GENERAL CONCEPTS in VACCINOLOGY:

Reasons to vaccinate:

The objective of vaccination should be to prevent or limit infection and disease caused by clinically significant infectious agents. The operative words here are clinically significant. Immunity is provided through the activities of both the humoral (antibody) and cell-mediated branches of the immune system. In addition, some veterinarians use the recommendation for vaccinations as a way to ensure client visits for yearly examinations and, least appropriate, as a profit center. Vaccination should be first and foremost a carefully considered and well thought out medical procedure.

Factors affecting the host response to vaccination:

A number of factors influence the host response to vaccine antigens. First is the nature of the vaccine. Generally, modified live viral vaccines (MLV) or recombinant viral vaccines stimulate a better response than killed virus (usually adjuvanted) vaccines. Bacterins generally stimulate a less active response and less durable immunity. The route of inoculation of the vaccine, whether parenteral (IM, SQ, or intradermal) or local (intranasal) will also influence the magnitude and nature of the host response. The age of the patient and the presence of maternal antibodies in pediatric patients are also important. Other influential factors include nutritional and general health status, the presence of concurrent infections (e.g., parasites), concurrent drug therapy (e.g., corticosteroids), and probably some genetic factors.

Maternal antibody is a very important aspect of pediatric protection and interferes with active immune response to
vaccination. Actively produced antibody (in the adult immune host) acts the same way to block response to booster vaccination. The amount of maternal antibody acquired by the puppy or kitten is dependent upon the immune status of the dam (particularly humoral antibody level). Once passed to the offspring, the maternal antibody will degrade at a constant rate, decreasing by about 50% every 14 days.

Finally, it is important to recognize that no matter how effective vaccines may be, there is a small fraction of the population that lack appropriate subsets of lymphocytes needed to develop an appropriate protective immune response. These non-responders could be vaccinated every 3-4 weeks with the most effective vaccine on the planet for their lifetime and they would still not be able to mount an effective protective response. This very small number of individuals may make up those we consider to have vaccine failure.

Types of vaccines and how they affect the immune response of the host:

Types of live vaccines include virulent, attenuated, and newer viral or bacterial vectored, and plasmid DNA vaccines. Virulent vaccines are not available for small animals. These vaccines are given by an unnatural route or at an age where the animal was safe from symptoms of disease.

The vast majority of small animal biologicals are attenuated products where the infectious organism has been changed to an avirulent form by egg passage, cell culture passage, or genetic manipulation (cold-adapted, deletion mutants, etc). Viral (e.g. recombinant canarypox vaccines) or bacterial vectored vaccines are becoming more available. They have the advantage of selectively incorporating the small portion of the virulent agent that produces durable immunity to a harmless virus or bacteria that will then carry the relevant protective antigens into the host allowing them to be exposed to the immune system and producing a durable immune response to the vectored proteins.

Stimulating immunity with plasmid or DNA vaccines is more selective still. Only the specific protective antigenic proteins are used in these vaccines. There is no whole living, replicating, organism involved, only some free DNA. Immune responses to naked DNA or plasmid antigen delivery systems have been less active than with other delivery systems. However,
there is much more work ongoing in this area and undoubtedly these selective and specific vaccines will be available in the foreseeable future.

Types of killed vaccines include whole killed or inactivated infectious agents. These organisms have been killed by chemical or physical inactivation techniques. Protein subunit vaccines have also been developed that use only a portion of the infectious agent. Other killed vaccine types include cloned and synthetic peptide vaccines.

MLV and recombinant vectored vaccines generally produce longer duration, more solid immunity. Both humoral and cell-mediated immune systems participate strongly in the response. A single vaccination may provide significant immunologic memory (as long as there is no maternal AB interference) for some antigens (e.g. feline panleukopenia). MLV or recombinant viral vaccines given to an animal without blocking maternal Ab do not or only infrequently require revaccination and they rarely cause hypersensitivity. It is possible for MLV vaccines to revert to virulence, however, this is an exceedingly rare occurrence. Reversion to virulence is not a problem with recombinant vectored viral vaccines.

Alternatively, killed vaccines and bacterins generally provide less durable and solid immunity. They require adjuvant, require more frequent revaccination, and multiple vaccinations are needed to establish immunity and immunologic memory. Killed vaccines may require more frequent booster vaccinations to maintain a good level of immunity. Killed vaccines cannot revert to virulence.

CHANGING VACCINATION PRACTICES IN THE 21st CENTURY:

Dramatic changes have occurred in the past 10 years regarding the way veterinarians view vaccines and vaccination practices. The concepts of core and non-core vaccines, disease risk assessment, extended inter-vaccination intervals, and using products that minimize the risks of vaccine-associated sarcoma (VAS) are currently mainstream veterinary medicine. There are now a number of publications that document the long duration of immunity provided by most feline viral vaccines. The third revision of the American Association of Feline Practitioners (AAFP) Vaccination Guidelines for cats was published in late 2006. This very through document is exhaustively referenced and is an outstanding resource for veterinary practitioners as they
change vaccination practices. The second revision of the AAHA guidelines was published in early 2006 and is also an excellent source of information.

AAHA Canine Vaccine Guidelines online: HYPERLINK "http://www.aahanet.org/About_aaha/About_Guidelines_Canine06.html" http://www.aahanet.org/About_aaha/About_Guidelines_Canine06.html


The AAFP vaccine guidelines specifically recommend avoiding vaccines that cause persistent local tissue inflammation. This means a general rule of avoiding adjuvanted vaccines and using non-adjuvanted vaccines whenever possible.

CORE VACCINES FOR CATS:

Core vaccines should be given to every patient regardless of lifestyle. For cats, the core vaccines include: parvovirus (panleukopenia), herpesvirus (feline viral rhinotracheitis), respiratory calicivirus (FCV), and rabies. For kittens, NON-ADJUVANTED FeLV vaccine should also be considered a core vaccine.

Modified live (MLV) FVRCP vaccines are recommended because they are not adjuvanted and do not carry the risk of inducing VAS. In addition, a recent study has shown more rapid development of immunity against feline parvovirus in kittens given MLV FVRCP compared to those given killed FVRCP vaccine.

What about virulent systemic calicivirus? Virulent systemic calicivirus (previously: hemorrhagic calicivirus) is a severe variant of feline calicivirus that has been reported very sporadically in the literature for years but was first fully described in the literature in 2000 by Dr. Niels Pedersenís study group at UC Davis. There have been a very few small clusters of severe and fatal calicivirus in shelters, catteries, and other crowded cat environments for many years so this is not a new problem. Genetic sequencing has shown that all of the irurulent Calicií variants examined so far are individual and different from each other genetically. This means that they mutate as more pathogenic variants out of of the swarm of caliciviruses being carried in these crowded cat populations.

Virulent calicivirus can cause high mortality in a small number of affected cats. However, all outbreaks have burned themselves
out in the affected population without spreading to the cat community at large. Although dubbed the killer Calicivirus in one biologic manufacturerís creative advertising materials, there is no reason for panic and a household pet is extremely unlikely to ever encounter this calicivirus variant. There is no reason to change to an adjuvanted calicivirus vaccine when the risk of VAS from an adjuvanted vaccine far outweighs the risk of potential virulent systemic calicivirus exposure in pet cats.

Feline leukemia virus (FeLV) vaccine is still on the AAFP non-core list but I consider it a core vaccine for pediatric patients with the caveat that only a non-adjuvanted FeLV vaccine that does not carry the risk of inciting chronic injection site inflammation should be used. The reason for recommending universal kittenhood protection against FeLV is because cats under a year of age are at greatest risk for acquiring this disease. Virtually 100% of kittens infected with FeLV at 6 weeks of age or less will remain persistently infected for life. At 6 months of age, the risk of persistent infection drops to 30% and this decreases further to 5% or less after 12 months due to the development of natural resistance to this disease with age. When we ask clients about their kittenís environment, they may tell us that the kitten will be kept only indoors. However, the kitten may escape to the outside or the client may begin allowing the cat outside. The owner may not return the kitten for FeLV vaccination after the pediatric vaccination series has been completed even though the kittenís risk of exposure to FeLV has changed. By vaccinating the most susceptible individuals (young kittens) we will provide the best possible protection during the period of highest susceptibility to the disease. After a year of age, if the cat truly is kept only indoors without exposure to FeLV-infected cats, we do not need to continue FeLV vaccine administration.

Non-core vaccines for cats:

I do not recommend giving Chlamydophila or Bordetella bacterins to household pet cats even though these vaccines remain on the AAFP non-core list. Both of these diseases are very uncommon causes of upper respiratory disease and these vaccines are reactive and have a short duration of immunity. Chlamydophila or Bordetella bacterins may be helpful for short-term use in shelter or cattery situations where an outbreak of upper respiratory disease has occurred if these agents are cultured from a number of cats and confirmed as a major component of the
respiratory syndrome.

Not recommended for cats:

The feline infectious peritonitis (FIP coronavirus) vaccine and feline Giardia vaccines are on the AAFP not recommended list for reasons of lack of efficacy.

In my opinion, the currently available FIV vaccine is also not acceptable because of poor to minimal efficacy. This vaccine is adjuvanted which means that it carries the risk of chronic injection site inflammation that can potentially lead to VAS. FIV-vaccinated cats will also test falsely positive on antibody-based tests (ELISA, Western Blot, and IFA) for at least a year post-vaccination. FIV PCR testing is not yet sufficiently accurate to help us differentiate vaccinated from naturally-infected cats.

Virulent Calicivirus vaccine is also on the NOT recommended list for all the reasons described previously.

PEDIATRIC VACCINATION:

The goal of pediatric vaccination is to stimulate active and solid immunity before the susceptible kitten is exposed to pathogenic disease. In the words of a famous Civil War general, we need to "Get there firstest, with the mostest." This means that we must start our vaccination program early enough to prevent active disease as maternal antibody wanes and we must use the safest, most efficacious vaccine products available.

The pediatric Core non-adjuvanted MLV FVRCP or MLV DAPP vaccine series should be started when the kitten/puppy is seen for its first pediatric examination at 6-8 weeks of age. Core vaccines should be repeated at 3-4 week intervals until the kitten/puppy is 16 weeks of age. Although some biologics manufacturers have experimental studies that demonstrate good protection by 12 weeks of age, recent research using conventional kittens indicates that maternal antibody interference with vaccination may persist in some kittens beyond 13 weeks of age. In dogs, maternal antibody against parvovirus may also persist at a level that blocks active immunity beyond 12 weeks of age. Therefore, I recommend administering the final pediatric vaccination at 16 weeks of age or older. Rabies vaccine should be given at 12 weeks of age or older as per the Rabies Compendium and local ordinances. Only a non-adjuvanted rabies vaccine should be
Kittens should be tested negative for FeLV prior to vaccination. In addition to the other serious consequences of infection, there is no demonstrated benefit of giving an FeLV vaccine to an FeLV-infected cat. A non-adjuvanted FeLV vaccine should be used according to the manufacturer's instructions.

If non-core vaccines are used based on patient risk assessment, they should be given on an appropriate schedule as per the manufacturer's instructions.

What if a client is late bringing the kitten or puppy for revaccination during the pediatric series or comes back at 6 months of age for neuter without having completed the pediatric series? Must I start the vaccination series all over again?

No. If the last core MLV FVRCP or DAPP vaccine was given at 12 weeks of age or older, one more MLV or rCDV vaccine should suffice to ensure solid protection. If the last vaccine was at less than 12 weeks, a series of two MLV FVRCP or DAP/rCDV vaccines is recommended.

What about an older animal of unknown vaccination status?

Similarly, if you are evaluating an older cat or dog of unknown vaccination status, a series of two MLV or rCDV vaccines, in addition to one RV is recommended to assure a solid basis of protection. After that, for adults, the revaccination interval for FVRCP is 3 years, RV at one year and then as per manufacturer's instructions or local ordinance thereafter.

RE-VACCINATION INTERVALS:

The recommendation for annual revaccination is a practice that was officially started in 1978 by the AVMA and, until fairly recently, has remained unchanged and unchallenged for most of that time. In actual fact, the annual booster (except for some rabies vaccines) was only a recommendation by the manufacturer, not a requirement. This recommendation was made without any scientific validation of the need to booster immunity so frequently. In fact, the presence of good humoral antibody levels blocks the anamnestic response to vaccine boosters just as maternal antibody blocks the response in some young animals. If one considers the same situation in human medicine, how often are humans boostered against infectious diseases? When did you
last get your booster shot?

Core Viral vaccines should be repeated at one year of age. FVRCP or DAPP is given no more frequently than 3 years after that time. RV should be re-administered according to the manufacturer’s licensing approval (1 year or 3 years) and according to local ordinance.

Most of the canine and feline non-core vaccines are bacterins and, as such, they are not very good immunogens. Bacterins must be given yearly to maintain adequate immune protection. FeLV vaccination may be continued according to manufacturer’s instructions if the cat is at risk of exposure after 1 year of age.

Is it better to use an adjuvanted 3-year licensed RV or a non-adjuvanted 1-year licensed RV in cats?

The most important factor in induction of VAS is chronic inflammation at the injection site. Experimental histologic studies of vaccination sites show that non-adjuvanted vaccines produce little to no inflammation, whereas adjuvanted vaccines cause inflammatory changes at the site that may last for months to years. In my opinion, it is safer to use a non-adjuvanted vaccine more frequently rather than any adjuvanted vaccine, regardless of the frequency of use.

What if I change the vaccine products I am using? Must I start the vaccine series all over again?

No. The body does not recognize vaccine brand names. The important protective antigens will be present in a product produced by a different manufacturer. All approved veterinary vaccines have been tested and licensed for efficacy by the USDA.

VACCINE ADVERSE EVENTS:

Systemic adverse events:

It is fairly common for cats to exhibit some malaise, low grade fever, and anorexia for 12-36 hours post-vaccination. These signs are more frequent when adjuvanted vaccines and/or multiple vaccines are given at the same visit. We see this adverse event so commonly that most veterinarians warn cat owners that this will occur. This problem is also seen in dogs but with less frequency.
Post-vaccinal urticaria occurs most frequently in miniature Dachshunds but can occur in any dog and rarely in cats. Antihistamines and rapidly acting corticosteroids usually resolve the problem fairly quickly.

*Limping kitten syndrome* is a post-vaccinal, febrile, non-erosive polyarthritis syndrome associated with calicivirus vaccine administration. As the name suggests, this syndrome is most common in young cats. The polyarthritis is a self-limited and usually lasts less than a week. NSAID or other analgesic treatment will provide relief and shorten the duration of clinical signs. Immune-mediated polyarthritis within 10-14 days of vaccination has been reported in dogs. This is also a self-limiting disorder and NSAIDs are also effective in alleviating clinical signs.

Localized cutaneous vasculopathy occurs in dogs at the site of rabies vaccination. In my experience, and in literature references, the Fort Dodge RabVac rabies vaccine has most commonly caused this problem. Dogs with soft, continually growing hair such as poodles and terriers are most frequently affected. An area of alopecia and hyperpigmentation develops over the vaccination site within weeks to months of vaccination. Treatment with pentoxifylline (25 mg/kg PO q12h) and Vitamin E (500 mg PO q24h) may reverse this cutaneous vasculitis and allow hair to regrow at the site. If not, excision of the affected area is the only cure. Any vaccine that has caused this problem should be avoided in the future.

Immune-mediated hematologic disorders including immune-mediated anemia, thrombocytopenia, and/or pancytopenia have occasionally been associated with vaccine administration in dogs and cats. Post-vaccinal anterior uveitis has been reported in a few cats. This appears to be an Arthus-like immunologic reaction similar to the *blue-eye* reactions seen with canine CAV-1 vaccine. These immune-mediated disorders usually appear within 3-4 weeks post-vaccination. Dr. Diane Shelton has reported masticatory myositis (MM) occurring within 10 days post-vaccination in young (< 6 months of age) Cavalier King Charles Spaniels. This may be a breed-related event. Fortunately, the MM resolved over time with no lasting muscle atrophy.

Severe, systemic vasculopathy is a rare, but serious, post-vaccinal event. Signs usually develop within 3-4 weeks post-vaccination. Lesions may include cutaneous ulceration, peri-
orbital, mucocutaneous, oral, esophageal, gastric ulceration, and sloughing of footpads. The distribution of the lesions may mimic an auto-immune disease and the link to recent vaccination may be overlooked. Biopsies reveal vasculitis as opposed to the epidermal clefting and other changes typical of IM disease. The same pentoxifylline and Vitamin E protocol as listed above for cutaneous disease is used to treat systemic post-vaccinal vasculitis. Supportive care to treat ulcerated areas may include analgesics, antibiotics, fluid and nutritional support. In general, corticosteroids do not work very well for this type of vasculopathy.

The most critical, life-threatening adverse vaccine reaction is systemic anaphylaxis. Affected animals may exhibit a shock-like event with collapse, panting, vomiting, and/or diarrhea, and at worst, cardio-pulmonary arrest. Intravenous fluids, rapid-acting corticosteroids and anti-histamines should be administered as soon as possible. The lung is a major shock organ in cats and an enriched oxygen environment may be helpful. Avoid over-aggressive fluid administration because pulmonary edema can result. As a breed, Pugs seem to have a higher incidence of life-threatening systemic post-vaccinal events.

Vaccine-associated sarcoma (VAS):

The issue that galvanized the veterinary community and stimulated us to reassess vaccination practices, particularly in cats, has been the emergence of vaccine-associated sarcomas. This often fatal consequence of vaccination has been strongly linked to adjuvanted vaccines because this problem did not appear in cats until killed, adjuvanted rabies and feline leukemia virus vaccines were introduced. All adjuvants induce chronic inflammation at injection sites that lead to sarcoma development in predisposed cats. Aluminum is not the only component that is associated with VAS; however, aluminum serves as the ismoking gun in injection-site tumors because no other injectable agents contain this material. The histologic appearance of VAS is classical because they have a significant lymphocytic and plasmacytic infiltrate. The etiology can be further confirmed with immunohistochemical studies.

There is probably a genetic component that predisposes some cats to tumor development at sites of chronic inflammation. A genetic marker has been identified which seems to be present in many cats with VAS. At present we are not able to test for this genetic predisposition. Mechanical influences such as the
temperature of the vaccine, the size of the needle used for injection, and the site of injection (subcutaneous versus intramuscular) have been ruled out as causal factors.

There are several significant problems with using retrospective epidemiologic studies to attempt to determine which specific products or adjuvant components are of most concern. First, veterinarians often change products and may not keep accurate records about which product brands and lot numbers were used. Second, tumors may develop many years after a vaccine was given. Therefore, if a VAS tumor develops in a 10 year old cat that has been vaccinated yearly, we cannot know whether it was the vaccine given this year, 5 years ago, or 9 years ago that produced neoplastic transformation.

The occurrence of VAS in cats has been listed in various reports to be between 1:1000 and 1:10,000. Cats tend to breed locally, not nationally or internationally. Local populations may have genetic variations that may predispose a cat to developing VAS. Thus, the incidence of VAS seen in a particular practice may be different from another practice 10 or 100 miles away that uses the same vaccines and protocols.

How do you I know whether my patient has a VAS and what should I do if I diagnose one?

A local reaction at the site of vaccination is relatively common in cats, especially when adjuvanted vaccines are used. This site reaction usually subsides within 3-4 weeks without incident. If the site lesion is still present 4 weeks post-vaccination, you should perform fine needle aspiration cytology. If only inflammation is seen, the site can be watched for an additional 4 weeks. If the local reaction is still present 8 weeks post-vaccination, it should be biopsied and if not neoplastic, the affected area should be excised. If there is neoplastic transformation at a vaccination site, the cat should be referred for imaging and radical surgical removal of the mass. Complete first excision is the best treatment and may be curative. Further adjunctive therapy for VAS might include radiotherapy (brachytherapy, etc.), chemotherapy, and/or immunotherapy. The specifics of these adjunctive treatments are beyond the scope of this discussion.

Using the AAFP recommended sites for vaccination gives us a better chance to remove vaccination-site sarcomas completely should they occur. However, the best ways to reduce the
incidence of site reactions and VAS are to use non-adjuvanted feline vaccines whenever possible and to give feline vaccines on an appropriate, reduced frequency schedule as recommended by the AAFP, ACVIM Infectious Disease study group, AAHA, and academic infectious disease specialists.

Lymphocytic nephritis from parenteral feline vaccines grown in Crandall Rees kidney cells:

Chronic progressive renal disease (CPRD) is the most common cause of morbidity and mortality in older cats. Lymphocytic/plasmacytic nephritis is a common histologic finding in cats with CPRD. A pilot study by Dr. Mike Lappin and his research group several years ago demonstrated that Crandall Rees kidney cell (CRCK) antigen from viral cell cultures used to produce feline vaccines caused the development of anti-renal antibody in cats vaccinated with parenteral FVRCP vaccines. A further report from this research group demonstrated lymphocytic/plasmacytic inflammation in the kidneys of CRKC-sensitized cats. While the long-term significance of these findings is not yet known, it is another reason to modify our vaccination protocols to reduce the number of vaccines and vaccinations given to cat to the fewest needed to maintain good disease protection and good health.

If one of my patients has a history of an adverse vaccine event following previous vaccinations, what should I do?

Patients with a history of adverse vaccine events should be critically assessed for the need for any more vaccines in the future. In general, we try to avoid revaccination whenever possible. If additional vaccines must be given they should be given individually and separated by a 3-4 week interval. A different brand/type of vaccine should be used and the patient should receive antihistamine and corticosteroid pre-medication. I recommend that pre-treatment and vaccination be given as early in the day as possible and the patient should remain at the veterinary hospital for observation for the remainder of the day.

Reporting adverse events:

Veterinarians should keep accurate records of the brand, lot, serial number and injection site of all vaccines administered to their patients. The peel-off vaccine labels are very useful for
those practices using paper records. Data should be entered in the electronic record for paperless practices. Any suspected adverse event should be reported to the Professional Services veterinarians of the biologics manufacturer involved. Adverse events should also be reported to the USDA Adverse Event reporting site at: HYPERLINK "http://www.aphis.usda.gov/animal_health/vet_biologics/vb_adverse_event.shtml" http://www.aphis.usda.gov/animal_health/vet_biologics/vb_adverse_event.shtml If entering this long string is cumbersome, you can iGooglei USDA adverse event, and the reporting site will be the first entry on the search results list. The USDA online reporting form is very easy to fill out and submit.

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ADVERSE EVENT REFERENCES:

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APPENDIX 1:  From Dr. Michael Bannasch at the UCD Shelter Medicine Program
VS FCV suspects in a Private Practice setting:

Due to increased vigilance nationwide in regards to VS-FCV we are unable to handle to the overwhelming volume of inquiries regarding suspect cases. † If you believe that you may have a suspect case please first review our VS-FCV information page HYPERLINK "http://www.sheltermedicine.com/portal/is_vsfcv.shtml" \t "_blank"http://www.sheltermedicine.com/portal/is_vsfcv.shtml

Key points to remember:

1. † Neither VS-FCV nor field strain FCV can be diagnosed on clinical signs alone. †

2. † Diagnosis of calicivirus is further complicated by the fact that calicivirus can be isolated from the oral cavity of as many as 1 in 4 healthy cats, so simply detecting the virus in saliva does not provide a definitive diagnosis – its presence could be completely coincidental. Finding calicivirus in other samples such as serum or tissue is more suggestive that an acute infection is present, but does not rule out the possibility that a co-pathogen such as Bordetella bronchiseptica or panleukopenia is responsible for severe manifestations of disease.

3. † So far, no relationship has been discovered between the genetic sequence of a particular strain of calicivirus and the level of virulence. Virulent systemic strains are not particularly closely related to one another, although within each outbreak isolates from individual cats have been similar. † Specialized laboratories can only distinguish between strains that are closely related to one another or to the vaccine. Therefore, within a given outbreak it is possible to identify which cats have been infected with that particular strain, but there is no way to say what the virulence may be of any particular strain from an individual cat based on genetic sequencing.

4. † If you have a single suspect case in your clinic, the cat should be carefully isolated and all surfaces should be cleaned with soap and water, followed by application of freshly made bleach solution diluted at 1/2 cup per gallon or potassium peroxymonosulfate (Trifectant®). The area should be allowed to dry thoroughly and the process repeated before any other animals are placed on the surface or in the cage. All suspect cases should be treated symptomatically, the clinic should treat all
suspects as being potentially contagious and staff should increase bio-security vigilance. †
†
5.† †At this point we are unable to provide diagnostic support to facilities reporting a single suspect case. †All professional staff that have been in contact with this suspect cat should be advised to protect the health of currently housed cats in the clinic and the health of their personal pets by thoroughly washing their hands and by changing clothes before coming into contact with subsequent animals.

6.† †We are interested in receiving tissue samples from suspect cats examined by private practitioners that meet ALL of the following criteria:

a.† †The particular case meets the criteria as outlined at HYPERLINK "http://www.sheltermedicine.com/portal/is_vsfcv.shtml" \\	"_blank"http://www.sheltermedicine.com/portal/is_vsfcv.shtml AND...

b.† †The client reports that other cats in his/her home have similar symptoms beyond what is generally described as Feline Upper Respiratory Disease and the client has brought these cases into your clinic for examination ORÔ

c.† †A single case occurred in your clinic AND subsequent to this cats visit, other suspect cases occur either in animals currently housed in your clinic, or who were in your clinic during the same time as the initial suspect case, or in staff members personal pets. †Or, the individual cat has come from a shelter or rescue group with other suspect cases that have been examined by a veterinarian and have been determined to be suspect VS-FCV cases.

7.† †VS-FCV has been ruled out in overwhelming majority of VS-FCV cases submitted to our program. †In cases VS-FCV has been confirmed, thorough disinfection and strict isolation of suspect cases has been sufficient to end the outbreak.
For additional information, contact:
Mike Bannasch
Program Coordinator
UC Davis Koret Shelter Medicine Program
530-754-7355