



10-1-1993

## 16th Annual Feline Symposium

Joan Capuzzi  
*University of Pennsylvania*

---

# 16th Annual Feline Symposium

The 16th Annual Feline Symposium was held on April 11 at VHUP. It included presentations by faculty members and the Parade of Breeds with Mr. Richard Gebhardt. Following the lectures, a wine and cheese reception for symposium participants, hosted by Mrs. R.V. Clark, Jr. and Mrs. Edith Young, was held. Following are summaries of some of the faculty presentations.

## Feline Toxicoses

Cats are unusual in the way they metabolize certain compounds, said Dr. Kenneth J. Drobatz, assistant professor of emergency medicine and director of VHUP's 24-hour emergency service, and they cannot tolerate various substances that are innocuous to many other species. Dr. Drobatz highlighted the causes, mechanisms, clinical signs, treatments and preventive measures inherent to some of the more prevalent feline toxicoses.

"Cats are very fastidious and picky about what they eat," Dr. Drobatz said. "In general, we don't see them getting into toxins on their own very often."

Case in point: organophosphates. Among the most common feline toxicoses, organophosphate toxicosis may occur in cats dipped in flea products containing organophosphates. Carbamates, another class of compounds in many insecticides, have a similar mechanism of toxicity in cats. Both inhibit acetylcholinesterase, an enzyme responsible for deactivating the neurotransmitter, acetylcholine, and continuous nerve impulses and muscle contractions result.

Clinical signs of organophosphate intoxication include salivation, lacrimation (excessive tearing), urination, defecation, respiratory distress, bradycardia (slow heartbeat) and pupil constriction. Muscle tremors may occur and, in severe cases, even paralysis.

A dipped cat exhibiting these symptoms should be washed immediately in a mild detergent. If symptoms persist, veterinary care is recommended. Once the patient is stabilized and bathed, the vet-

erinarian usually monitors vital signs and administers atropine sulfate and/or pralidoxime chloride. Activated charcoal may be given orally to bind, and prevent absorption of, any toxins which might have entered the digestive system during the cat's coat-cleaning routine.

If untreated, significant distress, such as paralysis of the diaphragm, and death, may result. Treated patients usually exhibit signs of recovery within 24 hours. "Most respond quite well to bathing and (medication)," said Dr. Drobatz, "but there are some that will continue to deteriorate no matter what we do."

Two other groups of compounds, pyrethrins and pyrethroids, are present in many insecticides and, though toxic in certain cases, are generally not as poisonous to cats as are carbamates and organophosphates.

Symptoms manifest in overexposed cats include hypersalivation, vomiting, diarrhea and muscle tremors. Behavioral changes may run the gamut, from depression to hyperexcitability. Cats suffering from pyrethrin/pyrethroid toxicosis should be bathed and their vital signs monitored. Valium may be administered to control seizures and activated charcoal given or vomiting induced to inhibit further toxin absorption.

Treatment for these topical poisonings, while often effective, is certainly no substitute for prevention, said Dr. Drobatz. "Be sure the flea products you use are formulated for cats." But, he added, bear in mind that sensitivity may vary among individuals.

Certain drugs are also lethal to cats, said Dr. Drobatz, because cats "are unique in the way they metabolize drugs."

Acetaminophen intoxication is seen with some frequency at VHUP's emergency room. Tylenol, whose active ingredient is acetaminophen, is occasionally given to sick cats by owners unaware of its consequences.

Cats lack a specific glucuronyl transferase necessary to metabolize acetaminophen. Acetaminophen effects the conversion of hemoglobin, responsi-

ble for carrying oxygen through the circulatory system, to methemoglobin, which has poor oxygen-transporting properties and gives the blood a brownish tinge.

Other signs of acetaminophen intoxication include swelling of the face and paws, cyanosis (bluish coloration) of mucous membranes and ear pinnae, hypersalivation, vomiting, hypothermia, tachycardia, dyspnea (respiratory distress, often signalled by panting), ataxia (impaired physical coordination) and lethargy.

Prompt veterinary care is necessary, and patients may be put into an oxygen cage to help restore blood oxygen levels. Inducing vomiting, if poisoning has occurred within the last three to four hours, and gastric lavage may be helpful. Activated charcoal may then be administered orally to prevent further toxin absorption.

Cimetidine, which inhibits the conversion of acetaminophen to other toxic metabolites, and N-acetylcysteine and ascorbic acid (vitamin C), which aid in the reconversion of methemoglobin to hemoglobin, may also be administered. Fluid therapy and basic supportive care may follow.

Acetaminophen intoxication is sometimes fatal, but patients that show signs of recovery 48 hours after treatment usually survive. Recovery may be monitored by checking gum color, which usually resumes a pinkish tone about 36 hours after treatment.

Aspirin intoxication, less common in cats, manifests itself through a variety of non-specific symptoms. These include elevated body temperature and respiratory rate, vomiting, diarrhea, ataxia and hyperexcitability. Aspirin absorption may be inhibited by inducing vomiting or administering activated charcoal.

Drug toxicosis is usually avoidable if owners defer the design of treatment regimens to veterinarians. "If you're thinking of giving your cat anything, I don't care how benign it seems," Dr. Drobatz advised. "call your veterinarian first."



Antifreeze, or ethylene glycol, is one of the few dangerous substances that cats may consume voluntarily. Ethylene glycol itself is nontoxic to cats, but its metabolites are toxic. The lethal toxic dose in cats is 1.5 ml./kg. "A little over a teaspoon can potentially kill a cat," said Dr. Drobotz.

Clinical manifestations occur in three stages. The central nervous system becomes affected during stage one, thirty minutes to twelve hours after poisoning; signs include seizures, stupor or coma. The cardiopulmonary system is affected and tachycardia becomes evident in stage two, which occurs during the next twelve hours. Stage three follows, and with it, the deterioration of renal function.

"If we have a cat that comes in and is in kidney failure," Dr. Drobotz said, "the prognosis that we'll be able to save it is pretty poor." Diagnosis includes measurement of blood osmolality, which increases with intoxication. In severe cases, crystals may be present in the urine, so urinalysis is often recommended. Serum ethylene glycol concentration may also be measured.

Dr. Drobotz also recommended activated charcoal to prevent further ethylene glycol absorption, intravenous fluids to diurese the kidneys and intravenous ethanol to inhibit the conversion of ethylene glycol to toxic compounds. The credo, "A little knowledge is a dangerous thing" is very relevant in feline toxicosis prevention. Before giving your cat a new substance, either orally or topically, consult a veterinarian.

J.C.

## Feline Reproduction

Cats are very prolific. A walk down almost any city street will bear witness to this fact. However, said Dr. Margret L. Casal, resident in medical genetics and pediatrics at VHUP, cats may encounter a number of difficulties procreating. Dr. Casal focused on normal feline reproductive cycles, abnormalities affecting fertility, pregnancy and parturition, and ways in which to determine breeding fitness of individual cats.

Toms are born with descended testicles, which may move up and down until puberty, about 6-8 months of age. They may remain fertile through 14 years of age.

Queens become fertile at 4-12 months of age and their reproductive life normally spans 8-10 years. From January/February through October/November, fertile queens go into heat approximately every 20 days. Feline heat cycles, which last 12-20 days during breeding season, are affected by light and temperature. In areas where temperature is constant and there are approximately 14 hours of daylight each day, queens may cycle throughout the entire year.

Proestrus, which occurs in about one in five cats, lasts two or fewer days. During this time, the queen exhibits signs of heat but is unreceptive to the tom. Estrus, or heat, follows and lasts 5-8 days, on average. During estrus, the estrogen level rises and the queen usually permits the tom to mount. The estrogen then falls, and the queen enters the nonestrus phase of about 10 days. The next heat cycle follows shortly thereafter.

Before mating cats, said Dr. Casal, it is important to determine their breeding suitability. "A good breeding tom and queen should come from healthy litters of good size and from queens that had no difficulties giving birth or rearing litters," Dr. Casal said.

The health history and results of a physical examination which may, in certain cases, include a semen evaluation, should also be taken into account.

Queens should have regular heat cycles.

Both queens and toms should be free of any genetic defects.

Mating normally lasts approximately four minutes and the queen ovulates shortly afterwards. The probability that a pregnancy will result from a single mating is about 50%, and queens may allow as many as thirty matings per day.

Pregnancy, which is accompanied by a fall in the estrogen level coupled with a rise in progesterone, can often be detected by palpation as early as day twenty. Ultrasound can normally be used to monitor fetal heart rate and development after the twenty-sixth day of pregnancy.

Gestation generally lasts 64-69 days and, about one week before giving birth, the queen's temperature, normally 101.5 degrees, drops to 98-99 degrees. She begins to prepare a birthing area about 12-24 hours before going into labor.

Once labor begins, the queen's temperature drops another 2-3 degrees, and the first kitten is normally born about four hours later. The usual time interval between kittens is 30-60 minutes and the average litter size is four.

Pregnancy may not follow this normal course when cats with fertility problems are bred. Chromosomal abnormalities and aberrations in sexual differentiation and development of reproductive organs may render both toms and queens infertile. Bite wounds to the testicles, if not treated properly, may cause sterility in toms.

Viral infections, such as feline leukemia virus (FeLV), feline immunodeficiency virus (FIV), feline rhinotracheitis virus (FRV), feline infectious peritonitis virus (FIP) and feline panleukopenia virus (FPV), may impair the overall fitness of breeding populations. Dr. Casal advised keeping breeding cats indoors and limiting their contact with outdoor cats. She also recommended testing new additions to the cattery for FeLV, FIP, FIV and toxoplasmosis and quarantining them for at least two to six weeks before introducing them into the population. "This is important," said Dr. Casal, "because these viruses can be transmitted from animal to animal and resultant infections may debilitate queens and arrest their heat cycles."

Continued on next page





## Feline Reproduction

*Continued from page 7*

Malnutrition and obesity may reduce feline fertility which, in toms, can also be impaired by hypothyroidism, hypervitaminosis A and stress. Other possible causes implicated in female infertility include hormonal imbalances, improper lighting, estrogen-producing cysts, concurrent diseases and lack of exposure to other cats.

Pregnancy is not always trouble-free either, said Dr. Casal. Viral infections, particularly FPV, FeLV and FRV suppress the immune system and may lead to fetal death. FRV can also cause malformation of kittens.

Pyometra and other bacterial infections, which may afflict the pregnant uterus, are generally easier to detect than viral infections because obvious clinical signs are usually present. These may include fever, lethargy, appetite loss and yellow-green vaginal discharge.

Malnutrition, spontaneous drops in progesterone, vaccinations and certain medications given during pregnancy may lead to abortions or abnormal fetal development. "I always say, 'the only drug you can give a cat during pregnancy is water,'" Dr. Casal remarked.

As in people, many things can go awry in cats during birthing. Obstructions caused by accident-related malformations of the birth canal and uterine rupture or torsion may render normal delivery impossible.

Uterine inertia, a condition in which the uterus fails to contract, may be caused by malnutrition, calcium deficiency, concurrent disease and acute fatigue. The primary clinical sign is a rise in body temperature 6-12 hours after the initial drop, with no kittens being born. The presence of oversized, malformed and dead fetuses may also interrupt parturition.

Immediate veterinary attention should be sought if problems develop during pregnancy or birthing, said Dr. Casal, and proper breeding management should be undertaken as a preventive measure. These precautions will, over the long run, strengthen gene pools and enhance feline breeding fitness.

J.C.

## Postvaccinal Tumors in Cats

An increasing number of vaccination-site tumors have been seen in cats since 1987. A study conducted by Dr. Mattie J. Hendrick, assistant professor of pathology at the School, found this phenomenon to be very real, but also very rare. Dr. Hendrick described this condition, its possible cause and its implications.

The increased occurrence of vaccination-site tumors corresponds to the time frame in which Pennsylvania's law mandating rabies vaccinations has been in effect. Between 1987 and 1991, the incidence of fibrosarcomas rose from 3.6% to 5.8% of feline biopsies; most of this increase is attributed to tumors at vaccination sites - the hind limbs and dorsal neck and thoracic regions.

Not to be confused with the inflammatory reactions that may occur at injection sites following inoculation, these fibrosarcomas appeared, upon biopsy, a proliferation of pleomorphic spindle cells often surrounding a necrotic center and surrounded by an inflammatory cell infiltrate filled with macrophages.

The macrophages were found to contain brownish-gray, crystalline material, identified as aluminum and oxygen. Interestingly, 20% of feline vaccines contain aluminum adjuvants, substances added to drug products to enhance their action.

"How and why this is happening," said Dr. Hendrick, "we don't know exactly. One hypothesis is that the adjuvant is causing a local, persistent inflammatory response. In the healing process, some of the cells that proliferate are fibroblasts. These fibroblasts may become neoplastic."

Similar tumor formation has also been found to occur in people with aluminum oxide hip replacements, but this particular phenomenon seems to be unique to cats. "It seems that there's something different about...their fibroblasts or their healing process," said Dr. Hendrick, "that the right stimuli can cause tumor formation."

Based on other published reports and personal communications, it appears that this phenomenon occurs throughout the U.S. and parts of Canada and Europe,

but that its frequency is very low, from 0.1%-0.1%. The research findings conclude that the occurrence of postvaccinal tumors in cats is not limited to the rabies vaccine or vaccines containing aluminum.

"I don't want you to get the impression from what I'm saying that you should stop vaccinating your cats..." Dr. Hendrick said. "The risk of other diseases far outweighs the risk of this entity."

Dr. Hendrick recommended that owners monitor vaccination sites regularly. "The earlier they're found and surgically removed," she said, "the better the chances of nothing bad happening to your cat."

J.C.

## Canine and Feline Symposia

The 24th Annual Canine Symposium "Your Veterinarian and Your Dogs" will be held Saturday, January 29, 1994 at the Veterinary Hospital of the University of Pennsylvania in Philadelphia.

Topics will include canine nutrition, genetic screening and genetic diseases of dogs, canine emergencies, and the PennHIP™ Program and skeletal problems of dogs.

The 17th Annual Feline Symposium will be held Saturday, April 16, 1994 at the Veterinary Hospital of the University of Pennsylvania in Philadelphia.

Topics will include feline pediatrics, dental management for cats, feline immunization, and feline diabetes. Mr. Richard Gebhardt, past president of the Cat Fanciers Association, will present his annual Parade of Breeds, and a grooming demonstration by Ms. Kathy Champion will also be featured. A tour of VHUP will be available following the formal presentations.

The cost of each all-day program is \$45, which includes lunch and parking. Reservations are required. To be placed on the mailing list for the detailed program, please write Dr. M. Josephine Deubler, School of Veterinary Medicine, VHUP, 3850 Spruce Street, Philadelphia, PA 19104.