

FELINE INFECTIOUS PERITONITIS (FIP) AND FCoV INFECTION TREATMENT

AN E-BOOK FOR VETERINARY SURGEONS

Diane D. Addie, PhD, BVMS, MRCVS

Note: this download is intended for veterinary surgeons only and should NOT be used by cat guardians to attempt to treat cats themselves.

These guidelines represent only the personal opinions of the author. For fuller explanations of each component, or to find the references, visit the FIP treatment page on the catvirus.com website.

1. DOUBLE AND TRIPLE CHECK THE DIAGNOSIS

Before commencing treatment, make absolutely certain that the cat has FIP: around 80% of cases presented to me as FIP turn out to have some other condition. Work through the [FIP diagnosis algorithm](#) and be sure that the cat ticks most of the boxes of all of the steps. If you are unsure about how to use the FIP diagnosis algorithm watch my YouTube video “Does Pancho Have FIP?”

It is essential to ensure that the diagnosis is correct: immunosuppressive drugs will markedly worsen other conditions (such as bacterial peritonitis or pleurisy) and even be fatal in other cases, for example toxoplasmosis, leishmaniasis.

Table of Contents

2. NUTRITION: this section applies to cats with wet or dry FIP; FCoV associated diarrhoea and asymptomatic healthy FCoV infected cats	4
Feed cats with FIP a little salmon, sardines, pilchards or other fish rich in omega-3	4
FCoV associated diarrhoea helped by chicken and pumpkin cat food	4
Probiotics	4
3. ANTI-INFLAMMATORIES / IMMUNOSUPPRESSANTS - given to both effusive and non-effusive FIP cases	4
Prednisolone.....	5
Prednisone.....	5
Dexamethasone / injectable corticosteroids.....	5
Thalidomide	5
Cyclosporin A (Atopica, Novartis).....	6
4. EFFUSIVE FIP: treatment for cats with wet FIP	6
Drain the effusion to obtain most accurate diagnosis, give physical relief, and remove virus.....	6
Recombinant feline interferon omega (Virbagen Omega, Virbac).....	6
Human interferon alpha	6
GS-441524	7
5. NON-EFFUSIVE FIP - treatment for cats with dry FIP.....	7
Diluting Virbagen Omega.....	7
Human interferon alpha	7
Polyprenyl immunostimulant (PPI) – for treating dry FIP only	8
Erythropoietin	8
Ursodeoxycholic acid (Ursodiol; Destolit; Urdox, Ursofalk; Ursogal)	8
S-adenosyl-L- methionine (SAME).....	8
Mirtazepine	8
Cimetidine (Zitac).....	9
6. MONITORING FIP TREATMENT / PROGNOSIS	9
Apha-1 acid glycoprotein (AGP).....	9
Haematocrit (Hct; packed cell volume PCV), bilirubin, lymphocyte count, globulins, albumin to globulin ratio.....	9
Cat’s weight	9
FCoV antibody titre	9
When to opt for euthanasia	10
7. FCoV ASSOCIATED DIARRHOEA	11

8. VITAMINS and ANTIOXIDANTS	11
Vitamin B12 (cobalamin) - essential	11
Vitamin E	11
Vitamin A.....	12
Vitamin B complex	12
Vitamin B1 (thiamine)	12
Vitamin C (ascorbic acid)	12
9. MISCELLANEOUS NOTES	12
Antibiotics.....	12
Feliway spray / diffuser	12
Coronavirus protease inhibitor (GC 376)	12
Human interferon alpha	13
Aspirin.....	13
Anabolic steroids	13
10. TREATMENTS NOT RECOMMENDED	13
Adipose stem cell therapy	13
Cyclophosphamide	13
L-lysine	14
Pentoxifyline (Trental)	14
Thromboxane Synthetase Inhibitors	14

2. NUTRITION: this section applies to cats with wet or dry FIP; FCoV associated diarrhoea and asymptomatic healthy FCoV infected cats

It is my opinion that feeding as varied and natural a diet as possible to cats with FCoV infection and FIP is essential: avoiding highly processed, pro-inflammatory grain-based, commercial foods (even the expensive so-called “veterinary” diets are usually cereal based).

Give real meat daily to augment arginine levels: even just a tablespoonful a day will make a difference. Or regularly use commercially available real meat based cat foods e.g. Applaws & Almo Nature (available from the Zooplus website in Europe: use [Zooplus link](#) on the catvirus website [links page](#) to obtain a discount).

Feed cats with FIP a little salmon, sardines, pilchards or other fish rich in omega-3

Increase the anti-inflammatory omega 3 fatty acid content of the cat’s diet (i.e. add sardines, pilchards, salmon, mackerel twice a wk for 6 weeks). Both Applaws and Almo Nature have canned food including real fish. However remember the risk of hypervitaminosis A (excessive laying down of bone at the joints) so be wary of feeding too much real fish – reassess the situation after 6 weeks.

Remember to instruct the cat’s guardian in a gradual changeover of the food: to change it over a period of weeks otherwise the cat will wolf down the new food for a few days, then get sick of it and never touch it again! The way to introduce a new food is to give it for one meal, then go back to the customary diet for the next few meals, then give a little of the new food again, and so on, gradually increasing the frequency of the new foods, until giving a different food every meal becomes the norm for the cat. To introduce new foods gradually properly will take at least a month.

FCoV associated diarrhoea helped by chicken and pumpkin cat food

I’ve had remarkable success using Applaws or Almo Nature chicken and pumpkin canned food in these cases. Applaws and Almo Nature are available from the Zooplus website in the UK and Europe: use the [Zooplus link](#) on the catvirus website [links page](#) to obtain a discount.

Probiotics

Probiotics such as Protexin Pro-Kolin+ can help cats with FCoV associated diarrhoea. Use the Protexin powder from:

www.pets-megastore.com.au/protexinprobioticpowder250gms-p-1733.html

It might also be worth trying Swanson *L. rhamnosus* capsules:

3. ANTI-INFLAMMATORIES / IMMUNOSUPPRESSANTS - given to both effusive and non-effusive FIP cases

Cats receiving immunosuppressants should also receive antibiotic cover to protect them against other infections. To my way of thinking there are three main choices: clindamycin if the cat has access to outdoors or is fed meat, and so could have toxoplasmosis. Clindamycin is also a good choice if the major differential is bacterial peritonitis or pleurisy. If infectious anaemia is a possible concurrent infection, use oxytetracycline or doxycycline: doxycycline has been shown to have anti-MMP-9 activity BUT in porcine coronavirus it can increase virus shedding. Cefovecin (Convenia, Zoetis) has the

advantages of not worrying about complicate, and not stressing the cat or risking the oesophagus by pilling.

MELOXICAM (METACAM, BOEHRINGER INGELHEIM)

Provided kidney function and blood pressure are normal, consider using the non-steroidal anti-inflammatory meloxicam instead of corticosteroids. Meloxicam was used for 119 days, along with one month of metronidazole, in one FIP case report in a cat who survived 787 days. ^{Hugo and Reading, 2015*}

Dose: 0.05 mg/kg BW, PO, q24h

CORTICOSTEROIDS

Prednisolone

Prednisolone is the immunosuppressant most frequently used in feline infectious peritonitis therapy, though unfortunately it suppresses both the humoral and cell-mediated immune response. In the last year I have done a 180° turn on the use of prednisolone in FIP, given new data, my recommendation would now be to use meloxicam instead, if possible.

If using prednisolone, it is **ABSOLUTELY ESSENTIAL** that you remember to decrease the doses till you find the minimum dose suitable for each individual patient: you should be doing this in most diseases in which you use glucocorticoids, not just FIP.

Prednisolone should never be used in cats with toxoplasmosis, septic peritonitis or pleurisy, which is why cytology of the effusion is a very important part of FIP diagnosis, as there will be many more white blood cells in the effusion of a cat with sepsis, and a good cytologist will detect the bacteria or fungi. If in doubt, send the effusion for bacterial culture.

Dose: 2 mg/kg/sid given by mouth, halving the dose every 10-14 days, right down to 0.5 mg/kg every other day or until an optimal dose for that cat is found (this will be the dose at which alpha-1 acid glycoprotein (AGP) levels have reduced to, and remain at, normal. (See the section below on monitoring treatment.)

Prednisone

Not recommended for cats.

Dexamethasone / injectable corticosteroids

Dexamethasone (or other injectable corticosteroids) can be used to kick start the immunosuppressive treatment (or for cats which cannot be pilled). It can also be administered directly to the site of inflammation in effusive FIP cases.

Dose: dexamethasone 1 mg/kg intrathoracic or intraperitoneal injection on one occasion or every 5 days.

Thalidomide

The rationale of using thalidomide instead of corticosteroids in the treatment of feline infectious peritonitis is to reduce inflammation and the humoral immune response to feline coronavirus while leaving the cell mediated (anti-viral) immune response intact. Thalidomide is not toxic to cats, although

* Go to the treatment page of www.catvirus.com for the full reference.

its fetotoxicity in pregnant human females has been a concern. Unfortunately, its availability is limited to certain countries.

Be sure to obtain the owner's consent for using a drug not licensed for cats.

Dose: 50 to 100 mg once a day in the late evening. CANNOT BE USED IN PREGNANT CATS as it is teratogenic.

Cyclosporin A (Atopica, Novartis)

Inhibition of the cell mediated immune system is the last thing you want in a healthy cat with a FCoV infection. However, recent research has shown that Cyclosporin A has anti-coronavirus activity although in a published case study it did not entirely remove FCoV infection.

Use only in cats with toxoplasma antibody titres of zero or give concurrent clindamycin treatment.

Warning: if you give CsA to a FCoV-infected healthy, or diarrhoea-only, cat, you WILL induce FIP. Only use with extreme caution.

Dose: start at 75 mg/cat/day

reduce to 50 mg/cat/day

reduce to 25 mg/cat/day

Monitor AGP and Hct and go back to the previous dose if necessary.

4. EFFUSIVE FIP: treatment for cats with wet FIP

Also see the effusive FIP staging table in section 6.

Drain the effusion to obtain most accurate diagnosis, give physical relief, and remove virus

In addition to the treatments in 2 and 3 above and 8 below, drain off as much of the effusion as possible: you will be removing virus infected cells and the source of pro-inflammatory cytokines as well as giving the cat physical relief. In addition, you will learn a lot more for diagnosis from examining the fluid than from blood tests.

While you have your canula in the abdominal or thoracic cavity, you can administer dexamethasone and feline interferon omega directly to the site of the inflammation.

Recombinant feline interferon omega (Virbagen Omega, Virbac)

Recombinant feline interferon omega (IFN omega) is available in many countries now. Once a vial is reconstituted, it will keep for up to 3 weeks at 4°C, or up to 6 months in a freezer.

Dose: give IFN omega initially into the abdominal or thoracic cavity (i.e. the site of the effusion) or subcutaneously at 1 MU* /kg every other day, and then twice a week for however long it takes until recovery is obtained.

Human interferon alpha

In those countries in which Virbagen Omega is not available, treatment with human interferon can be attempted. Feline interferon is infinitely preferable to human interferon since interferon is species specific,

* MU = Million units

plus cats will mount antibodies to human interferon if injected. However, I know it isn't always easy to obtain, and human interferon may be better than nothing.

Dose: In effusive FIP 30 i.u./daily per os can be used, or larger doses of interferon can be given by intramuscular injection daily ($10^4 - 10^6$ i.u. per day). By 6-7 weeks, if the cat is still alive, interferon will no longer work at this dose because the cat will make antibodies against it.

To obtain human interferon-alpha (Roferon or Intron A), write a prescription for your local pharmacist.

GS-441524

Nucleoside analogue that terminates the RNA chain of viral RNA-dependent RNA polymerase. Promising results *in vitro* and in one *in vivo* experimental study. [Murphy et al., 2018](#). Ten cats were given FIP in an experimental infection and treated with either 2mg/kg (5 cats) or 5 mg/kg: one cat in each group required a further treatment. The cats were reportedly alive 10 months later. ^{Murphy et al., 2018}

Can be obtained here: <http://glixxlabs.com/chemical-products/bioactive-screen-leads-p6/GLXC-12904>

Toll-Free #: (855) Go-Glixx (855-464-5499)

Phone #: 781-333-5348

Fax #: 781-333-5368

sales@glixxlabs.com

Glixxlabs will FedEx the drug overseas.

Dose: 2- 5 mg/kg SC sid for 2 weeks, repeating the course if clinical signs recur.

Important: remember to explain to your client that you will be using an unlicensed drug and get your client to sign a disclaimer absolving you of responsibility for the outcome

5. NON-EFFUSIVE FIP - treatment for cats with dry FIP

See also Polyprenyl Immunostimulant

In addition to the treatments in 2 and 3 above and 8 below, treat the cat with feline interferon omega (Virbagen Omega, Virbac, France).

Dose: 100,000 Units of feline interferon omega per day per os

Diluting Virbagen Omega

Virbagen Omega (VO) comes in vials of 10 million units. It is reconstituted with 1ml of diluent. Using 10 x 1ml insulin syringes withdraw 0.1ml into each of ten 1ml syringes (you now have 1 MU of VO per syringe).

Freeze 9 of the syringes in a baggie (they will last up to 6 months in the freezer). Put 1 syringe content (0.1ml) of reconstituted VO IFN (which now has 1 million units of VO) into 4.9 mls of saline or water: this gives you 100,000 units per half ml. Give the cat 0.5 mls of the mixture daily on food, or gently squirted into the side of the mouth at the commissure of the lips, with the head gently tilted backwards to encourage swallowing. This diluted mixture will last up to 21 days at 4°C.

Human interferon alpha

In those countries in which Virbagen Omega is not available, treatment with human interferon can be attempted. Feline interferon is infinitely preferable to human interferon since interferon is species specific,

plus cats will mount antibodies to human interferon if injected. However, I know it isn't always easy to obtain, and human interferon may be better than nothing.

Dose: Non-effusive feline infectious peritonitis (FIP): 30 i.u./daily or for 7 days at alternate weeks given by mouth.

To obtain human interferon-alpha (Roferon or Intron A), write a prescription for your local pharmacist.

Polyprenyl immunostimulant (PPI) – for treating dry FIP only

PPI is the go-to treatment for non-effusive FIP currently. I have little personal experience of using this compound: my mind is open about its efficacy: I would like to see an independent study with RT-PCR or histopathological confirmation of FIP diagnosis. I would also be grateful to any practicing veterinary surgeons willing to share their case reports with me: my email is draddie[at]catvirus [dot] com.

Survival was better in cats **not** concurrently treated with systemic corticosteroids, but it is probably safe to use topical ophthalmic corticosteroid treatment along with PPI in cats with intra-ocular signs of non-effusive FIP. Legendre et al, 2017

PPI is NOT recommended in effusive (wet) FIP.

Dose: 3.0 mg/kg orally of Polyprenyl Immunostimulant three times a week.

Cost: about £230 to get 60ml (6x 10ml bottles) including postage from America

To obtain PPI: email orders@vetimmune.com, or visit www.vetimmune.com.

UK veterinary surgeons will need to apply to the VMD for special import permission.

Erythropoietin

For cats with decreasing haematocrit due to non-regenerative anaemia (as opposed to immune-mediated haemolytic anaemia).

Dose: A 0.2 ml darbepoetin s.c. injection (0.5 micrograms/kg) given twice weekly to be gradually reduced dependent on PCV.

This is based on Chalhoub's paper quoting a weekly dose of 1 microgram/kg/week: Chalhoub et al, 2012.

Ursodeoxycholic acid (Ursodiol; Destolit; Urdox, Ursofalk; Ursogal)

Reduces bilirubin levels, TNF alpha, IL-6 and has antioxidant effects. However, no clinical trial has ever been published about whether or not it can improve survival of FIP cases.

Dose: 10 – 15mg/kg

S-adenosyl-L- methionine (SAME)

Consider using SAME (e.g. Hepatosyl, Ceva; Denamarin) for its anti-TNF-alpha action. In combination with ursodeoxycholic acid, it can decrease bilirubin levels.

S-adenosyl-L-methionine (SAME) is the principal methyl donor in methyltransferase reactions and SAME supplementation restores hepatic glutathione deposits and attenuates liver injury.

Dose: Denamarin comes in both feline and canine tablets. The dose is one feline tablet sid in cats up to 5.5kg and one bid in cats over 5.5kg.

Mirtazepine

Appetite stimulant.

Dose: 2 mg per cat per day

Cimetidine (Zitac)

Cimetidine is useful not only for cats with FIP who feel nauseous, but also for delaying the breakdown of praziquantel if one is administering that as an immune stimulant.

Dose and route of administration: 5 mg of cimetidine per kg of bodyweight administered three times daily by the oral route

Available here: www.vetuk.co.uk/pet-meds-prescription-only-zitac-c-21_818/zitac-vet-tablets-for-dogs-100mg-p-5940

6. MONITORING FIP TREATMENT / PROGNOSIS

Apha-1 acid glycoprotein (AGP) is a direct measure of inflammation and AGP measurement gives the most rapid idea if FIP treatment is working or not: initially monitor every 7 – 10 days, then increase the intervals to monthly if appropriate. If AGP is reducing, you can safely reduce corticosteroid dose. If it increases, you may have to go back to the previous corticosteroid level. AGP should be less than 500ug/ml. In effusive FIP it is in the thousands, in non-effusive FIP it is usually 2 to 3 times normal.

In the UK, AGP testing is available from the University of Glasgow Veterinary Diagnostic Services. www.gla.ac.uk/schools/vet/cad/

Haematocrit (Hct; packed cell volume PCV), bilirubin, lymphocyte count, globulins, albumin to globulin ratio are also useful parameters to monitor, especially in non-effusive FIP. One is looking for a reversal of the lymphopenia and non-regenerative anaemia (reticulocytes appearing in blood smears), decrease to normal levels of bilirubin and globulin (which will increase the alb:glob ratio). Decreasing Hct and increasing bilirubin are bad prognostic signs. Have a real veterinary haematologist (as opposed to a machine) check a smear to warn you of any early signs of immune-mediated haemolysis.

Cat's weight is especially useful in non-effusive FIP, where one would hope it would increase. In effusive FIP it is complicated by the presence or absence of fluid: weight increase might be a bad thing if it means the effusion is returning. Monitor weekly to monthly (can get the guardian to do this at home to reduce stress on the cat).

FCoV antibody titre: it is not worth measuring the FCoV antibody titre more often than every 3 - 6 months, there will be no discernible difference within a shorter period (or it may be simply lowered by the high amounts of corticosteroid which can be misleading). However at the end of treatment FCoV serology is a very useful measurement to let you know that it is absolutely safe to discontinue the interferon. (NB sometimes it is cheaper in your lab package to just keep getting the FCoV antibody titre with the FIP profile, than to ask for components individually.) Staging for effusive FIP to help you to assess whether it's worth treating or continuing treatment.

The average survival time for effusive FIP cases is 21 days (± 19 days). However, cats treated with Virbagen Omega have been documented as surviving 18 months.

In this system the severity of effusive FIP can be worked out, which will give you an idea of whether or not it is worth obtaining special drugs to treat, or whether it is worthwhile continuing treating a case.

Look at the parameter in the left hand column, then look at where the result of your case falls in the range, then put the score for that parameter into the last column in the grey shaded cells.

Finally work out the total score for your case:

- 0-4: survival time more than 2 weeks
- 5-11: survival time less than 2 weeks
- over 12: survival time less than 3 days

Remember that even giving the cat a few more days can help the cat's guardian come to terms with the imminent demise of their pet: corticosteroids don't cost much and will help ease those last days, and draw off the effusion to make the pet more comfortable. FIP doesn't seem to be a painful condition.

Parameter	Range	Score	Your case date	Your case date	Your case date
PCV (%)	>26	0			
	20 – 26	2			
	<20	4			
AST (U/L)	<150	0			
	150 – 300	2			
	>300	4			
Total bilirubin (mg/dl) [umol/L]	(< 0.5) [<lt;8.5]< td=""> <td>0</td> <td></td> <td></td> <td></td> </lt;8.5]<>	0			
	(0.6 – 2.2) [9 – 38]	2			
	(> 2.2) [>38]	4			
Potassium (mmol/L)	4.0 – 5.8	0			
	3.0 – 3.9	2			
	< 3.0	4			
Sodium (mmol/L)	156 – 165	0			
	150 – 155	2			
	<150	4			
Total					

This table is adapted from that of Tsai et al, 2011.[‡]

You can download the FIP Prognosis Excel file of this table from <http://www.catvirus.com/downloads.html> and see a video of its use here: <https://youtu.be/F6FXcWgEZxU>.

When to opt for euthanasia

[‡] Tsai HY, Chueh LL, Lin CN, Su BL. 2011 Clinicopathological findings and disease staging of feline infectious peritonitis: 51 cases from 2003 to 2009 in Taiwan. J Feline Med Surg. 13(2):74-80.

Negative signs that the treatment isn't working are AGP remaining high, bilirubin increasing; globulins staying high or increasing, Alb:Glob decreasing, weight loss. When Hct gets to below 20% and is non-regenerative (no reticulocytes seen on blood smear examination) and if your clinical opinion is that the cat is no longer getting any happiness out of life, then he or she should probably be humanely euthanased. Clearly, if the cat is distressed at any point in the treatment, then euthanasia will be required. Sadly, the average survival time for cats with effusive feline infectious peritonitis is 21 days (plus or minus 19 days), although I notice that cats with a thoracic effusion seem to survive much longer than cats with abdominal effusion. Cats with non-effusive FIP can last many weeks or months, though after neurological signs begin euthanasia usually ensues fairly rapidly.

7. FCoV ASSOCIATED DIARRHOEA

Which kind of FCoV diarrhoea are you dealing with?

Small intestinal diarrhoea (\pm vomiting, failure to thrive) of initial FCoV infection

Large intestinal diarrhoea of chronic FCoV infection – i.e. a FCoV carrier

Diarrhoea due to colonic FIP

In the first two cases, see the supportive treatment listed below, but in the third situation, colonic FIP, you will need to also apply the directions for non-effusive FIP given above.

Apply advice given in sections 2 and 3 above.

Give weekly Vit B12 injections – see note 8 below.

Try Applaws chicken and pumpkin food, if the cat gets dry food in addition to canned food, make sure it is Applaws or another meat-based diet and not a cereal-based food. Applaws and Almo Nature are available from the Zooplus website in the UK and Europe: use the [Zooplus link](#) on the catvirus website [links page](#) to obtain a discount.

Gil et al got a response to Virbagen Omega (Virbac), giving 5 x s/c injections of 1 MU/kg sid, repeating the course at 2 weeks and 2 months. FCoV shedding should be monitored by quantitative RT-PCR on monthly faecal samples (from a laboratory that reports a quantity, e.g. a Ct).

8. VITAMINS and ANTIOXIDANTS

Vitamin B12 (cobalamin) - essential

Cats with GI disease will be unable to absorb sufficient cobalamin, so will require a supplement by injection. Vitamin B12 supplementation is advisable in FIP cases because of its lowering effect on homocysteine and because it stimulates appetite.

Dose: inject 250ug per cat (not per kg) cyanocobalamin once a week s/c

Note to vet students and new graduates: this stuff stings like crazy! Be sure to rub the skin between thumb and forefinger both before and after the injection to release natural endorphins.

Protexin make **Cobalaplex**, the first oral cyanocobalamin (vitamin B12) supplement specifically designed for use in cats and dogs: this will be suitable to use in FIP cases who have a healthy gut.

Vitamin E (optional)

Vitamin E is an antioxidant.

Dose: 25-75 i.u./cat twice daily given by mouth or in food.

Vitamin A (optional)

Vitamin A is an antioxidant. Vitamin A supplementation is unnecessary in cats being fed real fish regularly. Cats cannot metabolise the beta-carotene form so must be given vitamin A as fish or fish oil, e.g. halibut liver oil. Real fish in the diet is preferable to just giving supplements. However hypervitaminosis A will cause excessive laying down of bone at the joints, so do not use frequently for more than 4-6 weeks.

Vitamin B complex (optional)

Multivitamins B are a good appetite stimulant and can be obtained from health food shops or chemists (I particularly like the one from Boots Chemists in the UK).

Dose: paediatric dose.

Vitamin B1 (thiamine) (optional – if not giving B complex)

Dose: 100 ug/day given orally (i.e. by mouth or in food).

Vitamin C (ascorbic acid) (optional)

Vitamin C is an antioxidant. Remember that given over a long period of time, vitamin C can predispose to oxalate crystals in the urine, so again this should only be used for a few weeks.

Dose: 125 mg twice daily given by mouth or in food.

9. MISCELLANEOUS NOTES

Antibiotics

Antibiotic cover is essential when immunosuppressing a cat. Your choice of antibiotics will depend on what your major differential diagnoses are, given the presenting clinical signs. For example, if you are awaiting FIP confirmation from your laboratory and your major differential diagnoses are toxoplasmosis, or bacterial peritonitis / pleurisy, then clindamycin (Antirobe) will be your antibiotic of choice because it covers both aerobic and anaerobic infections; if your major differential is infectious anaemia, then doxycycline or oxytetracycline will be your choice. Metronidazole is effective against anaerobic organisms, so is a good choice where bacterial pleurisy is a differential diagnosis. It inhibits TNF-alpha—i.e. is anti-inflammatory—and was used for one month, along with meloxicam, in one FIP case who survived 787 days. ^{Hugo and Reading, 2015} However, it is horrible to taste and can be difficult to administer to cats.

Avoid amoxicillin/clavulanic acid because it can inhibit interferon-gamma, which is essential for FIP survival.

Feliway spray / diffuser

For reducing stress (which is pro-inflammatory and also increases FCoV replication) keep a feline pheromone (Feliway, Ceva) diffuser plugged in at all times in the houses of FCoV-infected cats and in veterinary surgeries and hospital wards.

Coronavirus protease inhibitor (GC 376)

Seemed to help effusive cases more than non-effusive FIP cases. There are no coronavirus protease inhibitors commercially available at time of writing. Watch Dr Pedersen's SOCK website for news of updates and new clinical trials. www.sockfip.org

Dose: 15 mg/kg of GC376 administered subcutaneously every 12 h.

Human interferon alpha

Feline interferon is infinitely preferable to human interferon since interferon is species specific, plus cats will mount antibodies to human interferon if injected. However, I know it isn't always easy to obtain, and human interferon may be better than nothing.

Dose: Non-effusive feline infectious peritonitis (FIP): 30 i.u./daily or for 7 days at alternate weeks given by mouth.

In effusive FIP 30 i.u./daily can be used, or larger doses of interferon can be given by intramuscular injection daily (10^4 - 10^6 i.u. per day). By 6-7 weeks, if the cat is still alive, interferon will no longer work at this dose because the cat will make antibodies against it.

To obtain human interferon-alpha (Roferon or Intron A), write a prescription for your local pharmacist.

Diluting human interferon

To get 30 i.u./ml: Intron A can be obtained as 1 million i.u. Dilute whole vial in one litre of saline, giving 3000 i.u./ml. Put one ml of 3000 i.u./ml into 99ml of saline, to get 30 i.u. per millilitre. Aliquot into 1ml volumes^s and freeze for up to a year. Defrost as required, keep refrigerated for up to a week.

To obtain 10^4 i.u./ml put 1 x 1 million i.u. vial of Intron A or Roferon into 99ml sterile saline and divide into 1ml doses and freeze. For 10^5 i.u./ml use 9mls saline and proceed as above. For 10^6 i.u./ml use the whole vial.

Aspirin

For anti-inflammatory activity and pain relief.

Dose: 10mg/kg every 48-72 hrs per os.

Anabolic steroids

For appetite encouragement and anti-catabolism, especially if the kidneys are affected.

Choose from the following (in the UK):

Laurabolin injection: 2-5mg/kg every 21 days.

Nandrolin injection: 2-5mg/kg as a weekly injection.

Nandoral tablets - one a day either whole or crushed into food.

Retarbolin injection: 1mg/kg every 21 days.

Orandrone tablets: 0.5mg/kg daily (the tablets are 5mg).

Remember to warn the owner that the cat's urine could become more strong smelling with this treatment. The injectables usually require to be kept in the dark.

10. TREATMENTS NOT RECOMMENDED

Adipose stem cell therapy

Two cats were treated: they did not recover.

Cyclophosphamide

Contra-indicated

^{ss} Note that you can buy cheap 2ml tubes from laboratory suppliers such as Sarstedt or Anachem.

L-lysine

Contra-indicated since antagonises arginine

Pentoxifyline (Trental)

Doesn't work.

Thromboxane Synthetase Inhibitors

Two cats with abdominal effusions were treated with ozagrel hydrochloride with success (Watari *et al*, 1998). However, follow up studies failed to confirm the usefulness of this compound.

Dose: 5-10mg/kg twice daily and prednisolone at 2mg/kg/day.

For references and further reading, plus free CPD, visit www.catvirus.com

Dr Diane D. Addie February 2014 Updated July 2015, March 2017, Jan 2018, July 2018

Disclaimer: Dr Addie accepts no responsibility or liability for the way you choose to use the information presented here.

Conflicts of interest statement: Dr Addie has no monetary interests in any of the products mentioned here with the exception of being an affiliate of the Zooplus UK website.