

CORNELL FELINE HEALTH CENTER NEWS

No. 4

August 1981

Central nervous system disease in the cat

Brian A. Summers, B.V.Sc., M.Sc., Ph.D.

Fortunately for cats and their owners, disorders of the central nervous system (CNS) in the feline occur only sporadically. The brain and spinal cord are quite unique tissues and their diseases are difficult to treat. Furthermore, the capacity for regeneration and repair in the CNS is limited and consequently many animals (and people) who suffer CNS injury or disease are left permanently incapacitated.

Congenital CNS disorders are uncommon in the cat. For example, hydrocephalus, which is quite common in certain breeds of dogs, is rarely encountered in the cat. The Manx cat, however, does show a predisposition to spina bifida of the lumbosacral vertebrae and associated changes in the spinal cord (meningomyelocoele) may occur.

Furthermore, workers at Cornell have associated teratogenic effects with the administration of griseofulvin to pregnant cats. Cyclopia, exencephaly, microphthalmia and optic nerve hypoplasia were found. Accordingly, the administration of any drug to the pregnant queen should be with extreme caution.

Panleukopenia virus, the cause of infectious feline enteritis, can attack the brain of kittens in utero. Such animals are born with a cerebellar disorder, manifested by dysmetria and tremor once the kittens begin to ambulate. Some animals can compensate reasonably for their defect but, as alluded to above, their brain damage is permanent.

Nutritional disease and associated CNS injury are rare but thiamine deficiency may produce an encephalopathy in the cat (and many other species). Usually this is a result of the destruction of this vitamin by thiaminases of dietary origin (fish). Commercial foods for cats generally provide adequate B₁ and this condition is now less commonly encountered. Affected cats may be incoordinated, convulsions may occur, and handling the cat will often induce it to ventroflex the head and neck and roll up into a ball. Early therapy with thiamine may cure this disorder.

The most common feline CNS disorders are infectious and involve a spectrum of pathogens. Toxoplasmosis is caused by the protozoan organism *Toxoplasma gondii*. Occasionally this agent will produce a necrotising encephalomyelitis in the cat. Injury to the CNS is severe and the condition is frequently fatal.

Cryptococcosis may affect the feline and produces a disseminated meningo-encephalomyelitis. The organism responsible is a yeast, *Cryptococcus neoformans*,

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and again symptoms and pathological changes are severe.

A third killer which produces inflammation of the meninges and adjacent brain and spinal cord is the coronavirus of feline infectious peritonitis. Although predominantly affecting tissues of the abdominal cavity, FIP can involve the nervous system with lethal outcome.

Symptoms for the last three conditions mentioned may include depression, incoordination, paralysis, seizures, and so on. Interestingly, all three may extend from the CNS to the eye, producing a chorioretinitis.

Rabies may produce encephalomyelitis in the cat, as in many other animal species. Fortunately, feline rabies is documented relatively infrequently. Recently workers in Alabama recorded the presence of a polioencephalomyelitis in cats. One or two examples of this emerging disease have been recognized at Cornell also.

Finally, to complete the spectrum, larvae of the fly Cuterebra will occasionally gain access to the brain in cats. Apparently these larvae burrow in from the poll region, as signs are referable to cerebellar-medullary injury. The parasite wanders around in the tissue, producing severe injury. Happily, this bizarre situation occurs infrequently.

Storage diseases occur in all species and constitute an important group of metabolic disorders. The basis of the disorder is an enzyme deficiency and so the patient stores (in various tissues) metabolites that cannot be handled by normal catabolic pathways.

Clinical disease is often a reflection of CNS involvement, as these cells (neurones) are incapable of replacement and are soon impaired. These disorders are inherited and symptoms, first seen around one to three months of age, often reflect the

cerebellar involvement. Siamese cats are often victims of these disorders but cases in common domestic short hair cats are seen also.

Feline ischaemic encephalopathy is a syndrome in the cat somewhat akin to stroke in man. Onset of disease is peracute and is caused by focal cerebral ischaemia. Usually seen in mature cats (often in midsummer, curiously enough), it can be expressed by depression, circling, incoordination, or seizures. These acute signs often resolve in a few days, leaving a permanent change which may be behavioral, visual, or other. The cause of this disorder is not known.

CNS diseases associated with aging are occasionally encountered in the feline. A primary degenerative disorder of the spinal cord, myelopathy, has recently been described in the cat. A similar condition occurs in large aging dogs such as the German Shepherd.

Finally, tumors occur in the feline CNS and are not uncommon. Meningioma constitutes the most common primary
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CORNELL FELINE HEALTH CENTER NEWS

A publication of

Cornell Feline Health Center
NYS College of Veterinary Medicine
Cornell University, Ithaca, NY 14853

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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.

Diagnosis of virus infections in cats

Richard C. Weiss, V.M.D., Ph.D.

Virus infections constitute the most important group of infectious diseases affecting the cat. Viruses are submicroscopic particles, i.e., they cannot be observed by the ordinary light microscope, and consist of proteins and nucleic acids (e.g., DNA or RNA).

Unlike bacteria and most other life-forms, viruses require living cells to "stay alive." In fact, outside the living cell, viruses appear crystalline-like, almost mineral in structure. Once these inert particles invade cells they acquire the ability to incorporate the essential building blocks of life, amino acids and proteins (which are made, free of charge, by the cell itself), and may reproduce themselves countless times. Unfortunately, the cell (or entire organism, if the virus infection is severe enough) may be destroyed during the process of viral invasion.

Although cats are frequently infected by viruses without showing signs of disease, there are several important viruses of cats that are commonly associated with disease. These include feline panleukopenia virus (distemper, feline enteritis); rabies virus; herpesviruses (feline rhinotracheitis, pseudorabies); feline calicivirus; feline infectious peritonitis virus (FIP); and feline leukemia virus (FeLV, feline leukemia).

In general, whether or not an individual cat will develop disease following infection with any of these viruses depends on many factors, including age (kittens are frequently very susceptible to viral infections, particularly when they did not suckle the queen after birth, and are also quite vulnerable around weaning time), genetic background, nutritional status, environmental stresses, coinfection with other viruses (e.g., cats infected

with FeLV are more susceptible to FIP), and immune status (proper vaccinations, adequate intake of colostrum or "first milk" after birth, administration of immunosuppressive drugs which may impair resistance to disease, etc.).

Viruses may attack almost any organ of the cat and produce a variety of clinical syndromes, including respiratory disease (conjunctivitis, rhinitis or sinusitis, laryngitis, bronchitis, and pneumonia); enteric disease (gastroenteritis, dysentery); diseases of the blood, bone marrow and lymph glands (leukemia, lymphosarcoma); disease of the central nervous system (encephalitis, meningitis); and generalized or systemic diseases (e.g., peritonitis).

The diagnosis of specific viral infections based on clinical symptoms alone is frequently difficult, as the same symptoms of disease may result from the effects of other microbial agents (e.g., bacteria, fungi, mycoplasma, protozoa), parasites, toxins or chemicals, allergies, and cancer.

In addition to clinical signs, diagnosis of viral infection may be made by the veterinarian on the basis of one or more of five methods:

1. Viral isolation in tissue culture or eggs. In this method, swabs of infected secretions (oral, nasal, ocular, rectal) or small pieces of tissue are added to tubes containing living cells. The cells are then grown in the laboratory under proper conditions of temperature, carbon dioxide and acid levels which simulate the natural body environment. The cells are examined after several days. If virus is present in the samples, the cells undergo characteristic changes which are recognized by the virologist.

2. Histopathology. Tissues from deceased animals or tissues taken from

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the animal during surgery (biopsy) are fixed in formalin (a chemical preservative), sectioned, and observed under the light microscope for typical viral-induced cellular changes recognized by the pathologist.

3. Serological methods for identification of virus or viral protein. Numerous tests identify virus in cells by using antibodies which react specifically against the virus (e.g., direct fluorescent antibody test).

4. Electron microscopy. The electron microscope can magnify virus particles 100,000 times or greater and is used to examine tissues, secretions, and cell cultures for virus particles. In this method, many virus particles must be present in the sample in order for them to be seen. This is a fairly rapid but relatively insensitive technique for viral diagnosis.

5. Demonstration of specific antibody response against the virus (antibody titer). Antibodies against the virus are measured at the outset of disease and again at 10 days to two weeks later, if possible, to demonstrate a rise in the antibody levels. Examples of this method include the indirect fluorescent antibody test and the serum neutralization test.

In general, the particular method(s) used depends on which viral disease is suspected. For example, for diagnosis of FeLV, a blood test that identifies certain proteins associated with the virus (Method 3) is usually used in conjunction with clinical signs, although biopsy of the lymph nodes and examination of blood, tissue, and fluids for malignant cells (i.e., cytology) may also be required.

Diagnosis of panleukopenia is frequently made on the basis of clinical signs and blood counts, but may be confirmed by examining feces for viral particles by EM (Method 4), virus isolation in cell culture (Method 1), and/or histopathology of intestine

(Method 2).

Diagnosis of specific feline viral respiratory diseases (e.g., rhinotracheitis vs. calicivirus infection) requires isolation of the virus in cell culture, and/or demonstration of a specific antibody response (Method 5).

Even with all the available techniques, diagnosis of viral infection may be extremely difficult, since there may not be enough viable virus particles in the sample to yield a positive test, or the virus itself will not grow in the laboratory. This has been the major problem for many years with FIP diagnosis; diagnosis of FIP depends primarily on typical clinical signs, histopathology (Method 2), and an elevated FIP antibody titer (Method 5). The recent development of new and more sophisticated tests by virus researchers will certainly increase the chances of accurate diagnosis by the veterinarian of FIP and other important feline viral diseases.

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neoplasm, while lymphosarcoma, which may be seen at any age, is the other important diagnostic consideration. Meningioma produces depression, circling, and seizures, while paralysis, often referable to spinal cord involvement, is more typical of lymphosarcoma.

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Geographical distribution of feline infectious peritonitis (FIP)

J.E. Barlough, D.V.M.; J.C. Adsit, B.A.; F.W. Scott, D.V.M., Ph.D.

Feline infectious peritonitis (FIP) is a unique coronaviral disease of domestic and exotic cats characterized by fibrinous peritonitis and/or pleuritis, or formation of disseminated pyogranulomas, or both. It was first definitely described in 1963 by Dr. Jean Holzworth at the Angell Memorial Animal Hospital in Boston.

Later reports indicate that cases of FIP have apparently been observed since the early 1950s, although they had not been previously recognized as representing a separate disease entity. In the United States, FIP has been seen in the Midwest since at least 1962, in the New York City area since 1956, and in California since 1954.

Following the initial clinico-pathologic descriptions of FIP in the United States, clinical reviews and case reports began to appear in many areas of the world. Literature reports of FIP in numerous countries have appeared, including Australia, Austria, Belgium, Canada, Denmark, England, Finland, France, Germany, Iran, Ireland, Israel, Japan, Mexico, the Netherlands, New Zealand, Norway, Scotland, Senegal, South Africa, Sweden, Switzerland, and Yugoslavia.

In an attempt to supplement available literature information regarding the geographical distribution of FIP, the Cornell Feline Health Center in 1980-81 conducted an international survey of veterinary and agricultural college faculty members, diagnostic laboratory and agricultural ministry personnel, and veterinary investigational laboratory researchers.¹ Questionnaires sought information concerning the presence or absence of effusive and non-effusive FIP, and their approximate frequency of

occurrence in countries reporting their presence. Some of the major findings of this survey are summarized briefly below:

Brazil - 2 cases out of 700 diseased cats examined (University of São Paulo)

Chile - Not diagnosed

China (People's Republic) - Frequency unknown

Colombia - Approximately 8 cases of effusive FIP per year (National University of Colombia, Bogotá)

Egypt - Frequency unknown

Ghana - 1 suspected case in the past 5 years (Department of Veterinary Services, Kumasi)

Guatemala - Not diagnosed

India - Not diagnosed

Iraq - Not diagnosed

Italy - Approximately 4-5 cases per year (Universities of Perugia, Torino, Bologna, and Milan)

Kenya - Not diagnosed

Nigeria - 1 case in the past 5 years (Ahmadu Bello University)

Norway - 15-20 cases in the past 2-3 years (Veterinary College of Norway)

Papua New Guinea - Not diagnosed

Poland - Not diagnosed

Romania - Not diagnosed

Saudi Arabia - Frequency unknown

Scotland - Infrequently diagnosed (University of Edinburgh)

Sweden - Frequency increasing; 10-20 cases per year (Uppsala)

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Making Euthanasia Easier on Clients

LOS ALTOS, Calif. — Euthanizing a pet isn't a pleasant experience for the client or the veterinarian. But the practitioner who insists on payment for the procedure, especially if it's a hefty sum, can not only exacerbate grief, but positively alienate a client as well.

There is an antidote to this sticky situation: suggest the client make a donation to a charitable foundation for animals instead of paying a fee.

One doctor who has taken this tack sees it as a positive practice builder, in addition to providing the more intangible benefit of letting him feel like a "good guy."

Dr. Howard A. Weyker, at the Los Altos Animal Clinic here, has given his clients the charitable contribution choice since 1974. When an animal is euthanized at Los Altos, the staff expresses its sympathy and suggests, in place of a euthanasia fee, a \$20 tax-deductible donation to the Animal Health Foundation. The foundation supports animal health research and publishes a bi-monthly magazine, *Today's Animal Health*, which is sent free to the donor for a year.

Today's Animal Health is run by a volunteer board of veterinarians and is aimed at informing animal owners about responsible animal ownership and health care. Dr. Weyker calls the maga-

zine "an excellent means of informing pet owners about veterinary medicine."

While Dr. Weyker may charge an office fee to diagnose a moribund patient before euthanizing the animal, he says in most cases, even this fee isn't charged. If a client comes in to have an animal put to sleep and the remains disposed of, there's "never a charge."

He's convinced that this last act of "compassion" is a practice builder.

Checks of euthanasia records 10 or more years old—before the contribution program began—have shown that most of these clients never returned. In contrast, Dr. Weyker says many clients who have made contributions have either returned with their new pets or generated referral business.

Some practices in this area charge up to \$50 for the "pittance" it costs to euthanize an animal, says Dr. Weyker, while only a few sporadically offer the contribution alternative. At the same time, he notes that clientele at most of the practices has "dwindled" while his has "steadily" increased.

"We have a happy clientele, and I think our success has revolved around our euthanasia program," says Dr. Weyker. Never keen on charging euthanasia fees even before

starting the program, he adds that the feeless procedure is also "good for the ego—it's good to hear someone say you're a nice guy."

In addition, Dr. Weyker believes such programs result in beneficial overall publicity for veterinarians, perhaps even doing more for the profession than, for example, media spots sponsored by associations that picture the practitioner in a good light. One thing is clear, he stresses, "squeezing bucks out of people for euthanasia is not the way to improve the veterinary image.

"Even the local newspaper, which is generally anti-profession, has printed several unsolicited articles about our euthanasia donations and portrayed veterinary medicine in a very favorable and respectful manner," says Dr. Weyker.

Dr. Weyker also gives one-year subscriptions to *Today's Animal Health* to clients who surpass \$100 in paid fees for the year. The first complimentary issue is accompanied by a pre-printed note citing the practitioner as the gift subscription source. The subscriptions cost the practitioner \$3 each.

But Dr. Weyker says client response to the gift subscriptions, instituted three years ago, hasn't been nearly as "dramatic" as the reaction to the euthanasia program. ■


Let Our Memorial Gifts Program Work For You

As the preceding article shows, you can develop client loyalty, build better public esteem for the profession, and enlarge your practice through referrals by grateful clients, when you participate in a memorial gifts program.

What's more, your memorial gift to the Cornell Feline Health Center will help support critical research on deadly feline diseases.

There are two ways you can participate in the Cornell Feline Health Center memorial gifts program; (1) Instead of collecting a euthanasia and/or disposal fee, you can suggest that your client contribute directly to the Cornell Feline Health Center; or (2) You can surprise your client by collecting the fee as usual and then forwarding it to the Cornell Feline Health Center. Your client will be deeply moved to receive a sensitive acknowledgement from us explaining what you have done in memory of the deceased cat.

Personally and professionally, you will reap great rewards as you give through this program. Just fill out the form below and mail it today for your supply of memorial donation cards (pictured at right).



Cornell Feline Health Center
New York State Veterinary College
Cornell University
Ithaca, New York 14853

IN MEMORIAM

The enclosed check for \$ _____ is given in memory of

pet's name age breed

Owner: _____

Address: _____

Please acknowledge this gift in my name.

Veterinarian: _____

Address: _____

Would this client like to receive our publications?
 yes no

Please send a supply of donation cards for the euthanasia memorial donation program.

Other comments _____

Name _____

Address _____

City _____ State _____ Zip _____

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FIP (Cont. from page 5)

Turkey - Infrequently diagnosed
(Ankara University)

Uganda - Not diagnosed

Venezuela - Infrequently diagnosed
(University of Zulia, Maracaibo)

Yugoslavia - Infrequently diagnosed;
non-effusive form seen (University
of Zagreb)

Zambia - Not diagnosed

Zimbabwe - Infrequently diagnosed
(Ministry of Agriculture)

¹Barlough, J.E., Adsit, J.C. and
Scott, F.W.: The worldwide occurrence
of feline infectious peritonitis.
(submitted for publication)

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Cleaner litter boxes

The following practice tip appeared
in the January 1981 issue of *The
California Veterinarian*. It is
reprinted here with permission from
the editor.

"We eliminated the smell and source of
contamination over ten years ago. Our
hospital has used Mobilfoam trays for
pre-packaging (TF-0850 10"x5/8") as
the container in which we place one
handful of Vermiculite. Vermiculite
is a soil expander which can be pur-
chased at any nursery supply store.
The trays can be supplied by your
paper goods distributor. The cats
generally adapt well to the use of
the disposable system. Occasionally
they spread the light Vermiculite
about the cage. The Vermiculite is
very inexpensive compared to litter
and weighs one-tenth as much and is
highly absorbent and not dusty."

- Dr. Barry L. Rathfon, Director
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