



## Research on Feline Infectious Peritonitis (FIP)

The following information describes research on Feline Infectious Peritonitis (FIP) conducted by Dr. Alfred M. Legendre at the University of Tennessee - Knoxville.

Feline Infectious peritonitis (FIP) is one of the most devastating diseases of cats. It is considered nearly 100% fatal. Efforts at vaccination and treatment have been unproductive. Our pilot study treating cats with the dry form of FIP with the Polyprenyl Immunostimulant (PI) have produced promising results (Legendre & Bartges, 2009). It is commonly believed that cell-mediated immunity is required for elimination of the FIP virus. Cats in the terminal stages of FIP have severe depletion of the CD4+ and CD8+ T-lymphocytes necessary for mounting a cell mediated immune response. PI enhances cell-mediated immunity through upregulation of Th1 cytokines.

In 2006, we treated 3 cats diagnosed with dry FIP, and one of those is alive and healthy today. The study was resumed in 2009, and by now 30 cats have cleared a 1-year survival mark. Under the study funded by Winn Feline Foundation, we have treated 58 client owned, qualifying cats and assessed their progress on a monthly basis. This study was an open, one arm trial without a placebo control group because of ethical concerns about having a non-treatment group in a disease considered 100% fatal. Results of the study were presented at ACVIM Meeting in New Orleans in May 2012 and AAHA Meeting in Phoenix, AZ 2013.

### Winn Study

After Dr. Legendre published his initial article on FIP treatment with Polyprenyl Immunostimulant (PI), in 2010, Bria Fund at Winn Feline Foundation awarded Dr. Legendre a grant\* to treat 20 cats diagnosed with the dry form FIP with PI to see if this treatment is effective against FIP – a devastating disease affecting up to 5% of cats in shelters and catteries. PI directed the immune system to mount a cell mediated immune response against the FIP virus. The numbers of cats enrolled exceeded 20 very fast, and the research group has treated 58 cats. For details of the study, visit the Diagnostic Protocol page.

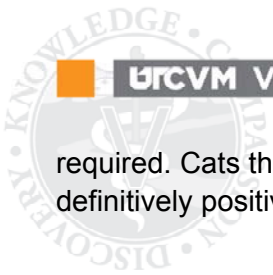
\*Thanks to Feline Pine who has funded this research

Doses and regimen used in the FIP study: Polyprenyl Immunostimulant is given orally, 3 mg/kg

(1.5 ml/kg) three days weekly

### Diagnostic Protocol

Cats with periodic fever, lethargy and anorexia that were not responsive to antibiotic therapy are likely candidates for the dry form of FIP. A complete blood count, serum chemistry panel, urinalysis and a albumin/globulin ratio were part of the basic profile. A serum sample positive for antibodies to coronavirus was also required unless the other findings were conclusive. There must have been a sufficient evaluation of the cat to have most likely identified diseases that could mimic FIP. There were two groups of cats in the study. When abdominal masses were suspected an abdominal ultrasound with aspirates or surgical biopsy were



required. Cats that had pyogranulomatous lesions on surgical biopsies or on needle aspirates were considered definitively positive for FIP.

Diagnostic protocol in the FIP study: Blood test (Albumin, Globulin, Lymphocyte count), Ultrasound, IFA analysis of biopsies or aspirates, FeCoV titer

Coronavirus antigen identified by immunofluorescence in the samples added additional support for the diagnosis. A second group of cats with clinical signs and history compatible with FIP that had a combination of increased serum globulins, low albumin/globulin ratios, lymphopenia, fever and a high coronavirus antibody titer were considered as probably positive for FIP. Both groups were included in the study. If the cat died, a necropsy was done by the primary care veterinarian and abnormal tissues were shipped in formalin to the University of Tennessee for histopathology.

### Treatment Protocol

Cats with the dry form of FIP were given the Polyprenyl Immunostimulant (PI) at 3mg/kg per dose three times a week. The use of concurrent steroids was discouraged. Cats currently on steroids were weaned off over 2-3 weeks while on the Polyprenyl Immunostimulant if appetite and well being could be maintained.

An initial 5 week supply of the Polyprenyl Immunostimulant was shipped to the veterinarian after the data was reviewed by Dr. Al Legendre if the cat met the inclusion criteria. The PI was shipped to the collaborating veterinarian monthly after the results of the monthly reevaluation were received. Ms. Gina Galyon was the veterinary technician who maintained the records and monitored the progress of the cats in the study and approved sending the next month's supply of the PI.

### FAQ

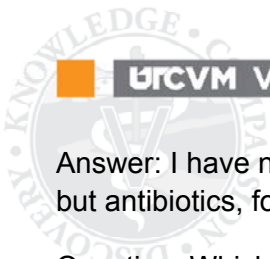
Question: What is the dose of Polyprenyl Immunostimulant I need to use for the "dry form" of FIP?

Answer: For cats weighing 5 kg or less, the dose is 3 mg/kg, given orally, every other day. For cats above 5 kg, we plateau out on the dose to 7.5 ml, or 15 mg per dose. The concentration is 2 mg/mL. If the volume is difficult to administer, divide the dose in half and give both halves on the same day.

Question: You mention that Polyprenyl Immunostimulant helped in cases with dry FIP. My cat has wet FIP. Can I use PI?

Answer: We have seen no benefit in the effusive form of FIP but have treated a limited number of cats with the effusive form.

Question: My veterinarian prescribed antibiotics to my cat? Is there any contraindication to using PI with antibiotics? With food supplements? Vitamins?



Answer: I have not used polyprenyl in conjunction with herbal preparations so I have no experience with that but antibiotics, food supplements and vitamins should be OK.

Question: Which percentage of “dry form” FIP cats benefit from PI? What are those benefits?

Answer: Our study sponsored by Winn Feline Foundation, found that 22% of cats diagnosed with dry FIP were alive for at least 6 months, and about 5% alive at least a year. The cats on Polyprenyl Immunostimulant that responded generally felt better with a better appetite and were more interactive with the owners.

Question: My cat is already receiving treatment with steroids. What do I need to do?

Answer: I prefer not having concurrent steroid therapy as an immunosuppressant could interfere with the immunomodulating effect. We prefer to wean them off the steroids if possible. Many of the cats treated with PI have been on steroids and steroids can be given if necessary to maintain appetite and general well being. The prednisolone can be continued until the cat feels better. Weaning off steroids should be done by your veterinarian.

Question: What should I expect as adverse effects of PI?

Answer: The main adverse effect of Polyprenyl Immunostimulant is that some cats do not like the taste and will foam up when given the treatment. There does not seem to be any other adverse effects noted.

Question: How soon will my cat start feeling better?

Answer: It seems that the cats that respond to the Polyprenyl Immunostimulant start feeling better in 10-14 days but it may be earlier.

Question: What is the mechanism of action of PI?

Answer: The aim of PI is to direct the immune response to a cell mediated rather than a humoral, antibody, immune response. The cell mediated response is the only way to destroy the virus in infected cells.

Question: How long will my cat need to take Polyprenyl Immunostimulant? Will she be cured after a course of treatment?

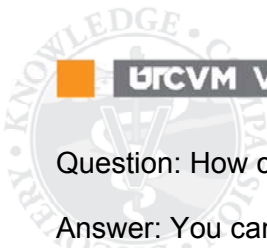
Answer: I approach dry form FIP as a chronic condition that can be controlled for a while and only occasionally cured. How long to treat before taking cats that are responding well off the Polyprenyl Immunostimulant? I don't know but I would be reluctant to stop the treatment in less than a year.

Question: Which form of non-effusive FIP responding to PI, e.g. ocular, neurologic or abdominal?

Answer: We have had responses in various presentations of “dry form” FIP. The more advanced the disease, the less likely it is to get a response.

Question: Where can we obtain the Polyprenyl Immunostimulant?

Answer: Your veterinarian can obtain the polyprenyl from the manufacturer Sass & Sass, Inc. of Oak Ridge, TN. The email address is [info@sassandsass.com](mailto:info@sassandsass.com).



Question: How can I donate to Dr. Legendre's FIP research?

Answer: You can donate directly to Dr. Legendre's FIP research at the University of Tennessee through the UTCVM giving site. Visit <http://www.vet.utk.edu/giving> and follow the blue buttons: TO CVM IT. For the actual giving site listing of gift funds, please add to the printable gift form under Small Animal Clinical Sciences, and below Oncology Research, please list:

Dr. Legendre for FIP Research