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From the Director

News

Large

Sudden death of cattle due to arsenic poisoning
Peter Launders, Cooma Veterinary Centre

Wildlife

Multi-local osteomyelitis in a Bearded Dragon – WINNER
Martin L Whitehead, Chipping Norton Veterinary Hospital, UK

Small

Christmas comes late!
Ellie Atkinson, Castle Vet Clinic, UK

Increased incidence of an inherited neurodegenerative disease (RCL or CL) in Border Collies – WINNER OF BEST VIDEO
Georgia Child, University Veterinary Teaching Hospital, Sydney & Amy Lam, Small Animal Specialist Hospital

Controversy Corner: Puppy vaccination schedule with Protec G3
Marco Vicent, Ballarat Drive Vet Clinic

Proliferative and necrotising otitis externa in a young cat – WINNER
Nick Lloyd, Paradise Veterinary Hospital

Sinus tachycardia and possible central diabetic insipidus in a Yorkshire Terrier with pancreatitis
Yuan-ye Lien, Hong Kong

Seaver’s Slide’ saves the day! – WINNER
Dave Goodwin, Sussex Inlet Vet Surgery

’saffy’ and Hypothyria
Geoff Haynes, North Croydon Veterinary Clinic

Prostate tumour in a 12-year-old beagle
Sally-Ann Williams, Auchenflower Veterinary Clinic

Feline hypernephrosis
Sally-Ann Williams, Auchenflower Veterinary Clinic

Flax-related anemic crisis in a young kitten
Natalie Burke, RSPCA NSW

Use of dog blood in a Felv+ positive cat
Karina Graham, North Shore Veterinary Specialist Centre

Management of chronic canine hypophosphatemia – MAJOR WINNER
Hvirghna Grice, Inverell Veterinary Clinic

Comment courtesy of: Sue Foster

Gastroenteritis and pneumonia
Eamonn Lim, Peakhurst Veterinary Clinic

How to deal with concurrent pancreatitis and diabetes in dogs and cats
Linda Freeman, Animal Diabetes Australia at Brolina Veterinary Clinic

To bleed or not to bleed? – That is the question...
Aimee Saunders, Oak Flats Vet Clinic

Interesting websites and articles on lipid research
Karen Seinels, Perth & Hugh Bain, Bateau Bay Veterinary Hospital

Isospora causing diarrhoea and weight loss in hand-reared kittens – WINNER
Nathalie Dowgyar, National Cat Centre, UK

What’s YOUR diagnosis?

Answer to C&T No. 5176 (Dec 2011)
Another unusual manifestation
Graeme Allan, Veterinary Imaging Associates

What’s YOUR Diagnosis? – CO-WINNER BEST PICS
Amy Lingard, The Cat Clinic

What’s YOUR diagnosis?
Answer to: Rice crispies: C&T No. 5142 (Sept 2011)
Jim Euchl, www.felipedia.org

Replies and Comments

APVMA encourages vets to report adverse product experiences. Reply to C&T No. 5182 page 44, 5183 page 46, 5187 page 48 in December Issue 266

Australian Pesticides and Veterinary Medicines Authority

Ethical dilemmas – pedigree dog breeding
Reply to C&T No. 5185

Margaret Thornton, West Cassowary Veterinary Hospital

Comment on: Use of mirtazapine in feline medicine (C&T No. 5181)

Martin L Whitehead, Chipping Norton Veterinary Hospital, UK

Perspective No. 89

Clinical Review: Non-infectious inflammatory ONS disease in the Dog

Dr Amy Lam, Small Animal Specialist Hospital

Authors’ views are not necessarily those of the CVE

Control & Therapy Series – 266 MARCH 2012

Australia’s Leading Veterinary Forum
Welcome to the first edition of C&TS for 2012. You will have noticed that our front cover shows Jenna O’Grady Donley with her mentor Robert Johnson, who has written a lovely tribute to Jenna on page 6. The accidental death of one so young and talented always comes as a shock.

The CVE held two events in February, with a very successful cattle workshop at the Camden campus of the University of Sydney early in the month and the Feline Conference at the Sydney campus two weeks later. The cattle workshop was the first of its kind conducted by the CVE, with an intensive 4 day program designed by Ian Lean to suit both beef and dairy cattle vets, who were drawn from all states of Australia and from as far away as Kununurra and New Zealand. John House and Allison Gunn, from the Livestock Services Unit at Camden, were critical to the success of the workshop as they arranged the logistics of teaching 34 veterinarians of varying skill levels the practical and didactic components of the workshop.

The Feline Conference was well attended and the feedback from participants was very positive. The two key speakers were enthusiastically received as were all the Australian-based supporting presenters. Dr Gary Norsworthy from San Antonio in Texas gave both informative and practical lectures which had masses of useful take-home messages for practitioners. Professor Jane Sykes from UC Davis (an ex-pat formerly from Melbourne) gave a series of fascinating lectures, with the latest information on infectious diseases, adverse drug reactions and bacteriologic resistance.

Our next major conference will be held offshore at Phuket in Thailand. This conference will feature 4 days of endocrinology with David Church and Tom Graves the main presenters, who will be supported by Jill Maddison. This will be a fantastic conference, so book early and plan your holiday around this event.

As usual there will be many workshops and seminars held around the country this year, as well as TimeOnline courses and webinars. Many are advertised in this edition of C&TS or can be found on the CVE website. There will be something for everyone and we feel that as usual our emphasis is on providing high quality education with practical information of immediate use to all of our customers.

There have been a number of recent awards honouring people associated with the CVE.

Dr Steven Holloway was awarded the 2011 T G Hungerford Award from UC Davis (an ex-pat formerly from Melbourne) gave a series of lectures, while Bob Kline from the University of Sydney Veterinary Teaching Hospital.

In April 1993 the University of Sydney was informed that the Post Graduate Foundation in Veterinary Science – now the CVE – was a significant beneficiary of a bequest from Valentine Eunice Margaret Victoria Charlton. The primary objective of this bequest is to provide for ongoing research and education in feline medicine and welfare with a particular emphasis on feline respiratory diseases.

As trustees of the bequest the PFG aims to ensure the future longevity and perpetuity of the fund by careful investment and preservation of the capital base. The PFG will also ensure that all expenditure of the income or requests for funding uphold the express wishes of the late Valentine Charlton.

In 2011 interest from the Valentine Charlton Bequest was used to fund:

- a Caretel MAX – 128x64-bit Multi-Parameter Monitor with invasive Blood Pressure Monitoring for use in the Sydney University Veterinary Teaching Hospital, Camden; and
- an Olympus Digital Camera with associated software for use in the Veterinary Pathology area of the university.

While this equipment will be used to improve the health and well-being of animals in the hospital, they will also be used to develop learning objects to be used not only in the Faculty but also in courses run by the CVE.

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STOP PRESS *** STOP PRESS!
Dr Graeme Allan awarded DVSc

We were also informed, just before this issue went to press, that Graeme – co-tutor of our Diagnostic Imaging Distance Education program with Robert Nicoll – has been awarded a DVSc for clinical research, thus confirming his status as Australia’s foremost leader in veterinary diagnostic imaging.

This is particularly significant as we understand that this is the first time a vet has been so honoured. Watch this space for the full story in a future issue.

CONGRATULATIONS FROM THE CVE STAFF, COUNCIL AND COMMUNITY

We offer our heartfelt congratulations to both Boyd and Graeme on their well-deserved recognition. The staff and council at the CVE are very proud of our long-term association with veterinarians/educators of this calibre and these Awards have only confirmed what all our Distance Education Participants who were lucky enough to have enrolled in their courses have always known – learning under Boyd and Graeme’s tutelage has always been a true privilege.

Note: Both Graeme and Boyd are the recipients of the T G Hufnerford Award (in 1993 and 2005 respectively), the highest award the CVE PGF can confer and which recognizes excellence in continuing veterinary education. The T G Hufnerford Award was instituted by the Council of the Post Graduate Foundation in Veterinary Science on the retirement of Dr T G Hufnerford OBE who was the first Director of the Foundation. The award was in recognition of his enormous contribution to the veterinary profession and to the Australian community and was first awarded in 1987.

2011 T G Hufnerford Award – Oration

We are delighted to announce that Steve Holloway is the recipient of the 2011 T G Hufnerford Award – see page 6.

Our June issue will feature Richard Mahl’s oration which was delivered as the T G Hufnerford Award Dinner held at The Refectory, University of Sydney on Thursday 16 February 2012. Watch this space!

Dr Douglas Bryden AM - Companion of Charles Sturt University

Former CVE Director Dr Douglas Bryden AM has been made a Companion of Charles Sturt University in recognition of his contribution as a Consultant to the University assuring with the development of the Veterinary program. The program was established to address the declining participation of veterinarians in rural practice, rural communities and the livestock industries and has been an outstanding success.

We will follow up this story in our June 2012 issue but, in the meantime sincere congratulations to Doug from the CVE/PGF community, who benefited enormously under his Directorship and governance.

Other features include the enlargement of Xrays and the ability to ‘roll over’ an article to view additional pertinent material omitted from the print version due to space constraints.

The C&T and Perspective Series is the brainchild of Dr Tom Hungerford, first Director of the PGF (1968-1987), who wanted a forum for uncensored and unedited material. Tom wanted to get the clinicians writing.

‘…not the academic correctness, not the theoretical niceties, not the super correct platitudes that have passed the panel of review… not what he/she should have done, BUT WHAT HE/SHE DID, right or wrong, the full detail, revealing the actual “blood and dung and guts” of real practice as it happened, when tired, at night, in the rain in the paddock, poor lighting, no other vet to help.’

Thank you to all contributors … and more C&T articles and Perspectives needed

Thanks to every author who contributed articles or comments to the Control & Therapy Series (C&T). Without your generosity the Series would cease to exist.

If you have treated a Large Animal, or Papillon, or any Wildlife lately, please write up the case and send it in. We aim to keep the Series broad and interesting.

C&T Series goes live!

Members/Readers of the soft copy version will be delighted to see that the March 2012 issue is in e-book format, allowing for a range of interesting features to be incorporated into the body of the PDF, such as the linking of audio and video with static print articles. Look for this symbol and ‘roll over’ it with your mouse.

Georgina Child and Amy Lam’s article ‘Increased incidence of an inherited neurodegenerative disease (NCL or CL) in Border Collies’ is our inaugural e-article and incorporates a video of ‘Clover’ and an enlarged Slideshow Image of NCL. (Courtesy of Peter Windor & Gauthami Kondagari from OLIVER, © Repro The University of Sydney)

STOP PRESS *** STOP PRESS!

Graeme Allan (second from left) teaching at Goyang in 1983.

Other features include the enlargement of Xrays and the ability to ‘roll over’ an article to view additional pertinent material omitted from the print version due to space constraints.

This is a wonderful advance for the Series and we encourage our contributors to embrace this opportunity by taking accompanying videos for their case articles and supplying Xrays and other visuals whenever possible.

PRINT copy recipients are invited to go to our website www.cve.edu.au/cvebookstore to view our e-book version.

Winners of Best Article in this Issue

Major Prize
Entitling the recipient to one year’s free membership of the CVE

• Virginia Grice: Management of chronic canine hypothyroidism

CVE Publication Prize Winners

• Martin Whitehead: Multi-focal oculomyalgia in a Bearded Dragon
• Nick Lloyd: Progeria and necrotising otitis externa in a young kitten
• Dave Goodwin: ‘Steaver’s Slide’ saves the day!
• Natalie Burke: Feline related anemic crisis in a young kitten
• Nathalie Dowgray: Acropora causing diarrhoea and weight loss in hand-reared kittens

Co-Winners of Best Pictures

Entitling the recipients to a free DVD from the CVE’s Vetbookshop

• Samantha Lam: Ophthalmoscopy and possanornithine
• Amy Lingard: What’s YOUR diagnosis?

Winner of Best Video

Entitling the recipient to a free DVD from the CVE’s Vetbookshop

Georgina Child & Amy Lam: Increased incidence of an inherited Neurodegenerative disease (NCL or CL) in Border Collies

Contact

For further information on the C&T Series contact Lisa Churchward, CVE Editor cve.publications@sydney.edu.au or (02) 9351-7979.

Increased incidence of an inherited neurodegenerative disease (NCL or CL) in Border Collies is our inaugural e-article and incorporates a video of ‘Clover’ and an enlarged Slideshow Image of NCL. (Courtesy of Peter Windor & Gauthami Kondagari from OLIVER, © Repro The University of Sydney)
Tribute to Jenna O’Grady Donley

By Robert Johnson – Jenna’s final year mentor and friend

Jenna Donley from the University of Sydney BVSc graduating class of 2011 passed away in early December as the result of an accident in Borneo. Jenna was not only a brilliant student but a most kind and caring person. She had a great future in the veterinary profession, particularly in the fields of rural mixed practice and wildlife and zoo medicine. Her Honours thesis on renal disease in captive non-domestic felids was awarded one of the highest marks ever in the University of Sydney Veterinary Faculty. A trust has been set up by the University of Sydney to ensure that the work that Jenna started will go on. She was awarded the University Medal for her academic efforts, which was collected posthumously by her very courageous mother.

Jenna’s passion for zoo and wildlife medicine led her to complete clinical rotations at Taronga Zoo and Adelaide Zoo. In addition, Jenna poured her energy and enthusiasm into her fifth year research project on characterising renal disease in non-domestic felids. She was successful in winning the Morris Animal Foundation Student Scholarship for her honours project, competing against student researchers from around the world and was due to present this work in Orlando Florida in March 2012. Jenna worked closely with her supervisor Jacqui Norris, Richard Malik and Joanna White on this project, as well as the generous and dedicated staff at Taronga (Sydney) and Taronga Western Plains Zoo, where the project was based. The Morris Animal Foundation has now given Jacqui permission to present Jenna’s work on her behalf. Jacqui and her team will continue to present these research findings to conferences locally and internationally to give greater awareness of the urgent need to move forward in providing evidence based solutions to a remarkably common group of diseases in some of our most endangered animal species.

As her final year mentor I was well aware of Jenna’s focus and commitment to being a zoo veterinarian. She did however realise that it was very worthwhile to gain clinical experience in general practice, especially rural mixed. We also discussed the benefit of various postgraduate study paths in zoo medicine and related fields. Jenna wished to continue her research interests as well as gaining valuable practice experience. I soon realised that she was the sort of person that when given advice would act upon it, so it had better be good! Our contact throughout the year was by email, SMS or face-to-face meetings. Jenna also spent a 4 week rotation at Taronga Wildlife Hospital. Throughout the year Jenna managed to complete her Honours thesis, study for her final year exams and achieve a wide variety of clinical experience. She also made time for her much loved family and her life partner Matt. She will be sadly missed but her memory and her devotion to the welfare of captive and wild animals will endure.

For information regarding how to make a gift in memory of Jenna O’Grady Donley, you can download the Gift Form at: sydney.edu.au/supportsydney/how/memorial_gifts

CVE Clinical Competency AWARDS FOR 2011

Each year we take great pleasure in inviting each Australian and New Zealand Faculty of Veterinary Science to contact us with the name for a recipient of the Centre for Veterinary Education Clinical Competency Award. This prize of $1,000 worth of CVE publications and/or other CVE products (Courses etc) is offered to the graduating student who has been recognised by the Faculty as being the most competent in clinical skills over the clinical portion of his or her undergraduate years. We are delighted to award the prize to the following graduates:

Charles Sturt University
Rhys Duncan

Murdock University
James Haberfield

University of Melbourne
Elise Harding

University of Queensland
Jula Dowsett

University of Sydney
Penelope Brown

Note: The Massey University recipient will be announced in our June 2012 issue.

2011 T G Hungerford Award

The 2011 TG Hungerford Award was presented to Dr Steven Holloway at the Annual Dinner on 16th February 2012.

Steven graduated from the University of Sydney in 1983 and worked for two years in private practice in Sydney followed by a two-year medical internship at the University of Melbourne, after which he was awarded an MVS and obtained membership of the ACVSc (Felina Medicine). He then undertook an internal medicine residency at the University of Florida, followed by two years as a clinical instructor at the University of Florida. In 1990 he became a Diplomate of the ACVIM (SAM). Steven returned to Australia in 1994 studying equine herpesvirus infections with Professor Michael Studdert and was awarded a PhD from the University of Melbourne in 1998. He lectured at the University of Sydney in 1998-1999 and was a Senior Lecturer and Associate Professor of Small Animal Medicine at the University of Melbourne 1999-2009. Steven is currently a registered specialist in small animal medicine and works at Advanced Vetcare in Melbourne.

With his outstanding contribution in the arena of veterinary education, the Centre for Veterinary Education Council is honoured to present Steven Holloway with the 2011 T G Hungerford Award.
Sudden deaths of cattle due to arsenic poisoning

C&T No. 5200

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102 Darling Street
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Peter Launders
cattle due to arsenic

Large Animals

Clinical scenario

Further to Adrian Bryant’s article and Peter Windsor’s comment (C&T No. 4975 from March 2009) I have also experienced cattle dying suddenly due to ingestion of arsenic. This case report goes through the diagnostic process that led me (finally) to a definitive diagnosis of arsenic toxicity.

On the day after Boxing Day 2009 I received a call from a local producer as a number of steers on agistment at his property had died suddenly. A mob of 100 2-year-old Angus steers had arrived 10 days previously from the Hunter Valley. Ten steers were dead by the time I arrived at the property. Clinical signs displayed before the deaths included maring or aggression, convulsions, ataxia and collapse. Death occurred in under 1 hour of the development of clinical signs. The steers had been vaccinated against clostridial diseases, but lungs grossly normal), botulism (but tongues not protruding to necropsy), there was a quantity of dirt/sand present in the pericardial sac, the liver was pale (possibly not totally liver damage). The tentative diagnosis was enterotoxaemia, possibly triggered by the change in diet from the Hunter Valley property to the agistment property. Enterotoxaemia is caused by a clostridial organism that is normally present in cattle. Disease and death occurs when a number of organic acids and the epsilon toxins produced enter the bloodstream and cause extensive damage to the animal’s blood vessels. Clinical signs of enterotoxaemia typically include maria, inco-ordination, convulsions, intestinal stasis and death.

Though the steers were vaccinated against clostridial diseases, vaccination may be required on a more frequent basis to prevent enterotoxaemia in certain (high risk) conditions. However, a number of pathological features expected to be seen with enterotoxaemia were not present at necropsy (e.g. small intestinal contents not creamy/yellow; no pulmonary oedema/congestion). The producer was advised to move the remaining steers to another paddock and vaccinate them with ‘5-in-1’ (even though the vaccine is not immediately protective).

Diagnostic possibilities

Differential diagnoses at this stage included nitrate-nitrite toxicity (cloudy weather; but blood not brown), lactic acidosis (but no grain in rumen), lead poisoning (but lowness in kidneys and no lead in dam water) and diarrhoea (consistent with nitrate-nitrite toxicity or enterotoxaemia). The information and evidence continued down through the small intestine and large intestine.

Numerous samples were taken for laboratory analysis: jugular blood, aqueous humour, kidney, spleen, liver, urine, small intestine, small intestinal contents, large intestine, mesenteric lymph node, oesophagus, abomasum and impression smears of small and large intestine. In-house testing of the urine showed the presence of glucose, consistent with enterotoxaemia.

The tentative diagnosis was enterotoxaemia, possibly triggered by the change in diet from the Hunter Valley property to the agistment property. Enterotoxaemia is caused by a clostridial organism that is normally present in cattle. Disease and death occurs when a number of organic acids and the epsilon toxins produced enter the bloodstream and cause extensive damage to the animal’s blood vessels. Clinical signs of enterotoxaemia typically include maria, inco-ordination, convulsions, intestinal stasis and death.

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The diagnostic plan was dependent on the laboratory results with further tests being requested as the most likely differentials were ruled out:

- **Enterotoxaemia (Clostridium perfringens)** – organisms identified on intestinal smears but negative for epsilon toxin
- **Cyanobacteria (blue-green algal bloom)** – negative in intestinal contents
- **Nitrate-nitrite toxicity – negative in aqueous humour fluid**
- **Pathology results:**
  - Liver – severe peracute multifocal necrotizing hepatitis
  - Kidney – severe hyperaque mucoid tubular necrosis

Based on the histopathology results, the EMAI pathologist was leaning towards a **bacterial or viral infection** in the liver and kidneys.

- **The pathologist attributed the erythema of the omasum and abomasum to congestion from a shock organ reaction, rather than any pathology.**
- **Further discussion with colleagues, the pathologist advised that viral infection was unlikely to be the cause.**

Though the liver damage appears quite similar to that seen with herpesvirus in horses, herpesvirus in cattle does not typically cause liver damage.**

- **Bacterial culture:**
  - **Negative for Salmonella**
  - **Positive for Aeromonas sobria (likely to be an incidental finding as this organism is primarily a pathogen of aquatic species not mammals; interestingly, the liver pathology seen in fish with Aeromonas sobria infection is similar to that seen here)**

A couple of other specific diseases were considered but ruled out:

- **Black disease (Cestodrum novyi)** – possible as liver fluke present in the Hunter Valley; unlikely as no inflammatory changes in the liver
- **Lactic acidosis – no supporting evidence** (no grain in rumen/ faeces, rumen fluid not acidic, expect to see range of syndromes with some less severely affected, not just all dying suddenly)

A breakthrough!

At this stage, Andrew Thompson from EMAI, a different pathologist who had taken over the case, suggested testing for arsentic and lead toxicity.

- **Lead poisoning – negative in kidney**
- **Arsenic toxicity – positive in liver (>1mg arsenic/kg)**

Clinical signs of arsenic toxicity include diarrhea, dehydration, abdominal pain, weakness, convulsions and cardiovascular collapse with rapid onset progressing quickly to death within hours. On reflection, the abomasal ulceration should perhaps have led us to consider arsenic toxicity earlier. However, the second necropsy did not show this almost pathognomonic sign and it is unusual to see liver necrosis with arsenic toxicity. While the diagnostic process in this case took almost 3 weeks to reach a conclusion, the early actions taken (primarily moving stock to a different paddock) were successful in minimising further stock losses by restricting exposure to the toxin.

Due to the presence of arsenic and the subsequent restrictions on selling or moving the cattle, the local LHPA District Veterinarian took control of the case to identify the source of the arsenic and advise on movement restrictions. A property inspection identified a distinctive ‘chemical’ smell in a small shed in the initial paddock with evidence that the cattle had licked the floor cleaning to try getting the arsenic salts, and chewed plastic bales. Soil tests from inside and outside the shed revealed arsenic levels of 2200mg/kg soil and 140mg/kg soil respectively. The producer was advised not to slaughter any of the cattle for at least 72 days to minimise the risk of any food safety/residue issues. The producer was advised to excavate the area and bury the contaminated soil with the carcasses.

The producer had purchased the property in 1991 and had not used arsenic in that time. He contacted the previous owner who had no recollection of using arsenic since it was taken off the market in 1992. However, he did recall having used arsenic for a sheep plague dip at some stage. Thus, the arsenic had been present undisturbed in the shed for almost 30 years.

Hopefully, this case reinforces the key points that arsenic persists for a long time in the soil/environment and that it should still be considered as a possible cause of sudden death in cattle. Any key point to take away (and to remind producers) is that the process of investigating and diagnosing the cause of sudden death can be long, frustrating, expensive and often unrewarding as there may be many possible causes which will require serial rounds of laboratory testing to reach a definitive diagnosis.

Figure 1. Abomasal erythema and ulceration

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Control & Therapy Series – 266 MARCH 2012

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Multi-focal osteomyelitis in a Bearded Dragon

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Martin, generously taking pics for the C&T Series.

Martin has won a free place at our upcoming Pet Lizards and Snakes Webinar – see below for details

Bearded dragons (natives of Australia) are the pet lizard most commonly seen in our UK practice. Inevitably, due to both the incomplete state of veterinary knowledge for reptile species and to financial constraints (they are often children's pets), we often do not reach a definitive diagnosis. Among the most frequent diagnoses made for systemically ill 'beardies' are metabolic bone disease (often with pathological fractures), preovulatory ovarian stasis and osteomyelitis. The 2.5-year-old male beardie pictured was a case of advanced osteomyelitis. The husbandry was appropriate and he was in good body condition, but he presented with multiple limb swellings; both forefeet, right hind foot, left stifle and left hind second toe. Despite having first noticed swollen toes and reduced activity 4 months previously, and further swellings appearing in the meantime, the owner had not sought veterinary attention because the patient had appeared bright otherwise, was eating well and had not lost weight.

The conscious whole-body dorsoventral radiograph (Figure 1) demonstrated multiple areas of bone lysis including both carpi, both tarsi, the left stifle and some toes. A poor prognosis was given and euthanasia recommended but the owner was keen for 'something to be done' so the beardie was briefly anaesthetised (intramuscular medetomidine and ketamine to allow intubation) using a lolly stick taped to the head to stabilise the endotracheal tube. A Doppler blood pressure device was used to monitor the heart and a lolly stick taped to the head to stabilise the endotracheal tube (Figure 2). A blood sample was also taken and the beardie given meloxicam and enrofloxacin while awaiting the culture results. The blood sample revealed raised uric acid indicating renal failure. The white-cell count was in the normal range. The culture grew only a coagulase-negative Staphylococcus – which I judged likely to be a contaminant. As there was, unsurprisingly, a poor response to the analgesia and antibiotics the bearded dragon was euthanised about a week later.

Obviously, if there are multiple sites of osteomyelitis, there may also be multiple undetected sites of soft-tissue infection. I did not get to do a necropsy examination in this case, but the renal failure may well have been secondary to the septicaemia that presumably 'seeded' the multiple sites of osteomyelitis. In most cases in which fine-needle aspirates are taken prior to antibiotic treatment, culture does grow a likely causative organism, but a substantial minority yield no growth or a likely contaminant, as in this case.

For beardies and other reptiles with radiographic evidence of osteomyelitis, if the history suggests that the lesions have not been present for too long (how long is 'too long'? – my current cut-off is a few weeks) and I can find only a single lesion on clinical examination and radiography, I recommend treatment and use analgesia and many weeks of systemic antibiotics, preferably on the basis of culture and susceptibility results (usually ceftazidime, enrofloxacin or amikacin) and I have had some good responses. However, if, in this case, there are multiple lesions that have been present for more than a few weeks I strongly encourage euthanasia on welfare grounds as my success rate with such cases has been very poor even in the absence of identified concurrent illness. However, as in this case, no matter how bleak a prognostic picture we paint, owners sometimes need 'something to be done' before they will consider euthanasia. Often the same owners will have delayed visiting the vet for weeks or months despite their reptile having obvious illness, resulting in the pet being beyond help when we first see it.

The lack of growth other than a coagulase-negative Staphylococcus does not rule out organisms that require special staining or culture, such as Mycobacteria or Chlamydias; these have been reported in cases of radiographic lysis in the joints and bones of lizards'. Fungi could also be a possibility. As the owner did not allow necropsy and histopathology, we can only guess at the aetiology.

Multi-focal osteomyelitis – see below for details

-- Selection criteria

• The lack of growth other than a coagulase-negative Staphylococcus does not rule out organisms that require special staining or culture, such as Mycobacteria or Chlamydias; these have been reported in cases of radiographic lysis in the joints and bones of lizards'. Fungi could also be a possibility. As the owner did not allow necropsy and histopathology, we can only guess at the aetiology.

• As the Uric Acid (UA) levels were raised, this would support profound renal damage, but UA only rises when there is severe renal damage. A better indicator of renal disease is the Calcium/Phosphorus ratio. In a normal reptile, the ratio is >1, while in a case of renal disease this falls to <1. This is often the first biochemical change seen in renal disease. Hyperkalaemia may also be a sign of acute renal disease. Were any of these changes present? Unfortunately, renal disease has to be approached with a severe status before any biochemical signs are detected in the blood. Reptiles are quite hardy and do not...
show clinical signs until well into the disease process, so early stage renal disease is usually undetected.

- **Metabolic Bone Disease – particularly Renal or Nutritional Secondary Hyperparathyroidism**: It is difficult to be certain when examining the radiograph but there may be generalised demineralisation of the skeleton. As well, there may be facial structure changes (a more rounded and shortened face) that would be typical of Metabolic Bone Disease – the angle of the image makes this difficult to assess fully – Martin, were these present?

- It is also possible that this beardedie also had Renal Secondary Hyperparathyroidism (RSHP) – a result of chronic renal failure, rather than the more common Nutritional Secondary Hyperparathyroidism (NSHP). Although NSHP cannot be completely ruled out – the fact that the beardedie was on a good diet when Martin queried the owner does not mean that this has always been the case. It may be useful to discuss this case with the owner to use a more detailed history: of sunlight exposure, actual dietary components provided and the amounts the beardedie ate; Is the beardedie by itself in the enclosure or is it sharing with another lizard (this is always a nightmare – one eventually misses out on vital heating and dietary requirements); temperature and light regimes – use questions such as these to explore all aspects of the diet and husbandry more thoroughly, to find any facts that may shed light on this case. In my experience, owners are oft en blissfully unaware of husbandry problems, as they feel they have everything ‘as best as it can be’. This is an interesting case and we all struggle with clients that delay in presenting their animal and then do not allow us to do a thorough diagnostic work up and follow the case to a full resolution. I have seen cases similar to this, as have other reptile veterinarians in Australia and in many cases the aetiology is not exposed. I congratulate Martin for documenting this case such as this to spread the word and to add to our knowledge. In many syndromes we see in reptiles, formal studies have not been done to document the actual changes in knowledge. In many reptile syndromes we see in reptiles, formal studies have not been done to document the actual changes in knowledge. In many reptile syndromes we see in reptiles, formal studies have not been done to document the actual changes in knowledge. In many reptile syndromes we see in reptiles, formal studies have not been done to document the actual changes in knowledge.

**Reference**


**Reply from Martin to Mike Cannon’s comments**

The blood indicators of renal failure in this case were ‘textbook’; raised uric acid and phosphorus with a very low CaP ratio of 0.58, indicating severe renal failure, as Mike explains. I did not measure potassium. The renal failure may have been caused by the infection that produced the osteomyelitis, may have been a pre-existing factor perhaps predisposing to infection, or may have been incidental to the osteomyelitis. Beardedies presenting with renal failure severe enough to substantially increase serum uric acid have usually lost a lot of weight over a few weeks, are inappetant and obviously uncomfortable. As this animal was in good condition and reportedly had been eating well months after the first signs of osteomyelitis, my guess is that in this case renal failure began after the osteomyelitis.

Mike wonders whether this case, as well as having osteomyelitis, has generalised radiographic demineralisation of the skeleton, which would be consistent with metabolic bone disease (MBD). I think it probably does, although as I explain below I am not sure how abnormal that is for a UK beardedie. Judgment here is subjective and, although in many cases demineralisation is blatantly present or absent, in many other cases I cannot be sure if there is significant demineralisation or not. I try to judge these radiographs before looking at blood results to avoid those influencing my interpretation, and I usually take at least 2 exposures with slightly different KV and mA settings, which I then compare to my store of radiographs of previous beardedie cases that I decided did or did not have MBD. Judgment of ‘borderline’ cases is to some extent influenced by the KV and mA settings (that is why I take exposures at different settings) and by size and body condition (amount of soft tissue). There are beardedies with better-mineralised skeletons than the above case, but among all those beardedies that we practice radiographs, the above case does not at all stand out as having poor skeletal mineralisation. Figure 1 shows our ‘best ever’ mineralised beardedie skeleton (big 6 y.o. beardedie that was lethargic and inappetant and that had cystic abdominal masses consistent with neoplasia). To us, this radiograph really stands out as we see very few cases with radiographic bone density approaching this. The animals we radiograph are all ill or injured, but our radiographs of adult beardedies with apparently good husbandry and without blood-biochemical indicators or specific signs of MBD (as opposed to non-specific signs such as lethargy and inappetance which may be related to other illness and/or MBD), show a wide range of radiographic skeletal mineralisation. Some animals with no specific signs of MBD have very deficient skeletal mineralisation – much worse than the above osteomyelitis case – and we confidently diagnose those as having MBD. But what is the lower limit of the ‘normal range of radiographic mineralisation’? Do all but the most radiographically mineralised have MBD? If so, then – despite our diagnosing clinical MBD very frequently – almost every adult beardedie without clinical MBD that our practice has radiographed had ‘subclinical’ MBD. Or, was the skeletal mineralisation of many of them just ‘normal’ for the UK (which is perhaps the same thing)? Until we know better, we treat them as if they have subclinical MBD and so, in addition to any other care, we review husbandry and increase the UV and calcium supply. In the osteomyelitis case above, as already noted, total calcium was a little low and phosphorus raised, consistent with renal failure – but changes with MBD could be similar! I did not think the face was rounded.

As Mike says, MBD can be secondary to renal failure (renal secondary hyperparathyroidism) but in captive reptiles it is more usually secondary to husbandry issues – inappropriate diet (nutritional secondary hyperparathyroidism) and/or insufficient UV light. The important part of the UV spectrum for vitamin D3 production is UVB and there is much discussion concerning the amount of UVB needed, the best type of UV source to use, and how far it should be from the reptile. And it varies with species, of course! MBD secondary to husbandry issues is probably the most common diagnosis for systemically ill beardedies as well as for several other lizard species (young veiled chameleons seem particularly sensitive) and tortoises.

Mike is right to emphasise history taking for reptiles – we have longer consults (20 minutes) for reptiles than for dogs and cats for that very reason. This beardedie had adequate sunlight exposure, and the husbandry was good. However, ‘good’ husbandry in the UK is still a different thing to being in their natural environment under the Australian sun. Beardedies in the UK typically live in a vivarium indoors and, as UV does not pass through glass, they are never or almost never exposed to any natural UV light (and compared to Australia the UK is UV deficient in any case). These days most, but still not all, keepers know that a UV source is needed, but many such lights do not provide as much UV as does the sun. Even indoors in the UK beardedies need supplemental heat. Pet beardedies are usually fed mixed salads/vegetables along with crickets and mealworms and sometimes locusts and waxworms. This is likely to be a restricted diet compared to their diet in the wild. Crickets, mealworms, locusts and waxworms are recommended by pet shops not because they are an ideal food, but because they are easy to grow and supply – beardedies can live on them but they are not optimal. In particular, the calcium content of crickets and mealworms is low and the CaP ratio is very poor. A calcium and vitamin D3 supplement, either sprinkled on the food or by ‘gut loading’ the crickets, helps, and I recommend varying the diet by feeding bugs and earthworms from the garden (safe in the UK provided pesticides are not used, but in some other countries there are bugs which are poisonous to beardedies, such as tsettes in the USA) and pinky mice. However, in the UK, in beardedies, some other lizard species and tortoises it is still relatively common to see advanced MBD in the absence of renal failure even when husbandry appears to be good and, as noted above, I suspect that at least in beardedies the MBD is extremely frequent. These species are just not evolved to live in captive conditions in the UK.

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Increased incidence of an inherited neurodegenerative disease (NCL or CL) in Border Collies

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Veterinarians that have Border Collie breeders as their clients should be aware of this disease and recommend DNA testing for all breeding dogs (males and females) prior to breeding.

Recently we have seen or been notified of 6 Border Collies that have been tested as affected or are showing typical clinical signs of NCL. These dogs were bred by various non-registered breeders and from locations throughout NSW and QLD. Neuronal Ceroid Lipofuscinosis (NCL) or CL is inherited in an autosomal recessive disorder with affected dogs having 2 copies of the abnormal gene. It causes progressive neurologic deterioration from approx 16 months of age and invariably results in euthanasia by 2½ years of age. It is a devastating and untreatable disease and awareness of this disease by veterinary practitioners is important – to recommend genetic testing of all Border Collies prior to breeding in an attempt to reduce the incidence of this disease and to recognise the clinical features of the disease to prevent unnecessary investigations in dogs presenting with the typical signalement and neurologic abnormalities seen in this disease.

Neuronal Ceroid Lipofuscinosis (NCL) or CL has been recognised in Australian Border Collies since the 1980s. With breeding analysis and careful breeding the disease was all but eliminated in the ‘show’ Border Collie population. However, awareness of this disease is poor amongst the breeders of non-registered and ‘working type’ Border Collies. In the 1990s scientists from the University of NSW, including the late Prof Alan Wilson, and the University of Melbourne identified the genetic mutation responsible and published their findings on the genetic defect in Border Collies – an autosomal recessive non-sense mutation – CLN5 gene. This research was supported by the Border Collie Clubs. A DNA test for this mutation has been developed and is commercially available.

Clinical signs
Border Collies with CL typically present with progressive neurological signs with an onset of 15–16 months of age. Affected dogs are typically presented with one or more of the following clinical signs – perceived visual disturbances; hyperaesthesia; starting easily; mild generalised ataxia (clumsy); abnormal behaviour including pacing, head swaying, disorientation, loss of previous training, ‘by catching’ and possibly seizures. Seizures are seen late in the course of the disease and may be partial seizures. Aggressive behaviour change may be seen in addition to other evidence of altered mentation. Once clinical signs are seen they may progress relatively quickly over months. Carrier dogs are neurologically normal and do not have any abnormalities in their lifetime attributable to the presence of 1 copy of the abnormal allele.

Physical examination findings
Dogs tend to be in good body condition, and have no abnormalities on physical examination.

Ophthalmological examination
The menace response may be present or absent, normal dazzle, normal pupillary light reflexes (direct / indirect) and normal palpebral reflex. Retinal exam in Border Collies tends to be unremarkable (other breeds with NCL may have retinal abnormalities).

Neurological examination
Affected dogs with NCL tend to have normal postural reactions, spinal reflexes and cranial nerve function. Variable generalised ataxia is common. Neurological abnormalities tend to be localised to forebrain dysfunction and generally do not have any lateralizing signs. No abnormalities are found on biochemistry profile, complete blood count, electrolytes or liver function testing.

Further investigations
DNA testing kits are commercially available through GTC, Fitzroy VIC (www.animalhealthwork.com.au). Testing requires a buccal swab and results are available within 14 days. This test can reliably identify the CLN5 mutation in affected and carrier dogs. The test is relatively cheap (approx $150). NCL is an autosomal recessive disease. This test identifies affected, carrier and clear dogs.

Background
Ceroid Lipofuscinosis
Ceroid lipofuscinosis is the most common of the lysosomal storage diseases. It is a heterogeneous disease – it can affect various age groups, various organs. Central nervous system dysfunction is usually predominant. Neuronal Ceroid Lipofuscinosis is caused by a genetic abnormality, due to reduced production of specific lysosomal enzymes. The lysosome is an organelle responsible for breaking down cellular waste materials and debris. Lysosomal storage diseases occur when the lysosome cannot degrade the metabolic products into diffusible substrates, thus the products accumulate in the cell. Cells throughout the body are affected. In particular, cells within the central nervous system and the brain especially are affected.

In people, several forms are recognised with different genetic mutations. The disease typically affects infants or juveniles (Batten’s disease) as the metabolic products accumulate in the cells and cause cell death early in life. Occasional adult forms of CL have been identified.

In dogs, NCL is predominantly a disease of purebred dogs. It has been recognised in several breeds and in recent years, DNA analysis has been used to identify specific genetic mutations. There is a differing age of onset in different breeds (less than 1 year to >4 years) and different clinical signs are identified with specific locations (e.g. cortical involvement more severely affected in different breeds). Lysosomal storage diseases are uncommon, but are a very important differential in a list of possible causes when making a neurological diagnosis, particularly (but not only) in juvenile dogs.

Histopathology
Ceroid Lipofuscinosis is identified as autofluorescent inclusions within neurons, and neurodegeneration. Intracytoplasmic inclusion bodies are found within the central cortex with PAS, Luxol fast blue, Sudan Black and Schmorl stains. Subtle inclusion bodies may be found with hematoxylin and eosin staining.

Treatment
There is no treatment for NCL in dogs or people. It is progressive.

Control in Border Collies
Border Collie clubs in Australia, including the Border Collie Club of NSW (www.bcncnsw.com.au), promote CL testing in all breeding dogs. Whereas the registered breeders of Border Collies have been aware of this disease for a long time, non-registered breeders of Border Collies and especially of the ‘working type’ Border Collie, have not been aware and the genetic mutation has remained in the population. This disease is devastating for both the owners of affected pets and their breeders.

It is recommended that any dog suspected of CL undergoes DNA testing. This may prevent unnecessary (and expensive) investigation for other causes of CNS disease. For any Border Collie with results that are consistent with CL, the breeder of the dog should be informed and all related dogs that are not desexed should be tested. Both the sire and dam must be carriers in order to produce affected offspring (or affected – as dogs may be bred from before 16 months of age and before they show clinical signs). Identification of affected dogs and carriers and preventing the breeding of carriers with other carriers will reduce the prevalence of affected dogs. Carrier dogs, although neurologically normal ideally, should not be bred from in an effort to reduce the incidence of the abnormal gene.

The following diagrams show the mating possibilities using the mathematical ratios of Mendel:

Figure 1. Autosomal recessive mode of inheritance.

Figure 2. A screen grab from the video showing ‘Clover’ pictured here with Christine Huynh, a 2011 Sydney University vet graduate. Please go to our e-book version, available at www.cve.edu.au/candtebook to view the accompanying video of ‘Clover’. Clover shared the same dam and sire as Jessie, but was born 8 months previously. When Clover’s diagnosis was confirmed the breeder notified Jessie’s owners who then presented her at the clinic when she showed clinical signs.

Figure 3 & 4. ‘Jessie’, shown above at 13-weeks-old and at 18-months-old.

www.cve.edu.au/
Case history

‘Jessie’ is an 18-month-old FS Border Collie presented with a 2 month history of loss of toilet training and a 1 month history of seizures requiring treatment, a history of being stopped when approached, not responding to previously known commands and, at times, not responding even to her owners’ commands. Her mother had the same behaviour and mild intermittent unsteadiness. No abnormalities were found on physical or neurologic examination apart from the behaviour described. DNA tests of both owners were affected.

The theory

Puppies are more prone to contract Parvovirus than older dogs, therefore vaccinating early minimises the risk of infection. So my recommendation is to vaccinate with Protech C3 at 6, 9 and 12 weeks. I have applied this schedule for several years, and so far I have no knowledge of any dog that has developed Parvovirus (in the following year).

The practice

On the other hand, I consistently see pups vaccinated elsewhere (with Protech C3) on a schedule of 6, 12 and 16 weeks, or variants such as 6-8 weeks, 12-14 then 16-18. While I can see some wisdom in vaccinating after 10 weeks (despite the recommendations of the manufacturer), I cannot see the sense of a 4-6 weeks gap between the 1st and 2nd vaccination. Sadly, one of my customers recently cancelled the appointment for vaccination at 9 weeks of age because the Puppy School trainer at another Vet Hospital told her it was too early.

If the vast majority of pups produce enough Parvo antibodies after the 10 week vaccination, why leave such a big gap between 1st and 2nd dose, contrary to the recommendations? What happens if one day a pup, or worse a whole litter, contracts Parvo say at 11-12 weeks of age? And what if the owner of this litter sues the vet, resulting in a court case? What sound scientific evidence did the vet have for an ‘off the label’ use of the product, which may have been responsible for the infection? Would BI approve of these recommendations?

So, if we are concerned that 10-12 weeks is too early for the last booster, why not give a dose when the next big risk (16-18 weeks) is? What wisdom is there in choosing ‘to be safe’ for the pup’s future wellbeing, and gambling on the initial high-risk period?

Reply courtesy of

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Thank you for the opportunity to respond to Dr Mario Viscardi’s comments.

The registered product information leaflet for Protech C3 does have a suggested primary vaccination program of 6, 8 and 10 weeks. However, veterinarians are encouraged to develop a primary vaccination protocol to suit their clients and local disease conditions. To minimise the risk of infection, pups can be vaccinated every 2 weeks until they pass the susceptible period when maternal antibodies wane; however, realistically, it may be difficult to encourage some pet owners to return to the clinic for multiple visits for cost and convenience reasons. I agree with Dr Viscardi’s suggestion of vaccinating pups more regularly between 6 and 12 weeks as this will give pups another opportunity to respond to vaccination in this critical period and reduce the length of time a pup is left susceptible once maternal antibodies have waned.

If any of your readers would like to discuss primary vaccination programs I encourage them to call me at Boehringer Ingelheim Technical Services on 1800 038 037.
At this stage I also weaned Rama off prednisolone as he needed more pain relief than the intermittent oral Temgesic he was receiving. I also placed him on metacam (a previous accidental dose while on prednisolone had made him very happy). I was also taken off Clavulox/Baytril and started on cimadinycin and flucnacozole. (Flucnacozole was stopped when Dr Mason alerted me to possible toxic interactions with cyclosporin.)

Within a few days of starting Rama on tacrolimus his left ear started exuding a necrotic pasty substance and the canal started to open up as the hyperplastic lesions started to shrink. The right ear also looked as though the lesions were starting to crumble away, too.

Within 2 weeks the external lesions had almost totally resolved. On an anasthesiologist to flush out residual debris there was still a mild polyp appearance in the distal canals, so topical tacrolimus was continued. All other treatments were stopped.

Rama remains deaf (and overweight from cortisone) but otherwise healthy and happy. There are possibilities for transitional auditory evoked response testing and CAT scans to see if anything can be done to restore his hearing, such as bulla osteotomy.

Tacrolimus. As Dr Davies said, this treatment does have the potential to allow other serious infections to take hold so I would not advocate its use in all cases. I was happy to use it as Rama was an indoor cat and had never contacted others outside his litter. Otherwise, IV and Toxoplasma testing would be advisable first.

Tacrolimus appears to have been very effective in many vets’ hands. I think in my case I was disappointed in its lack of effect probably due to poor local compounding; the second prescription was made up as a reverse thermodynamic gel – kept in the fridge it is liquid, but sets in the warm ear, keeping in contact. Had I been done then it may have been more effective (+oral cyclosporin too). Tacrolimus is potentially toxic to humans so care is needed in administering – gloves should be worn and hands washed post administration.

In Rama’s case, regular anaesthetic to keep the ears as clean as possible and treatments for secondary infections and anaesthesia were essential.

Postscript
Rama is my own kitten (of course) so I was happy (and desperate enough) to throw everything at him to give him relief. Many owners would find ongoing costs prohibitive. I hope this article may make some more vets aware of the problem and its likely cause and possible treatments so they can advise owners accordingly.

Rama being my cat, I plagued many people with emails and phone calls for advice so I give many thanks to: Ken Mason, Richard Malik, Andrew Freed, Mandy Burrows, Peter Hill, David Davies and Elizabeth Mauldin.

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Sinus tachycardia and possible central diabetic insipidus in a Yorkshire Terrier with pancreatitis

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The patient was a 14-year-old, neutered female Yorkshire terrier dog (3.2 kg) with anorexia for 2 days preceded by on-and-off inappetence and diarrhoea for several weeks. There was no history of polyuria and polydipsia (PUPD). Physical examination revealed dehydration, mild fever (39.6°C) and mild tensive abdomen on palpation but not localizable to a specific area. A complete blood count and biochemistry tests were unremarkable except for abnormal canine pancreatic specific lipase level (IDEXX Canine Pancreatic Lipase Test). Ultrasound revealed highly concentrated urine (SG 1.045) and radiology showed “thickened” intestinal loops. Abdomen ultrasound exam findings were mild pain (Murphy sign) when examining the cranial abdominal area and slow peristalsis of small intestine and stomach. The pancreas was scanned but poorly visualised due to technical limitations.

Presumptive diagnosis: pancreatitis.

The patient was hospitalised for intravenous Lactated Ringer’s solution. The rate was based on the hydration status: Buprenorphine (0.1–0.15 ml kg⁻¹ bid-qid IV). Later on the first day the sensation of pain intensified from mild to severe, just like those more ‘typical’ pancreatitis cases. Fresh frozen canine plasma CANNULUS 45 ml was infused intravenously on the second day after hydration had improved.

An ECG monitor was put on because the slow heart rate was auscultated. The rate was 50–70 bpm without pulse deficit and murmur and the rhythm was respiratory arrhythmia. The rate was unreasonable low for a small breed dog with intense pain. The heart rate should be higher in a normal animal, if in pain. The heart rate was supposed to be influenced by pancreatitis (and the Buprenorphine injection). However, at one time the heart rate jumped to 240–260 bpm in sinus rhythm! Cardiac massage was performed immediately and heart rate dropped to 70–100 in minutes.

After 7 days of treatment, the patient recovered from the pancreatic disease: appetite was good, no vomiting nor diarrhea and no abdominal pain. IV fluid therapy was discontinued. But 36 hours later the dog started to have neurological symptoms: ataxia, tremor and abnormal mentation. A blood test showed sodium raised to a critical level of 176 mmol/L! Immediately, the patient was put on a drip with 2.5% dextrose in 0.45% NaCl solution to try to lower the sodium concentration. More water was added to the food and also administered by syringe feeding. However, the sodium level was always high (fluctuated over 160 mmol/L) despite the pure water given and the urine output was so huge that at the peak there was almost 1 litre of urine produced per day! The urine SG was around 1.004 no matter whether the dog was dehydrated or not.

For the numerous causes of PUPD (although this dog didn’t drink much by herself), central diabetic insipidus (DI) was the most suspect. Therefore, trial treatment with MINIRIN® (desmopressin) 1 unit 5C bid was commenced. The sodium level was back to normal in 1 day and the urine output dropped gradually in 3 to 4 days to a steady level of 200 ml/day. The urine SG remained steady at around 1.020 when 1 to 8 hrs post injection and dropped to 1.008 immediately before the next injection. The daily water intake was carefully maintained at about 250ml/day to avoid fluid overload or dehydration. Metamizol was back to normal in about 1 week after the sodium level was under control.

I cannot say for certain that this was central DI although the response to desmopressin certainly fits this diagnosis. In pancreatitis cases, central DI is not a reported complication or a key reference.

The timing of the 2 diseases suggests causation, but we cannot think of a pathomechanism to link the 2 different disease processes. I’d be interested in any feedback about this case.
She was given Tolfedine® for pain relief and Clavulox® Injectable and iodine solution, and put a standard wound bandage on the right foreleg. We cleaned her wounds using chlorhexidine, put a Robert Jones carpus joint, but otherwise she was pretty stoic (typical Staff!) and never lacerated pads as well. Her gums were pink, lungs clear, heart racing were several open wounds and abrasions, a nail torn clean off and swollen left foreleg, with moderate lameness. In the right foreleg there were several open wounds and abrasions, a nail torn clean off and lacerated pads as well. Her gums were pink, lungs clear, heart racing.

Sadly, they couldn’t come in till 5.30pm that day and by that time Sophie was markedly lame in the right hind and also had a severely swollen left foreleg, with moderate lameness. In the right foreleg there were several open wounds and abrasions, a nail torn clean off and lacerated pads as well. Her gums were pink, lungs clear, heart racing were several open wounds and abrasions, a nail torn clean off and swollen left foreleg, with moderate lameness. In the right foreleg there were several open wounds and abrasions, a nail torn clean off and lacerated pads as well. Her gums were pink, lungs clear, heart racing.

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Prostate tumour in a 12-year-old beagle

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A 12-year-old MN beagle had been examined the day before for its annual health exam. The prostate gland was painless and moderately enlarged and irregular as per rectal palpation. The modal iliac (gubernaculum) lymph nodes were not palpable on rectal exam. There was no history of any frequent urgency or difficulty in urinating. He had been desexed around 5-months-of-age.

The following day, the dog represented with frequency, urgency and discomfort when attempting to urinate. Only very small volumes of urine were passed.

A cystocentesis was carried out to reduce the markedly distended bladder. Attempts to pass a urinary catheter were unsuccessful. Radiographs highlighted foci of tissue mineralisation, of varying intensities, at the pelvic inlet. (Figure 1)

Ultrasound of prostate revealed irregularly marginated hypoechoic regions separated by spurs. The spurs radiated from an irregularly marginated, central intense hyperechoic region with distal acoustic shadowing, indicating dystrophic mineralisation. Figures (2A & 2B)

This was suggestive of a prostatic carcinoma, although chronic prostatitis can present with peripheral mineralisation.

There were no uroliths visible within the bladder lumen. At exploratory surgery, the bladder wall was thickened, the neck of the bladder felt thickened and constricted with a ‘gritty’ feel on the left hand side. The constriction seemed to be surrounding the neck of the bladder.

Cystotomy was performed and no uroliths found. Retropulsion of warmed saline through a urinary catheter produced no stones.

A fine needle aspiration was performed on the prostate gland, 4mLs of slightly cloudy fluid with a few flecks of small fine white material was aspirated as well as several samples of the prostate gland.

Aspirating the prostatic fluid alleviated the pressure within the prostatic urethra and a Cooks Foley catheter was able to be passed into the bladder from the penis. The catheter was sutured to the external urethra and a Cooks Foley catheter was able to be passed into the bladder.

The cat improved dramatically within a 24 hour period; however, the owners were not keen on the idea. The dog had separation anxiety, shadowing the owners at all times and barking, panting and pacing even for virtual separation. Therefore, the dog required access to the entire house and the owners were unable to keep him confined on a veranda or in a bathroom.

Piroxicam (Feldene®) was dispensed (0.3mg/kg sid orally) in the hope of reducing the inflammatory response within and surrounding the prostatic carcinoma, as well as reducing the formation of new blood vessels within the tumour. Hence, reduce the tumour size and hopefully increase the size of the urethral lumen.

Unfortunately, the dog developed urethral obstruction within 3 days of discharge and was euthanased.

However, the owners were not keen on the idea. The dog had separation anxiety, shadowing the owners at all times and barking, panting and pacing even for virtual separation. Therefore, the dog required access to the entire house and the owners were unable to keep him confined on a veranda or in a bathroom.

Piroxicam (Feldene®) was dispensed (0.3mg/kg sid orally) in the hope of reducing the inflammatory response within and surrounding the prostatic carcinoma, as well as reducing the formation of new blood vessels within the tumour. Hence, reduce the tumour size and hopefully increase the size of the urethral lumen.

Unfortunately, the dog developed urethral obstruction within 3 days of discharge and was euthanased.

Feline hydronephrosis

C&T No. 5210
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A 16-year-old FN Burmese cat (3.05 kg) was present with a history of intermittent inappetence and constipation over the previous 6 months.

On presentation, the cat was bright, alert and responsive with excellent body condition. He had pericardial disease stage 2-3. No abdominal tenderness was evident. Systolic murmur III/IV.

Bloods: azotemia with low SG of 1.020. Urea 17.0 (5.0 - 15.0), Creatinine 0.25 (0.08 - 0.20), Potassium 5.6 (3.7 - 5.4). Bacterial culture and susceptibility of urine pending, but suggestive of renal insufficiency.

Ultrasound showed an enlarged right kidney with a markedly dilated renal pelvis and dilated ureter with what looks to be a urolith evident - see Figure 1.

The owner did not want any surgical intervention.

Further follow up as at October 2011.

The cat was diuresed with i/v fluids @ 10mL/kg body weight. He was carefully monitored for any evidence of pulmonary oedema to suggest over-hydration or cardiac heart failure. Pain relief (butorphanol 0.2mL, of 3mg/mL) was given every 4 hours for 8 hours then 8-hours.

The cat improved dramatically within a 24 hour period: interactive, bright, eating and comfortable. He was sent home on Metacam and the owner advised to provide a diet of tinned cat food and no dry food whatsoever.

He was seen for vaccination early this year and had gained weight and was more active (due to NSAID effect on concurrent degenerative osteoarthritis). The owner, an architectural student, was strapped for cash and although offered follow-up bloods and ultrasound, was happy with the cat’s progress and refused work-up. “
**Flea-related anaemic crisis in a young kitten**

**C&T No. 5211**

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‘Scooter’, a 3-week-old male Domestic Short Hair kitten weighing just 260 grams, presented to the RSPCA one afternoon as an emergency case. He arrived with his littermate, who sadly died on the way to the clinic before reaching veterinary care. Both kittens had a marked flea burden. We did not know much of Scooter’s history, except that he did not come from a good home and had not been given any flea or worming treatments. The owner also disclosed that the kittens had not been feeding from their mother for approximately one week prior to presentation, so both kittens were thin and weak.

Scooter presented in a critical state. He was depressed and moribund on admission. Indeed, he was barely able to move. Both respiratory rate and heart rate were very low, his mucous membranes were very pale, and a capillary refill time could not be determined. Scooter was rushed immediately into the emergency area and started on emergency oxygen supplementation but did not stabilise. Alloproline 0.1ml was administered intravenously to counteract the severe bradycardia; it was moderately effective in increasing the heart rate. Scooter was also hypothermic with a body temperature of 35.7ºC so he was warmed up with heat pads, bubble wrap and warm blankets. Even with the above symptomatic first aid Scooter did not stabilise. A 0.1ml blood sample was retrieved and a PCV measurement was taken. The PCV was determined to be 11% which is life-threateningly low. Due to this result, in combination with the patient’s critical state, it was decided that Scooter be given a blood transfusion. There was no time or resources (owners had limited finances) for feline blood typing in this situation, and there was no stored feline blood available at the clinic at the time; because of this, a canine blood transfusion was used. A large Mastiff donated 10ml of blood for the procedure; his PCV was 48% so 1.3ml citrate phosphate dextrose anticoagulant was then added to the 10ml of blood (the anticoagulant was extracted from an unused blood donor bag). The total blood volume for Scooter would be approximately 17.2ml (866ml/kg for cats – but can actually be up to 80ml/kg for kittens). The amount of blood to infuse was calculated by:

\[
\text{Total blood volume} \times (\text{required PCV} – \text{recipient PCV})
\]

\[
\text{Donor PCV} - \text{Amount of blood to transfuse}
\]

From this formula the amount to infuse was calculated to be approximately 8ml. In total, Scooter was most likely hypovolemic (blood loss due to fleas, plus dehydration) and critical so he could receive as a maximum 20mL/kg/hr which equates to 5ml/hr. We chose to start the transfusion intravenously via the left cephalic vein at 4ml/hr and administer the blood transfusion over a period of 2 hours. Once the transfusion was administered intravenous fluid therapy with 0.9% NaCl at 1ml/hr was started and continued for the next 24 hours, and 5% glucose added to drip after this period. Scooter was also given a small drop of kitten Revolution® off-label to help with the flea burden. Scooter was still moribund 24 hours later and prognosis for survival was guarded, however his vital signs were stable and improving. Approximately 36 hours post blood transfusion Scooter began to recover rapidly, becoming brighter and active, eating small amounts without assistance and gaining weight. After 4 days in hospital Scooter was well enough to go home with a foster carer and was visibly improving each day. Scooter is now 10 weeks old and living in foster care; he will soon be adopted and go to a new home.

It is important to remember that fleas can not only cause chronic debilitating anaemia and reduced quality of life, they can in some cases cause fatal. In small animals such as Scooter with a much lower total blood volume, a lower PCV to begin with, and lower total body iron reserves, it can take very few fleas to cause significant anaemia. It has been reported that it takes just 72 female fleas to ingest 1ml of blood from an animal per day! This means it could only take a matter of days for a very small animal such as Scooter to have critically low blood levels.

**Editor’s Comment:** When finances are limiting, it is actually safer to give dog blood to a cat, rather than an unmatched feline transfusion. Just remember, the red blood cells only last 7 days, and you can only try this trick once. It works well when you know you can fix the cause of the anaemia quickly and definitively. There are also quick ways to do a cross match – but it still takes time and possibly both Type A and Type B donors.

**Use of dog blood in a FeLV positive cat**

**C&T No. 5212**

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I used the dog blood trick (passed on to me from Richard Malik) for a cat the other day which was a FeLV-positive cat and had severe anaemia. The owners were coming in to euthanise it when it went into respiratory arrest. We had dog packed cells in the fridge that had just expired so I bolused 15mLs into him rapidly and he stabilised reasonably well. I also gave him a smidge of dexamethasone and butorphanol because he was quite restless immediately after, but was very calm and mooshy when the owners came.

This is a great trick that I’d like to share with CVE members/readers. The owners were thrilled they got to say a nice goodbye.

**Management of chronic canine hypophosphataemia**

**C&T No. 5213**

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**Patient:** ‘Meg’, an 8½-year-old female spayed Poodle X Silky Terrier.

Meg was presented in September 2009 for a variety of fluctuating symptoms. Her astute owners had noticed that she had become less boisterous, with episodes of intermittent agitation and shaking. Two episodes of agitation had coincided with application of Advantix in the first instance and Program in the second. On physical examination, Meg weighed 3.13 kg, HR 96, mucous membranes were pink and moist, capillary refill, CR and rectal temperature were normal. No abnormalities were detected on abdominal palpation, although she consistently disliked palpation of the cranial abdominal area. She was eating, drinking, urinating and defecating normally, and ate a balanced commercial dog food.

As she was in need of a dental, we decided to:-

1. Watch her closely, and try to bring her in during an episode of agitation, should it recur.
2. Try Advocate (after she returned a negative heartworm test) or Capstar for fleas in case she had an idiosyncratic reaction to the previously used flea products.
3. Run a general health profile (BUN, CREA, Ca”, TP, ALB, GLOB, ALKP, TBL, CHOL, GLU and PCV).

**Comment from Hugh White:** This is an excellent article and shows yet again that vets ‘in the bush’ can see and investigate the most obscure and complex cases. General practice is never dull if you keep looking, thinking and reading!
Initial general health profile results:
Meg returned values within reference intervals except for a slight elevation in ALT of 14.0 U/L (10-100), slightly low amylase at 224 U/L (500-1500) and hypophosphataemia, a low phosphate level of 0.58mmol/L (0.81-2.20). The moderate hypophosphataemia was difficult to interpret, in light of the accompanying normal parameters. We decided to:
1. Trial 7 days of Clavulox 12.5mg/kg BID and metronidazole 25mg/kg BID in view of the very mild hepatic changes and her gingivitis.
2. Repeat the general health profile at the end of the 7 days and, if within normal reference intervals, admit Meg for a general anaesthetic and IV fluid support.
The dental side of this plan was well and truly abandoned 7 days later Meg’s phosphate level had dropped further to 0.36mmol/L. ALT had increased slightly to 206 U/L, and amylase was low. Meg was diagnosed with moderate (bordering on severe) hypophosphataemia of unknown cause.

Hypophosphataemia in Dogs
Hypophosphataemia is present in dogs when the serum concentration is less than 0.8mmol/L. It is not usually clinically worrisome until the phosphate concentration is less than 0.48 – 0.60mmol/L. Clinical signs may develop when the serum concentration is less than 0.48mmol/L, although this is quite variable and can be clinically silent for some time – especially if the drop in concentration occurs gradually. Since hypophosphataemia of less than 0.32mmol/L is of major clinical concern, as it is known to affect the neuromuscular and cardiovascular systems, and also the haematological system causing lysis of red blood cells.1

A search of veterinary and human literature fleshed out the clinical picture:
• Rhabdomyolysis – dogs fed a low phosphorus diet for 4 weeks demonstrated a reversible decrease in average resting transmembrane potential, and increases in muscle Na+3, Cl− and water.2 In hypophosphataemic dogs a subclinical myopathy might set the stage for rhabdomyolysis if acute, severe hypophosphataemia is superimposed.3
• Haemolysis – hypophosphataemia can markedly reduce levels of erythrocyte ATP and 2-3-DPG.4,5 This increases the affinity of haemoglobin for oxygen and diminishes oxygen delivery to tissues. ATP and 2-3-DPG are required for maintenance of erythrocyte biocorollarvity and viscosity in the circulation.4,5 ATP depletion has been associated with decreased cell membrane deformability and life span, and rarely in humans with haemolytic anemia.6
• Leucocyte dysfunction – hypophosphataemia can also reduce the ATP content of leucocytes and ameliorate neutrophil phagocytosis, impairing chemoattract, phagocytic and bactericidal activity.6
• Respiratory failure – in human patients, moderately hypophosphataemic patients demonstrated respiratory muscle weakness that was reversed upon phosphate repletion.7
• Impaired myocardial performance – reversible depression of left ventricular function occurs in dogs with moderate hypophosphataemia.8
• Perturbed CNS – several human case reports indicate an association between hypophosphataemia and neurological problems such as altered mental status, irritability and polymyopathies including cranial nerves, seizures and muscular weakness.10
• Impaired platelet aggregation9
• GIT disturbances – may include anorexia, nausea and vomiting11
• Renal tubular acidosis – phosphorus depletion diminishes renal acid excretion and can lead to distal tubular acidosis.12
• Impaired myocardial performance11
• Impaired adrenal and gonadal function11
• Impaired skin and hair coat11
• Impaired neutrophil phagocytosis, impairing chemotactic, phagocytic and bactericidal activity.12
• Impaired respiratory function12
• Impaired renal tubular acidosis13
• Impaired renal tubular glucose excretion13
• Impaired insulin sensitivity13

Hypophosphataemia in Dogs (continued)
Rhabdomyolysis – hypophosphataemic patients demonstrated respiratory muscle weakness that was reversed upon phosphate repletion.11

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Perturbed CNS
Several human case reports indicate an association between hypophosphataemia and neurological problems such as altered mental status, irritability and polymyopathies including cranial nerves, seizures and muscular weakness.10

Key Points

1. Trial 7 days of Clavulox 12.5mg/kg BID and metronidazole 25mg/kg BID in view of the very mild hepatic changes and her gingivitis.
2. Repeat the general health profile at the end of the 7 days and, if within normal reference intervals, admit Meg for a general anaesthetic and IV fluid support.

At the time I discussed Meg’s condition with her owners, it was difficult to know what to do next, especially since Meg was not at this stage exhibiting any signs referable to hypophosphataemia.12 Neither did she have any of the occasional tremoring and agitation. We were very concerned however that left untreated Meg would become severely hypophosphataemic (a decrease of a mere 0.24mmol/L from her current level). We still had not ruled out early hyperparathyroidism, and discussed the cost of running a PTH assay. We also considered giving Meg an intravenous infusion of sodium phosphate and sought some guidelines regarding this.

In general, treatment of the underlying cause of hypophosphataemia should be attempted whenever possible.

Mild hypophosphataemia (0.48 – 0.80mmol/L) should be treated by increased oral intake.

Moderate hypophosphataemia (0.32 – 0.48mmol/L) may require replacement suitable when the phosphate level is <0.32mmol/L. When signs of phosphate deficiency are present (principally weakness) or when total body phosphate deposition is suspected.

Severe hypophosphataemia (0.32 mmol/L) is usually only seen in end-stage renal failure or severe deficiency and should be treated with intravenous supplementation.10

The reported veterinary dose of either intravenous potassium or sodium phosphate is 0.01 – 0.03 mmol/kg/hr.17 This requires very careful monitoring of plasma phosphate, calcium, sodium, potassium and glucose levels every 4 – 6 hours, due to the risks of hyperparathyroidism, hypercalciumia, hypocalcaemia, hypoglycaemia, hyperglycaemia or current dietary intake of phosphorus (anorexic patients).14

Taking into consideration that Meg was still (just) in the moderately hypophosphataemic range and her apparent resistance to the aforementioned treatment of hypophosphataemia, we adopted a different tack. We decided to increase Meg’s dietary phosphate if the phosphate had increased again to 0.65mmol/L. Her ALT remained slightly high (112) and amylase was low (349) as it had been throughout. Meg’s owner continued with her home-made phosphorus mixture for the following month.

At the time of writing, we are monitoring Meg monthly, and the justifiable for persisting with treating Meg is fourfold:–

1. Meg’s hypophosphataemia had been responsive to phosphorus supplementation, and her calcium levels were still normal. Also, with primary hyperparathyroidism sodium phosphate rarely drops below 0.6mmol/L due to enhanced intestinal absorption and bone mobilisation.15

After 2 weeks of resuming her phosphorus rich diet, Meg’s serum levels rose to 0.52mmol/L and will presumably continue to increase back normal as they did previously.

I have concluded that one more differential for canine hypophosphataemia may need to be added to the current veterinary literature – namely idiopathic selective phosphorus intestinal absorption disorder.5 This condition has shown me that individual dogs can be extremely resistant to the frightening list of possible sequelae for severe hypophosphataemia. The question why bother? My justification for persisting with treating Meg is fourfold:

1. We have no information in veterinary literature as to the effects of chronic (low) moderate hypophosphataemia in dogs

2. The sequence to severe hypophosphataemia as reported for human and dogs are extremely serious and possibly life-threatening.

3. Untreated, Megs hovers just slightly above the severely hypophosphataemic level; and

4. Meg’s owners are brilliant.

At the time of writing, we are monitoring Meg monthly, and are considering engaging the help of a veterinary nutritionist to formulate a long-term phosphorus rich diet for Meg. 27

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Hypophosphataemia unrelated to anorexia/inappetence,  
Vetnostics
Small Animal Medical Consultant

Until 2008, hypophosphataemia, for me, was just a consequence of another disease and usually clinically insignificant until it was occurring in DKA patients. However, with the outbreak of acquired proximal renal tubulopathy associated with feeding of KraMar Supanaturals Chicken Breast Strips®, hypophosphataemia became a more common finding in laboratory results. As I was not necessarily privy to the urinary findings, hypophosphataemia was sometimes the only marker for renal tubulopathy. Of the 108 dogs collected from Dr D M Thompson it was difficult to procure parenteral sodium or potassium phosphate. Cortofo is registered for phosphorus supplementation and contains 105 mg phosphorous/mL (2 mg phosphorous/mL; 31 mg phosphorus = 1 mmol) and vitamin B12. Dr Ashton then used diclomat phosphate (DCP) powder, at an empirical dose (1 tspn BID PO for a 20 kg DOG) to increase serum phosphate. Once a successful dose was established, calcium and phosphate monitoring were performed to ensure that both calcium and phosphorus had been unassailable and urinary fractional excretion of phosphate in this dog was still markedly increased. I also monitor a similar case in Queensland, which has also been managed with DCP for over 2 years. Dr Grice found innovative solutions to Megs’ hypophosphataemia. I had previously suggested using red meat (high in phosphorous) and supplements has significant merit and I will certainly be recommending that in the future. I have learned a lot from both the case and the report with its well-researched references. Reference:


Comment courtesy of:  
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Dr Grice should be congratulated on the investigation, management and reporting of this very interesting case. Hypophosphataemia unrelated to anorexia/inappetence, hypercalciemia or diabetes mellitus is rarely reported in the veterinary literature. There is a paucity of data on the clinical consequences of hypophosphataemia in dogs and recommendations for chronic therapy have been lacking.

Hypophosphataemia occurs by 3 mechanisms: decreased intestinal absorption, renal loss or extracellular to intracellular shifts. The most common causes are anorexia/inappetence (usually mild decrease), primary hyperparathyroidism or persistent hypercalciemia of malignancy and diabetes mellitus. Loss in the latter is due to marked renal loss and the true extent of hypophosphataemia may be masked by an extracellular fluid shift as a result of insulin deficiency. Insulin administration drives phosphate intracellularly and can result in severe hypophosphataemia.

In a report as a sequel to experimentally induced hypophosphataemia in dogs, however, as Dr Grice discussed, dogs are remarkably resilient to clinical consequences of hypophosphataemia.

A common recommendation in Fanconi’s syndrome is to use a  

5 mmol/L posaconazole

to try and normalise serum phosphate. Once a successful dose was established, calcium and phosphate monitoring were performed to ensure that both calcium and phosphorus had been unassailable and urinary fractional excretion of phosphate in this dog was still markedly increased. I also monitor a similar case in Queensland, which has also been managed with DCP for over 2 years. Dr Grice found innovative solutions to Megs’ hypophosphataemia. I had previously suggested using red meat (high in phosphorous) and supplements has significant merit and I will certainly be recommending that in the future. I have learned a lot from both the case and the report with its well-researched references. Reference:


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Unfortunately, Rocco was not easy for the owners to medicate. Despite missed doses and incomplete doses, Rocco continued to improve. There was concern regarding lethargy, inappetance and mild weight loss. Clinical examination, BP, UA, FBC, biochem, and T4 were all essentially normal. The owners felt that the issue was most likely behavioural in response to administration of the posaconazole. At 5 weeks of treatment, lesions sizes were approximately:

- lat D3: ~ 10 x 5 mm, flat
- med D3: ~ 12 x 9 x 4 mm
- dorsal D3: ~ 5 x 4 mm, flat
- lat D2: ~ 5 x 3 mm, flat

At 9 weeks of treatment, lesions were continuing to regress.

- lat D3: ~ 7 x 5 mm, flat
- med D3: ~ 10 x 6 x 4 mm
- dorsal D3: ~ 5 x 3 mm, very hard to see lesion
- lat D2: ~ 5 x 3 mm, very hard to see lesion

At 16 weeks, there was further improvement.

- lat D3: cannot see lesion
- med D3: ~ 8 x 2 mm, flat
- dorsal D3: cannot see lesion
- lat D2: cannot see lesion

At 22 weeks, there was slight discoloration on the medial aspect of D3 but otherwise no visible lesions.

At 32 weeks, there was no visible sign of any lesions.

At 56 weeks, Rocco is apparently still on medication. For the first 3 to 4 months, the owners were able to dose Rocco reasonably regularly. As time progressed, he became increasingly difficult to medicate. Some days he would not allow medication and other days, the owners would only try a reduced dose to at least have some drug administered. If Rocco was taking every dose, one bottle would last around 3½ months. The first bottle lasted a little over 4 months. The second bottle has lasted 9 months and is still going. It appears that the initial more intensive treatment, followed by lower chronic doses, has been effective but longer term follow up will be necessary to confirm this.

D3 and D2 have been clipped lightly before photography to enhance visualisation of the lesions.

Photos 1 and 2: pretreatment.

Photo 1. Pretreatment. D3 is directly under the thumb. The main lesion surrounds the sides and top of the nail. There is a smaller lesion more proximally near the fingernail.

Photo 2. Pretreatment. Close-up of D3 showing the main lesion surrounding the nail. The smaller lesion on the lateral surface of adjacent D2 can just be seen.

Photos 3 to 5: 2 weeks of treatment.

Photo 3. After 2 weeks, the lesions are noticeably smaller.


Photo 5. After 2 weeks. Closer view.

Photos 6 to 8: 9 weeks of treatment

Photo 6. The lesions on lateral and medial D3 are still visible but the lesion on the dorsum of D3 and lateral D2 are very hard to see.

Photo 7. The marks on lateral D3 are due to the clipper.

Photo 8. Closer view.

Photos 9 and 10: 16 weeks of treatment

Photo 9. The mark on lateral D3 is due to the clipper again. The lesion on lateral D3 and dorsal D3 are no longer visible.

Photo 10. The mark on the lateral D2 is due to the clipper (Rocco was not easy to clip). The lesion on D2 is no longer visible. The lesion on medial D3 is still present but not visible on the photo.

Photo 11. The mark on the dorsum of D3 is due to the clipper again. The lesion on dorsum D3 is no longer visible.
How to deal with concurrent pancreatitis and diabetes in dogs and cats

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Linda Fleeman is an international expert on canine diabetes and has published numerous papers on the clinical management of diabetes in dogs and cats. Linda has now left university practice to establish Animal Diabetes Australia, a clinical service specifically for diabetic dogs and cats at the Boronia Veterinary Clinic in Melbourne.

Abstract
Management of concurrent pancreatitis and diabetes mellitus presents a significant clinical challenge in dogs and cats. Pancreatitis can sometimes be difficult to diagnose and typically has an unpredictable clinical course. Acute pancreatitis results in metabolic derangements that can be life-threatening in otherwise healthy animals, and are further complicated in diabetic patients by development of ketoadsosis. Chronic pancreatitis can lead to loss of beta cells in diabetic dogs and cats, as well as progressive loss of exocrine pancreatic function. Diabetes mellitus is recognised as an important risk factor for pancreatitis yet there is still little information published on the best management strategies to reduce the risk of acute pancreatitis or slow the progression of chronic pancreatitis in these patients.

Dogs and cats with uncomplicated diabetes mellitus classically present with polyuria, polydipsia, weight loss, an increased appetite, and lethargy. The onset of these classic clinical signs is typically insidious, ranging from weeks to months in duration, and may initially be unnoticed or considered insignificant by the owner. Polyuria is the result of osmotic diuresis caused by increased water intake to prevent dehydration. Weight loss and lethargy occur because insulin deficiency results in decreased ability to metabolise the nutrients absorbed from the gastrointestinal tract, and loss of glucose and amino acids in the urine. Diabetic dogs and cats compensate for these effects by increasing their food intake.

The importance of the compensatory role of polydipsia and polyphagia in the pathophysiology of diabetes mellitus becomes apparent when these compensatory mechanisms fail. Any concurrent illness in diabetic patients that causes inappetence or anorexia and vomiting is rapidly complicated by dehydration, depression, and ketosis. The majority of diabetic dogs and cats that present with diabetic ketoadsosis have at least one concurrent disease, with acute pancreatitis the most common diagnosis in dogs1, while liver disease and pancreatitis are the most common concurrent conditions reported in cats2.

Acute pancreatitis in diabetic dogs and cats
The most frequent presenting signs of acute pancreatitis in dogs are anorexia, vomiting, and dehydration. Clinical signs in cats with pancreatitis are less specific, with inappetence and lethargy more commonly present than vomiting4. In both species, the clinical course tends to be unpredictable, the outcome can be fatal, and there is no specific treatment. The diagnosis of pancreatitis can be difficult because all of the available diagnostic tests have limitations. The most sensitive test in both dogs and cats is serum pancreatic lpaase inmuneactivity (cPLI and fPLI, respectively)4 while the most specific test is ultrasonography performed by a skilled operator.

Management of acute pancreatitis is primarily directed at its various clinical sequelae and the goal of treatment is to support the animal until there is spontaneous recovery. Concurrent diabetes mellitus with or without ketoadsosis presents an additional treatment challenge in these patients. With appropriate therapy, dogs with both acute pancreatitis and diabetic ketoadsosis have a similar chance of survival as those with diabetic ketoadsosis alone, although they typically require hospitalisation for a longer period3.

Longer-acting insulin preparations such as Caninsulin® (Intervet) should be discontinued and replaced with short-acting insulin until the animal is recovered and eating well. Suitable preparations include regular insulin (for example, Actrapid® Novo Nordisk) or lispro insulin (Humalog® Eli Lilly). Administration protocols involving either constant rate intravenous (CRI) infusion or intermittent intramuscular/subcutaneous injections are effective7, however CRI infusion protocols are simpler and less labour intensive for management of prolonged anorexia in diabetic dogs and cats. The main constraint is that a separate fluid administration line and infusion pump is required in addition to those used for supportive fluid therapy. An initial insulin infusion rate of 50 mU/kg/hr is recommended, which is easily achieved by administering a 50 mU/mL solution (25 U insulin in 500 mL saline) at 1 mL/kg/hr. This rate is halved to 25 mU/kg/hr (0.5 mL/kg/hr of this solution) when the patient’s blood glucose concentration reaches 10-15 mmol/L. At the same time, the maintenance fluids should be changed to contain 2.5% dextrose. A reliable means of achieving a fairly stable blood glucose concentration in an anorexic diabetic dog or cat is to balance intravenous infusion of insulin at 25 mU/kg/hr with 2.5% dextrose in 0.45% saline at 6 mL/kg/hr. Potassium depletion results from decreased intake due to anorexia and increased loss due to vomiting and diuresis. Fluid therapy causes dilution of circulating potassium levels and promotes further renal loss, while insulin therapy and correction of acidosis results in movement of potassium from the interstitial fluid into cells. Diabetic animals with acute pancreatitis therefore have a high risk of hypokalaemia and maintenance fluids should be supplemented with 30-40 mmol/L of potassium.

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1. This test can also be used on abdominal effusions, when present.

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of diabetic dogs12. The contribution of pancreatitis to clinical signs in some cases, while other animals have recurrent episodes of subclinical or clinical acute pancreatitis. Necropsy evidence indicates that chronic pancreatitis is very common in both dogs14 and cats15. Chronic pancreatitis can progress to an end-stage where there is substantial loss of both endocrine and exocrine function resulting in diabetes mellitus with or without exocrine pancreatic insufficiency. This process of pancreatic destruction can be associated with minimal clinical signs in some cases, while other animals have recurrent episodes of clinical acute pancreatitis of variable severity. Extensive pancreatic damage due to chronic inflammation is responsible for the development of diabetes in approximately 28% of diabetic dogs12. The contribution of pancreatitis to the development of feline diabetes is unknown, although it is frequently present in non-Burmese diabetic cats16.

Chronic pancreatitis in diabetic animals can have important clinical implications. In a study of 50 Owners of dogs with chronic pancreatitis, progressive destruction of both endocrine and exocrine tissue will result in loss of insulin-secreting beta cells, glucagon-secreting alpha cells, and exocrine acinar cells. Glucagon has an important role in the counter-regulatory response to hypoglycaemia and is therefore crucial in protecting diabetic dogs and cats from the life-threatening consequences of insulin overdose. Impaired glucagon counter-regulatory response to insulin-induced hypoglycaemia has been identified in diabetic dogs and was associated with episodes of clinical hypoglycaemia17.

Avoidance of insulin overdose is one of the primary goals of treatment of diabetic animals and this is especially important in patients suspected of having chronic pancreatitis. Loss of body weight and condition despite polyphagia are presenting signs for both diabetes mellitus and exocrine pancreatic insufficiency. Treatment of diabetes usually results in weight loss being arrested before optimal glycaemic control is achieved. If weight loss continues despite adequate glycaemic control, the possibility of concurrent exocrine pancreatic insufficiency should be considered and serum triglycerin concentration is the clinical course so that pancreatic enzyme supplementation can be started before there is excessive loss of body condition. A positive response to pancreatic enzyme supplementation suggests substantial weight gain and decreased gastrointestinal signs is typically seen within days in affected dogs.

Reducing the risk of pancreatitis in diabetic dogs

Hyperglycaemia is one possible inciting cause of canine pancreatitis, although there is no evidence for a similar role in feline pancreatitis. Increased serum triglyceride (TG) concentrations are commonly seen in diabetic dogs18 and so the diabetic state might also be a risk factor for pancreatitis. Restriction of dietary fat is an important part of the management of hyperglycaemia in dogs19,20 and is recommended for diabetic dogs when hyperglycaemia cannot be corrected by exogenous insulin therapy. Fasting serum TG concentrations can be monitored to identify persistent hyperglycaemia and to monitor the response to feeding a fat-restricted diet. Dietary fat restriction <30% of the total calorie content is recommended for all diabetic dogs with fasting serum TG concentration >5.5 mmol/L. For diabetic dogs with good glycaemic control, dietary fat restriction <30% is recommended if fasting serum TG concentration is >4.4 mmol/L. It is expected that fasting TG levels will decrease in response to dietary fat restriction. Therefore, if fasting serum TG concentration is <4.4 mmol/L when the dog is being fed a diet with <30% ME, further restriction of dietary fat to <20% is recommended.

The treatment oral dose of Vit K1 on product labels of available patented and generic Vit K oral products varies from 1-12.5mg/kg! This reflects the difference in whether 1st or 2nd Gen vitamins are to be treated. This is not clear on many pill packets. The overwhelming impression clinicians and owners have of rat bait poisoning is that the financial cost is considerable, even in an uncomplicated case. I have had animals die from lack of available finances not from a disease process per se, so making treatment affordable and safe is a priority of mine.

If I have a valuable working dog or beloved family pet – often some hours’ drive from a vet clinic – I can’t risk the first owner see the first rat bait ingested already do a faecal scoop as well so a suggested option of sending it back up the mountain road to wait for 2-3 days to re-test to see if bait had been ingested is a time bomb waiting to happen. Equally, the additional cost and travel inconvenience of regular on-going blood test monitoring is often not an option for many owners. Thus an extended dose of Vit K is often employed once ingestion is suspected. The concerns would be:

• The side effects from dosing for an extended period of time.
• The cost outlay to the client.

Side effects

Vit K is perceived to be safe. A fast- soluble Vitamin, it behaves biologically similar to a water-soluble Vit. It has a short half-life with no significant storage pools. The Herz body anaemia issue seems mostly traceable back to human infants – 1 canine case has been reported in 1984. If haemolytic anaemia is an issue with cats, I equally offer both alternatives of Vit K – MENADIONE- K or K, were implicated in adverse drug reactions.

Mammal’s work found that in a cohort of normal dogs given higher doses of Vit K, higher serum concentrations did not reveal accumulation of Vit K within the blood. Serum Vit K levels measured in these dogs from 8-25, presumed to be enzyme induction of the Vit K enzyme complex and or other microosomal systems which may have allowed more rapid clearing of Vit K.

So, on balance, perhaps it is safer to treat for longer than stop too early?

Cost

I do have to address treatment cost as this is not a plug for any one product. Finding affordable care for a client on limited funds is a daily reality of practice for those of us bathing it out at the front-line of first opinion practice.

• A new 5mg chewable tablet (Mobivit) produced by the makers of the earliest registered veterinary formulation here (10mg) is now available. Over a month of treatment, the 50mg option can end up costing 50% less than using their own 10mg tablet.

• Equally, another company’s 25mg tablet (Ceva) in a smaller pot [25] makes a very economical option to have sitting just-in-case on the Chemist desk. Rat bait ingestion by pets would be an uncommon presentation.

• There is also a syrup formulation from a third manufacturer Koagulan 100mL for difficult to orally dose smaller pets. Published treatment intervals range from 5-7 days for 1st Gen to 5-24 days for 2nd Generation baits.

• Even 24 days for 2nd Gen may not be sufficient.

• Maintain (AM J Vet Res 1989 50:10) found no detectable levels of Vit K1 but found prolongation of prothrombin time in a 2nd gen exposed dog 3 days after a 24 day treatment regime ceased.

A critical period after therapy was days 27-32 when the observation period was still impaired so that any insult to the vascular integrity could lead to severe haemorrhage. Dogs given 5mg/kg/day x 21 days were better at limiting pathological changes at days 27-32 of exposure. In Oriental rats given diet bait at alternate days on 2.5mg/kg/day. Coagulation was resolved by day 32 in Mount’s study.

Treatment Regimes

1. Plumb (7th edn, 2011) recommends: A loading dose of 2.5-5.0mg/kg PO followed by 3-5mg/kg divided and given PO twice daily.

2. The iconic UK 2010-11 BSAVA formulae suggest:

• Regime for known 1st Gen to be: S/C 5mg/kg in several sites followed by 6-12hrs with 2.5mg/kg orally twice daily for 3 weeks.

• Regime for 2nd Gen to be: S/C 5mg/kg in several sites followed by 6-12hrs with 2.5mg/kg orally twice daily for 3 weeks.

• Alternatively, Start s/c for 24-48hrs if PO is not an option in a critically ill case... Maintain on 2.5mg/kg if regular monitoring an option. Otherwise use 5mg/kg/day for a minimum of 3 weeks if regular revisits are not an option.

• Toxic Gene Type Unknown or Inadonide (Diphacrine) - BSAVA.

Treatment of 2.5-5mg/kg SC then 2.5mg/kg PO divided every 8-12hrs for 3-4 weeks. Test 2 days later and if PT elevated therapy should be for 2 additional weeks. PT not elevated then again 4thrs later. Clinical practice feedback is vets have had dogs, treated for 4 weeks successfully for some 2nd generations, then sadly succumb to fatal haemorrhage in the ensuing 2 weeks. Equally, there have been cases tested at 4 weeks clearly showed abnormal blood results requiring a total of 42 day treatment regime. This has led some clinicians using a standard 42 day treatment regimen.
The gold standard protocol of daily PT testing to determine treatment duration is simply not affordable for the average owner. The majority of poison cases are small to medium size dogs. Even a single lab test cost out at the laboratory set basic price can represent 10-24 days of drug treatment for a small dog — before any vet professional service time for consultation and blood collection is added. Therefore, on-going serial blood sampling can far exceed the cost of the actual life-saving part of the therapy — the vitamin medication. As a result, some vets thus choose, for financial and preventative reasons, to supply a 42 day not 28 day drug treatment regime to protect against potential catastrophic haemorrhage late in the equation.

- Treatment Regime for 1st Gen is Warfarin etc.
  Vit K at: 2.5-5mg/kg SC in several sites, then 1-2.5mg/kg divided daily 8-12 hours for 7-14 days (BSSA).
  Or 0.25-1mg/kg Vit K1/kg/BW in, s/c or orally in divided doses for 5-7 days (Woody JVM).
  Or 0.25-2.5mg/kg BW small dogs — 0.5-2.5mg/kg BW large dogs.
Warfarin does not inhibit the Vitamin K enzyme complex hence 1 week treatment— some 2nd gens can inhibit Vit K for 3-4 weeks.

Miscellaneous Points

The lipophilic nature of Vit K makes s/c injection with the smallest gauge needle in several sites a safe effective alternative to the high risk intravenous of iv option (reserve for severest cases) or the potential post injection xoxide haemorrhage and necrosis of i/v injections. Use injection route for longer in any malabsorption, cholestatic patients.

Vit K returns PT and APTT to normal within 48hrs. The longer plasma half-life of Vit K in dogs allows twice daily dosing for 1 week treatment — some 2nd gens can inhibit Vit K for 3-4 weeks.

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                        C&T No. 5217
Katrin Swindeks
Perth, Australia
E. k_swindels@hotmail.com
In response to queries from Wayne Mizon, CVE DE Feline Tutor, Katrin Swindeks, formerly of Murdoch University, has kindly alerted us to the following very worthwhile article: vitrescue.org

Intravenous lipids is useful for treatment of life threatening local anaesthetic toxicity ( lignocaine and bupivacaine) and may be useful for treatment of neuro-excitatory toxins due to highly lipophilic chemicals. Katrin also advises that she expects 2 more articles on this topic to be published in the next 6 months and refers readers to the following published article, and case studies:-


Case studies


The Septrin® caused the kittens to hyper-salivate profusely and after 48 hours there had been no improvement with the milk diet. All three kittens were bright and eating, the diarrhoea was no worse than that caused by the Septrin. Pronounced when the more concentrated Baycox® is used. This milk was stopped completely and they were feed 50% kitten food and 50% Hills Activity diet.

After posting their case on a feline medicine forum I received the information that Baycox® can be given 10-14 days after the first if the diarrhoea returns but was not necessary in this case. Infection with Isospora occurs following ingestion of either sporulated oocysts from a contaminated environment or from ingestion of a paratenic host (rice usually). Oocysts are passed sporulated in the faeces; they become infective in warm humid environments within 12-24 hours. Infected cats are usually asymptomatically but kittens may show clinical disease, usually transient watery diarrhoea. In some cases the diarrhoea may be haemorrhagic and occasionally severely infected kittens may die. Diagnosis is by demonstration of oocysts in faecal flotation. Frequent removal of faeces from the housing will help to remove oocysts from the environment before they sporulate. Within 12 hours the diarrhoea stopped and Thomas and Emily started to gain weight. A 2nd dose of Baycox® can be given 10-14 days after the first if the diarrhoea returns but was not necessary in this case. Infection with Isospora occurs following ingestion of either sporulated oocysts from a contaminated environment or from ingestion of a paratenic host (rice usually). Oocysts are passed sporulated in the faeces; they become infective in warm humid environments within 12-24 hours. Infected cats are usually asymptomatically but kittens may show clinical disease, usually transient watery diarrhoea. In some cases the diarrhoea may be haemorrhagic and occasionally severely infected kittens may die. Diagnosis is by demonstration of oocysts in faecal flotation. Frequent removal of faeces from the housing will help to remove oocysts from the environment before they sporulate.
What’s YOUR Diagnosis?

Answer to C&T No. 5176

Another unusual manifestation

C&T No. 5219

Amy Lingard – CVE DE Feline Tutor
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Images courtesy of Taronga Zoo, Sydney

Mineralisation of the patella ligament, also either meniscal calcification or synovial osteochondrosis (depends upon who you believe) in a Fishing cat.

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Send us a pic of your case

If you have a picture which would be suitable for the “What’s YOUR diagnosis?” column, please send it to Lis Churchward – Editor, as above.

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What’s YOUR Diagnosis?

C&T No. 5220

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Figure 1.

Figure 2.

Figure 3.

Figure 4.

Vet’s summary

‘Mia’ is a 7yo F/N Siamese with a history of pancreatitis and diabetes mellitus, currently in diabetic remission. Recently she has had a few episodes where she has developed marked swelling of her distal limbs or ears (see photos). She has been taken to her local clinic each time and responded to therapy with antihistamines. Physical examination is very limited due to her, shall we say, less than compliant demeanour!

She is an indoor cat, but has access to an outdoor cat enclosure. There are no known insects/spiders in the area and the owners have cleaned all debris from the enclosure.

She is on a homemade diet. Vaccinations are up-to-date and currently she is not on medication.

Further observations from her owner:

I think Mia has always had allergies. She used to twitch and pull out her fur and have bald patches. I think everyone believed it was because she was highly strung and had the habit of pulling her fur but we came to see that it occurred at different times of the year and believed it to be an allergy.

She was sent once for an allergy test to a specialist but she bit the specialist and they rang me to come and get her telling me they couldn’t do the test – very naughty girl!

Since Mia’s diabetic diagnosis and since I changed her food to a balanced raw diet her coat has improved so much, being thicker and silkier and whilst I do see her twitch and pull her fur a bit she never has bald patches anymore.

She has 3 episodes now of this unusual swelling.

The first occurred on the 15th June. She woke up with fat big (see photo) and continued to swell up her leg. The next day her back paw became really swollen (see picture). The next day her back paw was slightly reduced but that evening her nose swelled up and was very wide. I gave her a bump shot of insulin this evening as her blood glucose levels were going up. The next day her nose was still swollen.

Today she appears quite normal.

Every time there was a new swelling during this episode it happened early evening?

What’s YOUR diagnosis?

Answer to: Rice crispy: C&T No. 5142

(Sept 2011)

That afternoon we gave her a antihistamine injection and a bump shot of insulin as her numbers were going up again and she was OK after this.

The third started on the evening of the 16th of September. Her ears and ankles were starting to swell and a few hours later her paws were getting bigger, too. The next day her ears were still swollen but her paws had reduced except for one. Late afternoon we gave her a anti-histamine shot but an hour later her back paw became really swollen (see picture). The next day her back paw was slightly reduced but that evening her nose swelled up and was very wide. I gave her a bump shot of insulin this evening as her blood glucose levels were going up. The next day her nose was still swollen.

Today she appears quite normal.

Every time there was a new swelling during this episode it happened early evening?

Figure 1. A 2-year-old DISH, male neutered with watery discharge from the affected eye (courtesy of Agnieszka Zoltowska)

Answer courtesy of Dr Jim Euclid’s excellent website: www.felipedia.org

C&T No. 5221

Acute bullous keratopathy

Acute bullous keratopathy is one of many corneal diseases in cats. In this syndrome, there is acute, severe, bullous keratopathy of unknown etiology. Young cats are most commonly affected and the problem is usually bilateral. The lesions either resolve with little or no scarring or progress rapidly to corneal perforation. A conjunctival pedicle graft is usually an effective means of preventing corneal perforation if applied sufficiently early. Thermokeratoplasty may also be of benefit.

Acute bullous keratopathy begins as a corneal ulcer with rapidly developing secondary edema (bulla). In cats, the bulla can range from a few millimeters in diameter to the complete cornea.

MARCH 2012

Authors’ views are not necessarily those of the CVE
What’s YOUR Diagnosis?

Several small vesicles may coalesce to form a larger bulla. This condition is usually bilateral, but initially it may appear unilateral.14

Etiology

The etiology and pathogenesis of feline bullous keratopathy is unknown. In published reports, tests for feline immunodeficiency virus, feline leukemia virus, feline infectious peritonitis virus, feline herpes virus (FHV), aerobic bacteria, Mycoplasma spp., Chlamydia spp., and fungi were negative. Microbial cultures are usually negative and organisms were not detected on cytologic examination.

There are several theories as to how this condition develops in cats. The first is that it may be an inherited stromal dystrophy, as has been reported in the Manx cat. Ultrastructural examination indicates severe stromal edema, as well as abnormalities in Descemet’s membrane. However, abnormalities are not detected in the endothelium. In contrast to cats with bullous keratopathy, the entire cornea eventually becomes involved and the corneal lesions are usually progressive over a period of several years.

The second theory is that the bullae are caused by a localized breakdown in the ultrastructure of the collagen fibers through an enzymatic degradative process. This results in a breakdown of the collagen fibers, causing a lack of structural support, as well as breakdown of the ground substance, whose function is to help imbibes fluid within the stroma.

A third theory is that an underlying condition, such as pre-existing uveitis, may cause bullae formation, as the inflammatory process taking place in the anterior chamber may disrupt the ability of the corneal endothelium to draw fluid from the corneal stroma. However, there is no histological evidence of inflammation in any of the reported cases of acute bullous keratopathy. The relationship between uveal disease and the corneal changes remains unclear. Finally, in cats that develop bullous keratopathy, there is anecdotal evidence of prior treatment with topical or systemic dexamethasone. However, there is no evidence that this predisposes the cornea to develop this condition, and several cases of bullous keratopathy have been published that have not received steroids.15,16

Similar conditions occur in dogs and humans; however, the clinical presentations, histopathology, and etiologies vary from the condition in cats. In dogs, formation of multiple small superficial corneal bullae occurs as a complication of severe corneal edema usually seen in chronic cases of endothelial dystrophy. In humans, the condition of keratoconus is a noninflammatory corneal thinning disorder that usually involves a focal area of the cornea, much like feline bullous keratopathy. However, keratoconus is usually more chronic in nature. Occasionally, there have been reports of keratitis (known as acute hydrops) and rupture seen after long-standing cases. The light microscopic findings in human keratoconus differ from those of feline bullous keratopathy, in keratoconus, keratin deposits are often present, and breaks in both the Bowman’s and Descemet’s membranes are seen. The edema seen in acute hydrops is the result of these breaks in Descemet’s membrane, which has not been documented with feline bullous keratopathy. The etiology of keratoconus is also unknown, but theories have been proposed, including genetic mutations (it is suspected to be an autosomal dominant trait), eye rubbing, atopy, Down’s syndrome, and systemic collagen disease such as Ehler-Danlos syndrome.14

Diagnosis

The diagnosis is made on the basis of clinical presentation and ophthalmologic examination, although the condition must be differentiated from septic ulcers with collagenolysis. Light microscopic examination confirms the diagnosis by revealing marked edema separating the collagen fibrils of the corneal stroma. Inflammatory cells are inconsistently present; when present, they are usually scant and occasional polymorphonuclear cells will be noted within the stroma. No abnormalities are seen in Descemet’s membrane or the endothelium on light microscopy. The cornea surrounding the lesions appears normal.14,15

Treatment

Treatment of feline bullous keratopathy consists of procedures that provide pressure or structural support to the bulla. The most common treatment is a combination of a keratectomy, conjunctival flap, and temporary tarsorrhaphy.6 If these surgical procedures are not an option for owners, a long-term third eyelid flap may be successful. The use of topical antibiotics, mydriatics, and antiglaucoma medications is indicated. Bullae may recur in the same spot as previous bullae or in new locations within the cornea. Some bullae resolve without treatment. The prognosis for bullous keratopathy with surgical treatment is good.16

References

Due to space constraints, we are unable to publish them here. Please go to: www.felipedia.org/~felipedi/wiki/index.php?title=Bullous_keratopathy

What’s YOUR Diagnosis?

APVMA encourages vets to report adverse product experiences

Reply to C&T No. 5182 page 44, 5183 page 46, 5187 page 48 in December Issue 265

C&T No. 5222

Australian Pesticides and Veterinary Medicines Authority (APVMA)
PO Box 6182 Kingston ACT 2604
T. +61 2 6210 4806
FreeCall: 1800 700 583 (within Australia) - charges apply for calls made from mobile phones
Fax: +61 2 6210 4813
Email: aerp@apvma.gov.au
www.apvma.gov.au

The December 2011 issue of C&T contained 3 articles relating to incidents of permethrin poisoning, bifenox toxicity and suspected diazepam toxicity in a cat.

None of these incidents was reported to the adverse experience reporting program—AERP—that is one key way in which the Australian Pesticides and Veterinary Medicines Authority (APVMA) obtains post-market feedback on the safety and efficacy of registered chemicals.

Each of these incidents was of direct relevance and interest to the AERP and the APVMA welcomes the opportunity to provide further details about this important element of Australia’s chemical regulation system to C&T readers.

The APVMA regulates veterinary medicines and pesticides up to and including the point of sale. Regulated chemicals include veterinary medicines such as antibiotics and vaccines, nutritional products with specific health claims, insecticides, fungicides and herbicides.

The role of the AERP within this framework is to provide post-market feedback on the efficacy and safety of all of these registered products.

The AERP collects data relating to adverse reactions to veterinary medicines as well as to agricultural chemicals. These reactions may involve an animal ingesting a garden pesticide and is not limited to surveillance of reactions in ‘target’ species (such as a typical vaccine reaction).

Most reports received are submitted by product registrants. However, the APVMA would like to see more reporting by vets to report adverse experiences or trends over time. This can enable the APVMA to take further action for example implementing label changes to alert users to potential hazards or side-effects.

While ‘off-label’ usage of ag- vet products is beyond the official scope of the AERP, the reporting of such reactions and
Comment on: Use of mitrazapine in feline medicine (C&T No. 5181)

C&T No. 5224

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Amy Kho suggests that mitrazapine can be given daily without serotonergic effects. Quinzy and others (2011a) found that CDF decreased clearance of mitrazapine. However, I have encountered ‘serotonin syndrome’ in a cat after 3.75 mg mitrazapine q24h. This 14 year old male domestic short hair had multiple problems including pyroglutamic acid and inflammatory bowel disease (both reasonably well controlled on long-term, low-dose prednisolone), diabetes mellitus (well controlled on Caninsulin), hypocalcaemia after a maternal dystocia (well controlled on oral calcium and vitamin D3 supplements) and chronic renal failure (CRF). The CRF was treated with a renal diet, phosphate binder, home administration of subcutaneous fluids, and intermittent use of antacids. As the CDF progressed and he became inappetant, mitrazapine was added at 3.75 mg q24h. After the second administration the owner noticed dilated pupils and odd behaviour that resolved within a day but after the third administration the dilated pupils and odd behaviour – hyperactivity and restlessness – were more marked and there was also rapid breathing. As these signs were consistent with serotonin syndrome the mitrazapine was stopped. The signs resolved without any treatment and did not recur. Quinzy and others (2011a) found that CDF decreased clearance of mitrazapine.

Our practice, like many others, has been treating inappetant cats with mitrazapine 3.75 mg q24h for a few years. However, over the last couple of years we have largely stopped using it, not through any evidence-based decision but because we had subjectively felt that it seemed to make no difference. The results of the small studies by Quinzy and others (2011a,b) will encourage us to give mitrazapine again, this time giving it daily, and at the lower (1.18 mg) dose.

References

The article by Dr. Whitehead was very interesting. I have a strong interest in this topic. He makes the comment that vets should have been more ‘out there,’ but the problems the breeders are not done to know! They know best. They are totally obsessed by their breed and can see no wrong in breeding them are badly hip and elbow dysplastic.

Two quick examples come to mind for me. One is the pug obsessed by their breed and can see no wrong in breeding hyperaesthesia. Many dogs will hide and yelp or scream for decreased heart rate and altered respiration may be signs of decreased intracranial pressure. Evidence of non-CNS disease. Should be evaluated, as non-infectious inflammatory brain disease does not result in systemic illness. Generally there are no abnormalities on physical examination. Pyrexia may be seen but is usually mild.

Patients with inflammatory CNS disease usually present with acute onset of CNS disease. Left untreated it is usually progressive and may be fatal it is often multifocal – multiple regions of the brain (optic nerve, forebrain, cerebellum, brainstem, spinal cord and/or meninges can be affected. Patients tend to have cerebral hyperaesthesia. Many dogs will hide and yelp or scream for no apparent reason. They are often quiet or dull and have gut abnormalities. Clinical signs vary depending on the neurological location of the disease. Generally we try to differentiate them into four categories in terms of building blocks: ataxia, pacing, ventral visual impairment with normal pupillary light reactions, > tions.

Perspective 89

Clinical Review: Non-infectious inflammatory CNS disease in the dog

Dr Amy Lam

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1. Signalement:
Age: 0-1y, 1-10y, 10+y
Breed: Toy breed, Terrier (including Staffordshire Bull Terrier), other
Sex: Female / Male, Entire / Desexed

Non-infectious inflammatory CNS disease is common in toy breeds and terriers; particularly: Maltese, Yorkshire Terriers, Pugs. However, it can occur in any breed or cross breed. GME is most commonly seen in middle aged dogs 4 to 8 years of age. NME and necrotizing leukoencephalitis (NLE) tend to occur in younger dogs (Rogerson, 2010). It has been reported to occur occasionally in females than males. Non-infectious inflammatory CNS disease may represent up to 25% of all cases of CNS disease.

2. Clinical Examination:
History: Acute, subacute, subacute or chronic or episodic
Mentation: Dull or bright
Evidence of systemic disease?
Heart rate / respiratory rate and effort
Systolic blood pressure: >160 mmHg without pain or stress
Neurological examination: focal, multifocal or diffuse disease

The findings may help distinguish more behind the nature of the disease. For example – increased systolic blood pressure and decreased heart rate and altered respiration may be signs of increased intracranial pressure. Evidence of non-CNS disease. Should be evaluated, as non-infectious inflammatory brain disease does not result in systemic illness. Generally there are no abnormalities on physical examination. Pyrexia may be seen but is usually mild.

Patients with inflammatory CNS disease usually present with acute onset of CNS disease. Left untreated it is usually progressive and may be fatal it is often multifocal – multiple regions of the brain (optic nerve, forebrain, cerebellum, brainstem, spinal cord and/or meninges can be affected. Patients tend to have cerebral hyperaesthesia. Many dogs will hide and yelp or scream for no apparent reason. They are often quiet or dull and have gut abnormalities. Clinical signs vary depending on the neurological location of the disease. Generally we try to differentiate them into four categories in terms of building blocks: ataxia, pacing, ventral visual impairment with normal pupillary light reactions, >
caudal fossa (ataxia, vestibular disturbance, cranial nerve abnormalities, obtunded mentation, hemiparesis to tetraplegia, vestibular dysfunction) or spinal cord disease (paralysis, paraparesis, ataxia proprioceptive deficits). Spinal cord disease may be multifocal but cervical involvement is most common.

Optic neuritis is recognized in veterinary patients with unilateral or bilaterally dilated pupils that are unresponsive to light stimulation. Funduscopic examination may reveal a hyperemic, oedematous optic nerve and vessels may be dilated and focal haemorrhage may be present. Infectious CNS disease has been differentiated into disseminated, focal or ocular forms. This distinction may or may not be important and made on the basis of clinical signs only rather than histopathology.

The ocular form (optic neuritis) affects the retinal or postretinal portions of the optic nerve. Some reports suggest better prognosis with the ocular form of GME in comparison to focal or disseminated disease. Some dogs with ocular GME may subsequently develop the disseminated or focal form of the disease.

![Figure 1: Fundic examination: Optic neuritis. Note swollen optic nerve.](Photo courtesy of John (JRB) Mould and Mark Billson)

3. Further diagnostics:

**Clinical Pathology**

Clinically, inflammatory CNS disease usually results in multifocal neurologic deficits. The diagnosis of non-infectious inflammatory CNS disease is made on clinical examination findings and exclusion of infectious agent, congenital malformations, metabolic derangements, intracranial neoplasia and exposure to toxins. In many cases a tentative diagnosis or short differential list can be made given the patients signalment, history and clinical signs. The combination of advanced imaging and clinical pathology (serology, CSF analysis) findings, are the most clinically used diagnostic tests used for the diagnosis of non-infectious inflammatory brain disease.

**Biochemistry, haematology, abdominal and thoracic imaging** tend to be unrewarding in assessing inflammatory CNS disease. However, they are essential in excluding metabolic causes of CNS disease – for example hypoglycaemia and hepatic dysfunction. Survey radiography of the thorax and abdominal ultrasonography can help to diagnose primary neoplasms that may metastasise.

**Plain radiology**

Survey radiography of the cervical vertebral column should be performed if clinical signs of spinal disease are seen. Radiographs have largely been superseded by the extended availability of advanced imaging (CT and MRI). Myelography is usually contraindicated in patients with inflammatory disease. Examination of craniovertebral developmental abnormalities can be performed on plain radiographs if there is a suspicion of atlanto-axial or craniovertebral malformation (right signalment and age) or a history of trauma. Radiologic technique and then interpretation of craniovertebral developmental abnormalities can be challenging. Another indication for contrast radiography includes thoracoolumbar disease. Extraarticular lesions such as disc protrusions can be seen by a defect in the myelogram. In rare situations these defects may be neoplastic, abscesses or other. All of these are other differentials for a focal spinal cord lesion; neoplasia is not rare. Imaging decisions should be made on lesion localization and most likely differentials.

**Computed Tomography (CT)**

CT is mostly used for assessment of bone and vascular lesions. It is not the ideal diagnostic for non-infectious inflammatory CNS disease. CT is less sensitive especially in evaluating caudal fossa lesions (brain hardening artifact from the petrous temporal bones). ‘Mass effect’ – deviation of the faix or disruption of normal brain anatomy may or may not be seen in either CT or MRI.

**Magnetic Resonance Imaging (MRI)**

MRI is the diagnostic modality of choice for non-infectious inflammatory CNS disease. MRI uses the fluid characteristics and change to magnetic signals to create an image of the soft tissue of the brain and spinal cord, which is superior to any other technique. MRI sequences are selected depending on scout images and suspected disease process. There are no ‘typical’ MRI findings for non-infectious inflammatory brain disease. Infectious, vascular or neoplastic diseases may look similar. Lesions may be single or multiple. Various sequences are used (T1, T2, Fluid attenuating inversion recovery (FLAIR)). Contrast is commonly used as part of the standard examination. Typically the features of lesions seen on MRI of non-infectious inflammatory brain disease are as follows:

- **T1**: hypointense
- **T2**: hyperintense
- FLAIR: hyperintense
- Contrast enhancement (with gadolinium) is variable.
- Meningeal enhancement is variable

In some cases no abnormalities are seen. In our practice, all patients are anaesthetized for MRI, as the area scanned must be completely motionless. We have not had any adverse reactions to anaesthesia nor to contrast administration.

**Imaging**

- Radiography
- Computed Tomography (CT)
- Magnetic Resonance Imaging (MRI)

**CSF analysis**

CSF collection from patients with non-infectious inflammatory brain diseases generally show mild to moderate pleocytosis with a predominance of mononuclear cells and variable elevation in the concentration of protein in the CSF.

WBCC: variable between <10 cells to >5,000 cells/μL

- Normal: <0.5
  - Mostly small lymphocytes (60-90%)
  - Monocytes (10-20%) and large macrophages

Neutrophils usually <20%, but can be the predominant cell in some cases

Eosinophils occasional

Protein: variable: normal to >4g/L

- Normal CSF protein is <0.3g/L (cisternal tap), <0.5g/L (lumbar tap, see FIGURE LUMBAR TAP)

CSF can be cultured for bacteria aerobically / anaerobically and fungi. Cultures are rarely positive. CSF can also be submitted for PCRs and cryptococcal antigen testing.

**Figure 2: Multip核 hyperintense lesions on T2 image. (Courtesy of Dr Georgina Child and SMRI)**

**Figure 4: Cavitated lesions on T1. This is consistent with NME. (Courtesy of Dr Georgina Child and SMRI)**

**Clinical Pathology**

- Serology
- CSF collection
- Histopathology

**Serology**

Serology is vital in excluding infectious causes of inflammatory brain disease. Further testing should be performed as indicated in Australia.

- **Viruses**: are very uncommon in Australia.
- **Fungus**
  - Cryptococcosis (LCAT or identification – serum or CSF)
  - Aspergillosis
  - Exotic pathogens: Blastomyces, histoplasmosis, coccidioidomycosis
- **Protozoa**
  - Toxoplasma (Serum IgG and IgM levels, IgM of doubtful value in dogs. Rising titres may be of more diagnostic significance)
  - Neospora (Serum IgG + rising titre)

**Figure 3: Multiple hyperintense lesions on T2. (Courtesy of Dr Georgina Child and SMRI)**

**Figure 5: Lumbar CSF collection (Photo courtesy of Dr Georgina Child)**
achieved by brain biopsy. Stereotactic CT guided biopsies are the
definitive diagnosis. Treatment with steroids will change CSF analysis, however if used for <48 hours, it is less likely to change NR findings, thus stabilize the patient before diagnostic tests can be performed

Recommended initial doses of Prednisolone:
- Small dogs 2-4mg/kg/day divided
- Larger dogs >40kg: 50mg/m²/day divided. Maximum dose: 40mg/dog a12hrs

Clients are always warned about the significant side effects of corticosteroid use prior to treatment. Typically the doses are tapered after the first 2-4 weeks, slowly over the following 6 months or more; dose reduction depending on the clinical response of the patient. If remission is achieved most animals will need to be maintained on prednisolone (0.5-1mg/kg every other day or 2-3x a week) for the following 1-2 years. If the patient remains disease free, further dose reductions can be made again at this time. If the patient has recurrence of disease, or the side effects of prednisolone are excessive, alternative treatments should be combined with corticosteroids. Larger dogs tend to not tolerate long-term therapy well. Early adjunctive treatments should be considered, most patients require low doses of corticosteroids.

Significant side effects of corticosteroids
- urinary accidents (polyuria/polydipsia)
- polyphagia and weight gain
- excessive panting and lethargy
- iatrogenic hyperadrenocorticism
- muscle wasting
- calciﬁ cation of joints
- important,
- gastrointestinal ulceration (from anti-prostaglandin effects)
- pancreatitis (due to polyphagia and hyperlipidaemia)
- diabetes mellitus (from chronic hyperglycaemia)
- infections (especially urinary tract infection from reduced urine concentration)
- ligamentous and tendon injury
- pulmonary thromboembolism

Survival times: 2 – 1200 days. (Granger, 2010)

Azathioprine
Azathioprine is used in non-infectious inﬂ ammatory brain disease as an immunosuppressive therapy. It acts to inhibit T-cell function. It does cross the blood brain barrier in normal dogs. Effects tend to be variable. Side effects include:
- idiosyncratic pancreatitis, gastrointestinal disturbance, liver failure and myelosuppression. Liver failure and myelosuppression tend to occur in patients treated at high doses for extended periods of time. Recommended dose: 2mg/kg PO SID for 7-10 days, then 1mg/kg PO/day ~ 7mg/kg PO/week. We recommend azathioprine should be handled with gloves, not be split or crushed due to the possibility of human toxicity including drug-related neoplasia or mortality with this treatment.

Recommended dosing:
Initial: 0.5-1.0mg/kg q48 hours
Maintenance: 2mg/kg 24hr for first 5-7 days. Survival times not reported.

Cytosine Arabinoside (Cytarabine, Ara-C)
Cytarabine is a parenteral anti-neoplastic therapy. It has commonly been used to treat CNS lymphoma, lymphomatous neoplasms and myeloproliferative diseases in dogs. It prevents DNA synthesis. It readily crosses the blood-brain-barrier and has immunosuppressive and its immunosuppressive effects. It has a short duration of action. Cytarabine has been described as a treatment for non-infectious inﬂ ammatory brain disease as a continuous IV continuous infusion 100mg/m² 24 hours every 3 weeks (Smith, 2010). It has also been used at 50mg/m² by subcutaneous injection twice a day for 2 consecutive days with this cycle repeated every 3 weeks. This dose is lower than doses generally used as part of chemotherapeutic protocols for neoplasia. Side effects are uncommon, but include myelosuppression. Myelosuppressive effects are most pronounced with IV administration and are usually seen within the first 10-14 days, thus patients on chronic therapy should be assessed with a CBC 10-14 days after the first and second cycle of treatments, then every 3 months. Gastrointestinal side effects are uncommon. Cytarabine is relatively inexpensive and patients can be treated as outpatients. In our experience, this treatment has been very effective. The frequency of administration can be reduced to every 4 weeks, after 6 months of successful treatment, and again the frequency of administration reduced every 6 months depending on the stability of the patient’s neurologic status. Chemotherapy handling practices should be adhered to by the clinician and the client. Cytarabine is best used in conjunction with prednisolone. The dose of prednisolone dose can be reduced incrementally after each 2 cycles of cytaraﬁ ne if an animal’s neurologic status is stable. Cytarabine can be used indefinitely.

Recommended dose:
A: 100mg/m² IV over 24 hours in saline every 3 weeks
B: 50mg/m² SQ twice a day for 2 consecutive days with this cycle repeated every 3 weeks.
Survival times: 46-1025 days (Granger, 2010)

Cyclosporine has also been proposed as a treatment for non-infectious inﬂ ammatory CNS disease, as it is a recognized therapy for T-cell mediated immune disease by modulating interleukin 2 and α interferon. Cyclosporine is lipophilic; it modulates T-cell mediated immune responses. The blood brain permeability of cyclosporine is increased in dogs with perrivascular disease – thus achieves higher concentrations in the CNS with meningeal inﬂ ammation. Side effects are predominantly gastrointestinal – causing vomiting, diarrhoea and anaemia. Myelosuppression is rare. Gingival hyperplasia and hypertrichosis is occasionally observed.

Recommended dose:
Initial dose 6mg/kg BID with cranberry juice (to increase absorption) with a blood cyclosporine trough level target of 200-400ng/mL. The trough level should be tested 5-7 days after starting therapy and weekly for 1 month and every 4 months thereafter. Best absorption on an empty stomach. Cyclosporine can be an expensive medication long term, particularly in larger dogs. It is not recommended in dogs with hepatic metabolism.
Survival times: 6-1290 days sole therapy, with corticosteroids median: 930 days (Grieger 2010).

Alternative treatments:
Leflunomide is an immunomodulatory drug used in humans primarily in the treatment of rheumatoid arthritis. It has been used in dogs in conjunction with corticosteroids, or as a sole maintenance therapy in dogs with unmanageable steroid side effects. It is not a first line therapy for non-infectious inflammatory disease in dogs.

Recommended dose: 2mg/kg once a day initially.

Procabazine is an antineoplastic drug that is lipid soluble and readily crosses the blood brain barrier and used predominantly in human medicine to treat lymphoma. Side effects include myelosuppression, gastrointestinal signs and hepatic dysfunction.

Recommended dose: 25-50 mg/m2/day.

Lomustine is an antineoplastic alkylating agent. It is highly lipid soluble therefore crosses the blood brain barrier. It can be used when there are concerns that the underlying cause is CNS lymphoma, or primary brain tumors. It is not recommended for dogs with idiopathic non-infectious inflammatory CNS disease i.e. GME, NME. Treatment can cause myelosuppression, gastrointestinal ulceration, and hepatotoxicity.

Recommended dose:
Brain tumours: 60mg/m2 every 5-8 weeks for 6 months.
Lymphoma: 60-90mg/m2 every 3 weeks for 3 treatments, then every 4-6 weeks.

Additional therapies:
1. Animals with seizures should also be treated with an anticonvulsant in addition to immunosuppressive medications.
2. It is recommended that dogs placed onto corticosteroids (and phenobarbitone) be put onto a low fat, high fibre diet. This diet tends to increase satiety, and reduce polyphagia which commonly leads to pancreatitis, intestinal foreign bodies, and bloat.
3. Long-acting injections such as vaccinations, and pro-heart injections are non-recommended in dogs with immune mediated disease, unless absolutely necessary. There is no evidence to support vaccines, other injections or other causes of antigenic stimulation as a cause of non-infectious inflammatory CNS disease; however, relapses have been anecdotally reported after vaccination.

Intranasal vaccines, and vaccinations depending on serum titres and prevalence of disease are preferred.

Response to therapy
Response to treatment is usually gauged on clinical signs. Repeated CSF or MRI assessment can be performed, but is generally not required in the initial management of the disease. In our experience, the majority of dogs respond well to therapy with corticosteroids initially. We tend to add cytosine, and / or azathioprine and / or cyclosporine for steroid sparing effects – to enable possible earlier reduction in corticosteroid dose. Cytarabine can also be used as a first line treatment in animals with severe neurologic abnormalities and/or in those where clinical response is incomplete with high dose prednisolone during initial treatment. Therapy is usually for 6 months, with many dogs requiring long-term therapy, with low-doses of corticosteroids.

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