies should be given at a year of age, or a year after the first dose. The dose at one year should be labeled as a 3 year vaccine so the dog doesn't have to be revaccinated for 3 years.

Anyone living in an area requiring rabies more often than 3 years should work with local political representatives to get it changed! There is no scientific reason to revaccinate more often than every three years, and it's possible the duration of immunity will be shown to be much longer.

When you give non-core (optional) vaccines, they can be given with some of the core vaccines. If you give CIV, for example, it requires two doses, so 6 and 9 weeks would be good times to vaccinate. Time your Lepto and/or Lyme products so they start at or after 12 weeks, then revaccinate 2 to 6 weeks later. I prefer that Lepto vaccines not be mixed in the syringe with virals and they be given in separate sites and/or at separate times.

The immune response when bacterial and viral products are present in the same lymphoid tissues at the same time is vastly different than either of those alone with regard to cells and molecules that are stimulated. Furthermore, Dr. Max Appel reports Leptospira products can cause some suppressive responses to viral vaccines.

Unlike the core vaccines, which immunize with one dose if maternal antibody is not present and give lifelong immunity, non-core products almost always require two or more initial doses followed by a single dose annually. If the annual booster isn't given for 2 to 3 years, then 2 doses should be given again at 2 to 6 weeks apart, just like the initial series for non-core vaccines. That must be followed by annual revaccination. Only dogs needing non-core vaccines should receive them. In certain geographic areas with high

risk of Lepto or Lyme, all dogs may be receiving one or both of those vaccines; in other areas, probably few or no dogs need them.

There is at least one licensed vaccine still on the market that is never recommended by the Canine Guidelines or myself, and that's the canine coronavirus vaccine. I have always referred to that vaccine as a "vaccine in search of a disease!" It is not needed nor recommended. FIP for cats is not recommended either by AAFP or me. I also don't recommend FIV vaccine.

**84) Q: I have a 12 year old female intact dog whose distemper/parvo titers came back negative from Idexx. How safe is it to vaccinate this dog? I have had an animal with IMHA from vaccines and so I'm hesitant to revaccinate. I revaccinate for rabies every 3 years.**

**A:** I recommend you revaccinate your 12 year old because she needs to have antibody. The Idexx testing is done in a laboratory that uses the gold standard tests.

**85) Q: Some clinics are now offering "revaccinations" that are supposed to be 3-year boosters in conjunction with 3-year rabies booster. Is this a greater concern for reactions than the routine 1-year boosters given with rabies boosters?**

**A:** All the current CDV/CPV-2/CAV-2 vaccines last a lifetime. The 3-year vaccines are a marketing gimmick. All the current vaccines for CDV/CPV-2/CAV-2 provide more than 3 years; in fact, I've demonstrated that they all provide 7 or more years, which is a lifetime of immunity.

**86) Q: Why did my dog get kennel cough from the nasal vaccine? Which is better, intranasal or injected for kennel cough?**

**A:** Your dog is one of a few that have an allergic reaction to the *Bordetella bronchiseptica* in the intranasal vaccine. It is a reaction similar to hay fever, which is self-limiting, or can be controlled with steroids.

**87) Q: If you have immunity within 72 hours of vaccinating for parvo, is that with a MLV?**

**A:** Yes, that is with infectious [MLV] CPV-2 that you have immunity within 72 hours. Noninfectious (killed) CPV takes 3 or more weeks and often 4-5 doses in a puppy to get immunity. Killed CPV-2 vaccines are not recommended in the puppy. They could be used to revaccinate dogs that have been immunized with MLV if, for example, you want to increase the level of antibody in a breeding bitch.

**88) Q: Is it possible to OVER-vaccinate? As in an animal coming in that we inoculate immediately then discover it had its annual vaccines that very month.**

**A:** Yes, you can over-vaccinate! That's why you only want to give vaccines that are needed, and only as often as necessary. Vaccinating more often than necessary increases occurrences of adverse reactions, including type I to IV hypersensitivity reactions, autoimmune diseases, etc. The immune system is absolutely essential for protection from

infectious diseases, but it can be over-stimulated and cause disease and death from immune mediated diseases. Don't ever believe anyone that suggests "well, even if the vaccine doesn't help, it can't hurt!" We tend to believe that only good can come from giving a vaccine. Unfortunately, both good and bad can come from vaccines, just like everything in life. If you don't drink enough water, you can die, however if you drink too much, you can die! Vaccines are probably not as safe as water.

**89) Q: I have a cat that was vaccinated yearly for FeLV for 10 years. Skipped year 11, at age 12 she tested positive for FeLV...why? (She is in a shelter setting and there is a slight chance of exposure to a positive cat.)**

**A:** Vaccination with FeLV vaccine is often more than adequate when you give 2 doses 2 to 4 weeks apart to a kitten, again at a year, then never again. The cat you describe is probably the first and only cat that got FeLV at that age and after all those vaccines. In fact, I find it hard to believe, because of age related resistance and vaccination. Did she get a transfusion of blood from an FeLV cat? Was she ever tested prior to the first positive test? She may have been FeLV positive all along. Shelters rarely have many FeLV positive cats. We find less than 3% of cats (shelter, feral, pet) are FeLV (persistently viremic) positive. FeLV is an infectious disease, but it isn't highly contagious and cats develop a very effective age-related resistance after a year of age, especially when they have been vaccinated as kittens and again at one year of age. I do not recommend vaccinations for FeLV more often than every 3 years after kitten vaccination and again at 1 year. I never revaccinate my own cats after 1 year of age.

**90) Q: Many folks argue with my local animal shelter about the policy of vaccinating incoming adult strays and boosting them 3 weeks later. Is there a problem with treating these pets as immune naive? Economics, time management, and staff education are factors.**

**A:** If they are adults, they need only one dose of the core vaccines (feline or canine).

**91) Q: What are your recommendations for a dog that has immune-mediated thrombocytopenia (which occurred nine days after bordatella vaccine)?**

**A:** Don't revaccinate with Bordetella or any of the core vaccines. The IMTP can be triggered by vaccines. Dogs and cats with autoimmune disorders like IMTP, SLE, IMHA, etc. should only receive vaccines that are absolutely necessary. These are animals that should be titered, not revaccinated.

**92) Q: Does a positive test with the onsite tests indicate that the animal will not develop disease (as opposed to not develop severe disease)?**

**A:** The positive tests, onsite, in-clinic, or gold standard, demonstrate the animal has protective immunity and will be immune (not develop disease) if exposed to the virus. It might get infected, but won't develop disease.

**93) Q: What about recommendations for Lepto. My friend's dog contracted it 8 months after its last vaccination and died.**

**A:** Only dogs at high risk should receive Leptospira vaccines. Your friend's dog apparently did not have immunity to Lepto from the vaccine. I don't know when this occurred, but if it was several years ago, all the vaccines then only protected against 2 of the disease-causing serovars in the dog. Current vaccines have all 4 serovars that cause disease. Immunity from the vaccine is usually about a year duration and the vaccines are approximately 70 to 80% effective. This, compared to the core vaccines, is poor protection. (Core vaccines give lifelong immunity to 99% of dogs).

**94) Q: If killed vaccines require 2 doses, primer and then immunity, why is it not required to booster the first rabies vaccine given to puppies or kittens?**

**A:** Your question is a very good one. I published several articles in the late 1970s when we were changing from all live rabies vaccines to all killed rabies vaccines. I recommended that vaccination with killed products required 2 doses 2 to 4 weeks apart. Unfortunately, that recommendation wasn't implemented; instead, the old recommendations for live virus vaccines were transferred to the killed vaccines: one dose at 12 weeks, and one dose at 1 year of age or a year after vaccination. The rabies vaccines would be much more effective if 2 doses were given 2 to 6 weeks apart; then we wouldn't have to revaccinate until 3 years after, if then. Fortunately, the rabies glycoprotein G and the adjuvants in the vaccine make the killed rabies effective in at least 88% of dogs when 1 dose is given after 12 weeks followed by a second in a year (1 year product) or the 3 year product is effective 3 years after a single dose at 12 weeks in 88% of dogs. I believe 2 doses 2 to 6 weeks apart would be 99% effective; we could eliminate the dose at a year that is currently required by all states. Reducing the number of doses over the lifetime of the animal would be beneficial to the dog, the owner, and could improve public health.

**95) Q: Does the volume of the vaccine affect different sized animals negatively?**

**A:** Sometimes in very small breed dogs, the 1 ml volume is painful. Therefore, if it is a live vaccine, you can reconstitute the "dried cake" in ½ of the diluent (0.5 ml instead of 1.0 ml). That reduces some of the pain. Never split vaccines; never give less than the recommended dose. With killed (noninfectious) vaccines, they are already liquid, so you must give the entire dose. The volume/amount of vaccine is not based on weight or age.

**96) Q: If a shelter dog is given intranasal bordetella vaccine and has some coughing or nasal discharge does this mean dog is contagious and can infect other dogs?**

**A:** No, it doesn't necessarily mean that it is contagious. It may have developed an allergic reaction to the vaccine.

**97) Q: How often do animals acquire vaccine related cancers?**

**A:** If you are referring to cancers at the vaccination site, like injection site sarcomas in cats, the rate is 1 per 1,000 to 10,000 cats. It's much more common in the cat than the dog, and I would estimate injection site tumors (not just sarcomas) are about 1 per 100,000 to 500,000 dogs. Dogs do get them, and so do pet ferrets.

**98) Q: Can you discuss vaccination with monovalent vaccines for distemper and parvovirus and appropriate timing?**

**A:** Monovalent vaccines can be used at any time in the vaccination program, but are most often used when revaccination for a single disease is all that is necessary. Unfortunately, few or no veterinarians have monovalent vaccines on hand. Most have 5 way (CDV, CPV-2, CAV-1 and 2, CPI).

**99) Q: What are your thoughts on FVRC or FVRCP intranasal vaccinations in a shelter?**

**A:** I recommend them for pet cats, but I believe parenteral MLV are just as good, if not better, in shelters than IN. In some shelters, I have switched parenteral MLV to killed parenteral and had similar or better control of FIRDC (URI).

**100) Q: Should core vaccines be given in multiples or spaced out?**

**A:** The CDV/CPV-2/CAV-2 should be given as a combination vaccine, not separated in puppies.

**101) Q: For those who do choose not to vaccinate at all - do you recommend titer testing more often?**

**A:** I *never never never* recommend not vaccinating! NEVER! At a minimum, every puppy should receive a CDV and CPV-2 vaccine at 14 weeks of age or older, and every cat a FPV vaccine at 14 weeks or older. I also believe every dog and cat should receive rabies vaccine. Please vaccinate. Over the years, I've seen too many people lose young and old dogs and cats to these diseases that could have been prevented. I've seen litters of puppies and kittens lost because there was no vaccination of the dams, and thus no passive immunity. I didn't like reminding those people "I told you at a minimum to vaccinate pups for CDV and CPV-2, and kittens for FPV." That is my extreme minimum program! The extreme minimum means vaccinating once with modified live infectious vaccines at 14 to 16 weeks of age or older, and testing titers 2 or more weeks after that. If positive, you don't have to revaccinate them. Please don't do anything less than that for your animal. If you already have a dog or cat over 18 weeks of age, you can titer first so you know their immunity status. If any disease comes back negative, vaccinate for it.

### **Rabies Vaccine**

**102) Q: Do you personally feel that the rabies vaccines are dangerous? Will titer results ever take the place of the actual vaccine if immunity is proven, i.e., the ongoing work by Dr. Jean Dodds?**

**A:** Rabies vaccine is probably the most reactogenic viral vaccine because it is killed and adjuvanted. So it is associated with adverse reactions (as are all vaccines). Some of the rabies vaccines are more reactogenic than others. Studies in progress may show that the duration of rabies is much greater than 3 years. Based on antibody titers, it appears that it

will be 6 or more years. If we can vaccinate less often, that would be a benefit to public health and the health of dogs and cats.

**103) Q: What are the immunological/protective differences between 1-year vs. 2-year and 3-year rabies vaccines?**

**A:** There are no immunologic differences between 1-year and 3-year rabies vaccine. They all provide the same duration of immunity. However, the USDA requires the rabies vaccine to have a minimum DOI label, so the current vaccines are 1-year, 3-year, and 4-year (feline only). There is no 2-year. By law, a dog getting 1-year rabies vaccines must be revaccinated every year; a 3-year can't be given until after the animal has received a 1-year; after that, a dog could get a 3-year vaccine, or a cat could get the 4-year vaccine.

**104) Q: Could you comment briefly on the status of the Rabies Challenge Study? And thank you very much for your work and for your time tonight.**

**A:** The rabies vaccine studies we're doing to determine the minimum duration of immunity (DOI) are just now starting their fifth year. Things look excellent for DOI.

**105) Q: I have heard that SOME vets may be willing to give a "doctor's letter" to avoid the rabies vaccine for animals with illnesses/cancer. Is this common or becoming more commonly accepted?**

**A:** Some states allow exemptions from rabies vaccinations based on medical reasons. However, if the dog isn't up to date, and it bites someone, it will be considered not vaccinated if it's past due for rabies. It must be quarantined and monitored closely. More states in the U.S. are beginning to allow these exemptions, which often have to be written by a veterinarian on an annual basis. It is the state that determines whether or not it is possible to get a medical exemption.

**106) Q: Can this titer testing be an acceptable test for rabies titers for entry into countries like England or places like Hawaii that have very strict rules regarding rabies?**

**A:** Titer testing is being done for rabies for entry in European countries, UK, Hawaii and elsewhere, but rabies titers can only be performed in approved labs.

**107) Q: What about rabies with cats...is it better to use the recombinant rabies even though it is 1-year?**

**A:** I favor the non-adjuvanted recombinant rabies vaccine for cats, but the 3-year killed adjuvanted vaccines are also very effective. The prevalence of injection site sarcomas from those vaccines is somewhere between 1 in 1,000 to 10,000 cats. There are few or no differences immunologically between most 1 and 3 year rabies vaccines. However, there are significant differences regarding administration of 1 and 3 or 4-year rabies vaccines. One year rabies vaccines, by law, give 1 year duration of protection, and 3-year vaccines give 3 years – even though both give a minimum of 3 years protection. As a licensed veterinarian, even in states that don't require rabies vaccination for cats, if you use a 1-



year rabies product, give it annually, and if you use a 3-year, you can give it more often but don't give it less than every 3 years. If you use the 4-year product, you can give it every 4 years when feline rabies vaccination is not required more often. If it is, follow the state or local regulations! I believe rabies vaccine regulations should be federal, not state or local, and there would be an exception for Hawaii, as they don't need rabies vaccination programs.

**108) Q: Haven't 3-year rabies vaccination been shown to cause sarcomas at the site? Why can't I use a 1-year vaccination since it's the same?**

**A:** One-year killed adjuvanted rabies vaccine is just as or more likely to cause injection site sarcomas as 3-year products.

**109) Q: I had antibody testing done on my year old dog, rabies was not included in the testing. All other antibodies showed immunity. Can I have rabies done separately?**

**A:** You don't need to do rabies titers, as rabies titers cannot be used since the vaccination program is the only thing that satisfies legal requirements.