

1 The cat is exhibiting signs of musculoskeletal pain, but from the history and clinical signs this could be either muscle pain, joint pain, or skeletal pain.

- Common causes of generalized muscle pain include inflammatory myopathies (e.g. toxoplasmosis, immune-mediated myositis), metabolic myopathy (hypokalaemic polymyopathy), or degenerative myopathy (myositis ossificans).
- Causes of joint pain include infections (bacterial polyarthritis, mycoplasma polyarthritis, FCV-associated polyarthritis, endocarditis), immune-mediated polyarthritis (proliferative, erosive and idiopathic polyarthritis; systemic lupus erythematosus), haemarthrosis (as a result of a bleeding disorder), and degenerative joint disease.
- Causes of skeletal pain in this cat could include developmental abnormalities (e.g. osteogenesis imperfecta with secondary pathological fractures), nutritional causes (e.g. nutritional secondary hyperparathyroidism with osteopenia and possible pathological fractures, vitamin-D deficient rickets, hypervitaminosis A – classically associated with a liver-rich diet).

Consideration may also need to be given to the possibility of severe pain with, for example, a spinal disorder (e.g. discospondylitis).

Priorities for further investigation and a minimum database for adequate assessment would include a neurological assessment, a dietary history, blood/urine analyses, and radiography. A blood panel should include assessment of muscle inflammation/damage (elevations in CK, AST, and possibly ALT), and electrolyte evaluation (especially potassium, calcium, and phosphate). Radiography is a high priority for evaluation of joints and bones, and, if joint disease is suspected on clinical or radiographic grounds, cytology of multiple joint taps is indicated.

Other investigations would depend on the findings from the initial investigations.

2 i. All of the cats in the house should be treated for at least 4 weeks, and for at least 2 weeks beyond the time at which the cats appear clinically normal. The treatment of choice for adult cats is oral doxycycline at 10 mg/kg once daily. Pregnant queens and kittens whose teeth are still developing (<9 months of age) can be safely treated orally with amoxicillin–clavulanate at 12.5 mg/kg twice daily although a longer period of treatment may be required and future recrudescence of infection is more commonly seen following treatment with this drug. Azithromycin is sometimes recommended as a treatment for *Chlamydophila* but clinical trials have not supported its use.

ii. Once all of the cats have been treated, strategies can be followed to prevent future outbreaks. Any new cats purchased should be screened for *Chlamydophila* (by serology or conjunctival swab) prior to entry to the household. Vaccination of all cats is also an option although, as with any vaccine, this does not completely eliminate the risk of infection occurring in the household.

3 A 4-year-old neutered female DSH cat (3) presented with severe pruritus, miliary dermatitis and peripheral lymphadenopathy. Fleas and flea dirt were evident on examination and an intradermal skin test showed a strong positive reaction to flea extract. Using knowledge of flea biology, how should this cat be treated?



4 i. What is the most obvious feature on examination of the mucous membranes of the oral cavity in this 11-year-old cat with established CRF (4)?
 ii. What is the likely cause of this problem and how should its management be approached?

3 *Ctenocephalides felis* adults feed almost immediately they move onto their host. Copulation and egg-laying can take place within 24–48 hours of the first blood meal. The eggs are laid in the fur and fall off into the environment. Under appropriate conditions, eggs hatch in 1–6 days. Larvae feed on flea dirt shed by adults and this stage typically lasts 1–3 weeks. The pupa develops within a cocoon, and adults can emerge within a week, although this can be much delayed. The complete life cycle takes around 2–40 weeks (typically 3–5) depending on environmental conditions.

Treatment must be aimed at the affected cat, in-contact animals, and the environment. Short-acting glucocorticoids and/or antihistamines may be needed to control pruritus.

Adulticides are essential and should be used on all in-contact animals. Efficacious topical ('spot-on') products include fipronil, imidacloprid, and selamectin. Fipronil is also available as a spray and is favoured by some for initial therapy of flea allergic dermatitis. Nitenpyram is an oral adulticide with a rapid knock-down time. Adulticides must be administered on a regular basis, to maintain effective control. Adulticides should be combined with IGRs which may be hormone analogues (e.g. pyriproxyfen) or chitin synthetase inhibitors (e.g. lufenuron), the former given topically, the latter systemically.

The environmental stages may make up to 95% of the total flea population and both mechanical cleaning (vacuuming, washing) and environmental chemical sprays/foggers (e.g. IGRs, such as pyriproxyfen and methoprene, usually combined with an adulticide) should be used to control infestation here.

4 i. The most obvious abnormality in this cat is the marked pallor of the mucous membranes indicating probable underlying anaemia. Although in this case the marked pallor is highly suggestive, routine haematology would be needed to confirm this, and a reticulocyte count should be performed to determine whether it is regenerative or not.

ii. Anaemia in CRF has a multifactorial aetiology. Reduced production of erythropoietin from the failing kidneys results in a relative or absolute lack of this hormone causing a non-regenerative anaemia. The production of uraemic toxins reduces the half-life of circulating RBCs, and chronic blood loss can also contribute to anaemia of CRF. Blood loss may be secondary to uraemic thrombopathy, but more commonly occurs due to gastrointestinal ulceration and chronic bleeding. Determination of iron and ferritin status may be required to identify iron deficiency.

If the anaemia is accompanied by iron deficiency, iron supplementation should be provided (50–100 mg/day ferrous sulphate) and H₂-blockers and/or sucralfate administered. Anabolic steroids have some role in stimulating erythrocyte production but their efficacy is relatively poor. Recombinant human erythropoietin (100 U/kg SC three times weekly) has been used to correct the erythropoietin deficiency and can be dramatically effective (as long as the cat is not iron-deficient). However, around 30% of cats develop antibodies negating its effect. Trials are currently being carried out with recombinant feline erythropoietin.



5 A 6-year-old neutered female DSH cat (5) presents with a chronic history (many months) of bilateral nasal discharge and persistent productive mucopurulent sneezing. Two years previously the cat had a severe acute upper respiratory tract infection assumed to be due to FHV. Investigations suggest chronic 'post-viral' rhinitis. What options should be considered for the management of this cat?



6 A client is a breeder of Persian cats. For some time now, several of her cats have suffered with intermittent signs of conjunctivitis (6).

- i. What are the major infectious causes of conjunctivitis in cats?
- ii. What is a possible diagnostic plan?

5 Therapy aims to improve nasal/sinus drainage, reduce mucus formation, and control infection/inflammation. For most cases, clinical signs can be improved but not resolved. Strategic, intermittent, or persistent therapy may be required:

- Flushing the nasal cavities under anaesthesia can be useful to clear inspissated secretions. Flushing can be retrograde (via catheters inserted through the nares) or antegrade (via a Foley catheter in the nasopharynx). Copious volumes of sterile saline are used, with the nose pointed down, a cuffed endotracheal tube in place, and the pharynx packed with swabs.
- Saline nebulization or steam inhalation (e.g. placing the cat in a hot, steamy bathroom) can reduce the viscosity of secretions and encourage productive sneezing. Also, one to two drops of sterile saline can be administered in each nostril, as required, up to several times daily.
- Strategic systemic antibiotics are required as opportunistic infections with the normal upper respiratory tract flora are common due to the altered micro-environment. Prolonged (6–8 weeks) therapy may be required initially, as some cases are associated with turbinate osteomyelitis. Mixed infections, including anaerobes, are typical.
- Topical glucocorticoids (inhaled or drops) appear to benefit some cats. Nasal biopsies often show a predominantly lymphoplasmacytic infiltrate and there is some rationale for topical steroids in these cases.
- Rhinotomy, turbinectomy, and fat transplantation into the frontal sinuses has been advocated. However, the benefit is highly questionable in most cats.

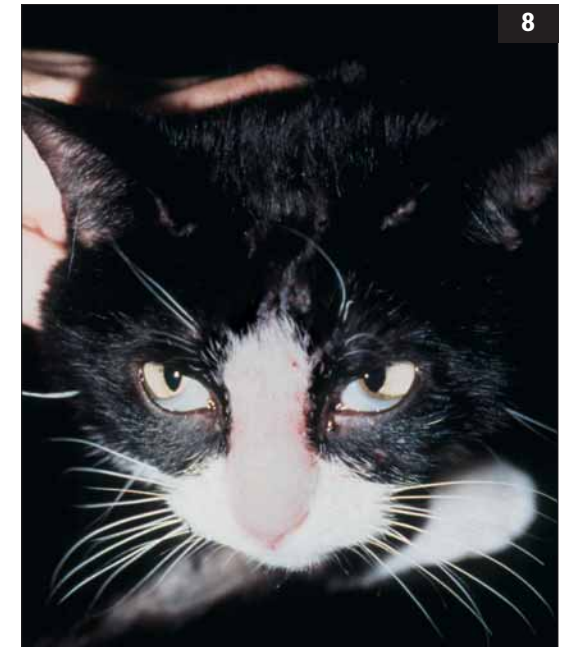
6 i. The major infectious causes of conjunctivitis are the cat ‘flu’ viruses FHV and FCV and the ocular pathogen *Chlamydomphila felis* (previously referred to as *Chlamydia psittaci* var *felis*).

ii. If any of the cats are currently showing signs of conjunctivitis, conjunctival swabs should be taken and submitted for diagnostic tests. These might include PCR testing and/or *Chlamydomphila* and ‘flu’ virus isolation. *Chlamydomphila* serology can also be extremely helpful in screening a cattery for evidence of recent infection and is worth considering in those catteries where the cats are free of signs at the time of examination. Fluorescent antibody titres to *Chlamydomphila* persist for several months and a high titre (>512) indicates recent or active infection. Low titres (<32) are generally not considered to be significant. If an intermediate titre (32–512) is seen in a cat with conjunctivitis, it may be worth repeating the serology in 2–4 weeks and looking for a rising titre in case the cat is in the early stages of infection. Intermediate titres in cats with no clinical signs indicate infection in the past year. Serology cannot be used as a diagnostic test in cats that have been vaccinated for *Chlamydomphila* as antibodies induced by vaccination will be detected by the test.



7 A bone marrow aspirate is being performed in this cat (7). What are the indications for performing this procedure?

- 8 A 4-year-old DSH (8) presented with chronic diarrhoea.
- How could small or large bowel diarrhoea be differentiated?
 - What relevant feature is shown by this cat?
 - What is the likely diagnosis and what treatment should be given?



7 Bone marrow aspirates will aid diagnosis in the following situations:

- Non-regenerative anaemias, leucopenias, thrombocytopenias, and pancytopenias where systemic diseases such as CRF, infectious diseases (e.g. FeLV, FIV), and toxic insults have been ruled out as possible causes.
- Suspected leukaemias, e.g. lymphocytic, neutrophilic.
- Suspected hypereosinophilic syndrome.
- Pyrexia of unknown origin.
- Detection of FeLV latent infection via specialist culture of the bone marrow.
- Suspected primary erythrocytosis.

8 i. Reliably differentiating small and large bowel diarrhoea can be difficult at times, and some cases have disease involving both regions of the intestine. The table below acts as a guide to distinguish the two.

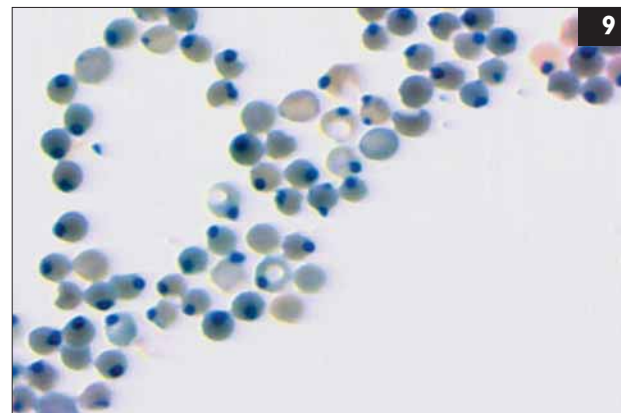
ii. In addition to the diarrhoea, this cat is showing bilateral protrusion of the nictitating membranes.

iii. There is a well recognized, although still poorly understood, syndrome of chronic small intestinal diarrhoea associated with persistent or intermittent nictitating membrane protrusion in cats. Epidemiological studies have strongly suggested there is an infectious cause for this syndrome, and further investigations have suggested a viral cause. A torovirus (related to coronaviruses) has been isolated from some of these cases but definitive cause and effect have not yet been established.

The diarrhoea in these cases is self-limiting, but it can take from a few weeks to many months for the signs finally to resolve (with waxing and waning of signs in some cats). There is rarely significant systemic disease or weight loss. Feeding of a bland diet is commonly recommended, but other therapeutic interventions have failed appreciably to alter the course of the disease or the severity of the diarrhoea in most affected cats. The use of antibiotics is contraindicated as this can exacerbate the diarrhoea through alteration of the intestinal microflora.

Signs of small and large bowel diarrhoea

Signs	Small bowel	Large bowel
Frequency of defecation	± Mildly increased	Increased
Urgency/tenesmus/dyschezia	Absent	Present
Faecal mucus	Absent	Present
Faecal consistency	Loose	Loose to formed
Faecal blood	± Melaena	± Haematochezia
Steatorrhoea	Sometimes	Absent
Faecal colour	Variable	Usually brown
Weight loss	Common	Rare



9 The blood smear stained with new methylene blue (9) is from an anaemic cat.

- What type of anaemia is present?
- What are the potential causes of this anaemia?

10 The proprietor of a rescue centre reports that several cats in their care have suddenly developed very watery diarrhoea (10).

- What infectious causes of diarrhoea should be considered?
- What is your diagnostic plan?

