RED LIGHT, GREEN LIGHT
PEER REVIEWED

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Chronic Upper Respiratory Tract Disease in a Cat

SAM, AN 11-YEAR-OLD, NEUTERED PERSIAN CAT, has an 8-year history of recurring and progressively worsening chronic upper respiratory disease. He is presented because of loud breathing and head shaking while sneezing nonproductively over the past 3 days. The patient is reportedly withdrawn and less interested in eating but is still drinking. The patient has received amoxicillin previously (most recently, 5 weeks ago); he also receives glucosamine with chondroitin sulfate for arthritis. His weight is stable and BCS is 4/9. No oral lesions are seen. TPR is normal, but tracheal-auscultated sounds are harsh. CBC reveals stress lymphopenia and mild monocytosis. Serum chemistry values are within normal reference intervals, and urinalysis is unremarkable.

Which of the following drugs would be appropriate in the management of this patient?

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

Turn the page and compare your results ▶

RED = do not use
YELLOW = use with caution, moderately effective
GREEN = safe & effective

	RED	YELLOW	GREEN
Amoxicillin–clavulanic acid			
Azithromycin			
Pradofloxacin			
Doxycycline monohydrate/hyclate			
Cefovecin			
Famciclovir			
Zidovudine			
Mirtazapine			
Cyproheptadine			
Meloxicam			
Prednisolone			
L-Lysine			
Probiotics			

BCS = body condition score, CBC = complete blood count, TPR = temperature, pulse, respiration

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.

Amoxicillin–clavulanic acid

CORRECT RESPONSE

Amoxicillin–clavulanic acid, a β-lactam antibiotic, is used for elimination of infection and clinical signs associated with *Chlamydophila* spp. This patient's underlying problem is most likely long-term inflammation and cartilage damage. This drug would be safe but would have limited long-term efficacy. Adverse effects include occasional anorexia, inappetence, and vomiting,[1] which may be problematic in a cat that is already inappetent because of nasal congestion.

Azithromycin

CORRECT RESPONSE

Like amoxicillin–clavulanic acid, although azithromycin would be safe for this patient, the drug would be expected to have limited long-term efficacy because of long-term underlying inflammation and cartilage damage. Azithromycin may show excellent control of clinical signs. In one study of *C felis*-infected cats, azithromycin once a day for 3 days and then twice a week provided similar rapid resolution of clinical signs and negative isolation scores as compared with doxycycline; however, azithromycin failed to eliminate bacteria, allowing for relapse.[2] *C felis* was reisolated in 4 of 5 cats.[2] Furthermore, daily administration in chronically infected cats was ineffective at clearing infection.[2]

Pradofloxacin

CORRECT RESPONSE

Pradofloxacin, an antibiotic with coverage against gram-positive, gram-negative, and anaerobic organisms, would be safe for this patient. It can be a safe and efficacious treatment for some cats with suspected bacterial upper respiratory disease; however, no difference in efficacy has been noted when compared with amoxicillin.[3] Clinical trials have indicated the safe, extended use (ie, for up to 6 weeks) in cats, but such use may be associated with sporadic cases of myelotoxicosis. Pradofloxacin has low retinotoxic potential.[4] Marked improvement in clinical signs has been seen after 1 week of treatment, with elimination of *Mycoplasma* spp from >95% of cats after 6 weeks of treatment and of *C felis* from 76% of cats (as compared with complete elimination of both organisms with doxycycline treatment).[5]

What Did You Say?

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Doxycycline monohydrate/hyclate

CORRECT RESPONSE

Like amoxicillin–clavulanic acid and azithromycin, doxycycline has limited long-term efficacy because of underlying inflammation and cartilage damage. Because of its antiinflammatory properties,[3,6,7] however, this drug may be a better option for this patient than other antibiotics.

Doxycycline treatment has been associated with 100% elimination of *Mycoplasma* spp and associated clinical signs and has resulted in significantly better general condition after 14 days of treatment as compared with baseline and with cats treated with enrofloxacin.[5]

GI adverse effects (eg, vomiting, inappetence, diarrhea) can occur in some cats and may be concerns in an already inappetent patient. Additionally, there is recognized risk for esophagitis when doxycycline capsules are retained in the esophagus in cats. Flushing with a bolus of water (5-6 mL) has been shown to prevent capsules from lodging in the esophagus in cats[8]; however, a suspension is preferable when possible.

Cefovecin

CORRECT RESPONSE

Although cefovecin would be safe and convenient, it lacks efficacy against organisms associated with upper respiratory tract infection.[9] Cats treated with either amoxicillin–clavulanic acid or doxycycline had a better clinical response than those treated with a single SC injection of cefovecin.[9]

Famciclovir

CORRECT RESPONSE

The antiviral famciclovir appears to be a promising treatment of diseases associated with feline herpesvirus type 1 (FHV-1) infection; however, efficacy for conditions other than conjunctivitis is limited.[10] More rigorous clinical trials are required to optimize the dose regimen for safe and effective antiherpesvirus treatment in cats.[10] Famciclovir metabolism may become saturated at high doses and may not provide additional benefits or efficacy.[11,12] Renal function should be monitored during treatment. Although this drug would be safe for this patient, the absence of conjunctivitis makes its use unwarranted.

Doxycycline treatment has been associated with 100% elimination of *Mycoplasma* spp and associated clinical signs and in general has resulted in significantly better patient condition.[5]

FHV-1 = feline herpesvirus type 1, GI = gastrointestinal

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Mirtazapine is an effective appetite stimulant (and antiemetic), but the underlying cause of anorexia should be addressed before using an appetite stimulant.

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Zidovudine

CORRECT RESPONSE

Zidovudine (also known as azidothymidine [AZT]), another antiviral agent, has been studied for use as treatment of retroviral infection but not of FHV-1 infection. Because of its adverse effects (eg, neutropenia, GI signs, marked bone marrow hypercellularity), zidovudine would not be a good option for this patient.

Mirtazapine

CORRECT RESPONSE

Mirtazapine is an effective appetite stimulant (and antiemetic); however, the underlying cause of anorexia should be addressed before using an appetite stimulant. In patients with decreased hepatic or renal function, the mirtazapine dose should be reduced. Mirtazapine can cause serotonin syndrome, but the risk is low unless the drug is overdosed; cyproheptadine may be an effective antidote.[13] Mirtazapine should not be used concurrently with cyproheptadine because of presumed opposing mechanisms.[14-17] Because of the increased risk for serotonin syndrome (see **Cyproheptadine**), this drug should be avoided if tramadol or a monoamine oxidase inhibitor is being administered.

Cyproheptadine

CORRECT RESPONSE

Cyproheptadine would be indicated for this patient as an appetite stimulant and offers additional benefit if an allergic component exists. In patients with decreased hepatic or renal function, the cyproheptadine dose should be reduced. This drug should be avoided in cats with lipidosis and should not be used concurrently with mirtazapine.[18] This drug can also be used to treat mirtazapine-induced serotonin syndrome.

Meloxicam

CORRECT RESPONSE

Given the underlying inflammatory component of chronic upper respiratory disease in cats, agents that break the inflammatory cycle may be beneficial. Appropriate NSAID use in cats would be associated with low risk for development of acute kidney injury and may help reduce inflammatory components of chronic upper respiratory disease. Risk factors (eg, dehydration, hypovolemia) should be addressed before use of this drug. Like any NSAID, the meloxicam dose must be based on lean/ideal body weight in a hydrated

patient. It must not be used concurrently with corticosteroids.[19,20] Patients should be hydrated before use of this drug.

Prednisolone

CORRECT RESPONSE

Prednisolone has potential antiinflammatory benefits but, at high doses, can cause reactivation of latent FHV-1 infection. Additive GI ulcerogenic effects may result when this drug is used with another glucocorticoid. Prednisolone should be avoided in cats with heart disease or a history of herpetic keratitis and with concurrent NSAID use.[21]

L-Lysine

CORRECT RESPONSE

L-Lysine would be safe for this patient but has limited efficacy, is likely of little benefit, and is cost-prohibitive for many pet owners. Its use has been associated with decreased conjunctivitis only in some cats and resulted in significantly fewer viral shedding episodes in one study.[22]

However, a different study found greater disease severity and more FHV-1 DNA in oropharyngeal or conjunctival specimens when dietary lysine supplementation was implemented.[23] Finally, in one shelter, feeding cats with L-lysine did not reduce the incidence of upper respiratory signs or conjunctivitis when compared with the untreated control group.[24]

Probiotics

CORRECT RESPONSE

Probiotics would be safe for this patient but have limited efficacy.[25] Cats receiving a probiotic maintained greater enteric microbial diversity as compared with those treated with a placebo and may have had fewer episodes of recrudescent conjunctivitis. Administration of a probiotic may lessen morbidity associated with chronic FHV-1 infection in some cats.[25]

There are marked differences in composition, potency, and stability among commercially available probiotics. Additional studies are warranted to determine clinical efficacy.

AZT = azidothymidine, DNA = deoxyribonucleic acid, FHV-1 = feline herpesvirus type 1, GI = gastrointestinal, NSAID = nonsteroidal antiinflammatory drug

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MORE on page 31 ▶