

AAFP/EVERYCAT FIP DIAGNOSIS GUIDELINES

Feline infectious peritonitis (FIP) is one of the most common infectious diseases and causes of death in cats when untreated. Young cats less than 2 years are especially vulnerable. FIP is caused by feline coronavirus (FCoV). It has been estimated that around 0.3% to 1.4% of feline deaths at veterinary institutions are caused by FIP. Nearly every small animal practitioner will see cases, especially those working with shelters, rescue groups, and/or breeders.

FCOV CHARACTERISTICS

FCoV has two different bio-pathotypes

FECV (feline enteric coronavirus)

- Non-mutated, harmless or mild GI disease
- Affinity for enterocytes
- Very common (almost 100% in multicat populations)

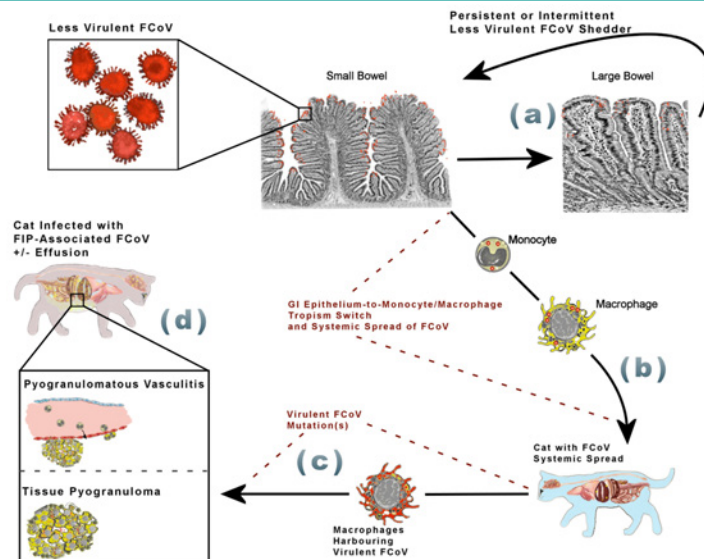
FIPV (feline infectious peritonitis virus)

- Mutated, virulent FIP disease
- Affinity for monocytes and macrophages
- 7-14% in multi-cat environments infected with FCoV have mutation of cell tropism to virulent virus

FCoV biotypes (both non-mutated, harmless and mutated, virulent) occurs in two serotypes (types I and II), which encompass numerous strains. To date, specific viral mutations leading to the biotype switch remain undetermined.

PREREQUISITES FOR DEVELOPMENT OF FIP IN FCoV-INFECTED CATS

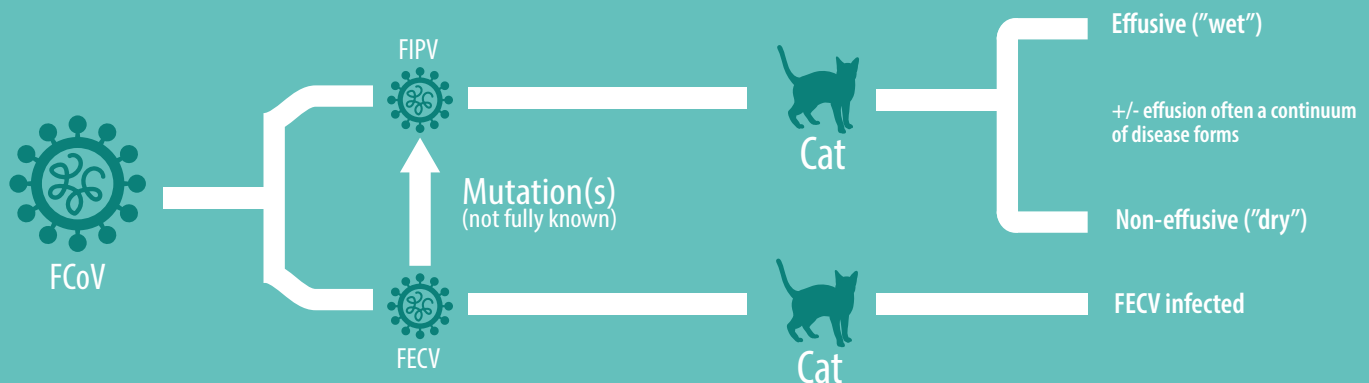
- Internal mutations of FCoV in an individual cat lead to a switch in cell tropism of FCoV from gastrointestinal epithelial cells to monocytes/macrophages (but that alone is not enough)
- A virulent FIP-associated FCoV acquires the ability to replicate efficiently in monocytes/macrophages, thus allowing rapid systemic spread throughout the body
- Activation of virulent FIP-associated FCoV-infected monocytes/macrophages leads to pronounced cytokine production and immune system activation



Approximately 70% to 80% of cats shed FCoV in feces intermittently for 2-3 months. Others, 10% to 15%, persistently shed high viral loads long-term. Finally, about 5% are resistant to infection, and quickly cease shedding or never shed virus at all.

FCoV RT-PCR on fecal samples detects whether a cat is shedding FCoV and does not confirm the presence of FIPV.

OUTCOMES OF FCoV INFECTION



THE MANY FACES OF FIP

The phrase “the many faces of FIP” has been used to describe the multitude of clinical and laboratory abnormalities associated with FIP. FIP is a disease that is diagnosed based on an increasing index of suspicion (brick-by-brick) using the individual patient’s history, signalment, physical examination findings, and diagnostic test results.



Five-year-old male castrated domestic shorthair cat with non-effusive FIP presenting as progressive weight loss, anemia, and development of blindness. The cat was PCR positive on FNAs of kidney, liver, spleen, and MLNs. Image courtesy of Matthew Kornya



Weight loss and progression of neurological signs accompanied the presence of anisocoria in this 12-year-old male castrated domestic shorthair cat. Image courtesy of Glenn Olah



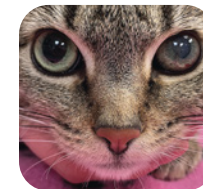
Cat with abdominal effusion (ascites) presenting with abdominal distension, weight loss, and decreased muscle mass. Image courtesy of Stephanie Newton



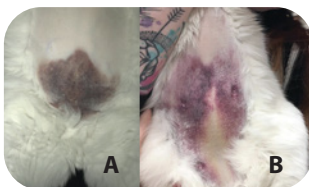
Kitten from a rescue group showing lethargy (listlessness), a common early sign of FIP. Likewise, failure to thrive or unthriftiness is a frequent complaint in a kitten or young cat with FIP. This kitten eventually developed seizures from neurological FIP. Courtesy of Julie Jacobs



Cortical blindness in a male Bengal manifesting as bilateral dilated pupils. Courtesy of Glenn Olah



Cat demonstrating subtle differences in the clinical presentation of anterior uveitis caused by FIP: iris color changes, haziness in the anterior chamber (hypopyon or hyphema), and lesion(s) (keratic precipitates) in the cornea. Repeated ophthalmoscopic examinations are indicated in difficult-to-diagnose FIP cases. Image courtesy of Marybeth Rymer



Ventral inguinal area of an 8-year-old male castrated domestic shorthair cat with significant dermal vasculitis and neutrophilic splenitis that later developed effusion and was diagnosed with FIP. Cats with skin changes can be difficult-to-diagnose FIP cases. These images show the initial (a) and later (b) presentation of the vasculitis. Images courtesy of Matthew Kornya



Male Ragdoll with a history of anorexia, fever, and weight loss of 2 lb (0.9 kg) over two weeks, as well as effusion, caused by FIP. Image courtesy of Stacey DeVaney



(a) Female spayed Persian showing depression, weakness, and tremors. (b) Same cat with progression of neurological signs to decreased consciousness, weakness, and focal seizures. Images courtesy of Tammy Evans

DIAGNOSIS OF FIP

HISTORY:

Risk factors influencing the development of FIP: group housing, age, breed, stress, retroviruses.

SIGNALMENT:

Most commonly: age at FCoV exposure (<2 years old), sex – intact (male), certain purebred cats (genetics and lineage).

PHYSICAL EXAMINATION:

Signs can be simple to diagnose or more complex over time. Repeat examinations may be needed.

CLINICAL SIGNS

Early, Non-specific	Effusive (in 41 to 86% cases)	Non-effusive (in up to 50-60% of cases)	Ocular (~up to 16%) Primarily non-effusive	Neurological (~up to 30%) Primarily non-effusive
Inappetence, lethargy, waxing/waning fever (recurrent or unresponsive to treatment) Lymphadenopathy, weight loss, failure to gain weight	Ascites (abdominal distension), pleural (dyspnea, tachycardia), pericardial	Pyogranulomatous lesions or masses (signs depend on which organs affected—kidneys, liver, GI, brain, skin, spinal cord)	Anterior +/- posterior uveitis, chorioretinitis, hyphe hypopyon, keratic precipitates, dyscoria, anisocoria, retinal vasculitis retinal cortical blindness	Seizures; abnormal behavior & mentation; tremors; ataxia; tetra- or paraparesis; incoordination; hyperesthesia; palsy; central vestibular signs—nystagmus, head tilt, circling, obtunded, postural reaction deficits

Primary differential diagnoses:

Neoplasia (e.g., Lymphoma), Septic Peritonitis/Pleuritis, Toxoplasmosis, Mycobacteriosis, Trauma (especially kittens), Congestive Heart Failure, Pancreatitis, Lymphocytic Cholangitis

SELECTING DIAGNOSTIC TESTS



There are several diagnostic algorithms for FIP published elsewhere to provide a systematic approach to diagnosis. These include Table 4 in the *AAFP/EveryCat FIP Diagnosis Guidelines* and ABCD's Diagnostic Approach (available at catvets.com/ABCD-Diagnostic-Approach).

In general, clinical suspicion for FIP should be raised based on signalment factors and clinical signs, as well as support by results of routine laboratory testing and imaging (i.e., radiographs and POCUS). Cytology and Rivalta's test will greatly increase the index of suspicion for a diagnosis, if these samples are attainable. This should be followed by molecular diagnostics such as PCR on effusion, aspirates, or other samples; or ideally by immunohistochemistry on biopsy samples, which remains the gold standard.