

Overview on the 2003 Canine Vaccine Guidelines and Recommendations

Kathy Yonkers, BSDH, RDH, BS, MS
Post-graduate Certification in Healthcare Evaluation
Member of ACKCSC Health Committee
email: stuarthome@earthlink.net

Understanding the Key Elements of Immunity:

Before examining the specifics of these new vaccination guidelines, there are several key elements involved in canine immunity that need to be reviewed.

In mammals, resistance to disease includes a non-adaptive, natural immunity and an adaptive or acquired response. The adaptive immune response system has important characteristics as defined by Black (1999)-

SELF-RECOGNITION

- ❑ The body has a mechanism to recognize and differentiate between foreign invaders and "self" components.
- ❑ In healthy, immune competent canines, immune responses are not produced against "self"-components, such as the thyroid gland.
- ❑ "Self-component" immune response is seen in auto-immune diseases and disorders,

SPECIFICITY

- ❑ This property refers to the ability of the immune system to respond in a specific manner to the molecules (antigens), rather than responding in a random manner.
- ❑ When a canine encounters the parvovirus, for example, and responds to that specific agent, it does not respond to the other viruses that may be present with the same action.

PASSIVE AND ACTIVE IMMUNITY

- ❑ Passive immunity results when antibodies are produced by one canine and then acquired by another.
- ❑ The acquisition of the antibodies (IgG) in colostrum by a neonate is an example of (naturally acquired) passive immunity.
- ❑ Passive immunity is functional immediately upon reception, whereas active immunity requires a time period, before a functional immune response develops.
- ❑ Active immunity occurs when a canine's immune system is induced to produce a specific immune response against a pathogen.
- ❑ Active immunity can occur either upon infection or disease (naturally acquired active immunity), or artificially upon vaccination (artificially acquired active immunity).
- ❑ Active immunity can last as long as the immune system cells, that mediate this immunity, survive within the canine; this can be for weeks, months, or years.

MEMORY

- ❑ A molecule (chemical group) eliciting an immune response is termed an antigen.

- Foreign material, including microorganisms, can contain chemical groups recognizable by the body as foreign.
- The initial contact with a molecule (antigen) eliciting an immune response (forming antibodies) leaves an imprint of information. The first contact imprints "memory" so that the body repels the next invasion.
- Every time that antigen invades an animal, its immune system (memory) and the appropriate antibodies are produced by the host lymphocytes (white blood cells).
- Actively acquired specific immunity possesses memory.
- An immune response may be primed by exposure to an antigen, and thereafter with subsequent exposure to the same antigen, the immune response against that antigen occurs in a rapid fashion.
- This memory is a function of the circulation of the lymphocytes which either mediate the specific immune response or can give rise to cells (by dividing) that differentiate into immune-response-mediating cells.
- Subsequent exposure to an antigen, in sufficient quantity, will also serve to strengthen subsequent immune responses.
- Vaccines are synthetic forms or processed natural antigens used to stimulate the production of antibodies.
- Vaccinations are artificially acquired active immunity.
- The goal of vaccination is to prime humoral (antibodies) and cellular immune (lymphocytes) responses against pathogens (or their toxins) without causing disease.

Booster vaccines are employed for a number of reasons:

- To stimulate an acquired specific immune response induced by a prior vaccination; the goal is to increase that prior acquired specific immune response and "boost" the protection against that specific disease.
- To assure that all recipients of a vaccine will display the needed level of acquired specific immune response.
- To replenish the acquired specific immune response after a long period (e.g., <3 years as in the case of the rabies' vaccine).

According to **W. Jean Dodds, DVM of HEMOPET** there are two types of vaccines currently available to veterinarians: modified-live vaccines and inactivated ("killed") vaccines. She discusses the following differences:

□ **Modified Live Vaccines (MLV)**

Modified-live vaccines contain a weakened strain of the disease-causing agent. Weakening of the agent is typically accomplished by chemical means or by genetic engineering. These vaccines replicate within the host, thus increasing the amount of material available for provoking an immune response without inducing clinical illness. This provocation primes the immune system to mount a vigorous response if the disease-causing agent is ever introduced to the animal. Further, the immunity provided by a modified-live vaccine develops rather swiftly and since they mimic infection with the actual disease agent, it provides the best immune response.

❑ Inactivated Vaccines (Killed)

Inactivated vaccines contain killed disease causing agents. Since the agent is killed, it is much more stable and has a longer shelf life, there is no possibility that they will revert to a virulent form, and they never spread from the vaccinated host to other animals. They are also safe for use in pregnant animals (a developing fetus may be susceptible to damage by some of the disease agents, even though attenuated, present in modified-live vaccines). Although more than a single dose of vaccine is always required and the duration of immunity is generally shorter, inactivated vaccines are regaining importance in this age of retrovirus and herpesvirus infections and concern about the safety of genetically modified microorganisms. Inactivated vaccines available for use in dogs include rabies, canine parvovirus, canine coronavirus, etc.

Noted Immunologist R.D. Schultz (2000) indicated in his chapter, Considerations In Designing Effective and Safe Vaccination Programs for Dogs, that:

Canine vaccines which are considered essential, and should be given to every dog, are termed "core vaccines". All other vaccines are regarded as "non-core" and should be used in dogs considered at high risk on an as needed basis. Core vaccines are considered essential because they are designed to prevent important diseases that pose serious health threats to susceptible dogs, irrespective of geographic location or the life style of a dog. Some "non-core" vaccines also may be considered "core" because they are designed to prevent a disease that is a potential public health threat.

The "core" vaccines (with common abbreviations):

- ❑ Canine Distemper Virus (CDV)
- ❑ Canine Parvovirus-2 (CPV-2)
- ❑ Canine Adenovirus-2 (CAV-2)
- ❑ Rabies Virus (RV)

The "non-core" vaccines are divided into viral, bacterial and parasite groupings with the available formula* noted:

Viral

Canine Coronavirus (MLV, K)
Canine Parainfluenza (MLV, K)

Bacterial

Bordetella bronchiseptica (MLV, K)
Leptospira canicola (K)
Leptospira pomona (K)
Leptospira grippotyphosa (K)
Leptospira icterohaemorrhagiae (K)
Borrelia burgdorferi (Lyme disease)
(K, KR)

Parasite

Giardia (K)

Key: MLV=Modified Live Vaccine
K=Killed Vaccine
KR=Killed Recombinant Vaccine

adapted from: http://www.ivis.org/advances/Infect_Dis_Carmichael/schultz/chapter_frm.asp?LA=1

Common Questions Regarding Vaccinations:

R.D. Schultz, B.S., M.S., Ph.D, Professor and Chair of Pathobiological Sciences at the University of Wisconsin-Madison School of Veterinary Medicine (2000) generated these inquiries regarding canine vaccination:

- ❑ At what age should the vaccination program begin?
- ❑ How often does a dog need to be revaccinated? (What is the duration of immunity?)
- ❑ How does one determine the risk of disease, and therefore the necessity for one or more of the "non-core" vaccines?
- ❑ Do all current vaccines for a given disease provide similar protection?
- ❑ What are the risks of causing adverse reactions with certain vaccines or when giving vaccines too often?

Let us address these questions in light of these new guidelines:

- ❑ At what age should the vaccination program begin?
The vaccination schedule should begin at age 6-8 weeks; with the later being more optimal. Passive acquired immunity antibody declines below levels to interfere with core vaccines by 12-14 weeks of age. Schultz (2000) noted, "a small percentage of pups (<5%) fail to develop immunity to one or more of the core components. Reasons which have been given include: The presence of passively acquired antibody at the time of last vaccination; delay in maturation of the immune system; poor vaccinal immunogenicity: vaccine not given often enough, genetic inability to respond to certain vaccine antigens: immunosuppressions: too many components in a multi-component vaccine; or ineffective lots of vaccine".

The Canine Distemper (CDV), Canine Parvovirus-2 (CPV-2) Canine Adenovirus-2 (CAV-2) vaccination series should be at a 3-4 week intervals ending at about 14 weeks of age (indicating a schedule of 6-8 weeks, 9-11 weeks, 12-14 weeks, respectively). The rabies vaccine should be given 3-4 weeks apart from the CDV/CPV-2 vaccines.

Colorado State University's Small Animal Vaccination Protocol (2002) recommends the "Progard-5 (intervet)" vaccine, which contains modified live canine distemper, adenovirus type 2, parainfluenza, and parvovirus vaccine. They also recommend the "Imrab 3 (Rhone Merieux)" vaccine, which is a killed rabies vaccine with three-year duration of immunity after the initial one-year vaccine. The first booster for all the "core" vaccines will be at one year of age and at three-year intervals thereafter, until otherwise determine and/or mandated by law.

- ❑ How often does a dog need to be revaccinated? (What is the duration of immunity?)
Schultz (2000) discussed in his chapter, Considerations in Designing Effective and Safe Vaccination Programs for Dogs, that:
The duration of immunity for the "core" vaccines after the initial puppy series and first booster: Canine Distemper (CDV), Canine Parvovirus-2 (CPV-2) Canine Adenovirus-2 (CAV-2) are reported to be > or = to 7 years with >90% efficacy. The Rabies virus vaccine was reported at > or = to 3 years of age with >85% efficacy.

The "non-core" vaccines have a wide variation of duration of immunity and estimated efficacy.

- ❑ How does one determine the risk of disease, and therefore the necessity for one or more of the "non-core" vaccines?

Of the non-routine vaccines, Intranasal Bordetella/Parainfluenza is recommended to be used 3 days before possible exposure to kennel cough carriers (e.g., shows, boarding, field trials). Duration was noted to be < 6 months duration. Colorado State University's Small Animal Vaccination Protocol (2002) indicated it may be "repeated up to six times a year" in high-risk situations. They utilize the "Progard KC (Intervet)" intranasal vaccine for their clients. The other "non-core" vaccinations will be determined by local health risk factor and weighed against the risk of possible side effects of the vaccination.

- ❑ Do all current vaccines for a given disease provide similar protection?

Modified Live Vaccines (MLV) - this type of vaccine induces rapid active specific immunity due to exposure to the actual disease agent. They provide a greater immune response with longer duration of immunity.

Inactivated Vaccines (Killed) - this type of vaccine requires more than a single dose to induce active specific immunity and have a shorter duration of immunity.

- ❑ What are the risks of causing adverse reactions with certain vaccines or when giving vaccines too often?

Schultz (2000) further clarified:

“bacterial vaccines are more likely to cause immune-mediated reactions than do viral vaccines. Killed vaccines, especially those which contain adjuvants, are more likely to cause adverse reactions than do modified live vaccines. Because immune mediated reactions are genetically determined, some breeds, especially certain families of dogs, are at much greater risk of developing adverse reactions than the canine population as a whole.”

The American Animal Hospital Association Canine Vaccine Task Force's (2003):

...in an effort to inform veterinary practitioners, clarify misunderstandings held by veterinarians, and encourage practitioners to recognize that immunization of patients is a medical procedure. As such, it is bound by the same tenets that govern the recommendation of other medical procedures-principally, that it be tailored to the needs of the individual patient. Many diseases we immunize against are ubiquitous. Many are serious and some even life threatening. Some are of limited demographic concern given the exposure risk for each patient. These factors have all been considered in developing the AAHA Canine Vaccination Guidelines. In the end, each veterinarian must do what he or she determines to be in the best interest of the patient. Vaccination of individual animals produces not only individual immunity but also population or herd immunity. Since we have no readily available and reliable way to determine if each patient has developed an adequate immune response, we encourage the practice philosophy of vaccinating more patients while vaccinating each patient no more than needed, (abstract: Medline)

Bibliography and recommended reading:

Black, J.G., (1999) Basic Principles of Specific Immunity and Immunization. Black's Microbiology: Principles and Explorations. Fifth Edition, Marymount University. Important words and concepts from Chapter 17, Black, 1999 (3/28/2003): Abedon S.T., Location: <http://www.mansfield.ohio-state.edu/~sabedon/black17.htm> - booster

Dr. Jean Dodds' Recommended Vaccination Schedule retrieved April 5, 2003, from: <http://www.weim.net/emberweims/Vaccine.html>

Carmichael, L.E., Schultz, R.D., (May 5, 2000) Considerations in Designing Effective and Safe Vaccination Programs for Dogs. International Veterinary Information Service, Recent Advances in Canine Infectious Diseases. Location: http://www.ivis.org/advances/Infect_Dis_Carmichael/schultz/chapter_frm.asp

Veterinary Medical Teaching Hospital, University of California, Davis's Canine Vaccination Protocol (2002) retrieved April 5, 2003, from: <http://www.vmeth.ucdavis.edu/vmeth/clientinfo/info/vaccinproto.html>

Colorado State University's Small Animal Vaccination Protocol (2002) retrieved April 5, 2003, from: <http://www.vth.colostate.edu/vth/savp2.html>

Bellwether 48 Winter 2001, The Newsmagazine of the University of Pennsylvania School of Veterinary Medicine: Vaccination Sidelines for Dogs and Cats retrieved April 5, 2003 from: <http://www.vet.upenn.edu/comm/publications/bellwether/48/vaccination.html>

Dodds, W.J.: Vaccine Protocols for Dogs Predisposed to Vaccine Reaction. J Am Hosp Assoc 2001-37: 1-4 retrieved April 5, 2003 from: <http://www.cavaliers.co.uk/articles/vaccineprotocols.pdf>

Paul, M.A.; Appel, M.; Barrett, R.; Carmichael, L.E.; Childers, H.; Cotter, S.; Davidson, A.; Ford, R.; Keil, D.; Lappin, M.; Schultz, R.D.; Thacker, E.; Trumpeter, J.L.; Welborn, L.; Report of the American Animal Hospital Association (AAHM) Canine Vaccine Task Force. J Am Anim Hosp Assoc 2003- Mar-Apr: 39(2):119-31. Abstract retrieved April 5, 2003 from: Medline database

Note: You may ordered a copy of the "2003 Executive Summary of Canine Vaccine Guidelines" by calling AAHA's member services at 1-800-883-6321