

Section I: Feline Vaccination/Wellness Protocol

I. Kitten Vaccinations:

6 to 8 weeks FRCP#1, Intestinal Parasite Treatment #1, HWP, (Fe/Fi Test if 8 weeks of age)

9 to 11 weeks FRCP#2, Fe/Fi test, FeLV#1, Intestinal Parasite Treatment #2, HWP

12 to 14 weeks FRCP#3, FeLV#2, Intestinal Parasite Treatment, HWP

16 to 17 weeks FRCP#4, Rabies, Intestinal Parasite Exam, start monthly HWP

6 to 7 months Spay/Neuter, Heart Worm Exam (wellness profile recommended presurgically)

II. Adult Vaccinations:

All kittens receive core vaccines. Additional vaccination recommendations are based on risk factors. Patients are classified into three groups based on their lifestyle/environment.

Group A = High Contact (Primarily outdoor or outdoor only, frequently treated for cat fights)

Group B = Indoor/Outdoor (Primarily indoor but goes outside on occasion)

Group C = Indoor Only

III. Recommended Vaccines:

Group A	Group B	Group C
FRCP, FeLV, Rabies, FIV	FRCP, FeLV, Rabies	FRCP, Rabies

IV. Frequency of Vaccination:

FRCP - Initial Series for all cats; then, at 1 year; then,

Every 3 years for Panleukopenia (when using a certified 3 year vaccine)

+/- Annually for Rhinotracheitis and Calicivirus

FeLV - Initial Series for all cats; then, annually for Groups A and B

FIV - Annually (when indicated)

Rabies - Annually or every 3 years depending on the type of vaccine.

V. Additional Notes:

Do not use Rhinotracheitis/Calicivirus boosters in cats with chronic gingivostomatitis and faucitis.

FIV vaccine is only recommended for outdoor cats which fight or live with FIV+ cat and should be boosted annually.

Bordetella vaccine is only recommended if boarding at facility where bordetella has been a problem. It is boosted annually.

Do not use Modified Live Vaccines (example, Purevax) in FeLV or FIV positive cats.

Do not give Rabies vaccine to FeLV+ or FIV+ cats until after they have finished their initial series.

VI. Routine diagnostics recommendations:

Intestinal Parasite Examinations should be performed every 6 months

Heartworm Examinations are recommended every annually.

Wellness profiles are recommended annually up to 12 years; then, every six months.

AGE Wellness Profile Elements

Less than 5 years CBC, ALT,ALP,BUN,CREAT,LYTE

5 to 8 years CBC, ALT,ALP,BUN,CREAT,LYTE,BILI

8 to 11 years CBC, ALT,ALP,BUN,CREAT,LYTE, BILI, T4

Greater than 11years CBC, ALT,ALP,BUN,CREAT,LYTE Q 6 months with BILI, T4 annually

A CBC is recommended every six months for FeLV+ and FIV+ cats.

Section II: Feline Infectious Diseases and Vaccination Information

I. General notes

- A. Cats past **16 weeks** will only need 2 doses of vaccine for all the core vaccines. Kitten vaccine protocols should continue until no sooner than **16 weeks** of age.
- B. Vaccination under anesthesia is **not recommended** due to possibility of allergic reactions.
- C. Any nodule present at a vaccination site after 3 months, greater than 2 cm in size or growing in size after 1 month should be removed and examined histologically.
- D. One important risk factor that was associated with sarcoma development was administration of cold vaccines.

II. Core Vaccines

A. Feline Panleukopenia

- 1. Vaccinate at 8 to 9 weeks of age and then follow at 3 to 4 week intervals until 16 weeks of age. After booster in 1 year, vaccinating every 3 years will be protective. (Shoal Creek Animal Clinic uses a certified 3 year vaccine.)
- 2. General notes:
 - a. Virtually all susceptible cats are exposed during their first year of life, although the majority of infections are subclinical. Environmental contamination and fomite transmission (including flies and possibly other insect vectors) are the main routes of transmission, versus intercat contact.
 - b. Feline panleukopenia is important in the development of hypertrophic cardiomyopathy in that a significant number of cats dying of idiopathic cardiomyopathy were found to have the virus upon PCR examination.
 - c. MLV vaccines produce more rapid and effective immunity than do inactivated virus vaccines. These should definitely be used in contaminated areas such as shelters and catteries or during outbreaks.
 - d. Avoid vaccinating pregnant females and kittens younger than 4 weeks. Intranasal vaccination is not as protective as parenteral vaccines and is not generally recommended.
 - e. The evolution of the canine parvovirus (CPV-2) to variants CPV-2a and CPV-2b, allows the infection of domestic cats with this virus. FPV vaccines provide cross-protection against these

viruses but the immunity is of short duration and only gives partial protection. These variants generally cause only mild disease. The newest variant CPV-2c is the most virulent and the one that has the least cross-reactivity with FPV, thus less protection from this vaccine.

B. Feline Rhinotracheitis Virus (FHV-1) and Feline Calicivirus (FCV)

1. Vaccinate at 6 weeks, then every 3 to 4 weeks until 16 weeks of age. After booster at 1 year vaccinating every 3 years may be protective but some authorities recommend yearly vaccination for cats that may be boarded. (Greene, 3rd Ed.)

2. General notes

a. Vaccines protect against disease but not against infection or the carrier state. Feline chronic ulcerative gingivostomatitis and faucitis are likely caused by hypersensitivity to persistent FCV infection and routine annual boosters are not recommended (especially of adjuvanted, non-infectious products).

b. A febrile limping syndrome can occur in kittens (<6 months) within 3 weeks of vaccination with MLV FCV. Animals are febrile, lame, anorectic, and can have respiratory signs and oral ulcerations. The lameness is usually a shifting leg lameness.

c. Parenteral MLV vaccines have to be given carefully because clinical signs will occur if the cat licks any from injection site or if the vaccine is aerosolized and then inhaled.

d. Intranasal vaccines provide the quickest protection but often induces mild ocular and respiratory signs.

e. FHV is more virulent and FCV is more common. FCV survives longer in the environment (approx. 1 week) than FHV (approx. 1 day). Spread is most often by contact with an infected cat, (commonly a clinically recovered carrier cat).

f. FHV can cause permanent damage to the nasal turbinates, leading to chronic bacterial rhinitis, sinusitis, or conjunctivitis. This is more common in short-nosed pure-breed cats such as Persians and Himalayans.

g. FCV usually causes ulceration of the tongue but can cause ulcers on the lip and nose. Lameness can also occur. There is a strain which causes a severe systemic illness with limb edema, hemorrhagic diarrhea and respiratory signs. Current vaccines do not protect against this strain.

h. There is little strain variation in FHV. FCV has many strains and the cross-protection among strains varies. This means cats can be sequentially infected with different viruses and show

varying degrees of clinical signs. This also means the strains in the vaccine will be more or less protective against the wild strains, depending on the prevalence of different strains in a region.

i. Carrier states

i. FHV-1: Virtually all recovered cats become latently infected. Virus reactivation is most likely after stress with a lag period of about 1 week with shedding lasting 1-2 weeks.

ii. FCV: subclinical carriers shed virus continuously and are always infectious to other cats. The virus persists in tonsillar and other oropharyngeal tissue. However most animals are not long-term carriers (about 50% have eliminated the virus by day 75 post-infection). At any given time about 20-30% of cats in a population are carriers.

j. VS-FCV (Virulent Systemic Feline Calicivirus)

Virulent systemic feline calicivirus (VS-FCV) is a novel, emerging pathogen with mortality up to 67% even in previously healthy adult cats; VS-FCV has resulted in at least six epidemics since 1998. Affected cats have systemic vascular compromise and hemorrhagic-fever like signs in part due to viral invasion of epithelium and endothelium, coupled with host cytokine responses. The Feline Vaccine Advisory Panel of the AAEP reviewed available materials on FCV infections as well as those materials about CaliciVax ® that are available to all veterinarians and believes there is insufficient information to make definitive recommendations concerning the use of products that contain a strain of VS-FCV at this time. While FCV is considered a 'core' vaccine component by the Panel, further data is required before recommendations about specific FCV vaccines (including vaccines that incorporate a VS-FCV strain) can be made.

C. Rabies

1. Vaccinate after 12 weeks of age. After a booster in 1 year can vaccinate every 1-3 years as determined by vaccine type and local laws.

2. General notes

a. Total volume of vaccine needs to be given, regardless of the size of the kitten. One injection of inactivated vaccine does not produce a lasting antibody titer and the second vaccination in 1 year is extremely important.

b. An immediate booster is recommended to the previously immunized dog or cat after a known or highly suspected rabies exposure.

c. Vaccine types

i. Inactivated cell culture vaccine. This vaccine have large amount of antigen and are very

immunogenic. With adjuvant, they become even more effective but have some problems with allergenicity and oncogenicity.

ii. Parenteral Recombinant vaccine utilize a canary pox virus vector which expresses a glycoprotein of the rabies virus. This type of vaccine is currently available for cats only.

iii. DNA plasmid vaccine. A DNA plasmid coding for rabies glycoprotein is inserted into bacteria. These are not licensed now but may be the recommended vaccines of the future.

3. Notes about Rabies

a. Most dogs and cats are infected with the virus variant associated with the dominant wildlife reservoir in the region. Wildlife rabies is on the increase. Most rabid cats are infected with the raccoon variant and are found along the east coast.

b. Since 1981, more cases of rabies in cats than dogs has been reported.

c. Adequate vaccination of 70% of dog and cat population is needed to prevent occurrences of rabies epidemics.

d. Cats consistently develop the furious form of rabies first and the paralytic phase can develop around day 5 of the disease. However, most cats die on the third to fourth day of illness.

e. Sustained inflammatory reactions which occur at the site of vaccination are considered precursors to sarcoma, which can develop months to years later. These are more frequent in cats than dogs.

III. Non-Core Vaccines

A. Feline Leukemia Virus

1. Administer at 8 to 9 weeks of age and repeat in 3 to 4 weeks. If greater than **6 weeks** between vaccines repeat a second dose. For at risk animals should be repeated yearly. Not recommended for cats with minimal risk of exposure (a closed, FELV negative, indoor environment). Strongly recommended for **all kittens**.

2. General notes

a. Kittens younger than 16 weeks have the greatest risk of becoming persistently infected. Vaccines do not provide any protection before 12 weeks of age (since inactivated and given at 9 weeks).

b. Preventing exposure is the best way to prevent infection. Vaccines do not provide complete protection. The virus is spread through close contact, sharing food bowls, mutual grooming, etc. Fleas are considered a potential source of transmission.

c. FELV virus is inactivated in the environment within a few seconds so indirect transmission is not possible.

d. The FELV infection status of all cats should be determined. Ideally, they should be tested for infection **before every vaccination** and when there is a possibility of exposure. To ensure the least chance of introducing FELV into a household, recommend testing at adoption and then 90 days later.

e. Four categories of infection

i. Regressor cats: exposed, immunity prevents viral replication, no viremia, completely clear infection, high antibody titers.

ii. Transient Viremia: exposed, viremia = infectious, no infection of bone marrow - completely clear virus (within 3 to 6 weeks). ELISA positive during viremia, FA negative.

iii. Latent infection: exposed, viremia = infectious at first, virus enters bone marrow and remains but is cleared from the blood = non-infectious, ELISA negative, FA negative. Can be reactivated spontaneously with stress or glucocorticosteroids (although the chances of this decreases with time.)

iv. Persistently viremic: exposed, viremic, virus in bone marrow, continuous viral production and viremia, ELISA positive, FA positive, infectious. Dead within 3 years.

f. If exposed <6 months of age 85% will be persistently infected.

g. If exposed between 6 months and 1 year 15% will be persistently infected.

h. After 1 year it is difficult to infect in experimental situations. However the amount of exposure greatly correlated with risk of becoming persistently infected. For example, living with a FELV + cat increases the risk of persistent infection. Extended exposure increases the risk of persistent infection and approximately 10-15% of adult cats will become persistently infected when housed with viremic cats for more than a few months.

3. Prophylactic care for FELV+ cats:

a. Twice yearly PE and CBC

b. Yearly SAP, UA as well

c. No vaccines to MLV of any kind, although vaccination programs to core vaccines should be maintained.

d. These animals do not mount normal immune response to vaccine so **more frequent vaccinesshould** be considered, especially in endemic rabies areas.

e. FELV vaccines liscenced for 3 years should be used if available. Non-adjuvanted vaccines should be used instead of adjuvanted vaccines.

4. Vaccine options

a. Adjuvanted - killed - higher likelihood of vaccine associated sarcoma and allergenicity

b. Recombinant canarypox - administered intradermally. Non-adjuvanted and given intradermally through vet-jet technology.

c. DNA vaccine - contains feline IL-at gene as adjuvant (vs. aluminum). Not yet available in US.

B. FIV

1. The use of the vaccine should be limited to outdoor cats that fight or FIV negative cats living with an FIV+ cat. For cats in which it is indicated, the cat should be tested negative first and then vaccinated with 3 doses, 3 weeks apart. Yearly boosters are recommended. Permanent identification of vaccinated cats with microchips is recommended.

2. General notes

a. Subtype A is common in the western US and subtype B is common in the east. Naturally infected cats can harbor multiple subtypes, indicating a lack of cross-protection between subtypes which may be relevant to vaccination.

b. Aggressive behavior is the most common means of transmission and this is reflected in a higher prevalence in adult male cats versus adolescents and kittens. High rates of transmission (about 50%) also occur between queens and kitten, both in utero and in milk. However those kittens suffer very high mortality and are probably not important in maintaining the virus in the population.

c. The acute phase of illness lasts from a few days to several weeks and then the cats will enter a phase where they are clinically healthy. This phase can last from several months to many years.

They will then enter the terminal phase of the illness (Feline AIDS) where they will succumb to infections, neoplasia, myelosuppression, or neurologic disease.

d. Cats that have a positive in house test should be retested to confirm, ideally with a Western Blot test. Kittens less than 6 months which test positive should be retested after 6 months of age as they can have circulating maternal antibodies leading to false positive before that time.

e. Cats vaccinated with FIV vaccine will be indistinguishable from naturally infected cats by any of the commonly available tests (including Western Blot). The vaccine only contains inactivated subtype A and subtype D and cross protection against subtype B is unknown.

3. Caring for the FIV positive cat

a. Keeping the cat indoors is the best procedure to prolong life.

b. Routine vaccination of FIV+ cats can stimulate the animals' lymphocytes and increase production of virus. FIV+ cats are able to mount a response to vaccine until the terminal phase of illness. Thus for an individual cat the risk of exposure to pathogens has to be weighed against the possibility of causing FIV progression of infection. Only core vaccines and inactivated vaccines should be considered. Duration of immunity is unknown.

c. PE - every 6 months

d. CBC, SAP, UA every 12 months

C. Chlamydia felis

1. Only recommended for cats in multi-cat environments where *C. felis* has been documented to cause disease. The vaccine attenuates clinical disease but does not prevent infection or shedding. Can administer at 9 weeks and booster 3 to 4 weeks later. Annual vaccination is recommended when the vaccine is indicated.

2. General notes

a. Cats up to 1 year of age are likely to be infected with *C. felis*. Thereafter the prevalence decreases and cats over 5 years of age are unlikely to be infected. Rates are higher in the summer months.

b. Diagnosis is by culture or PCR. The organisms can also be seen by cytology although this method is not that sensitive.

c. Cats become infected after close direct or aerosol contact. A low dose will produce unilateral signs of conjunctivitis while a higher dose will produce bilateral signs. Some infections may become chronic and insidious. Reactivation of shedding can occur with pregnancy. The organisms spread internally and can affect the lung, liver, spleen, and kidney among other organs. Treatment is with oral doxycycline for systemic signs and topical tetracycline.

d. Attenuated *C. felis* products can cause fever, lethargy, anorexia, and stiffness in a few cats 1 to 3 weeks after vaccination.

e. *C. felis* causing conjunctivitis in people is rare but has been reported. People should take precautions in medicating cats with conjunctivitis and the cats might have to be treated with systemic anti-microbials in households where the people have conjunctivitis.

D. Bordetellabronchiseptica

1. Vaccine can be considered for cats which are going to a high-risk environment such as a boarding facility, shelter, cattery, etc. where bordetella has been documented. Vaccination with the intra-nasal modified live vaccine should be administered as a single dose in cats over 8 weeks of age. Annual vaccination is recommended if continued risk.

2. General notes

Cats can acquire bordetella from other cats or dogs. Occasionally people can become infected, especially if immunocompromised. Vaccinated cats can shed bordetella for several weeks to a year after vaccination and during this time can infect other cats and potentially other susceptible species.

IV. Variably Recommended

A. Feline Coronavirus (FIP)

1. Administered at 16 week with a booster in 3 to 4 weeks. Only efficacious in animals with no previous exposure to coronavirus - measuring titer before vaccine is advisable.

2. General notes

a. The best protection against disease is to prevent transmission of the FeCoV from queen to kittens by isolation and early removal of kittens.

b. Controversy about whether the vaccine induces antibody dependent enhancement and thus **faster** development of disease.

c. Antibodies are present in about 90% of cats in catteries and 50% of cats in single-cat households.

d. Cats become infected with the coronavirus after exposure to infected feces (ingestion) or possibly inhalation. All natural infections of FeCoV can lead to FIP although this only happens 10% of the time. Whether this is due to a mutation of the virus or different host susceptibility is still controversial. Some cats remain carriers of FeCoV and will continue to shed virus forever, other cats will shed virus for 2-3 months before eliminating the virus.

e. Cats are most likely to develop FIP in the first 6-18 months after infection, 50% of infected cats are <2 years old. Most FIP cats have a history of stress within the previous 2 months.

B. Giardialamblia

1. Given after 8 weeks of age, booster in 3 to 4 weeks. Repeat yearly if used.

2. General notes

a. There are insufficient studies to support the role of the vaccine in preventing disease.

b. The prevalence of infection is much higher than the prevalence of clinical disease. Acute diarrhea tends to occur in young animals.