

Feline Infectious Peritonitis (FIP)

Feline Infectious Peritonitis (FIP), is probably one of the most difficult and complex diseases in the feline community today.

I by no means am a veterinarian nor a veterinary technician.

I am a rescuer and my job as a rescuer is to educate myself to minimize disease in our shelter and foster homes, as well as to educate the public.

My goal with this article is to convey what I have learned and study about the disease to the average cat owner in a way that are easy to understand.

I will try to make it as simple as I can for all to understand, however with such complex disease that may be a bit challenging.

So what is FIP?

Feline infectious peritonitis (FIP) is an incurable and fatal disease that affects the felidae family, both domestic cats and wild cats.

It is believed to be caused by Feline Infectious Peritonitis Virus (FIPV), which is a mutation of Feline Enteric Coronavirus (FECV), sometimes known as FeCoV.

There several groups and strains of *Coronavirus that can infect different species, therefore you find* feline coronavirus (FCoV), canine coronavirus (CCV), transmissible gastroenteritis virus (TGEV) of swine, and human coronavirus HCoV229E. Coronaviruses also includes bovine coronavirus and mouse hepatitis virus and in a different group avian infectious bronchitis virus and its variants.

FIPV is neither infectious, nor is it peritonitis, although it was so named to explain the symptoms as originally recognized.

Currently, FIPV is believed to be a mutation of one of the many strains of FECV. Once it mutates into FIPV, it has the ability to grow and invade white blood cells called macrophages in the body.

The immune system's response causes an intense inflammatory reaction in the containing tissues.

Studies show that mutant FECVs arises within an individual cat.

In consequence it is safe to say that the majority of cats do not "catch" FIP, but they develop it themselves from their own mutant FECV.

Feline Enteric Coronavirus (FECV) is contagious, it lives and replicates within the cells of the intestinal tract and may be shed into the feces. but once it mutates into FIP is now in other parts of the body NOT longer in the intestines but in the macrophages which are

white blood cells within tissues, at this point it is no longer shed through the feces, therefore is not contagious anymore.

Therefore the likelihood of transmission from cat to cat at this point is rare and it is really unlikely that a cat infected with FIP is a risk to other cats, therefore isolation is not necessary.

Transmission and infection of FECV.

The most common form of transmission of FECV (not FIP) is through feces, however because it is an indirect virus it can be transmitted through food, water bowls and clothing. It is also believe that an infected female cat passes the virus to their kittens, usually when the kittens are between five and eight weeks of age, in utero transmission is not known.

Most cats infected with FEVC (approx. 95%) do not develop FIP.

It is only in a small percentage of cats that the virus actually progresses into FIP (1 in 5000).

This progression can occur weeks, months and even years after initial exposure, which is partially why it is so difficult to diagnose.

Exposure to FECV does not necessarily produce clinical signs, however it may cause upper-respiratory-like symptoms, loose stools, fever, weight loss, lack of appetite and jaundice.

Even though an infected cat may show no signs, it can continue to shed the FECV virus for up to seven weeks after exposure.

Depending on the cat's immune system FEVC may or may not mutate into FIP.

In cats that do develop FIP, symptoms can appear suddenly, but because cats are very good at masking disease by the time symptoms appear, they are usually in advanced stages of illness. Often, there is little that can be done beyond supportive nursing care and keeping the cat as comfortable as possible until is time to let go.

When it mutates it usually happens in cats with a weak immune system, like young kittens, senior cats or cats with an already comprise immune system,

Most cats that develop FIP are under 2 years of age, however any cat at any age is at risk.

There are two main forms of FIP: the effusive form that is more commonly known as the "wet" form, and the non-effusive form, more commonly known as the "dry" form.

The wet form of FIP is much more common, actually 60-70% of all cases are in the wet form. This form progresses more rapidly than the dry form.

Symptoms can be difficult to diagnose as symptoms usually mimic common diseases, this is the reason of why FIP is a disease that is frustrating and confusing even to veterinarians.

Fever, diarrhea, weight loss, lack of appetite and jaundice can appear in both the wet and dry forms of FIP.

The wet form is further characterized by an accumulation of fluid within the abdomen or chest, fever, diarrhea, weight loss, lack of appetite and jaundice.

With the dry form, there is no accumulation of fluid in the lungs, but there are inflammatory lesions called pyogranulomas that can be found in any organ of the body, including the nervous system. Neurological signs including loss of sight can occur as well.

FIP is relatively uncommon in the general cat population, but rates of the disease are much higher in multiple-cat households, shelters and catteries.

There is evidence that a genetic component exists, making certain bloodlines more susceptible to mutating the FECV than others. This could explain why catteries and multi-cat environments with biologically related cats show a higher incidence, and why FIP was originally thought to be contagious.

How is FIP diagnosed?

Organ biopsy is the only diagnostic procedure that can confirm this diagnosis in the living cat or examination of tissues at autopsy.

The most commonly available so-called "FIP test" is only a test for the presence of antibodies generated against any type of coronavirus.

In other words, all that is tested for (the titre level) is for EXPOSURE to a coronavirus, as mentioned above.

As most cats in shelter and rescue settings--ie, multi-cat situations, will have been exposed to FECV, the titre level has little meaning in and of itself. (Most humans also would test positive for coronavirus, too--it's the cause of what we call the common cold.)

PCR, Elisa and IFA tests only test for coronavirus antibody.

Basically none of the above mentioned tests are able to differentiate antibodies generated against FECVs or other coronaviruses from antibodies developed in response to infection by FIPVs.

A "positive" coronavirus antibody test does not confirm that the cat has FIP and a "negative" coronavirus antibody test does not rule out a diagnosis of FIP.

The PCR (polymerase chain reaction) test for FIP, is mostly performed on blood, but body cavity effusions and tissue samples can also be tested.

PCR is a very sensitive and specific technique for detecting small amounts of viral nucleoprotein.

Nucleoprotein can be identified and the quantity amplified by the test methods so that it can be detected.

To date, studies show that research has not found nucleoprotein sequences that are unique to pathogenic FCoV.

So, because some nonpathogenic FCoVs are capable of systemic invasion, finding coronavirus protein in the systemic circulation is NOT confirmed.

This particular test is so sensitive that contamination with stray DNA will result in a false positive test.

Also "The biology of pathogenic FCoV is such that infected cats may not be viremic; therefore it is best to take samples from thoracic, abdominal fluids, peritoneal lavage, or biopsies of a lesion instead of blood sample for detecting FIP.

Cats with dry form of the disease are the most difficult to diagnose as often they are not viremic.

Histopathology or immunohistochemical evaluation of needle biopsies should also be sufficient for diagnosis. It is therefore difficult to see what advantage this test has over other methods of diagnosis.

The "7B protein" test FIP-specific ELISA Test .

This test is performed by Antech Laboratories.

The company states that the test can identify a specific protein called 7B protein that is only produced by FIP-producing coronaviruses.

A very limited experimental study of approx. 10 cats showed that a standard coronavirus antibody test became positive after cats were vaccinated with an experimental FIP vaccine from a benign FIP strain but that the 7B ELISA test did not become positive until after challenge with one strain of virulent FIP virus.

Unfortunately, recent studies have shown that not all FIP-type coronaviruses have an active 7B protein and that some non-FIP coronaviruses do have it.

Therefore the Elisa test is not specific for FIP-coronaviruses diagnosis either.

The IFA test is also virus-neutralization tests and it only detects the presence of coronavirus antibodies, but it cannot differentiate between the strains of feline coronavirus.

A positive result it only means that the cat has been exposed to coronavirus and does not mean that it is the strain that causes FIP.

Vaccinations.

Vaccination appears to be effective against some strains of FCoV when given intranasally, but NOT subcutaneously.

Intranasal vaccination has the advantage of inducing local IgA antibody production on mucosal surfaces where initial penetration of the virus usually occurs.

Researchers have isolated a temperature-sensitive strain of FCoV.

This FCoV strain replicates well at the lower 31° C (87° F) temperature of the upper respiratory tract, but it doesn't replicate at higher of 38-39° C (100-102° F) systemic body temperatures.

This strain would seem to be ideally suited to intranasal inoculation and its temperature sensitivity would limit systemic invasion of the virus.

Pfizer produces a commercial FIP vaccine using this temperature-sensitive virus strain, the manufacturer reported reasonable efficacy against several strains of FCoV and field studies by the manufacturer reported few adverse effects.

However, a report by Drs. Chris Olsen and Fred Scott at Cornell University did not confirm the efficacy the manufacturer claims the vaccine has.

Additionally, antibody-dependency enhancement of infection has been demonstrated in vaccinated cats. The manufacturer insists that the reduced efficacy of the vaccine seen in Cornell studies was due to the severity of virus challenge under the conditions of the experiments and that virus exposure of this magnitude does not occur in nature.

Fact is that not all unvaccinated cats developed FIP and following virus challenge while 100% of the vaccinated cats developed the disease and some of them had accelerated disease associated with ADE.

Therefore it is unlikely that the severity of the challenge alone accounts for the vaccine failure. To date nobody knows the true level of virus exposure that occurs in the course of natural infection.

It may in fact be as great or greater than the one used in vaccine studies.

Although anecdotal occurrences have been reported, antibody-dependent enhancement of disease associated with FCoV vaccination has not as yet been confirmed, so it may be just a laboratory phenomenon.

To vaccinate or not to vaccinate.

This is really a topic that is very controversial.

HPR does NOT vaccinate for FIP and does not recommend it either, because of the side effects and risks not to mention the fact that to date there is no vaccine that protects for all strains of FIP.

However vaccination is a preference of each individual cat owner that should be carefully discussed with your veterinarian.

Reference links on vaccinations:

<http://www.avma.org/onlnews/javma/jul03/030701o.asp>

<http://www.cliniciansbrief.com/pdfs/supplements/mercu07.vax.feb.fnl.pdf>

<http://www.vas-awareness.org/References.htm>

<http://www.vin.com/proceedings/Proceedings.plx?CID=WSAVA2002&PID=2615>

Please keep in mind that studies show that only 7% of veterinarians pay close attention to vaccinations protocols and many do the contrary to professional recommendations and often used just as a way to make money and not really thinking in the best interest of the animal.

Treatment.

Unfortunately there is no known cure for FIP as FIP is a fatal incurable disease.

Therefore treatment is palliative and symptomatic.

As we mentioned above the best you can do is provide constant nursing care and keep the cat stress free and as comfortable as possible until it is time to let go.

Wet FIP usually progresses too rapidly for any therapy to be attempted.

The best candidates for treatment are FeLV negative cats with effusive disease and in good physical condition.

Combination therapy with prednisolone (4 mg/kg PO q24h) and cyclophosphamide (2-4 mg/kg PO q24h x 4 days/week) accompanied by antibiotics may provide temporary remission.

Recombinant DNA human alpha interferon (rHuIFN-alpha) and feline fibroblastic beta interferon (FIFN-β), have shown significant antiviral effects against FIPV.

New studies shown that antiviral agents such as ribavirin (Virazole) and adenine arabinoside (Vidarabine) appear to be effective against FIPV.

Please note that: ribavirin is toxic to cats in high doses.

Any treatment involving medications must always be closely monitored by a license veterinarian.

The most promising treatment of FIP is combination therapy with an antiviral agent to inhibit viral replication and an immune response modifier to enhance protective immune defenses.

Quarantine, as we mentioned above (but will repeat again) it is not necessary as FIP is not truly an infectious disease.

As FIP signs can be easily overlooked, it is highly advised to have your cat seen by your veterinarian at least once a year for a check up and certainly it should be checked if there are any signs of abdominal distention, chronic diarrhea, changes in the eyes, lethargy or if the cat develops an URI (upper respiratory infection).

Prevention

There is no way at this time to know in which cats the common FECV might mutate, so prevention of FIP itself would require a total elimination of FECV. FECV is very common, but there are things you can do to reduce the incidence of coronavirus, and thus the possibility of it mutating into FIP in susceptible cats.

FECV can live in the environment for up to 7 weeks.

The good news is that the virus is killed by most disinfectants.

Tips for preventing infection:

Litter boxes should be cleaned and disinfected daily, litter spilled around litter boxes should be scooped up and the floor should be disinfected as well.

Keep litter boxes as far away as possible from food and water bowls.

Newcomers should always be isolated from the resident cats.

Cats that appear to be sick should always be seen by a veterinarian and isolated from the rest, even if you feel bad about isolating one of your cats, it is best to isolate and lose one than to lose all of your kitties to a fatal disease.

Prevent overcrowding, keeping the number of cats down is always best, as overcrowding of cats is very stressful on them.

Remember that stress induces illnesses to surface, so keeping stress to a minimum is a must.

Rescuers, please always isolate newcomers, keep dishes and litter boxes with the same group of cats and DO NOT rotate them. Testing and vaccination at intake is also a must.

Daily disinfection is a must for floors, litter pans, dishes, water bowls, litter scoops and

cages.

Proper nutrition is also important to prevent disease, as I always say when you feed good quality food, you save on vet bills.

Please remember that we are not veterinarians, so please nothing here said should replace your veterinarian advise.

But also remember that your pet is yours, that said always ask your vet questions, ask for an explanation why is she/he is doing this or that, why is he recommending this or that, the benefits the risks and so forth

If you are not comfortable with the answer your vet gives you, always seek a second opinion.

Not because your vet is a vet he or she knows best, after all there are many veterinarians out there that are excellent vets, but some are just running a business, so the more you do to your pet, the more money they get out of you, regardless of risks and consequences.

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