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Congestive Heart Failure & Diabetes in a Cat

STILTON, A 9-YEAR-OLD, OVERWEIGHT DOMESTIC LONG-HAIRED CAT, is hospitalized for pulmonary edema resulting from congestive heart failure (CHF) and diabetes mellitus (DM). Previous treatment included daily oral theophylline and monthly methylprednisolone acetate injections for suspected asthma, which may have potentiated the recent onset of CHF and DM. Stilton has had PU/PD for several weeks and vomited once the previous day. Initial examination revealed increased respiratory rate and effort, 180-bpm heart rate with intermittent gallop rhythm, and 1-lb weight loss as compared with 2 months earlier. Chemistry panel confirmed DM (glucose, 535 mg/dL) and identified hypokalemia (potassium, 3.0 mmol/L) but was otherwise unremarkable. CBC was normal. Urinalysis obtained by cystocentesis found 4+ glucose, with WBCs TNTC and occasional bacilli.

Which of the following treatments could be used safely?

Based on the information provided, how would you grade the following options and why?

Turn the page and compare your results ►

| | RED = do not use | YELLOW = proceed with caution | GREEN = safe |
|---------------------------|------------------|-------------------------------|--------------|
| Ampicillin | RED | YELLOW | GREEN |
| Enrofloxacin | RED | YELLOW | GREEN |
| Fluticasone | RED | YELLOW | GREEN |
| Furosemide | RED | YELLOW | GREEN |
| Gentamicin | RED | YELLOW | GREEN |
| Insulin glargine | RED | YELLOW | GREEN |
| Intravenous fluids | RED | YELLOW | GREEN |
| Maropitant | RED | YELLOW | GREEN |
| Oral potassium | RED | YELLOW | GREEN |
| Oxygen therapy | RED | YELLOW | GREEN |
| Pimobendan | RED | YELLOW | GREEN |
| Prednisolone | RED | YELLOW | GREEN |

CHF = congestive heart failure, DM = diabetes mellitus, TNTC = too numerous to count



Did you answer?

The following represents the best responses based on drug metabolism, pharmacokinetics, species, diagnostic differentials, clinical and laboratory data, and other pertinent findings.

Ampicillin

| CORRECT RESPONSE



Antibiotic therapy is indicated in patients with urinary tract infections.^{1,2} Ampicillin, a broad-spectrum β -lactam antibiotic, is concentrated in urine and does not interfere with treatment protocols for DM or CHF. Side effects are minimal.³ Of note, ampicillin could be administered IV in this vomiting cat. Therapy with potentiated ampicillin (amoxicillin–clavulanic acid) could be considered after vomiting resolves. Antimicrobial choices should be directed by culture and sensitivity data if possible.

Enrofloxacin

| CORRECT RESPONSE



Although antibiotics are clearly indicated for urinary tract infections, if a patient is receiving theophylline for asthma, toxicity (restlessness, vomiting/diarrhea, tachycardia) may develop as a result of altered xanthine clearance from concurrent fluoroquinolone administration.^{4,5} Theophylline toxicity has been shown in dogs and humans but only anecdotally in cats. Enrofloxacin could be administered if theophylline is discontinued.

Fluticasone

| CORRECT RESPONSE



Inhaled glucocorticoids can be useful for controlling allergic airway disease in cats.⁶ Fluticasone has limited systemic effects and is particularly useful in asthmatic cats with relative contraindications (eg, concurrent heart disease, DM) for systemic glucocorticoids.^{6,7} In this cat, the decision to start fluticasone should be delayed until CHF and DM are under control and a diagnosis of asthma confirmed.

Furosemide

| CORRECT RESPONSE



This cat's CHF may be linked to recent administration of methylprednisolone acetate affecting sodium and water retention, but the presence of pulmonary edema requires administration of a diuretic to eliminate the edema.^{8,9} Side effects associated with furosemide therapy include excessive dehydration, electrolyte depletion (less common in cats), and azotemia.¹⁰ Furosemide administration is indicated by clinical signs rather than a set schedule.¹⁰

CHF = congestive heart failure,
DM = diabetes mellitus

What Did You Say?

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Gentamicin

| CORRECT RESPONSE



While antibiotic therapy is indicated for cats with urinary tract infections,^{1,2} the nephrotoxicity associated with aminoglycosides, particularly in combination with furosemide, makes the risk for kidney injury too high to warrant recommending its initial use.³

Insulin glargine

| CORRECT RESPONSE



Insulin therapy is indicated, given the preceding signs of PU/PD and weight loss coupled with hyperglycemia and 4+ glucosuria.¹¹ Regular insulin is typically used initially until the cat is eating and drinking normally. Maintenance treatment with insulin glargine is widely used and can effectively induce diabetic remission in many cats.¹²

Intravenous fluids

| CORRECT RESPONSE



IV fluid support is often indicated in cats with newly diagnosed DM. However, in patients with CHF, fluid therapy is contraindicated initially, as increased hydrostatic pressure can worsen pulmonary edema.⁸ Fresh water should be offered regularly.

Maropitant

| CORRECT RESPONSE



Vomiting and nausea may contribute to persistent anorexia in a diabetic cat. Maropitant, a useful antiemetic with a strong safety profile, will not interfere with treatment protocols for asthma or CHF.¹³ Because this cat vomited once before presentation, it is reasonable to wait and see if vomiting recurs before administering maropitant; from a drug-interaction perspective, however, it is safe to administer.¹³

Oral potassium

| CORRECT RESPONSE



PU/PD, coupled with decreased oral intake, results in potassium depletion in most diabetics.¹² Because IV fluids with potassium supplementation can be challenging in patients with CHF, oral potassium supplementation should be considered in addition to offering palatable foods on a regular basis. This approach is particularly important with furosemide initiation.¹⁰



**RED LIGHT,
GREEN LIGHT**

PEER REVIEWED

Oxygen therapy | CORRECT RESPONSE

Oxygen therapy is indicated to improve tissue oxygenation and reduce respiratory difficulty.¹⁴ Most commonly administered to cats via oxygen cage, oxygen therapy can be discontinued when orthopnea and respiratory distress have been resolved. Thoracic radiography may be useful to determine whether pulmonary infiltrates have cleared.

Pimobendan | CORRECT RESPONSE

Although pimobendan has been used off-label in cats with increasing efficacy,^{15,16} until echocardiography confirms the absence of left ventricular outflow obstruction, the use of pimobendan should be avoided.

Prednisolone | CORRECT RESPONSE

Prednisolone is typically considered useful treatment for airway inflammation associated with feline asthma.⁷ However, most glucocorticoids promote water retention and should not be used in patients with active CHF.^{7,9} Prednisolone can also lead to insulin resistance, making it more difficult to control newly diagnosed DM.⁷ Because this cat has active CHF, additional systemic glucocorticoid therapy (eg, methylprednisolone acetate injection) should be avoided unless clearly indicated.

CHF = congestive heart failure, DM = diabetes mellitus

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1. **UTIs in small animal patients: Part 2: Diagnosis, treatment, and complications.** Smee N, Loyd K, Grauer GF. *JAAHA* 49(2):83-94, 2013.
2. **Feline bacterial urinary tract infections: An update on an evolving clinical problem.** Litster A, Thompson M, Moss S, Trott D. *Vet J* 187(1):18-22, 2011.

MORE on page 21 ►

quellin™ (carprofen)

soft chewable tablets

Non-steroidal anti-inflammatory drug

For oral use in dogs only

BRIEF SUMMARY:

Before using quellin soft chewable tablets, please consult the product insert, a summary of which follows:

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

PRODUCT DESCRIPTION: quellin (carprofen) is a non-steroidal anti-inflammatory drug (NSAID) of the propionic acid class that includes ibuprofen, naproxen, and ketoprofen.

INDICATIONS: Carprofen is indicated for the relief of pain and inflammation associated with osteoarthritis and for the control of postoperative pain associated with soft tissue and orthopedic surgeries in dogs.

CONTRAINDICATIONS: Carprofen should not be used in dogs exhibiting previous hypersensitivity to carprofen.

WARNINGS: Keep out of reach of children. Not for human use. Consult a physician in cases of accidental ingestion by humans. For use in dogs only. Do not use in cats. All dogs should undergo a thorough history and physical examination before initiation of NSAID therapy. Appropriate laboratory tests to establish hematological and serum biochemical baseline data prior to, and periodically during, administration of any NSAID should be considered.

PRECAUTIONS: As a class, NSAIDs may be associated with gastrointestinal, renal and hepatic toxicity. Effects may result from decreased prostaglandin production and inhibition of the enzyme cyclooxygenase which is responsible for the formation of prostaglandins from arachidonic acid. When NSAIDs inhibit prostaglandins that cause inflammation they may also inhibit those prostaglandins which maintain normal homeostatic function. These antiprostaglandin effects may result in clinically significant disease in patients with underlying or pre-existing disease more often than in healthy patients. Carprofen is an NSAID, and as with others in that class, adverse reactions may occur with its use. The most frequently reported effects have been gastrointestinal signs, vents involving suspected renal, hematologic, and neurologic, dermatologic, and hepatic effects have also been reported. Concomitant use of carprofen with other anti-inflammatory drugs, such as other NSAIDs or corticosteroids, should be avoided because of the potential increase of adverse reactions, including gastrointestinal ulcerations and/or perforations. Carprofen is not recommended for use in dogs with bleeding disorders, as safety has not been established in dogs with these disorders. The safe use of carprofen in animals less than 6 weeks of age, pregnant dogs, dogs used for breeding purposes, or in lactating bitches has not been established.

ADVERSE REACTIONS:

During investigational studies for the caplet formulation with twice-daily administration of 1 mg/lb., no clinically significant adverse reactions were reported. Some clinical signs were observed during field studies which were similar for carprofen caplet and placebo treated dogs. Incidences were observed in both groups: vomiting (4%), diarrhea (4%), changes in appetite (3%), lethargy (1.4%), behavioral changes (1%), and constipation (0.3%).

For a copy of the Material Safety Data Sheet (MSDS) or to report adverse reactions call Bayer Veterinary Services at 1-800-422-9874. For consumer questions call 1-800-255-6826.

ANADA 200-555 Approved by FDA

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