Telazol: A New Injectable Anesthetic
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During the last several years, many combinations of injectable medications have been used to produce chemical restraint for animals for examinations, analgesia for painful conditions and anesthesia for surgical procedures. These have included combining narcotics and tranquilizers for neuroleptanalgesia or using neuroleptanalgesia with nitrous oxide for balanced anesthesia. Many procedures have utilized the dissociative anesthetic, ketamine, in combination with tranquilizers and sedatives for clinical anesthesia.

The combinations with ketamine have most often included acetylpromazine, xylazine or diazepam. The utilization of these medications reduces the side effects of ketamine. In the cat the objective has been to improve muscle relaxation. When used with xylazine, muscle relaxation has improved as well as analgesia during the first few minutes of drug effect.

Considerable effort was made during the 1970’s to develop a new dissociative anesthetic combination for veterinary medicine. The needed research was completed, material submitted to the Food and Drug Administration and approval was granted for a new product, CL-744, known as Telazol. This product will be available to the practitioner in the near future.

Pharmacology
Telazol is composed of equal weights of tiletamine hydrochloride and zolazepam HCL. Zolazepam HCL combined with tiletamine hydrochloride reduces convulsive and clonic muscle reactions which may occur, and provides better muscle relaxation. This combination of drugs provides a similar state of anesthesia to ketamine and a tranquilizer.

Telazol could be classified as a general anesthetic. Tiletamine is more potent than ketamine, but not as profound as phencyclidine. The patient's eyes are usually open even during profound surgical anesthesia with Telazol. In addition, many reflexes are not abolished. Anesthetized animals respond to corneal and palpebral stimuli; laryngeal, pharyngeal, pedal and pinnal reflexes may also persist. Salivation is a common occurrence in most animals receiving Telazol. Salivation can be controlled by administering atropine sulfate or glycopyrrolate.

Routes of Administration
Telazol is effective whether administered intramuscularly or intravenously. Anesthetic

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doses are the same for either route of administration. Time for attainment of surgical anesthesia varies with the route of administration. However, it usually is reached within 30 to 90 seconds following intravenous dosing and within 5 to 12 minutes after intramuscular dosing.

Dosage varies with the physical condition of the animal and duration of the surgical procedure. Starting doses (IM or IV) depend on the effect desired. The dosage range in the cat is 2-15 mg/kg. Low dosages of Telazol® may be used to produce a measurable tranquil state of light anesthesia (e.g. chemical restraint), which is desirable when working with fractious animals.

Telazol® can be utilized as an induction agent prior to intubation and transfer to volatile anesthesia. Intubation is not difficult, even though pharyngeal and laryngeal reflexes are functional.

Metabolic Disposition of Tiletamine HCL

In cats only 5 to 10 percent of the dose of tiletamine HCL was detected in urine; none appeared in the feces. However, it was found in the bile. Plasma half-life in cats was 2 to 4 hours. Tissue half-life was considerably longer than the plasma half-life.

Physiological Effects of the Drug

Cardiovascular:
Telazol® was rapidly absorbed following IM injection. A slight lowering of the blood pressure by about 10 percent was seen during the first hour after injection; this was followed by a return to control levels. The heart rate may change, but electrocardiograph patterns were unaffected.

Respiratory:
Arterial blood pO₂ can drop after 20 mg/kg and after 10 mg/kg. This occurs approximately three minutes after injection, with recovery by the 15 or 35 minute sampling time. The cause of hypoxemia is probably decreased tidal volume.

Elevated blood pO₂ may be typically seen 35 to 65 minutes after injection. This is the consequence of decreased body temperature upon the oxygen-hemoglobin dissociation curve. The animals have a greater response by this time and tidal volume may increase.

Epinephrine-induced Arrhythmias:
Sensitization potentials of Telazol® and halothane to catecholamine-induced arrhythmias have been studied in dogs and cats. Under halothane anesthesia (1.25 to 1.5% in a 95/5 mixture of O₂/CO₂), all of the animals tested developed severe ventricular arrhythmias after receiving 1 mcg/kg of epinephrine intravenously. Also, fibrillation occurred in one-third of the cats after epinephrine challenge.

Concurrent usage of phenothiazine tranquilizers such as acetylpromazine to control tachycardia should not be made with Telazol®.

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**Body Temperature:**
Telazol<sup>R</sup> depresses the body temperature. Therefore, it is prudent to monitor body temperature and supply supplemental heat as indicated for the well being of anesthetized and recovering patients.

**Conclusions from Drug Studies**
In a preliminary study conducted to obtain dosage data in domestic cats as a basis for designing toxicological studies, it was learned that:

1) Cats without prior exposure to Telazol<sup>R</sup> expired within 1 to 2 hours after receiving a dosage $\geq 100$ mg/kg;

2) Cats with prior experiences with Telazol<sup>R</sup> were more tolerant of the drug, surviving dosages as high as 150 mg/kg;

3) Dosages of 12, 36, and 60 mg/kg were well tolerated at daily intervals for seven consecutive days, with evidence of a shortening of recovery time with succeeding doses.

Further conclusions regarding the toxicity study of Telazol<sup>R</sup> in domestic cats are:

1) The only toxic effects observed at 2.0 to 12.5 times higher than the intended clinical dosage were a dose-related lesion at the injection site and elevations of SGOT. The lesions at the injection sites were observed after 7 injections of the drug had been made in 14 days at the same site (quadriceps femoris muscle); muscle lesions were not detected on physical examination.

2) The effects of Telazol<sup>R</sup> when given at the intended clinical doses of 3.0 to 12.0 mg/kg were not considered to be significantly more toxic than intramuscular injections of physiological saline solution.

3) Telazol<sup>R</sup> is a safe anesthetic for cats with a wide margin of safety.

**Concluding Remarks**
Telazol<sup>R</sup> has been used in a wide range of diagnostic and surgical procedures in dogs, cats and wild animal species. Mid-range dosages provide favorable responses, similar to other dissociative anesthetic agents. Low dosage administration followed by painful procedures can result in elevated heart rates and blood pressures, body movement and other signs of inadequate anesthesia. Whereas, high doses may result in symptoms of respiratory depression, prolonged sleep and other symptoms of excessive anaesthesia. Telazol<sup>R</sup> should be administered with appropriate attention to the animal’s condition, the procedure to be performed, and the dosage needed. There is a greater extent of somatic analgesia than visceral and many of the characteristics of ketamine anesthesia may be observed.

Telazol<sup>R</sup> was developed in the Research Laboratories of Parke Davis and Company, Ann Arbor, Michigan 48106. The efforts of doctors D.A. McCarthy, C.C. Beck, and James Mosier (all deceased) and their coworkers in developing this product are recognized. Much of the data for these studies was determined by the author.

This article was adapted from a seminar presented at the 78th Annual Conference for Veterinarians (January 1987) at the NYSCVM, Cornell University, Ithaca, NY.

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**References:**

Parasites are not just limited to the gastrointestinal tract and various organs. Certain parasites thrive within the blood. Because these parasites destroy the erythrocytes, the clinical signs of blood parasitism parallel that of hemolytic anemia.

Whenever a patient presents signs of anemia, its blood should be examined for hemoglobin content, blood cell count, abnormalities in erythrocytes (size, shape, staining), and parasites.

Biting and blood-sucking insects (i.e. fleas, ticks, mites) have been implicated as the vectors for protozoan blood parasites.

**Hemobartonellosis (Feline Infectious Anemia)**

This rickettsial parasitic blood disease was first identified in South Africa in 1942 and in the United States in 1953. The causative agent is *Hemobartonella felis*. This parasite is responsible for about 10 percent of feline anemia cases. The disease is non-transmittable to humans. The primary mode of infection is by blood-sucking insects (i.e. fleas). Also, *H. felis* can be transmitted from infected queens to their newborn kittens. However, it is not known if this occurs in utero, during parturition or nursing. The risk of hemobartonellosis is greater for male cats 4 to 6 years old.

**Clinical Signs:**

The most common signs are depression, weakness, anorexia, pale mucous membranes, and a fever (103-105°F). Additionally, splenomegaly and icteric mucous membranes may be noted.

**Diagnosis:**

Identification of parasites in stained blood smears is the primary method of diagnosis. The parasite usually is attached to the periphery of the erythrocyte. However, due to the cyclic nature of the parasitemia, organisms may not be detectable in blood collected at any given time. Furthermore, one must be careful not to confuse normal Howell-Jolly bodies with *H. felis*; the parasites are smaller in size (0.2-0.3 microns in diameter) and more lightly stained than Howell-Jolly bodies.

Under low magnification and during the acute phase of the disease, erythrophagocytosis by monocytes or macrophages may be observed. Anemia caused by *H. felis* is regenerative. Many affected cats have a positive direct Coombs test because of antibody on erythrocytes. Therefore, unless parasites are detected, feline infectious anemia is virtually indistinguishable from autoimmune hemolytic anemia.

![Periphery of erythrocytes parasitized by Haemobartonella felis (400x magnification).](image)

**Treatment:**

Cats should be treated orally for 3 weeks with oxytetracycline (20 mg/kg, t.i.d.). Cats should also receive a glucocorticoid such as prednisolone (1 to 2 mg/kg, b.i.d.). Chloromycetin is also effective in treating hemobartonellosis. Another treatment alternative is an injection of thiacetarsamide (0.5 ml/10 lb
body weight, IV). A second injection should be given two days later.

The long-term prognosis following recovery from haemobartonellosis appears favorable. However, if an infected cat is not treated, it only has about a 66 percent chance of survival. Cats remain carriers of the organism after recovery from anemia.

Prevention:
A comprehensive pesticide control program for both the animal and the environment is prudent, since blood-sucking insects have been implicated in the spread of this disease.

Babesiosis
Feline babesiosis, a hematoprotozoan disease, has been reported in South Africa (coastal region), South America, Asia, India, Sudan, and Kenya. Although, feline babesiosis has not been reported in the United States, the possibility of infection exists. The Babesia species infecting wild and domestic cats include *B. cati*, *B. felis*, *B. herpailuri*, and *B. pantherae*. Cats at highest risk appear to be cats under two years of age.

Within the last decade Babesia has been recognized as a human pathogen. However, human cases of Babesia have been related to infections in rodents and ruminants. The transmission of Babesia from dogs and cats to people has yet to be determined.

Clinical Signs:
The disease is characterized by anorexia, lethargy, weakness, dehydration, and pale mucous membranes. Cats with severe anemia display tachycardia, tachypnea, and dyspnea with exertion.

Diagnosis:
Diagnosis is based on identifying the organism in erythrocytes. The size of the parasite ranges between 1.0 to 3.4 microns, depending on the Babesia species. Sometimes the parasites are arranged in a Maltese cross configuration. Serum biochemistry results are non-differentiating in diagnosis. However, alterations may occur in the liver enzymes with mild to moderate increases in serum bilirubin and a progressive increase in gamma globulins. A macrocytic, hypochromic anemia is usually present with babesiosis. Currently, there is no IFA test for *B. felis*.

Treatment:
Primaquine phosphate is a very effective therapeutic drug. The dosage should not exceed 0.5 mg per kilogram of body weight, administered intramuscularly. Cats that are severely anemic should receive a whole blood transfusion. Stress should be minimized for severely anemic cats to prevent iatrogenic death.

Cytauxzoonosis
This is a fatal hematoprotozoan disease that was first identified in cats by Wagner in 1976. Cases of cytauxzoonosis have been reported in Missouri, Texas, Oklahoma, Mississippi, Louisiana, Alabama, Georgia, and Florida. It is thought that the disease is transmitted by ticks, however, there is no published documentation to support this hypothesis.

Cytauxzoon has an erythrocytic and a schizogenous tissue phase of infection in the host.

Clinical Signs:
Signs observed in naturally occurring cytauxzoonosis include anorexia, dyspnea, lethargy, dehydration, depression, icterus, pale mucous membranes, and a high fever (103-107°F). In experimentally induced disease the incubation period ranged from 5 to 20 days. When a cat presents with acute anemia, jaundice, and a high fever, cytauxzoonosis should be included in the differential.
Cats usually succumb to the disease within a week after clinical signs appear.

**Diagnosis:**
Diagnosis is made by observing the parasite in a stained blood smear. The parasite appears as ring-form piroplasms in the erythrocyte phase. The cytoplasm stains light blue and the nucleus stains a dark red or purple. The diameter of the parasite is 1.0 to 1.5 microns. An indirect fluorescent antibody (IFA) test has been developed for the detection of the tissue phase of the disease. However, the test is not yet on the market.

**Treatment:**
Unfortunately, attempts to treat the disease have proven unsuccessful. Supportive fluid therapy and broad-spectrum antibiotics (e.g. tetracycline) may prolong the course of illness but do not effect a cure.

**Prevention:**
A parasite control program and confining cats indoors may be effective methods to prevent Cytauxzoonosis.

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**References:**

**Research Briefs**
Lyme Disease (LD) is receiving increased attention by the veterinary profession as more cases are being reported in cats, dogs and horses. Lyme Disease has been reported in the northeastern, midwestern and western regions of the United States.

LD is caused by the spirochete Borrelia burgdorferi. The primary vector of B. burgdorferi is the Ixodes tick. It is also speculated that the common cat flea, C. felis, may also be a carrier.

The clinical signs of LD in animals is thought to follow a course similar to the disease in humans. The first stage of LD begins with a skin lesion (erythema chronicum migrans) which may be associated with fever, malaise, lethargy and lymphadenopathy. Stage two occurs several weeks later when neurologic or cardiac problems may develop. The final stage, usually occurring years later, produces arthritis. According to the report in DVM magazine, initial signs of LD in cats included pyrexia, mild to moderate anemia and anorexia.

Elevated sero-titer to B. burgdorferi is the current method of diagnosis. Treatment of LD consists of antibiotic therapy (tetracycline, penicillin, and erythromycin).

Proper usage of pesticides in the environment and on the animal is an important part of a control program for LD. Chlorpyrifos is the preferred environmental pesticide.
Brochures Keep Clients Informed

The Cornell Feline Health Center publishes a series of client information brochures. These brochures are written in non-technical terms for your clients. They are available for a reasonable fee of $20 per 100 copies, which covers printing and mailing costs. If you are a member of the Cornell Feline Health Center there is a 10 percent discount on your brochure order. To order a supply for your practice use the order form on this page.

**Owner's Guide on Feline Leukemia.** (12 pages) The most-asked questions on feline leukemia are answered in this brochure, including treatments, prevention, and prognosis.

**Feline Infectious Peritonitis.** (9 pages) The question and answer format makes this brochure easy-to-read and understand. Topics covered include signs of the disease, treatment, and prognosis.

**The Older Cat -- Its Special Needs.** (9 pages) An aging cat is prone to a variety of maladies. This brochure addresses the more common problems such as nutrition, kidney failure, tumors, digestive tract disorders, oral problems, heart disease, diabetes mellitus and arthritis.

**Feline Behavior Problems.** (8 pages) Aggression and soiling are the most common and frustrating behavior problems associated with cats. This brochure offers practical solutions for the distraught owner.

**Urinary Obstruction in Male Cats.** (7 pages) The various factors implicated in causing this disease are presented in this brochure. Other information included are the signs of FUS, treatment, home care and prognosis.

**Are Parasites Robbing You and Your Cat?** (5 pages) Roundworms, hookworms, tapeworms, and coccidia are the most common internal parasites affecting a cat's health. The importance of fecal exams and treatment are stressed.

**Everything You Always Wanted to Know About Your New Kitty** (7 pages) This brochure provides recommendations on choosing a pet, vaccinations, nutrition, grooming and general health.

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Cornell to Study Feline Lentivirus

Feline T-lymphotropic lentivirus (FTLV) is a newly recognized feline retrovirus which closely resembles the human AIDS virus (HIV) in biologic activity. FTLV was isolated by Dr. Niels Pedersen and coworkers at the University of California at Davis. According to preliminary studies by Pedersen's group, the virus appears to be fairly widespread in the cat population, with most cases occurring on the East and West coasts and in Texas.

Although FTLV is tentatively classified as a lentivirus, it is antigenically unrelated to HIV or other lentiviruses. The virus is very species-specific, and there is no evidence that infection of humans with FTLV can occur.

The virus causes an immunosuppressed state which may be due to the death of certain T-lymphocyte populations similar to the pathogenesis of AIDS. The syndrome also resembles that seen in cats immunosuppressed by feline leukemia virus. Initial signs of FTLV infection are lymphoadenopathy, low grade fever and lymphopenia. Subsequent disease manifestations depend on the types of opportunistic infections which result from immunosuppression. Pedersen reports chronic or recurrent rhinitis, gingivitis, cystitis, diarrhea and dermatitis along with weight loss and general un thriftiness as the most common clinical signs. Neurologic abnormalities may also be present.

The Cornell Feline Health Center is developing a research program to study the pathogenesis and biologic properties of FTLV and to determine the incidence of the virus in the Northeastern states. Practitioners who encounter feline leukemia virus negative cats with signs similar to those previously mentioned are encouraged to contact Dr. Peggy Barr by letter (Cornell Feline Health Center/NYSCVM/Schuman Hall/Ithaca, NY 14853) or by phone call (607-253-3414).