



Colorado Veterinary
Medical Association

DOG AND CAT VACCINE ANTIGEN SELECTION GUIDELINES

(approved by the CVMA Board of Directors January 18, 2004)

The Colorado Veterinary Medical Association (CVMA) recognizes that each animal's adult basic needs for vaccine protection can be different. An animal kept only at home or only indoors is vaccinated differently than one that travels and boards. An animal used for breeding will be vaccinated for the desired antibody levels to be transferred to her offspring. An animal exposed to others in shows may need different and more frequent vaccination requirements. Geographical and individual premises will have different diseases to consider. If the feline owner is concerned with a vaccine induced sarcoma, then a yearly rabies vaccine may be indicated over the vaccine with a three year duration. Although the rabies requirements may vary from each municipality, CVMA was instrumental in addressing this issue in 1998. If a veterinarian anywhere gives and issues a three year rabies vaccine, the local governing agency in Colorado must recognize this certificate.

The American Association of Feline Practitioners (AAFP),^{a,1,2} the American Animal Hospital Association (AAHA),^{b,3} and the Council on Biological and Therapeutic Agents (COBTA)^{c,4} have published information concerning dog or cat vaccination guidelines in the last several years. Each of these manuscripts is supplied via the listed internet links. The AAFP guidelines are endorsed by AAHA and the American College of Veterinary Internal Medicine (ACVIM). The AAHA guidelines are being reviewed for endorsement by ACVIM.

There are many vaccine antigens available for administration to dogs and cats. For some of the antigens, there is strong consensus nationally that all dogs and cats should be immunized ("core" vaccines). For other vaccine antigens, there are differences in regional prevalence of the disease in question or other reasons that make some antigens optional for some pets. The CVMA Task Force on Vaccine Issues has reviewed the AAFP, AAHA, and COBTA manuscripts as well as other pertinent information related to dog and cat vaccination issues and provides them to our membership via internet links and as the reference list.

The CVMA Task Force on Vaccine Issues recommends that all puppies and kittens and all adult cats and dogs with unknown vaccination history be optimally immunized with core vaccine antigens as defined in this document. After the puppy or kitten vaccine series, each dog and cat should be presented to the veterinary clinic for a general health examination and a vaccine needs risk assessment yearly. We believe that optional antigens and administration intervals should be individualized to each patient upon consultation with the owner and a discussion of benefits, risks, and costs. The following is offered by the task force for use as a further guideline to aid in vaccine antigen selection for use with dogs and cats residing in the State of Colorado.

Vaccination guidelines for cats

The CVMA guidelines were adapted from those made by the American Association of Feline Practitioners (AAFP) and Academy of Feline Medicine.^{a,1,2}

Core vaccine antigens

Panleukopenia, calicivirus, and feline herpesvirus 1. All healthy kittens and adult cats without a known vaccination history should be administered panleukopenia, rhinotracheitis (feline herpesvirus 1; FHV-1), and calicivirus containing products (FVRCP), subcutaneously (SQ) low on the right shoulder or intranasally. Kittens presented at 6 to 12 weeks of age should receive a modified live or killed FVRCP with boosters given every 3-4 weeks until 12 weeks of age. Kittens presented at > 12 weeks of age and adult cats with unknown vaccination history should receive 2 killed or 2 modified live FVRCP 3-4 weeks apart.

At one year of age or one year after the last vaccination, a booster FVRCP vaccine should be administered. After one year of age, a health examination should be performed and risk of infection by herpesvirus 1, calicivirus, and panleukopenia should be assessed yearly. The AAFP Vaccination Guidelines suggest that the duration of immunity induced in the majority of cats by FVRCP vaccines is at least 3 years. A recent challenge study performed at Colorado State University supports that claim. Cats inoculated SQ with either a modified-live or killed FVRCP 30 to 36 months previously were 100% protected on challenge with virulent panleukopenia and had greatly diminished clinical scores compared to unvaccinated control cats when challenged with FHV-1 and calicivirus.⁵

Rabies. Since 1980, more cases of rabies have been reported in cats than in dogs in the USA. In 2001, 270 cases of feline rabies were reported versus 89 cases of canine rabies.⁶ Thus, all cats should be vaccinated against rabies. Cats should be administered their first rabies vaccine in accordance with the vaccine label, local ordinances, and published guidelines.⁷ At one year of age or one year after the last vaccination, a booster rabies virus vaccine should be administered. A health examination should then be performed yearly. The rabies vaccine interval is determined by local ordinances. With the exception of one canarypox vector rabies vaccine,^d all rabies vaccines are killed and adjuvanted. The canarypox vector rabies vaccine causes less subcutaneous inflammation than the killed vaccines, but has not definitively been shown to be less likely to induce soft tissue sarcoma formation at injection sites.⁸ Because the canarypox vector vaccine causes less inflammation, it is currently the rabies vaccine used in cats at Colorado State University.^e

Optional antigens

Chlamydophyla felis (previously Chlamydia). Chlamydophyla felis infection in cats generally only results in mild conjunctivitis, is not life-threatening, only occurs in a small percentage of pet cats, responds readily to treatment, and is minimally zoonotic.⁹ In addition, Chlamydophyla containing products may have a high incidence of side-effects. Thus, whether vaccination is ever required is controversial. The use of this vaccine should be reserved for cats with a high risk of exposure to other cats and in catteries with endemic disease. Duration of

immunity for Chlamydophila vaccines may be short-lived, so high-risk cats should be immunized prior to a potential exposure.

Bordetella bronchiseptica. Many cats have antibodies against Bordetella bronchiseptica and there are sporadic reports of severe lower respiratory disease due to bordetellosis in young kittens.^{10,11} However, the significance of the problem for adult, pet cats is largely undefined. In a seven year period at Colorado State University, B. bronchiseptica was isolated from < 3% of the nasal or lower airway cultures performed on cats with respiratory disease.¹² Most of the clinically ill cats reported in the literature were kittens from crowded and presumably stressful environments. Bordetellosis is apparently not life-threatening in adult cats, is uncommon in pet cats, responds to a variety of antibiotics, and is minimally zoonotic.¹³ In addition, since the vaccine is given IN and is modified live, some vaccinated cats develop the same clinical signs as induced by natural exposure.^f Thus, whether vaccination is ever required is controversial. The use of this vaccine should be reserved for cats with a high risk of exposure to other cats and in catteries with endemic disease.

Feline leukemia virus. Feline leukemia virus vaccines are potentially indicated in cats allowed to go outdoors or that have other exposure to cats of unknown FeLV infection status. The vaccines are likely to be most helpful in kittens because as cats age, there is an acquired resistance to FeLV infection that limits usefulness of vaccination in adult cats.¹⁴ The prevalence of FeLV infection varies by the region and population; 1.6% of client-owned cats and 7.8% of humane society cats tested on the Front Range of north-central CO were positive in one study.¹⁵ Cats to be vaccinated should receive 2 vaccinations initially. FeLV containing products should be administered SQ or IM in the distal left rear limb to allow for tracking of the causes of vaccination site sarcomas. Maximal duration of immunity is unknown, so annual or biannual boosters are currently recommended. The vaccine is not effective in persistently viremic cats and so is not indicated. However, administration of the vaccine to viremic or latent cats does not have increased risk of vaccine reaction. FeLV testing should be performed prior to vaccination because the retrovirus serologic status of all cats should be known so appropriate husbandry can be maintained.^g The canarypox vector FeLV vaccine^h causes less subcutaneous inflammation than the killed and adjuvanted vaccines, but has not definitively been shown to be less likely to induce soft tissue sarcoma formation at injection sites.

Feline immunodeficiency virus. The prevalence of FIV infection varies by the region and population; 2.4% of client-owned cats and 7.8% of humane society cats tested on the Front Range of north-central CO were positive in one study.¹⁵ A killed vaccine containing antigens from 2 FIV isolates was recently licensed for use in the United States.ⁱ In pre-licensing studies, 689 cats received 2,051 doses of vaccine with side-effects detected in < 1%. In a challenge study performed 375 days after inoculation with 3 doses (3 weeks apart), 84% of the vaccinates did not become FIV- infected and 90% of the controls became FIV-infected giving a preventable fraction of 82%. Thus, administration of the vaccine to cats with high risk of exposure to FIV-infected cats may benefit some. However, the efficacy and safety of the vaccine has not been assessed under field conditions in large numbers of cats with exposure to multiple FIV strains. Whether the vaccine will induce soft tissue sarcomas at vaccination sites is currently unknown. The primary problem with FIV vaccination at this time is that the vaccine induces antibodies detectable by the currently available antibody tests. Thus, after vaccination, the practitioner will

be unable to determine whether the cat is infected by FIV by use of currently available antibody tests. PCR for detection of FIV DNA is available in some laboratories, including Colorado State University, but standardization and external quality control for laboratories providing PCR testing is not currently performed.^j If performed by a laboratory that uses appropriate controls, a positive PCR assay result will prove current FIV infection. However, due to low viral loads, negative PCR assay results may be common.

Feline infectious peritonitis. The currently available coronavirus vaccine^k that is used to attempt to prevent feline infectious peritonitis in cats appears to be relatively safe. However, the maximal duration of immunity and efficacy against multiple coronavirus strains is unknown. The efficacy of this vaccine has not been proven in cats with positive coronavirus serology. Many cats that will be exposed to coronaviruses have done so by 16 weeks of age when the vaccine series is to be started. In pet cats, the seroprevalence of coronavirus infection is high but the incidence of disease due to feline infectious peritonitis virus infection is very low in single cat households.^{16,17} Since the incidence of disease is low, cats are commonly exposed to coronaviruses prior to vaccination, the duration of immunity is short, and the efficacy is less than 100%, coronavirus vaccination is currently considered by the AAFP to be optional for pet cats. The vaccine may be indicated for coronavirus-naïve cats entering a known feline infectious peritonitis-infected household or cattery.

Giardia spp.. When given twice, the currently available *Giardia* spp. vaccine^l lessened numbers of cysts shed and lessens clinical disease on challenge with one heterologous strain. The vaccine is adjuvanted, but it is unknown whether it will lead to the development of injection site soft tissue sarcomas. On the Front Range of north-central Colorado, the prevalences of *Giardia* spp. infection in client-owned and humane-society cats were 3.1% and 1.3%, respectively.¹⁵ Since the disease is usually not life-threatening in cats, is of low prevalence in pet cats, generally responds to therapy, and is rarely zoonotic, routine use in healthy, client-owned cats is not recommended by the AAFP. Additionally, it is now known that there are multiple *Giardia* spp., including a feline specific strain.¹⁸ It is unknown whether the vaccine is protective against strains other than the one used in challenge studies. It is possible that vaccination will ultimately be shown to aid in the control of giardiasis in endemic catteries, shelters, or multiple cat households. However, in one study, the vaccine was ineffective for the treatment of giardiasis in experimentally inoculated cats.¹⁹

Vaccination guidelines for dogs

The following CVMA guidelines are adapted from those published by the American Animal Hospital Association.^{b,3}

Core vaccine antigens

Distemper, parvovirus, adenovirus 2, and parainfluenza. All healthy puppies and adult dogs with unknown vaccination history should be administered products that contain canine distemper virus, parainfluenza, adenovirus 2, and parvovirus (DA2PP) antigens. Puppies born to vaccinated bitches and presented at 6-12 weeks of age should be vaccinated every 3-4 weeks until 14-16 weeks of age. Puppies presented between 12-16 weeks of age and adult dogs with unknown vaccination history should be given 2 vaccines, 3-4 weeks apart. Puppies between 6 and 8 weeks of age should receive a distemper-measles vaccine at that time, and then receive routine vaccines at 10, 13, and 16 weeks of age. High antigen mass, low passage parvovirus vaccines are not needed after 16 weeks of age and are likely to be effective in most puppies that are vaccinated to 12 weeks of age.

At one year of age or one year after the last vaccination, a booster DA2PP vaccine should be administered. After one year of age, a health examination should be performed and risk of infection by canine distemper virus, parvovirus, and adenovirus 2 should be assessed yearly. The AAHA Vaccination Guidelines suggest that the duration of immunity induced in the majority of dogs by killed or modified live DA2PP vaccines is at least 3 years.^{b,3} However, if the recombinant distemper virus is used, annual boosters are required. The duration of immunity to canine distemper virus vaccines and parvovirus vaccines are now estimated to be at least 5 years, based on both challenge and serological studies.^{3,20-22}

Rabies. Dogs should be administered their first rabies vaccine in accordance with the vaccine label, local ordinances, and published guidelines.⁷ At one year of age or one year after the last vaccination, a booster rabies virus vaccine should be administered. A health examination should then be performed yearly. The rabies vaccine interval is determined by local ordinances.

Optional vaccine antigens

Bordetella bronchiseptica. Bordetella bronchiseptica vaccines are considered optional since the agent rarely causes life-threatening disease in otherwise healthy animals, is not the only cause of kennel cough syndrome, is easily treatable, and is minimally zoonotic. Additionally, there is genetic information that suggests that field strains of the bacterium vary considerably from vaccine strains.²³ Thus, it is unknown which field strains are protected against by currently available vaccines. The optimal vaccination protocol with vaccines containing this antigen is unknown, but in one study, concurrent use of an intranasal and parenteral product gave optimal protection in previously naïve dogs.²⁴ In another study based on serum antibody anamnestic responses, administration of a parenteral product was superior to an intranasal product in seropositive dogs.²⁵ Serum antibody titers persist for months and so most dogs only need only one or two immunizations yearly. Optimally, booster vaccines should be administered 5 days before potential exposure.

Leptospira spp. Prevalence of Leptospira spp. infections vary throughout the country and are uncommon in dogs in Colorado.²⁶ Thus, vaccination is currently recommended most strongly for dogs living in endemic parts of the state or traveling to other endemic areas. Currently available vaccines commonly induce vaccine associated side-effects. If used, Leptospira-containing products with the most serovars are indicated. However, there are serovars in the environment that are not in any vaccines and there is minimal cross-protection between serovars. Thus, it is important that clients realize that even though their dog has been given a Leptospira vaccine, 100% protection cannot be guaranteed. Duration of immunity is likely less than one year.

Borrelia burgdorferi. The majority of dogs exposed to Borrelia burgdorferi fail to develop measurable clinical disease. Colorado is not an endemic area for the Ixodes tick vector and so endemic Lyme Disease in CO dogs is unlikely. Dogs previously naturally infected with B. burgdorferi likely do not benefit from vaccination. Even in endemic areas, the potential for vaccine reaction approximates the potential for developing Lyme disease. Thus, the use of this antigen for the majority of dogs in CO is not recommended. Maintaining strict tick control while visiting Lyme endemic areas like Wisconsin could be considered in lieu of vaccination. The most appropriate vaccination interval is unknown.

Coronavirus. Coronavirus infection dogs results in mild gastrointestinal disease unless concurrent infection with parvovirus occurs. Experimentally, the virus does not cause disease in dogs after 6 weeks of age.²⁰ In one study at Colorado State University of dogs with and without diarrhea, only one dog was shown to be shedding coronavirus in feces and it was a healthy control dog.²⁷ In another study, it was shown that vaccination with parvovirus vaccine protected puppies against challenge with both viruses.²⁰ In addition, duration of immunity are essentially unknown for coronaviruses in dogs. The AAHA Canine Vaccination Guidelines Committee considers this antigen to be not recommended in any situation.^{b,3}

Giardia spp. A Giardia spp. vaccine has been introduced for use in dogs.^m The vaccine is given to dogs > 8 wks of age, subcutaneously, twice, 2-4 weeks apart. In a clinical study of 755 dogs, adverse reactions were not reported. In challenge study performed 12 months after the second inoculation, only 9 of 20 vaccinates shed cysts, whereas, all 10 placebo inoculated dogs shed cysts. Vaccinates shed cysts for an average of 7 days versus 37 days for placebo dogs. Average number of cysts shed per gram of feces per day was 0.8 and 670, for the vaccinated dogs and placebo dogs, respectively. On the Front Range of Colorado, the prevalences of Giardia spp. infection in client-owned dogs with or without diarrhea were 5.6% and 5.1%, respectively.²⁷ Since the disease is usually not life-threatening in dogs, is of low prevalence in pet dogs, generally responds to therapy, and is rarely zoonotic, routine use in healthy, client-owned dogs is not recommended. Additionally, it is now known that there are multiple Giardia spp., including at least one canine specific strain.¹⁸ It is unknown whether the vaccine is protective against strains other than the one used in challenge studies. It is possible that vaccination will ultimately be shown to aid in the control of giardiasis in endemic kennels, clinics, or shelters. However, the vaccine did not aid in the control of endemic giardiasis in one kennel.²⁸ Some Giardia infected dogs have responded to the use of the vaccine as immunotherapy.²⁹

Footnotes

^ahttp://www.aafponline.org/about/guidelines_vaccine.pdf

^{b**}<http://www.aahanet.org/assnlink/sharedvac.cfm>

^{c**}<http://www.avma.org/noah/members/policy/polvaccination01.asp>

^dPUREVAX™ Feline Rabies, Merial

^e<http://www.vth.colostate.edu/vth/savp2.html>

^f Protex-Bb, Intervet

^ghttp://www.aafponline.org/about/guidelines_retrovirus_testing_2001.PDF

^hPUREVAX™ LEUCAT, Merial

ⁱFel-O-Vax® FIV, Fort Dodge Animal Health

^jVeterinary Diagnostic Laboratory, Colorado State University, Fort Collins, CO

^kPrimucell FIP, Pfizer Animal Health

^lFel-O-Vax® Giardia, Fort Dodge Animal Health

^mGiardiavax™, Fort Dodge Animal Health

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