

WELCOME TO THE WEBINAR

FIP: From Fatal to Treatable Navigating Diagnosis and Treatment of Feline Infectious Peritonitis Hosted by ClearPoint Pharmacy

Thank you for joining us today!

Housekeeping:

- This session is being recorded.
- Duration: 60 minutes, including Q&A.
- Please submit your questions anytime using the Chat box.
- For technical help: use the Zoom chat or email info@clearpointpharmacy.com









- •FIP Overview
- Diagnosing FIP
- Antiviral Treatment Options
- •Compounding Excellence: Standards, Access & Support
- •Q&A + Wrap-Up

By the end of this session, attendees will be able to:

- •Diagnose FIP using a combination of clinical signs and diagnostic tests.
- •Recognize and apply the latest antiviral treatment options (dosages, routes, monitoring, safety).
- •Identify proper indications for FIP antivirals and distinguish correct vs. incorrect use.





MEET OUR SPEAKERS

Dr. Samantha Evans, DVM, PhD, DACVP, DACVM

- Assistant Professor, Colorado State University
- o Research focus: advancing diagnostics and therapeutics for infectious diseases, with a specialty in FIP.

Nicole Jacque

- Co-Founder, FIP Global CATS
- Advocate and board member in feline welfare and FIP research

Dr. Robert Nashat, PharmD

- Pharmacist with 15+ years of experience; Owner, ClearPoint Pharmacy
- Operates multiple pharmacies across Canada, and specializes in sterile and non-sterile compounding



How to Get Your RACE CE Credit



• Step 1: Attend the Full Webinar

Stay logged in for the full session (at least 50 minutes of a 60-min program).

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FIP: From Fatal to Treatable



Navigating Diagnosis and Treatment of Feline Infectious Peritonitis







Disclaimer and Disclosure



FINANCIAL DISCLOSURE:

Evans and Jacque: I have delivered many webinars and lectures with honorarium on FIP diagnosis and treatment, including lectures sponsored by compounding pharmacies.

Current research support: EveryCat, Morris Animal Foundation, Best Friends Animal Society, Stokes Pharmacy (supplying GS-441524 tablets).

UNLABELED/UNAPPROVED USES DISCLOSURE:

We will discuss off-label and unlicensed use of antiviral medications, including GS-441524, Remdesivir, molnupiravir, EIDD-1931, GC376, and Paxlovid.





About Us

Samantha J.M. Evans, DVM, PhD, DACVP, DACVM Colorado State University



Dr. Evans's work centers around advancing diagnostic and therapeutic approaches for infectious diseases, including a specialized focus on Feline Infectious Peritonitis (FIP).

She currently serves as an Assistant Professor of Veterinary Clinical Pathology at Colorado State University.

Nicole Jacque Co-Founder of FIP Global CATS



In addition to her work as a Software Engineering Manager, Nicole is an active advocate for Feline Infectious Peritonitis (FIP) research and treatment.

She co-founded FIP Global C.A.T.S. and serves on the boards of several animal welfare organizations.





Agenda



- FIP Overview
- Diagnosing FIP
- Antiviral Treatment for FIP





FIP Overview





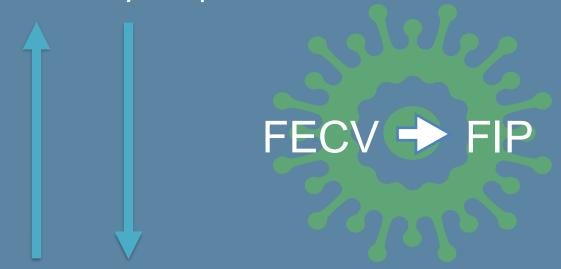
FIP Overview



FIPV arises from enteric FCoV when it mutates such that it can replicate efficiently within monocytes and macrophages.

Effusive ("wet") FIP

No cell-mediated immunity Inflammatory Response



No FIP

Strong cell-mediated immunity

Non-effusive ("Dry") FIP

Weak cell-mediated immunity Inflammatory Response





FIP Overview





Wide (non-exclusive) range of presentations:

- Effusive: protein-rich effusions
- Non-effusive: granulomatous

Can affect cats of any age

Most common in young cats (<2 years old)

Uniformly fatal without treatment











Feline Enteric Coronavirus (FECV) vs Feline Infectious Peritonitis (FIPV)



FECV

- Typically harmless and infection is unnoticed but nearly ubiquitous
- Can be shed in feces for weeks, months or even longer
- Extremely contagious
- Immunity
 - Transient and slow to develop
 - Recurrent infection is common
- Difficult to eliminate in multi-cat households
 - Viable on surfaces for 7 weeks (dry conditions)

FIP

- Mutation from FECV
- No horizontal transmission*
- Unique mutation in each cat
- FECV -> FIPV in ~11% of cats
 - Only 1:10 to 1:30 actually develop FIP
- Fatal without treatment





Don't treat FECV with antivirals!

- Will not work!
 Difficult/impossible to maintain
 FECV free state
- Poor anti-microbial stewardship
- Will encourage anti-viral resistant strains in the wild







Diagnosing FIP





Diagnosing FIP

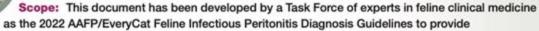


Journal of Feline Medicine and Surgery (2022) 24, 905-933

SPECIAL ARTICLE

2022 AAFP/EveryCat Feline Infectious Peritonitis Diagnosis Guidelines

Clinical importance: Feline infectious peritonitis (FIP) is one of the most important infectious diseases and causes of death in cats; young cats less than 2 years of age are especially vulnerable. FIP is caused by a feline coronavirus (FCoV). It has been estimated that around 0.3% to 1.4% of feline deaths at veterinary institutions are caused by FIP.



veterinarians with essential information to aid their ability to recognize cats presenting with FIP.

Testing and interpretation: Nearly every small animal veterinary practitioner will see cases. FIP can be challenging to diagnose owing to the lack of pathognomonic clinical signs or laboratory changes, especially when no effusion is present. A good understanding of each diagnostic test's sensitivity, specificity, predictive value, likelihood ratio and diagnostic accuracy is important when building a case for FIP. Before proceeding



EveryCAT

Vicki Thayer DVM, DABVP (Felin Co-Chair Purrfect Practice P Lebanon, OR, US

Susan Gogolsk

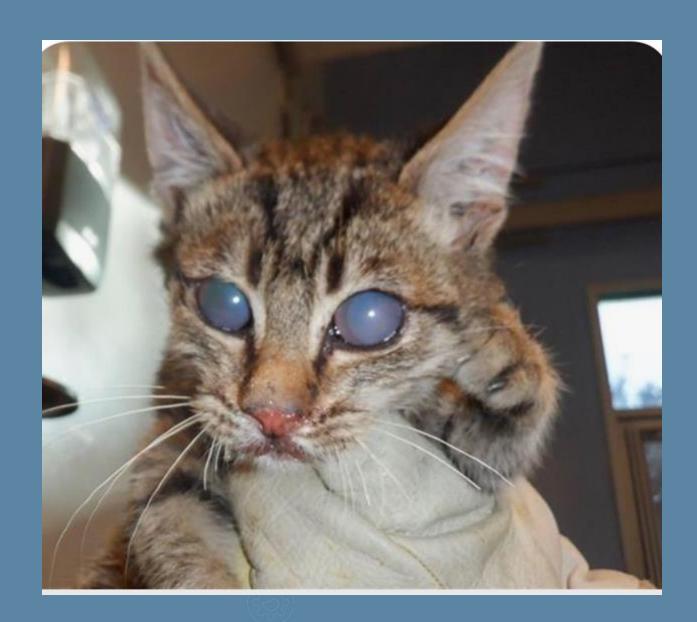






Signalment

- Age
 - 70% of FIP cases occur in cats 1.5 years of age or less
- Breed
 - Pure-bred cats have 3x greater incidence due to genetic factors passed in bloodlines.
- Origin
 - Cats from crowded or stressful multi-cat environments (for example hoarding situations, crowded shelters) are more likely to develop FIP.
- History may include:
 - failure to thrive
 - recent stressful event (surgery, re-homing, vaccination, other illness)
 - weight loss







Common non-specific symptoms =

- Cyclical antibiotic-unresponsive fever
- Lethargy
- Anorexia
- Weight loss
- Jaundice
- Lymphadenopathy
- Pale mucus membranes
- Scrotal enlargement/priapism
- Vasculitis
- Organomegaly
- Uveitis
- Ataxia





Biochemical and Hematologic Changes



- Anemia
- Neutrophilia
- Lymphopenia
- Hyperproteinemia (hyperglobulinemia)
- A/G ratio < 0.6
- Hyperbillirubinemia

Not all FIP cats will show all (or any) of these changes







Diagnosis: Effusive FIP

- Effusion can be
 - Abdominal
 - Pleural
 - Pericardial
- Characteristics of FIP Effusion:
 - Sticky/stringy
 - protein > 2.5 g/dl
 - low cellularity < 10,000/uL
 - Non-degenerative neutrophils, monocyte/macrophages, large foamy macrophages, lymphocytes









Diagnosis: Effusive FIP

- Fluid Diagnostic options
 - Cytology
 - RT-PCR
 - A/G ratio of fluid
 - Rivalta Test*
 - Measurement of protein with refractometer*
 - Cytology (Microscopic examination)*
 - Bacterial culture

* can be performed in-house!









Diagnosis: Non-effusive FIP



- Common findings
 - Organomegaly
 - Mesenteric lymphadenopathy
 - Pyogranulomatous lesions and masses
 - Vasculitis/phlebitis
- Diagnostics
 - Xray
 - Ultrasound
 - FNA
 - Biopsy
 - Diagnostic treatment trial





Diagnosis: Ocular FIP

- Common findings
- Anterior ± posterior uveitis/chorioretinitis
- Blindness
- hyphema
- perivascular cuffing
- keratic precipitates pathognomonic!
- anisocoria
- change in iris color
- hypopyon







Diagnosis: Neurological FIP

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- Common findings:
 - abnormal behavior/mentation
 - central vestibular signs (nystagmus, head tilt, circling, obtunded appearance, postural reaction deficits)
 - Tetra/paraparesis
 - ataxia
 - CNS Blindness
 - Seizures
 - anisocoria





The clock is ticking...

• Median survival time without treatment is 9 days





Ritz S, Egberink H, Hartmann K. Effect of feline interferon-omega on the survival time and quality of life of cats with feline infectious peritonitis. J Vet Intern Med. 2007;21(6):1193-1197. doi:10.1892/06-302.1





Diagnostic Treatment Trials

- Appropriate when:
 - Running out of diagnostic options
 - Available diagnostics inconclusive
 - Client cannot afford other diagnostic options
 - MRI, CSF tap, biopsy, FNA, etc
 - Urgent intervention is needed
- Pick appropriate time endpoints
 - 5-7 days is typically enough time to see significant clinical improvement
 - Note that bloodwork takes longer to normalize



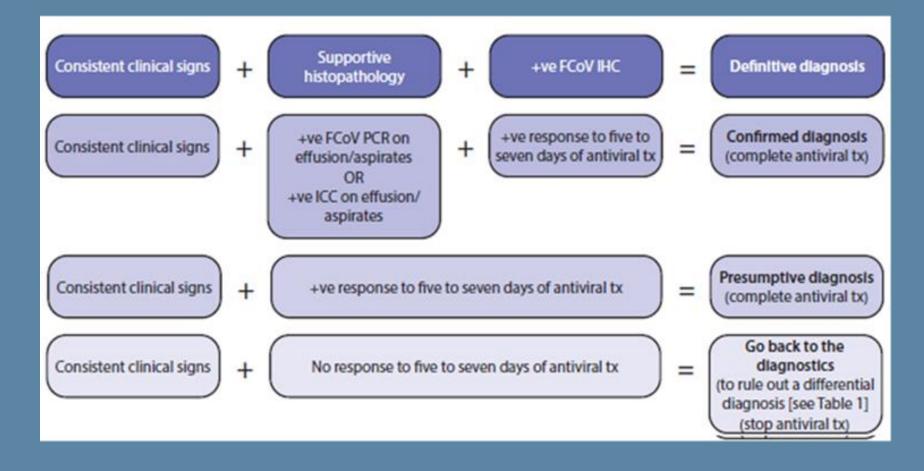


Tear 'N Share

Feline Infectious Peritonitis
Diagnosis: A Practical Approach
for Clinicians

By Petra Cerná, PhD, DACVIM (SAIM), MANZCVS (Medicine of Cats), CertAVP (SAMF), MRCVS, AFHEA;
Sally Coggins, BVSc (Hons I), PhD, MANZCVS (Medicine of Cats); and Samantha Evans, DVM, PhD, DACVP, DACVM

Feline Veterinary Medicine Association Magazine Summer 2025



10 September, 2025 | Clearpoint Pharmacy

FIP Diagnosis Algorithm

Signalment and History

- · FIP is most common in cats < two years old but can develop at any age
- FIP can affect cats of any breed but some pedigree cats (e.g., British Shorthair, Ragdoll, Maine Coon, and Sphynx) are more predisposed.
- Some cats can have a more acute onset of signs (e.g., effusive FIP), but a chronic history of weight loss, decreased appetite, and lethargy is also reported (e.g., noneffusive form)

Ocular Signs Uveitis, chorioretinitis, hyphema, etc. General Examination Findings Fever, enlarged lymph nodes, enlarged abdomen (peritoneal effusion), Increased respiratory rate (pleural or pericardial effusion), dehydration, pale mucous membranes, Icterus, etc. Neurological Signs Ataxia, hyperesthesia, nystagmus, seizures, dullness, etc.

Diagnostics

Hematology

- Anemia If moderate to severe, perform saline agglutination or Coombs test to rule out associative IMHA/PIMA
 Neutrophilia (if neutropenia, investigate possible secondary bacterial infection or sepsis), lymphopenia
- . Serum chemistr
- Hyperglobulinemia, hypoalbuminemia, low AG (≤0.4 = FIP likely)
- Hyperbilirubinemia, increased liver enzymes.
- Electrolyte abnormalities
- POCUS screen for pleural, peritoneal, and pericardial effusion
- Fluid analysis
- "High protein (>3.0 g/dl = FIP likely), low cellularity
- Abdominal ultrasound
- Enlarged lymph nodes; abnormal spieen, liver, and kidneys (medullary rim sign); mass lesions.

FNA and cytology

- Pyogranulomatous inflammation
- Histopathology If biopsy performed
- RT-PCR for coronavirus
- o Fluid sample
- * Tissue FNA mix with either a small amount of saline, EDTA-saline, or RNAlater if available
- Tissue sample fresh frozen is best, but technique can also be performed on fixed tissue samples.
- * Blood not usually recommended; negative result does not exclude FCoV
- Immunocytochemistry detects FCoV antigen in macrophages
- Oytocentrifuged slides (cytospins) of fluid if possible
- FNA slides
- Cell pellet from fluid or FNA tissue suspended in saline
- Immunohistochemistry detects FCoV antigen in macrophages in tissue



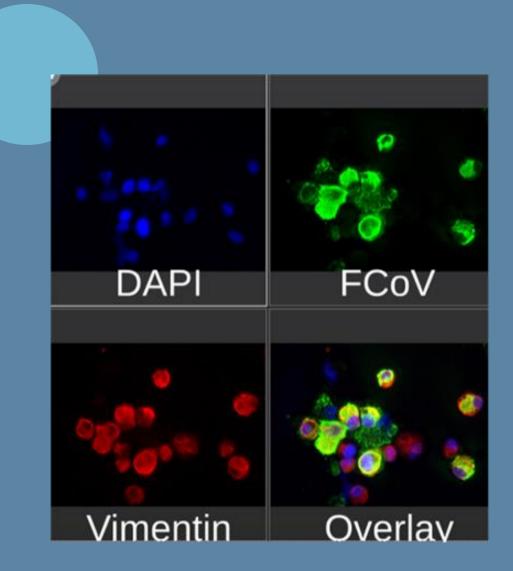
If cat is very sick or caregivers have financial constraints for additional tests, consider treatment trial with antivirals for five to seven days

IMPORTANT: Always recheck the cat in three to seven days. If no clinical response, perform additional tests as it is unlikely the cat has FIP

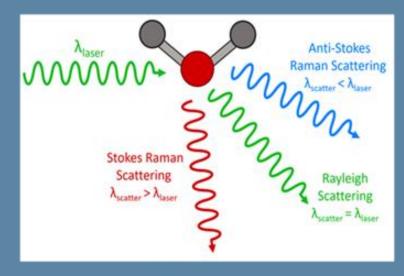
> DO NOT CONTINUE antiviral therapy for > 1 week if NO CLINICAL RESPONSE, particularly if the FIP diagnosis was not confirmed

The Next FIP Revolution: New Diagnostic Options





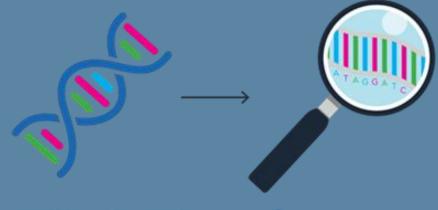
Multiplex Fluorescent Immunocytochemistry



Raman Spectroscopy



CBC/Chem + Machine Learning



Whole Virus Genome Sequencing





Antiviral Treatment for FIP











Treatment Options

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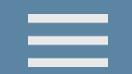


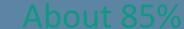
- GS-441524
 - Compounded
 - Recommended first line treatment
- Molnupiravir
 - Compounded
 - Often used as rescue treatment, can be used as first line treatment if GS is not accessible
- Remdesivir
 - Off-label prescription of human COVID drug Veklury (Gilead Sciences Inc.)
 - Primarily used when oral treatment is not feasible
- Nirmatrelvir + Ritonavir (Paxlovid)
 - Off-label prescription of human COVID drug Paxlovid (Pfizer)
 - Primarily used as rescue treatment in conjunction with GS or Molnupiravir
- EIDD-1931
 - Compounded
 - Primarily used as rescue treatment





GS-441524/Remdesivir Efficacy





STANDARD ARTICLE

DOI: 10.1111/jvim.16803

Journal of Veterinary Internal Medicine

Outcomes of treatment of cats with feline infectious peritonitis using parenterally administered remdesivir without transition to orally administered GS-441524

86%

Sally J. Coggins 1 | Jacqui M. Norris 1 | Richard Malik 2,3 | Merran Govendir 1 Benjamin Kimble 1 | Mary F. Thompson 1 Evelyn J. Hall¹

DOI: 10.1111/jvim.16804

STANDARD ARTICLE

Journal of Veterinary Internal Medicine ACVIM



Thirty-two cats with effusive or non-effusive feline infectious peritonitis treated with a combination of remdesivir and GS-441524

Jodie Green Harriet Syme

| Sarah Tayler 81.3%

Original Article





Retrospective study and outcome of 307 cats with feline infectious peritonitis treated with legally sourced veterinary compounded preparations of remdesivir and GS-441524 (2020-2022)

Journal of Feline Medicine and Surgery The Author(s) 2023

Article reuse guidelines: sagepub.com/journals-permissions DOI: 10.1177/1098612X231194460 journals.sagepub.com/home/jfm

This paper was handled and processed by the European Editorial Office (ISFM)

S Sage

Samantha S Taylor^{1,2,3}, Sally Coggins⁴, Emi N Barker^{5,6}, Danièlle Gunn-Moore7, Kamalan Jeevaratnam3, Jacqueline M Norris⁴, David Hughes⁸, Emily Stacey⁹, Laura MacFarlane¹⁰, Carolyn O'Brien¹¹, Rachel Korman¹², Gerard McLauchlan¹³, Xavier Salord Torres¹⁴, Aimee Taylor⁵, Jos Bongers¹⁵, Laura Espada Castro¹⁵, Max Foreman¹6厄, James McMurrough¹7, Bethany Thomas¹7[©], Emilie Royaux¹8, Isabel Calvo Saiz19, Guido Bertoldi19, Caroline Harlos20, Megan Work²¹, Cameron Prior²¹, Stephanie Sorrell²² Richard Malik4 and Séverine Tasker2,6

84.4%





GS-441524 Efficacy

- Actual prognosis depends on:
 - How quickly treatment is started after diagnosis
 - How stable patient is at time of starting treatment
 - Adherence to treatment protocol
 - Comorbidities
 - Quality supportive care

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STANDARD ARTICLE

Journal of Veterinary Internal Medicine

Actim

American College of Veterinary Internal Medicine

American College of Veterinary Internal Medicine

American College of Veterinary Internal Medicine
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Outcomes of treatment of cats with feline infectious peritonitis using parenterally administered remdesivir, with or without transition to orally administered GS-441524

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Sally J. Coggins 1 | Jacqui M. Norris 1 | Richard Malik 2,3 | Merran Govendir 1 | Evelyn J. Hall 1 | Benjamin Kimble 1 | Mary F. Thompson 1
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92% if survived first 48h treatment





GS-441524 Treatment Protocol



Clinical Presentation	Oral GS-441524 Dose
no ocular or neurological symptoms (+/- effusion)	15 mg/kg q24h (or divided/split q12h)
Ocular symptoms (+/- effusion)	15-20 mg/kg q24h (or divided/split q12h)
Neurological symptoms (+/- effusion)	10 mg/kg q12h

- •12 weeks/84 days of treatment*
 - Be sure to monitor weight and adjust dose
- Dose can be adjusted upwards based on response to treatment in 5-10 mg/kg intervals
- Fasting (no food 1 hour before/after) with a small treat given along with medication is recommended
 - Facilitates administration
 - TDM data (unpublished) suggests better absorption with a small treat





Monitoring Treatment

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- Cats gain weight very quickly on treatment!
- Weighing cats weekly and adjusting the dose for weight gain is very important
 - Failure to do so is a common cause of treatment failure





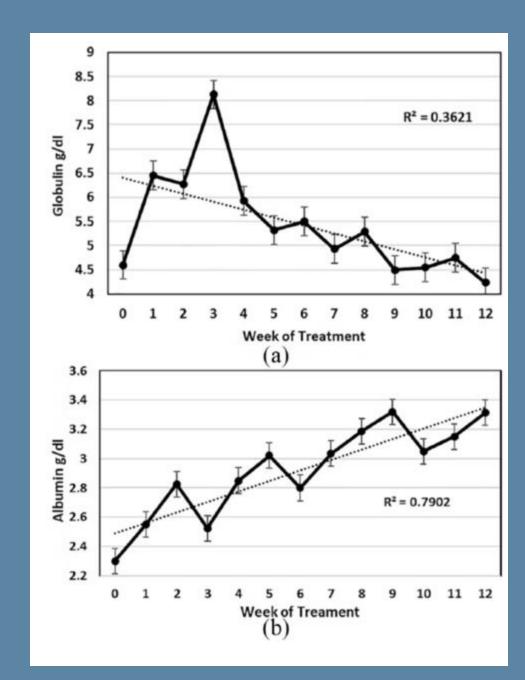


Monitoring Treatment



General Recommendations:

- 48-72 hours: Verbal check-in with client to assess response to treatment
- 2 weeks: Verbal or in-clinic checkin to assess response to treatment
- 6 weeks: Clinical exam, CBC and Biochemistry panels
- 12 weeks (before stopping treatment): Clinical exam, CBC and Biochemistry panels
- 4 weeks post-treatment: Clinical exam, CBC and Biochemistry panels







Treatment Length





- Current recommendation is 12 weeks of anti-viral treatment
- Recent research suggests that shorter treatment durations may be possible for <u>some</u> cats:
 - effusive FIP
 - No data yet for other presentations of FIP
 - clinical, haematological and biochemical parameters normal within 28 days
 - No data for use of other antivirals





Rescue Therapy

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- If a cat does not respond, shows signs of viral resistance, or has adverse effects you can switch antivirals (monotherapy)
 - Use the normal dosing protocol appropriate for that antiviral
- Antivirals can be combined
 - GS-441524/Paxlovid
 - Molnupiravir/Paxlovid
 - GS-441524/Molnupiravir





Article

Unlicensed Molnupiravir is an Effective Rescue Treatment Following Failure of Unlicensed GS-441524-like Therapy for Cats with Suspected Feline Infectious Peritonitis

Meagan Roy 1, Nicole Jacque 2, Wendy Novicoff 3, Emma Li 1, Rosa Negash 1 and Samantha J. M. Evans 1,*00





Article

An Optimized Bioassay for Screening Combined Anticoronaviral Compounds for Efficacy against Feline Infectious Peritonitis Virus with Pharmacokinetic Analyses of GS-441524, Remdesivir, and Molnupiravir in Cats

Sarah Cook ^{1,*}, Luke Wittenburg ², Victoria C. Yan ³, Jacob H. Theil ⁴, Diego Castillo ¹, Krystle L. Reagan ⁵
Sonyia Williams ¹, Cong-Dat Pham ³, Chun Li ³, Florian L. Muller ⁶ and Brian G. Murphy ¹







Summary of FIP Antiviral use

Remdesivir & oral GS-441524 should be our first-line antivirals

(minimize subcutaneous administration of RDV/GS-441524 where possible)

Switch to Molnupiravir or EIDD-1931 if poor response to remdesivir / GS-441524 Or recurrent disease

(or if remdesivir / GS-441524 are cost prohibitive)

Add in a protease inhibitor for refractory cases

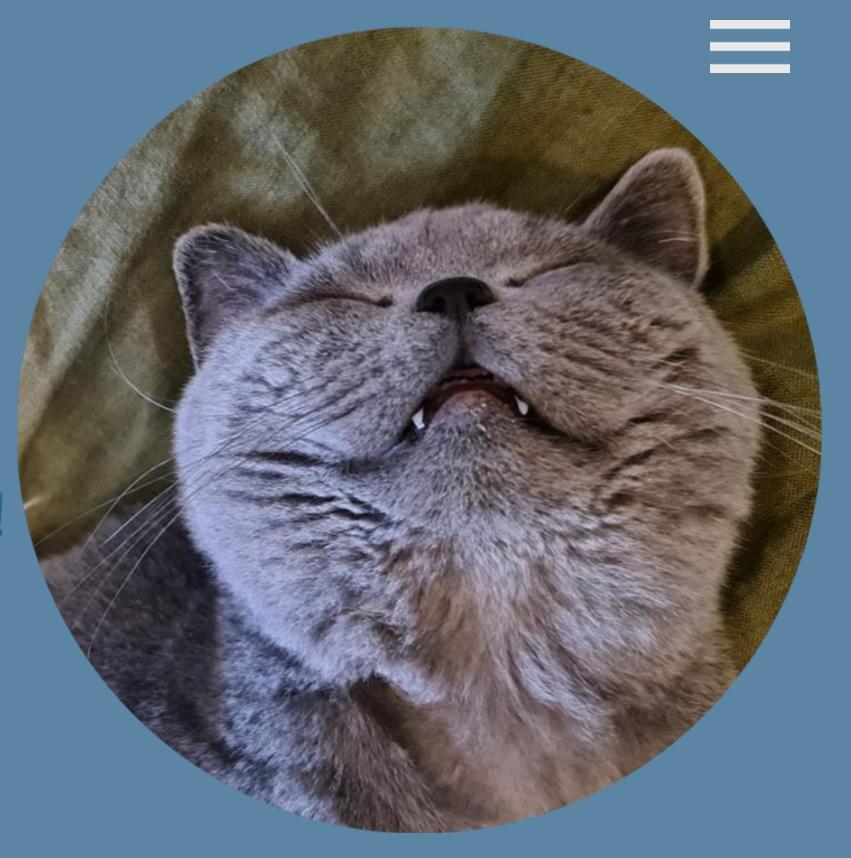




Treatment of FIP will continue to evolve rapidly

ISCAID FIP Treatment
Guidelines are being developed!







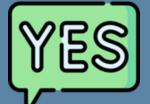


FAQ's





My patient has already started on XYZ treatment - can I switch to GS-441524?



Can I use empiric therapy with GS-441524 to help diagnose FIP?



- Should I treat FECV-infected cats with GS-441524 to prevent FIP?
- What about all of the supplements and add-ons?



• Can I vaccinate/neuter?



Ideally wait 2-3 months post treatment, but fine to do sooner if risk requires this

Do neurologic or severe cases of FIP need to be started on injectable drugs?







Should I still treat if retroviral positive?





2021



Article

Unlicensed GS-441524-Like Antiviral Therapy Can Be Effective for at-Home Treatment of Feline Infectious Peritonitis

Sarah Jones 1, Wendy Novicoff 2, Julie Nadeau 3 and Samantha Evans 1,*00

- Department of Veterinary Biosciences, College of Veterinary Medicine, The Ohio State University, Columbus, OH 43210, USA; Sarahejones79@yahoo.com
- Departments of Orthopaedic Surgery and Public Health Sciences, School of Medicine, University of Virginia, Charlottesville, VA 22903, USA; wmn2v@virginia.edu
- Hamilton Region Veterinary Emergency Clinic, Hamilton, ON L8P 4W3, Canada; julie.nadeau7@gmail.com
- Correspondence: evans.2608@osu.edu; Tel.: +1-614-292-9706

Yes!

Follow up study in progress (3yr survival)

n = 393 cats

17 were retroviral positive, 14 still alive

"Emerging evidence retroviral positive cats can still have a favourable response to treatment"





FIP treatment in FeLV+ cats

University of Florida/Austin Pets Alive (ISCAID Abstract)

- Survival rate of FeLV+ and non-FeLV+ cats nearly the same (about 74%) at about 3 months post treatment
- Survival rates diverged about 1 year post treatment (due to FeLV progression)
- No significant differences in response to treatment bloodwork markers
- Used black market drugs, varying dosage protocols









Thank you to Dr. Evans & Nicole for advancing our understanding of FIP diagnosis and treatment.

Next: ClearPoint Pharmacy perspective

- Quality & safety standards in compounding
- Pharmacist expertise & case support
- Ensuring access for veterinarians and families







QUALITY & SAFETY STANDARDS FOR COMPOUNDED VETERINARY PRODUCTS









Compounded using high-quality ingredients from a Health Canada-approved Canadian GMP wholesaler



Certificate of Analysis (CoA) issued for the product confirming regulatory compliance



Voluntarily third-party tested for identity, purity, and potency



Potency validated for a 6-month Beyond-Use Date (BUD) to ensure stable, consistent results





Educational Resources

Dosing guides, treatment protocols, and client handouts, plus access to our Veterinary Portal for online ordering, success stories, blog updates, and resources for veterinarians and pet owners

Comprehensive FIP case tracking and follow-up

For every case we treat, we record the cat's gender, age, weight, and diagnosis (type of FIP). At the 2-week follow-up with the cat owner, we ensure they have an appointment booked with their veterinarian, document symptom progress, send an update to the veterinarian, and complete a final follow-up at the end of treatment to provide a full case summary.

Pharmacist qualified and educated on FIP treatment

Including dosing and guidelines, to answer all veterinarian and client questions, and a separate French-speaking pharmacist available for GS-441524 & FIP inquiries



AVAILABILITY & ACCESS





Available as oral suspension and now Tablets!



24-hour overnight shipping anywhere in Canada



Same-day GTA delivery for orders before 2 PM



Free shipping on all orders





First in Canada to offer compounded Molnupiravir.

Indication / Positioning

- Relapse cases after having been treated with an adequate dosage of GS-441524
- Refractory cases where cats do not respond as expected to GS-441524 and Cats that cannot be fasted with GS-441524

Quality & Safety

- Compounded with GMP-sourced ingredients (Health Canada-approved)
- CoA provided for the product

Educational Support

Dosing guides & protocols for vets and pet owners will be available Shortly but Our Clinical Pharmacist Should be able to answer any questions that you may have!





Molnupiravir for the Treatment of Feline Infectious Peritonitis (FIP): Mechanism, Evidence, and Clinical Application



Wednesday, November 19 at 7:00 PM ET



RACE - CE Credit Hours: 1 (Approval Pending)



Dr. Sally Coggins

BVSc (Hons I), MANZCVS (Feline Medicine) | PhD

THE UNIVERSITY OF SYDNEY



Dr. Samantha EvansDVM, PhD, DACVP | CSU



QUESTIONS?





Dr. Samantha Evans samantha.evans@colostate.edu

Nicole Jacque nicole@fipglobalcats.com

ClearPoint Pharmacy
info@clearpointpharmacy.com















- Thank you to our speakers and all participants.
- •Reminder: CE certificates will be emailed within 7-10 business days.
- •Recording and slides will be shared with registered attendees.
- •Stay connected: +289-635-2735 | www.clearpointpharmacy.com [For Veterinarians]
- •Future Webinar November 19, 2025 @ 7PM EST

 Molnupiravir for the Treatment of Feline Infectious Peritonitis (FIP):

 Mechanism, Evidence, and Clinical Application

