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What You Need To Know About Vaccinations Today!

I. Immunology Basics

- A.** It has been recognized for centuries that individuals who recover from certain diseases are protected from recurrences by an internal mechanism. (Small Pox Vaccine 1796 Jenner)
- B.** Components of the immune system – See Diagram 1
 - 1.** Cellular Immunity – T Lymphocytes
 - a. Act against fungi, intracellular bacteria, pox viruses
 - b. Activated in transplant rejection
 - c. Antitumor activity
 - d. Affected by HIV virus
 - 2.** Humoral Immunity – B Lymphocytes
 - a. Produce antibodies (immunoglobulins) in response to immune stimulation.
 - b. Arise in response to foreign substances introduced into the body (antigens).
 - c. Majority of the cells produce IgG – See Diagram 2.
 - 3.** Basic definitions relating to immunization
 - a. **Antigen** – “a substance that can induce a detectable immune response when introduced into the animal.”
 - i. Must be “foreign” to the individual
 - ii. Must be of a significant molecular size
 - iii. Must be of specific chemical complexity
 - b. **Antibody** – an immunoglobulin produced by lymphocytes in response to bacteria, viruses, or other antigenic substances
 - i. An antibody is specific to an each antigen
 - ii. Each class of antibody is named for its action
- c. Passive Immunity** – A form of immunity resulting from antibodies that are transmitted naturally to the naïve individual

i. Response that develops from administration of immunoreactive cells from a donor who had recovered from illness or was previously immunized.

ii. Giving already produced antibodies to a specific antigen

iii. Immunity is not permanent and is generally short-lived

iv. Examples – maternal antibodies in colostrums to puppies

v. Can induce illness in some cases – serum sickness

d. Active Immunity – An outside source of reactive protein (antigen) is derived and given to an individual to induce an immune response and antibody production.

i. Must be given prior to exposure to a given antigen (minimum 2-3 weeks) to have time for immunity to develop.

ii. Booster vaccinations will induce a rapid immune response

iii. Duration of immunity will vary by antigen given – ie. viral vs bacterial

iv. Example – vaccine.

e. Modified live vaccine –genetically altered actual infecting organism given in a carrier to produce immune stimulation

i. Risk of mild or rarely severe infection

ii. Long-lived immunity

iii. Cannot be used in pregnant dogs

f. Killed Vaccine –Structural components derived from a bacteria or virus which are then used to stimulate the immune response

i. Highly safe

ii. Short lived duration of immunity

g. Duration of immunity – length of time that antibodies to a specific antigen can be detected in the body and that the animal will not succumb to illness when exposed to the specific disease. Immunologic memory.

h. Core vaccines – Vaccines that are determined to be basic and necessary for every dog to receive

i. Non-core vaccines – vaccines available but are given on a specific case by case basis as determined by risk and other factors.

j. Antibody titers – a measurement of antibody to a specific virus or other antigen

i. In the liquid portion of the blood

ii. Positive shows you don't have to revaccinate

iii. May help prevent needless revaccination or limit risk in those animals who may have had previous reaction or illness and could be harmed by revaccination.

k. **Nonresponders** - a genetic characteristic seen particularly in some breeds where the animal does not develop an immune response to a highly pathogenic agent. The animal would be likely to be more susceptible to a particular illness even those considered to be less likely to cause severe illness.

II. Why should we or do we immunize?

- A. It is the most effective and economical way of preventing disease and protecting the health of pets and the people who care for them.
- B. Long history of successful control of disease in the overall population – example eradication of small pox.
- C. The decision to immunize against a specific pathogen is a complex judgement based on assessment of risk, sometimes for the pet itself but sometimes to prevent illness in humans indirectly (ie Rabies).
- D. Requires availability of safe and effective immunogens – FDA standards and approval of all vaccines.
- E. Proven duration of immunity –FDA testing standards
- F. A harmful consequence of natural infection – ie. Canine distemper vs. Kennel cough
- G. Vaccination of an individual pet requires medical assessment by the veterinarian
 - 1. Life style –hunting, breeding, family pet, multiple pet household
 - 2. Risk of exposure – travels to different states, grooming, boarding, camping
 - 3. Stage of life – puppy vs. adult vs. senior
 - 4. Transmissibility of a zoonotic disease to owners – Rabies

H. Owners need to be educated about what vaccines their pet needs and be able to communicate their pet's risks with their veterinarians to avoid over vaccination and properly protect their pets.

III. Current Vaccine Guidelines – AVMA 2006

- A. **Core vs. Noncore** (diagram 3)
- B. Puppies should not be vaccinated prior to 5 weeks of age because their immune systems are immature and the maternal antibodies can block the appropriate response.
- C. First puppy shots (distemper, parvovirus and adenovirus) should be given at 8-9 weeks of age and then repeated ideally at 11-12 weeks and again at 14-16 weeks.
 - 1. A minimum of 2 weeks and preferably 3-4 weeks should be between doses.
 - 2. A series is necessary because we do not know when the maternal antibodies will be low enough to not block the puppie's response to the vaccine. Less than 50% of puppies will respond at 6 weeks whereas close to 100% will respond at 14-16 weeks.
 - 3. The dose at 14-16 weeks is considered the most important and all puppies should have at least one vaccination at this time.

- D. A booster (CDV, CPV, and CAV) should then be given at 1 year and then every 3 years after that.
- E. Rabies is the only vaccine that is required by law for the protection of people.
 - 1. Only vaccine that does not get boosted in a series initially
 - 2. Given initially at 3-4 months and then again at 1 year for the first series.
 - 3. Can be given every 1 or 3 years after the initial first series depending on state laws.
 - 4. They currently recommend giving this vaccine on a separate day and at a different location from the other vaccines.
 - 5. Rabies Challenge Fund – 5-7 year vaccine challenge trials
- F. Adult dogs without vaccination history –
 - 1. Should receive 1 or 2 doses of Distemper combo and 1 year Rabies as per state law
- G. Noncore vaccines – should be administered only to dogs at risk due to geographical location, local environment, or lifestyle places them a risk of contracting each of the specific infections.
 - 1. Include : Bordetella bronchiseptica (kennel cough), Borrelia burgdorferi (Lyme), and leptospirosis (all 4 serovars)
 - 2. Often need to be boosted yearly as opposed to 3 year boosters
- H. Vaccines not recommended
 - 1. Coronavirus – infections are uncommon and the clinical illness is mild to subclinical and self-limiting.
 - 2. Giardia lamblia – reported to reduce or prevent oocyst shedding but it does not prevent infection, a minimum duration of immunity is not reported based on challenge, not licensed as a therapeutic vaccine, limited studies on actively shedding dogs suggest it is not effective
- I. Antibody titers
 - 1. Limited to distemper and parvovirus only
 - 2. Titers may not always correlate with protective immunity – Leptospirosis
 - 3. Different laboratories perform testing by different methods – ie hemagglutination inhibition (parvovirus), virus neutralization (distemper) which are considered to be more accurate and reflective of immunity than immunofluorescent assays.
 - 4. Reasonable indications –
 - a. Assessing antibody response in high-risk dogs following vaccination (ie to determine if nonresponder) Done 2 weeks post vaccination of the last of the series in a puppie.
 - b. Assessing antibody level in a patient with a current or previous medical condition that precludes administration of a vaccine (ie allergic reaction, current illness, fever, history of a previous immune system disorder).
 - c. Verifying a sustained post vaccination antibody titer instead of vaccination.
- J. Most important message to take home is that there is no one vaccination program and the above are meant as guidelines vs. rules. Each vaccine program should be tailored to the specific needs of each animal.

IV. The Controversy

- A. All veterinarians are not following the newest guidelines for various reasons although about 50% are currently doing so.**
- B. Most veterinarians have the most trouble letting go of the annual vaccination idea. Habits are hard to break.**
- C. More information is forthcoming as more studies and research are conducted.**
- D. We are in transition and you can help by discussing your ideas and concerns with your veterinarian. Knowledge can be a powerful tool.**
- E. "Be wise immunize, but immunize wisely!"—Dr. Richard Ford**

References upon request.

LEVEL 1:

STEM CELL COMPARTMENT

TRUE, SELF-PERPETUATING, HEMATOGENOUS STEM CELLS, PROBABLY MULTIPOTENT, RESIDE PRIMARILY IN BONE MARROW

LEVEL 2:

"BURSAL EQUIVALENT" PROBABLY DIFFUSED IN MAMMALS

PRIMARY LYMPHOID ORGANS

SEEDING VIA CIRCULATION

INDUCTIVE INFLUENCE, PROLIFERATION

INDUCTIVE INFLUENCE, PROLIFERATION

THYMUS

"BONE MARROW" DERIVED, THYMUS-INDEPENDENT LYMPHOCYTES

THYMUS-DERIVED, LONG-LIVED, RECIRCULATING LYMPHOCYTES

LEVEL 3:

PERIPHERAL LYMPHOID SYSTEM

SEEDING TO PERIPHERAL COMPARTMENT

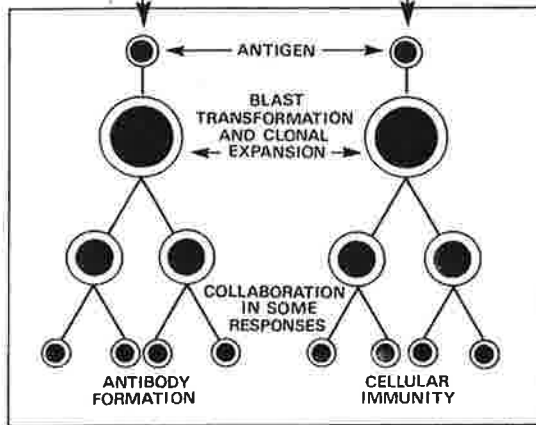


DIAGRAM 1.

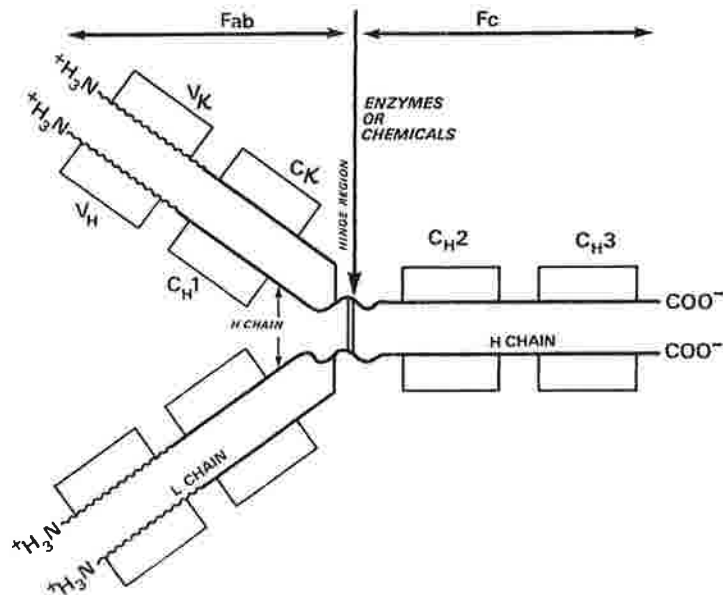


DIAGRAM 2.

AAHA Guidelines: Core vs. noncore classification

Do you know what vaccines in your refrigerator are recommended as core and noncore? The 2006 AAHA Canine Vaccine Guidelines classified vaccines into three main groups: core, noncore, or not recommended. So go ahead—open your fridge and take a look.

Core vaccines (universally accepted for all dogs):

- Canine parvovirus (CPV-2) (MLV)
- Canine distemper virus (CDV) (MLV)
- Canine distemper virus (rCDV)
- Canine adenovirus-2 (CAV-2) (MLV parenteral)
- Rabies 1-year (killed)
- Rabies 3-year (killed)

Noncore vaccines (optional—administered based on the pet's geographic area and lifestyle):

- Distemper-measles virus (D-MV) (MLV)
- Parainfluenza virus (CPIV) (MLV-parenteral)
- *Bordetella bronchiseptica* (killed bacterin)—parenteral
- *B. bronchiseptica* (live avirulent bacteria) + parainfluenza virus (MLV)—topical (intranasal) application
- *B. bronchiseptica* (cell wall antigen extract)—parenteral
- *Borrelia burgdorferi* (Lyme borreliosis) (killed

whole bacterin) or *B. burgdorferi* (rLyme borreliosis) (recombinant—outer surface protein A)

- *Leptospira* species (killed bacterin)

Not recommended:

- Canine parvovirus (CPV-2) (killed)
- Canine adenovirus-1 (CAV-1) (MLV and killed)
- Canine adenovirus-2 (CAV-2) (killed and MLV-topical)
- Canine coronavirus (CCV) (killed and MLV)
- *Giardia lamblia* (killed)

Not classified:

- *Crotalus atrox* toxoid (rattlesnake vaccine)
- *Porphyromonas* species (periodontal disease vaccine)

Reference

1. American Animal Hospital Association. 2006 AAHA Canine Vaccine Guidelines, Revised. Available at: <http://www.aaahanet.org/PublicDocuments/VaccineGuidelines06Revised.pdf>. Accessed July 19, 2007.

Adverse Reactions Seen in Various Species Known and/or Believed to be Caused (Triggered) by Vaccines

Severe Reactions:

Immunosuppression - Multiple Species

Vaccine-Site Injection Sarcomas - Primarily Feline

Anaphylaxis - All Species

Abortion - Multiple Species

Arthritis, Polyarthritis - Hypertrophic Osteodystrophy (HOD)

Autoimmune Hemolytic Anemia

Immune Mediated Thrombocytopenia

Hemolytic Disease of Newborns (Neonatal Isoerythrolysis) - Bovine

Post Vaccinal Encephalitis

Seizures

Thyroiditis

Glomerulonephritis

Disease or Enhanced Disease which the vaccine was designed to prevent

Moderate Reactions: (Multiple Species)

Behavioral Changes

Vitiligo

Weight Loss (Cachexia)

Reduced Milk Production

Lameness

Granulomas/Abscesses

Hives

Facial Edema

Atopy

Mild Reactions: (Multiple Species)

Lethargy

Hair Loss and Hair Color Change at site of injection

Fever

Soreness

Stiffness

Refusal To Eat

◆ **Parvovirus:**

Parvovirus (more commonly known as Parvo) is a highly contagious disease which causes diarrhea and vomiting, and often leads to death. Parvo is most common in puppies; however, dogs of any age can be susceptible. Contaminated feces is the most common way to transmit parvo from one dog to another. Parvo can also be carried on the dog's hair and feet, as well as on contaminated cages, shoes, and other objects.

◆ **Coronavirus:**

Coronavirus, next to Parvo, is the second leading cause of viral diarrhea. It affects dogs of all ages, puppies most severely. Symptoms include diarrhea, vomiting, excessive thirst, weight loss and loss of appetite. It is possible for your dog to have both Coronavirus and Parvo at the same time. In fact, dual infections can lead to severe enteritis and death.

◆ **Lyme disease:**

Lyme disease is a devastating bacterial disease which can cause permanent and painful disabilities in dogs. Symptoms include arthritis, sudden onset of severe pain and lameness, fever, lethargy, depression and loss of appetite. Severe forms of Lyme disease can affect the heart, brain, and kidney.

◆ **Distemper:**

Distemper is a highly contagious viral disease. It affects the respiratory and the nervous systems, causing fever, lethargy, coughing, vomiting, diarrhea, seizures, and eventually death.

◆ **Hepatitis:**

Hepatitis is a contagious disease of the liver. Symptoms include fever, vomiting, diarrhea, and abdominal pain. Hepatitis can also cause severe kidney damage.

◆ **Leptospirosis:**

Leptospirosis is a bacterial disease carried by many wild animals. A dog can contract the disease from infected animals or by drinking contaminated water. Symptoms include high fever, jaundice, hemorrhaging, and bloodstained feces.

◆ **Infectious**

Tracheobronchitis:

Infectious Tracheobronchitis (most commonly known as Kennel Cough or ITB) is an acute and highly contagious disease. There are several organisms that can cause ITB. They are Bordetella bronchiseptica, canine parainfluenza (CPI), canine adenovirus 1 (CAV-1), canine adenovirus 2 (CAV-2), canine distemper virus (CDV), reovirus and small organisms called mycoplasma. These organisms may act alone or in combination, however the most commonly involved organisms are Bordetella, CPI and CAV-2.

Symptoms include severe coughing spells sometimes followed by vomiting and gagging. The dog may also have watery eyes and/or a nasal discharge.

◆ **Rabies:**

Rabies is probably the most feared disease.

The rabies virus attacks the brain and is always fatal. Dogs are exposed to rabies by bites from wild animals particularly skunks, raccoons, bats, and foxes. Rabies can be transmitted to humans through the bite or scratch of an infected pet.

How can I protect my dog from these diseases?

The prevention of infectious disease is accomplished by maintaining high levels of general health, limiting exposure to possible sources of these infectious agents, and by the regular use of vaccines. Only your veterinarian can determine which vaccines are appropriate for your dog based on his age, lifestyle, and other factors.

Schedule a health exam with your veterinarian so she/he can design a vaccination/disease prevention program to keep your dog happy and healthy for years to come.

