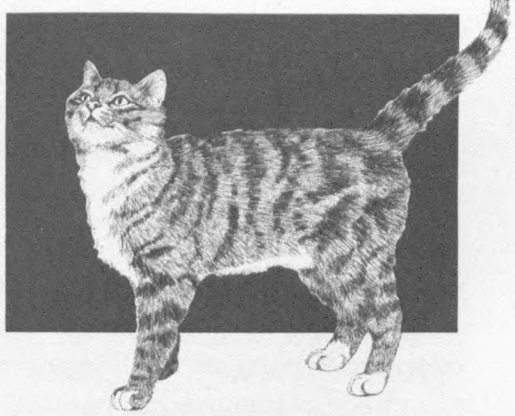
Perspectives On Cats
A Newsletter for Cat Fanciers
From The Cornell Feline Health Center
Summer 1991



Feline Infectious Peritonitis Vaccination— Past and Present

Christopher W. Olsen, D.V.M. and Fred W. Scott, D.V.M., Ph.D.

In the 25 years since feline infectious peritonitis (FIP) was first described as a disease entity, a great deal has been learned about this devastating disease. But despite these advances, FIP continues to instill fear and frustration among cat owners and veterinarians. While FIP only occurs sporadically in the general pet cat population, it remains a much more frequently occurring and serious problem in catteries, multiple cat households, and animal shelters. The reasons for this dichotomy include factors such as the stress inherent in multicat housing and the increased potential for exposure and transmission in such circumstances. The prolonged and variable incubation period of FIP also makes it difficult to trace back and identify possible source cats.

Perhaps the two biggest impediments to control of FIP are the lack of a specific test for and vaccine against the causative agent, feline infectious peritonitis virus (FIPV). Notably, the first commercially offered vaccine has just been marketed, *Primucell FIP®* by SmithKline Beecham Animal Health (formerly Norden Laboratories). Because of this, we'd like to review the history of FIPV vaccination attempts and what is currently known about Primucell FIP®.

Feline infectious peritonitis virus is only one of several coronaviruses that can infect cats. These include canine coronavirus (CCV), transmissible gastroenteritis virus of swine (TGEV), and most importantly, feline enteric coronavirus (FECV). FIPV and FECV are closely related viruses. Their major difference is that FIPV can induce a fatal, systemic disease whereas FECV most often produces subclinical or self-limiting enteritis. This is because FECV replication is primarily restricted to the intestinal epithelial cells, whereas FIPV can pass the mucosal border of the intestinal tract to infect monocytes/macrophages (types of white blood cells) and thereby spread systemically.

Pathogenesis of FIP

Why has it historically been so difficult to produce a vaccine against FIPV infection? The answer lies in how FIP develops. After infection through the mucosal surfaces of the upper respiratory or intestinal tracts, the blood transports FIPV to its many target organs. The intense inflammatory response leads to the classic lesions and/or fluid accumulation of FIP. The antibodies formed in response to FIPV infection are the basis for disease development rather than being protective. We also know that FIPV-specific antibodies can increase the infectivity of FIPV for

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macrophages, the target cell for FIPV replication. A final problem to overcome for vaccination is that once in macrophages, FIPV is largely protected from any effective immune response.

Past Vaccine Failures

To date, numerous attempts to produce a safe and effective vaccine against FIPV have been largely unsuccessful. We will review these by vaccine type.

Inactivated or killed vaccines generally induce a somewhat poor immune response as compared to modified-live virus vaccines. Several early attempts to produce inactivated vaccines by traditional means resulted in sensitization or enhanced disease instead of protection against virulent FIPV.

Approaches to FIPV vaccination using live or modified-live viruses have been more thoroughly evaluated. Dr. Barlough and colleagues at Cornell University tried using heterologous live coronaviruses as FIPV vaccines. Inoculation of cats with either canine coronavirus or human coronavirus 229E did not protect the cats against subsequent challenge with FIPV. Similarly unsuccessful results were obtained using transmissible gastroenteritis virus, a coronavirus that is very closely related to FIPV.

There are at least nine different strains of FIPV, which vary in virulence from being almost 100% fatal to almost 0%. Therefore, it made sense to see if a somewhat avirulent but fully "live" strains could serve as a vaccine strain. Drs. Pederson and Floyd evaluated three strains of FIPV and found that only one demonstrated any ability to protect cats against virulent FIPV challenge. However, it could still cause too much disease to be considered as a viable vaccine candidate. The FECV's evaluated to date induce substantial antibody-dependent acceleration of disease without protection, and are currently unacceptable as vaccine viruses.

Virulent FIPV strains have been experimentally rendered less virulent and evaluated as "modified" live virus vaccines. Use of a modified strain again led to antibody-dependent acceleration of disease instead of protection.

Researchers at the Cornell Feline Health Center have also derived a modified-live strain of FIPV for use as an intranasal vaccine, and have assessed its potential to protect cats against lethal FIPV challenge. The results, first reported at the Eastern States Veterinary Conference in January 1988, have been better than those of many other reported studies, but frustrating because of their inconsistency. Protection has varied from 100% to less than 25% in different trials. Overall, this experimental vaccine provided protection to approximately 50% of vaccinated cats. This work is continuing, as is work to see if ways can be developed to improve the immune response to FIPV vaccination.

Perspectives On Cats

A Newsletter for Cat Fanciers From The Cornell Feline Health Center

The ultimate purpose of the Cornell Feline Health Center is to improve the health of cats everywhere, by developing methods to prevent or cure feline diseases, and by providing continuing education to veterinarians and cat owners. All contributions are tax-deductible.

Director: **Fred W. Scott, D.V.M., Ph.D**
Assistant Director: **John E. Saidla, D.V.M.**
Editor: **June E. Tuttle**
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Besides these traditional approaches, Dr. Vennema and colleagues in the Netherlands have attempted to produce a FIPV vaccine using a modern recombinant carrier virus approach. When cats were infected with the recombinant vaccinia virus as the "vaccination" process, instead of being protected they developed accelerated disease compared to unvaccinated controls.

Primucell FIP®

The latest contender in the story of FIPV vaccination is also the first commercially marketed vaccine—SmithKline Beecham's Primucell FIP®. This is a temperature-sensitive, modified-live virus vaccine. It was derived from a virulent strain of FIPV by serial passage in cell culture, followed by ultraviolet irradiation. The result is a strain of virus that can replicate well at the cooler temperatures of the oronasal cavity (31°C), but poorly at systemic body temperature (39°C). As such, it is obviously designed to be an intranasally administered vaccine. The rationale behind this approach is to produce a "local" vaccination that induces a strong mucosal immune response, and thereby prevent infection across the mucosal barrier right at the start. The importance of local immunity to protection against the related coronavirus, transmissible gastroenteritis virus, is now well founded, lending further support to this approach for FIPV. This approach also makes sense considering the ever present problem of antibody-dependent enhancement of disease, since ideally the virus will be blocked before ever gaining entrance into the body.

Safety:

SmithKline Beecham Animal Health has done extensive safety tests of this vaccine. They have shown that the vaccine was apparently safe when administered to cats parenterally instead of intranasally. Also it was safely given to immunosuppressed or cats with feline leukemia. They also tested the vaccine in cats with pre-existing coronavirus antibodies, either due to previous FECV exposure or sublethal FIPV exposure. All the vaccinated animals "developed blood abnormalities only rarely" and "lacked abnormally high febrile responses" according to SmithKline Beecham, and no FIP. They have done preliminary safety tests of the vaccine in pregnant queens and young (3 to 8 weeks of age) kittens. *However, we stress that the vaccine is not approved for use in pregnant cats, nor in kittens less than 16 weeks of age.*

SmithKline Beecham has reported safety data on 1,473 doses of Primucell FIP® that were administered by 12 practicing veterinarians. Minimal adverse reactions, such as drooling and sneezing, were reported in 176 cats, but no anaphylactic reactions were reported.

Efficacy:

SmithKline Beecham has evaluated the vaccine's efficacy in a group of FIPV endemic catteries. In these endemic catteries they vaccinated 50% of the cats with Primucell FIP®, and gave a placebo vaccine without FIPV to the other cats. They followed the incidence of FIP in the vaccinate and control populations for at least 6 months. Kittens born during the study were vaccinated at 6 and 9 weeks of age. Under these natural conditions, the incidence of FIP in the vaccinate and control groups was not statistically different. (In one cattery that had persistent FIP losses they vaccinated all the remaining cats, and afterward found that FIP losses stopped. The significance of this is difficult to assess since there were no unvaccinated controls in this cattery and FIP losses in multiple cat environments typically fluctuate over time.)

Perhaps only time will tell just how effective Primucell FIP® will be in reducing the population-wide incidence of FIP. An efficacy trial of Primucell FIP® under experimental conditions is being done at Cornell University.

One possible reason for the apparent lack of efficacy in endemic catteries is the 16-week-old

Synbiotics' Feline Infectious Peritonitis Test

Synbiotics Corporation has been working on a new laboratory test to identify cats that have been infected with feline infectious peritonitis (FIP) virus. This test, based on anti-idiotypic technology, is still going through the licensure process, but as of early April 1991 it had not yet been approved by the USDA. Recent prerelease advertisements in veterinary and lay publications have resulted in numerous calls to the Feline Health Center and the Diagnostic Laboratory about this test. This brief report is to inform you of the development status of this test.

Synbiotics kindly supplied the Diagnostic Laboratory and the Feline Health Center with kits for evaluation of specificity and sensitivity. Unfortunately, during this evaluation, some problems were identified, as happens with any new test. We have shared our results with Synbiotics Corporation and are confident that these problems will be addressed.

According to Gregory Soulds, Synbiotics' vice president of marketing, sales, and business development, his company plans to "expand the scope of its independent clinical studies to broaden the experience base with the new anti-idiotypic assay technology among opinion leaders and academic institutions." He further states, "It is anticipated that these results should be available in the next few months and release of the product could be as early as August 1991."

"Synbiotics apologizes for the fact that the delayed product launch resulted in premature advertisement for the product,"commented Soulds. "However, we feel that the additional studies will better insure the broad acceptance of this important new technology in the long run."

Once this kit receives USDA approval and is released, we would hope to re-evaluate the final version of the kit. ■

FIP Vaccination *(continued from page 3)*

recommended age of vaccination. A recent study by Drs. Addie and Jarrett from Scotland has shown that transmission of feline coronaviruses can occur as young as 4 to 6 weeks of age. The results of this study are consistent with results previously reported from our laboratory by Dr. Cheryl Stoddart. SmithKline Beecham Animal Health scientists are currently evaluating the use of Primucell FIP® in younger kittens, but the vaccine is currently licensed for use at 16 weeks of age, with boosters in 3 to 4 weeks, and then yearly.

A final comment regarding vaccination and testing—Dr. Jay Gerber of SmithKline Beecham Animal Health reports that Primucell FIP® vaccination of seronegative cats will induce low positive coronavirus titers as measured by ELISA. This will pose a particular problem for cattery owners who are striving, in part by serologic testing, to maintain a coronavirus-free population. ■

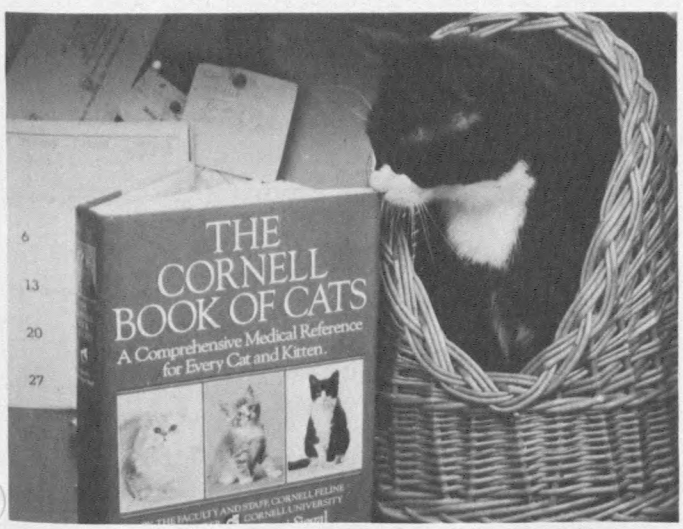
Dr. Christopher W. Olsen received his D.V.M. degree from Cornell University and is currently working on his Ph.D. degree in veterinary virology.

Dr. Fred W. Scott is the director of the Cornell Feline Health Center and professor of veterinary virology at Cornell's College of Veterinary Medicine.

Mascot is Named

There were 140 names submitted, from *Activated* to *Zorro*. The committee, comprised of staff members, found it difficult to choose the most appropriate name. There were unexpected surprises with some of the entries. An elementary learning disabled class created a special book, complete with crayon drawings depicting "Cookie's Week". Another entrant sent in a package of organically grown catnip for our mascot to enjoy. Others shared photos of their look-alike cats and personal stories. We heartily thank those who actively participated in "Name the Mascot Contest". Your interest and support is vital to the programs of the Cornell Feline Health Center.

First place was tied between *Dr. Mew* and *Cor-Vet*. The final vote was for *Dr. Mew*, submitted by Aminah Seebach of New York. The runnerup, *Cor-Vet*, was submitted by Ada McWilliams of New York. Second place was *Cookie* submitted by learning disabled children at Rosewood Park Elementary School in California. Third place was a four-way tie with the name of *Tuxedo* submitted by Mrs. Sward of New York, Rachel Potter of New York, Jean Lothrop of California, and Arlene Perino of New Jersey. Prizes will be awarded for these entries.



Dr. Mew recommends **The Cornell Book of Cats** *for all cat owners.*

Because we received so many names we decided to reprint others that especially caught our eye. Entrants' comments are also included with the name they submitted.

Amicus Puss	"Amicus" is Latin for "friend"
Bat Cat	
Bonkers	
Catman	He looks like he is wearing a Batman mask
Coreo	Cornell Oreo
Cornellius	
Ezra	
Felix	Latin for "happy" to represent Felis domestica
Ithacat	
K-10	One better than a K-9 (canine)
Kemo-Sabe	The Lone Ranger. Who was that maskot?
Lucky	
Mr. Corfel, M.H.C.	"Mister Cornell Feline, Mascot Health Center" (nickname Mister C.)
Othello	
Oreo	
Sneakers	
Super Destroyer	
Sylvester	
Weebok	Like Reebok. He looks like he is wearing sneakers.

■

Hospice Care for Terminally Ill Cats

John E. Saidla, D.V.M.

Many cat owners are perplexed regarding the level of terminal care they can provide for older cats with advancing neoplastic diseases (tumors) or other debilitating chronic diseases such as kidney failure. They are not ready to euthanatize the cat, yet they cannot provide the care that their veterinarian feels is necessary for humane treatment of the terminally ill cat. A hospice can provide for this care, allowing the owner time to adjust and prepare for the inevitable.

Younger cats in the later stages of infectious diseases (i.e., feline leukemia, feline infectious peritonitis or feline immunodeficiency virus) may be difficult to manage at home, but not critical enough to spend their last weeks in a veterinary facility. These cats can usually be managed if they are not around healthy cats. Management of the sick cat is not the major problem, but controlling the possible spread of infection to other cats is of utmost concern.

Several shelters and individuals have set aside space in which to provide intermediate care for chronically or terminally ill cats. Most of these facilities are for small numbers of cats that are in a similar stage of the same illness.

Personnel providing this care should be skilled in nursing care; have good coping skills; have a sense of reality regarding what can be provided in terms of space, level of care, number of cats; and recognition of financial constraints. Volunteers can be utilized to relieve full-time employees and to help when more care is needed. Stress levels among workers in these facilities are very high. There are good feelings regarding the idealistic goals for caring of terminally ill cats, but depression when a favorite cat dies or is in a prolonged "just living" state.

A good working relationship between the care giver and veterinarian is necessary for a hospice program to be successful. In any extended care facility there will be the need for veterinary examinations, purchase of fluids and supplies, supervision of medication administration, and consultation regarding euthanasia or elective care until death.

If you are considering such a facility, contact your veterinarian to discuss the feasibility of a hospice facility. He/she can advise you on any restrictions imposed by the state Veterinary Practice Act. Legal advice will be necessary to provide forms, releases and other legal documents to protect the operators of the facility from law suits arising over disputes regarding the care provided. Zoning ordinances and laws must be met in most areas before a facility can begin care, despite its size.

The owners of the cats should be allowed very liberal visiting hours so they can continue the human-pet bond. Dealing with distraught and sometimes guilty owners will occupy much of the staff's time and resources. This program cannot be considered as a substitute for appropriately timed euthanasia. It is best used as an alternative to give the owner time to accept and prepare for the inevitability of the pet's death. ■

Mail Bag

We regret that this column does not appear in this issue. We did not receive any questions from our readers. If you have a question you want answered in this column please send it to: POC Mail Bag, Cornell Feline Health Center, 618 VRT, Ithaca, NY 14853-6401.

Honor Roll

We extend a special "thank you" to the following people who have donated $100 or more to the Center:

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Bequests

Some individuals have chosen to provide support by naming the Cornell Feliine Health Center as their beneficiary in their wills. We gratefully acknowledge the following bequests :

Evelyn Cross
Arthur Eschner
Sara Littlejohn
Catherine Mortenson
Frank Promowitz

In the News

Winn Foundation Funds Feline Health Studies at Cornell

Dr. Fred Scott received a grant for $14,720 to evaluate SmithKline Beecham's new vaccine for feline infectious peritonitis. This modified-live vaccine was recently licensed in the United States for intranasal use in healthy cats to prevent the disease. This study will independently evaluate the safety and efficacy of this vaccine using the manufacturer's recommended doses and age of vaccination.

Chronic renal disease is being diagnosed with increasing frequency in the cat. Drs. Yaphe, Center, Reimers and Kallfelz will use their $6,300 grant to establish parameters which will aid in earlier detection and treatment of renal disease. The value of vitamin D supplementation as a treatment modality will also be explored in this study.

The Robert H. Winn Foundation was established by the Cat Fanciers Association (CFA) in 1968 to support health-related studies to benefit cats. Donations from CFA cat clubs and individuals fund the grants awarded to institutions.

Good News About Allergies to Cats

According to a recent study at Washington University School of Medicine, washing your cat in distilled water may help relieve your allergies to cats. A monthly 10-minute soaking proves to be sufficient. However, it may take several months before your allergies to cats abate.

Science News reports that 30% of asthmatics are allergic to cats. The allergic response is triggered by proteins that are deposited on the cat's fur as it grooms itself. These proteins are secreted by the cat's salivary and sebaceous glands.

(Resource: Cats Magazine, June 1991)

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