

**Sunday, October 21, 2007**

**FREQUENTLY ASKED QUESTIONS (FAQ)**

**1. Is there a risk of over-vaccinating a pet (e.g. injecting it too often, or using vaccines that are not required for the specific pet)?**

Yes – Vaccines should not be given needlessly, as they may cause adverse reactions. Vaccines are medical products that should be tailored to the needs of the individual animal.

**2. May I mix different types of vaccines in the syringe?**

No - One should never mix different vaccine preparations in the syringe unless specified by the data sheet.

**3. May I co-inject different vaccines (not part of a single commercial product) into the same animal?**

Yes – but different vaccines should be injected into separate sites that are drained by different lymph nodes.

**4. May I use smaller vaccine doses in small breeds to reduce the risk of adverse reactions?**

No - The volume (e.g. 1.0 ml) as recommended by the manufacturer generally represents the minimum immunizing dose, therefore the total amount must be given.

**5. Should the large dog (Great Dane) be injected with the same volume of vaccine as the small dog (Chihuahua)?**

Yes - Unlike pharmaceuticals that are dose-dependent, vaccines are not based on volume per body mass (size), but rather on the minimum immunizing dose.

**6. May I vaccinate the anaesthetized patient?**

It is best not to do this if possible - the patient may develop a hypersensitivity reaction and vomit, leading to an increased risk of aspiration. Also, anaesthetic agents may be immunomodulatory.

**7. May I vaccinate pregnant pets?**

No - Vaccination with MLV and killed products during pregnancy should be avoided, if at all possible.

**8. May I vaccinate pets that are on immunosuppressive or cytotoxic therapy (e.g. for cancer or immune-mediated diseases, such as those with an autoimmune or hypersensitivity pathogenesis)?**

No - Vaccination especially with MLV products should be avoided as they may cause disease; vaccination with killed products may not be effective or may aggravate the immune-mediated disease.

**9. How long after stopping immunosuppressive therapy do I wait before vaccinating a pet?**

A minimum of 2 weeks.

**10. May I vaccinate every week if an animal is at high risk of disease?**

No - Vaccines should not be given more often than every other week, even when different vaccines are being given.

**11. When should the last vaccine dose be given in the puppy and kitten vaccine series?**

The last dose of vaccine should be given at around 16 weeks of age.

**12. May I inject a killed vaccine, followed at a later time with a MLV for the same disease?**

No - The killed vaccine may induce an effective antibody response that will neutralize the MLV in the vaccine, thereby preventing immunization. It would be preferable to give the MLV vaccine first and if/when needed, revaccinate with the killed vaccine preparation.

**13. May I inject a modified live intranasal *Bordetella* vaccine?**

No - The vaccine can cause a severe local reaction and may even kill the pet.

**14. May I give a killed *Bordetella* vaccine destined for parenteral use intranasally?**

No - This will not stimulate a specific response to the *Bordetella*; you should give a live vaccine via the intranasal route, as specified by the data sheet.

**15. Are precautions necessary when using MLV FHV-1/FCV parenteral vaccines in cats?**

Yes - Mucosal (e.g. conjunctival and nasal) contact with the preparation must be avoided, because the vaccine virus can cause disease.

**16. Can nosodes (holistic preparations) be used to immunize pets?**

No - Nosodes cannot be used for the prevention of any disease. They do not immunize because they do not contain antigen.

**17. Should dogs and cats with a history of adverse reaction or immune-mediated diseases (hives, facial oedema, anaphylaxis, injection site sarcoma, autoimmune disease, etc.) be vaccinated?**

If the vaccine suggested to cause the adverse reaction is a core vaccine, a serological test can be performed, and if the animal is found seropositive (antibody to CDV, CPV-2, FPV) revaccination is not necessary. If the vaccine is an optional non-core vaccine (e.g. *Leptospira* bacterin) revaccination is discouraged. For rabies, the local authorities must be consulted to determine whether the rabies vaccine is to be administered by law or whether antibody titre may be determined as an alternative.

**18. May I use different vaccine brands (manufacturers) during the vaccination program?**

Yes – It may even be desirable to use vaccines from different manufacturers during the life of an animal, because different products may contain different serotypes (e.g. of feline calicivirus).

**19. Should I use a disinfectant (e.g. alcohol) on the injection site?**

No - The disinfectant might inactivate an MLV product, and it is not known to provide a benefit.

**20. Can vaccines cause autoimmune diseases?**

Vaccines themselves do not cause autoimmune disease, but in genetically predisposed animals they may trigger autoimmune responses followed by disease – as can any infection, drug, or a variety of other factors.

**21. May I split vaccines in combination products?**

Yes - For example, *Leptospira* bacterins are often the diluent for the viral antigen combination. The “viral cake” may be resuspended in sterile water, and the *Leptospira* bacterin be given separately at another site or time, or discarded.

**22. Will a single vaccine dose provide any benefit to the dog or cat?  
Will it benefit the canine and feline populations?**

Yes - One dose of a MLV canine core vaccine (CDV, CPV-2 CAV-2) or a feline core vaccine (FPV, FCV, FHV-1) should provide long term immunity when given to animals at or after 16 weeks of age. Every puppy and kitten 16 weeks of age or older must receive at least one dose of the MLV core vaccines.

If that were done, herd (population) immunity would be significantly improved. Even in the USA with its good vaccination record, probably <50% of all puppies and <25% of all kittens ever receive a vaccine. We must vaccinate more animals in the population with core vaccines to achieve herd immunity (e.g. 75% or higher) and prevent epidemic outbreaks.

**23. When an animal first receives a vaccine that requires two doses to immunize (e.g. killed vaccines like *Leptospira* bacterins or feline leukemia virus), and it does not return for the second dose within  $\leq 6$  weeks, is there any immunity?**

No - A single dose of a two-dose vaccine does not provide immunity. The first dose is for priming the immune system, the second for boosting. If a second dose is not given within 6 weeks of the first, the regime must start again, making sure the two doses are given within 2 to 6 weeks. After those two doses, revaccination with a single dose can be done at any time.

**24. May I give a MLV product to a wild, exotic species or to a domestic species other than to the ones which the vaccine was licensed to protect?**

No - Never. Many MLV vaccines have caused disease in animal species other than those for which they had been licensed. Even worse: the vaccine could be shed from those animals, regain virulence through multiple passages and cause disease even in the target species for which it had been developed. The consequences could be catastrophic!

A highly effective and very safe vaccine for species that are susceptible to CDV is a canary poxvirus-vectored recombinant CDV vaccine that is available as a monovalent product for ferrets or a combination product for dogs. The monovalent vaccine is being used in many wild and exotic species susceptible to CDV.

**25. May I vaccinate a puppy that is at high risk of getting CDV with a human measles vaccine?**

No - Due to an insufficient amount of virus, the human MV vaccine is not immunogenic in the puppy. Measles virus vaccines made specifically for the dog (sometimes combined with CDV) will give temporary protection at an earlier age than a CDV vaccine. At 16 weeks or older, the puppy must be vaccinated with a CDV vaccine, to achieve permanent immunity.

**26. I know that maternally derived antibodies (MDA) can prevent active immunization with MLV vaccines - but can they also block immunity to killed vaccines?**

Yes - MDA can indeed block certain killed vaccines. If the killed product requires two doses, as is often the case, and the first dose is blocked by MDA, then the second dose will not immunize. In this circumstance, the second dose will prime (if not blocked), and a third dose is required to boost and immunize.

This is not true for MLV, where - in the absence of MDA - it only takes a single dose to prime, immunize, and boost. Nevertheless two doses are often recommended, particularly in young animals, to be sure one is given when MDA cannot block. That is why in the puppy or kitten series, the last dose should be given at around 16 weeks of age or later.

**27. I have been told that certain canine MLV combination core products need only be given twice, with the last dose at an age as young as 10 weeks. Is that accurate?**

No - it is not. No combination core product currently available will immunize an acceptable percentage of puppies when the last dose is given at 10 weeks of age. The last dose should be given at around 16 weeks of age, regardless of the number of doses given earlier.

In the presence of MDA, MLV vaccines either immunize or they don't, and the animal will be either immune or not immune - there is nothing in between. MLV vaccines do not give a little immunity with any dose when blocked by MDA.

**28. For how long can a reconstituted MLV vaccine sit at room temperature without losing activity?**

At room temperature, some of the more sensitive vaccines (e.g. CDV, FHV-1) will lose their ability to immunize in 2 to 3 hours, whereas other components will remain immunogenic for several days (e.g. CPV, FPV).

**29. May I give the same type of vaccine parenterally and intranasally, for example the canine and feline vaccines used to prevent respiratory diseases ('kennel cough' and feline upper respiratory disease)?**

Yes - But be sure to give the product approved for that route. If you use the parenteral MLV vaccines containing FCV and FHV-1 locally, you could cause disease in the cat. If you use the killed FCV and FHV-1 vaccines locally, you would not get any immunity and might cause significant adverse reactions. If you gave the intranasal live 'kennel cough' vaccine parenterally, you could cause a severe necrotizing local reaction and even kill the dog, whereas giving the parenteral killed *Bordetella* vaccine intranasally will not immunize and may cause a hypersensitivity reaction.

However, both types of products can be given at the same time or at various times in the life of the animal. Vaccinating both parenterally and intranasally may actually provide better immunity than vaccinating at only one site. Thus parenteral vaccination provides protection in the lung but little or no immunity in the upper respiratory tract (especially local secretory IgA and CMI), whereas intranasal vaccination will engender good secretory IgA and local CMI and non-specific immunity (e.g. type I interferons), but will not always provide immunity in the lung.

**30. Are there dogs and cats that cannot develop an immune response to vaccines?**

Yes - This is a genetic characteristic seen particularly in some breeds, and these animals are called 'non-responders'. Genetically related (same family or same breed) animals will often share this non-responsiveness. If the animal is a non-responder to a highly pathogenic agent, like canine parvovirus or feline panleukopenia virus, the infected animal will die if infected. If it is a non-responder to a pathogen that rarely causes death, it may become very sick but will survive (e.g. after a *Bordetella bronchiseptica* infection).

**31. Are there mutants (biotypes or genotypes) of CDV or CPV-2 in the field that the current vaccines cannot provide protective immunity against?**

No. - All the current CDV and CPV-2 vaccines provide protection from all the known isolates of CDV or CPV-2, respectively, when tested experimentally as well as in the field.

**32. How long after vaccination does it take for the dog to develop immunity that will prevent severe disease when the core vaccines are used?**

This is dependent on the animal, the vaccine, and the disease.

- The fastest immunity is provided by CDV vaccines – MLV and recombinant canarypox virus vectored. The immune response starts within minutes to hours and provides protection within a day to animals without interfering levels of MDA and dogs that are not severely immunosuppressed.
- Immunity to CPV-2 and FPV develops after as few as 3 days and is usually present by 5 days when an effective MLV vaccine is used. In contrast, the killed CPV-2 and FPV-2 vaccines often take 2 to 3 weeks or longer to provide protective immunity.
- CAV-2 MLV given parenterally would provide immunity against CAV-1 in 5 to 7 days; when given intranasally, however, the same level of immunity to CAV-1 is not present until after 2 or more weeks.
- Time from vaccination to immunity is difficult to determine for FCV and FHV-1 because some animals will not develop any immunity.

**33. Will the current 'kennel cough' vaccines provide any protection from disease caused by the new canine influenza virus?**

No - The racing greyhounds that have been found infected and that developed disease had been routinely vaccinated 3 or more times a year with commercial 'kennel cough' vaccines. Canine influenza virus is antigenically unrelated to any other virus of dogs, but related to Equine Influenza Virus.

**34. If an animal has gone beyond the time that is generally considered to be the maximum DOI for the vaccine (7 to 9 years for CDV, CPV-2, CAV-2; >1 year for *Leptospira*, *Bordetella bronchiseptica*; >3 years for rabies), do I have to start the series of vaccinations again (multiple doses 2 to 4 weeks apart)?**

No - For MLV vaccines, multiple doses are only required at the puppy or kitten age, when an animal has MDA.

**35. What can I expect from the core vaccines in terms of efficacy in the properly vaccinated puppy/dog and kitten/cat?**

- Dogs properly vaccinated with MLV or recombinant CDV, CPV-2 and CAV-2 would have  $\geq 98\%$  protection from disease. Similarly we would expect a very high protection from infection.

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- For the properly vaccinated cat that had received MLV vaccines, we would estimate that  $\geq 98\%$  would be protected from disease and infection with FPV.
- In contrast, we can expect FCV and FHV-1 vaccines, at best, to protect from disease, especially in a highly contaminated environment (e.g. shelter) and protection would be seen in 60 to 70% in a high risk environment and higher in the household pet cat.

**36. Are serum antibody titres useful in determining vaccine immunity?**

Yes - Especially for CDV, CPV-2 and CAV-1 in the dog, FPV in the cat and rabies virus in the cat and dog. Serum antibody titres are of limited or no value for the other vaccines. Assays for CMI are of little or no value for any of the vaccines for various technical and biological reasons. Such factors are less of an issue for serological tests where it is much easier to control many of the variables. However, discrepant results are still obtained, depending on the quality assurance program of the given laboratory.

**37. Do puppies develop immunosuppression after the initial series of core vaccines?**

Yes - If a combination product containing MLV-CDV and MLV-CAV-2 with other components is used, a period of immunosuppression lasting approximately 1 week develops, beginning 3 days after vaccination. If the combination vaccine does not contain either MLV-CDV or MLV-CAV-2, then such suppression does not occur.

**Biographical Profile**

**Dr. Ron Schultz** earned his BS degree (1966), MS (1967) and PhD in Immunology and Veterinary Pathology (1970) from the Pennsylvania State University. From 1970 to 1978 he was an Assistant then Associate Professor at NY State College of Veterinary Medicine, James A. Baker Institute, Cornell University. He established the first Veterinary Clinical Immunology Laboratory in the US while on the faculty at Cornell. He also served as Associate Director of the Human Health Service Laboratory at Cornell University. From 1978 to 1982 he was a Professor and Director of the Veterinary Clinical Immunology Laboratory that he established in the School of Veterinary Medicine, Auburn University. He accepted his current position as Professor and Chair of the Department of Pathobiological Sciences, School of Veterinary Medicine, UW-Madison in 1982. At the time he accepted this position he was the only member of the department which now has many faculty, staff and students, including faculty in the Wisconsin Veterinary Diagnostic Laboratory. He is an honorary diplomate of the American College of Veterinary Microbiologists. Dr. Schultz has won several awards, is a member of numerous professional organizations and served or serves on numerous Editorial Boards and National and International advisory panels. He is on the AAHA Canine Vaccine Task Force, the AAFP Feline Vaccine Task Force that provide Guidelines for Canine and Feline Vaccines and Vaccination Programs as well as the Vaccine Guideline Group for the World Small Animal Veterinary Association. He has served on National Academy of Science panel to review USDA Grants Programs and was recently invited to be a Member of the Assessment Panel to review research programs of the USDA's Agriculture Research Service Laboratories throughout the US.. He was

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the first president of the American Association of Veterinary Immunologists and has been president of the Conference of Research Workers in Animal Disease. He has published more than 200 papers on the immunology and microbiology of animal disease, clinical immunology and vaccinology and has edited several books and holds multiple patents. He has trained more than 50 graduate students and postdoctoral fellows in his laboratories at Cornell, Auburn and Wisconsin. He has received millions of dollars in extramural research funds for research primarily to study diseases of dogs, cats and cattle and also received funding for instructional training programs.