Special Anniversary Issue

Control & Therapy Series

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FREE Vetmedin® for the initial treatment of 1,000 dogs with preclinical heart disease*

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ONLY Vetmedin® is registered for the treatment of preclinical (stage B2) MMVD.*

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Join us in helping 1,000 dogs have a healthy heart for longer

 disclaimer: Knowledge and best practice in the field are constantly changing. As new research and clinical data become available, changes in practice, treatment and drug therapy may become necessary or appropriate. Readers are advised to check the most current information provided by the manufacturer of each product to verify the recommended dose or formula, the method and duration of administration, and contraindications. It is the responsibility of the practitioners relying on these materials to determine when and how to use them responsibly in each case, and to verify the accuracy of diagnosis, to determine dosages and the best treatment for each individual patient, and to take all appropriate safety precautions. The views expressed in the letters, comments and replies do not necessarily reflect the views of the author(s) or the publisher, and do not constitute an endorsement by the author(s) or the publisher. The publisher cannot be held responsible for any injury and/or damage to persons or property arising out of or related to the use of the materials contained in this publication. 
From the director

2019 has not started well for many of our colleagues, with severe flooding in far North Queensland, extensive bushfires, heat waves and a worsening drought affecting much of the continent. Signs of a slowing economy are starting to be acknowledged by even the most optimistic forecasters, which means that on top of the natural disasters there is little to look forward to in the immediate future.

Many younger Australians have never lived through a major economic downturn, given that we did not suffer during the GFC nearly as badly as much of the western world. Unfortunately, a stagnant or shrinking economy has a negative impact on all types of veterinary practice, on top of the adversity imposed by climatic aberrations. When times are tough, discretionary spending is reduced and unfortunately this can impact on many routine visits to the veterinarian.

Having been through this situation in regional mixed practice several times during my years as a principal, it was soon realised that rather than sitting around waiting for it to rain and for the economy to pick up, time can better be spent working on aspects of the business which are often neglected when everyone is flat out. Time can be well spent on improving your HR and business systems, stock control, assessing the usefulness and lifespan of older equipment, getting essential repairs and maintenance completed, taking overdue leave and analysing your client relationships, so that when things start to pick up, you and your team are ready and raring to go.

Another factor adding insult to injury is the impact of a shortage of veterinary locums across the country. Despite graduating more vets each year than the UK, we have the paradox of a workforce shortage, which means that many practices are finding it hard to send vets on CPD courses or to accommodate annual leave requests. Thankfully, with our affordable TimeOnline courses, the CVE offers a broad range of subjects which can be taken without leaving the practice and enable people to stay up to date with the latest information.

For those who can get away and long for some in depth learning, the June Melbourne conference will set you and your practice up to handle emergencies both medically and surgically, with two entertaining and very informative speakers from the UK—the husband and wife team of Sophie Adamantos and Mickey Tivers, backed up by high calibre local speakers. See the CVE website and emails for further information. This course looks like being a corker!

The feedback survey after the recent cardio-respiratory conference held in Melbourne was extremely positive, which was self-evident during the conference, so for those of you CVE members who were unable to attend, look out for the recordings of the lectures as they become available in the CVE video library. As usual we asked for suggestions of future conference topics, and there were numerous requests for practical neurology. Guess what? The CVE holiday destination conference will provide exactly that, with 4 days of practical neurology to be held in Cairns in September.

Calendarempty

Respiratory Failure
Tue 23 April - Mon 20 May 2019
Small Animal Nutrition
Mon 6 May - Sun 2 June 2019
Feline Emergencies
Mon 13 May - Sun 9 June 2019
Practical Ophthalmology
Mon 20 May - Sun 16 June 2019
Avian Anaesthesia & Analgesia
Mon 3 - Sun 30 June 2019
Equine Lameness
Mon 3 June - Sun 14 July 2019
Shock & Fluid Therapy
Mon 17 June - Sun 14 July 2019
Goat Medicine & Husbandry
Mon 8 July - Sun 4 August 2019
Canine Abdominal Ultrasound
Mon 15 July - Sun 11 August 2019
Rabbits & Rodents
Mon 12 Aug - Sun 8 Sept
Heart Murmurs & Coughing in Dogs & Cats
Mon 5 August - Sun 1 Sept 2019

Workshops

Backyard Chickens
Mon 1 - Sun 28 April 2019
Demystifying ECGs
Mon 8 April - Sun 5 May 2019
Essential Wellbeing & Coping Skills for Veterinarians
Mon 15 April - Sun 12 May 2019

PodcastPLUS

Clinical Reasoning in Veterinary Neurology
Thu 28 March - Thu 4 April 2019
Dealing with the Emergency Cat
Thu 25 April - Thu 2 May 2019
Avian Radiology
Thu 30 May - Thu 6 June 2019
Update on Drugs in Behaviour Medicine
Thu 27 June - Thu 4 July 2019
Salmonella - Cast it Out!
Thu 25 July - Thu 1 August 2019
Adrenal Diseases in Cats
Thu 29 August - Thu 5 Sept 2019

Calendar Key

Conference
Seminar
Workshop
TimeOnline
PodcastPLUS
Theory & Practice

More information and bookings available at https://www.cve.org.au

Author: Hugh White
Issue 294 March 2019

CVE Control & Therapy Series – Issue 294 March 2019

Centre for Veterinary Education | Est. 1965
CVE Control & Therapy Series – Issue 294 March 2019

Centre for Veterinary Education | Est. 1965
A study investigating the use of the hand-held infrared thermometer to identify horses with high skin surface temperatures as an early detection method for exertional heat illness in thoroughbred racehorses: a study at the racetrack

M A Brownlow & T Cole

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Abstract: Thoroughbred racehorses perform exercise at maximal intensities and typically become hyperthermic due to the huge amount of metabolic heat that is produced during racing. Despite a thermoregulatory mechanism which performs efficiently in most circumstances, certain weather conditions can compromise the horse’s ability to dissipate heat. Early detection of exertional heat illness (EHI) in thoroughbred racehorses can be difficult because signs are often vague and the measurement of rectal temperature as an indicator of hyperthermia is not practical. Best practice in the treatment of EHI in horses, as in humans, centres on early detection, rapid assessment and aggressive cooling. Research in humans has shown that EHI is manageable when recognized early and appropriate treatment provided.

The aim of this study was to investigate infrared measurement of skin surface temperature as an indicator of hyperthermia is not practical. Best practice in the treatment of EHI in horses, as in humans, centres on early detection, rapid assessment and aggressive cooling. Research in humans has shown that EHI is manageable when recognized early and appropriate treatment provided.

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50 YEARS OF EVOLUTION
In pictures, as depicted on our anniversary cover

It begins with the original ‘Hungry Tom’s green notes’ and shows the progression of the series.

Vets & contributors provide our cover images
As we proudly proclaim, the C&T is written by vets for vets. Likewise, our contributors have provided all the wonderful images that have graced our covers since we went colour—a tradition we are keen to maintain, so please get your cameras out next time you see an interesting case.

Complementary eBook
Established March 2012, Issue 266
Producing a complementary eBook version in addition to print allows for the inclusion of multimedia as well as the facility to produce images in full screen. The eBook is emailed to all CVE Members quarterly while the back issues are saved here: www.cve.edu.au/control-and-therapy. Watch the 3 Videos in this issue in the eBook version.

Reading the C&T for the first time?
Brief definitions
C&Ts: Ideally, short, pithy, practical articles ranging in length from a few lines to a page or two, hopefully accompanied by colour images, videos, graphs, X-rays, hand-drawn diagrams, tables etc. They should be something you can read and put into practice today.
Perspectives: Generally lengthier and more technical or theoretical.

We want to hear from you!
Is there one C&T or Perspective that is of particular importance or significance to you? Perhaps an article that revolutionised your approach to a particular disease or method? Or a particular issue that stands head and shoulders above the rest? Or maybe an article that you contributed that affected you in a profound way…? We’d like to hear what the C&T means to you and why you value it.

The best reply will win a voucher for CVE$1,000!
The 3 runner-up comments will each win a voucher worth CVE$250
Submissions are open until 30 October 2019 with the winners announced in the December 2019 issue.
We look forward to your feedback!
Thank you.
Please send your reply to:
Joanne.Krockenberger@sydney.edu.au no later than 30 October 2019. It may be that the C&T or Perspective you nominate has stood the test of time and should be reprinted so that newer veterinary graduates can benefit from its wisdom.

AVIAN
Owls:
1. A Sooty Owl (Tyto tenebricosa) with aspergillosis
2. A Powerful Owl (Ninox strenua) with Haemoproteus infection

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Comments Courtesy of Bob Doneley BVSc FANZCVS (Avian Medicine)
CVE Tutor for Backyard Chickens TimeOnline course.

Background:
‘HigherGround Raptors’, located in the Southern Highlands, was started and is owned and run by Peg McDonald. The facility rehabilitates sick, orphaned and injured raptors and owls.

1. A Sooty Owl (Tyto tenebricosa) with aspergillosis

Allied organisation Australian Raptor Care and Conservation Inc (ARCC Inc) is a not-for-profit organisation dedicated to furthering and sharing our knowledge with regard to the rehabilitation and release of injured and sick raptors and owls. ARCC Inc is also dedicated to furthering our knowledge of these wonderful birds. See www.australianraptorcareandconservation.com.

HigherGround Raptors has a purpose-built circular flight aviary modelled on the flight aviary at Abu Dhabi Falcon Hospital, but adapted for the climatic conditions found in the Southern Highlands of NSW. Peg McDonald has travelled to the Falcon hospital four times and completed 16 weeks training in raptor care and treatment.

She also has successfully rehabilitated and released over 1,000 raptors/owls over the past 30 years.

The aviary is 100m round and between 6-8m high. It attaches to two traditional rectangular aviaries which feed into it when birds are deemed ready for more appropriate exercise.

Southern Highlands Veterinary Centre provides pro bono veterinary services to this wonderful charity.

Sooty Owl (Tyto tenebricosa)

This owl presented as a second opinion in November 2016 with a chronic wound on the left distal tibiotarsus with a large amount of scar tissue.
There was no evidence of osteomyelitis (bone infection) in the left leg on radiographs. Her white cell count and heterophil count was within the normal range. She was started on half an Amoxyclav (amoxicillin/ clavulanic acid) 250mg twice daily and also oral meloxicam at a dose rate of 0.5mg per kg twice daily.

BOB DONELEY’S COMMENT:

The accepted dose of meloxicam for birds is actually 1.5mg/kg q12h. There may be some species variation, but I use the highest dose in all raptors without a problem.

Prior to admission here the Sooty Owl had been kept on organic material in a box for one week, then moved to a carer who maintained her in a large box with shade cloth over the top and a soft towelling base to facilitate clean wound healing for approximately four weeks.

She had been maintained on a suitable diet consisting primarily of rats and mice, and this was continued with feathered quail added once weekly.

Eight days later she was re-examined under general anaesthetic. A large portion of necrotic material was removed from the wound on left leg and the wound was flushed and the skin edges debrided and closed with 3-0 polydioxanone (absorbable suture material).

Following surgery she was started on clean quail and chicken and housed in the intensive care unit. The oral antibiotics and meloxicam were continued for another 5 days.

Following suture removal she was moved to a small 3x3x4m aviary to allow her access to sunshine and fresh air without a lot of movement, flying and bouncing. She had been eating well, but following transfer into the small aviary she was reluctant to feed for three days, and then a very faint noise was detected when she was breathing. There was no open mouth breathing.

It was decided to monitor her closely and move into intensive care again, but by the next day her condition deteriorated rapidly and she died suddenly.

2. A Powerful Owl (Ninox strenua) with Haemoproteus infection

A Powerful Owl presented from the Milton area on the South Coast of NSW. He was found by a member of the public who lived in an area surrounded by forest.

This owl was observed sitting/lying on the ground and becoming progressively weaker over a period of five days, during which time the member of the public tried to contact an appropriate rescue group.

On presentation he was extremely thin and very weak. He was also ataxic and unable to walk. He was presumed to have suffered some sort of traumatic event resulting in him being unable to fly and thus hunt. His weight was 1,070 grams (females average 1,250 grams and males 1,450 grams), and given his current starved state he was likely to be a larger male.

It is important to note that Powerful Owls (along with other Ninox Owl species—the Rufous and Barking Owls) exhibit normal sexual dimorphism where the males are larger than the females. Reversed sexual dimorphism, where the females are larger than the males occurs in other owl species such as the Sooey owl and Masked owl.

Bedding should not be organic (newspaper, straw, shaving). Aspergillus fumigatus is found commonly in the environment. It is also saprophytic meaning it grows in decaying organic matter, and this is the reason that organic bedding should be avoided at all times. It is also opportunistic and is more likely to infect birds with a compromised immune system.

Clean intact towels that can be changed regularly are ideal. The bird should be kept in a well ventilated area to ensure regular exchange of fresh air. Birds should also be removed from their enclosure before cleaning due to the risk of inhaling fungal spores that become airborne during the cleaning process.

BOB DONELEY’S COMMENT:

Many raptor and owl species are prone to aspergillosis, especially in the stressful conditions of captivity. Many avian vets routinely start them on terbinafine (Lamisil®) 10mg/kg q24h or itraconazole 10mg/kg q24h as a prophylactic therapy.

He was examined under anaesthesia and blood was collected from the cutaneous ulnar vein. NB: no more than 8%
He required intensive treatment to ensure his survival. Peg McDonald started him on Vetfarm Spark, giving 10mLs via tube feeding every couple of hours. After 12 hours, egg yolk was added to the Spark mix and he was fed every 4.5 hours. After 24 hours, blended chicken meat to puree consistency was added to the Spark and egg yolk mix—feeding around 18mLs every 4.5 hours. After 36 hours hand feeding commenced using clean chicken breast.

This regime saw him eating solid food faster than a more typical patient, but he was at high risk of starvation and required a faster progression onto solid food.

Once the ataxia resolved after 10 days he was allowed to feed unassisted. He was provided with clean chicken and quail meat. Owls can’t digest bones and fur as their proventriculus produces much less acidic stomach acid, so it is important to provide clean meat whilst they are convalescing. Feeding food items with bones and skin will require the owl to work harder digesting this food and is less desirable in a hospital situation.

In fact, raptors like goshawks have stomach acid 20 times stronger than owls meaning they can digest bone, whereas owls can’t digest bone and need to pass bones and fur as casting.

One month later and the Powerful Owl was doing very well. He had gained weight and was showing no signs of ill health. He was re-examined under anaesthesia and blood was collected to check the status of the Haemoproteus infection. His weight had increased to 1400 grams.

The blood results showed his red cell count had increased to within the normal range (see table left).

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The blood results showed his red cell count had increased to within the normal range (see table left).

It was now very difficult for the pathologist to locate Haemoproteus organisms, meaning the infection had almost completely resolved without specific treatment, as his health had improved and he gained weight.

He was released in the same area he was found after one month in care.

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If you would like to follow our work, check out the HighGround Raptors and Australian Raptor Care and Conservation Inc Facebook pages.

If you can assist us in any way please feel free to contact Charlie via charlie@southernhighlandsvets.com.au
Veterinary care of bats and Australian Bat Lyssavirus

Kate Bodley & Sarah Frith
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Anne Fawcett’s C&T No. 5705 was very relevant as we approached the summer season, when flying fox feeding activity and numbers are at their highest. The frequency of reported interactions between bats and people will probably continue to increase, as urbanisation and development results in closer contact with wildlife. All bats are vulnerable to a range of anthropogenic threats, such as roost disturbance and habitat destruction. Thirteen of Australia’s bat species are now listed as threatened under our national conservation legislation, including the grey-headed flying fox.

The relatively recent establishment of grey-headed flying fox colonies in Victoria means that these charismatic and intelligent animals are frequent patients in Zoos Victoria’s wildlife clinics. Injuries suffered by bats often are severe, and require immediate veterinary attention to relieve pain and suffering.

Veterinary intervention is required following bat interactions with humans and pets:

- Clinical assessment and treatment of injured bats: insectivorous bats and flying foxes. Entanglement in fruit netting is a major cause of hospital admissions of grey-headed flying foxes in Melbourne, and these animals may have devastating soft tissue trauma of the wing/s and oral cavity (Scheelings and Frith, 2015).
- Humane euthanasia of a bat for testing, following a report of possible ABL exposure (bite or scratch to pet or person).
- Providing advice for pet owners following bat-pet contact: dog attack, as described in C&T No. 5705, or cats that have presented an insectivorous bat to their owner.

Within Zoos Victoria’s veterinary clinics, animal care staff follow these protocols when handling bats:

1. They must have completed the pre-exposure rabies vaccination course, and their rabies neutralising antibody titres must be adequate when checked. Titre checks are performed every two years. The initial course of pre-exposure rabies vaccine is provided free of charge to Australian wildlife handlers working in a volunteer service in Victoria.

2. Staff members that are involved with capture, restraint and/or assessment of bats must have received adequate training in restraint and safe handling of bats, and must be wearing mandated personal protective equipment (PPE) during procedures.

When handling flying foxes, a long-sleeved shirt or jacket of heavy material (with both sleeves buttoned at the wrist) and long pants must be worn. We use 19” Protective Arm Sleeves (Hexarmor® AS019S) to prevent scratches that may occur during restraint. These are manufactured for industrial puncture protection and are washable. In addition, two layers of gloves are worn: protective gloves (Hexarmor® leather or deerskin handling gloves) with a nitrile or latex glove must be worn by all staff members involved with handling a conscious flying fox. Once the bat is safely anaesthetised, the outer gloves can be removed and nitrile or latex gloves are worn throughout the procedure. Glasses/goggles and surgical mask or face shield are worn when there is risk of exposure to bodily fluids or injury from a conscious bat.

When handling insectivorous bats, a double layer of disposable gloves is worn, with the outer glove being nitrile.

When handling dead bats, direct handling of the animal (e.g. barbed wire). Needle stick injuries pose a similar risk—do not recap needles.

Euthanasia

The most frequently-used method for induction of anaesthesia is restraint for administration of gaseous anaesthetic agents by facemask. Lethabarb is then administered IV via the saphenous (interfemoral) vein in the uropatagium, or the cephalic vein. If the bat is contained in a transport box, you can adapt the box for use as an induction chamber to induce anaesthesia with minimal handling. Intramuscular administration of medetomidine/ketamine combination may also be used to anaesthetise an animal prior to euthanasia. Forty mg/kg tiletamine/zolazepam squirted directly onto oral mucous membranes may immobilise flying foxes in situations where handling is extremely dangerous—this method is not recommended for routine procedures, as anaesthetic recovery is prolonged and variable (Heard 2014).

Possible ABL exposure cases:

C&T No. 5705 outlines the approach required when a case of possible ABL exposure is reported in NSW. Each state animal health authority produces recommendations that will assist veterinarians involved in these cases. In our experience, such cases can have very complex histories, and several people may have had contact with a single bat before it is presented at the veterinary clinic. In Victoria, state authorities do not yet have a formal, co-ordinated system for transportation of bats and/or bat tissues between veterinary clinics and laboratories, and we rely on the goodwill and hard work of rabies-vaccinated wildlife carers, veterinary pathology couriers, and the state’s veterinary pathologists and animal health officers to make the system work.

In all possible exposure cases, the bat must be tested for ABL, therefore submission of tissues to the relevant government laboratory must occur as quickly as possible. Often the bat is alive following these interactions, and must be transported to a veterinary clinic for euthanasia and submission of fresh tissues for testing. When ABL testing is required, the entire body is submitted on ice (double-bagged, sealed in an esky that is clearly labelled as a potential biohazard, with submission documents provided free of charge)

Figure 1: Hexarmor® protective sleeves will provide protection against bites and scratches and are easy to wear. Nitrile gloves are worn throughout the procedure. During conscious restraint and anaesthetic recovery, additional leather/deerskin/Hexarm® gloves are also worn, as these are the periods when there is greatest risk of bite injury.

Figure 2: The lesser long-eared bat Nyctophilus geoffroyi is an insectivorous bat, here in dorsal recumbency. The location of the cephalic vein (white arrow) and saphenous vein (red arrow) is similar in all bats.

Figure 3: The grey-headed flying fox, Pteropus poliocephalus, in dorsal recumbency. The location of the left cephalic vein (white arrow).
Please send us your pocket pets, exotics, bird, fish & canine cases!

We aim to keep the Control & Therapy Series a varied forum, not skewed towards any species. Please write up the interesting case you saw recently and include videos, coloured photos and other visuals where possible and email or post to:

Joanne.Krockenberger@sydney.edu.au

How does a vet find a new disease that no one has seen before?

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This a very brief version of events: I thought I could have discovered a new disease, possibly zoonotic from flying foxes. There were 9 dogs in a yard over which flying foxes were flying—dropping faeces, urine, and dead foetuses in the yard, as the client’s house was close to their roost in Cessnock. Test, I hear you say. All 9 dogs developed a cough, two died, the husband also developed a cough and was apparently quite unwell. The concept of One Medicine / New Zoonotic Disease—all these were running through my mind!

We only had clinical interaction with two of the dogs. The first died in spite of treatment. The second was treated and then an autopsy. The pathology specimens were sent to Elizabeth Macarthur Agricultural Institute (EMAI) after talking to a pathologist there—they were worried this was an unknown zoonosis.

The EMAI pathologist’s reports were inconclusive. I argued that EMAI was a Government lab and should be looking for new disease causative agents, but apparently they only look for what they already know, especially notifiable diseases. They do not try to look for what they do not know.

So who looks for diseases we do not already know about?

RESPONSES

1. Siobhan Mor
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From my perspective, and even before further laboratory investigation, I would still think the scenario should— as a first step—be reported to the Animal Disease Hotline (1800 675 888). This would engage government veterinarians in the risk assessment process and usually they are better informed than private vets in terms of who to engage (public health unit, wildlife coordinator etc.)

But there are some legitimate hurdles in this scenario as it involves a companion animal species, which doesn’t really fall under the remit of government unless there is a clear threat to the livestock industry and/or public health (much to the frustration of private vets).

This is a bona fide gap in disease surveillance (lack of companion animal health surveillance) — and it is common throughout the world. In Australia, there is the National Significant Disease Investigation program (NSDI) (www.animalhealthaustralia.com.au/what-we-do/disease-surveillance/national-significant-disease-investigation-program) which pays a subsidy to private vets to investigate significant disease events; private vets should know about this though I suspect this is still largely directed to livestock investigations. Then there is the question of lab capacity and whether state labs have the capacity and remit to investigate unknowns in companion animals. I suspect in the end this kind of scenario falls to researchers to investigate (in universities or government labs), but the entry point for a private practitioner to engage with that side is probably not very clear.

2. Keith Eastwood
Epidemiologist
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This is an interesting topic and one that has challenged our (human) public health unit in the past when we’ve been involved with animal health situations such as a kangaroo die-off. Early notification is an important starting point so that agencies can determine whether they have a role.
Managing disease outbreaks and public health incidents that occur at the human and animal health interface

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Introduction
Incidents such as animal die-offs, zoonosis clusters, chemical spills, emerging diseases and a host of other events impact on human, animal and environmental health. As such the response can be complex and involve multiple agencies and organisations that rarely work together at the coal-face. The following article identifies some of the issues and challenges and is taken from a presentation delivered at the 2016 One Health EcoHealth Conference, Melbourne and co-authored by Paul Freeman, Tiggy Grillo, Tony Merritt, Peter Massey and David Durrheim.

Understanding One Health
In a simplistic fashion, One Health may be considered as the area of intersect between various disciplines usually confined to human, animal and environmental health. However, in reality One Health is complex and responding to a One Health incident may involve multiple agencies plus a host of stakeholders such as the RSPCA, Wildlife Health Australia, councils, interest groups, local veterinarians, land management groups, environmental bodies, community organisations etc. The geographical jurisdiction of these groups rarely coincide so an incident affecting a large area may impact multiple branches and organisations in other states and territories. Additionally, other disciplines such as the social sciences may have relevance.

Managing One Health incidents
Coordination of expertise and inter-departmental collaboration is important. In some circumstances the lead agency is obvious, however, in other situations responsibility may be blurred and leadership may become an issue. In a recent joint exercise (Tamworth, 2017), 7 organisations were invited to meet and discuss bat-related environmental issues with each group asked to nominate the lead agency. Six different suggestions were provided and no group stepped forward themselves.

In the response or are, at least, able to monitor progress. Pursuing an emerging disease, per the scenario provided, would depend on the circumstances and explores the boundary of surveillance and research – a likely area of contention. Pragmatic issues such as lead agency, cost-sharing and media reporting have already been mentioned but are crucial and not always easily resolved.

It is not possible to have a conversation involving One Health incidents without considering how much easier incidents like this would be managed through a national communicable disease control centre. Imagine if the incident described by Marshall occurred on the border of two states!

3. Karrie Rose
Manager – Australian Registry of Wildlife Health
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Investigating novel pathogens can be a very expensive and lengthy process and the current biosecurity systems do seem to focus on the notification and management of known animal diseases. In addition to the programs that Siobhan has outlined, there is a NSW Wildlife Inter-Agency Group, chaired by DPI and involving EPA, OEH, Health, LLS, WHA and the Registry. These meetings are held quarterly to address the management of emergent wildlife disease events. Discussions to define a lead agency and determine who will pay for the costs for emergency/emerging wildlife disease events are ongoing. The NDSI program is fantastic to enable the early stages of a disease investigation and WHA have done a great job to ensure that it is easily accessed. Those funds often range between $500 to $3,000 which is a very, very small fraction of the money expended on any investigation.

In relation to practical advice to practitioners, contacting WHA and the Registry are also good options if wildlife are affected (not for domestic animals though).

Outside of the given scenario, I would tend to contact experienced wildlife carers to determine whether a disease syndrome in wildlife was common or likely to be something new. Whenever experienced and trusted carers say this is new, there is good value in conducting an investigation.

Generally, we recommend an investigation whenever there is a mass mortality event (5-10 or more unexpected mortalities), signs or findings consistent with a notifiable disease (tubercles, foot or oral ulcers) animals with unexplained emaciation or neurological signs, or signs of potential infectious disease (enlarged lymph nodes, polyarthritis, discharges, respiratory distress).

Think of Occupational Health and Safety/Personal Protective Equipment (PPE) before first contact. We’ve just recently had some cases where we have been incredibly pleased that we were replete with PPE and had no students attending animal handling and necropsies of some severely emaciated wild animals.

4. Kate Wingett | Senior Veterinary Officer
Animal Biosecurity Services and Response
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An excellent area of working across sectors to assess and mitigate risks. The advice from Siobhan is spot on in regards to contacting the Emergency Animal Disease Hotline on 1800 675 888 to report such cases. The NSW Biosecurity Act 2015 and subordinate legislation require mandatory reporting of biosecurity events, an unusual mortality event would be considered a biosecurity event. Actions taken in any one event will be based on a risk assessment performed by the relevant stakeholders, including NSW Health and Office of Environment and Heritage when appropriate. As mentioned by Siobhan and others, NSDI funding, WHA and The Registry are all excellent avenues open to private practitioners to collaborate when investigating such events.

In a recent joint exercise (Tamworth, 2017), 7 organisations were invited to meet and discuss bat-related environmental issues with each group asked to nominate the lead agency. Six different suggestions were provided and no group stepped forward themselves.

The Cutting Edge Surgery Conference (September, 2018) featured Chris Tan, Philip Moses, Lucas Beirer and Gordon Corfield and was a great success.

If you missed it, don’t miss the proceedings! Available in print or digital format it includes notes on:

• Laparotomy
• Four Ligature Splenectomy
• Collapsing Trachea
• Gall Bladder Mucocele
• Skin Reconstruction Techniques, etc.

The Cutting Edge Surgery Conference
Figure 1: One Health?
Figure 2: A more realistic description of One Health.
Table 1: One Health response process

| Surveillance: disease or event notification |
| Establishing the lead agency |
| Organizing a response team |
| Allocating responsibilities |
| Sharing workload, costs and activities |
| Combining skills, networks and resources |
| Interventions |
| Report, recommendations and actions |

Figure 3: Agency priorities (Graphic courtesy Dr Siobhan Mori).

Table 2: Possible One Health incidents

| Zoonotic clusters e.g. anthrax, Q fever, psittacosis |
| Commercial animal outbreaks e.g. avian influenza |
| Animal die-offs (sentinel events) |
| Food safety e.g. salmonella contaminated melons |
| Events of unknown aetiology |
| Animal contact e.g. brucellosis |
| Environmental contamination |
| Severe weather events |
| Others |

Key to the entire response process is prompt event notification. The alerted agency is obliged to inform all affected parties, a responsibility which inevitably exposes flaws in the communication path. Once the lead agency is determined an investigation team is assembled and responsibilities allocated. Issues of sharing workload and costs rely on good will and (hopefully) prior experience working together, but offer opportunities for tension.

Preparedness

In some of the incidents noted in Tables 2 and 3, the One Health involvement is obvious, but in others it is less evident but nonetheless important. For instance in the 2007 Australian equine influenza outbreak there was no direct human risk but impact on income and stock/pet-loss, export implication etc. placed a significant mental health burden. The outbreak provided opportunities for a One Health response through sharing staff, expertise and providing surge capacity (resulting in cooperation between the Department of Primary Industries and New South Wales Health).

The value of preparedness, collaboration and network-development in ‘peace time’ is important to ensure a cohesive response when One Health incidents are identified. This can be achieved through encouraging regional One Health Networks that bring together professionals from relevant disciplines. There are many opportunities to work together before the inevitable incident arises, such as research and surveillance projects, joint exercises, regular meetings, cross-education opportunities, collaboration on policy development and development of factsheets.

Conclusion

Unwelcome interactions between humans, animals and the environment resulting in health emergencies are inevitable and demand multi-agency intervention. Preparedness through regular networking, joint exercises and other collaborations can only be of benefit and should be encouraged.

Table 3: One Health incidents experienced in northern NSW since 2007

| Influenza: equine, avian, human, swine |
| Q Fever clusters |
| Brucellosis (B. suis): pig shooters, dogs, families, litters |
| Wildlife die-offs |
| Cryptosporidiosis in livestock and farmers |
| Kuruin in horses |
| Anthrax in cattle |
| Bats, Australian Bat Lyssavirus risk and bat camps |
| Weather events: ‘east coast lows’, bushfires, floods, drought |

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The CVE’s South Africa field trip was an incredible time. Two full weeks were spent at Dinokeng Game Reserve, a 22,000 hectare reserve an hour from Johannesburg, observing wildlife which included numerous species, as well as conducting various surveys to collect data to help WEI (Wildlife Ecological Investments) manage the reserve from a conservation perspective. We experienced so many fabulous moments.

In the first week we were involved in remote anaesthesia using a dart rifle on 4 lionesses to insert Desloren (GRNH antagonist) implants to prevent pregnancy to manage the population and prevent mating between siblings. This included hands-on work taking blood samples, faecal samples, external parasites (ticks), hot branding, applying and monitoring a pulse-oximeter, auscultating breathing and heart beat and minor surgeries on open wounds. The next day we were involved in darting a male lion to replace his radio collar with new batteries to enable tracking his movements and those of the accompanying females. Similar samples were taken from him as well. There was much unexpected excitement when the male suddenly growled and staggered to his feet with most of us close by early in the procedure. He did not rouse fully and we were able to move away (some too quickly) to allow the wildlife veterinarian to administer extra anaesthetic to continue the work. We wanted to dart the female as well to renew her Desloren implant but couldn’t. However, now her companion is collared it should be much easier to locate and anaesthetise her to renew her implant.

Game drives involved identifying all mammals larger than a scrub hare along a 10-km transect, including age, sex and GPS coordinates. Interesting species included white and black rhinoceros, impala, kudu, nyala, blesbok, red hartebeest, wildebeest, eland, cape buffalo, warthog, waterbuck, vervet monkey, jackal, mongoose, cheetah and of course lion, elephant, giraffe and zebra. For the vegetation surveys we were divided into two teams, one identifying and measuring (height, grazing damage, fire damage) all the grass species within multiple plots, the other collecting similar data for woody plants over 0.5 m high. The data are used to monitor the populations and estimate the reserve’s carrying capacity to avoid damaging the ecosystem.

The CVE’s trip to South Africa was a truly unique opportunity for veterinarians to employ some of their veterinary skills in an authentic wild African environment. The group loved every minute of their time at Dinokeng Nature Reserve, and some are making plans to return next year with friends and family.
During the enlightened ’60s a few real scientists began to fully examine these questions.

The Evolution begins post WWII

Modern equine veterinary practice began with the increasing number of veterinary graduates immediately after the end of World War II. Prior to this period, in most States, only small numbers of veterinary surgeons derived the bulk of their income from horse practice.

Director Dr Tom Hungerford Heads the PGF

The initial impetus began around 1965 with the Sydney Post Graduate Foundation (PGF) in Veterinary Science courses.

These were usually held over a week, expanding from one to a number occurring throughout the year under the very capable directorship of Dr Tom Hungerford who invited overseas lecturers from the USA and England to present cutting edge lectures on horses, covering the areas of Equine Medicine, Surgery and Reproduction.

These courses which attracted veterinary surgeons from Australia and NZ were hugely successful as they excited a great thirst for knowledge which was difficult to obtain due to the lack of published scientific articles with interest in the horse and its problems. Many firm friendships developed at these courses and helped with the dissemination of ‘new’ knowledge.

The PGF hosts the J D Stewart ‘Equine Diseases’ course in 1970

Driven by the icon Dr T G Hungerford, it was held at Sydney University, and was one of the first PGF courses purely for horses. The keynote speaker was Associate Professor of Pathology at the University of Pennsylvania Dr Jim Rooney DVM. Dr Rooney had autopsied over 400 horses and was a revelation! He was supported by A. Bain, P. E. Sykes, D. R. Hutchins, T. K. Bell, Hugh McL. Gordon, R. R. Pascoe, J. D. Steel, M. Robinson, R. H. C. Penney, L. H. Larsen, F. Fallon and J. G. McLean.

Figure 1: Horse operation 1914. Equine Surgery was very much a ‘grass lawn’ adventure with poor, ineffective anaesthetics, almost no analgesics and no tranquillizers.

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Thanks to Bill Howey, former PGF Director, for supplying the article (first published in the Australian Veterinary History Record, Mar 2009) and to the University of Sydney Veterinary Science Archives for the images.

‘What makes a horse good?’ & ‘What makes a good horse?’

The evolution of modern equine practice in Australia

RR Pascoe, GH Hazard, WP Howey

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Using a warm table to ‘freeze’ a cat into bliss and prevent actinic skin disease

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Given the preferred ambient temp of cats being so high (32-38°C), I now have a variety of removable heat packs wrapped in fleeces (the latter is the preferred cat substrate according to a behaviour study) on my consult table. (See C&T No. 5626 ‘Comfortable ambient temperatures in elderly cats’, and C&T No. 5639 ‘Reply to 5626: Sun drunk cats.’)

The heat plates transform handling—the cats realise the heat pack is there, sit on it and they don’t move. You can do so many things and the cat doesn’t care because they are in a heat bliss. One grumpy old cat, who came to the clinic in a cat box hand-carried from home by the owner on a cold day, was so enamoured of the heat pack that he dug his nails into the wheatgerm version and we could not separate him from it. He hugged it to his chest like a baby and wouldn’t let go. The packs are small and almost disposable (they are made by a client; see C&T No. 4891 figures 1.4) so he went home with it. The owners say the heat packs have transformed his behaviour.

We also use the ‘SnuggleSafe’ heat discs which have removable covers and are wipeable. I am now suspicious that all those drawings/illustrations over the centuries of cats curled up are actually cats freezing cold, when given the chance, cats stretch out and soak up heat and lie extended out in the sunshine. They usually only curl up tight if they are cold.

Now, when clients bring a cat to the clinic in their car, the nurses also ask them not to sit the cat cage on the back seat directly in the flow of the car’s air-conditioner. We ask them to set the carrier behind a seat and cover it.

Re actinic-induced or solar-induced skin disease

How many of our cat-owning clients understand, or even know, that if a cat’s preferred ambient temperature is 30-38°C, then failing to provide appropriate non-solar sources of heat indoors pushes the cat to seek out and remain in sun-heated areas for longer than is safe/healthy?

Keeping a cat indoors, and away from windows, etc—especially in an air-conditioned house but then failing to provide access to heat sources may keep the cat safe from actinic damage but sets up a cascade of stress and uncomfortable living, similar to how we humans would feel living at 10.14°C.

I use the heat packs on the table to show how obsessed the cat is with getting warm, and how that endangers the pet. Not just the usual perils of hiding under car engines and getting into warm tumble dryers but also, while seeking warmth through extended window-baking, they are getting lots of damaging rays as well.

If skin cancer is a reflection of imbalance/exposure to damaging sun rays in the environment, then not addressing all aspects of the environment leaves treatment unprovided. We prescribe UV shirts, cox2 drugs, Aldara etc but we need to get the owner to understand the ‘why’ and the ‘how’ actinic lesions occur in the first place, so that the owner understands and is on-side and committed from day 1.
Anaesthetic protocols for dogs on anti-anxiety medications

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Hospitalisation and anaesthesia for a dog on oral anti-anxiety medications including tricyclic anti-depressants (TCAs) e.g. clomipramine or selective serotonin re-uptake inhibitors (SSRIs) e.g. fluoxetine, needs careful pre-planning and management to help reduce the stress of both hospitalisation and after care. Stress can have negative effects on both the welfare of the patient while in hospital and the outcome of surgery in the post-operative period.

I have put together a protocol which I use for patients on anti-anxiety medications requiring a general anaesthetic. The protocol is designed for dogs undergoing routine procedures such as dentistry, desexing or minor surgery not requiring extensive use of opioid medication post-operatively. There are many different options, but after discussion with veterinary anaesthetists and veterinary behaviourists, this is my approach:

### Regular medication

Patients who have been prescribed SSRIs or TCAs need to continue the medication as before.

**Example 1:** If the patient takes fluoxetine in the evenings, ensure that the dog receives the dose the evening before the surgery and the owner brings his medication along in case the dog needs to stay in overnight.

**Example 2:** If the patient takes clomipramine twice daily and is due for a dose the morning of the surgery, time the evening dose to be given a little earlier than usual (e.g. 5pm) and give the morning dose with a tablespoon of food 12 hours later (i.e. 5am). A small amount of food given early in the morning 6 hours before surgery is acceptable.

Do not abruptly discontinue the behaviour modification drugs pre or post-surgery, as this can be detrimental to their welfare.

### Admitting the patient

Consider a later admission for highly anxious patients so that the wait time between admission and collection is reduced. This may mean the owner takes a day off work to allow for a suitable admission and collection time.

Avoid ‘double-handling’ the patient unnecessarily by administering the pre-med in the consult room with the owner present where possible.

### Premedication

I use one of the options below:

1. **Acepromazine (ACP) 0.025mg/kg + methadone 0.25mg/kg IM; or**
2. **Medetomidine 0.003mg/kg + methadone 0.25mg/kg IM**

There is no evidence to suggest that doses of acepromazine (ACP) between 0.01-0.03mg/kg alter the seizure threshold in dogs.

Ideally give the pre-med into the neck muscles with a 25-gauge needle as it tends to be absorbed faster when given in this region. These combinations should be given in the same syringe, rather than 2 separate injections.

### Anaesthesia

Alfaxan® 2mg/kg (0.2mL/kg) IV for dogs then isoflurane/oxygen maintenance. I tend to ‘top-up’ my anaesthetics with small increments of Alfaxan® rather than increasing the isoflurane above 2%.

Intravenous fluid therapy at 5mL/kg/hr for cardiovascular support for the first hour, then reduce to 2.5mL/kg/hr (maintenance) is warranted for all patients on SSRIs or TCAs undergoing anaesthesia. (In our practice we use it routinely for all patients).

Blood pressure monitoring is worthwhile in these patients to check for hypo or hypertension intra-operatively and manage as required.

### Post-operative pain relief

For patients having a ‘rough’ recovery (vocal or painful) then medetomidine 0.003mg/kg IV can be given immediately (if not used in the pre-med), Repeat methadone 0.25mg/kg subcutaneously at 4 hours after the pre-med dose was given.

Non-steroidal anti-inflammatory drugs are a good option for post-operative pain relief in these patients.

There is no concern about the short-term use of NSAIDs and behaviour modification drugs (SSRIs or TCAs) in dogs. The risk of gastrointestinal ulceration is something that is monitored for in people but not a contraindication for combining the two classes of medications and has yet to be recognised as an adverse interaction in dogs.

For canine patients unable to tolerate NSAIDs, then paracetamol at 11mg/kg PO SID could be an alternative option.

### Serotonin syndrome

Serotonin syndrome is a toxicity caused by excess serotonergic stimulation in the central and peripheral nervous system.

There is a risk of serotonin syndrome when SSRIs or TCAs are combined with certain medications for extended periods or if a dog receives an extremely high dose of their SSRI or TCA (e.g. overdose).

**Clinical signs include:**

- Autonomic signs—diarrhoea, mydriasis, tachycardia, tachypnoea, hypertension, fever
- Neuromuscular signs—hyperreflexia, myoclonus, tremors, rigidity, seizures, respiratory muscle compromise
- Altered mentation—agitation, confusion, disorientation, vocalization, excitement

Serotonin syndrome is unlikely to occur for routine procedures where opioids are used at standard dose rates in the immediate post-operative period; however, for patients receiving high dose fentanyl constant rate infusions (CRI), it needs to be monitored for closely. It is best to avoid post-operative tramadol or fentanyl patches for patients on SSRIs or TCAs.

Dr Lauren Harris.

Drugs to be aware of that may contribute to serotonin syndrome (serotonergic agents) include: fluoxetine, clomipramine, opioids, mirtazapine, metoclopramide, trazodone. There is an extensive list of these on VIN and treatment of serotonin syndrome in the conference proceedings from IVECCS 2017, ‘Serotonin Syndrome’ by Dr Lauren Harris.

Practitioners should be aware of the clinical signs to look out for when preparing to anaesthetise a patient on a long-term SSRI or TCA medication.

Continued overleaf...
Additional anti-anxiety medications

For particularly anxious patients for the perioperative period, I would consider adding in:
- Trazodone 2.5-5mg/kg PO SID
- Clonidine 0.01mg/kg (more readily available than trazodone which requires compounding)
- Gabapentin 10-20mg/kg PO BID - TID
- Zylkene supplementation

For complex cases where a patient is clinically unwell and on multiple medications requiring a general anaesthetic, it is worthwhile consulting with a veterinary anaesthetist pre-operatively.

Gentle handling

When admitting patients with an anxiety disorder:
- Use a low level cage, preferably in a quite separate room from other pets/people
- Gentle handling techniques recommended
- See www.fearfreepets.com and www.drsophiayin.com for further information
- Southwest Veterinary Symposium 2018 conference proceedings article titled “Fear-Free Gentle Control and Handling Techniques” by Dr Debbie Martin is available on VIN
- Try to discharge the patient as soon as possible once recovered and stable to avoid unnecessary long stays in hospital

We always stagger each surgical admittance by 20 mins so no dog goes in the kennel first but waits with its owner until sedation kicks in and is then taken and operated on; this helps keeps most dogs in the ‘green light’ zone. We do this for all surgeries (learnt the hard way in the UK doing a lot of Pit bull and Rottweiler ops that avoiding the spike of anxiety getting such dogs out of a kennel 2 hours after they were in it all alone and in the ‘red zone’ makes for safer handling and smoother general anaesthetics).

We also do dummy runs in the weeks before elective surgeries on behaviour cases. This is where owner and dog come in as if for the op—they arrive, go into the consult room, then the owner and the dog walk to kennels and the dog goes into the run with owner. Both dog and owner get an appropriate edible treat and then both leave. This means the dog has a good first experience of the run and when it wakes up in it, it has some idea of where it is and that nothing bad happened last time. Post op, the owner comes to collect it from the run after all paperwork and payments processed so the dog goes straight out and home. This routine makes the return visit for surgery removal (if not dissolvable) so much less stressful for both dog and for the vet.

An 8-year-old female neuter British Shorthair was presented in hypoglycaemic coma with seizures. She had a several year history of persistent diarrhoea and her diet consisted of supermarket dry food only.

Clinical pathology revealed absolute neutropenia, hypoglycaemia and likely sepsis. Insulin levels were (appropriately) undetectably low on a paired blood sample, and abdominal imaging (see below) showed no nodule or mass suggestive of insulin-secreting neoplasia.

Accordingly, the hypoglycaemia was presumed to be a manifestation of sepsis. She was stabilised with IV fluids, dextrose and antibiotics and abdominal imaging was performed. Abdominal ultrasound imaging showed spectacular jejunal thickening, including thickening of the muscularis layer. Maximal jejunal thickening was 3.4mm. Intestinal biopsy was offered but declined. Inflammatory bowel disease and diffuse small cell lymphoma were considered the most likely diagnostic possibilities, but small cell lymphoma was suspected due to the severity of clinical presentation and the sonographic changes.

Treatment was started with prednisolone 5mg sid and chlorambucil 2mg EOD.

She was also supplemented with subcutaneous cobalamin (B12) injections for the first 6 weeks of treatment and monthly thereafter, as well as Hills i/d diet® (canned).
Cooling interventions for dogs with the use of a cooling collar

Comment on C&T No. 5720, Dec 2018 Alleviation of thermal strain after racing in the thoroughbred racehorse with the use of a cooling collar by M A Brownlow

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What an absorbing read, this latest writing for C&T from Dr Brownlow (actually her series C&T Nos. 5376 and 5377 as well as Perspective No. 137), and while there are many differences in the way athletic horses overheat (‘exertional heatstroke’ from strenuous physical exercise) compared to our mostly less active canine companions, there is much we can learn from this fantastic treatise of Dr Brownlow.

May I also put in a plug for the excellent C&T No. 5649 by Dr Aine Seavers who shares her Client Handout titled ‘Simple ways to keep pets cool and safe in summer—a client handout.’

I was totally captivated by this article.

What a clever, scientifically-based (cutting edge info re carotids and heat stress) utterly simple and effective device for horses. This is true ‘Tom’s paddock/Goanna Track’ stuff where great veterinary ingenuity using simple and affordable concepts has the potential to ripple out across the paddock to the dog in the kennel as well as the horse in the stable.

So, can we translate this collar/carotid concept to small animals?

I am hoping I can translate that idea to heat-distressed canine hospitalised patients, as all I would have to do is fill my intravenous fluid bag heat pack covers (C&T No. 4891) with an icepack filler and, voila, my canine heat-distressed patients now get ice on their carotids. We had long tubular heat/cool packs to put in the groin and the axillae (Figs 1-4 C&T No. 4891) but had not thought about the strap-on carotid ice pack concept.

Preventative Cooling Collars are sold for dogs. I noted them in my simple ‘Cooling Tips for Hot Dogs’ blog post (C&T No. 5649) but have not directly promoted their use as the current models cover only about a 1/3rd of the neck. They are somewhat heavy and cumbersomely, so mostly only of use as an in-home cooling aid for non-emergency cases.

Now my new concern (having read this whole equine cooling article in full; a rare thing for me to do as a small animal vet) is whether the whole carotid cooling concept actually works in dogs at all? There are interspecies variations in carotid blood supply and presence (or not) of retae.

The work on carotid cooling in man has been extrapolated superbly to horses where similar anatomy ensures it is effective.

Can we claim the same effect in dogs/cats given the differences in their anatomy?

I would love an anatomy guru to comment on this so we can work out possible success or not.

Two other thoughts:

1. Given that we apply rugs to horses to assist them to acclimatise when we move them to colder pastures, should we be applying cooling collars to horses to assist them when we transport them to hotter climates?

2. Can this device be used in the ill pyrexic or injured horse?

Note: Aine has updated her client handout featured in C&T 5649. Please follow the link bit.ly/cool-pets-aine

Editor’s Note: Meg is working on a cooling collar for racing greyhounds and we await the results with great interest.
Dogs pant when they’re hot but it’s not the only way they regulate body temperature. Thermoregulatory strategies as postural changes, seeking shade or at least a cool environment, and grooming (in the cat).

The body’s surface is the main site for heat exchange with the environment. Controlling the flow of blood to the skin is an important way to control the rate of heat loss to—or gain from—the surroundings. In endothelial warm blood from the body’s core typically loses heat to the environment as it passes near the skin. When needing to lose heat, vasodilation increases blood flow to the skin and helps the animal lose some of its extra heat to the environment. In dogs, it is said that over 70% of total body heat loss is dissipated through radiation and conduction from the body surfaces (peripheral vasodilation).

Evaporative mechanisms, such as panting and sweating become more important in maintaining normothermia as the environmental temperature rises to close to body temperature. There is a large surface area for water loss from the nasal and oral subcutaneous which in evaporative cooling: hyperalimentation improves this evaporation efficiency. However, high humidity (>35%) reduces evaporative competence, and evaporation is effectively annulled when environmental humidity reaches 80%.

In dogs, evaporative cooling from panting combined with a countercurrent heat exchanger (the rete mirabile) helps keep the brain from overheating.

Although written on racehorses suffering exertional heat stress, there are some very relevant quotes, and paragraphs in Dr Meg Brownlow’s recent review of the equine cooling collar for us small animal practitioners, and I iterate some of these below for our interest:

In the dog, the temperature of the cerebral arterial blood is the major determinant of brain temperature. The panting carnivore can keep the temperature of the brain below that of the body during times of heat stress. This is achieved by a special arrangement of the carotid artery called a rete which is a compact network of intertwined arteries that lie submerged within the cavernous sinuses at the base of the brain. The rete structure is a countercurrent heat exchange between the incoming “hot” arterial blood and the exiting venous blood which has been cooled by evaporation from respiratory surfaces. The presence of the rete structure in those species allows brain and body temperature to dissociate, particularly when conditions are hot and during exercise-related thermal stress. This lowering of brain temperature below arterial blood temperature has been referred to as selective brain cooling (SBC).

The basic cooling principle of a rete is that the blood flow is slowed and there is a relatively large surface area for heat exchange to take place between “hot” and “cool” blood.

Cooling the Neck Region in Humans

‘Cooling collars have been used in human athletes (Tyler and Sunderland 2011a; 2011b) and in the military (O’Hara et al 2002; Zhu 2000; Godon et al., 1990). Mustafa and Thulesius (2002) demonstrated experimentally that cooling the neck region and thereby the cerebral supply vessels represented a promising therapeutic strategy in that it might eliminate or diminish vasocstriction and trigger an additional vasodilatation, effectively reversing cerebral pathophysiology associated with exercise-induced hyperthermia.’

Cooling collar mechanism of action

The mechanism of action of the cooling collar is yet to be determined. Some studies in humans suggest that cooling collars may cool the blood in the carotid arteries as it passes to the brain and if the brain is kept cool, tolerance to elevated core body temperature may be extended and signs of heat illness more easily controlled. Others suggest that the collar just acts as a ‘heat sink’ removing heat from the skin, decreasing body temperature and reducing the perception of hyperthermia by the animal and thus reducing thermal stress as an effect simply of cooling skin thermoreceptors in the area of the horse’s neck. It is also quite possible that the collar is cooling venous blood in the jugular vein. This implies that any effect on the brain is a consequence of a decrease in the temperature of the blood exiting from the heart and in this instance the collar might be inducing general body cooling and secondarily cooling the brain. The carotid arteries supply the brain with the majority of its blood flow. If the collar can cool the blood flowing in the carotid arteries there might be two positive effects: firstly, if the temperature of the blood going to the brain is reduced, heat will be lost from the brain simply by convection because of the temperature differential; and secondly, cooling the arteries might also cause them to dilate, increasing blood flow through the brain.

Conclusion

The cooling collar may be a promising therapeutic strategy for exercise-induced hyperthermia in all sporting horses and in particular thoroughbred racehorses. The supposition is that if the brain can be kept cool, tolerance to elevated deep body temperature might be extended.
and signs of heat illness may be more controllable or entirely negated. It must be emphasized that the cooling collar is only recommended for use as an adjunct to whole body targeted cooling and does not replace it.

References/Quotes from references from Dr Brownlow's worth reading by canine enthusiasts

‘Cooling of carotid artery preparations induced a reversible reduction of vasoconstriction in rabbits...’ (Matsuda S & Thulesius O, Stroke 2002; 33:256-260)

‘Many of the cooling methods and devices detailed in the literature are impractical for use in the field. Future research should focus on cooling technologies that are practical in the battlefield and have sustainable cooling effects...’ (Chaar R, Eveland E et al, Military Medicine, 173, 7-653, 2008)

‘Influence of the carotid rete on brain temperature in cats exposed to hot environments’ Baker MA, J. Physiol (1972), 220, pp.711-728. This full paper is worth reading.

‘Blood supplying the brain appears to be cooled via a countercurrent heat exchange with cool blood draining the nasal mucosa (in the carotid rete)’ (Taylor CR & Lyman CP, American Journal of Physiology, Vol. 222, No. 1, January 1972

‘In alert, resting dogs, the brain is warmer than arterial blood in the common carotid artery. When dogs run, brain temperature drops, despite a sharp rise in carotid blood temperature, and is maintained 1.3°C below carotid temperature during exercise. This brain cooling apparently results from countercurrent heat exchange between warm arterial blood supplying the brain and cool venous blood draining the nose and mouth. The heat exchange occurs in the arteries at the base of the brain, which form a rudimentary carotid rete in the dog, and is greatest during exercise, when respiratory evaporation is at a peak. In animals with a carotid rete, the brain is protected against overheating during the severe thermal stress of exercise.’ (Baker MA, Chapman LW, Science Vol 195, Issue 4280, February 1977)

‘The rise in brain temperature during tracheostomy breathing in warm environments, and drops, despite a sharp rise in carotid blood temperature, and increased with increasing ambient temperatures. Brain temperature always rose more than carotid arterial temperature during tracheostomy breathing in warm environments, suggesting that carotid arterial blood is cooled on its way to the brain in dogs which are breathing through intact respiratory passages...’ (Baker MA, et al, Respiration Physiology Vol 22, Issue 1, December 1974)

‘The largest single source of arterial blood supplying the brains of dogs and cats comes from the maxillary artery over an anastomotic ramus leading to an internal rete mirabile enmeshed in the cavernous sinus...’ ‘Extensive extracranial arterial anastomoses located in the orbit, netia mirabilia and neck musculature are significant and make it difficult to render the brain ischaemic.’ (Gilliam LA, Amend J, Anesth Analg 1979; 48(2):237-53)

Sassy is a 3-year-old neutered female Oriental. She presented to the original veterinarian on 25/05/2018 for anorexia. She had a 5 day history of vomiting shortly after eating and had lost weight. Clinical examination revealed no abnormalities. The clinician took a conscious lateral radiograph which he thought demonstrated food in the stomach although the rest of the intestines were empty. He recommended paraffin oil and was investigating the option of endoscopic exam.

Sassy presented to our clinic 5 days later. Her owners had stopped all her dry food and were feeding her boiled chicken, sardines and paraffin oil. They were advised to give her 6 mLs of paraffin oil 4 times per day. They were concerned that she had started to make a ‘gurgling’ noise during respiration and she was slightly more laboured in her breathing. They also thought she had lost nearly 2 kg in weight. They mentioned that Sassy had not defecated for 5 days. According to her owners she had not vomited since her initial visit to the original veterinarian as he had given her something to stop vomiting, but this was not recorded in her clinical notes.

On first clinical examination she had a BCS of 3/9, weighed 3.6 kg and was bright and alert. She had a strong gag reflex and cough with gentle tracheal pressure. Her intestines felt thickened but no obvious mass was palpable. She was purring which made thoracic auscultation difficult to assess for a wheeze and there was no obvious stridor or stridor. She had no discharge from her nose. I did not think that Sassy was laboured in her breathing and nor did she have increased effort. She was purring, however, so a respiratory rate assessment was not possible.
We sedated Sassy (using Zoletil® 5mg/kg IM) with the aim to collect bloods for a total annual health profile (i.e., Complete Blood Count, Serum Biochemistry, and Urinalysis). The plan was to take thoracic and abdominal radiographs and to do an abdominal ultrasound. Lateral abdominal radiographs looked similar to the previous veterinarians radiographs taken 5 days earlier. It appeared that she possibly had something within her stomach, almost empty intestines and small amounts of faeces at the pelvic canal. Thoracic lateral radiographs were unremarkable, with a VD difficult due to her conformation and incomplete sedation.

On abdominal ultrasound, I noted that her intestines were thickened (0.3 cm), she had multiple prominent lymph nodes and her stomach was filled with something, mostly likely food and maybe a fur ball (see images). I noted that either a lot of food or liquid was moving through her intestines or they appeared hyper motile on ultrasound. The remainder of her abdominal ultrasound examination was unremarkable. Urinalysis results were unremarkable.

Figure 1: Abdominal ultrasound-nodular thickening of the intestinal wall. I placed Sassy on Hartmann's (7mls/hr.) with 20 mmol/L KCl added and gave her intravenous maropitant (1mg/kg IV SID), metoclopramide (0.66 mg/kg, BID), and MiraLAX paste (25mg SID) and I continued with MiraLAX 1/4 teaspoon SID in wet food. Her appetite was excellent, she was eating 2-3 sachets of Whiskas ‘Oh so fishy’ per day and was very bright and alert. She had gained 150 grams since first presentation. We sent her home on her oral medications with the plan to see her back in 2 weeks for a weigh-in and depending on how she was going, possibly repeat her abdominal ultrasound to take a look at her stomach again in 6-8 weeks’ time.

Her owners phoned back 3 days later (6/6/18) to say she was eating well, had been defeating normally but they were concerned that she was still a little wheezy and possibly a bit snotty. Two days later her owners called again to report that she had gone slightly off her food, was very snotty and almost soundless obstructed in her nose. In particular her left nostril. They also thought she was a bit laboured in her breathing. They thought that she was like this prior to coming to our clinic the first time. Sassy was last vaccinated 12/5/16, but was a completely indoor cat with no history of boarding. The other household cat was completely normal. We dispensed another course of Vibravate paste (25 mg SID) as the last course was just about to end.

Six days later (12/6/18) Sassy’s owners brought her back because she had gone off her food again, despite appearing to be hungry. Her owner thought that she was having trouble swallowing. According to her owners she had defecated only twice in the last 2 weeks. They had continued with the Vibravate paste but had stopped the Maropitant and Metoclopramide tablets for reasons they could not explain. She was also struggling to drink water and would gag and gurgle after attempting. They described a purulent discharge from the left nostril that waxed and waned and did not think that the antibiotics were making any difference at all.

On clinical examination she had an obvious loud upper respiratory stertor when breathing in (see video). She was much more subdued in her demeanor and had marked weight loss. Sassy now weighed 3.46kg. She was mildly dehydrated and her heart rate was slow at 140 bpm and her respiratory effort was increased. She became easily distressed with minimal examination. She had no discharge from her nares at this point.

I performed an in house smear exam of a cotton tip placed into her left nostril. There was a lot of squamous cells but no obvious bacteria and was pretty unremarkable. We started Sassy back onto intravenous fluids (Hartmann’s with 10mmol KCl/500 ml) at a rate of 8.6 ml/hr. I gave her intravenous buprenorphine (0.015 mg/kg IV) and gave her Mirtazapine (1.8mg/cat) orally. It was my plan to GA Sassy the next day when she was better hydrated to radiograph, scope, flush and biopsy her nose depending on what we found at each step of the way.

Overnight Sassy had eaten all her food and was very alert and affectionate, as she had been in the past. Obvious loud upper respiratory stertor was still present. I used ACP (0.03 mg/kg) and methadone (0.3 mg/kg) as a premed intramuscularly. I induced her with Alfaxalone (1mg/kg IV) and intubated her with an un-cuffed size 3.5 ET tube. Her anaesthetic was unremarkable. We initially took nasal radiographs which were unremarkable. I also took a lateral skull radiograph to look for a pharyngeal polyp. With my limited experience, I scoped up the back of her nose to view her choana. On the left side I thought I could see some whitish lumps but there was a lot of blood which made examination difficult. There was no obvious polyp. I then packed the back of her throat with cotton swabs tied together & flushed her left nostril only with 10 mlS of warmed saline. When I was removing the swabs there was a lot of blood and mucous along with a small piece of

Figure 2: Nasal cytology: There is high cell recovery with the field of view dominated by medium to large round cells with scant to moderate blue cytoplasm consistent with the appearance of medium to large lymphoid cells. There are few scattered small lymphocytes and other cells present. The specimen appears consistent with nasal lymphosarcoma. The histology of the case confirmed this diagnosis.

Figure 3: Sassy. Watch the video in the eBook showing respiratory stertor.

Figure 4: Abdominal ultrasound-nodular thickening of the intestinal wall. I placed Sassy on Hartmann’s (7mls/hr.) with 20 mmol/L KCl added and gave her intravenous maropitant (1mg/kg IV SID), metoclopramide (1 mg/kg IV BID) and started Doxycycline (Vibravet®) paste (25mg SID). She was not overly interested in food but was left with a variety of wet diets in her cage overnight. The reasoning behind the

Figure 5: Abdominal ultrasound-note thickening of the intestinal wall.

Figure 6: Faeces containing lots of fur.

Figure 7: Cytology from nasopharyngeal tissue flushed out by vigorous hydropulsion.

Figure 8: Nasal cytology: There is high cell recovery with the field of view dominated by medium to large round cells with scant to moderate blue cytoplasm consistent with the appearance of medium to large lymphoid cells. There are few scattered small lymphocytes and other cells present. The specimen appears consistent with nasal lymphosarcoma. The histology of the case confirmed this diagnosis.
whitish pink tissue. We repeated the process but this time we got a large piece of the same tissue. Before placing this into formalin I weighed the piece of tissue onto a glass slide and set it aside. We repeated the process a third time and again got more small pieces of tissue. All were placed in the formalin pot.

Lastly I used nasal biopsy forceps and took 3-4 tissue samples from her rostral nasal passages. Sassy recovered uneventfully from her procedure and anesthetic. She was eating again within the hour and bright and affectionate again.

On examination of the glass slide I had stained using Diff Quik I was very concerned that Sassy may in fact have nasal lymphoma. The sample had numerous cells which look to me to be plasma lymphocytes of varying sizes. (See images of in-house cytology).

On discussion with her owners we decided to send the two samples from her nose for histopathology.

Sassy was discharged the next day to her owners. She was much less laboured and noisy with her breathing. She was eating well and had regained 100 g in weight. She was still extremely bright and affectionate. She had defected normally again.

I sent her home on oral Mirtazapine (1.8 mg/cat SID), transmucosal buprenorphine (0.01mg/kg BID) and Vibramet paste (25mg/cat SID). Sassy was easy to medicate orally and it was my intention to get her as well as possible should her owners consider chemotherapy should the diagnosis of nasal lymphoma be confirmed.

Histopathology did confirm the diagnosis of nasal lymphoma from the pieces of tissue that were flushed out of the back of her nose. Interestingly the nasal biopsies taken blindly from the rostral nasal cavity came back with a diagnosis of chronic mild lymphoplasmacytic rhinitis.

Sassy is a complicated case because she presented initially for anorexia, vomiting and weight loss. It was not until she returned the second time that we had heard her noisy breathing or saw signs of a nasal discharge and stertor that we investigated her for nasal discharge. To be honest, I was thinking that she possibly had an inflammatory polyp and nasal lymphoma was not on my list of differentials. At her initial visit she most definitely had something within her stomach (confirmed on both radiographs and ultrasound) and thickened intestines and prominent lymph nodes which could have all explained her anorexia and weight loss. It was not until she re-presented with obvious stertor that we diagnosed her nasal lymphoma and this could have been completely missed and treated inappropriately had we not flushed her left nostril with saline and collected the material on the swabs.

Sassy lives over 2 hours from our clinic and due to a number of family factors and finances her owners have chosen not to consider chemotherapy despite the potential for a very good outcome. I am hoping that they may reconsider as she is one of the sweetest cats we have had the pleasure of treating.

I would like to acknowledge that Dr Richard Malik assisted me multiple times (via email) through the diagnostic and treatment process of Sassy, assisting with keeping me on track and keeping an open mind to the possible differential diagnoses.

BELATED CONGRATULATIONS!

The investiture at Government House on Wednesday 5 September 2018. Dr Bill Howey (left) is presented with his medal from NSW Governor David Hurley.

Dr Bill Howey awarded Order of Australia Medal (OAM)

Dr Bill Howey, Director 2000 to 2002 of the CVE then known as the Post Graduate Foundation in Veterinary Science or PGF, was announced a recipient of the Order of Australia Medal for service to veterinary science in the Queen’s Birthday Honours list on 11 June 2018.

Referred to himself often as a ‘10 pound Pom’, Bill has dedicated himself to the veterinary profession and public service.

Many of our members and readers will know Bill through his long association both with the PGF and the Scone Equine Group. Those with a love of history and keen interest in equine medicine will enjoy visiting Bill’s website http://sconevetnursery.com.au

See page 22 to read a short précis of an article co-authored by Bill. The evolution of modern equine practice in Australia

The impossible diabetic

Pete Coleshaw

Jaffa’s Heath Centre for Cats

Salisbury UK

You know the scenario—the scrappy polydipsic cat that needs sedation or restraint for blood collection, and your heart sinking when the glucose hits the 20’s. Sorry mum/dad, your cat really isn’t a suitable cat for insulin injections never mind the monitoring blood tests. Euthanasia beckons.

But hang on, why is the cat so freaky? Nasty cats don’t look to be scared, depressed, or anxious cats do, so why don’t we address this in order to give the cat some peace and to permit medication and monitoring?

As a slight aside I reckon that a high proportion of our cats are held hostage to their emotions and may lead tortured lives due to fluctuine (Prozac) deficiency—but that is another story for another time.

So enter Tabitha, a proteinuric chronic renal disease (CRD) cat who is content and happy at home with mum, but has never been a cuddle cat and who reacts violently to strangers in the house—and at the vets. Her diagnosis was during a 30 degree heat-wave (that’s hot for the UK) so she was immediately admitted for fluids and confirmation of diabetes. Blood glucose was 15 mmol/L with 2+ glycosuria, 5G 1020 (previously 1010). Bloods were sent for fructosamine, and urine was collected overnight into Katkor (non-absorbent litter) for short term differentiation of stress hyperglycaemia. Fluoxetine was commenced 7mg per os along with gabapentin 25mg BID. Continued glycosuria the following morning was the prompt for commencement of glargine Tunit BID.

With a more sedate Tabitha the following evening, the owner was instructed on how to inject, and watched me administer the insulin. The following day she managed it herself—a major achievement in everyone’s eyes. Glycosuria persisted but the fructosamine came back as 340—indicative of high non-diabetic or reasonably controlled diabetic? Had Tabitha become diabetic so recently that there had not been enough time elapsed for a high reading to develop?

Urine glucose actually increased to 4+, so insulin was increased to 2 units BID. A week after initial diagnosis, urine glucose was still 4+, BG 13-15mmol/L and fructosamine was repeated—and had dropped to 30!

With hypoalbuminaemia and hyperphosphidaemia excluded it was concluded that Tabitha may be one of the cats for whom fructosamine is not helpful. Ear pricks performed by our nurse in the home environment confirmed continued mild hyperglycaemia of 14.15 mmol/L—eliminating, in my eyes, the possibility of renal tubular leakage of glucose in a non-diabetic patient.

The question then was: how were we to monitor Lilly’s blood glucose when urine is glucose-free. We had switched her diet to minimal carb high-meat, and had obvious concerns of hypoglycaemic episodes if she went into diabetic remission. One thought was to reduce the insulin until glycosuria returned and then drop the dose by one unit.

Enter Freestyle Libre, a human diabetic monitoring device recently introduced and taking the world by storm. A 35mm disc with an adhesive is applied to the skin with the wire bathed in interstitial fluid. Whilst it does not measure blood glucose there is excellent correlation with a time-lag between blood and interstitial fluid levels. Measurements are taken every 15 minutes on a rolling 8 hr recording period, with a sensor lasting for 14 days. At the end of this period it ceases to work. It can be purchased with a reader but can also be used with an iPhone 7 or later, or Android 5 or later, obviating the need for the reader. The device costs around AU$92.50 and the reader a similar sum.

There is a blue-tooth device called ‘linkblocon’ ambrosiasys.com which is an extra device which attaches to and which trebles the size of the sensor and allows real-time remote monitoring. Not really an option, nor indicated, for our kittens!

A major consideration: once the device has been paired to a phone it cannot be changed, so don’t test it on your own phone unless you want to surrender it to your client for 2 weeks!

The Libre device comes with its own applicator. The skin is cleansed, wiped with alcohol and allowed to dry (without bathed in interstitial fluid. Whilst it does not measure glucose, whilst the device is self-adhesive, a tacking agent can be used for extra security (Torbot Skin Tac™). Once applied there is a narrow fabric fringe which can be superglued onto the skin. Discussions on VN mention the occasional need for body-bandages.

Application of the reader went without incident, and we lowered the Gabapentin over the first week, coming off it in...
10 days, at which point we started reducing the fluoxetine dose to 5mg with a view to reducing it to the minimal effective dose. The initial heavy sedation not only permitted us to perform all the tasks we needed but also gave the owner the confidence to learn the technique in a compliant patient. The cat quickly took to being injected while she was eating and we aim to have her off anxiolytics, if possible.

So far the device is working a treat, and the ease of getting glucose curves means that hourly ear-pricks or foot pad pricks can potentially be relegated to the history books for any diabetic never mind the tricky ones.

So for the next unmanageable case bring on the gabapentin and Prozac, and the Freestyle Libre!

Applying Freestyle Libre

1. Clip the chosen area—back of neck or shoulder. My latest cat was dehydrated and emaciated; sub-cut fluids prompted a useful thought, creating a soft cushion to which the patch could be applied! This will make it much easier to apply it to the base of the neck.

2. Cleanse the clipped area with alcohol.

3. Apply Skin Tac™ or equivalent if you use an adhesive agent—otherwise the patch is self-adhesive.

4. The dispenser and applicator are ‘mated’ and the applicator is pressed firmly onto the chosen site.

5. Spots of cyanoacrylate glue can be applied to the exposed fringe.

Post script

This article was written in our first flush of enthusiasm for the device. Whilst the latter doesn’t wane there are certainly a few important considerations.

Application

Lateral chest gives a flatter base.

Some cats seem irritated—either by the device, or where the glue is used. Application of ‘soft-nails’ will reduce self-trauma; alternatively a neck sock will protect.

Removal

Geriatric cats often have very thin skin and a firmly adhered device needs very careful teasing off to avoid tearing the skin, especially at the glue points. An adhesive remover such as Detachol can help here.

We have had devices stop working—I think because the probe comes adrift from the skin; I think this is an unavoidable hazard in thin skin.

Technology

One aged couple struggled with the technology, simple as it seems to us.

The constant recording means that lows are clearly identified and this can create great client anxiety. The lack of any clinical signs of hypoglycaemia associated with these ‘lows’ is interesting and deserves further consideration.

Case end—result

Tabitha is now in diabetic remission with no insulin required. She remains on low dose fluoxetine as this has had beneficial effects on her psyche. She is now hyperthyroid!

Figure 1: The freestyle Libre device.

Figure 2: The device comes with its own applicator.

Figure 3: Cleanse the clipped area with spirit. Apply Skin Tac™ or equivalent if you use an adhesive agent; otherwise the patch is self-adhesive.
Each month in the CVE News we advise which videos from our major conferences have been uploaded for viewing by Members in the CVE Video Library.

Jill Maddison BVSc Dip Vet Clin Stds PhD FACVSc SFHEA MRCVS
- Clinical Reasoning in Clinical Practice: Making the most of the initial consultation
- Assessing the Patient with Vomiting & Diarrhoea: When should I worry?

Caroline Mansfield BSc BVMS MVM PhD MANZCVS Dipl. ECVIM-CA
- Diagnosis & Management of Canine & Feline Pancreatitis in the 21st Century
- Understanding Inflammatory Bowel Disease

David Church BVSc MRCVS MRCVS MRCVS presents:
- Coughing, Sneezing & Dyspnoea
- A Logical Approach to Polydipsia and Polyuria
- Updates in Diabetes Management in Cats and Dogs - Is there a 'best' insulin?
- Hypercalcaemia – Ignore at your peril

Niek Bejerink DVM PhD Dipl. ECVIM-CA (Cardiology) presents:
- Diagnostic Tools in Cardiorespiratory Medicine – What, when and where?
- Cardiac Therapeutics – Choosing the best drugs for dogs presented with heart disease
- Cardiac Therapeutics – Choosing the best drugs for my feline patient

Note: Members must log into the CVE website to access the 250+ videos available.

cve.edu.au/video-library

How would you treat this case: 8-year-old female neutered Kelpie with vaginal bleeding?

Elizabeth Thrift
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An 8-year-old female kelpie who had been desexed presented to the veterinary clinic 8 months later with haemorrhagic vulval discharge. She was prescribed antibiotics. When rechecked almost one month later, the owner reported the discharge had largely stopped. However, blood was noted on vaginal examination.

She presented to me for further assessment. An abdominal ultrasound was performed with the following results:

1. The left adrenal is characterised by a prominent, caudal pole containing a well demarcated hypoechoic rounded silhouette. Given the morphological features, adrenal hyperplasia is suspected. Other possibilities include small myelolipoma or adenoma.

2. Caudal to the right kidney and in association with the retroperitoneal adipose tissue, there is a rounded well demarcated hypoechoic structure/nodule without visualization of hilar region measuring 1.0cm by 0.5-0.7cm. No visualization of cystic regions. Small right retroperitoneal nodule. Possibilities for this lesion include lymph node, granuloma, residual ovarian tissue.

3. The uterine stump is prominent. No evidence of uterine horns. No evidence of underlying uterine pathology at this stage.

Her Anti-Mullerian Hormone (through Vetnostics) was elevated at 0.9 (<0.6 for a neutered female).

Taking all these findings, the working diagnosis was endometritis or early pyometra. ovarian remnant syndrome (ORS), possibly with stump endometritis or early pyometra.

Measurement of LH (luteinising hormone) can be used as part of a GnRH stimulation test. However, it can also be helpful as a one-off measurement. If LH is high (>1µg/L) this indicates a complicating factor; if it is low (<1µg/L) this indicates the presence of ovarian tissue and negative feedback. The advantage of LH is that it can be measured at any stage of the cycle, unlike oestrogen when the bitch needs to be in pro-oestrous or oestrous or progesterone when the sample needs to be taken during the 2 month period that the bitch is in dioestrous. However, not all labs offer this assay especially as the gold standard is to use radioimmunoassay (RIA) for a quantitative result. There are commercially available semi-quantitative canine specific LH kits (Witness, Synbiotics) which have recently shown to be helpful in diagnosing ORS cases (Alm and Holst 2018). AMH is only produced by the granulosa cells of small growing pre-antral follicles. It is not produced by the adrenal glands. Therefore, AMH can be used at any stage of the bitch’s cycle to detect the presence of ovarian follicles.

Further diagnostics would initially include a vaginal cytology if the bitch was still showing signs of heat or oestrous. This is a simple, cheap tool that provides very important information on the presence of oestrogen as well the possibility of an inflammatory process also occurring (i.e. pyometra). Greater than 50% cornification/keratinisation of the vaginal epithelial cells indicates oestrogen is present. The most likely source of oestrogen is ovarian. Personally, I find little value in measuring blood oestrogen concentration unless it is part of a stimulation test. Measurement of progesterone can also help determine if ovarian tissue, specifically luteal tissue, is present. Concentrations greater than 2ng/mL are indicative of ovarian tissue presence. However, progesterone will only be detected if the bitch is in dioestrous (2 month period following oestrus).

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Comment courtesy of Glynne: Advanced Small Animal Reproduction
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I agree, ORS would be first on my list of differentials with a recent history of ovariohysterectomy (OVH) and then a bloody vulval discharge 8 months later. However, it is important to rule out all other causes for a bloody vulval discharge such as vaginitis, vaginal neoplasia, foreign body, uterine stump pyometra (this is often a sequelae to ORS), exogenous oestrogen exposure, coagulopathy and urinary tract infection. A complicating factor would be if she had a granulosa cell tumour which is something to consider given her age.

How would you treat this case: 8-year-old female neutered Kelpie with vaginal bleeding?
Accompanying this rise in progesterone, is a change in the correlation between ability of the veterinarian and ORS of the bitch’s age (Hollinshead et al., 2016). It is my experience that the development of ovarian tissue variable, particularly in prepubertal animals (Place et al., 2011). I suspect the BD assay was used in this case with the low total AMH values reported. Therefore, positively, the elevated AMH result is strongly supportive of the presence of ovarian tissue in this case. However, if the AMH has been low and below the reference value I would be running additional tests (LH) as discussed above. Interestingly, the human based assay is highly sensitive for the detection of ovarian tissue in queens (Axner and Holst Holst, 2015). The other commercially available AMH assay is made by ANSH and is a canine-specific ELISA assay. It is for this reason that I think it has greater sensitivity and accuracy in the detection of ovarian tissue present regardless of the bitch’s age (Hollinshead et al., 2016). It is my view that this is the reason for the absence of AMH in bitches and confirmation of OR.

Unsurprisingly, exploratory laparotomy and removal of the OR is the treatment of choice. However, given this bitch’s age, non-invasive medical management is attractive but unfortunately can be unrewarding, frustrating and in some cases cause additional complications. A 12 month Suprelorin implant is a non-invasive option which is appealing for many cases BUT when used in older bitches it can result in unpredictable and undesirable side effects such as persistent oestrous. Given this bitch’s older age this side effect is a possibility if this treatment option was taken. Long term use of a short acting progestagen at very low daily dosage to suppress her heat is an option also but there are a number of potential medical side effects, especially when used for long term use and in an older bitch. Also, she would need to be out of heat before starting or the risk of a stump pyometra occurring would be high. There are not many other medical options. Mibolerone (anabolic steroid) is cost prohibitive in Australia and NZ and long term would pose health concerns also. If she is left to cycle every 6-8 months it is not only inconvenient for the owners but she is at risk of developing a life-threatening stump pyometra and the risk of mammary neoplasia is also increased.

Unfortunately, in my opinion, exploratory laparotomy is the best treatment of choice for this bitch. I know this is not ideal in an older bitch with owners that have financial concerns. But long term, if successful, it will be the best choice for her health and long term client satisfaction!

ORS is not easy to treat and in many cases not easy to diagnose. Management of the client and their expectations/understanding of this surgical complication is important.

References:
Hollinshead FK, Walker C and Hanlon DW. Determination of the normal reference interval for anti-Mullerian hormone (AMH) in bitches and use of AMH as a potential predictor of litter size. 2016 Reprod Dom Anim 51; 1-6
Axner E and Holst BS. Concentrations of anti-Mullerian hormone in the domestic cat. Relation with spay or neuter status and serum oestradiol. 2015 Theriogenology 83; 817-821
Alm H and Holst BS. Identifying ovarian tissue in the bitch using anti-Mullerian hormone (AMH) or lutenising hormone (LH). 2018 Theriogenology 106; 15-20

1. John Baguley
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The object of the Veterinary Practice Act 2003 is to regulate the provision of veterinary services for a number of purposes including to promote the welfare of animals and ensure acceptable standards are met by veterinarians.

Within the constraints of its legislative functions, the Veterinary Practitioners Board (Board) is able to assist the profession in relation to this apparent shortage of veterinarians in a number of ways.

Firstly, it is possible for a veterinarian who does not possess the qualifications for full registration in NSW to be granted limited registration. Limited registration is granted for a specific purpose including to assist with development of practical skills to pass the National Veterinary Exam (after passing an English test and series of multiple choice questions) or where there is an identified need and no person capable of being granted full registration is available who has the necessary qualifications or experience to fulfil the role.

Limited registration is typically granted with specific conditions, including working under supervision, working only in a specific area and for a specific employer. Limited registration is generally only possible for up to one year.

For further information please review the Board policy Requirements for Limited Registration available from our website (Resources, Policies).

Secondly, the Board is able to assist the profession through data collection and dissemination. This has been limited to some extent in the past due to the lack of some data being collected (for example full time or part time employment) and the Board’s database itself (it was not initially designed for this purpose).

March PodcastPLUS
Clinical Reasoning in Veterinary Neurology
Steven De Becker
Thursday 28 March - Thursday 4 April 2019

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The most important role performed by veterinary schools is to produce graduates with the day one practice as well as at least one of their final year elective extramural placements. DVM students now enter final year with much more confidence in production animal handling, compared to BVSc students, and have opportunity to choose a placement in a rural setting of their choice. Together, this should foster a positive rural experience for students.

With respect to admissions criteria, the University offers the Early Offer Year 12 (E12) Scheme for domestic students coming from a school listed on UAC's Educational Access Schemes S01E list ([https://www.uac.edu.au/assets/documents/eas/eas-S01E-school-list.pdf](https://www.uac.edu.au/assets/documents/eas/eas-S01E-school-list.pdf)). These Schools are amongst the most economically disadvantaged or geographically isolated, with many rural schools represented. All successful applicants are guaranteed a place, provided:

- They meet the E12 ATAR (which for BVB/DVM is 5 points lower than students not applying through this pathway); and
- They meet admission requirements (commitment statement).

These students also receive a $5,950 scholarship.

During the selection process, postgraduate entry DVM students with a rural background also receive a selection advantage compared to those from an urban background.

Finally, the School would be delighted to support initiatives that rural practices wish to be involved with to increase exposure of DVM students to opportunities in rural practice. I have seen scholarship programs and Careers Days’ work well in New Zealand. In the case of the latter, practices have the opportunity to mix and mingle with students and talk to them about the opportunities that exist.

In summary, the rural shortage is likely to be multifactorial and SSVS absolutely wants to play its part and help with a solution. We need to make changes in an evidence- based way or in the absence of evidence, ensure that mechanisms are in place to monitor what we do when we make changes.

I have just been reading with interest C&T No. 5742: Why is it so hard to find a vet? I graduated from Charles Sturt Univ in 2015 and am in job number 3—not something I’m particularly happy about but at least the first two jobs I could not have continued on with for much longer than I did. As a new graduate I was set to work in a 3-vet practice growing to 4 vets and supposedly ‘new grad friendly’ with plenty of support, but which ended up being down to 2 vets and mostly sole charge work within 6 months of starting. Any suggestions I had for how to improve how things were being run were listened to at the time but not heard, and ultimately my love for my job was waning rapidly. I left the first job for a variety of reasons, but would have preferred to stay on if things could have changed for the better.

I then moved to job number 2, an internship role predominantly focusing on dairy cattle but with some small animal work too. As an intern I was told that I would get full support, that I would not be expected to do any sole-charge work that was out of my comfort zone and that an experienced vet would always be available to help as required. Unfortunately I was again disheartened to hear a disgruntled senior colleague on the phone, particularly during the calving season, saying that I just had to deal with the situation as it presented itself, or on a couple of occasions the cat only went out and the job themselves without taking me as it was ‘easier that way’. This was during a period for me where I spent 3 months on call every weekend, and 4 weeks time off during the week. So I was sufficiently exhausted and although learning plenty, I just wanted for an experienced set of hands or eyes at some of these call outs.

Suffice to say I looked for a new job at the end of my 12 month contract despite being offered ongoing work with that clinic. Now in job number 3 back in mixed general practice I am back doing a similar job to what I was doing as a new grad, although now with at least another vet to discuss cases with if required, either in person or over the phone. However, there have been numerous times in this role that I have considered other options—either locum work or work outside the vet profession—simply due to the fact that opportunities for improvement in skill base are not readily available in this job. Essentially I feel now as though I’m in a role where I can only improve slightly from where I am, and most times when I requested certain CPD courses/workshops the bosses will say ‘no, you won’t need to know things that in-depth, I’ll just find some old course notes from when I did a course and then you’ll be fine’.

In response to the comment that vet students going through courses these days are from privileged background—that’s certainly not what I would consider was the case with my graduating class. I spent 9 years at uni, first gaining a BSc, then going on to do vet. I have a hefty loan and with living costs and vet salaries as they are I won’t be paying that off in a hurry. So unfortunately from my experiences I can understand why there are large numbers of inexperienced vets moving towards locum work—at least they might feel then that they are making some progress in life!

While I understand the great cost that taking on new grads is to a veterinary business (particularly a private practice), the first few years are so critically important for developing sound basic skills—not just clinical and surgical skills but having from senior vets about communication, dealing with really difficult cases, mental health awareness etc. Our profession is so under-resourced that it’s unrealistic to do more and more with any more as clients become better educated about whatever ailments their animal may have, so providing appropriate support to junior vets, at least in my opinion, is critical to retaining them in the profession—even if ‘I’ll say it’, a female vet decides to have children 5-10 years into her career!

I don’t have any answers to this dilemma, but agree that there ought to be some more brainstorming and/or research done regarding how many vets are retained in clinical roles and, if not, what their reasons are for diversifying or leaving the profession altogether. Maybe there are just so many non-clinical roles now that the number of graduates still isn’t enough, once international students are taken into consideration.

Professional roles. Or maybe there just aren’t enough practices available to support graduate vets and give them a good career grounding, so they take any new opportunities when they are offered. Volunteer work for 8 months, overseas travel, and a yoga course sure does sound pretty good, but definitely not an option for most new grads I would have thought!

It’s definitely a challenge from both ends, new grad and boss, to get things right. I think sometimes the biggest issue is that we have bosses who have so many things going on that they can’t just be there as a vet and/or mentor to support their colleagues. And in many of the situations I’ve been in it’s the nurses that lose out too, unless the head nurse is well trained and is taking care of that side of the business. I have friends who have gone through internships with large franchise companies and they loved their first few years out—they get heaps of support and CPD provided by senior vets across all the branches, which also means they have access to help from people with a large number of special interests too. A support program like that, or something akin to how graduate doctors start out in industry could be beneficial. But there are still plenty of vet practice owners who are of the opinion that being dropped in the deep end is the best way to start out in practice. It’s that attitude that would be nice to see gone from the industry—I don’t think it does any good for our profession at all.

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2. Frazer Allan
Head of School and Dean
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The most important role performed by veterinary schools is to produce graduates with the day one competencies required of the veterinary profession and expected by the public. This is a role that the Sydney School of Veterinary Science (SSVS) takes seriously.

Where there is an issue, such as the inability to attract veterinarians to rural Australia, it is the role of veterinary schools to work with all stakeholders (practitioners, the veterinary regulatory bodies, industry groups, the public at large, the AVA, and the State and Federal Governments) to firstly understand why this is occurring and then propose solutions.

As John Baguley has outlined in his response, the VPB can assist on the supply side through the use of limited registration provisions. The VPB can also provide data to inform good decision-making.

Veterinary schools have potential levers that they can pull but these have a medium– to long-term impact given that it takes a minimum of four years to produce a veterinary graduate. Schools can influence both the curriculum (and hence the student experience) and the student cohort through the setting of admissions criteria. The relative influence of these levers, compared to, say, the student experience when in rural practice, peer to peer influence, students’ perceptions of veterinary life after graduation and a host of other variables, is currently unknown. We are about to embark on a study at the University of Sydney to try to unravel this fundamentally important question.

With respect to the curriculum, the views of the profession were taken into account when the new DVM program was created (noting that the first cohort of Sydney DVM graduates cross the stage in March this year). The School has provided students with greater exposure to large animals, with the aim of better preparing students for rural practice. We have doubled the hands-on classes involving horses and cattle. Compared to the BVSc program, classes in cattle pregnancy diagnosis have increased threefold. Students now undertake hands-on production animal classes each semester of the course in order to provide continuous learning and exposure, and most importantly to build their confidence in dealing with these species. The number of sheep classes have increased and now incorporate two intensive training days at a large, University-owned commercial sheep and beef property, Arthur’sleigh.

Rural experiences are integrated in the DVM through compulsory rural placements. Students are required to complete half of their pre-clinical placements in a rural practice,
Control of feline dermatophytosis in a shelter with use of mycoparasite Pythium oligandrum & vaccine

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Abstract: **Pythium oligandrum (PO)** is a mycoparasite widely used in the treatment of fungal infections in plants important for agriculture. Several studies have been published in the past 15 years about the use of PO in the treatment of dermatophytooses in humans and a few about the treatment of dermatophytooses in animals (cats and guinea pigs). A study was performed in a cat shelter where an outbreak of an infection of *M. canis* was present. Severely ill and really shy cats were treated topically with PO; healthy cats were vaccinated with inactivated vaccine (autovaccine made directly from the strain cultivated at the laboratory from this shelter). Treatment with PO was successful in 87% of the cats treated by PO and 100% successful in the vaccinated cats. No life-threatening side effects were observed. Two years after the time of treatment there were not any cases of dermatophytosis observed in the cats in the shelter or in adopted cats. The results of this study suggest that the treatment of cats and the environment with PO can be useful in the control of dermatophytosis in shelters or multi-cat households with sub-optimal conditions.

Introduction

Dermatophytooses is a fungal infection, widespread throughout the world which affects the superficial layers of the skin, hair, and claws, as the dermatophytes produce enzymes which enable them to utilize keratin from the keratinised portion of the epidermal tissue. It is one of the most commonly diagnosed zoones in cats. It is quite a significant disease in animal shelters, because of environmental contamination and the easy transmission of spores. Many species of the filamentous fungi, belonging to the genera: *Microsporum*, *Trichophyton* and *Epidermophyton*, have been recognized. Molecular studies have showed that all dermatophytes are closely related genetically to each other.

The most often diagnosed cause of dermatophytosis is *M. canis* which is a typical zoophilic dermatophyte. Some of the infected cats may be asymptomatic, e.g. cats living in a contaminated environment. Animals living in a contaminated, humid environment; young, pregnant, immunocompromised, or old animals and Persian heritage cats are predisposed to the infection.

Dermatophytosis can be diagnosed by Wood’s Lamp examination but the effectiveness of the examination is only about 50%—*M. canis* strains fluoresce, but scales, debris, bacteria or topical medicaments can produce false positive results. An easy and rapid procedure is a direct microscopic examination of the hair and scale, but this should be carried out by an experienced diagnostian. The method of choice for diagnosing is fungal culture, because it enables identification of both genus and species.

It has been documented that the disease is self-limiting and the infected cats could heal spontaneously. Treatment is still recommended in order to limit the spread of the infection to other animals and humans and to reduce dissemination of highly resistant spores to the environment. There are many reports on successful treatment protocols for catteries, shelters and for cats with experimental infections based on a daily or pulse administration of a systemic antifungal therapy, application of topical antifungal solutions and home hygiene recommendations. None of them is without side effects.

Only a few studies report on vaccination with killed vaccine, but vaccination could be also a therapeutic option for treatment of clinical signs of dermatophytosis in otherwise healthy animals. Some studies report good efficacy in treatment, some even 100% efficacy. There are two commercial vaccines available for treatment in Czech Republic, one for cats (Biofet M, ÚSKVBL registration No. 97/044-01-C) and one for dogs (Biocat M, ÚSKVBL registration No. 97/065-01-C).

Biological control of soil-borne pathogens by the mycoparasite Pythium Oligandrum (PO) is well known and has been demonstrated in a number of studies on plants important for agriculture. Recently, studies utilizing the mycoparasitism of PO in dermatophytosis therapy in humans and some case reports of the same in animals described a good therapeutic effect, while no side effects were recorded at all. Recently in vitro studies documented mycoparasitism of PO. This fact is very important for groups of animals containing individuals in a variously compromised health status such as those in animal shelters.

Open field questionnaire among Czech veterinarians showed that the treatment with PO was comparable with the conventional local therapy. In an open field study performed on 25 guinea pigs with dermatophytosis, 100% of the fungal cultures were negative after the PO treatment.

Materials and Methods

The study was carried out in an animal shelter in the Czech Republic, which did not have any established treatment approach to the management of dermatophytooses. Before our study, only cats with clinical signs of the ringworm disease were treated—there were no systematic measures to deal with dermatophytosis in the shelter during the six years of its existence. The shelter and the shelter staff participated in the study with informed consent.

Cats treated in the study

There were 94 cats and 3 dogs in the shelter at the time of the outbreak of an infection of *M. canis* and *P. Oligandrum*, Group 1 (middle-aged, relatively healthy cats No. 1-34), Group 2 (quarantined cats No. 35-46 and 93-94), Group 3 (healthy queens and new-born kittens, middle-aged tomcats, No. 47-64), Group 4 (young cats, shortly after treatment of *T. Glandula* and *Cryptosporidium* infection, No. 65-72), Group 5 (very shy, healthy middle-aged cats, No. 73-84), Group 6 (old and chronically ill cats on renal diet, No. 85-92). (Fig. 1) Because of the failure of full funding of this project during the study, high number of fungal cultures could be performed at the end (Day 92). No cats were euthanised in order to conduct the study (e.g. due to difficulty handling).

From all cats in the shelter, 35 were included in the study. Inclusion criteria were: presence in the shelter for the whole time of the study, ability to collect fungal culture samples at the end of the study. In one case where a cat could not continue the vaccine therapy, it was switched to the PO treatment but not included into the study group (cat No. 17). It needed treatment for inflammation in the right carpal joint just one week after the first dose of vaccine—this cat was treated with antibiotics and NSAIDs and the condition resolved in three weeks.

From the 6 cats with lesions, fur samples for trichoscopy were also collected at the same time (Day 1 and Day 92). One of the cats included in the study was long haired and the rest were domestic shorthair cats. Cats were divided into two treatment groups according to their health status. Group POT (Pythium oligandrum & vaccine), but vaccination could be also a therapeutic option for treatment of clinical signs of dermatophytosis in otherwise healthy animals. Some studies report good efficacy in treatment, some even 100% efficacy. There are two commercial vaccines available for treatment in Czech Republic, one for cats (Biofet M, ÚSKVBL registration No. 97/044-01-C) and one for dogs (Biocat M, ÚSKVBL registration No. 97/065-01-C).

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Clinical examination and fungal culture

On Day 1, a clinical examination of all cats and dogs was performed. Samples for fungal cultures were taken by a cotton swab set Fungi Quick, by rubbing the whole body of the animal. In 6 cats with visible lesions on the skin, samples of fur for trichoscopy were collected from the affected areas. The follow up sampling for fungal culture and the clinical examination of all animals was performed on Day 92 in the same way as on Day 1.

Treatment protocol

As a means of reducing M. canis in the environment, the walls and all the furniture were also treated by spraying the suspension of PO (in a special formula for use on walls, Bio Repel—Silica, Panicum milaceum, PO, registered by Czech Republic Ministry of Health), used following the producer’s instructions periodically. This process was proposed as a preventive procedure to be periodically carried out also in the future.

Pythium oligandrum treatment group (PO group)

The effervescent tablets with PO (Ecosin 3g tbl. Institute for State Control of Veterinary Biologicals and Medicines (ÚSKVBL), registration No. 057-09/2002 in the Czech Republic) were dissolved in two litres of lukewarm water (about 34°C) and left to activate for 30 minutes. The fresh suspension was immediately applied onto the cats by a sprayer; this was easily applicable to the very shy cats, too. The fur of every cat was completely covered with the suspension after the application. Then, the cats were left to dry naturally. Although the producer of PO preparation recommended only 3 weeks of therapy, we decided to continue for 6 weeks in total, according to our previous experience.1,2,3

The spray was applied once in 24 hours on the scheduled days; the 2-day blocks of application were followed by a 3-day pause between Days 52 and 73. Then, the suspension was applied in single pulses twice a week until Day 86.

Inactivated vaccine treatment group

The inactivated autovaccine (SEVAX 0412, ÚSKVBL No. 56/2012, 1ml pro toto) was first administered SC to two young, healthy, easily manipulated cats on Day 44 (cats No. 9 and 18). These cats were carefully observed for possible adverse effects and their temperature was measured daily for a week. As there were no changes in their state of health, the vaccine was given to the other cats as scheduled.

The autovaccine was applied to the 15 other cats of VT group on Days 51, 65 and 79. The cats No. 9 and 18 also received the following vaccines one week earlier. All the cats were examined carefully before the application and observed in detail on the following 2 days.

Monitoring in the shelter

Cats were observed at least twice daily by the owners of the shelter. All the cats were observed and clinically examined by a vet every 14 days during the treatment. All changes in the clinical state of the cats were noted.

Fungal culture

M. canis was cultivated on a solid culture medium (Sabouraud dextrose agar OXOID C2 s. o. Thermo Fisher Scientific, Czech Republic). After optical growth control, a microscopic check of the strain was performed. Then, 5-10 ml of saline was applied to a Petri dish and the culture was re-suspended and transferred into the bottle with a culture medium for dermatophytes. The cultivation in liquid media was carried out at 25°C and took 8 days; the bottles were shaken for 1 hour every day. During this time, the growth and purity of the dermatophyte were checked on Day 4. At the end of the cultivation, the growth was checked microscopically and the samples were applied to solid media to check on the growth.

Figure 2: Cat No. 35 which tested positive for dermatophytosis (a) before treatment and (b) after treatment.

Table 1: Summary of the data from cats POT group

| Cat No. | Sex | Age (yr) | S in the shelter | No. Days | CT | Day 1 | Total | Health status | Data effects | VT Day 2 | VT Day 3 | VT Day 4 | VT Day 5 | VT Day 6 | VT Day 7 | VT Day 8 | VT Day 9 | VT Day 10 | VT Day 11 | VT Day 12 | VT Day 13 | VT Day 14 | VT Day 15 | VT Day 16 | VT Day 17 | VT Day 18 | VT Day 19 | VT Day 20 |
|---------|-----|---------|-----------------|----------|-----|-------|-------|-------------|------------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|----------|
| 4       | M   | 3       | DSH shy         | +         |   |       |       | ND          | CURT       |          | -         | -         | R         |          |          |          |          |          |          |          |          |          |          |          |          |
| 5       | F   | 1       | DSH             | -         |   |       |       | ND          | CURT       |          | -         | -         | R         |          |          |          |          |          |          |          |          |          |          |          |          |          |
| 17      | M   | 3       | DSH             | -         |   |       |       | ND          | CRF        |          | -         | -         | R         |          |          |          |          |          |          |          |          |          |          |          |          |          |
| 18      | F   | 3       | DSH shy         | +         |   |       |       | ND          | CRF        |          | -         | -         | R         |          |          |          |          |          |          |          |          |          |          |          |          |          |
| 29      | F   | 1       | DSH             | dry       |   |       |       | ND          | AURT       |          |          |          | S         |          |          |          |          |          |          |          |          |          |          |          |          |          |
| 30      | M   | 2       | DSH             | dry       |   |       |       | ND          | AURT       |          |          |          | S         |          |          |          |          |          |          |          |          |          |          |          |          |          |
| 33      | M   | 1       | DSH             | dry       |   |       |       | ND          | AURT       |          |          |          | S         |          |          |          |          |          |          |          |          |          |          |          |          |          |
| 36      | F   | 1       | DSH             | dry       |   |       |       | ND          | AURT       |          |          |          | S         |          |          |          |          |          |          |          |          |          |          |          |          |          |
| 38      | M   | 3       | DSH             | dry       |   |       |       | ND          | AURT       |          |          |          | S         |          |          |          |          |          |          |          |          |          |          |          |          |          |
| 40      | F   | 3       | DSH             | dry       |   |       |       | ND          | AURT       |          |          |          | S         |          |          |          |          |          |          |          |          |          |          |          |          |          |
| 47      | M   | 3       | DSH             | dry       |   |       |       | ND          | OK         |          |          |          | S         |          |          |          |          |          |          |          |          |          |          |          |          |          |
| 48      | M   | 3       | DSH             | dry       |   |       |       | ND          | OK         |          |          |          | S         |          |          |          |          |          |          |          |          |          |          |          |          |          |
| 72      | F   | 1       | DSH             | -         |   |       |       | ND          | CRF        |          |          |          | S         |          |          |          |          |          |          |          |          |          |          |          |          |          |
| 88      | F   | 1       | DSH             | dry       |   |       |       | ND          | CRF        |          |          |          | S         |          |          |          |          |          |          |          |          |          |          |          |          |          |

Abbreviations: MC—fungal culture; + positive; - negative; CE—Clinical Examination; DSH—domestic short hair; LH—long hair; R—rehomed; S—in the shelter; D—dead; OK—healthy; AURT/CURT—an acute/chronical upper respiratory tract problems; CGIT—chronical non-infectious intestinal inflammation; ARF/CRF—acute/chronical renal failure; UTI—urinary tract inflammation; CA—canceroma; ND—not done.
Trichoscopy

In addition to the fungal culture, a trichoscopy was performed on cats with clinical signs. The aim of this was to compare the easy, traditional diagnostic method with the laboratory results in order to distinguish whether this, as a method of first choice for many vets, is reliable enough for diagnosing dermatophytes. Five of the cats exhibited suspicion lesions on the skin: Cat No. 11—ears; No. 29—tail; No. 30—head and neck; No. 35 dorsum nasal region and parts were found positive in the trichoscopy and also on culture; another, Cat No. 27—dorsal body and neck) was examined, but no dermatophytes were seen and the fungal culture was negative, too. Still, all skin lesions healed during the treatment. For illustration, see Fig. 2.

Clinical findings and treatment responses

The complete scheduled treatment was possible in 35 cats. After the treatment, all of the cats were clinically examined by the veterinarian. In view of the fact that the literature often describes the risk of vaccinated cats becoming carriers of the infection without clinical signs, 1,8,30 samples were taken from all of the vaccinated cats at Day 92 were taken from all of the vaccinated cats.

Four cats from VT group (No. 6, 12, 14 and 19, Table 2) displayed in Table 1. The only cats remaining positive after the treatment were one old neutered female (No. 33) which suffered from an acute upper respiratory tract infection at the time of the Day 92 testing. This young cat was first further treated with Ecosin and after recovering from the respiratory problems, it was additionally vaccinated on the same course as the other cats and 3 consecutive applications following each other in 2 weeks. There were no severe adverse effects observed during the PO therapy. Still, the cat No. 30 (old diabetic cat) suffered from severe stress after 2 successive PO treatments at the time of the Day 92, but this problem was only temporary and resolved itself spontaneously within 3 weeks.

Long-term clinical follow up

A long-term follow up was carried out for 2 years after completing the study and was based on the reports of clinical signs by the shelter owners and the vets. All of the cats and dogs present in the shelter were regularly checked by a veterinarian every 6 weeks until September 2014. There were no reports of any clinical manifestations similar to ringworm disease in the shelter in cats, dogs or the owners until 2018. Moreover, there were no reports about a recurrence of the disease after rehoming of any of the shelter cats—the shelter owners collect information about the state of health of every rehomed cat from the new cat owners, including photographs of the animal in the new environment, during the first weeks after the rehoming and they sometimes even visit the new homes of the cats.

Discussion

Originally, the dermatophytosis treatment study in the shelter was designed as an eradication study, including substantial changes of the cat housing and husbandry. We intended to carry out a statistical study of PO and vaccination treatments with a control group of cats conventionally treated by itraconazole. 1,2,6,7,12,15,18,23,26,28,34

With respect to the complicated situation of the NGO running the shelter and also to the low rate of completely healthy and cats eligible for the experimental treatment, the intended study had to be changed. Finally, the design of the study was far from ideal, but still we were able to apply the treatment by vaccination to the healthier cats as described above and to apply the PO therapy to the cats with high morbidity. For these old and/or chronically or acutely ill cats and also for the extremely shy ones, this was the only acceptable treatment modality. In the literature, there are recommendations to euthanize such cats at the beginning of a dermatophytosis eradication process, 3,7,10 but this was morally unacceptable for the shelter owners.

While some of the studies stated that the cats which were vaccinated against M. canis become lifelong carriers of the disease or develop immunoresistance, 3,7,10 we did not observe anything like this in our study; our results are consistent with other recent studies. 3,8,11 As all of the 17 vaccinated cats were clinically and mycologically negative after the treatment, there was no need for a statistical analysis. Still we have to admit, that we cannot quantify the contribution of PO to this state, while PO was regularly spread all over the environment and it actually chases the pathological fungi. 3,7,10

In the POT group of 18 cats, treated by PO, it is clear that there is no statistically correct conclusions can follow from these results, because the number of treated individuals is too low for any rigorous statistical testing. Despite the fact that we have no exact evidence, we can intuitively evaluate these results with great confidence of the vaccine’s reliability. We judge from our data that treatment by PO is useful especially for cats which were diagnosed with comorbidities. The treatment of positive cats was successful in 87% of the group (16/18 cats) and all 100% of the negative cats remain negative after the procedure. Although this pilot study could be realised only to a limited extent, the valuable experience that was collected still suggests that such treatment, although carried out imperfectly and in a very difficult environment, can have the desired effect. After the end of the therapy, we proposed to the shelter owners a set of measures to be taken to prevent a new outbreak of the disease, which is being gradually implemented in the shelter’s daily practice. Surprisingly, the suppression of the occurrence of clinical signs of ringworm disease persists even two years after the Day 92. This result was reached due to the combination of several new routine methods applicable even to severely ill cats—every incoming cat is sprayed with the PO suspension as soon as possible and also the environment is regularly treated with the suspension of PO in a special formula for use on as a part of periodical maintenance.

Furthermore, the housing conditions of the cats is significantly improved by removing the carpets, the redundant wooden wall facing and some of the furniture. The carpets are being replaced by easily washable surfaces (ceramic) and the wooden quarantine cages have already been replaced by completely washable metal ones. The previously imperfect quarantine room has been divided into two rooms, one for newcomers and ill cats with contagious diseases and one for convalescents after surgery. The quarantine rooms are completely washable and it is easy to disinfect them. Furthermore, there are no more kittens accepted to the shelter building at all, they are all kept in a separate home-like shelter building (deposit). The improvement in the housing conditions contributes to the prevention of a repeated outbreak of dermatophyte disease in the shelter.

Table 2: Summary of the data from cats VT group

| No.  | Мицелларный тест | Long-term follow up | After the treatment | | | 
|---|---|---|---|---|
| 1 | + | | | |
| 2 | + | | | |
| 3 | + | | | |
| 4 | + | | | |
| 5 | + | | | |
| 6 | + | | | |
| 7 | + | | | |
| 8 | + | | | |
| 9 | + | | | |
| 10 | + | | | |
| 11 | + | | | |
| 12 | + | | | |
| 13 | + | | | |
| 14 | + | | | |
| 15 | + | | | |
| 16 | + | | | |
| 17 | + | | | |
| 18 | + | | | |
| 19 | + | | | |

Abbreviations: MC—fungal culture; + positive; - negative; CE—Clinical Examination; DSH—domestic short hair; ND—not done

Conclusion

The results of this study suggest that vaccination against M. canis with an autovaccine tailored to the given cat can be a safe option for the treatment of healthy cats. But still, treatment with Pythium mycogarique has a great advantage in its applicability to shy or health compromised cats and thus this can be a reasonable first choice treatment for the shelters. The greatest advantage over the traditional therapeutic approach 1,14,19,22 is the fact, that the ill and shy animals do not need to be euthanised in order to eradicate signs of the ringworm disease in the shelter conditions, and therefore the moral issues of the rescuers are not in conflict with the treatment.

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Conflict of interest

The authors do not have any potential conflict of interest to declare.
A selection of infectious diseases of companion animals housed in shelters (with a focus on cats)

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Shelter medicine provides challenges that are unique due to dealing with large numbers of stressed animals housed in a confined space, usually at a high population density. It’s even more complicated since many of the animals are young and at increased risk of developing infectious diseases because their passive and acquired immunity are in a state-of-flux.

A key challenge for shelter vets is minimising the risk associated with the development of infectious diseases. Failing that, shelter vets need to know how to best manage infections when they arise, in a timely and even preemptive fashion. Our focus in this Perspective is contagious diseases generally encountered uncommonly in privately-owned animals but observed quite frequently in sheltered companion animals in Australia.

We do this with the aim of informing clinicians who predominantly focus on private practice but perform some shelter work (e.g. assisting local rescue groups and pounds). We also include a short section on vaccination, since the higher stress levels and increased pathogen exposure encountered by shelter animals compared to privately-owned animals demands for some modifications to general vaccination philosophy and guidelines.

1. Feline herpesvirus-type 1 (FHV-1)

FHV-1 is the most common respiratory pathogen isolated from cats and kittens, both with and without overt feline upper respiratory tract disease (FURTDD). One Australian study of privately-owned cats found a FHV-1 prevalence of 21% (98/462) in cats with URTD using a PCR assay.¹ While there are no published reports to date of FHV-1 prevalence in Australian shelters, an overseas study investigating several Californian animal shelters found that FHV-1 prevalence was as high as 41% in one shelter sampled.²

The most common manifestation of FHV-1 infection in cats is sneezing with serous nasal and/or ocular discharge (Figures 1 & 2). Less commonly, but worth remembering, is that FHV-1 associated dermatitis is a phenomenon sweeping the shelter medicine world; this is the installation of portals to convert one cage into two cages, connected by a ‘portal’ or tunnel (Figure 4). This allows cats to have separate toilet and eating/drinking areas, which has been shown to reduce stress levels and therefore the incidence of FURTDD (Figure 5). The Koret Shelter Medicine Program at UC Davis has some great online resources for clinicians interested in reading more about the prevention and holistic treatment of FURTDD. Appropriate disinfection protocols and personal protective clothing for staff are of course a mandatory component of case management. There is also a recent trend for minimalistic cleaning of cages (e.g. only cleaning the litter tray and replacing food bowls without cleaning the whole cage) to reduce stress and to leave important marking scents.

Figure 1: A range of presentations for cats with FURTDD.

Figure 2: A cat with severe FHV-1 infection displaying prominent and severe ocular involvement.

Undoubtedly stress and overcrowding play a huge role in sheltered cats developing FHV-1 infection, and recovering from FHV-1 infection, whether it be a new infection or recrudescence of a latent infection (where the virus hides away in the trigeminal ganglion). Consequently, treatment of the overall situation is just as important as treatment of the infection itself. Ideally, infected cats showing clinical signs should be removed from the shelter and fostered into low-stress households. If this option is not available, infected animals should be isolated in a quiet, low-stress section of the facility, and some people like to spray bedding with feline facial pheromone (Feliway³) to help de-stress the patients.

‘Portal-mania’ is a phenomenon sweeping the shelter medicine world; this is the installation of portals to convert one cage into two cages, connected by a ‘portal’ or tunnel (Figure 4). This allows cats to have separate toilet and eating/drinking areas, which has been shown to reduce stress levels and therefore the incidence of FURTDD (Figure 5). The Koret Shelter Medicine Program at UC Davis has some great online resources for clinicians interested in reading more about the prevention and holistic treatment of FURTDD. Appropriate disinfection protocols and personal protective clothing for staff are of course a mandatory component of case management. There is also a recent trend for minimalistic cleaning of cages (e.g. only cleaning the litter tray and replacing food bowls without cleaning the whole cage) to reduce stress and to leave important marking scents.

Bacterial co-infection (secondary invasion) with FHV-1 is common and may include Mycoplasma spp., Bordetella bronchiseptica, Chlamydia felis and a variety of obligate anaerobes. Multiplex PCR testing is commercially available in Australia and will detect nucleic acid from viral and bacterial pathogens commonly implicated in cases of FURTDD.² Both amoxicillin-clavulanate acid and doxycycline have been used for treatment of FURTDD with similar efficacy; our preference, however, is to treat doxycycline monohydrate at 10mg/kg SID (with food or just before a meal) to cover possible secondary Mycoplasma infections and to avoid the stress of twice daily pilling. Treat for 21 days if you suspect Chlamydia infection (cats with chlamydiosis usually present with severe chemosis and purulent ocular discharge, often affecting one eye first, and then spreading to the other eye).

Recently, famciclovir has been used successfully in many cases of FHV-1 infection; this is an anti-viral drug that was developed for the treatment of α-herpesvirus infections in people (e.g. ‘cold sores’) and has demonstrated clinical efficacy in cats infected with FHV-1. Our current recommended dosage for famciclovir is 30-40mg/kg every 8-12 hours based on serum pharmacokinetics (and saturation of the hepatic conversion of famciclovir to penciclovir), even though David Magg’s group still recommends 90mg/kg BID-TID, which most people find prohibitively expensive. Based on some unpublished research in Australia we have been involved with, we do NOT recommend ‘blanket’ prophylactic treatment of all cats presenting with FURTDD with famciclovir instead we advise it to be used early and regularly, but only in cats presenting with clinical signs likely associated with FHV-1 infection (i.e. where nasal and/or ocular signs are prominent, rather than oral cavity disease with ulcers more suggestive of infection with calicivirus). Cats with prominent FHV-1 associated ocular
Virulent systemic feline calicivirus (VS-FCV)

Virulent systemic feline calicivirus (VS-FCV) infection was first described in the literature as a focal outbreak affecting cats in northern California in 1998. Although not widely cited, the syndrome might actually have been first recorded in Australia in 1972 by Daria Love and Keith Baker in a case cluster of kitten mortalities, with isolation of calicivirus from lung and brain tissue as well as mouth ulcers. Since these seminal reports, it has been reported in many countries including Australia, with a recent relatively mild outbreak occurring in Canberra in early 2018.

One of the pioneers of the shelter medicine movement, Dr. Kate Hurley, reported an outbreak affecting 54 cats in the west Los Angeles area that occurred in 2002 with a mortality rate of 40%. This outbreak was particularly concerning as it demonstrated the interplay between shelters and private veterinary clinics. It was a reminder that private clinicians not working in shelters also need to be on the lookout for cases of VS-FCV, despite it being a disease that usually arises in group-housing situations (e.g. shelters and research colonies). In Hurley’s report, three different veterinary clinics were presented with cases of VS-FCV following a suspected outbreak at a local rescue facility that housed around 40 kittens and cats at the time of the outbreak. Some of the treated cats did not have direct contact with sick animals but were likely infected due to fomite transmission via owners who had other cats being treated in hospital or were technicians at one of the three clinics. This was an unfortunate demonstration of the environmental survivability of FCV (up to 1 month under ideal conditions) and the need for vigilant barrier nursing and disinfection protocols in veterinary hospital and shelters. We favour accelerated hydrogen peroxide for disinfection after preliminary cleaning, since it is insensitive to staff and straightforward to use.

In addition to common signs of upper respiratory FCV infection (e.g. anorexia, tongue ulceration, nasal discharge and dyspnoea), veterinarians should also be aware of additional signs which may be evidence of the more pathogenic VS-FCV:

- High fever (as high as 41.4°C)
- Severe respiratory distress
- Facial and/or limb oedema (Figure 6)
- Ulcerative dermatitis, crusting and alopecia of the face, ears and feet (‘paw and mouth disease’; Figure 7)
- Limping
- Ocular discharge and/or conjunctivitis
- Icterus probably due to viral pancreatitis
- Sudden death.

Definitive ante-mortem diagnosis of VS-FCV is not yet possible, although this is an area of active research. Swabs of lesions are PCR-positive for FCV. Treatment of cats with VS-FCV infection is mainly supportive (intravenous fluids therapy, analgesia and antibiotics to cover secondary bacterial infections). Treatment with feline interferon-omega (FeIFN-ω) is helpful (Virbagen™, manufactured by Virbac Animal Health). Drugs used to treat norovirus infections in people might eventually prove useful for the clinical management of cats with VS-FCV. Core vaccination with commercial vaccines is generally not protective against VS-FCV.

Coccidiosis

Coccidiosis, caused by Cystoisospora spp. (called isospora spp. in older literature), is relatively uncommon in privately-owned pets but is commonly detected in shelter animals (particularly puppies and kittens). Palmer et al. (2008) performed a national Australian study of gastrointestinal parasites in dogs and cats and found Cystoisospora spp. in 10% of shelter kittens/cats sampled, but in only 1.2% of privately-owned cats and dogs tested. The figure of 10% in shelter animals is reminiscent of some unpublished research we performed with Professor Jan Slapeta in Sydney in 2012 on shelter animals. Coccidiosis is so common in some shelters in Australia that affected rescue organisations routinely treat all animals awaiting adoption, and some breeding kennels routinely treat all puppies in the third or fourth week of age, with a single dose of the anti-protozoal drug toltrazuril (see below).

Detection of Cystoisospora spp. is relatively straightforward with routine saturated salt faecal flotation and microscopy. Look for organisms about half the size of nematode eggs; some may appear in the distinctive sporozoite stage (two nuclei contained within the one sporocyst wall; red arrow in Figure 8).

Note: Currently available multiplex faecal PCR panels do NOT test for Cystoisospora spp. So, you will miss them unless you do a faecal float!

The off-label treatment of choice for coccidiosis in small animals is toltrazuril, which comes in a formulation for piglets or chickens called Baycox™ (Bayer Animal Health). In confirmed cases of Cystoisospora infection, administer a once-of dose of 20-30 mg/kg (dogs) or 30mg/kg (cats). Some people give this dose every day for 3 days, to ensure adequate dosing (the formulations are not palatable; the pig formulation is better to give than the chicken formulation). Some authorities recommend re-treatment after 3 weeks to cover the possibility of re-infection via acquisition of oocysts in the environment. We recommend bathing kittens and puppies (e.g. using Malaseb™, DERMcare), although any pH neutral shampoo will do after treatment to remove any contaminated feces that might be stuck to the fur and then placing them in a disinfected cage to prevent re-infection.

Giardiasis

Like coccidiosis, giardiasis is relatively uncommon in privately-owned pets but is common in shelter animals (particularly dogs). Palmer et al. (2008) found 14% of Australian shelter dogs sampled were infected with Giardia spp. (versus 6% of privately-owned dogs), and 3% of Australian shelter cats sampled were infected with Giardia spp. (versus 1% of privately-owned cats). Interestingly in this study, no dogs with giardiasis displayed clinical signs of gastrointestinal disease, highlighting that infection with Giardia spp. can often be asymptomatic. The unpublished research we performed in Sydney in 2012 on shelter animals with Jan Slapeta found a similar overall prevalence of giardiasis and of predominantly sub-clinical infections in dogs and cats. Environmental decontamination is a very important part of preventing this disease spreading in shelters, and good design of facilities which make them easy to disinfect and keep clean is important for both prevention, and to prevent cross contamination once disease occurs (Figure 9).

Giardia organisms are very difficult to detect with routine saturated salt faecal flotation and microscopy. Instead, a faecal antigen point-of-care kit is the easiest way to diagnose giardiasis in-clinic. Multiplex faecal PCR panels DO include Giardia spp. and are another way to detect infection.

Even though many cases of giardiasis are asymptomatic, we still advise treatment because of the possible public health risk to owners (some assemblages of Giardia are host-specific for dogs and cats, while others are potentially zoonotic). Under some circumstances Giardia can cause significant small bowel and/or large bowel diarrhoea (sometimes haemorrhagic) in cats including coloinal ulceration also may benefit from cidofovir drops given twice daily (sourceable from good compounding pharmacies, e.g. BIova).
**GIARDIASIS SUMMARY:**

1. Giardiasis is common in shelters, including animals without signs of gastrointestinal disease.
2. Detection of Giardia spp. requires antigen testing with a point-of-care kit or qPCR testing (i.e. routine faecal flotation will often miss this parasite).
3. Treat with fenbendazole or secnidazole.
4. In cats, look for co-infection of Giardia spp. with T. foetus, and treat with ronidazole as appropriate, but sequentially and NOT simultaneously.

**5. Dermatophytosis (Ringworm)**

Dermatophytosis is a nightmare for cat shelters to manage. Infected cats (Figures 10 and 11) need to be isolated during treatment (usually for 6-8 weeks). Fungal spores can survive in the environment on broken hair shafts for months or even years, making outbreaks of ringworm in shelters a huge risk. There are few things more heartbreaking as a shelter veterinarian than the euthanasia of otherwise healthy cats with a treatable disease to mitigate the risk of spread of this dermatomy. Microsporum canis, a zoophilic dermatomy, is the normal culprit, although occasionally the geophilic (soil dwelling) organisms Microsporum gypseum and Trichophyton mentagrophytes are responsible. The diagnosis and treatment of all three organisms is much the same.

Screening cats with a Wood’s lamp is quick and easy (Figure 12), but unreliable (not all isolates glow apple green) and highly affected by the skill of the operator. In addition, some cats with dermatophytosis are asymptomatic and therefore very difficult to detect. In a study of 273 stray cats in Italy, which reported a dermatophytosis prevalence of 6% (many of which were asymptomatic), 20/20 cats declared infected based on Wood’s lamp testing were found to be uninfected when hair was cultured (i.e. all 20 positive results were false-positives).18 This result was a reminder that the only way to accurately diagnose dermatophytosis in cats is by fungal culture, although PCR may offer another option in the foreseeable future. Many shelters have started to routinely perform fungal culture on all incoming cats using sterile toothbrushes, and this can be done cheaply if fungal culture plates are bought in bulk and some basic fungal identification training is completed. The authors would like to acknowledge the efforts of Dr. Denise Wigney at the University of Sydney—over the past five years Denise has incubated and interpreted the fungal results for thousands of rescue cats in the Sydney area, all in her own time and for no personal gain.

**DERMATOPHYTOSIS SUMMARY:**

1. Be alert for ringworm in cats with and without clinical signs of skin disease in shelters.
2. Ideally screen all incoming cats for ringworm by fungal culture.
3. Treatment of cats with ringworm should consist of isolation, systemic medication (itraconazole or terbinafine) and bathing.

**6. Feline leukaemia virus (FeLV)**

Many Australian clinicians with whom we speak claim to rarely see FeLV infection in their private practices nowadays, and some have even ceased to test for it regularly. We agree that the prevalence of FeLV in Australian cats has probably reduced over the past thirty years, as has been the general trend in Europe.22 Note that FeLV is still quite prevalent in many parts of Asia and South America; for example, a recent study found 12% of privately-owned cats presenting to an emergency hospital in Malaysia were infected with FeLV. However, over the past five years we have seen enough cats with FeLV to say with confidence that it is still out there (Figure 13).19 Australian veterinarians need to keep it on their list of diagnostic possibilities and be on the lookout if doing any work for local shelters or rescue organisations.

Of concern for us, in terms of spread of FeLV infection, are small rescue organisations that cannot afford to test all incoming cats for FeLV infection, and who practice group-housing without routinely vaccinating against FeLV. We have assisted two such organisations in Sydney, both with around 40-50 cats housed in a single facility, that had outbreaks of FeLV infection (including in some cats older than 10 years-of-age). The problem is amplified if FeLV-infected cats arerehomed to new owners before the shelter realises they are infected—it is these cats that Australian veterinarians in private clinical practice might see in the setting of FeLV-related disease, even if not specifically doing work for a shelter or rescue organisation. In passing, we would like to thank Martine Perkins and Andrea Harvey who have helped us track down these FeLV cases back to the rescue facilities they came from.

Due to the low FeLV prevalence in Australia (less than 2%), veterinarians testing for FeLV antigen with a point-of-care test kit may obtain surprising results,20 and always confirm a positive in-house FeLV result with FeLV qPCR testing. An excellent resource for referring to when testing for FeLV infection can be found on the ABCD website.24 We have been involved with the management of many FeLV-infected cats, and, despite the generally poor prognosis

doing, and both acute and chronic, and sometimes signs can be severe.

Treatment for giardiasis is usually with fenbendazole (Panacur™, Coopers Animal Health) at 50 mg/kg SID for 5 consecutive days (Plumb’s Veterinary Drug Handbook). Fenbendazole at this dose will also remove any nematode infections (including roundworm, hookworm, whipworm and lungworm), and consequently fenbendazole can be used as a routine anthelmintic in dogs, cats and pocket pets (as it is in the UK, with registered companion animal products licensed for this purpose). However, fenbendazole is only effective against some tapeworm infections (effective against Taenia spp. but not Dipyridium caninum, the flea tapeworm), and therefore praziquantel should be added whenever a cestode infection is suspected or confirmed. Panacur™ is highly unpalatable as the large animal drench preparation, and if treating many animals with fenbendazole it can be well worth investing in fenbendazole tablets from a quality compounding pharmacist (e.g. BOVA). It’s best not to use metronidazole as a treatment for giardiasis since the dosage required to clear Giardia has the potential to cause neurotoxicity. One of us (EJP) prefers metronidazole at a conventional dosage (10-15 mg/kg twice daily for 5 days) to treat the dysbiosis and inflammatory bowel disease which commonly occurs secondary to Giardia infection.

For cats not amenable to treatment with fenbendazole for 5 days, a single dose of secnidazole (which can be ordered from BOVA compounded to a suitable strength) at a dosage of 20-30 mg/kg SID for 5 consecutive days, a single dose of secnidazole (which can be ordered from BOVA compounded to a suitable strength) at a dosage of 20-30 mg/kg SID for 5 consecutive days, or a single dose of metronidazole at a conventional dosage (10-15 mg/kg twice daily for 5 days) may be used.

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reported in the literature (a common figure used is that 90% of cats with progressive FeLV infection will die within three years of diagnosis, usually due to development of lymphoma, leukaemia or severe aplastic anaemia); some will remain healthy for many years, so-called ‘slow’ cats. Therefore, to treat the animal, not the statistics (i.e. a poor prognosis should not be used as a reason for euthanasia, if owners are willing to treat and agree to house the cat indoors to prevent the spread to other cats). We are currently overseeing a medication trial for FeLV-infected cats in Australia using a novel drug manufactured in Malaysia that has shown some early promising results; if anyone is interested in finding out more please email me at westman.mark@sydney.edu.au. We are also trialing a treatment protocol for FeLV-infected cats using a triple drug approach that has been a highly effective antiretroviral therapy for HIV-positive patients; this protocol requires committed owners with good financial resources, as the drugs are expensive.

**FeLV SUMMARY:**
1. All incoming cats to a shelter or rescue facility should be screened for FeLV infection using a point-of-care antigen test kit (with confirmatory PCR testing performed on any positive samples).
2. If FeLV testing all incoming cats to a shelter or rescue facility is not possible, cats should be housed separately (or only mixed with cats vaccinated against FeLV).
3. Veterinarians should consider FeLV infection for any cats presenting with leukaemia, lymphoma or anaemia, particularly younger cats and kittens.

7. **Feline immunodeficiency virus (FIV)**

Like FeLV infection, FIV infection is commonly screened for by the larger rehoming organisations and shelters in Australia, and less commonly screened for by the smaller rehoming/rescue organisations. We performed the largest seroprevalence survey in Australia to date in 2011-2013, finding 15% of cats older than 2 years-old of age with some level of outdoor access were FeLV-infected, while 6% of cats in a large shelter in WA were FeIV-infected. The American Association of Feline Practitioners recommends that all new cats entering a shelter should be tested for FIV (and FeLV) infection prior to rehoming. We recommend all incoming cats older than 6 months of age, and kittens born to FIV-positive queens can be FIV tested using an antibody test kit from as early as 12 weeks of age, although kittens that test FIV-positive should be retested 1-2 months later or confirmed by PCR testing in case of a false-positive result from persistence of circulating maternally-derived antibodies.

As clinicians would already be aware, the prognosis for a FIV-infected cat is much better than the prognosis for a FeLV-infected cat. In fact, although FIV-infected cats are approximately 5-6 times more likely to develop lymphoma than FIV-uninfected cats, if kept in low stress households many FIV-infected cats may live relatively normal lives. Within stable households (i.e. minimal or no inter-cat aggression), FIV transmission between cats is rare. Despite this, if considering rehoming a FIV-infected cat to a household with a FIV-uninfected cat, we recommend vaccinating the other cat against FIV. However, since the FIV vaccine only has 56% effectiveness, we would in addition recommend shelters screening for FIV infection should be using Witness™ or Anigen Rapid™ FIV test kits, since incorrect diagnosis of FIV infection by other FIV kits may result in unnecessary euthanasia or restrictions being placed on the cat for rehoming. To date, these are the only test kits that have been independently reviewed for performance in FIV-vaccinated cats, and we would therefore advise against using any other test kit for FIV screening until rigorous scientific evaluation has been performed. A helpful algorithm for determining FIV infection can be found in Figure 4 of this open access paper.

Kittens born to FIV-positive queens can be FIV tested using an antibody test kit from as early as 12 weeks of age, although kittens that test FIV-positive should be retested 1-2 months later or confirmed by PCR testing in case of a false-positive result from persistence of circulating maternally-derived antibodies.

**FIV SUMMARY:**
1. Shelters should screen for FIV infection using Witness™ or Anigen Rapid™ FIV test kits
2. Shelters that rehome FIV-positive cats should house them individually while at the shelter, or only group-house them with other FIV-positive cats
3. Shelters should recommend FIV vaccination of FIV-negative cats to be co-housed with a FIV-positive cat, and recommend annual retesting of FIV-vaccinated cats to detect vaccine breakthroughs
4. Shelters should help educate the public about FIV transmission and the prognosis for FIV-positive cats.

8. **Feline panleukopenia virus (FPV)**

Like its canine counterpart, feline parvovirus replicates within enterocytes in crypts are damaged leading to severe gastrointestinal signs. Lymphoid tissue and bone marrow are also affected (hence the leukaemia), as is CNS tissue in cases of in utero infection. It is one author’s experience (SM) that most kittens present with peracute illness. Within a 12-hour period, a kitten looking vaguely ‘flat’ can progress to severe illness or even death. Pyrexia and inappetence are commonly seen, followed by or associated with vomiting and watery diarrhoea. Within a single litter...
Transmission is predominately via the faecal–oral route, although the virus may be shed in any body secretion. In shelters, we recommend this helpful review by Richard Squires.36

Vaccination often. Animals should be vaccinated with a core C3/F3 vaccine as soon as they enter the building (unless the animal is sick or injured), and dogs should also have an intranasal or intraoral 'kennel cough' vaccine administered at the same time. Note that this does NOT mean 2, or 4, or 8 hours after admission. Animals need to be vaccinated within an hour of entry. Vaccines should be stored correctly and reconstituted at the time of vaccination (i.e. not made up and stored in the fridge for later use). Animals then need to be re-vaccinated 2 weeks later. Puppies and kittens should be vaccinated as early as 4 weeks-of-age and then, ideally, fortnightly until 20 weeks of age (if still being housed at the shelter).

Vaccinate for longer. Despite the ‘early finish’ label claim by some vaccine manufacturers, we recommend vaccinating all shelter animals with a C3/F3 vaccine every 2 weeks until 20 weeks of age, as per the 2015 World Small Animal Veterinary Association (WSAVA) Vaccination Guidelines.37

Figure 14: Point-of-care blood typing kit using immunochromatography methodology.

Figure 15: Giving a feline blood transfusion using a syringe driver. This permits slow and accurate rates of blood administration, and if you collect blood into 25 mL syringes preloaded with citrate phosphate dextrose, there is no double handling of blood, as it goes straight into the syringe driver warm and ready to administer.

**References:**


22. Søvagunathan A, Atewa AM, Lobetti R. Prevalence of feline immunodeficiency virus and feline leukaemia virus infection
64

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