

## Encyclopedia of Feline Veterinary Medical Information

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### Feline Infectious Peritonitis (FIP)

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FIP is a difficult disease to diagnose and to treat. Testing for this disease is not very accurate and the clinical signs are easily confused with a number of other diseases. The disease does not appear to affect all cats exposed to it in the same way. The only certain diagnoses are made at the time of a necropsy exam (autopsy). This makes FIP one of the most frustrating diseases for veterinarians and their clients.

FIP is caused by a coronavirus. There are other coronaviruses that affect cats but that do not produce feline infectious peritonitis. The most common of these are the feline enteric coronaviruses. The antibodies produced against these other diseases are too similar to FIP virus for current tests to be able to distinguish between them. This is the difficulty in making a definite diagnosis of FIP. To make matters worse, a negative titer (no discernible antibodies) to FIP does not rule out the disease. There are several possible explanations for this but it is not uncommon for cats to have negative FIP titers when the disease is present.

Feline infectious peritonitis is probably the most common cause of unexplained fevers in cats. It can cause a number of other signs, as well. Lethargy, weight loss, eye disease, swelling of the abdomen or fluid in the chest can all occur with FIP. Many secondary problems, such as liver or kidney disease can occur with FIP. Any cat with fevers that do not respond to antibiotics should be considered as a candidate for this disease. In any chronic illness in cats for which no other cause can be found, FIP should be considered. There are two commonly recognized syndromes associated with feline infectious peritonitis. In the "classic" FIP case, fluid accumulates in the abdomen and it can become quite distended. This is known as the effusive form of FIP. The abdominal distension does not appear to be painful. The other recognized syndrome is the "dry" form of FIP, in which the symptoms of fever, weight loss and other clinical signs develop but there is no fluid accumulation. This is the more common form of the disease.

Not all cats that are exposed to the FIP coronavirus will develop the disease. In colonies of cats in which this disease is known to be present, estimates are that 8 to 20% of cats exposed to the virus will develop clinical signs of FIP. The rest of the cats may become immune to the disease or may simply not react to it. The reason that only a relatively small number of cats exposed to the virus develop the disease is unclear. It is known that the cell mediated immune response is the primary protection for the cat's body in the case of FIP. Cats that do not have a good cell mediated response may be more susceptible to the disease. The humoral (antibody) defense system actually enhances the damage caused by FIP virus and seems to be partly the culprit in the death of affected cats.

The "war" with the FIP virus is won or lost at the places it seeks to gain access to the body. The cellular immune system consists of the white blood cells that find and destroy pathogens. If a cat has a competent cellular immune system, it has a good chance of becoming immune or of becoming a carrier of FIP with no apparent symptoms. If the white blood cells fail to find and kill the virus where it seeks to enter the body through the nasal passages and oral tissue, then the humoral (antibody) immune system takes over. Unfortunately, it appears that the complexes of antibody and virus (antigen) that develop are very harmful to the body. The immune response appears to be the cause of death in FIP cats since cats that can not mount an effective antibody response are not affected by this virus.

FIP virus itself lasts in the environment for up to 6 weeks. It is easily killed with disinfectants, so careful cleansing of a household may help prevent the spread of the disease if a cat with FIP is identified in a household with more than one cat. Due to the delay in the appearance of clinical symptoms once infection occurs, it is likely that most cats in a household have been exposed to the virus by the time it becomes evident that one of the cats is sick. Reducing stress levels by resisting overcrowding of cats in a household, providing adequate litterpans and vaccinating for other diseases may be helpful in reducing the spread of FIP as well.

Once the FIP virus gains access to the cat's body it takes about 2 weeks for the virus to become widespread. After that, the length of time to clinical symptoms is variable but probably rarely exceeds 2 months. Most cats with FIP will die within 2 to 11 months from the damage caused by the virus, the immune system and secondary problems such as kidney or liver failure. An exception to this might be cats that are able to fight off the disease at the cellular level but never completely clear it from their bodies. It is possible that these cats are carriers of the disease and that they may be affected later in life if some immunosuppressive disease or event inhibits their ability to keep the FIP virus in check.

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It is possible to measure antibodies against coronaviruses in cats. This is the "FIP test" that is commonly available. Unfortunately, the cross reaction with other coronavirus antibodies makes it very likely that there will be antibodies found, sometimes in high levels, whether an FIP infection is present or not. To further complicate matters, it is not unusual for cats with FIP to have negative antibody titers because of antigen/antibody interactions, exhaustion of the ability to produce antibody, or other factors. When cats have the "effusive" form of FIP in which abdominal fluid accumulation occurs, the thick, straw colored fluid has characteristics that strongly suggest FIP. It is possible to run a more specialized lab test, a polymerase chain reaction test for FIP, on this fluid. This type of testing is more accurate than FIP antibody testing but still is not definitive. Blood tests to compare the various protein levels in the blood can be very suggestive of FIP infection, as well. High immunoglobulin levels are very suggestive of FIP in the presence of clinical signs. Despite all of this, there is no clear-cut way to make a sure diagnosis of FIP prior to death. There are many instances in which the clinical signs and supportive labwork make it very likely that this disease is present and it is possible to be reasonably certain that FIP is the problem in many cats. It can be very very difficult to rule out FIP, though. Cats exhibit widely varying clinical signs of this illness and lab results can be completely inconclusive. It may be impossible for your veterinarian to tell you that FIP is definitely not the problem and it is easy for a veterinarian to overlook this disease when the clinical symptoms strongly resemble another problem.

There is no treatment that has been proven to work on a consistent basis for feline infectious peritonitis. Aggressive treatment of the secondary problems and suppression of the humoral immune system with corticosteroids or other medications may be beneficial in prolonging the lifespan of cats infected with this disease. There have been reports of recovery from FIP infection in a limited number of cats. Newer anti-viral treatments have not yet proven to be successful in cats in clinical situations but work continues and there is some hope that effective treatment will one day be possible.

There are two ways to prevent FIP infection. Strict sanitation and isolation of infected cats and all susceptible kittens from each other is one approach. Vaccination is the other. Sanitation appears to be a major factor in preventing the spread of this virus. In catteries with known FIP exposure, it is possible to severely limit the spread of the disease by keeping kittens isolated from adult cats after the age of 6 weeks and following good sanitary practices. As noted previously, this virus is susceptible to most disinfectants. If kittens are not exposed to other cats in the household after six weeks of age, there is a very good chance that they can avoid infection. Once they go to a home where they are the only cat, there is little chance that they will be exposed to the virus. Vaccination for FIP is a controversial subject. Studies done at Cornell University with the new vaccine seemed to show that it was not very effective and that it may even sensitize some cats to the disease. The manufacturer of the vaccine, Pfizer, believes that the study was flawed by the severity of the viral challenge used. The increased sensitivity to FIP does not appear to occur in clinical situations, at present. The decision on whether or not to vaccinate is a difficult one. The best approach is to assess the risk of infection with FIP for an individual patient and make the decision accordingly. It is unlikely that an individual housecat will be exposed to the disease and vaccination probably does not make sense for these cats. It is much more likely that cats in a large cattery will be exposed and vaccination makes more sense in this situation. Even in this case, strict isolation of kittens from infected cats would be necessary until the entire course of the vaccine is administered, to allow the vaccine time to work effectively prior to exposure to FIP virus.

Feline infectious peritonitis must always be considered in cats with persistent fevers or vague histories of "not doing right". In multiple cat households, it is worthwhile to confirm the presence of this problem through post-mortem examination (autopsy, necropsy) of cats that have died. Knowing for sure that it is a problem will help a great deal when mapping out a plan to eliminate it from a cattery or household. If other problems are the cause of death, knowing that will help as well.

FIP is among the most complex of diseases to understand. There will continue to be controversy surrounding the prevention, treatment and diagnosis of this disease.

(c) Michael Richards, DVM

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