Companion Animal Research Review™

Making Education Easy

Issue 8 – 2019

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Abbreviations used in this issue

FDA = Food and Drug Administration
IBD = inflammatory bowel disease
IV = intravenous
PCR = polymerase chain reaction
SCFA = short-chain fatty acid
TID = three times daily
TSH = thyroid-stimulating hormone

Welcome to Issue 8 of Companion Animal Research Review.

Veterinary students exhibit poor sleep quality and experience more than normal excessive daytime sleepiness according to the findings of a US study. Following on, we discover that thoracic drainage catheters inserted into the pericardial space via a modified Seldinger technique can be positioned in dogs to aid the management of pericardial effusion, and can be placed under minimal sedation. Other topics covered in this issue include dietary intervention for pruritus in dogs, rectal levetiracetam in dogs with cluster seizures, oesophageal imaging features in brachycephalic versus non-brachycephalic dogs, an iodine-restricted diet for hyperthyroidism in cats, and faecal short-chain fatty acids and dysbiosis in dogs with chronic enteropathy.

Kind regards,

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Independent commentary by Nick Cave.

Nick Cave is an Associate Professor in small animal medicine and nutrition at Massey University, NZ. He graduated from Massey University in 1990 with a BVSc, and worked in general practice for 6 years until 1997, when he returned to Massey for a residency in small animal internal medicine, attained membership in the Australasian College of Veterinary Scientists by examination, and graduated with a Masters in Veterinary Science in 2000. In 2004 he moved to the University of California, Davis, where he attained a PhD in nutrition and immunology. At the same time, he completed a residency in small animal clinical nutrition, and became a diplomate of the American College of Veterinary Nutrition by examination in 2004. In late 2005, he returned to Massey University to lecture in small animal medicine and nutrition. He is a founding member of the WSAVA Global Nutrition Committee, and a founding board member for the Massey University Working Dog Centre.

Sleep quality and sleepiness among veterinary medical students over an academic year

Authors: Nappier MT et al.

Summary: This study used data from assessments of Pittsburgh Sleep Quality Index and the Epworth Sleepiness Scale in veterinary medical students throughout the academic year to determine sleep quality. Overall, the students had poor sleep quality and experienced more than normal excessive daytime sleepiness.

Comment: I have always considered it very bad form to sleep during lectures and wished sorely to avoid the humiliation of being woken up from a stolen minute of slumber in the back row of the theatre. So as an undergraduate, to avoid offence to the lecturers and embarrassment to myself, I took a more considerate approach and tended to abstain from anything too serious before lunch. I could not ever have been charged with pushing myself too hard. Do undergraduates push themselves harder now, under the weight of greater expectations and external pressures? And do we see greater anxiety and turmoil in students? A survey of Sydney University veterinary students in 2005 revealed that only 6% were not stressed by the curriculum and 50% experienced depression and feelings of being overwhelmed (Collins H and Foote D. 2005). Although those numbers are similar to other professional degrees, there is no comfort in that solidarity. Inadequate sleep is well recognised as both a sign of, and a cause of, poor mental health, which has led to the odd term "sleep hygiene". In the study by Nappier et al. (2019), the authors surveyed veterinary students across an academic year at Virginia Tech in the US. The scale they used for sleep quality included scores from 0 to a theoretical 21, where lower is better, and <5 is "healthy". Perhaps it was no surprise that none of the year groups, on average, scored less than 5, though they were consistently in the 6-8 range, which is known to impair learning, and when chronic, is thought to increase the risk of poor mental health. Nonetheless, the scores were consistent with similar studies in medical, dental and pharmacy students elsewhere. That the first year students were the best and the final year students the worst, was unsurprising. However, there was a clear improvement in the final year students, to the point that they were almost "hygienic" come matriculation. The authors posited that an improved ability to deal with stress may have explained their blissful slumber, though it seems to me that simply knowing the end is nigh might be enough. But other than reminding us of the value of sleep for life, not just for study, I'm not sure how educators can respond to this sort of information. Perhaps we should simply be tolerant and understanding when foreheads are laid gently against the desk during lectures and treat the sleeping with sympathy rather than humiliation. At the 1999 ACVIM forum in Seattle, I was, at least in physical form, in the audience of a mid-morning lecture after a typically juvenile evening of revelry. I sat slumped in my chair with the same postural rigidity as Stephen Hawkins, but with a good deal less of his mental awareness. About 20 minutes in, I succumbed to somnolence and toppled into the aisle. Before I hit the ground, I awoke and prevented imminent prostration by adopting a strange, quadrupedal stance, scurrying forward like a startled capybara before standing upright, and without a hint of dignity, I resumed my seat. My embarrassment was completed by the fact that I had been sitting next to Professor Grant Guilford at the time. He lacked sympathy.

Reference: Front Vet Sci. 2019;6:119
Abstract

Retrospective evaluation of pericardial catheter placement in the management of pericardial effusion in dogs (2007-2015): 18 cases

Authors: Cook S et al.

Summary: This retrospective study (2007-15) conducted at a university teaching hospital examined the use of pericardial catheters placed via a modified Seldinger technique for pericardial fluid drainage in 18 dogs with pericardial effusion. Of 18 pericardial catheters, most were placed within 1 hour of presentation and all within 5 hours (median 72.5 min). Sedation with butorphanol occurred in 10/18 cases, and 4 with additional midazolam. Pericardial catheters were positioned for acute drainage in 4 cases and were immediately removed; 14 remained *in situ* for a median of 18 hours, 10 were re-drained after pericardial catheter placement. New arrhythmias occurred in 6 cases, with 4 receiving anti-arrhythmic therapy. Seven cases were euthanised, 1 died and 10 patients were discharged.

Comment: I originally started to write "The first time…", but then it is true of all times, that when you aspirate the viscous haemorrhagic fluid during pericardiocentesis, your own heart flutters with a sympathetic arrhythmia at the possibility you have just punctured the right ventricle. It may be unnecessary, but it would not be misleading to add that for the first time I was clenched so firmly with anxiety, that you could not have swiped an EFTPOS card between my buttocks. "But" to the point: pericardiocentesis is an emergency procedure that is life-saving, but not without risk. One always hopes that the first procedure tears a hole in the pericardium so that it drains into the mediastinum and prevents reoccurrence, though frustratingly, repeated centesis is required in about a third of cases. In people, placement of an in-dwelling catheter is associated with a reduction in the recurrence of idiopathic and postoperative effusions by up to 70%. The authors of this study used minimal sedation (usually butorphanol/midazolam), and fewer than half were given local anaesthesia, yet they managed to place 14 gauge chest tubes; although central venous catheters would be equally suitable. The modified Seldinger Kit makes the procedure more fiddly and expensive, but not by a lot, and their results certainly suggest a reduction in reoccurrence. The incidence of arrhythmias was not greater than previously published and most did not develop during the catheter placement suggesting that the technique does not increase their risk. Annoyingly, the authors reported that during the retrospective period, their practice managed 94 other cases by intermittent pericardiocentesis, yet they did not make any comparison, nor even report the rate of requirement for repeated centesis in their own population. Nonetheless, the next case I will manage, I will certainly consider this technique, while trying to relax a little.

Reference: J Vet Emerg Crit Care (San Antonio) 2019;29(4):413-7
Abstract

Open-label clinical trial of rectally administered levetiracetam as supplemental treatment in dogs with cluster seizures

Authors: Cagnotti G et al.

Summary: This prospective, open-label clinical trial tested the use of a standard treatment protocol (diazepam, phenobarbital) with (n = 36) or without (n = 21) rectally administered levetiracetam 40 mg/kg in preventing additional seizures in dogs presenting with cluster seizures or status epilepticus. In dogs with cluster seizures, the response rate was 48% with standard treatment and 94% with the addition of rectal levetiracetam ($p < 0.001$). There were insufficient dogs with status epilepticus to analyse.

Comment: Levetiracetam (Keppra®) is rapidly absorbed, is not significantly metabolised by the liver, and has infrequent side effects in dogs. It is still a new kid on the seizure-block and with the exception of a couple of small trials in which its efficacy as a sole treatment was unimpressive, it has been evaluated in dogs as an adjunctive, rather than mono-therapy. It has been shown to be rapidly absorbed following per-rectal administration and thus can be considered for treatment of cluster seizures or status epilepticus by owners at home. In addition, the management of status epilepticus or clusters in hospital can be frustrating and we are constantly on the lookout for better treatments of the problem cases, where progressive anaesthesia to the point of needing ventilation can be required. This study evaluated its administration to dogs in status epilepticus or experiencing clusters, when given in addition to a standard protocol of IV diazepam followed by IV phenobarbital. The authors formulated a 200 mg/mL suspension in sterile water and administered it rectally every 8 hours. A response to therapy was defined as the absence of a seizure in the following 24 hours and the difference in the response rate was impressive, which given the size of the study, was compelling. Although there is insufficient evidence to select the drug as oral monotherapy over other alternatives such as phenobarbitone or imepitoin, this study supports its use in hospital in severely affected cases.

Reference: J Vet Intern Med. 2019;Jun 20 [Epub ahead of print]
Abstract

Diet intervention alleviates pruritus by reducing intestinal inflammation to improve skin health in dogs

Authors: Badri D et al.

Summary: This crossover study in 15 dogs with dermatologic disorders and 15 pair-matched healthy dogs examined the effect of dietary interventions (with or without grains) to alleviate pruritus by reducing intestinal inflammation. Dogs with dermatologic disorders experienced an increase in response rate for pruritus reduction of 14.3% when fed grains compared to control food and a decrease in the mean level of faecal calprotectin (57.91 vs 129.09 ng/g). Healthy dogs experienced no change in mean faecal calprotectin level with diet (36.40 vs 33.68 ng/g). The number of dogs with dermatologic disorders with decreasing faecal calprotectin levels was 42.86% higher with the grain-based diet. The grain diet also increased the mean neutrophil count in dogs with dermatologic disorders (4.28 vs 3.85 k/μL), but had no effect in the healthy dogs (3.97 vs 3.77 k/μL).

Comment: Sometimes I select papers for Research Reviews after a careful reading, sometimes after a quick read through, but in this case I selected it based purely on the intrigue induced by the title. Unfortunately, it is published only in extended abstract form and we can only hope it is a preliminary publication and not the last word on the subject. The authors hypothesised that "dietary intervention alleviates pruritus by reducing intestinal inflammation to improve skin health", but there is no room it seems in the abstract to justify that hypothesis. It is not news that animals with food hypersensitivity can have both pruritus and gastrointestinal signs. In fact, the more closely dermatologists question owners about gastrointestinal signs, the more they tend to recognise. And the nutritional reasons why chronic gastrointestinal disease can impair the coat and skin are legion. But other than improving nutritional status, would reducing intestinal mucosal inflammation affect the skin? In this study, the authors used the presence of calprotectin in the faeces as a marker of "intestinal inflammation". Calprotecin is a protein found in neutrophils and macrophages, and is released by them during activation. Enteritis leads to extravasation and an increase in faecal calprotectin. As such, it correlates with disease activity in human ulcerative colitis, though not as closely with Crohn's disease. In dogs, faecal calprotectin concentrations correlate strongly with the number of neutrophils and macrophages in the mucosa in chronic enteritis, and it reliably increases in acute enteritis. In this very brief description, there was no attempt to analyse the data for statistical significance, though the small number of dogs made it unlikely to detect a difference unless the effect size was huge. The interesting feature in this case, was that the principle difference between the two diets was that the test diet "included grains", though what that exactly meant quantitatively or qualitatively was not described. Dogs with "derm disorders" fed the test diet started with much higher faecal calprotectin and reduced more than when fed the control diet, but still remained higher at the end. There was no clear definition of the dogs' diseases, no mention of the presence of gastrointestinal signs, and certainly no demonstration of causality between any specific quality of the diet and the faecal analysis. However, it is becoming increasingly clear how different dietary ingredients affect the intestinal microflora, as well as the intestine directly, and we are only scratching the surface of our own understanding of how intestinal inflammation affects other body systems. So it is possible that the diets differed enough to affect the microflora or the mucosa, to make a clinical difference, though these data are little evidence of that, and I can certainly not agree with the authors suggesting that it was the presence of "grains" in the test diet that had reduced pruritus, and that it had done so by reducing intestinal inflammation. It is unfair to judge this based on an abstract alone, but I certainly hope that we see more data on what might be an intriguing mechanism of action.

Reference: Curr Dev Nutr. 2019;3(Suppl 1):nzz033.P09-001-19
Abstract

Retrospective analysis of esophageal imaging features in brachycephalic versus non-brachycephalic dogs based on videofluoroscopic swallowing studies

Authors: Eivers C et al.

Summary: These UK authors undertook videofluoroscopic swallowing studies in brachycephalic dogs and non-brachycephalic dogs presented for dysphagia or regurgitation between 2006 and 2017, and investigated associations between the imaging findings and patient signalment. A total of 36 dogs were included in the study, 10 normal and 26 with presumed oesophageal dysmotility; cases were divided into brachycephalic and mesaticephalic breeds. Twenty (77%) of the 26 dogs with presumed oesophageal dysmotility were brachycephalic with a median age of 1 year (range 0.2-10.5 years). The most common findings in the cohort were prolonged oesophageal transit time in 21 dogs, decreased propagation of secondary peristaltic waves in 20 dogs and gastro-oesophageal reflux in 18 dogs. Hiatal herniation was evident in 8 dogs (all were brachycephalic) and only brachycephalic dogs exhibited morphological oesophageal variations. Brachycephaly was found to be significantly associated with oesophageal dysmotility ($p = 0.005$), gastro-oesophageal reflux ($p = 0.02$), prolonged oesophageal transit time ($p = 0.41$), and hiatal herniation ($p = 0.03$).

Comment: Our understanding of the relationship between inadequate airway function in brachycephalics and risk of aspiration has come a long way. The earliest observations resulted from catastrophic aspiration events that were distressingly common during the immediate post-operative airway surgery period. The initial supposition was that the combination of opiates, residual airway obstruction, upper airway inflammation, and pain were sufficient to raise the risk. While all of that is true, it has only recently become apparent that oesophageal dysfunction and degrees of hiatal herniation are frequently present in the worst affected breeds prior to surgery. The authors of this paper, from the University of Edinburgh, claim to have observed an increase in oesophageal dysfunction in brachycephalics and our experience at Massey has certainly been similar. If true, it suggests an anti-Darwinian pas de deux of airway and oesophageal genetics that is rapidly becoming incompatible with life, let alone acceptable welfare. The authors retrospectively evaluated swallowing studies of all breeds, and whilst not clearly stated, the implied hypothesis was that brachycephalics would be over-represented and that risk factors could be identified. As a descriptive study, this is informative and sobering. As an attempt to address the implied hypotheses, it oversteps a little. This was a very biased convenience sample, with no case controls, and cannot be considered to provide any evidence for the evaluation of risk, prevalence or breed predilections. The claim that brachycephalic dogs were significantly more likely to have oesophageal dysmotility compared to non-brachycephalic dogs can't be concluded from this data set. In fact, it is difficult to know exactly what one can conclude from this particular data set. Some observations are worth noting though. Prolonged oesophageal transit was the most common abnormality, but gastro-oesophageal reflux was also very common in brachycephalics. Once thought rare, sliding hiatal hernias were present in a third, half of which were French Bulldogs. So, although this is not a good piece of epidemiology and has not really contributed to our understanding of risk or prevalence for oesophageal dysfunction, it should serve as another demonstration of the comorbidity of brachycephalic obstructive airway syndrome and dysphagia, which tragically, can be a lethal combination.

Reference: J Vet Intern Med. 2019;Jun 19 [Epub ahead of print]
Abstract

Validation of exercise testing and laryngeal auscultation for grading brachycephalic obstructive airway syndrome in pugs, French bulldogs, and English bulldogs by using whole-body barometric plethysmography

Authors: Riggs J et al.

Summary: This prospective clinical study examined the utility of exercise testing (5-minute walk and 3-minute trot tests; n = 57) or auscultation of laryngeal stridor (n = 57), compared to whole-body barometric plethysmography, to predict laryngeal collapse in brachycephalic dogs. Sensitivity of clinical examination for brachycephalic obstructive airway syndrome diagnosis was increased from 56.7% to 70% after the 5-minute walk test, and 93.3% after the 3-minute trot test. Sensitivity of laryngeal stridor as a predictor of laryngeal collapse was also greater after (70%) versus before (60%) exercise. The specificity of laryngeal stridor was 100% (pre- and post-exercise).

Comment: The psychologist Philip Zimbardo became famous, perhaps infamous, for his Stanford Prison experiment, in which he ostensibly demonstrated how social conformity and peer expectations facilitate antisocial behaviour. The "experiment" launched his career, much of which he spent talking about why good people do bad things, or rather, why we do things that under other circumstances we would disapprove of, coining it the "Lucifer Effect". There are many reasons why we sometimes accept things that under other circumstances we would object to, and in pet ownership that can lead to poor decision-making. Perhaps the most insidious and hardest to combat is familiarity, which may sometimes breed contempt, but has certainly allowed the breeding of dogs that should not. Familiarity is a problem with owners of brachycephalic dogs, where acceptance of the "normality" of airway obstruction, obstructs their own recognition of the morbidity. The study by Riggs et al., helps us in that regard. No one has successfully pronounced "plethysmography" without a deep sense of satisfaction and lingual accomplishment. I'm not sure that anyone gets the same satisfaction from watching a dyspnoeic bulldog in a perspex box, but the resulting measurement of volume changes with respiration graphically depicts the exertional efforts required to inspire. Plethysmography is currently the method de rigueur for assessing brachycephalics and it offers a reliable, quantitative measurement that can be used clinically for grading the severity, for measuring the response to surgery, and for research. But not even the most ardent fan would recommend you consider buying one. The perspex box is simple, but the sensitive pressure sensors and electronics are not, and a bespoke set up will set you back more than $20k. So the question is whether a simpler, cheaper test could effectively quantify the degree of airway dysfunction in brachycephalics. This study provides a simple, reliable, sensitive and highly specific test for demonstrating significant airway dysfunction. The fact that laryngeal auscultation added little to either sensitivity or specificity makes it even simpler. For anyone attempting to convince an owner that their beloved bulldog or precious pug is suffering, a simple 3 minutes is all that is required to provide sufficient evidence. Whether that evidence is enough to disabuse them of the idea that it is acceptable, is for another study, but for now, we must wield straightforward empirical evidence to combat one of the more pernicious of human tendencies - ignoring ills that are familiar.

Reference: Vet Surg. 2019;48(4):488-96
Abstract

Oral beta-lactamase protects the canine gut microbiome from oral amoxicillin-mediated damage

Authors: Connelly S et al.

Summary: This study used a canine model of antibiotic-mediated gut dysbiosis to test 3 SYN-007 (ribaxamase) delayed-release formulations intended to degrade orally administered beta-lactam antibiotics in the lower small intestine (distal to the site of oral antibiotic absorption) to protect colonic microbiota. Oral amoxicillin 40 mg/kg TID with or without oral SYN-007 10 mg TID was administered for 5 days, and serum amoxicillin levels did not differ between control and all 3 SYN-007 formulations. All but 1 SYN-007 formulation reduced systemic antibiotic concentrations after the last dose. Whole genome shotgun sequence metagenomic analyses indicated a loss of diversity and emergence of antibiotic resistance genes after amoxicillin alone. Microbiome diversities were not altered and the presence of antibiotic resistance genes was reduced when SYN-007 formulations were co-administered.

Comment: The depth of our ignorance of the effects of oral antibiotics is enough to induce mental borborygmus. We have a tendency to blot from our minds the havoc we wreak in the gut while blissfully picturing the targeting of the single pathogen responsible for the urinary tract infection, abscess or folliculitis. And when we do intend to target the intestinal microflora, we do so with a wilful abandonment of critical thinking, or worse, with the dangerous misapprehension that we know what we are doing. What do you know of *Megamonas* spp., *Ruminococcus* spp., *Peptostreptococcaceae*, *Lachnospiraceae* spp., or *Blautia* spp.? These are often the most common taxa found in healthy cats and dogs, yet you probably haven't even heard of them. The only reason I know anything about them is because of the faecal genotyping research that we, and others around the world, have been doing. But I struggle to remember who does what and have no knowledge of their antibiotic sensitivities. And into the rich and complex ecosystem of the intestine we throw antibiotics, with the same indiscriminate attitude as a deranged captive chimp has when throwing his own faeces at the crowds. However, the great majority of the bacteria in the gut reside in the colon, by which point the majority of an oral antibiotic should be absorbed. That fact opens the door to the possibility of protecting the colonic flora. The study by Connelly et al., explored the effect in dogs of giving beta-lactamase, a bacterial enzyme we are so frequently in a fluster to inhibit, in a series of different polymer-coated capsules designed to remain intact in the acid of the stomach, persist in the more neutral small intestine, then slowly dissolve in the alkaline pH of the colon. In the control group, oral amoxicillin, though admittedly at a heroic dose, led to a profound decrease in bacterial diversity and the selection of resistant species. The authors' best beta-lactamase formulation successfully delivered the enzyme to the colon, where it was sufficient to eliminate the majority of residual amoxicillin, thus abrogating the disturbance that oral dosing caused in the control group. This study was more than proof of principle for human medicine. Beta-lactam induced *Clostridium difficile* colitis is an important and serious disease in humans, which may be preventable with this approach. In canine and feline medicine, we rarely detect the effects of the disturbance beyond the sage nod of recognition that antibiotics can sometimes cause gastrointestinal upset. However, beyond our continual push to reduce unnecessary antibiotic use, or avoid unjustified duration of exposure, the future may involve the combination of antibiosis plus some measure, such as that in this paper, to mitigate the chaos to the commensal ecosystem that we cause, and to which we are currently ignorant of.

Reference: Microorganisms 2019;7(5):150
Abstract

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Prospective randomised blinded clinical trial assessing effectiveness of three dental plaque control methods in dogs

Authors: Allan RM et al.

Summary: This prospective, randomised, blinded 6-week clinical trial in 22 dogs tested three methods of controlling dental plaque accumulation; daily tooth brushing using veterinary toothpaste, daily administration of a dental hygiene chew, or a prescription dental diet. Daily tooth brushing was more than 3-fold as effective (blinded scoring of plaque accumulation coverage and thickness) as a daily dental chew or dental diet. Scores for diet and dental chews did not differ from one another.

Comment: Periodontal disease stands alone amongst the pantheon of companion animal diseases because of the combination of prevalence to the point of near inevitability and its inexorable march from healthy to horrible throughout an animal's life if not actively prevented. The morbidity and expense of treatment in the global pet population has been shown to be more than twice that of all other disease categories added together. Now admittedly, I made that last sentence up, but you can't deny that part of you wasn't surprised when you read that. Yet despite the prevalence, morbidity and expense, there are few, if any decent long-term prospective controlled clinical trials of the efficacy of measures to prevent it. Now what constitutes "decent" is a matter for debate, but what is suitably long term? Surely, long enough to have demonstrated a significant effect on the development of periodontitis. In a recent study in Yorkshire Terriers, 98% of 40 dogs had developed periodontitis before the age of 1.3 years (Wallis C et al., 2019). But other than the worst of the toy-breeds, a suitable study should surely be at least 1 year. In the study by Allan et al., (2019), presented here, the authors used a "clean mouth model", whereby all enrolled dogs started with a dental prophylaxis and after randomisation to the treatment groups, they followed them for 6 weeks. That is long enough to determine if plaque developed, but is not long enough for significant calculus, nor periodontitis to develop. Perhaps most importantly of all, was it long enough to meet their experimental aims? The authors point out that no previous study has simultaneously assessed those three methods of plaque control within a single clinical trial in client-owned dogs. If their finding of the superiority of brushing was not a surprise, the strength of their conclusion was. The authors stated that the study "conclusively demonstrated that brushing is greater than 3-fold more effective at controlling plaque" than the other methods. Does a 6-week study with 8 dogs in the brushing group, where brachycephalic and toy breeds were excluded, really show that? In the aforementioned study of Yorkshire Terriers, 20 were assigned to brushing, and they were housed and cared for by the Waltham Centre in the UK, with dedicated paid animal care assistants. During the first 6 months, successful brushing was tolerated by almost none of the dogs and at the end of their 1-year trial, brushing made absolutely no difference to the development of periodontitis. So what should we conclude? For starters, the ability and compliance of owners limit what we can infer from studies that show superiority of one technique over another. But we also recognise that since there is not a single technique that is 100% effective, we need to continue recommending multiple overlapping approaches if we are to slow the inexorable march from healthy to horrible.

Reference: J Small Anim Pract. 2019;60(4):212-7
Abstract

One-year study evaluating efficacy of an iodine-restricted diet for the treatment of moderate-to-severe hyperthyroidism in cats

Authors: Loftus JP et al.

Summary: A 1-year study in 8 cats with a moderate to severe increase in total thyroxine (TT4; median 8.4 µg/dL) examined the value of an iodine-restricted diet. Abnormal thyroid scintigraphy in all cats confirmed hyperthyroidism. Overall, 6/8 cats achieved a normal serum TT4 after 4 weeks of the iodine-restricted diet; cats that did not achieve normalisation had the highest initial TT4 concentrations. As a result of emergence of chronic kidney disease, 3 cats were withdrawn from the study before completion.

Comment: Most of the studies investigating the efficacy of Hill's iodine-restricted diet have understandably been conducted by the company in colony-housed cats. The efficacy of any dietary therapy in pets has to account for owner compliance and animal acceptance, which makes the previous independent study of client-owned cats important (Hui TY et al., 2015). That prior study, included 48 cats that were followed for 6 months, and showed convincingly how serum T4 normalises in the great majority of cats on the diet. So what could an uncontrolled study of 8 cats tell us that is new? The starting T4 concentrations were impressive, with a range of 80-300 nmol/L and 6/8 were euthyroid within 4 weeks, confirming the short-term efficacy of the approach, even with very active adenomas. The authors also followed the cats for 12 months, and only 2 of the 5 left in the study were euthyroid at that stage, and none had measurable TSH at the end. That is certainly disappointing, especially when all of the cats in the study were housed indoors and compliance was at least reported to have been excellent. So this study might not add much that is new to this topic and probably raises more questions of its own. What determines which cats respond and which do not? What determines long-term control other than dietary compliance? It will be helpful as more studies of this nature accumulate, so we can assist owners in making decisions about treatment by alerting them to factors that make dietary management likely, or unlikely to be effective.

Reference: Vet Med (Auckl) 2019;10:9-16
Abstract

Fecal short-chain fatty acid concentrations and dysbiosis in dogs with chronic enteropathy

Authors: Minamoto Y et al.

Summary: This prospective cohort study was conducted in 49 privately owned healthy control dogs and 73 dogs with chronic enteropathy to evaluate faecal concentrations of short-chain fatty acids (SCFAs) and faecal microbiota (Illumina sequencing and quantitative real-time PCR). Median faecal concentrations of acetate were lower in dogs with chronic enteropathy than in healthy dogs (185.8 vs 224.0 µmol/g; $p = 0.03$), as was propionate (46.4 vs 105.9 µmol/g; $p < 0.001$). Total SCFAs were also lower in dogs with chronic enteropathy than in healthy dogs (268.1 vs 377.2 µmol/g; $p = 0.005$).

Comment: Bacterial fermentation to produce SCFAs is one of the most important benefits of dietary fibre in monogastrics, including cats. Let's skip over what constitutes dietary fibre and focus on the products of fermentation and their effects. The principle SCFAs that have been studied are fuel for colonocytes, lower the pH of the contents, but also bind to specific receptors expressed by a wide range of cells, and function as signals between the intestinal microbiome and the immune system in the intestine, and beyond. They also influence metabolism and, in humans at least, affect the risk of and response to obesity, diabetes, and cancer. There are two factors to be considered in regards to the intestinal production of SCFA – the dietary substrate available to the bacteria, and the bacteria themselves. In the study by Minamoto et al., the authors comment that the majority of research conducted in this area, including research here at Massey, has focused on the dietary effects in healthy dogs and cats. In their study, the focus was on the effect that an abnormal bacteriome ("dysbiosis") associated with chronic enteropathies (i.e. IBD) has on faecal SCFA concentrations. Previous studies have shown reasonably consistent reductions in key SCFA producers in dogs with IBD, and this study was consistent with those observations, and confirmed the reduced concentrations of the key SCFAs. However, they were unable to properly account for dietary effects, since they didn't know the fermentable fibre content of the diets fed, which was a little disappointing, since the difference in SCFAs between the diseased and normal dogs was significantly less than differences achievable in normal dogs on different diets. Nonetheless, the faecal concentrations of SCFAs were lower and that may contribute to the chronic inflammatory state. What we need now for a complete understanding of the importance of these observations is to know to what degree both the bacteriome and their products can be manipulated through providing appropriate substrate through the diet. Faecal transplantation in chronic enteropathies has a theoretical, if not practical appeal, but that approach is known to be transient and, without the provision of suitable dietary substrate, ineffective. This is one of the first studies to have looked at both the bacteria and their functionally important products, though we need many more for us to have actionable clinical management strategies as a result.

Reference: J Vet Intern Med. 2019;May 17 [Epub ahead of print]
Abstract