A review of recent breakthroughs in feline medicine

Morgan Stark, DVM, DACVECC
Criticalist
Cape Cod Vet Specialists

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Outline

- Feline infectious peritonitis (FIP)
  - 2022 AAFP/Every Cat Foundation feline infectious peritonitis diagnosis guidelines
  - GS-441524
- Feline arterial thromboembolism and Rapamycin
- Diabetes mellitus
  - 2025 iCatCare consensus guidelines on the diagnosis and management of diabetes mellitus in cats
  - Sodium-glucose cotransporter 2 inhibitors
- Lower urinary tract disease
  - 2025 iCatCare consensus guidelines on the diagnosis and management of lower urinary tract diseases in cats

Feline infectious peritonitis

- Caused by a feline coronavirus (FCoV)
  - Transmission: fecal-oral route
  - Highly contagious
  - Gastrointestinal signs
- FIP
  - A virulent biotype is created by acquisition of mutations that lead to a change in cell tropism
  - Tropism for monocytes and macrophages allows dissemination of the virus through the lymphatic and vascular systems

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Feline infectious peritonitis

- Two clinical forms:
  - Effusive FIP
    - Cavitary effusions and immune-mediated vasculitis
  - Non-effusive FIP
    - Granulomatous lesions in organs

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Journal of Feline Medicine and Surgery
Volume 24, Issue 9, September 2022, Pages 905-933

https://doi.org/10.1177/1098612X221118761

Special Article

2022 AAFP/EveryCat Feline Infectious Peritonitis Diagnosis Guidelines

Vicki Thayer[1,*], Susan Gogolski[2], Sandra Felten[3], Katrin Hartmann[4], Melissa Kennedy[5], and Glenn A Olah[6]

2022 AAFP/EveryCat Feline Infectious Peritonitis Diagnosis Guidelines

Table 1 Risk factors influencing the development of FIP

Risk factor	Examples/comments
Origin	✣ From environment with high FCoV load
Background	✣ FIP diagnosed in the same litter/family lineage[9] ✣ Immunosuppressive therapy[9] ✣ Adoption or acquisition from a cattery, shelter, rescue or rehoming center[62,63] ✣ Recent stressful event:[17,26,54,55,62,64,65] – Surgery (spay, neuter or other) – Vaccination – Gastrointestinal disease – Upper respiratory tract disease – Travel, boarding, attending cat shows – New household member (eg, new baby or pet), moving house
Signalment	✣ Age at exposure to FCoV (less-virulent biotype): <2 years old[66–69] ✣ Sex: intact (male) cats[3,4,5,70,71] ✣ Breed: certain purebred cats (eg, Bengals, Birmans;[3,68] see supplemental file 7)
Health status	✣ Coinfection (eg, FIV, FeLV) or concurrent disease[9,23,72] ✣ Immunosuppression[9]
Housing conditions	✣ Multi-cat household[45,48] ✣ Frequent introductions and reintroductions to new cats[73–75] ✣ Variable lengths of stay in multi-cat environments[76] ✣ Mingling of different age groups[77] ✣ Overcrowding (>5 cats)[63]

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2022 AAFP/EveryCat Feline Infectious Peritonitis Diagnosis Guidelines

Table 2 Signs associated with FIP

System	Signs
Non-specific	Lethargy, anorexia, weight loss (or failure to gain weight/stunted growth), unthriftiness, fever (waxing/waning; usually <104°F/40°C), jaundice, lymphadenopathy, pale mucous membranes
Abdominal	Distension, fluid wave (ascites), abdominal masses (eg, solitary mural intestinal lesions of colon or ileocecolic junction with regional lymphadenopathy), diarrhea, lymph node enlargement (necrogranulomatous lymphadenitis)
Respiratory	Dyspnea, tachypnea
Cardiac	Cardiac tamponade, heart failure (pericardial effusion)
Reproductive	Scrotal enlargement (effusion), priapism
Neurological	Seizures, abnormal behavior/mentation (dementia, aggression, rage, hiding/withdrawal), central vestibular signs (nystagmus, head tilt, circling, obtunded appearance, postural reaction deficits), anisocoria, ataxia, tetra- or paraparesis, incoordination, hyperesthesia, seizures, palsy (brachial, trigeminal, facial or sciatic nerves), cortical blindness[95]
Ocular	Anterior ± posterior uveitis or chorioretinitis, blindness, hyphema, perivascular cuffing (retinal vasculitis) and fluid accumulation (retinal detachment), hypopyon, fibrinous exudate, keratic precipitates, dyscoria, anisocoria, change in iris color
Dermatological	Toxic epidermal necrolysis, intradermal papules, signs of vasculitis/phlebitis, skin fragility syndrome

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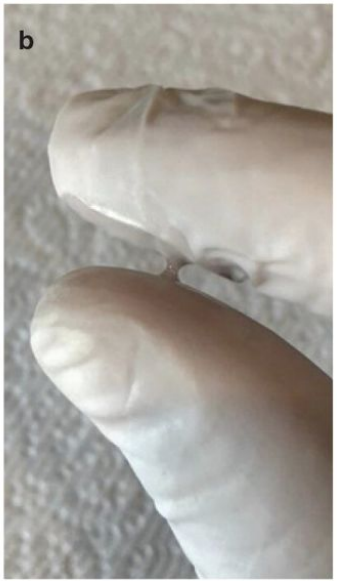
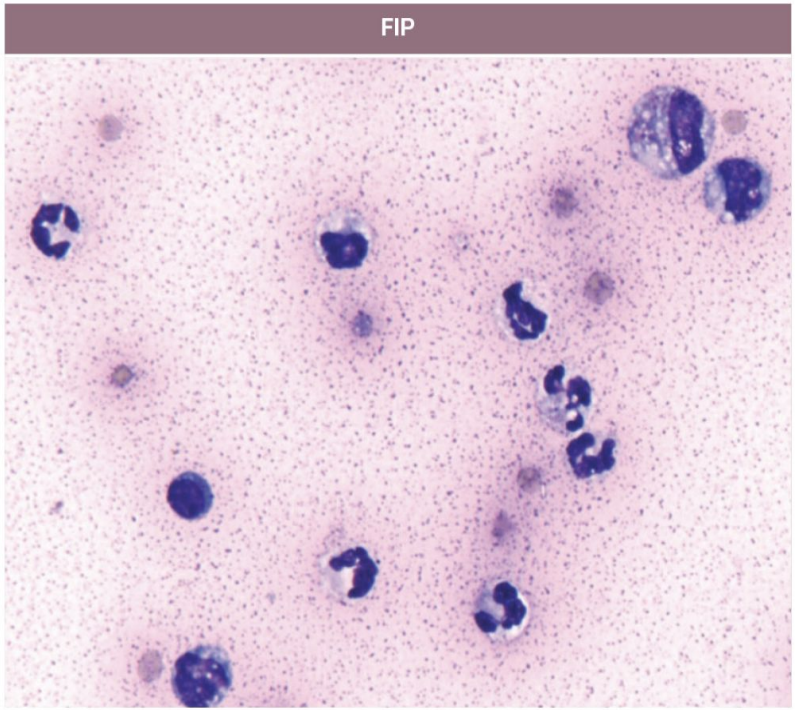
Diagnosis: effusion analysis





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Diagnosis

- Histopathology
- Detection of viral antigen
  - Immunostaining
  - Performed on cytology samples from tissues, effusions, CSF or aqueous humor
- Detection of viral nucleic acids
  - Real-time quantitative PCR
    - Performed on blood, effusions, CSF, aqueous humor, tissue samples, or FNAs
- Detection of anti-FCoV antibodies

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Diagnosis

- Gold standard: detection of virus within macrophages of diseased tissues using immunostaining
- Both direct and indirect detection methods only indicate the presence of feline coronavirus, not specifically the mutated virus
    - FCoV found in tissues outside the intestinal tract does not mean the patient has FIP
    - Detection of mutated FCoV has been found in cats without FIP

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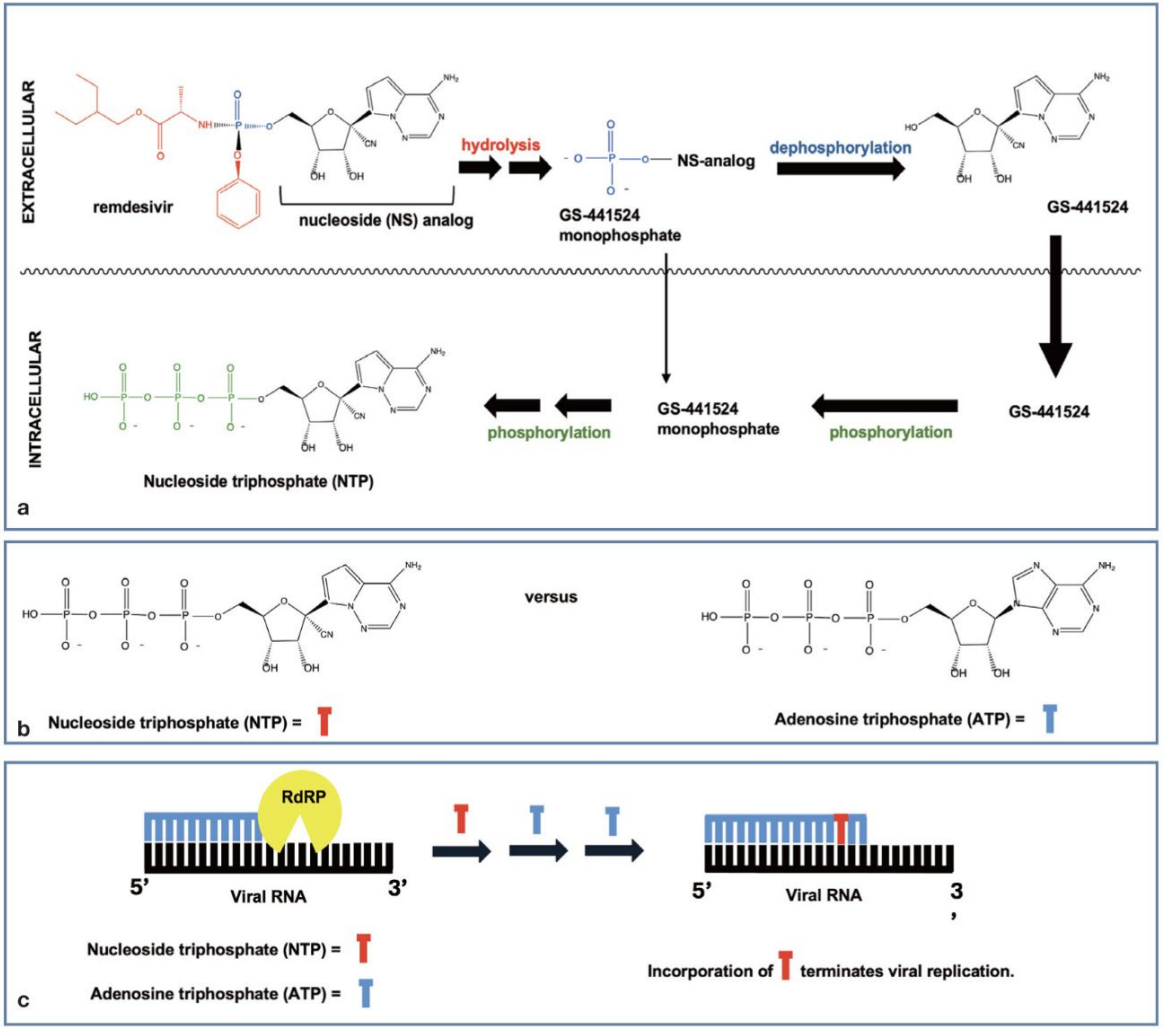
Treatment

- GS-441524
  - Adenosine nucleotide analogue
  - Interferes with coronavirus replication



pathogens

MDPI

Systematic Review

Efficacy of GS-441524 for Feline Infectious Peritonitis: A Systematic Review (2018–2024)

Emma Gokalsing [1], Joana Ferrolho [1], Mark S. Gibson [1], Hugo Vilhena [1,2,3,4] and Sofia Anastácio [1,5,6,*]

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Systematic Review

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- 551/650 cats were treated with GS-441524 alone
- The success rate was 83.1% (458/551) for this monotherapy
- Cats with neurological and ocular FIP had the lowest success rate of 43%
- No life-threatening adverse effects

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Journal of Feline Medicine and Surgery
Volume 25, Issue 8, August 2023

https://doi.org/10.1177/1098612X231183250

Sage Journals

Original Article

Long-term follow-up of cats in complete remission after treatment of feline infectious peritonitis with oral GS-441524

Katharina Zwicklbauer [1], Daniela Krentz [1], Michèle Bergmann [1], Sandra Felten [1], Roswitha Dorsch [1], Andrea Fischer [1], Regina Hofmann-Lehmann [2], Marina L Meli [2], Andrea M Spiri [2], Martin Alberer [3], Laura Kolberg [3], Kaspar Matiasek [4], Yury Zablotski [1], Ulrich von Both [3,5], and Katrin Hartmann [1]

Key points

- New availability of antivirals is providing an opportunity to successfully treat cats with FIP
- GS-441524 seems well tolerated in cats
- Future explorations can focus on tailoring treatment protocols for specific disease manifestations and severity

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Feline arterial thromboembolism (FATE)

Journal of Feline Medicine and Surgery (2024) **26**, 1–13

REVIEW

FELINE AORTIC THROMBOEMBOLISM
Recent advances and future prospects

Julien Guillaumin

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Journal of Feline Medicine and Surgery (2024) **26**, 1–13

REVIEW

FELINE AORTIC THROMBOEMBOLISM
Recent advances and future prospects

Julien Guillaumin

- Causes of FATE include:
  - Cardiomyopathy
    - An estimated 25% of cats with hypertrophic cardiomyopathy develop FATE
  - Neoplasia
  - Infection/inflammation
  - Hyperthyroidism
  - Corticosteroids
  - Progesterone agonists

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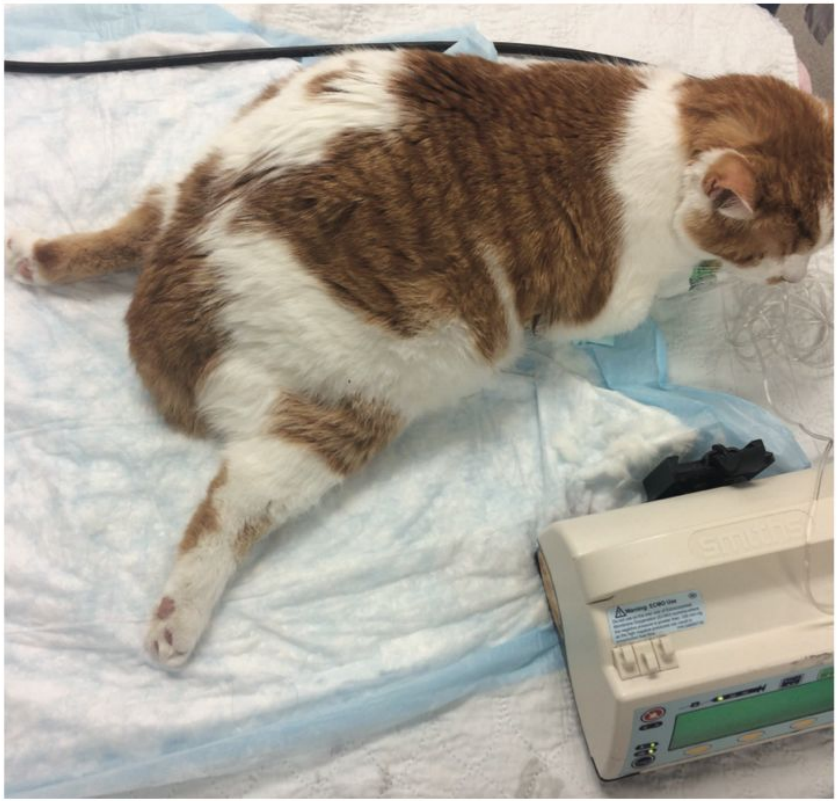
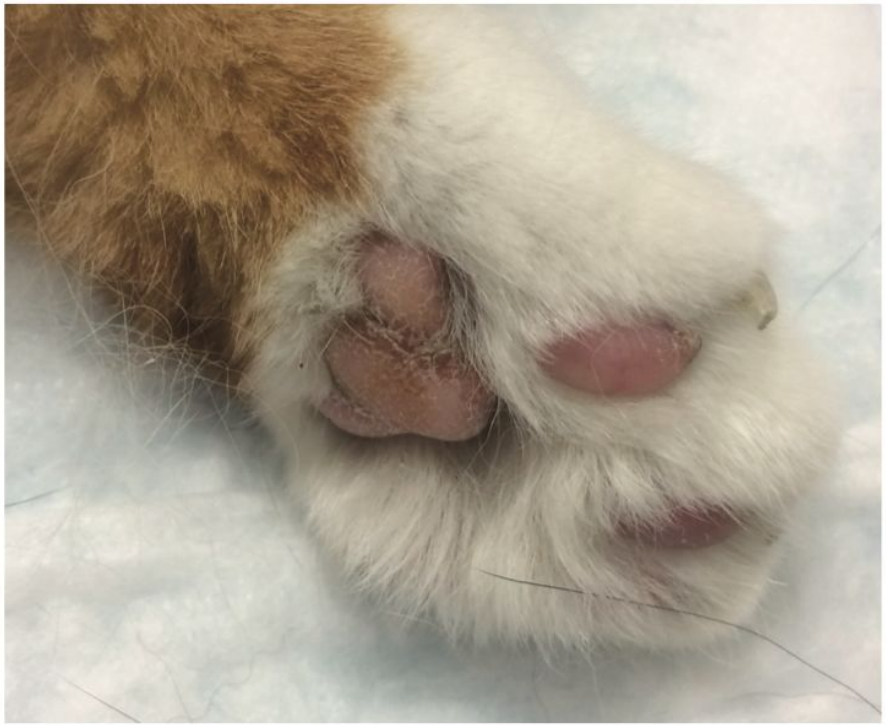
Clinical signs of FATE





Diagnosis of FATE

frontiers | Frontiers in Veterinary Science

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Utilization of peripheral glucose and lactate differences in the diagnosis of feline arterial thromboembolism: a multi-center study

https://www.frontiersin.org/articles/10.3389/fvets.2024.1505479/full

Michael Yee[1], Julien Guillaumin[2], Meredith 't Hoen[1]*, Jiazhang Cai[3], Jonathan Mochel[3] and Rebecca Walton[1,4]

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Prognosis

- Prognosis: poor
  - Euthanasia rates ≥ 90%
- A 2022 prospective, multicenter study of cats with bilateral pelvic limb paralysis (BLASTT)
  - 37.5% discharge rate
- Retrospective studies have shown survival times after discharge of up to 350-500 days

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Treatment

Journal of Feline Medicine and Surgery
Volume 24, Issue 12, December 2022, Pages e535-e545

https://doi.org/10.1177/1098612X221135105

SAGE journals

EPUB

Original Article

Bilateral lysis of aortic saddle thrombus with early tissue plasminogen activator (BLASTT): a prospective, randomized, placebo-controlled study in feline acute aortic thromboembolism

Julien Guillaumin [1], Teresa C DeFrancesco [2], Brian A Scansen [1], Rebecca Quinn [3], Megan Whelan [4], Rita Hanel [5], Isabelle Goy-Thollot [6], Isabelle Bublot [7], James B Robertson [8], and John D Bonagura [2,9]

Objectives The aim of this study was to investigate the impact of tissue plasminogen activator (TPA) on the treatment of feline aortic thromboembolism (FATE).

Prevention

Journal of Feline Medicine and Surgery
Volume 24, Issue 4, April 2022, Pages 277-283

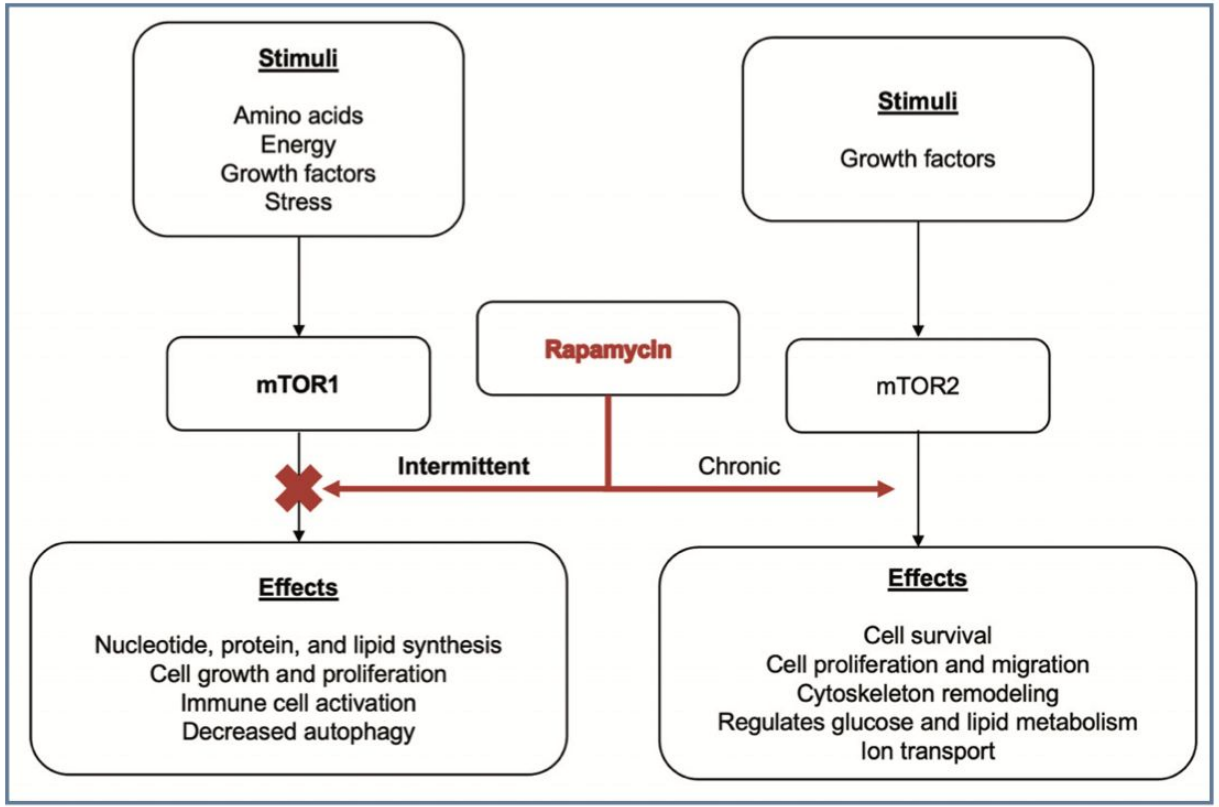
https://doi.org/10.1177/1098612X211013736

Original Article

Dual therapy with clopidogrel and rivaroxaban in cats with thromboembolic disease

Sara T Lo [1], Ashley L Walker [1], Catherine J Georges [1], Ronald HL Li [2], and Joshua A Stern [3]

Rapamycin



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Rapamycin

JAVMA

AVMA

Delayed-release rapamycin halts progression of left ventricular hypertrophy in subclinical feline hypertrophic cardiomyopathy: results of the RAPACAT trial

Joanna L. Kaplan, DVM, DACVIM[1]; Victor N. Rivas, MS[1,2]; Ashley L. Walker, DVM[1]; Louise Grubb, BSc, MBS[3]; Aisling Farrell, MPSI, MSc, PGCert[3]; Stuart Fitzgerald, MVB, MANZCVS[3]; Susan Kennedy, BSc, PhD[3]; Carina E. Jauregui, RVT, RLAT[1,2]; Amanda E. Crofton, DVM[1]; Chris McLaughlin, DVM, DACVECC[2]; Rachel Van Zile, DVM[2]; Teresa C. DeFrancesco, DVM, DACVECC, DACVIM[2]; Kathryn M. Meurs, DVM, PhD, DACVIM[2]; Joshua A. Stern, DVM, PhD, DACVIM[1,2]*

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Key points

- Rapamycin appears to be well tolerated in the study population of cats
- Future research should clarify if rapamycin can prevent or delay the complications of HCM including development of congestive heart failure, thromboembolic disease, and improve survival

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Diabetes mellitus

Journal of Feline Medicine and Surgery
Volume 27, Issue 11, November 2025

https://doi.org/10.1177/1098612X251399103

Sage Journals

Clinical Spotlight Review

2025 iCatCare consensus guidelines on the diagnosis and management of diabetes mellitus in cats

Samantha Taylor, Panel Chair, BVetMed(Hons), CertSAM, DipECVIM-CA, MANZCVS, FHEA, FRCVS [1,*], Martha Cannon, BA, VetMB, DSAM(Fel), FRCVS [2], David Church, BVSc, PhD, MANZCVS, FHEA, MRCVS [3], Linda Fleeman, BVSc, PhD, MANZCVS [4], Federico Fracassi, DVM, PhD, DipECVIM-CA [5], Chen Gilor, DVM, PhD, DACVIM (SAIM) [6], Jocelyn Mott, DVM, DACVIM (SAIM), FACVIM (feline and canine diabetes) [7], and Stijn Niessen, DVM, PhD, DECVIM, PGCertVetEd, FHEA, MRCVS [8]

Practical relevance: Diabetes mellitus (DM) is a common feline endocrine disease. Developments in therapy mean there are now more options for treatment, including various types of insulin and novel oral medications. Use of continuous glucose monitoring (CGM) devices has increased, providing more detailed information on affected cats. Selecting the appropriate treatment for DM, monitoring the cat's response and treating complications can present challenges, but these patients are nonetheless rewarding cases to manage for clinicians.

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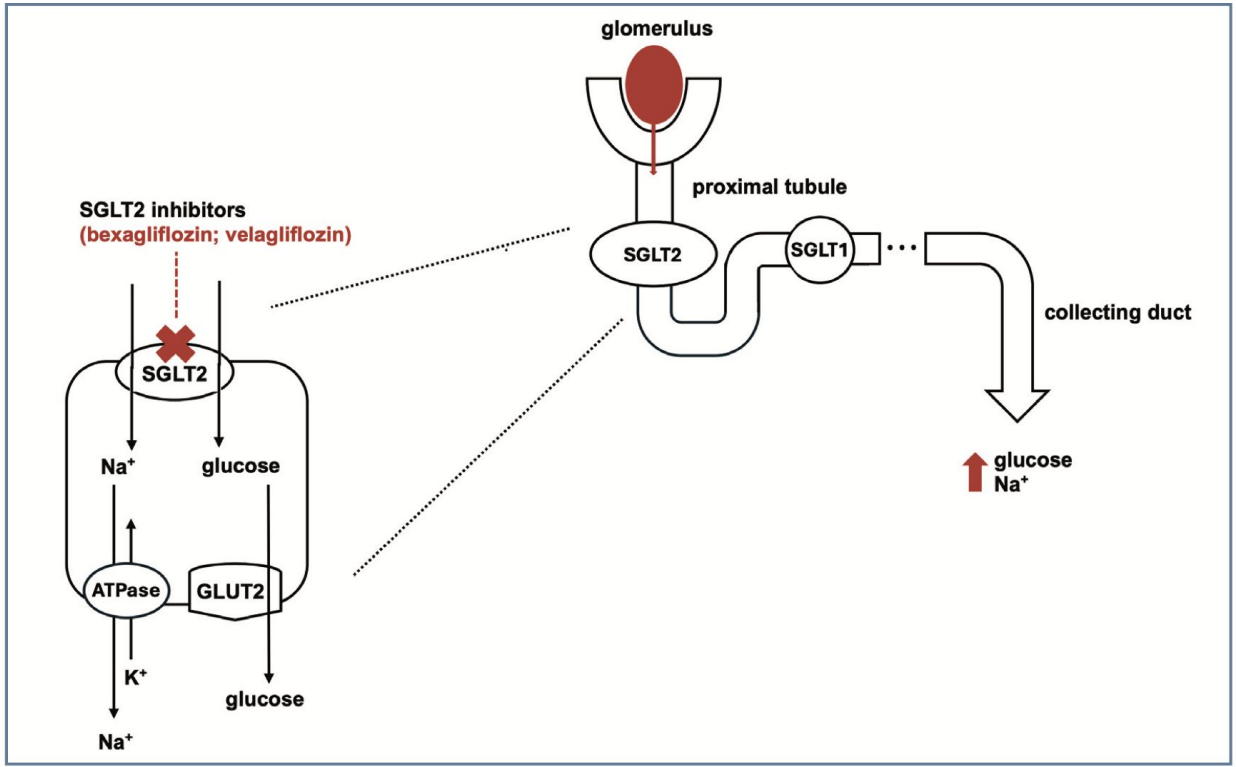
Sodium-glucose cotransporter 2 inhibitor



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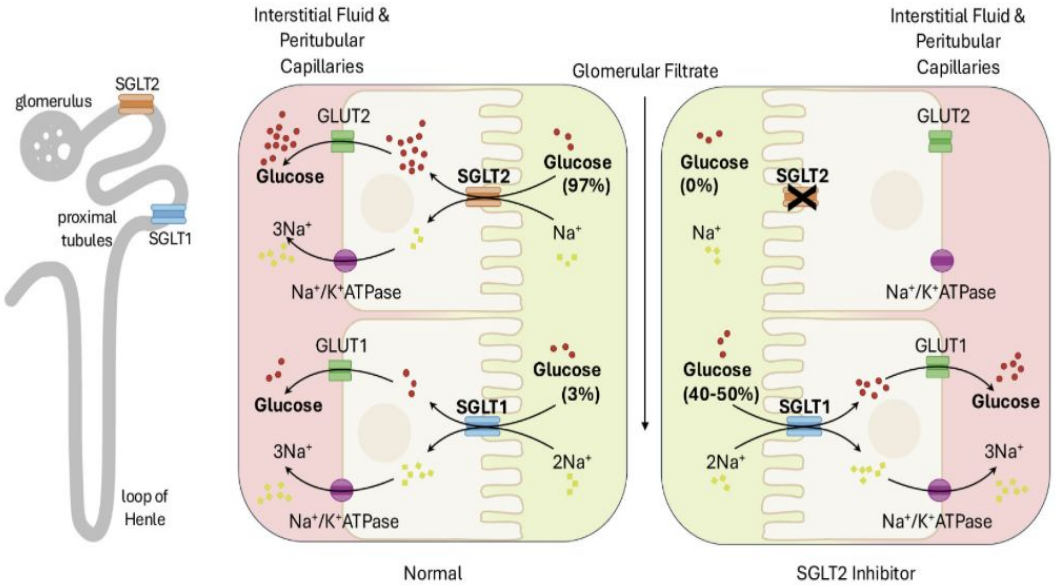
Sodium-glucose cotransporter 2 inhibitor

- Patient selection is crucial
  - Ideal candidate: healthy, newly diagnosed diabetic, good appetite, no significant comorbidities

CONTRAINDICATIONS

- Do not use Bexacat in cats with diabetes mellitus who have previously been treated with insulin, who are receiving insulin, or in cats with insulin-dependent diabetes mellitus. The use of Bexacat in cats with insulin-dependent diabetes mellitus, or the withdrawal of insulin and initiation of Bexacat, is associated with an increased risk of diabetic ketoacidosis or euglycemic diabetic ketoacidosis and death.
- Due to risk of severe adverse reactions, do not use Bexacat in cats with evidence of hepatic disease or reduced renal function.

Sodium-glucose cotransporter 2 inhibitors



- Adverse effects
  - GI upset
  - Hypoglycemia
  - Urinary tract infection
  - Euglycemic DKA

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Euglycemic DKA

- Diagnosis
  - Ketonemia/ketonuria
  - Metabolic acidosis
  - Euglycemia
- Treatment
  - Discontinue SGLT2i
  - Fluid therapy with supplemental dextrose
  - Correction of electrolyte derangements
  - Insulin therapy
  - Appropriate nutritional support

Elanco™

15 mg flavored tablets
For oral use in cats only
Sodium-glucose cotransporter 2 (SGLT2) inhibitor

CAUTION
Federal law restricts this drug to use by or on the order of a licensed veterinarian.

WARNING: DIABETIC KETOACIDOSIS/EUGLYCEMIC DIABETIC KETOACIDOSIS
- **Cats treated with Bexacat may be at an increased risk of diabetic ketoacidosis or euglycemic diabetic ketoacidosis (see Adverse Reactions). As diabetic ketoacidosis and euglycemic diabetic ketoacidosis in cats treated with Bexacat may result in death, development of these conditions should be treated promptly, including insulin administration and discontinuation of Bexacat (see Monitoring).**
- **Due to the risk of developing diabetic ketoacidosis or euglycemic diabetic ketoacidosis, do not use Bexacat in cats with diabetes mellitus who have previously been treated with insulin, who are receiving insulin, or in cats with insulin-dependent diabetes mellitus (see Contraindications).**
- **Bexacat should not be initiated in cats with anorexia, dehydration or lethargy at the time of diagnosis of diabetes mellitus or without appropriate screening tests (see Animal Safety Warnings).**

Key Points

- SGLT2i represent a new treatment option for uncomplicated diabetics
  - Advantages: once daily oral administration, low risk of hypoglycemia
  - Patient selection and client education are critical

Persistent plasma bexagliflozin concentrations and reduced clearance of Bexacat, represented as the presence of plasma half-lives in excess of 24 hours, may result in prolonged clinical effects such as glucosuria and/or euglycemia despite discontinuation of Bexacat in some cats with hepatic disease and/or reduced renal function, including cats with clinically undetectable disease at the time of Bexacat initiation. Reduced clearance of Bexacat may contribute to persistent glucosuria, resulting in an osmotic diuresis and dehydration that requires appropriate hydration support. These cats may require hospitalization, which may be protracted, for sequalae such as diabetic ketoacidosis, euglycemic diabetic ketoacidosis, or hepatic lipidosis.

Lower urinary tract disease

Journal of Feline Medicine and Surgery
Volume 27, Issue 2, February 2025

https://doi.org/10.1177/1098612X241309176

Sage Journals

Practice Guidelines

2025 iCatCare consensus guidelines on the diagnosis and management of lower urinary tract diseases in cats

Samantha Taylor, BVetMed(Hons), CertSAM, DipECVIM-CA, MANZCVS, FRCVS [1,*], Søren Boysen, DVM, DACVECC [2], Tony Buffington, DVM, PhD, DACVIM (Nutrition) [3], Serge Chalhoub, BSc (Hons), DVM, DipACVIM (SAIM) [4], Pieter Defauw, DVM, PhD, DipECVIM-CA [5], Mikel M Delgado, PhD [6], Danièlle Gunn-Moore, BSc (Hons), BVM&S, PhD, MANZCVS (Feline), FHEA, FRSB, FRCVSRoyal (Dick) [7], and Rachel Korman, BVSc, MANZCVS (Int Med), FANZCVS (Fel Med) [8]

Practical relevance: Lower urinary tract signs (LUTS) such as dysuria, haematuria, periuria, pollakiuria and stranguria can occur as the result of a variety of underlying conditions and diagnostic investigation is required to uncover the underlying cause and select appropriate treatment.

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Presenting clinical signs of LUTD

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Journal of Feline Medicine and Surgery
Volume 27, Issue 2, February 2025

https://doi.org/10.1177/1098612X241309176

Sage Journals

Practice Guidelines

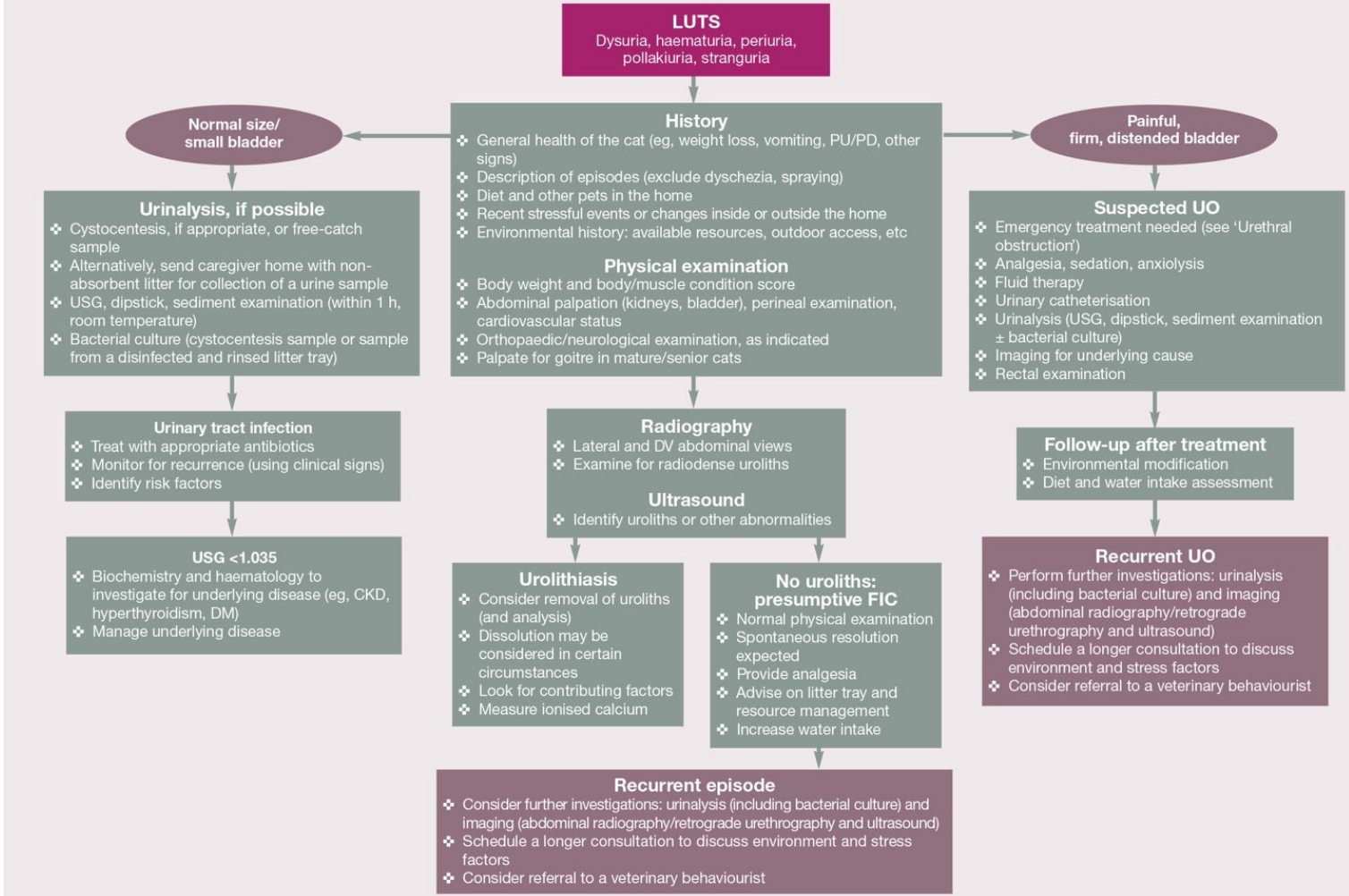
2025 iCatCare consensus guidelines on the diagnosis and management of lower urinary tract diseases in cats

Causes of lower urinary tract signs in cats

- FIC (most common)
- Urolithiasis
- Infectious diseases (bacterial, fungal)
- Urethral trauma (catheterisation, external trauma, previous urolithiasis)
- Neurogenic conditions (urethral spasm, reflex dyssynergia, detrusor atony)
- Neoplastic disease (urothelial carcinoma [UC; transitional cell carcinoma], squamous cell carcinoma, lymphoma)
- Anatomical abnormalities (congenital, acquired [strictures])

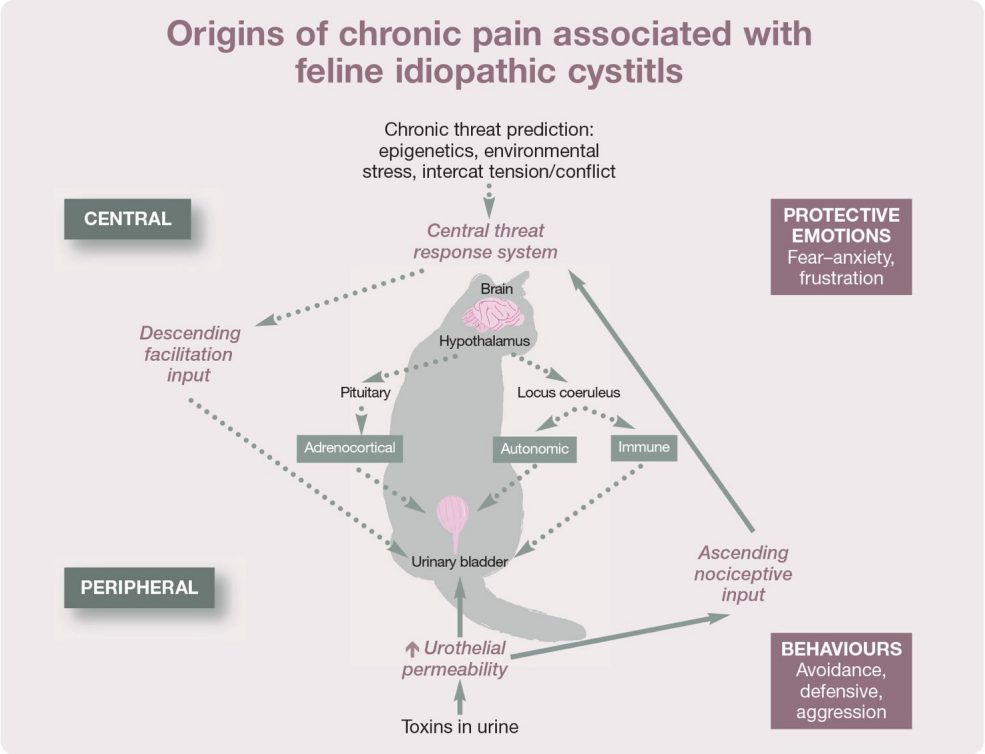
Note that UO (and urethral plugs) are not included in this list because they are a consequence/manifestation of underlying causes, rather than a standalone diagnosis. FIC = feline idiopathic cystitis

Decision-making for cats with signs of lower urinary tract diseases



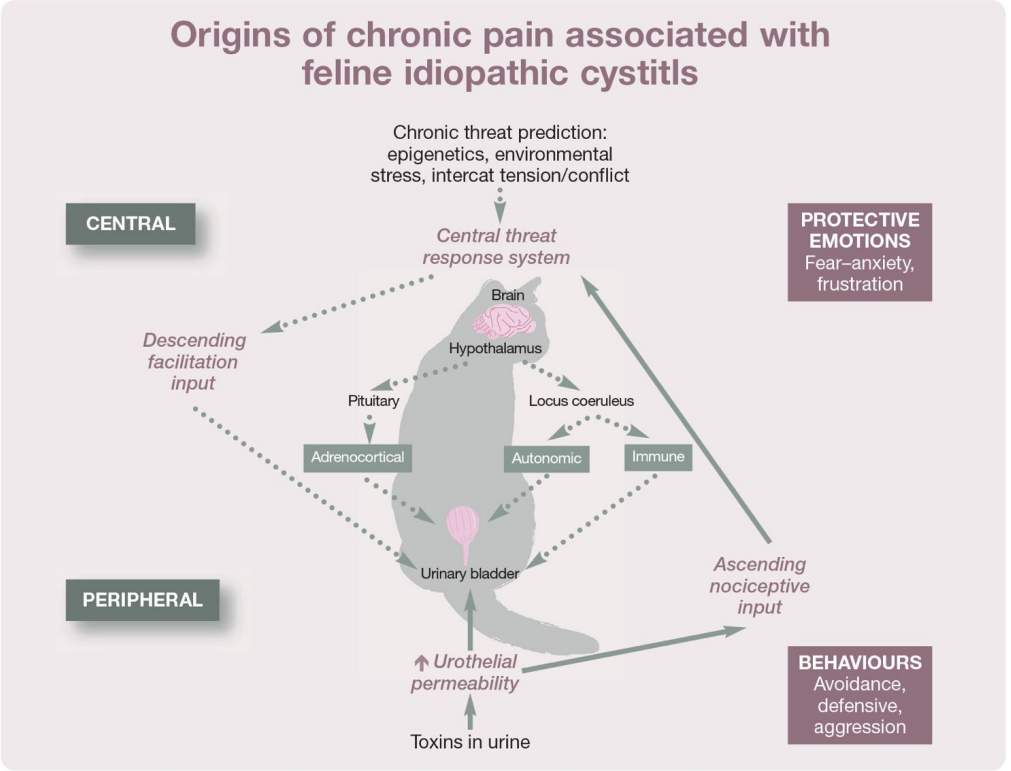
Feline idiopathic cystitis

- Most common cause of LUTS
- Interstitial cystitis in humans
  - Bladder pain syndrome
- Systemic disorder
- Diagnosis of exclusion



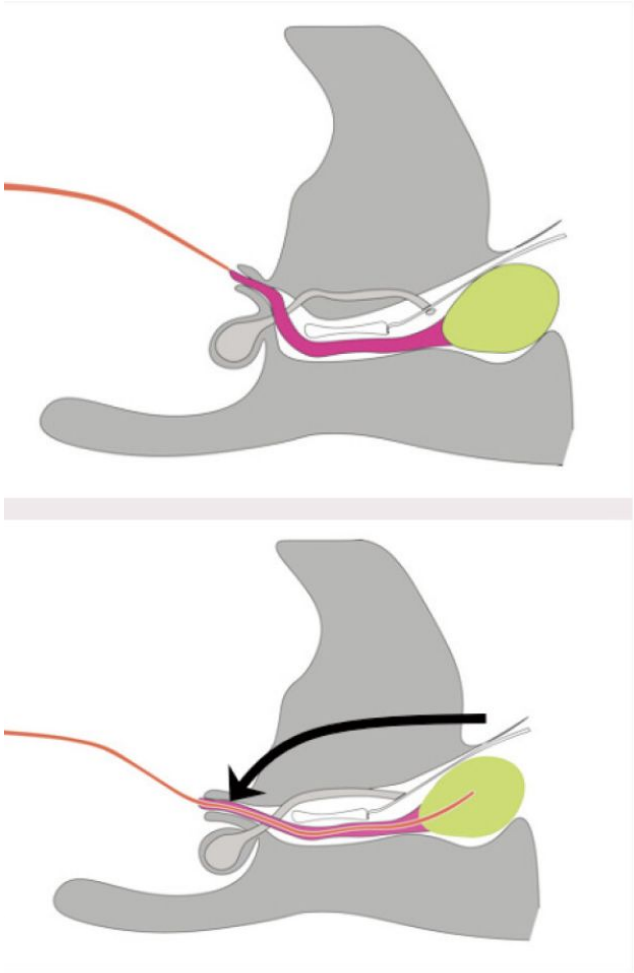
Feline idiopathic cystitis treatment

- Multimodal environmental modification
- Analgesia
- Behavioral medications
- Diet
- Low-dose radiotherapy



Urethral obstruction

- FIC reported as the most common cause
  - Rule out urolithiasis
- Consequences:
  - Metabolic acidosis
  - Azotemia
  - Hyperkalemia
  - Dehydration
  - Hypovolemia
  - Uroabdomen
  - Death



Environmental modifications

- Goal: decrease the cat's perception of threat and increase their sense of control
  - Private, secure resting place
  - Large, open, and clean litter boxes
  - Cats are sensitive to scents
- Consider caregiver burden and education

international cat care

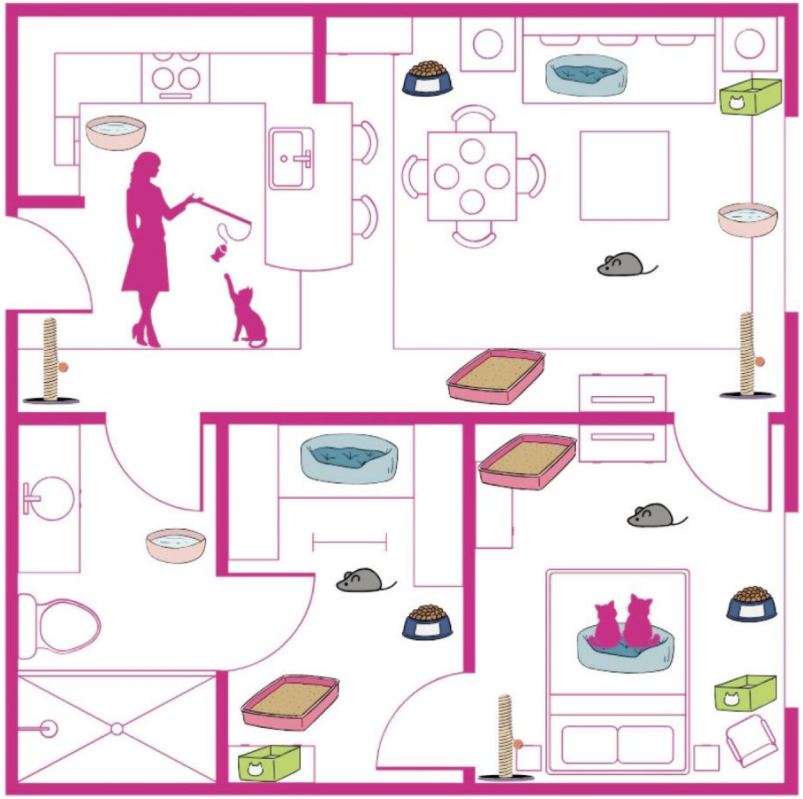
Multiple and separated key resources (food, water, beds, scratching, climbing and safe places).

Positive interactions between pets in the home.

Safe places to rest and retreat to.

Positive interactions between cats and humans, including gentle handling, interactive play and reinforcement-based training.

Multiple, large, clean litter trays in separate and accessible areas, using sandy, unscented litter substrate.



Behavioural needs for play and mental stimulation are met.

Avoidance of heavily scented products. Appropriate use of pheromones. Opportunities to mark territory via scent glands (facial rubbing and scratching).

Key points

- FLUTD is not a diagnosis
- Urethral obstruction is a consequence of lower urinary tract diseases
- FIC is a systemic disorder involving the urinary bladder and other organ systems
  - Optimally managed with multimodal environmental modification
- FIC is painful

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QUESTIONS?

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nicholemanfredi@capecodvetspecialists.com

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