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Hot Topics in Feline Medicine Mini Series

Session 1: Lifestage Feline Medicine

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Introduction

This talk will take a tour through the different life stages of cats as certain conditions are more commonly seen in certain age groups. The talk will feature case studies to illustrate the material in a practical way.

Lifestage healthcare consists of appropriate preventative care and nutrition according to lifestage. International Cat Care has produced guidelines on the management of different ages of cats, and categorised age groups as kitten, junior, adult, mature, senior and geriatric. In this session we will discuss kitten, adult/mature and geriatric lifestage illnesses, but of course conditions will overlap age groups and we don't have time to discuss everything! It can be useful in the veterinary clinic to consider if preventative healthcare programs are optimised according to the age group managed. For example, are you doing all you can to prevent obesity to reduce the incidence of diabetes mellitus in adult/senior cats? Are you ensuring parasite control and behavioural advice are priorities for kitten clinics?

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Kittens

Kittens are cute, cheeky and get into trouble! They also suffer more frequently from certain infectious diseases than older cats, some more serious than others. Consider the origin of the kitten too – although an unowned cat will have a questionable background regards worming and exposure to infectious disease in a shelter, pedigree cats from breeding establishments may be overcrowded or have poor hygiene too.

Feline infectious peritonitis virus will be discussed in session 2 in detail. In this section of session 1 we will focus on infectious gastrointestinal disease. Session 2 also covers other infectious diseases such as Herpes and Calici virus.

Diarrhoea in kittens

So a new kitten comes into the practice with a history of diarrhoea? Not worried? Certainly some cases will be self-limiting, but others can be serious with clinical signs of dehydration and sepsis. Examine each case carefully for warning signs of something more serious e.g. anorexia, lethargy, haematochezia, dehydration, melaena.

The major differential diagnoses for kitten' with diarrhoea are infectious (viral, parasitic, bacterial, protozoal) and dietary (intolerance rather than allergy). With toxins, immune-mediated disease, neoplastic and metabolic causes less common in this age group. Interestingly partial GI obstructions and intussusceptions can present with diarrhoea. Inflammatory bowel disease can present at any age, early ages also possible, but infectious and dietary causes are more likely.

Investigation often starts with a faecal sample sent to the lab – but be clear what you are testing for and how to interpret the results. It is often advised to pool 3 days of faecal samples (stored at 4°C to overcome issues of intermittent shedding).

Gut bugs – what to worry about!

Kittens and cats from shelters or overcrowded environments are at higher risk from infectious causes, some of which are zoonotic. Stress plays a role in susceptibility to gastrointestinal infection so think about the cat's environment, not just its current clinical state.

Consider the nature of the diarrhoea – large (LI) or small bowel (SI)? Consider also severity and clinical condition of the kitten, clearly more urgent treatment is required if the kitten is also underweight, dehydrated or systemically unwell. Bacterial and viral causes should be considered if the kitten is pyrexic for example. Many pathogens are also found in healthy cats so simply submitting a culture or PCR and acting on any positive results is not enough and will result in over treatment.

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Common pathogens include (in brackets type of diarrhoea usually caused, small intestinal (SI), large intestinal (LI) or both):

- Coronavirus (SI)
- *Campylobacter* spp (both)
- *E.coli* (both)
- *Salmonella* (both)
- *Giardia* (SI)
- *Cryptosporidium parvum* (SI)
- *Toxocara and toxoscaris* (SI)
- *Tritrichomonas foetus* (LI)
- *Clostridium* spp (LI)
- Parvovirus (panleuopenia) (LI)

Diagnosis of enteropathogens

Until relatively recently faecal samples were submitted for faecal parasitology and culture only, and most of us were happy interpreting the results. Complicating the diagnosis of enteropathogens is the potential for false positive test results, particularly since the increased use of PCR faecal testing. Whilst useful, the possibility of simply identifying commensal bugs must be taken into account along with the fact that PCR can amplify tiny, potentially insignificant amounts of DNA – so producing positive results where other tests would have been negative. In fact, all the organisms tested for in PCR panels have been frequently isolated from the faeces of clinically healthy cats. PCR does not distinguish viable from non-viable organisms.

Studies have shown that many non-diarrhoeic cats will test positive for enteropathogens. For example, in one study of cats in California, USA, significantly more cats without diarrhoea tested positive for *Campylobacter* spp than cats with diarrhoea. In that study of over 200 cats no pathogen was isolated more frequently in the cats with diarrhoea (Queen et al 2012); highlighting the need to inpterpret results sensibly. When submitting and interpreting faecal infectious disease test results consider whether any positives are clinically significant, and furthermore if they require treatment or are self-limiting. Overuse of antibiotics can result in an increase in other bacteria in the gut and contribute to the development of resistance.

A recent study looking at 1088 PCR panel results from cats with diarrhoea seen in first opinion practice in the UK (Paris et al, 2014) showed worryingly high levels of positive results, including 56.9% positive for coronavirus, 22.1% positive for panleukopenia, 24.4% *Cryptosporidium spp*, 56.6% *Clostrium perfringes*, 20.6% Giardia, 18.8% *T.foetus* and 0.8% *Salmonella enterica*. These are high numbers and pedigree cats and younger cats were more likely to be positive. In the same study 62.5% of cats had 2 or more species of pathogen. This does not mean that in these cases the pathogens identified are the cause of the diarrhoea!

Interpreting faecal PCRs

The key fact is that the positive result on your report must not be blamed for the cat's diarrhoea without due thought. Consider if the clinical signs fit the PCR result? Is the pathogen isolated prevalent in normal cats? Most importantly – don't blindly submit a PCR panel if the results are not going to change what you do with the case. A classic example is coronavirus faecal PCR. This test has minimal utility unless you are looking at faecal shedding, perhaps in a breeding household with FIP – this is an uncommon situation so why test for it in an average cat with diarrhoea? Yes, it may be the cause of the diarrhoea, especially

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in a young cat but it is self-limiting so has the result changed your treatment? There is no doubt faecal PCRs are useful and have a place in our diagnostic artillery – we just have to interpret them with our brains switched on! Consider whether faecal culture and parasitology are adequate and how PCR can fit into your work up and spend your owner's money wisely.

In the next section I will discuss the significance of positive PCR results according to organism.

Viral enteropathogens

1. **Panleukopenia/feline parvovirus**

As you are aware the clinical signs of parvovirus are severe and most often seen in young cats. Confirming the diagnosis can be difficult and rely on clinical signs and the presence of leukopenia. A differential diagnosis for a cat with diarrhoea, pyrexia and leukopenia would be salmonellosis. Can take 2-3 days before virus is excreted so tests will be negative. PCR more sensitive than ELISA but results take 3-5 days so treatment will already be underway. Re test suspicious negatives after 2-3 days.

In the study mentioned above over 20% were positive for panleukopenia when they are highly unlikely to have had diarrhoea due to infection with this pathogen given the UK prevalence and clinical outcome. Positive results may be due to recent vaccination, asymptomatic infection (in older cats) or passive carriage of the virus. PCR cross reactivity with canine parvovirus is also known to occur.

2. **Coronavirus**

Feline enteric coronavirus (FECV) can cause a mild-self-limiting diarrhoea. Yes coronavirus is the cause of FIP but diarrhoea is not a common presentation of FIP and as we will discuss in detail in session 2 the suspected mutation to an FIP causing virus is uncommon. Faecal PCRs as mentioned will pick FECV up but interpret results with caution! A bland diet and occasionally fluids are all that are needed for recovery.

Bacterial enteropathogens

As discussed finding a known bacterial cause of diarrhoea in the faeces of a cat with diarrhoea doesn't mean it is the cause. Think about the clinical signs and appropriate method of testing. Bacterial faecal culture may be more appropriate than PCR.

1. ***Campylobacter spp***

These gram-negative bugs may or may not cause diarrhoea in cats. Most studies show similar isolation rates in healthy and diarrhoeic cats. Young cats and those in over-crowded environments are more likely to test positive. Treatment may or may not alter the clinical course of infection and should be reserved for cases with fever, haemorrhagic diarrhoea or where there is concern about zoonosis. Bear in mind that the majority of human cases are associated with food rather than pets, although sensible hand hygiene is recommended if a cat tests positive. Consider advising owners on these risks if they are feeding raw food to their cat. Treatment with amoxicillin-clavulanate, fluoroquinolones or erythromycin are effective.

2. ***Clostridium spp***

Clostridium difficile again can be found in healthy and diarrhoeic cats, and again PCR may not be the best test for this pathogen as it doesn't distinguish toxin producing vs non-toxin producing strains of the bacteria. Similarly a positive culture doesn't confirm causation. If clinical signs of acute onset watery diarrhoea are reported and a positive culture is obtained, ideally further tests for toxin A or B are performed. This is rarely done in general practice so treatment may be indicated with metronidazole.

Similarly *Clostridum perfringes* may be part of normal microflora – or there as a result of disrupted intestinal microflora due to another cause of the diarrhoea. Enterotoxin testing is most useful with PCR suffering again from its detection of *C. perfringes* in normal animals. Large bowel diarrhoea is usually the result of clinically significant infection and metronidazole or amoxicillin-clavulanate are effective.

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3. Salmonella

Salmonella typhimurium infection can result from ingestion of contaminated prey species. Infection may result in illness, termed 'songbird fever'. Clinical signs can include fever, vomiting and diarrhoea, abdominal pain and anorexia. Leukopenia may result and disgnosis made via faecal culture or PCR. If a PCR positive result is obtained the faeces should be submitted for culture. As always carriers may occur and a positive result should be matched with clinical signs. Resistance is an issue and treatment should be reserved for systemically unwell cats and be continued for up to 28 days to avoid relapse and resistance development. Faecal excretion should be re assessed before stopping treatment and consideration given to the zoonotic potential of the organism. The feeding of raw food may be an increased risk to humans and advice on hygiene should be given.

4. E.coli

E.coli are part of normal gut microflora but can cause clinical disease in some cases, often when something has disrupted the harmony of the GI tract – such as inflammation, antibiotic treatment or other pathogens. Tests to differentiate pathogenic from non-pathogenic bacteria are not widely available, PCR testing may help here. Supportive treatment only may be effective, as the development of resistance is a concern if treating. Amoxycillin-clavulanate, fluoroquinolones or cefovecin may be provided as empirical treatment as culture will not allow sensitivity testing due to the lack of differentiation between pathogenic and non-pathogenic strains.

Protozoal enteropathogens

There is no doubt infection with protozoa is a kitten problem. The common protozoa causing an issue are found in kittens most frequently, but also kittens in overcrowded places or background involving stress/poor hygiene and poor nutrition.

1. Coccidia

Isospora felis and *Isospora rivolta* are the most common to cause a problem in kittens and most infections are subclinical. Mild watery diarrhoea may occur and if the kitten is unwell with other GI disease for example then the coccidial infection may cause more severe clinical signs such as haemorrhagic diarrhoea and weight loss. Diagnosis via faecal flotation is straightforward and treatment should be reserved for cats with persistent shedding and only after other pathogens have been excluded and other diseases causing the clinical signs managed. Toltrazuril, ponazuril or sulpha containing antibiotics can be used. As with other enteropathogens, consider the individual case and complicating factors rather than the just the positive faecal result.

2. Giardia

This flagellated protozoan parasite is likely more pathogenic, although again asymptomatic infections can exist. Trophozoites adhere to the enterocytes in the SI and may disrupt the tight junctions causing increased intestinal permeability. Coinfection with other pathogens may also occur, such as *T.foetus* and *Cryptosporidium*. Systemic illness due to Giardia infection is rare, watery SI diarrhoea may occur. Giardia can be hard to diagnose due to intermittent shedding of cysts, hence previous recommendations to pool 3 days of faeces for further testing. Trophozoites may be identified on a wet smear, with characteristic pear shape and 'falling leaf' motility. Zinc sulphate centrifugal flotation can improve sensitivity, but in most cases a sample will be sent to the lab for an ELISA or PCR. The ELISA is specific (few false positives) but false negatives can occur. SNAP tests for Giardia antigen are available and have good negative predictive values (i.e. few false positives) but as with all tests for Giardia false negatives are possible due to intermittent shedding. The treatment is safe – so in many cases a course of fenbendazole is sensible (50mg/kg for 5-7 days) and will also treat other parasitic infections. Note that the cysts are immediately infective and so cases of recurrent infection may due to pets in the home re-infecting each other so look for the dog that is the culprit!

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3. Tritrichomonas fetus

A more recently recognized cause of diarrhoea in cats, attention has focused on this pathogen recently. This protozoan infects the large intestine causing a much more LI type of diarrhoea with mucus, urgency and increased frequency. Coinfection with Giardia occurs in up to 12% of patients. PCR is effective for the diagnosis – but make sure you don't have a lot of cat litter in the sample that will contaminate and potentially inhibit the PCR.

Treatment with ronidazole is the most effective, but is off license so owners must sign a disclaimer. Note that once daily treatment is adequate. Neurotoxicity is possible and doses should be reduced if cats have any evidence of liver dysfunction. The condition will self-resolve after around 2 months in many cases, although the average is 9 months infections lasting over 2 years reported. Consider the severity of the clinical signs.

4. Cryptosporidium

Cryptosporidium parvum infects the small intestine, but infections are usually short-lived and self-limiting. Recent tests have shown many cats are infect infected with *Cryptosporidium felis* not *C.parvum.*

Most infections are sub-clinical and coinfection with another parasite such as Giardia may be the cause of diarrhoea in some cases. A positive PCR does not confirm the protozoa is the cause of diarrhoea. Treatment is challenging with no effective agent available. Azithromycin has been shown to be effective. Importantly manage the diarrhoea and coinfections and then consider if treatment is needed and PCR positivity is maintained.

Treatment of diarrhoea in kittens

Many cases will suffer simply one episode of acute diarrhoea that resolved. Sensible management of cases with normal hydration status, demeanour and no other signs of illness include:

- A diet specifically for gastrointestinal disease, as these tend to have limited antigen and be highly digestible, feeding a non-kitten diet for a short time will not cause issues. A moist food is ideal as hydration is a priority. Indeed adding water to food and offering broths made of (unsalted) chicken stock can help prevent dehydration
- Antibiotic therapy is not usually needed and actually may worsen diarrhoea by altering the intestinal microflora. The use is indicated if there are known complicating factors such as immunosuppression, sepsis or damage to the intestinal wall that could result in translocation of bacteria (e.g GI haemorrhage).
- Routine treatment with fenbendazole, it is well tolerated and even with negative faecal results is a sensible option prior to any further investigation.
- Probiotics or no probiotics?

Probiotics – do they do any good?

Probiotics are heavily marketed by drug companies and frequently used in companion animals, as well as horses for example.

Probiotics are live microorganisms given to improve GI health. There is still a paucity of evidence as to their effect in both humans and animals, however, studies in humans have shown benefits. In dog and cat studies (Hart et al 2012) have shown benefit in cases of acute or chronic non-specific diarrhoea and dogs with diet-associated diarrhoea.

Lahor et al (2012) showed cats with Tritrichomonas receiving ronidazole and probiotic were less likely to relapse.

Other studies have looked at effects on the immune system, even response to vaccination with results showing an effect on the immune system, but the significance of the effect is unclear.

If diarrhoea continues then further investigation is indicated and should start by excluding faecal parasites and systemic illness, plus retroviral disease for example.

The take home message here is to interpret faecal results in context and have an open mind – remembering that just finding a potential pathogen does not mean they are the cause of the illness.

Adult/mature cats

Adult/mature cats (prior to becoming senior at 10 years) may start to develop diseases of middle to old age, including diabetes mellitus, obesity, and gastrointestinal diseases.

Frustratingly, vague signs such as lethargy and anorexia are very common presenting signs in feline practice and a wide number of differential diagnoses therefore need to be considered for such cases. **Pancreatic, hepatic and biliary diseases are relatively common causes of these vague signs**, although may also result in additional clinical signs such as vomiting or jaundice, that helps to increase our index of suspicion for this group of disorders. In most cases cats with disease in this area will present with non-specific clinical signs. In this part of the talk we will focus on this group of conditions.

Triaditis – what is it?

You may know the answer to this question and hear this term mentioned frequently. In human medicine it is used differently, for a specific liver disease affecting the portal 'triads'. In cats we use the term to describe the condition of inflammatory gastrointestinal disease, pancreatitis and inflammatory or infectious liver disease. Various studies have examined this combination of clinical diseases and there is no doubt that cats may suffer two or more of the three conditions, although on average only 30-39% have all three (Callahan and Clark 2011). In studies examining the combination of diseases, bear in mind that there were several different diagnoses at each site, so neoplastic liver disease may occur with pancreatitis, neutrophilic cholangitis and non-infectious pancreatitis and IBD, the term triaditis doesn't give us a precise diagnosis.

Why do cats suffer in contrast to dogs?

- The reason for the close association with these other diseases is predominantly thought to be a result of the close anatomical and functional relationship between the major pancreatic duct and common bile duct.
- One of the major differences in the feline pancreas is that the majority of cats have only **one pancreatic duct** which, in contrast to dogs, enters the intestine at the major duodenal papilla together with the common bile duct. This close association makes cats with biliary disease very susceptible to the development of pancreatitis, since any inflammation/blockage of the distal common bile duct may result in reflux of pancreatic secretions up the pancreatic duct.

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- Other reasons for the association include the fact that vomiting increases the likelihood of pancreaticobiliary reflux, and in comparison to dogs, cats have a much **higher concentration of intestinal microflora** so when pancreaticobiliary reflux occurs a mixed population of bacteria, bile salts and activated pancreatic enzyme enters the pancreatic and biliary ducts.

There is no doubt we should be open to the possibility of disease in all three areas, we should treat each case individually. In this part of the talk we will focus on pancreatitis.

Pancreatitis in cats

Pancreatitis is being increasingly diagnosed, however, it is still a challenge to diagnose and treat, and we are still likely missing cases. Feline pancreatitis is certainly different from the canine disease, in presentation and management. There are more studies needed to help us understand this condition but here lets summarise what we know.

There are acute and chronic versions of this condition, with cats most frequently affected by chronic pancreatitis. This division is based on histology acute pancreatitis: neutrophilic inflammation and acinar cell/peripancreatic fat necrosis, chronic pancreatitis: lymphocytic inflammation, fibrosis and acinar atrophy. There is likely some overlap however, with the disease more of a spectrum both in severity and histological diagnosis.

Cats are NOT small dogs!

Pancreatitis in cats doesn't seem to behave in the same way as canine pancreatitis:

- Chronic pancreatitis is more common
- It is often associated with IBD (+/- cholangitis)
- Never starve a cat (actually recent thinking suggests canine pancreatitis patients shouldn't be starved)
- A very low-fat diet just doesn't suit cats; they are not designed for it! A diet to manage the concurrent IBD may be a better idea
- Diabetes is a co-morbidity to be assessed and watched out for (diabetic cats have significantly higher PLI than non-diabetic cats)

Aetiology

The cause of pancreatitis is still not fully understood. As mentioned above, one theory is that due to the fact that the pancreatic duct empties into duodenum with the common bile duct, reflux of bile or gut content may occur. Bacterial infection may be implicated – studies have shown bacteria in inflamed pancreas samples, however, they could be both cause or the result of translocation and sepsis due to the pancreatitis. In humans, immune mediated pancreatitis occurs. This would nicely explain the triaditis link – but is not as convincingly diagnosed. Certainly in humans with pancreatitis a systemic inflammatory syndrome occurs, with multiple organ involvement, and this is likely true of cats, but what happened first (pancreatitis or systemic inflammation) may not be clear. Pancreatic ischaemia may occur, during surgery or during periods of hypotension, again this is uncommon. We are left in the vast majority of cases not knowing the cause. Traumatic pancreatitis after an RTA can occur – and is often very severe in the author's experience. Rare cases of toxoplasma, herpes and other causes are reported.

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Clinical signs

Non-specific, vague, chronic – but you need to diagnose these cases so be on the look out. Mild cases are described as subclinical – but I think it is more likely we are not great at identifying cats in pain, if the pain is mild and chronic in nature. They will hide illness. Humans with mild pancreatitis still describe a chronic abdominal pain that is highly unpleasant, can we assume cats feel the same? Certainly cats do not present, in the majority of cases, as obviously as dogs. Clinical signs include:

- Vomiting
- Diarrhoea
- Abdominal pain – subtle – are you examining the cranial abdomen gently?
- Anorexia
- Lethargy

On examination, as mentioned some clinical signs may alert you to disease in this region including: jaundice, a cranial abdominal mass or be again non-specific – pallor, dehydration, hypothermia, weight loss.

So how do you diagnose pancreatitis?

As well as clinical signs, physical exam findings and non-specific laboratory results (e.g. mild anaemia, leukocytosis, elevated liver enzymes, hypocalcaemia: which is associated with a poorer outcome), hypokalaemia), other tests will be needed to confirm a diagnosis. There are species differences again between dogs and cats here. Lipase and amylase are of limited value as they will be increased with multiple other conditions. Feline pancreatic lipase immunoreactivity (fPLI) is now commonly used to diagnose pancreatitis in cats, including using a bench side test. The Spec fPL is performed in the lab and provides a quantitative assessment, and the SNAP fPL is semi-quantitative.

Interpreting fPLI tests

The Spec fPL has the following reference ranges: 3.5 – 5.3µg/l – grey zone, > 5.3µg/l consistent with pancreatitis.

The Snap fPL indicates a result above 3.5µg/l but doesn't give further information so is ideally confirmed in the laboratory.

The fPLI is a sensitive test for **moderate** pancreatitis, but the sensitivity falls for **mild** pancreatitis so more false negatives as the severity of the disease reduces.

BUT – does chronic disease and fibrosis result in a consistent increase? What is the effect of gastrointestinal disease?

The best test we have besides histology but remember it may miss cases of chronic, mild pancreatitis that are still clinically significant.

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Imaging is used frequently in humans to diagnose pancreatitis. Contrast CT and MRI for example. In cats ultrasound is useful – but has a low sensitivity and like fPLI its sensitivity is increased in more severe cases. Ultrasound cannot distinguish between acute and chronic disease, but it should find a mass, cyst or other structural consequence of pancreatitis. It also allows assessment of the GI tract and liver as well as fine needle aspiration of any lesions.

Ideally the diagnosis of pancreatitis is confirmed with histology. The problem is in many cases the last thing they need is an exploratory laparotomy. However, if surgery is being performed, perhaps to biopsy the get – it makes sense to biopsy the pancreas at the same time. With appropriate surgical technique, recent studies have shown no increase in the risk of pancreatitis from pancreatic biopsy, if performed correctly with no disruption to the blood supply. A study recently demonstrated that complications should be minimal post surgical biopsy – but in that study a diagnosis was more likely to be reached in dogs than cats – where chronic pancreatitis was more likely and a patchy distribution of lesions may result in false negatives (Pratschke et al 2015).

Pancreatitis and diabetes mellitus – what is the link?

A complex relationship likely exists between these two conditions. End stage chronic pancreatitis can result in DM when islet cells are loss in addition to acinar cells. Conversely there is evidence that DM can cause pancreatitis due to the hyperglycaemia, hyperlipidaemia contributing to an inflammatory state.

fPLI is commonly elevated in cats with DM.

Pancreatitis may reduce insulin sensitivity making affected cats harder to stabilize and more likely to develop DKA.

Pancreatitis may reduce appetite and cause vomiting – all hampering stabilization of the cat with DM.

Obesity in humans is a pro-inflammatory condition, could the same be true for cats and therefore predispose to both conditions?

Advice to look for pancreatitis in cats diagnosed with DM is sound – it means the clinician will be aware of potentially fluctuating insulin requirements and risk of complications, it may also deter a tight control of glucose levels with the intension of inducing remission due to the risk of hypoglycaemia.

Treatment of pancreatitis

The approach to each case will depend on the individual, remembering the spectrum of disease severity and co-morbid conditions. Assess each patient carefully regards nausea, pain, hydration status. Be proactive and assume that the cat is in pain, even if it is hard to determine.

FLUID THERAPY: Cats with pancreatitis are often dehydrated, and may also be significantly hypovolaemic (think about this, do you know the clinical difference between these terms?). Crystalloids (Lactated Ringers or 0.9% NaCl) are usually recommended for initial replacement. Hypovolaemic cats (presenting with pale mucous membranes, poor pulse quality, tachycardia or bradycardia, and, in severe cases, low arterial blood pressure) will benefit from an initial bolus of fluids (10-20ml/kg over 20 minutes

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and repeated as needed). Close attention to cardiovascular parameters is important, and be aware that cats are particularly prone to volume overload, often presenting as pleural effusion, if excessive fluids (especially colloids) are administered.

Plasma administration has been recommended in order to provide a source of protease inhibitors, which in theory should reduce activation of pancreatic enzymes. However, studies in cats are lacking, and availability in practice is limited. This will only really be appropriate for acute necrotizing pancreatitis.

Attention must also be paid to electrolyte abnormalities, in particular hypocalcaemia and hypokalaemia. Guidelines for management of hypocalcaemia in cats with pancreatitis are not well established, but the author has used parenteral calcium gluconate for management of moderate-to-severe reductions in ionised calcium concentration. Note that calcium solutions must not be added to fluids containing bicarbonate. Potassium chloride can be added to maintenance fluids, the rate depending on the severity of hypokalaemia. Care must be taken not to administer potassium at rates exceeding 0.5mmol/kg/h. Addressing hypokalaemia which may occur in over 50% of cases is important to improve appetite, demeanour and muscle strength.

NUTRITION: In cats, vomiting is less common than in dogs which allows enteral nutrition to be addressed early in the course of treatment. However, affected cats may be nauseous without vomiting. Hepatic lipidosis is common in cats with pancreatitis and is associated with a poorer prognosis. Appropriate, aggressive nutrition is essential to prevent hepatic lipidosis developing or worsening.

Attentive nursing and appetite stimulants may tempt cats to eat, but rarely results in consumption of the full caloric requirement. If vomiting is not a major feature, then naso-oesophageal or oesophagostomy tubes can be placed with minimal equipment. THINK ABOUT EARLY USE OF FEEDING TUBES IN THESE CASES!
If in doubt use an antiemetic, side effects are minimal but they may make a big difference to the cat. Choices include: metoclopramide, as an infusion it is more effective and may also help with ileus which is associated with the pancreatic inflammation, maropitant, ondansetron. Maropitant may also be a visceral analgesic due to its NK-1 receptor antagonism. Mirtazepine is an appetite stimulant but may also have some anti-nausea effect.
There is no evidence to support the use of a low fat diet, a good choice is a moderate fat, high protein diet to prevent hepatic lipidosis.

SUPPORTIVE CARE: Pancreatitis is a painful condition, and opioid analgesia is appropriate. Suggested drugs include pethidine (3-10mg/kg q 4-6 hours), morphine (0.1-0.5mg/kg I/M or S/C q 6-8 hours) or buprenorphine (0.01-0.02mg/kg I/M or S/C every 8 hours). Fentanyl patches can be placed on the skin to provide analgesia for up to 72 hours. Non-steroidal anti-inflammatory drugs should be avoided in severe pancreatitis due to increased risks of renal toxicity in dehydrated or hypovolaemic patients.

Vitamin B supplementation may be helpful in cats with prolonged anorexia and/or concurrent GI or liver disease, as B12 deficiency is common in these patients.

Often the most important aspect of therapy is the treatment of concurrent disease such as IBD, cholangitis/hepatitis and diabetes mellitus. At this stage, there are no recognised treatments to prevent ongoing inflammation and fibrosis in cases of chronic pancreatitis and management of these cases can be very problematic, relying on symptomatic treatment alone.

Antibiotics are often given but this is likely a sterile process in the majority of cases, however acute cases are at risk of sepsis and may benefit from broad spectrum antibiotics. In humans antibiotic use doesn't alter outcome. Research continues on whether there is a bacterial component to pancreatitis in cats.

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Corticosteroids are only indicated in cases with a biopsy result of lymphocytic pancreatitis, and they often have concurrent IBD. Further work is needed to see if corticosteroids are indicated or not.

Pancreatic enzymes are used in some human cases to reduce the severity of painful episodes, and anecdotally in veterinary medicine they have been used with some success in the odd patient. Of course cases of EPI will need supplementation.

Surgery is only indicated in cases of EHBDO and pancreatic cysts or abscessation (although literature describes some pancreatic duct stenting procedures).

When managing a case of pancreatitis, it is worth warning owners that there is no 'quick fix', recurrence is possible and nursing with close attention to nutrition and nausea are required.

Think – ANALGESIA, NAUSEA, NUTRITION, MANAGEMENT OF CONCURRENT DISEASE!

Geriatric cats

OLD AGE IS NOT A DISEASE!!

We are all well aware that geriatric cats get more health problems than other ages of cats, and I am sure you are all familiar with the most common including:

- Hyperthyroidism
- Chronic kidney disease
- Osteoarthritis
- Dental disease
- Neoplasia
- Cognitive dysfunction syndrome

Co-morbidities are also common, older cats can develop several diseases at the same time, making each more challenging to treat. This age group is special, and any opportunity to help make them more comfortable in their final years should be taken.

Importantly remember that old age is not a disease, it brings diseases but putting things down to 'getting old' is not acceptable and owner should be educated accordingly. We can diagnose and effectively treat older cats and leaving them in chronic pain is avoidable.

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Senior cat healthcare

Ask yourself – what are you doing in your practice to care for older cats? You may say you manage the chronic diseases well, great – but are you maximising efforts to diagnose disease early? Cats are the masters of hiding illness and so some form of wellness clinic or check ups can identify apparently subclinical illness. Ideas include:

- Senior health nurse clinics, offered free of charge to include a weight check, blood pressure and possible urinalysis. This will diagnose cats with CKD from the low SG, diabetics, dental disease and identify cats losing weight, or conversely gaining weight. This generates practice income as nurses refer back to vets.
- Asking clients to bring a urine sample to routine vaccination appointments for cats over 10 years old for example. Sending them non-absorbant litter to facilitate this.
- Sending questionnaires – mobility questionnaires are a great way to identify osteoarthritis in cats, owners previously did not note any problems, can see the changes in their cat and then questionnaire can be repeated once they are on treatment.

These are just a few ideas, inform your owners, offer them preventative healthcare for older cats and you will be surprised how many owners will be keen to explore this option. It also shows them you are interested in their cats.

What is new in chronic kidney disease (CKD)?

Chronic kidney disease is a common diagnosis in older cats. In the last 10 years great strides have been made in this area regarding standardisation. The International Renal Interest Society (IRIS) have created a system of staging of CKD that we will revise below. We will not have time to discuss all there is to know about CKD, so we will focus on areas of management of CKD that could be improved upon and include:

- Early diagnosis
- Identification of complications
- Appropriate use of angiotensin converting enzyme inhibitors (ACEi) and angiotensin receptor blockers (ARBs)
- Appropriate use and introduction of diet (including emphasising the importance to owners).

IRIS staging of CKD

Why stage CKD? Acceptance of staging of CKD has grown significantly in the last few years as the advantages are seen, this is not just an academic exercise. Advantages include:

- It allows different clinicians dealing with a case to immediately understand the severity of a cat's CKD and diagnose progression and complications rapidly
- It means guidelines can be followed for each stage
- It allows owners to be given an understandable system and prognosis
- It assists research into CKD as cats are grouped in a standard way.

Staging is done as follows:

1. Creatinine is assessed and stage allocated. IMPORTANT POINTS:
    - Do not stage when the cat is not fully hydrated (and pre-renal azotaemia causing an effect)
    - Ideally ensure the creatinine is stable and measured on more than one occasion (this may not always be possible but is ideal)
    - Don't miss stage 1 cats – creatinine is normal but the cat has other abnormalities consistent with CKD

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Stage I (non-azotaemia CKD):
Normal creatinine (<140µmol/l) but another abnormality present indicating renal disease (e.g. renomegaly, proteinuria, poor urine concentrating ability).

Stage II (mild CKD):
Creatinine above the reference range at 140-250 µmol/l. This lower level (around 140mmol/l) may be within some laboratories reference ranges.

Stage III (moderate CKD):
Plasma creatinine 251-439 µmol/l.

Stage IV (severe CKD):
Cats with this stage of CKD have creatinine levels >440 µmol/l.

Substaging CKD – proteinuria

Substaging according to protein level in the urine is of increasing importance as studies identify proteinuria as a significant negative prognostic indicator in feline CKD. Staging is performed according to UPC measurement in patients with inactive sediments. Interestingly in end-stage and severe renal disease the UPC can actually fall as there simply are not enough glomeruli remaining to losing the protein into the urine.

SUBSTAGE	**Non-proteinuric (NP)**	**Borderline proteinuric (BP)**	**Proteinuric (P)**
UPC	<0.2	0.2-0.4	>0.4

Substaging CKD – blood pressure

Cats with CKD frequently have elevated blood pressure and this will cause progression of renal disease as well as clinical signs and reduced quality of life in affected cats. Untreated hypertension causes end-organ damage including damage to the brain, heart and further renal damage. Ocular changes are also common including renal detachment and haemorrhage, and total retinal detachment and blindness.

Diagnosis of hypertension

The most common methods used to measure blood pressure are indirect techniques Doppler and oscillometry.

Indirect Blood pressure Measurement in Cats

Indirect/non-invasive blood pressure measurement in cats is now a widely used technique in general practice and is really essential for practices seeing cats. Using indirect techniques can provide an indication of systolic blood pressure, although this technique will never be as accurate as direct methods. Experience of the equipment will improve the ability to achieve accurate results.

Options include:

1. Doppler ultrasound technique

This technique has been shown to be the most reliable of the indirect techniques. The procedure involves use of a cuff, sphygmomanometer and an ultrasound transducer with amplifier.

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Cuffs need to be the appropriate size with usually 2 options, 2.5cm and 3.3cm. Ideally cuffs are 30-40% of the limb circumference.

This technique is very easy and rapid with practice. In many cases it is better done with the owner present to reassure the cat. Do not restrain the cat if possible and keep the atmosphere calm and quiet (see below). This technique only reads systolic blood pressure (although with experience a diastolic reading can be taken) but this is not a problem as diastolic hypertension is not reported in cats.

2. Oscillometric technique

This technique has previously not been as reliable in conscious cats. However, the recent introduction of high definition oscillometry has overcome many of the problems associated with traditional oscillometry and published studies have now shown that this technique provides an accurate assessment of BP in cats. It is recommended that the unit is connected to a PC or tablet to allow visualization of the recording to exclude movement artefacts that may cause spurious results. The tail may be a better site to use this machine on to reduce the movement noted when used on the limbs.

With all techniques it is important to be consistent in the technique and ensure the readings are realistic and themselves consistent for the individual cat.

>180 mmHg is classified as severe risk of end organ damage (H)
160 to 179 mmHg is classified as moderate risk of end organ damage (M)
150 - 159 mmHg is classified as low risk of end organ damage (L)
<150 mmHg is classified as minimal or no risk of end organ damage (N)

Substaging according to results:

Always take note of the cat's demeanour during measurement and what cuff size was used to allow monitoring.

A further Substage can be assessed on the basis of complications related to the blood pressure. These complications include evidence of end organ damage (see below) and an annotation 'nc' for no complications and 'c' for complications is given.

Assessing 'end organ' damage

If you are in any doubt about the SBP readings evidence of end organ damage from the hypertension should convince you it is present and is an indication for urgent treatment.

1. The eye

This includes retinal haemorrhage, detachment, intraocular haemorrhage and subtle vessel tortuosity (retinal or iris). Sudden onset blindness or anisocoria can occur as a result of retinal detachment.

Ocular examination should include assessment of PLRs, and using direct, or indirect ophthalmoscopy. Indirect takes a little practice but can provide a quicker and wider view of the retina. Eyes may need dilating to fully assess the retina.

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2. The kidneys

This may be the cause or effect of the hypertension. Hypertension may cause glomerular and tubulointerstitial changes. Therefore biochem including urea and creatinine should be performed. Urine protein content has been associated with hypertension, and reduced survival so check a UPC and always a USG. Whether the cause or effect treatment of hypertension will help prevent progression of renal disease.

3. The heart

Ventricular hypertrophy is a consequence of chronic hypertension. Equally hypertrophic cardiomyopathy can result in hypertension. Studies showed that treatment of hypertension could result in improvement in cardiac parameters. As mentioned before CHF is rare as the result of hypertension alone and cats should be checked for other disease such as hyperthyroidism.

4. The brain

Neurological signs are rare with hypertension alone but can occur with severe and untreated hypertension. ABP should be checked in all older cats with CNS signs. Differentials include neoplasia, vestibular disease etc.

Once underlying causes have been assessed and treated if necessary then the hypertension should be treated. Early treatment is vital to prevent further damage. Also blind cats with retinal damage can recover some sight if the hypertension is treated effectively as the retina may re-attach.

Cats with CKD and moderate or high risk of end organ damage should be treated with anti-hypertensive drugs.

Avoiding 'white coat' hypertension

Inevitably BP is elevated by stress in the clinic, but this can be minimized. I strongly recommend using Cat Friendly Clinic principles within your practice. See www.catfriendlyclinic.org for more details. Tips include:

- Think about the cat prior to entry to the consult room – the waiting room for example – separate cat room or area away from dogs – cat friendly practice techniques
- Allow the cat to explore the consult room and relax prior to measurement – take the history during this time
- Wear ear phones when using Doppler to prevent noise upsetting the cat.
- If not using headphones then keep volume off until the probe is in position
- Keep owners present if possible
- Use minimal restraint
- Inflate the cuff gently and not suddenly
- Ignore the first couple of readings
- If the readings are not consistent, have a break, leave the cuff on, reassure the cat and start again.
- Take at least 5 readings and average
- Check heart rate corresponds with readings from machines
- If contact not great with Doppler use more gel
- Clean area with surgical spirit before using gel and Doppler probe
- Do not clip unless very hairy cats and if needed clip quickly then have a break before starting.

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Often nurses are more patient than vets at measuring BP – are your nurses doing this?

MEASUREMENT OF BP SHOULD BE CONSIDERED PART OF THE PHYSICAL EXAMINATION IN OLDER CATS!

Early diagnosis of CKD

The 'holy grail' of CKD management is to diagnose the condition early and reverse the damage to the kidneys. Reversal of the damage is unlikely, but we know that interventions such as diet can slow the progression and improve the prognosis, so early diagnosis is desirable. In this regard consider the following:

- Target 'at risk' groups for assessment and see them more often: older cats are more at risk so check them regularly: International Cat Care WellCat guidelines recommend screening older cats more frequently – with cats over 11 being weighed and body condition scored every 6-12 months, increasing to every 3-6 months for over 15 year old cats.
- Weight older cats regularly and don't forget the body condition score: weight loss maybe the only clinic sign the cat shows, minor weight loss may indicate underlying disease – do you weigh EVERY cat that enters your clinic – you should – they are giving you useful information!
- Urine assessment: as mentioned earlier checking simply a urine specific gravity (SG) can pretty much exclude CKD. Normal cats should concentrate their urine to above 1.035. Other conditions can cause a low SG, but it is not normal and should prompt further testing – you can learn a lot from urine! A low SG may be the only indication of early stage CKD before elevation of creatinine.
- Blood pressure measurement: as mentioned this should be performed in catt cats over the age of around 10 as part of a physical examination, including at a simple vaccination appointment.
- Blood sampling: we know that creatinine is an insensitive marker of CKD, as it is only elevated once ¾ of the nephrons are lost. It is still useful to check in older cats of course but the search for other molecules that may identify early CKD has been on for some time. In humans assessment of glomerular filtration rate (GFR) is standard, but it is simply performed via a calculation using the serum creatinine. Such systems have not worked for cats. You can measure GFR, but the test is expensive and not frequently performed in general practice. More recently research has looked at other biomarkers, including SDMA (see box).

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SDMA for the early diagnosis of CKD in cats

This molecule, symmetric dimethylarginine (SDMA) has been shown to correlate with GFR in recent studies. A persistent increase in SDMA suggests reduced renal function and may diagnose stage 1 CKD.

It increases earlier than creatinine, when 40% of nephrons are lost (cf 75%)

It is not affected by food (cf urea)

Looking at SDMA in cats already diagnosed with CKD may help staging – creatinine being so insensitive, i.e. a thin cat may have a lower creatinine, SDMA will be unaffected

May be useful as screening test for older cats

Early diagnosis may help with investigating underlying causes, early treatment and monitoring

Early warning to watch for hypertension and other complications

Early warning to take care with NSAIDS and general anaesthesia

Identification of complications of CKD

A diagnosis of CKD is not an end point. Sending them off with a bag of food is not good enough! It is an opportunity to prolong and improve the cat's quality of life.

Look for the complications including:

- ANAEMIA – non-regenerative
- HYPERTENSION
- DEHYDRATION
- HYPERPARATHYROIDISM
- HYPERPHOSPHATAEMIA
- HYPOCALCAEMIA AND HYPERCALCAEMIA
- HYPOKALAEMIA
- PROTEIN MALNUTRITION AND MUSCLE BREAKDOWN
- METABOLIC ACIDOSIS
- URAEMIA
- PROTEINURIA
- GI EFFECTS (nausea etc)
- URINARY TRACT INFECTION

- Modify progression of CKD
  - TREATMENT OF PROTEINURIA
  - TREATMENT OF HYPERTENSION
  - MANAGEMENT OF HYPERPARATHYROIDISM

In the talk we will discuss such complications and use cases to show how to avoid missing any!

Just send them home with a bag of kidney diet?

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Do you consider diet a treatment? A medication? We are perhaps guilty of not thinking of food in this way. However, when it comes to CKD diet is the ONLY intervention that has, thus far, been shown to prolong life in cats with CKD. Two studies have shown great improvements in survival with diet:

- Elliot et al (2000) showed that cats fed a renal diet live 2.4 times longer than those fed a normal diet (633 days versus 264 days)
- Ross at al (2006) showed that cats with CKD followed for 2 years on the renal diet had no uraemic crises or died, whereas the other group fed a normal diet suffered 26% a uraemic crisis and 22% died from CKD

So diet is important! To maximize compliance, think about:

- Making sure your clients realise the importance of diet, considering it as a treatment, not just food
- Introduce diet at the latest stage 2 CKD, so it is better accepted before any decline in appetite
- Do not introduce diet when the cat is unwell or hospitalised, it is tempting to put renal diet in the cage with a renal case but now is not the time
- Offer owners a 'menu' of different diets, not just one brand, and a combination of dry and wet, cats may change their preferences day to day
- Slow introduction, offering alongside the normal diet usually better accepted than mixing new and old foods
- Follow up with the client – how are they getting on? A nurse could call the client after a few days
- Use appetite stimulants if needed to get the cat eating the diet (mirtazepine)
- Feed as only part of the diet if the cat is not eating enough (regular weighing and BCS assessment) as it will still be of benefit
- Consider phosphate binders for cats who refuse the diet
- Consider tips such as use of correct bowl type (shallow, flat, ceramic) and warming food
- Even discuss methods of offering food – location, leaving for a short time before removing.

Appropriate use of angiotensin converting enzyme inhibitors (ACEi) and angiotensin receptor blockers (ARBs)

A lot of attention recently has focused on the use of drugs such as ACEi and ARBs to ameliorate the negative effects of the angiotensin on the kidney and reduce proteinuria. There are a few facts to think about then reaching for such medications.

- Proteinuria is classified by IRIS as negative if the urine protein creatinine ratio is <0.2, borderline at 0.2-0.4 and elevated at >0.4. A UPC is needed for quantification and a dipstick is not enough. A dipstick may exclude proteinuria if finances restrict assessment of a UPC, then if positive ideally UPC is measured.
- Studies have shown that both benazepril and telmisartan reduce proteinuria in cats with CKD
- The majority of cats with CKD are NOT proteinuric, in this species the disease is more tubulointersititial than glomerular, hence less protein loss into the urine
- Proteinuria IS associated with a poorer prognosis, so the higher the UPC the shorter the lifespan of cats with CKD
- Studies have not shown a survival benefit for cats with CKD treated with ACEi

So it is currently recommended that ACEi or ARBs are used in cats with a UPC of greater than 0.4 (and clinical stable, having excluded urinary tract inflammation and infectrion). They may have a benefit for cats with a UPC of 0.2-0.4 BUT this has not yet been proven in studies. ARBs are at least as good as

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ACEi based on current research. ARBs have the potential benefit of preventing a phenomenon of ACE escape where angiotensin 2 is produced via other mechanisms other than using ACEs.

Comorbidities – the cat with more than one condition!
Older cats collect diseases. They prefer to add one every few years in my experience! So any other cat diagnosed with a condition should be investigate for another, as the effect of managing one will be negated by the untreated disease. For example we know that 90% of cats over 12 years of age will be affected by osteoarthritis, and that many of these cats will also have dental disease. Some common combinations are discussed below.

The cat with CKD and hyperthyroidism
These two conditions are commonly diagnosed together, but raise challenges regarding diagnosis and management. A recent study reported that 14% of hyperthyroid cats had pre-existing CKD at diagnosis. I think it is important to fully assess each patient as an individual before deciding on a treatment plan. Firstly, it is worth thinking about how the two interact together. Hyperthyroidism and CKD have a complex relationship. Hyperthyroidism increases the GFR, and may actually cause damage to the kidney via glomerular hypertension, resulting in tubulointerstitial damage, fibrosis and progression of CKD. Hyperthyroidism via its increase in GFR also masks CKD, falsely lowering creatinine into the reference range in some cases. Both conditions cause a reduce urine SG, and both have been associated with hypertension.

Specific issue include:

- Diagnosis of hyperthyroidism: CKD may reduce the thyroxine (T4) into the reference range (sick euthyroid syndrome)
- Hyperthyroidism may lower creatinine (and SDMA) via the increase in GFR
- Free T4 may be falsely elevated by diseases such as CKD
- Importantly cats with both conditions are prone to urinary tract infections and this should be tested for as a priority as infection may be clinically silent. A simple in house sediment exam is cheap and should be routinely performed. There are odd cases where even the sediment is inactive but bacteria are cultured – but this is uncommon. Ideally bacterial culture and sensitivity is performed.

However, here are a few helpful tips:

- Cats with CKD and hyperthyroidism with a normal T4 will have T4 in the upper reference range, above 30nmol/l.
- Cats with CKD and a T4 less than 30nmol/l are extremely unlikely to have hyperthyroidism
- Cats with CKD and a falling creatinine should be assessed for hyperthyroidism
- Both groups have reasons to have hypertension and should have their BP measured

Other tests can be used to help make the diagnosis such as measurement of thyroid stimulating hormone (TSH, low in cats with hyperthyroidism), and thyroid scintigraphy although this is not widely available.

When staging a cat with CKD, hyperthyroidism can elevate urea (due to food intake), and lower creatinine, meaning staging must be postponed until the hyperthyroidism is controlled. Similarly SG will be low in both conditions. Hyperthyroidism may also result in proteinuria, that resolves with treatment of the hyperthyroidism.

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Treatment wise historically it has been thought better to only partially control the hyperthyroidism as full return to euthyroidism may result in elevations in urea and creatinine. However, being an uncontrolled hyperthyroid is not pleasant for the cat clinically, and there is the possibility that the increased GFR is further damaging the kidneys. Are we merely making ourselves feel better when we look at the lab results?

When hyperthyroidism is treated, the GFR may lower by as much as 50%, in some cases unmasking, or worsening signs of CKD. The CKD was however, already there and it is important owners understand that the treatment of the hyperthyroidism has not caused the CKD.

Unfortunately it is not possible to predict which cats with hyperthyroidism have CKD (i.e. if non azotaemic prior to diagnosis). Urine SG, biochemical parameters and haematological variable have been assessed and failed to predict the outcome of azotaemia. SDMA has not been tested in this situation, it may be of benefit and certainly a cat with hyperthyroidism and an elevated SDMA may have CKD.

Ideally before electing a permanent solution for the hyperthyroidism (radioiodine or surgery) cats are treated medically and the urea/crea reassessed when the T4 is normal to allow assessment of renal function, and to lower T4 more gradually to avoid a crisis. Importantly re check renal parameters after 2-3 weeks of treatment for hyperthyroidism. I would still recommend treatment however, and if renal parameters are stable (even in a cat with CKD) radioiodine can be considered. It is usually only patients in higher stage CKD that cannot tolerate being euthyroid.

Monitoring of the cat's clinical condition, particularly body weight, appetite, and demeanour should be a priority when balancing these 2 conditions.

CKD and osteoarthritis – treatment options

This combination of conditions is highly likely to be underdiagnosed. Consider the figures of over 90% of cats (radiographically and on PM) over 12 years of age having evidence of OA – then the prevalence of CKD in cats being over 50% (higher in older cats) - are you missing cases of OA in cats with CKD and visa versa?

A recent study (Marino et al, 2014) noted a that in a group of cats with degenerative joint disease (DJD); 68.8% had CKD as well. This study interestingly noted a CKD prevalence of 50% in a group of randomly selected cats from a practice database.

Certainly there is a massive undertreatment of OA in cats with CKD (and cats without). So how do we manage pain in cats with CKD?

The question is often, can we used NSAIDS in cats with CKD. The answer is yes and no, two studies have shown that meloxicam can be used without deterioration in renal function in groups of cats with CKD. (Gowan et al, 2011, 2012). These studies used lower doses of meloxicam: 0.02mg/kg SID and there is concern this dose will not be adequate to control pain. Owners however do report that these doses are associated with increased mobility and return to other normal behaviours and further studies have shown the effectiveness of doses of 0.01-0.03mg/kg SID. Interestingly in one study cats on long-term meloxicam actually showed an improvement in renal function, for unknown reasons.

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Important factors when considering prescribing NSAIDs to cats with CKD include:

- Do not use NSAIDs in cats with CKD that are not stable
- Do not use in cats with hydration deficits
- Titrate to the lowest possible dose and assess effects using questionnaires
- Encourage food and water intake at all times to maintain hydration (have an owner fact sheet and specific advice)
- Monitor renal function and for side effects
- Ask owners to sign a disclaimer as this is off license use, most owners are happy to do so once they understand the risk-benefit
- Advise owners not to give meloxicam if the cat is at all unwell or not eating

Do not underestimate the benefit of other factors is making cats with OA more comfortable such as environmental management changes. Other strategies include:

- Nutraceuticals such as omega 3 and glucosamine/chondroitin: remember the analgesic effect is minimal and these are not a substitute for other analgesics but they may help some cats.
- Weight reduction: obesity may not cause OA but it may contribute and is worth addressing. Even a 6% weight loss has been reported to be associated with improved quality of life.
- Environmental modifications: improving access to resources, reducing stress, interaction and exercise can all make a big difference.

Alternative analgesics have not been fully investigated. Tramadol is associated with side effects and may be bitter to administer. Gabapentin has been used anecdotally but more research is required.

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References

Queen EV, Marks SL, Farver TB. (2012) Prevalence of selected bacterial and parasitic agents in feces from diarrheic cats and healthy control cats from Norther California. *J Vet Intern Med* 26: 54-60.

Paris JK, Wills S, Balzer HJ et al (2014) Enteropathogen co-infection in UK cats with diarrhoea. *BMC Veterinary Research* 10: 13

Elliott J, Rawlings JM, Markwell PJ, Barber PJ. Survival of cats with naturally occurring chronic renal failure: effect of dietary management. *J Small Anim Pract*. 2000;41(6):235–242. 6.

Ross SJ, Osborne CA, Kirk CA, Lowry SR, Koehler LA, Polzin DJ. Clinical evaluation of dietary modification for treatment of spontaneous chronic kidney disease in cats. JAVMA. 2006;229(6):949–957.

Marino CL, Lascelles BDX, Vaden SL et al. Prevalence and classification of chronic kidney disease in cats randomly selected from four age groups and in cats recruited for degenerative joint disease studies. J Fel Med Surg 2014; 16: 465-472

Gowan RA, Lingard AE, Johnston L, et al. Retrospective case-control study of the effects of long-term dosing with Meloxicam on renal function in aged cats with degenerative joint disease. J Feline Med Surg 2011; 13: 752–761. 37

Gowan RA, Baral RM, Lingard AE, et al. A retrospective analysis of the effects of Meloxicam on the longevity of aged cats with and without overt chronic kidney disease. J Feline Med Surg 2012; 14: 876–881.

Feline cholangitis: a necropsy study of 44 cats (1986-2008), Callahan Clark et al, JFMS 2011 13: 570-578

Pancreatic surgical biopsy in 24 dogs and 19 cats: postoperative complications and clinical relevance of histological findings.

Pratschke KM[1], Ryan J, McAlinden A, McLauchlan G.

Hart, M. L., Suchodolski, J. S., Steiner, J. M., *et al*. (2012) Open-label trial of a multi-strain synbiotic in cats with chronic diarrhea. *Journal of Feline Medicine and Surgery* 14, 240–245

Lalor S and Gunn-Moore D. Effects of ronidazole and probiotic therapy in cats with Tritrichomonas foetus-associated diarrhoea. *J Fel Med Surg* 2012; 14: 650-658 (abstract)

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