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THE AUSTRALIAN VETERINARIAN

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‘STEALTHY’ STEM CELLS BETTER FOR TREATING TENDON INJURIES IN HORSES

Treating equine donor stem cells with a growth factor called TGF-β2 may allow them to avoid “tripping” the immune response in recipients, according to new research from North Carolina State University. The work could simplify the stem cell treatment process for ligament and tendon injuries in horses, and may also have implications for human stem cell therapies.

Mesenchymal stem cell therapy is a promising avenue for treating musculoskeletal injuries - particularly tendon and ligament injuries - in horses. Mesenchymal stem cells are adult stem cells found in bone marrow that act as repair directors, producing secretions that recruit paracrine, or healing, factors to the site of injury.

Just as blood cells have “types,” depending upon which antigens are on the blood cell’s surface, mesenchymal stem cells have differing sets of major histocompatibility complex molecules, or MHCs, on their surfaces. If the MHCs of donor and recipient aren’t a match, the donor’s stem cells cause an immune response. In organ transplants, MHCs are carefully matched to prevent rejection.

“These treatments aren’t like a bone marrow transplant or an organ transplant,” says Lauren Schnabel, associate professor of equine orthopedic surgery at NC State and corresponding author of the work. “Since the mesenchymal stem cells are being used temporarily to treat localized injury, researchers once thought that they didn’t need to be matched - that they wouldn’t cause an immune response. Unfortunately, that isn’t the case.”

Schnabel and Alix Berglund, a research scholar at NC State and lead author of the paper describing the work, wanted to find a way to utilize mesenchymal stem cell therapy without the time, effort and additional cost of donor/recipient matching.

“Since these cells don’t have to be in the body as long as an organ does, ‘hiding’ them from the immune system long enough for them to secrete their paracrine factors could be a way around donor/recipient matching,” Berglund says. “Downregulating expression of the MHC molecules could be one way to do this.”

The researchers cultured stem cells and lymphocytes, or T cells, from eight horses, cross-pairing them in vitro so that the stem cells and lymphocytes had differing MHC haplotypes. In one group, stem cells had been treated with transforming growth factor beta (TGF-β2) prior to being added to the lymphocytes in the culture media; the other group was untreated. TGF-β2 is a cell-signaling molecule produced by white blood cells that blocks immune responses.

Cultures with treated stem cells had a 50% higher stem cell survival rate than untreated cultures.

“We use mesenchymal stem cells to treat musculoskeletal injuries - particularly tendon injuries - in horses very effectively,” Schnabel says. “And while you can extract the secretions from the stem cells, you get better results with the cells themselves. Stem cells aren’t just a reservoir of secretions, they’re a communications hub that tells other cells what they should be doing. So finding a way to utilize these cells without stimulating immune response gives us better treatment options.”

“This is a promising pilot study,” Berglund says. “Our next steps will be to further explore the immune response in vivo, and to look at human cells in vitro, as this work has excellent potential to help humans with these injuries as well.”

Abstract: Allogeneic mesenchymal stem cells (MSCs) are a promising cell therapy for treating numerous diseases, but major histocompatibility complex (MHC)-mismatched MSCs can be rejected by the recipient’s immune system. Pre-treating MSCs with transforming growth factor-b2 (TGF-b2) to downregulate surface expression of MHC molecules may enhance the ability of allogeneic MSCs to evade immune responses. We used lymphocyte proliferation assays and ELISAs to analyze the immunomodulatory potential of TGF-b2-treated equine bone marrow-derived MSCs. T cell activation and cytotoxicity assays were then used to measure the in vitro cell-mediated immunogenicity. Similar to untreated MSCs, TGF-b2-treated MSCs inhibited T cell proliferation and did not stimulate MHC-mismatched T cells to proliferate. Additionally, similar quantities of prostaglandin E2 and TGF-b1 were detected in assays with untreated and TGF-b2-treated MSCs supporting that TGF-b2-treated MSCs retain their strong immunomodulatory properties in vitro. Compared to untreated MSCs, TGF-b2-treated MSCs induced less T cell activation and had reduced cell-mediated cytotoxicity in vitro. These results indicate that treating MSCs with TGF-b2 is a promising strategy to reduce the cell-mediated immunogenicity of MHC-mismatched MSCs and facilitate allogeneic MSC therapy.

Journal Reference:

Alix K. Berglund, Julie M. Long, James B. Robertson, Lauren V. Schnabel, North Carolina State University

“We use mesenchymal stem cells to treat musculoskeletal injuries - particularly tendon injuries - in horses very effectively,” Schnabel says.

“And while you can extract the secretions from the stem cells, you get better results with the cells themselves. Stem cells aren’t just a reservoir of secretions, they’re a communications hub that tells other cells what they should be doing. So finding a way to utilize these cells without stimulating immune response gives us better treatment options.”

SOME ENGLISH BULLDOGS THOUGHT TO HAVE CANCER MAY HAVE NEWLY IDENTIFIED SYNDROME

Some English bulldogs diagnosed with a common cancer may instead have a newly described, non-cancerous syndrome called polyclonal B-cell lymphocytosis. The discovery was made by Morris Animal Foundation-funded researchers at Colorado State University during a study to better understand B-cell chronic lymphocytic leukemia (BCLL). The team published their findings in the Journal of Veterinary Internal Medicine.

"This could save some dogs from being misdiagnosed, treated for cancer or even euthanised when they shouldn't be," said Dr. Anne Avery, Professor, Department of Microbiology, Immunology and Pathology at Colorado State University. "The dogs may look to their veterinarians like they have leukaemia, based on original diagnostics, but they don't actually have cancer."

In a previous BCLL paper published by Dr. Avery's team, they identified different breeds at an increased risk for that tumour type. One breed was English bulldogs, but the dogs had a unique presentation as compared to the other breeds. English bulldogs were significantly younger when they presented and also had differences in what their B-cells (antibody-producing white blood cells) expressed on their cell surface when analysed by flow cytometry. That led researchers to wonder whether English bulldogs truly had BCLL or a different, previously unidentified disease.

For this retrospective study, the team identified 84 cases with increased numbers of B-cells in the blood, drawn from their database of 195 English bulldogs. The team analysed the serum of these dogs to determine the types of antibodies they produced. Since many of the dogs had enlarged spleens, the team also took a closer look to see what kinds of cells expanded there.

Then researchers performed an assay to determine if the B-cells were identical or not. If they were identical, it would suggest they arose from a single cell and likely would have been cancerous. The team also examined the sexes of the dogs, as well as the ages and what clinical signs were present (if any) when the blood was drawn.

The team found that 70% of the dogs did not have cancer. These dogs tended to be young, some just 1 or 2 years old when they developed the syndrome. Three-quarters of the dogs were male, and more than half had enlarged spleens. Most of the cases had hyperglobulinemia, an excess of antibodies in the blood stream. The team hypothesised that this syndrome has a genetic basis.

"This important finding demonstrates that we shouldn't assume that a high B-cell count always indicates cancer in English bulldogs," said Dr. Janet Patterson-Kane, Morris Animal Foundation Chief Scientific Officer. "This is very important information for veterinarians who may initially see these patients in their clinic."

The team is looking for evidence of this syndrome in other breeds, but they believe it is rare in dogs other than English bulldogs. The group's next step is to look for the genetic mutation that leads to this syndrome. They would also like to follow the dogs for a longer period to learn if there are health consequences to persistently high B-cell numbers.

The findings in this new study clarify the results from the original BCLL research, according to Avery. Rather than being at high risk for BCLL as originally thought, English bulldogs develop a benign syndrome that has many similarities to leukaemia. The syndrome almost certainly has an underlying genetic cause and does not appear to have a malignant clinical course.

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DEVELOPMENT OF NEW STEM CELL TYPE MAY LEAD TO ADVANCES IN REGENERATIVE MEDICINE

A team led by UT Southwestern has derived a new “intermediate” embryonic stem cell type from multiple species that can contribute to chimeras and create precursors to sperm and eggs in a culture dish.

The findings, published online this week in Cell Stem Cell, could lead to a host of advances in basic biology, regenerative medicine, and reproductive technology.

Cells in early embryos have a range of distinct pluripotency programs, all of which endow the cells to create various tissue types in the body, explains study leader Jun Wu, Ph.D., assistant professor of molecular biology. A wealth of previous research has focused on developing and characterising “naïve” embryonic stem cells (those about four days post-fertilisation in mice) and “primed” epiblast stem cells (about seven days post-fertilisation in mice, shortly after the embryo implants into the uterus).

However, says Wu, there’s been little progress in deriving and characterising pluripotent stem cells (PSCs) that exist between these two stages -- largely because researchers have not been able to develop a paradigm for maintaining cells in this intermediate state. Cells in this state have been thought to possess unique properties: the ability to contribute to intraspecies chimeras (organisms that contain a mix of cells from different individuals of the same species) or interspecies chimeras (organisms that contain a mix of cells from different species) and the ability to differentiate into primordial germ cells in culture, the precursors to sperm and eggs.

For this study, the researchers successfully created intermediate PSCs, which they named “XPSCs” from mice, horses, and humans.

Wu says that these results could eventually lead to an array of advances in both basic and applied research. For example, looking at gene activity in XPSCs from different species and interspecies chimeras could help researchers understand which signatures have been conserved through evolution. Examining the communication between cells in chimeras may help scientists identify strategies that could be used to accelerate the development of tissues and organs from stem cells used for transplantation. And using chimera-derived primordial germ cells to create sperm and eggs could aid in preserving endangered animal species and advancing infertility treatments.

“These XPSCs have enormous potential. Our study helps open the door to each of these possibilities,” says Wu, who is a Virginia Murchison Linthicum Scholar in Medical Research.

Wu notes that developing XPSCs presented a special challenge because the conditions that keep naïve PSCs in a stable state are exactly the opposite from those that stabilise primed PSCs. While culture conditions for naïve PSCs must activate a WNT cell-signalling pathway and suppress the FGF and TGF-ß pathways, the conditions to maintain primed PSCs must suppress WNT and activate FGF and TGF-ß.

Aiming for the preferred environment for XPSC derivation, Wu and his colleagues placed cells from early mouse embryos into cultures containing chemicals and growth factors that activate all three pathways. These lab-grown cells were extremely stable in culture and able to multiply without developing any further for approximately two years.

Additional experiments showed that these cells met the expectations researchers have long strived to meet of contributing to chimeras and directly differentiating into primordial germ cells. Wu and his colleagues made intraspecies chimeras of mice using cells derived from mice with different coat colours by injecting the cells into early mouse embryos. They also tracked the contributions of the XPSCs by tagging the cells with a fluorescent protein and then identifying them throughout the resulting offspring’s body.

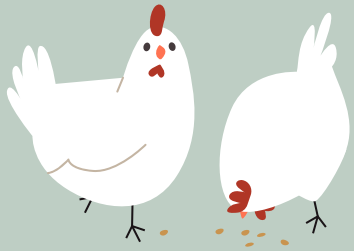
Wu’s team made interspecies chimeras by injecting horse XPSCs into early mouse embryos and allowing the embryos to develop in mice for several days. Surprisingly, although horses have a comparatively long gestational period -- nearly a year -- the researchers found that these foreign cells had contributed to mouse organ development, indicating that signals from the mouse cells determine organ developmental timelines.

Like XPSCs from other species, the human cells showed that they were capable of differentiating into a variety of tissues if culture conditions allowed them to progress in development, as well as directly form primordial germ cells in a dish.

Journal Reference:

Leqian Yu, Yulei Wei, Hai-Xi Sun, Ahmed K. Mahdi, Carlos A. Pinzon Arteaga, Masahiro Sakurai, Daniel A. Schmitz, Canbin Zheng, Emily D. Ballard, Jie Li, Noriko Tanaka, Aoi Kohara, Daiji Okamura, Adrian A. Mutto, Ying Gu, Pablo J. Ross, Jun Wu. Derivation of Intermediate Pluripotent Stem Cells Amenable to Primordial Germ Cell Specification. Cell Stem Cell, 2020; DOI: 10.1016/j.stem.2020.11.003

NEW STUDY FINDS CAGE-FREE EGG-LAYING HEN MORTALITY DECLINES OVER TIME



New research published today in the journal Scientific Reports based on the largest-to-date analysis of commercial data on egg-laying hen mortality finds that mortality in higher-welfare cage-free housing systems decreases over time as management experience increases and knowledge accrues.

This finding marks a major turning point in the debate over the transition in housing systems for egg-laying hens from battery cages to indoor cage-free systems, which some egg producers have argued would increase hens' mortality even as it allowed birds to stretch their wings.

The study, authored by Dr. Cynthia Schuck-Paim and others, included data from 16 countries, 6,040 commercial flocks, and 176 million hens in a variety of caged and cage-free systems. Specifically, researchers compared mortality of flocks housed in conventional battery cages; furnished cages -- which provide hens with additional space, together with a few home comforts such as a perch, nest and litter substrate to allow them to forage and dust bath; and indoor aviaries, or cage-free housing systems.

The authors conclude that mortality in cage-free flocks is not inherently higher than those housed in conventional battery cage systems, but rather declines as managers gain experience and knowledge over time.

"When comparisons are made between systems with similar levels of technological maturity, mortality in cage-free housing is not higher than in caged systems," said Schuck-Paim. "In fact, the observed trends in the data show that mortality can be lower in cage-free housing if management continues to improve and genetics are optimized for cage-free systems."

Furthermore, the paper notes that lower mortality or longer survival of hens is not necessarily a good indicator of health or welfare.

> **"What makes animals suffer is not necessarily what kills them," said Schuck-Paim. "Unhealthy individuals can suffer for extensive periods in caged conditions before succumbing to their fate, if they die at all; whereas other deaths, for example accidents or predation, may affect otherwise healthy individuals."**

These findings could reframe the debate on the welfare of laying hens and on the evolution of the egg industry, and highlight the importance of taking the degree of maturity and level of experience with a production system into account when conducting any farm animal health, behaviour and welfare study that compares outcomes across systems.

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BRUCE ADDISON, Veterinary Microbiologist • **Addison Biological Laboratory, Inc.**

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Pet oral health care is an ongoing challenge for pet owners and veterinary teams. Periodontal disease is the number one health problem in small animal patients, according to the American Kennel Club. By age 3, more than 80 percent of dogs and cats have some form of periodontal, or gum disease. Pet owner resistance to in-clinic dental procedures that involve x-rays and anesthesia is well known.

To optimize pet health, **the starting point for comprehensive oral care must be in the home** where bad breath is the primary warning sign. Most veterinary clinic personnel miss the opportunity to educate pet owners about daily oral care and promote in-home solutions for their pets.

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EQUINE GLANDULAR GASTRIC DISEASE AND WHY YOU MIGHT NOT HAVE HEARD OF IT BEFORE?

Equine Gastric Ulcer Syndrome (EGUS) is common terminology that most veterinarians and horse owners are far too familiar with. The term has been around for the past 20 years and was originally coined by a panel of experts in the field at a time when vets and horse owners were just starting to learn about diseases within the equine stomach.

Gastroscopes used in the original studies were only 2.5m in length, allowing visualisation of only the squamous mucosa within the stomach. This led to an inherent bias in our understanding of EGUS towards disease of the squamous mucosa. When gastroscopes evolved and increased in length, veterinarians were able view the glandular mucosa, which in turn resulted in increased recognition of glandular disease. This necessitated a review of the terminology and in more recent times EGUS has been reclassified as an over-arching umbrella term that simply describes ulcerative, erosive, inflammatory, and hyperkeratotic diseases of the stomach.

Identified distinct differences between diseases of the squamous versus glandular mucosa include pathophysiology, prevalence, risk factors, treatment, management, and prevention. The term EGUS is now divided into Equine Squamous Gastric Disease (ESGD) and Equine Glandular Gastric Disease (EGGD) with A/Prof Ben Sykes, a leading EGUS researcher, describing them as

> **"Like the odd couple. They just live together in the same apartment but are not related to each other. As such we can't extrapolate from one disease for another."**

EGGD Pathophysiology
EGGD presents with inflammatory and erosive lesions due to breakdown of the mucobicarbonate layer which normally protects the glandular area from acid burn. The specific causes why this defence mechanism breaks down are not well understood but risk factors have been associated through A/Prof Sykes' and others' research.

EGGD Prevalence
EGGD prevalence is less well documented than ESGD prevalence but it has been reported as between 47-65% in Australian Thoroughbred racehorses and 27-33% in competing endurance horses (Sykes et al. 2015). A retrospective study in the United Kingdom reported EGGD in 54% of leisure horses and 64% in sport horses presented for gastroscopy (Hepburn, 2014). These findings support the clinical impression that EGGD is more prevalent in riding horse populations than racehorse populations and the majority of the EGGD lesions in all the above studies were located within the pyloric antrum.

EGGD Risk Factors
The risk factors for EGGD are very different to ESGD and less well described. While nonsteroidal anti-inflammatory drugs (NSAIDs) used at higher doses may cause EGUS (both ESGD and EGGD), the impact of them at normal therapeutic doses is less clear. No evidence exists to date to support the role of Helicobacter infection in EGGD, in contrast to peptic ulcer disease in people. There is minimal data to support the role of diet with EGGD, unlike ESGD, however, exercise does play a role in EGGD albeit appearing to be a different mechanism than for ESGD. A Canadian showjumper study conducted by Pederson et al (2018) found that horses exercised 6-7 days a week were approximately 3.5 times more likely to develop EGGD than horses exercised 5 days or less per week. Similarly, an Australian and UK racehorse study by A/Prof Sykes et al (2019) found horses exercised 5-7 days a week were approximately 10 times more likely to have EGGD than horses exercised 4 days or less per week. This shows the importance of rest days for glandular gastric health and current prevention recommendations include 3 rest days per week to allow mucosal recovery and repair from exercised induced injury.

The association of stress and ESGD has been discussed for many years but the term can be quite unclear at the best of times, with minimal evidence to support a role for stress in the causation of ESGD. However, there is a growing body of evidence to support behavioural stress as being central to EGGD risk. A study within Switzerland by Scheideger et al (2017) investigated the stress response in horses with EGGD through stimulating the release of cortisol via adrenocorticotrophic hormone (ACTH). Horses with EGGD had more pronounced stress responses when compared to horses without EGGD. A/Prof Sykes explains that further research is warranted in following the population of horses over a period of time as we don't know if this response was cause or effect.

Another study in Finland by Mönki et al (2016) suggested that an increased number of riders or handlers increased the risk of EGGD. This discovery comes back to the concept of behavioural stress as horses are routine animals, and they can engage or bond with individuals differently. As such a change in riders or handlers may be a behavioural stressor. The same study found a breed disposition for EGGD amongst Warmbloods.

EGGD Clinical signs
It is difficult to establish clinical signs of EGGD at a population level, explains A/Prof Sykes but a range of behavioural manifestations are observed and a link with poor performance has been established. Racehorses performing below expectation were approximately 4 times more likely to have EGGD in one study (Sykes et al. 2019), and in a Canadian study by Pederson et al. (2018) horses competing internationally were 9 times less likely to have EGGD than horses competing nationally. However, it is important to note that poor performance can be due to multiple factors and that EGUS is only one differential in the work up of poor performance.

EGGD Treatment
A/Prof Sykes explains that oral omeprazole alone is not as consistently effective in treating EGGD compared to its effects in ESGD (Sykes et al. 2017). Accordingly, a combination treatment protocol involving omeprazole and sucralfate is generally advised. Alternatively, misoprostol has also shown to be an effective treatment through enhancing the protective mechanisms of the glandular mucosa.

EGGD Prevention and Management
In terms of prevention and management it is important to address the risk factors by including 2-3 rest days per week, increasing environmental enrichment, removing potential stressors such as musculoskeletal pain, and including a digestive health supplement.

While searching for a high-quality product he could use and

recommend, A/Prof Sykes found GastroAID was the only product on the Australian market that aligned with the findings of his research (Sykes et al. 2014). Not only is GastroAID backed by independent research, including his own, it has scientifically proven high-quality ingredients that are all clearly listed on the label, is Australian made, is manufactured to GMP standards and conforms to ISO quality standards.

Kelato has two supplements in their digestive health range- GastroAID Recovery and GastroAID Everyday.

GastroAID Recovery is Kelato's premium supplement targeting both foregut and hindgut health formulated to aid horses recovering from EGUS or support horses during high risk periods. It is unique due to the combination of antacids and "coating agents" pectin and lecithin that provide an enhanced "alkaline slime" barrier for the squamous mucosa and supplement the natural defence mechanisms of the glandular mucosa. For hindgut health, the prebiotic and live yeast probiotic work together to maintain a healthy environment, stimulate the growth of beneficial microbes and enhance feed conversion efficiency.

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Benefits:

- Controls Stomach Acidity
- Promotes Healthy Stomach Lining
- Inhibits Harmful Bacteria
- Improves Intestinal Integrity
- Promotes Beneficial Microbes
- Enhances the Body's Defences

When managing EGGD, A/Prof Sykes brings to light the importance of taking a holistic approach including managing the environment and emotional wellbeing of the horse to reduce the prevalence of disease.

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THE ABCS OF VETERINARY DENTISTRY: D IS FOR DENTIGEROUS CYST

DR DAVID E CLARKE BVSC DIPLOMATE AVDC FELLOW AVD - REGISTERED SPECIALIST, VETERINARY DENTISTRY AND ORAL SURGERY | TRACEY SMALL BA (SOC SC), VN, DIP VN (DENTISTRY) WWW.DENTALCAREFORPETS.COM.AU

IN THIS ARTICLE WE CONTINUE OUR JOURNEY THROUGH THE ALPHABET LOOKING AT THE LETTER D.

Odontogenic cysts are epithelium lined structures that occur in the areas of the jaws containing teeth.1-3 Uncommon in dogs, they have been reported to include dentigerous cysts, periapical (or radicular) cysts, lateral periodontal cysts, odontogenic keratocysts and canine odontogenic parakeratinised cysts.1,3-6 Odontogenic cysts arise within islands of remnants of odontogenic epithelium (dental lamina, rests of Malassez) located in the periodontal ligament stroma.1

Dentigerous cysts are the most common odontogenic cysts in dogs.1,3,6-10

During odontogenesis, once the enamel has been formed, the enamel organ atrophies and becomes the reduced enamel epithelium.11,12 The reduced enamel epithelium is a closed sac that encompasses the crown of the tooth and is attached at the cemento-enamel junction (CEJ).11-13 When the tooth erupts through the gingiva, the enamel epithelium desquamates to form a ring of tissue around the CEJ and becomes part of the gingival attachment and is no longer a closed sac.6,12

When a tooth fails to erupt, the reduced enamel epithelium remains a closed sac around the crown of the tooth and fluid is drawn in by a process of osmosis resulting in a cyst.12,14 The cyst forms when fluid accumulates within the cyst lining consisting of epithelial cells derived from the reduced enamel epithelium.11,14 This cyst continues to expand compromising and destroying local bone, adjacent teeth and resorption of roots.11-15 Dentigerous cysts are therefore associated with unerupted teeth.11-15 Dentigerous cysts are usually painless, however, the fluid accumulation and proliferation of epithelial cells often cause local destruction to bone and adjacent teeth.11,12

Case study

Tilkah, an 18 month old, 15.5kg, spayed female Blue Heeler dog **(Figure 1)** was treated for a dentigerous cyst. She was originally referred to the practice at eight weeks of age with a Class 2 malocclusion that also involved bilateral malposition of the mandibular deciduous canine teeth (704, 804). 704 was positioned distal to 604 and 804 was linguoverted and traumatising the hard palate on the palatal aspect of 504. At the initial visit, the displaced

Figure 1

teeth were causing significant pain and possibly causing a dental interlock preventing normal elongation of the mandible. Treatment involved extraction of 704 and 804 to relieve the trauma and allow the jaw to grow in length if the malocclusion was not of genetic origin. The recommended revisit time was six months of age for review of the erupting permanent mandibular canine teeth, but due to family restrictions Tilkah returned for an occlusion assessment at 12 months of age. On conscious examination it was noted that the mandible had not elongated, the left mandibular canine tooth (304) had erupted into an atraumatic position caudal to the left maxillary canine tooth (204), and the mandibular right canine tooth (404) was linguoverted causing trauma to the hard palate. In addition, it was noted that the mandibular right first premolar (405) was not visible on probing and charting. Treatment options for 404 included tooth extraction, crown amputation and direct pulp capping, or orthodontic movement were discussed with the owner, who chose crown reduction and pulp capping. Tilkah was then admitted for treatment of 404 to alleviate

trauma to the hard palate and to radiograph the presumed absent 405. Pre-anaesthetic blood chemistry and haematology profile were within normal limits. A 22 gauge intravenous catheter was placed in the right cephalic vein aseptically and a balanced electrolyte solution Hartmans™ 2.5ml/kg/hr commenced. A preanaesthetic of acepromazine 0.4mg, buprenorphine 150ug and atropine 0.84mg was given by subcutaneous injection. Tilkah was induced with diazepam 4mg and ketamine 80mg via IV catheter 30 minutes later. Anaesthesia was maintained via #8 cuffed endotracheal tube using 1.5 - 3% isoflurane in oxygen. Anaesthetic monitoring included visual assessment, reflex activity, oxygen saturation, heart rate, expired CO2, respiratory rate and blood pressure. These parameters were recorded every five minutes on an anaesthetic monitoring form. IV fluids were increased to 5ml/kg/hr (77ml) throughout the surgery procedure. Tilkah was placed into right lateral recumbency and a warming blanket was placed over her to maintain body temperature.


Figure 2

Once Tilkah was stabilised a comprehensive oral examination was performed by the veterinary dental specialist and nurse. Overall teeth were healthy, no gingivitis was present, some generalised calculus was recorded, tooth 404 was linguoverted and tooth 405 appeared missing **(Figure 2).** Dental radiographs were taken with a size 2 Sopix digital DR sensor plate.


Figure 3

Radiographs of 405 **(Figure 3)** revealed an unerupted tooth with no significant radiographic changes to the surrounding area and displacement of the crown in a coronal/distal direction and the root was tipped distally. Based on these findings a tentative diagnosis of a dentigerous cyst was made. The crown amputation and direct pulp capping were performed successfully, but due to anaesthetic considerations, a decision to extract 405 in four months when Tilkah would return for radiographs of the crown amputation and vital pulp therapy of 404 to assess tooth vitality was made and the owner informed.

Tilkah returned four months later for assessment and treatment of the unerupted 405 and to radiograph the vital pulp therapy of 404. Tilkah was found to be in good health and well hydrated. Anaesthesia was performed as previously described.

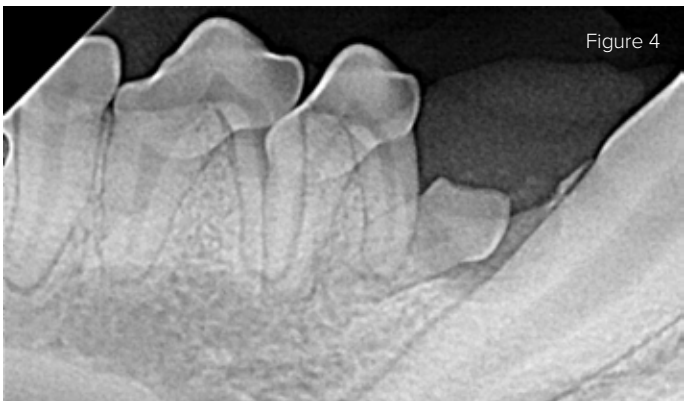


Figure 4

The patient was placed into left lateral recumbency. A local nerve block using 0.3mls of 3% mepivacaine into the mandibular right middle mental foremen using a dental aspirating syringe and carpule was performed, which blocks the inferior alveolar nerve, thereby anesthetizing the mandibular incisors and canine. Mepivacaine takes affect within two minutes and lasts for approximately 2-3 hours. A radiograph of the previous crown amputation and direct pulp capping showed a formed dentinal bridge and narrowing of the pulp canal, indicative of treatment success and tooth vitality. A radiograph of the impacted 405 **(Figure 4)** showed an enlargement of the lesion and some alveolar bone loss associated with the distal aspect of 404.

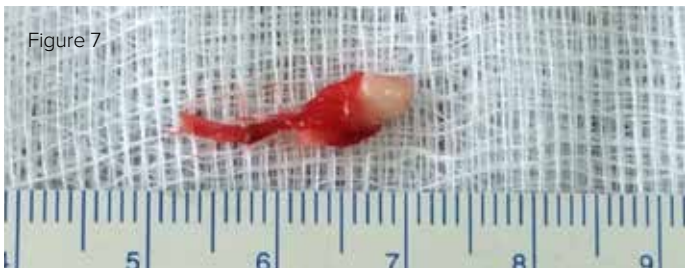
A size 15 surgical blade was used to make an incision into the gingiva over the normal position of 405 extending from the mesial aspect of 406 to the distal aspect of 404. A No 2 Molt periosteal elevator was then used to elevate an envelope flap to expose the underlying area.


Figure 5

The flap was retracted with a Minnesota retractor to visualise the impacted tooth **(Figure 5)**.

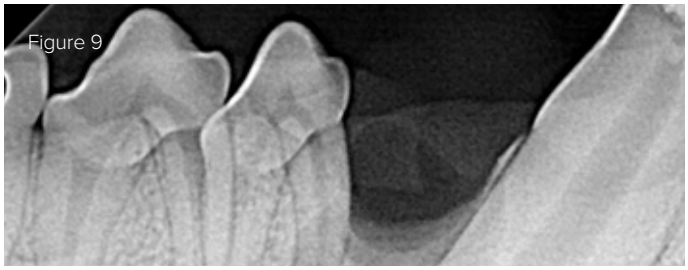

Figure 6

A No. 2 winged Cislak dental elevator was used to sever the periodontal ligament supporting 405 which had a portion of the soft tissue (presumed to be a dentigerous cyst lining) attached to the CEJ **(Figure 6)**.

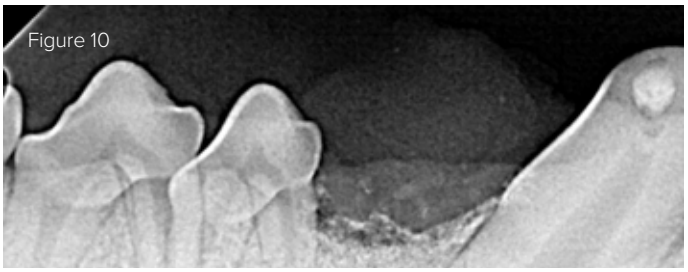


The 405 with attached epithelial tissue was extracted with extraction forceps **(Figure 7)** and placed into a formalin pot for histopathology at Gribbles Pathology. A post extraction radiograph showed there was alveolar bone resorption along the distal surface of 404 and the mesial surface of the mesial root of 406 where the epithelial lining was adhered to.

The epithelial cavity lining was debrided using a No 2 Molt periosteal elevator **(Figure 8)** and placed into a separate formalin pot for histopathology. The exposed root surfaces of 404 and 406 were curetted with a #5/6 Gracey curette.



A radiograph was taken to confirm complete extraction of 405 and debridement of the cavity **(Figure 9)**.



With confirmation of extraction of 405, the area was flushed and tricalcum phosphate was placed into the defect to the height of the alveolar bone and radiographed **(Figure 10)**.

The gingiva was sutured closed with polyglycolic acid absorbable suture size 3/0 **(Figure 11)**.

Tilkah was moved to a recovery cage. IV fluids were reduced to 2.5ml/kg/hr (38ml) for an hour. A subcutaneous injection of meloxicam 3mg for pain and inflammation was administered.

At discharge, the client was instructed to feed soft chunks of meat for the next 10 days and to prevent Tilkah from chewing on any hard objects to allow the extraction site to heal. Medications were explained, oral meloxicam to the 15.5kg dose mark once daily and clindamycin 150mg capsules twice daily for 10 days. Maxigard™ gel (chlorhexidine free zinc and Vitamin C formula) was advised to use daily by placing a pea sized drop on both upper canines for regular oral hygiene.

A revisit consultation was booked for two weeks time. The owners were contacted by phone two days post-surgery, Tilkah was recovering well with no complications. The histopathology report noted: Macroscopy – "Tooth 405 and cyst". A tooth with surrounding attached connective tissue and five tiny fragments of light tan non-descript tissue the largest of which measures 3mm x 1mm. The soft tissues from around the tooth are removed and placed into a single cassette with fragments of additional tissue and the tooth is placed into decalcification for further processing. Microscopy – Gingival cyst (multiple fragmented sections): The sections evaluated are fibrovascular connective tissue with multiple segments of the surface having an intact layer of stratified epithelial cells. The epithelial cells are well differentiated with no outstanding atypical features. In some areas the underlying connective tissue is consistent with granulation tissue and some segments have mild local active inflammation composed of macrophages, lymphocytes, plasma cells and occasional neutrophils. The decalcified sections of tooth have no significant changes. Diagnosis - Gingival cyst: Dentigerous cyst. Comments – The gingival tissues provided are lined by stratified squamous epithelial cells with additional sections of a histologically normal tooth which is consistent with a dentigerous cyst. A diagnosis of dentigerous cyst was therefore confirmed by histopathology and the owners were informed of the result.

A revisit consultation two weeks post-surgery showed that the surgery site had healed, and sutures had dissolved **(Figure 12).** The owners were shown how to brush Tilkah's teeth and instructed to do so daily using the supplied Petosan toothbrush and toothpaste. An appointment was made for six months to radiograph the surgical site, to evaluate the success of enucleation of original cyst and to assess the health of bone structure and tooth vitality of 404 and 406.

At this revisit, the area had healed well **(Figure 13)** and radiographs confirmed successful regrowth of previously lost bone **(Figure 14).**

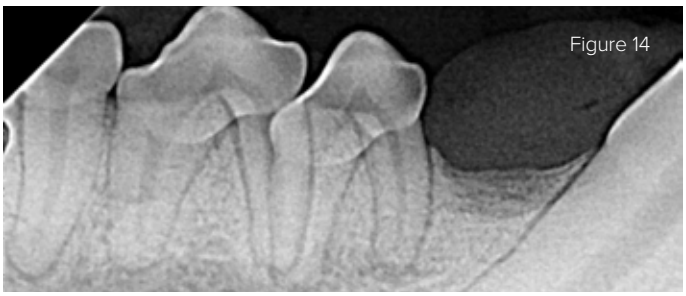


Figure 14

Conclusion

Dentigerous cysts should be a primary consideration for any oral swelling or missing tooth in either jaw.3,6,16,17 The most commonly represented breeds are the brachycephalics and the most common area is the first premolar in the mandible.3,17

Because dentigerous cysts are often discovered as an incidental finding, the significance of a thorough oral examination and radiographs of all presumed missing teeth cannot be over emphasised.3,6,17 Treatment involves a surgical approach using a mucogingival-periosteal flap to accomplish removal of the unerupted tooth, complete enucleation of the cyst wall, curettage, osteoplasty, and bone grafting if bone defects are extensive.3,6,16,17 In the many cases, a bone graft is not necessary, as a healthy blood clot using the host's own osteoblasts to replace bone lost is recommended. Prognosis is excellent when treated early and when the cyst is completely excised6,11,12,14,15 as early detection and treatment of dentigerous cysts prevents the continuation of local bone and tooth destruction.11,13-15 Histopathology of the epithelial lining is recommended.

It is recommended that follow up radiographs are performed six months later to confirm success of excision, to assess the regeneration of local bone, vitality of adjacent teeth, periodontal support and root resorption.6,11,13-15

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DOGS AND THEIR OWNERS SHARE A RISK OF DEVELOPING DIABETES

Owners of a dog with diabetes are more likely to develop type 2 diabetes themselves than owners of a dog without diabetes, finds a study published in the Christmas issue of The BMJ.

No shared risk of diabetes was found between cat owners and their pets.

The findings support the view that dog owners and their pets might share certain health behaviours, such as physical activity level.

Worldwide, more than 400 million people have type 2 diabetes and this is set to increase in the coming decades, partly due to the population aging, and by shifts in lifestyle behaviours and obesity rates.

Some studies have suggested a link between adiposity (being severely overweight or obese) in dog owners and their pets, suggesting that the two might share health behaviours such as activity level. But no study has investigated shared diabetes risk in dog and cat owners and their pets.

To address this knowledge gap, researchers based in Sweden and the UK set out to investigate.

Using veterinary care insurance data, they identified 208,980 owner-dog pairs (175,214 owners and 132,783 dogs) and 123,566 owner-cat pairs (89,944 owners and 84,143 cats) from 1 January 2004 to 31 December 2006.

This information was linked to Swedish health and drug registers to identify cases of type 2 diabetes in dog and cat owners and cases of diabetes in their pets over a six-year follow-up period (1 January 2007 to 31 December 2012).

A range of potentially influential factors were taken into account. These included personal and socioeconomic circumstances of the dog owners, such as age, sex, region of residence, marital status, education level, and income, and age, sex and breed of pet.

The rate of type 2 diabetes during follow-up was 7.7 cases per 1000 person years at risk in dog owners and 7.9 cases per 1000 person years at risk in cat owners.

The rate of diabetes in the pets was 1.3 cases per 1000 dog years at risk and 2.2 cases per 1000 cat years at risk.

Compared with owning a dog without diabetes, owning a dog with diabetes was associated with a 38% increased risk of type 2 diabetes. This estimate did not change noticeably after adjusting for other risk factors.

The risk of developing diabetes was also 28% higher in dogs with an owner who had type 2 diabetes compared with dogs with an owner who did not have type 2 diabetes. This estimate, however, was reduced after adjusting for age of the owner.

No association was found between type 2 diabetes in cats and their owners.

Possible explanations for these findings include shared lifestyle behaviours, such as physical activity levels and dietary habits between dog owners and their dogs that affect the risk of diabetes, say the researchers. Lower concordance between cat owner and cat physical activity could help explain the absence of a shared diabetes risk in owner-cat pairs.

This is an observational study, so can't establish cause, and the team were unable to assess diet and physical activity level as underlying causes of the associations. The results are also limited to pet owners who had the financial means to take out veterinary insurance and who received drug treatment for their diabetes.

Nevertheless, the researchers say this was a robust study showing that owning a dog with diabetes was associated with an increased risk of type 2 diabetes in the owner, which could not be explained by personal and socioeconomic circumstances of the dog owners.

It is possible, therefore, that dogs with diabetes "could serve as a sentinel for shared diabetogenic health behaviours and environmental exposures," they conclude.

DEEPER INSIGHT INTO HOW TICK SPIT SUPPRESSES CATTLE IMMUNITY

A tick saliva study reveals immune responses that could lead to better protection for cattle.

Scientists from Hokkaido University, Japan and Universidade Federal do Rio Grande do Sul and Universidade Federal do Rio de Janeiro, Brazil, have revealed that substances in tick saliva activates immune response-suppressing proteins in cattle that facilitates the transmission of tick-borne diseases. The finding was published in the journal Scientific Reports and could help in the development of alternative control strategies.

The Asian blue tick, Rhipicephalus microplus, feeds on cattle, causing skin lesions, chronic blood loss and transmission of disease-causing parasites. The costs of preventing and treating disease and loss of some cattle are considerable in many parts of the world.

Some ticks have developed resistance against currently used acaricides, the tick equivalent of insecticides. To develop alternative strategies that can better protect cattle, such as vaccines, scientists need to better understand tick infections at the molecular level. For example, scientists already know that tick saliva suppresses the immune response in cattle, facilitating the transmission of tick-borne parasites, but the exact process has not been fully clarified.

Infectious disease veterinarian, Satoru Konnai, and scientists at Hokkaido University in Japan and colleagues in Brazil investigated what happens to immune cells when they are exposed to tick saliva. The team found that substances in tick saliva, likely a lipid compound called a prostaglandin, increase the expression of two specific cellular membrane proteins on some immune cells. The interaction of these proteins, called programmed cell death protein 1 (PD-1) and programmed death-ligand 1 (PD-L1), leads to the suppression of an immune cell called helper T cell (Th1). This means that the cattle's immune response is less able to combat invading tick-borne parasites.

Further investigation showed Asian blue tick saliva contains a high concentration of prostaglandin E2, which is known to induce PD-L1 expression. However future studies need to confirm if prostaglandin E2 plays a direct role in suppressing the cattle immune response. Also, since this study involved cells in the laboratory, the team says further research in live cattle is needed.

"Our findings suggest that Asian blue tick saliva inhibits the immune responses of helper T cells, at least in part, via the interaction between PD-1 and PD-L1," says Konnai.

Associate Professor Satoru Konnai of the Laboratory of Infectious Diseases at Hokkaido University conducts research on the development of novel therapeutic strategy for intractable diseases control in animals; the pathogenesis of bovine leukemia; analysis of mechanism of tick-borne pathogen transmission and development of anti-tick vaccines.

The Asian blue tick with its eggs (Photo: Itabajara da Silva Vaz Jr).
CREDIT ITABAJARA DA SILVA VAZ JR)

GLADYSFIED WITH THE AWL NSW'S BUSHFIRE EFFORTS WITH PREMIER CITATIONS FOR 19 TEAM MEMBERS

On New Year's Day 2020, the Animal Welfare League NSW (AWL NSW) Mobile Vet teams joined volunteers and staff to rush to the Far South Coast as first responders to the bushfire crisis that threatened lives and homes of the local communities.

To recognise AWL NSW's service to the community during this catastrophic event, the Honorable Gladys Berejiklian MP NSW Premier has issued Premier citations for 19 members of the AWL NSW team, who were directly involved in our bushfire efforts or were on the field at various fire grounds across the state.

AWL NSW provides vital veterinary intervention and conducts animal rescue, rehabilitation and rehoming. Our inspectorate and veterinarians are often on the frontline to treat and save native wildlife, livestock and companion animals during emergencies and other sudden unforeseen situations.

AWL NSW CEO Mark Slater will be presenting the citations and lapel pins to all the recipients on December 18 2020. He says, "Our efforts went on for three months and saw some of our staff working not only under duress but in situations that tested their professional capacity and mettle as humans."

Slater also acknowledged the invaluable contributions of AWL NSW members who remained at our shelters across the region to provide solace and support to animals in our care, despite going through stressful situations on the personal front.

AWL NSW wishes to express our heartfelt gratitude to our donors and supporters. Without their generosity, it would be difficult to cover multiple emergencies as we did same time last year and in early 2020. The public's unwavering support strengthened our resolve in deploying rapidly during emergencies and disasters.

The 2019-2020 bushfire emergency in Australia had a far-reaching impact on the community, tearing through lives and homes of thousands of people and wiping out over 1 Billion animals.

To help prepare our rapid response for future emergencies, please call 02 8777 4461 or visit awlnsw.com.au

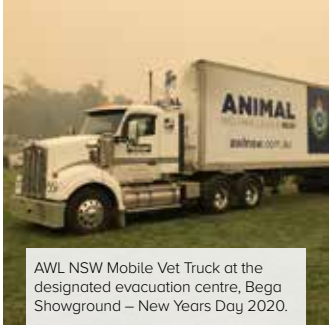
AWL NSW Team at Taree Showground.


AWL NSW Vet Team conducting health checks on animals with burns at Taree.

AWL NSW Mobile Vet Truck at the Bega Sales Yard. This was the second spot we visited after Bega

AWL NSW Mobile Vet Truck at the Bega Sales Yard. This was the second spot we visited after Bega


WL NSW Inspector providing fresh clear water to a local resident's pet at Bega.



AWL NSW Mobile Vet Truck at the designated evacuation centre, Bega Showground – New Years Day 2020.


AWL NSW Team travelled to Old Bar near Taree to check on livestock.

STUDY HIGHLIGHTS FACTORS THAT PREDICT SUCCESS FOR TREATING CANINE BEHAVIOURAL DISORDERS

There is a saying that you can't teach old dogs new tricks. When it comes to canine behavioral problems, age is only one factor that can predict how well a pet may respond to clinical intervention. In a paper published in Frontiers in Veterinary Science, researchers provide the first evidence on the importance of not just a dog's age, sex and size on treatment success, but the owner's personality and the kind of bond that human and animal share.

The study analyzed the physiological and psychological characteristics of 131 dog-owner pairs who attended a veterinary behavioral service over a six-month period. The statistical results were based on a behavioral assessment questionnaire that was given at the beginning, middle and end of the research program, along with other baseline assessments. Data collected included various types of aggressive behavior, signs of separation anxiety, and the animal's energy and excitability levels.

The team at the University of Pennsylvania's School of Veterinary Medicine (PennVet) found that while the dogs that showed the most improvement were those that started with the least desirable behaviors, such as being overly aggressive or excitable, other results were counterintuitive. For example, canines with owners who considered themselves conscientious did not show significant behavioral improvement compared to others.

"This was a surprising result, which was in some ways at odds with the findings from a previous study," said Dr. Lauren Powell, lead author of the paper and a postdoctoral researcher at the University of Pennsylvania, referring to a 2018 paper in PLOS One that investigated the associations between owner personality and psychological status with the prevalence of canine behavior problems.

There could be at least a couple of explanations for these conflicting results, according to Powell. Conscientious dog owners in the current study, for instance, may have already exhausted the limits of reducing undesirable behaviors like a dog's aggression toward strangers.

"Another explanation is that conscientious owners may be more aware of their dog's behavior and report changes in a more accurate manner, whereas less conscientious owners may only report major changes, like the absence of bites," Powell noted.

Identifying the factors that predict success or failure in correcting canine behavioral problems may help veterinarians provide better guidance to owners in the future. For example, the study revealed a negative relationship between introverted owners and fearful dogs in terms of treatment outcomes. In such cases, a veterinarian could use that information to explain to the pet owner why the dog needs to choose when it wants to interact or be left alone.

"Veterinarians that are able to pick out situations where dogs may be at risk for low improvement can also be more proactive during the follow-up, reaching out to the clients more frequently and empathetically," Powell explained.

One reason why veterinary scientists are interested in improving behavioral outcomes is that research has consistently shown that poor canine behavior is a leading cause of pet abandonment. An estimated 3.3 million dogs end up in animal shelters in the United States each year, and about 670,000 are euthanized, according to the American Society for the Prevention of Cruelty to Animals (ASPCA).

While the PennVet team has no immediate plans for follow-up studies, Powell said it would be valuable to investigate why so many problem behaviors did not appear to respond to treatment.

"This would involve more detailed follow-up of cases to look at issues such as owner compliance with treatment protocols, owners' decisions to euthanize or rehome their dogs, and why some owners failed to complete the study," she said.

PHARMAUST ANTI-CANCER DRUG TRIALS MEETING TARGETS, CALLING MORE DOGS!

Biotech company PharmAust is calling for more dogs with B cell lymphoma in a Phase IIb trial to help evaluate its newly formulated anti-cancer drug Monapantel (MPL), shown to be safe and effective for dogs that have not undergone any treatment for this cancer.

This trial comes following the completion of a Phase I trial in humans and Phase II and IIa trials in pet dogs of the same drug. Lymphoma is a common cancer diagnosed in dogs. Symptoms can include swellings (enlarged lymph nodes), lethargy, weight loss and loss of appetite.

"Currently, there is no cure for B cell lymphoma," said Dr Richard Mollard, Chief Scientific Officer of PharmAust. "Usually, only 50% of dogs with B cell lymphoma will survive without treatment for around 30 days and the other half will have progressive disease[1]."

Veterinary trial centres are set up in New South Wales, Queensland and Western Australia to evaluate MPL in dogs that have been newly diagnosed with treatment naïve (not undergone any treatment) B cell lymphoma. Two other trial sites in Melbourne and Sydney are expected to start up in February/March.

MPL is already approved for veterinary use for a different indication and species. PharmAust is aiming to repurpose MPL as a safe and effective approved cancer treatment.

"So far, the initial trials in pet dogs with cancer have proven successful," said Dr Mollard. "We were pleased to see that in the first trial using the original liquid formula, six of seven dogs achieved stable disease over a prescribed 14-day trial period, with six of seven dogs also showing reductions in their tumour sizes."

No safety issues, improved taste

No safety issues were encountered in this first trial; however, the drug formula had a particularly unpleasant taste. So, the drug was reformulated from liquid to a more convenient and very easy-to-swallow tablet.

"This tablet resolved the taste problem and allowed us to significantly increase the dose being given in a second Phase IIa trial," said Dr Mollard. "From this trial, using this tablet we were able to identify an optimal dose where anti-cancer activity was maximised. At this dose, one dog's total tumour burden reduced by over 60 percent and some of the individual tumours disappeared, all within 14 days. It is this dose that we are now taking into the new Phase IIb trial."

Currently, the best indicated treatment option is chemotherapy, which comes with its own set of limitations and adverse events, and unfortunately, relapse can occur within six to 12 months.

"Monepantel is comparatively very gentle and we would like to see dogs doing well over the first 28-day period, then three and six months, and longer," said Dr Mollard. "If this trial determining the optimal prescribed dose is a success, PharmAust will embark on a larger Phase III trial. Going forward, owners of pet dogs with B cell lymphoma will then be given a greater choice of treatment options for their dogs. PharmAust would like to see dogs feeling considerably better, with tumours either disappearing or stabilised."

Which dogs with lymphoma are eligible?

To participate in the Phase IIb trial, dogs can have any stage of lymphoma but must be feeling generally well. Ultimately, the patient will only be given the treatment if they have B cell lymphoma but immunophenotyping (analysis of whether the cancer is a B cell or T cell type) is covered as part of the initial screening.

The dog entry criteria for the new clinical trial program are:

- Any stage of lymphoma (based on physical exam)
- Substage A (feeling well)
- Immunophenotype can be pending but must be submitted, and needs to be B-cell based on clinical characteristics
- No previous treatment in the previous 8 weeks, including corticosteroids (prednisolone)
- No other significant concurrent medical problems
- Good quality of life
- The dog should weigh more than 11kg.

Participating vet clinics

The MPL program now commencing involves consultations/ treatments at the dog's nearest trial centre, which currently includes the following five sites:

- Animal Referral Hospital in Homebush, Sydney NSW. Dr Sonya Yu (02) 9758 8666
- Western Australian Veterinary Emergency and Specialty (WAVES) in Success, Perth WA. Dr Sue Bennett (08) 9412 5700
- Perth Veterinary Specialists, Osborne Park, Perth WA. Dr Jessica Finlay (08) 9204 0400
- Animal Referral Hospital in Sinnamon Park, Brisbane QLD. Dr Kathleen O'Connell (07) 3172 0593
- Veterinary Specialist Services in Underwood, Brisbane QLD. Dr Catherine Chan (07) 3841 7011

Two other sites in Melbourne and Sydney are anticipated to re-join the trial in the near future.

Owners will have to transport their dogs to their respective centre and pay the cost for initial consultation for diagnosis. Once the pet is diagnosed with lymphoma, PharmAust will cover all clinical trial costs, including travel expenses to and from the trial centre as well as post trial maintenance treatment if both pet owners and vets consider this might be beneficial.

The MPL tablets will be administered at home and owners will be asked to keep a simple logbook during the trial period.

Pet owners interested in enrolling their dog in the MPL trial need to contact their veterinarian for a referral to their nearest trial centre.

Veterinarians – for questions about patient referrals or trial sites, please contact Dr Richard Mollard at rmollard@pharmaust.com

DOG CANCER FACTS

Close to 50% of dogs over the age of 10 will develop cancer and approximately 1 in 4 dogs will at some stage in their life develop cancer, according to the Vet Cancer Society[2].

PharmAust offers a reminder to regularly inspect your pet for any lumps or bumps and pay attention to sudden changes in appearance and behaviour, which can help with early detection.

LOOKING AFTER YOUR WORK-MATE – DOGS ON UTES

DR JEFF CAVE, DISTRICT VETERINARY OFFICER

There is no argument that working dogs are a valuable and helpful asset to farmers and it stands to reason, if your dog travels on the back of your ute, you need to take extra care to avoid exposing them to heat stress on hot days.

While it is legal to allow appropriately restrained dogs to travel on the back of utes, dogs being left in the sun for long periods can quickly dehydrate or even die from heat stress.

Adequate shelter, for example a fixed canopy, needs to be provided to protect tethered dogs from extreme temperatures.

A lot of utes and tray backs these days are made of metal and will heat up quickly and could easily burn dogs' paws.

New regulations introduced in Victoria in December 2019, require that when the temperature is 28 degrees or above that an area of insulating material be placed on the metal tray to protect the dog from the metal surface.

Ensure dogs kept in cages have adequate ventilation, particularly when the vehicle is not moving, and ensure all dogs are given regular access to cool water.

Victoria's Prevention of Cruelty to Animals Act requires dogs travelling in the back of utes, trailers or open tray trucks to be tethered or caged in a manner that prevents them from falling from the vehicle. The only exemption is when dogs are actively working livestock.

The tether should only be long enough to permit the dog to stand, lie down and move about but not so long that it could potentially let the dog fall off the vehicle and be dragged or strangled.

Tethering dogs should always be regarded as a temporary, short term method of restraint.

In addition, it is an offence to leave an animal unattended inside a motor vehicle when the outside temperature is 28 degrees or above, so be sure to make appropriate arrangements when you are travelling with animals.

For further advice please contact the RSPCA, your local veterinarian or Agriculture Victoria veterinary or animal health officer, or in NSW your Local Land Services.

RACE HORSE WELFARE WINS WITH LAUNCH OF TRANSFORMATIVE EQUINE CARE AUTOMATION

A new automation platform for the care and management of thoroughbred racehorses was launched today as a world first for the equine industry, created by a team of leading Australian experts.

StableWizard was inspired by the vision of Kevin Maloney, Chairman of Australia's premier Segenhoe Stud, to take transformative automation tools into the field of race horse management. The cloud-based, real-time information system was created through a two-year development process embedded with Australia's leading trainer Chris Waller.

With horse welfare at the heart of the system, StableWizard delivers a data capture and utilisation platform that is proven to improve horse welfare and asset management as well as business efficiency and safety, reducing costs and enhancing outcomes.

StableWizard transforms the future of equine training, using technology to drive safety, welfare, efficiency, and performance across the sector.

Thoroughbred horse welfare has been in the spotlight in Australia and globally and the founders of StableWizard believe their product will not only elevate and modernize equine management, but it will also have positive repercussions globally creating what will be considered the new standard in the industry.

With the eyes of trainers, owners, and a rigorous regulatory regime having oversight on every horse in Australia, the $9.5 billion local industry and its global counterparts have been ripe for automation in the training field and Australian workflow automation experts Redleaf have stepped up to the task.

"StableWizard automation will be like the transformation from horse and cart to the automobile for this industry," said Maloney.

The simple to use and secure cloud-based system delivers a high-performance, real-time workflow management platform to capture critical welfare data, raise alerts, and support training regimes. Trainers receive real-time oversight of operations to improve welfare and performance outcomes, as well as record keeping of vital statistics and data for business operations planning as well as presenting a horse's recorded history in its circle of life. Other service providers like vets, farriers, physio, and dental services can all utilise the input and output of the data.

"By ensuring and maintaining the health and wellbeing of each horse in my care in a stable with this incredibly useful data provided by StableWizard, we have improved the efficiency of our business and the care we can provide to our horses. Some processes that took 2 hours now take 2 minutes," Waller said.

"The benefits to our clients, the owners, are also clear as we can be more effective, timely in our communication to them, elevate our level of care, and provide a full picture data record of their horse.

"StableWizard really works. We see the benefits of it through longevity and great performances. The finer details it offers are the difference between winning big races or not," he added.

The solution seamlessly translates traditional horse management tasks like recording temperature and feed checks onto an easy to use dashboard via a phone or device, making the information accessible immediately to those that need it where and when it's required. It revolutionises the intensive daily training regime in the way it can track, alert, retain, and relay instant vital details to the trainers across multiple remote geographic locations and time zones.

Along with robust and secure tracking data, it delivers efficiencies such as feed management that both save money, time and improve planning and resource allocation for the business.

Highly experienced veterinary expert Dr. Malcom France, BVSc PhD, from the Board of the ANZ Council for the Care of Animals in Research and Teaching, says the level of data and alert system for anomalies in a horse's condition provide an exceptional capacity to ensure a horse's health and welfare which can only improve the well-being of the race horse and improve results and longevity across the industry.

"I think it's essential that the horse racing industry adopt new technologies and works with a foundation in animal welfare science that we now have available. That's important not only for community expectations but also for the performance of the animals themselves as well as the welfare of those animals so everybody wins," Dr France says.

Accreditation tools, staff training, and certification modules are all being embedded into the system to centralise and simplify the trainer's operations.

"The potential uses in this environment are almost limitless and we plan to introduce more components to develop it into a full suite of solutions for the delivery of equine welfare, a purpose very near and dear to our hearts," says Maloney.

StableWizard is able to be tailored for any stable environment and to capture an individual trainer's specific requirements. With research and development partners, StableWizard is investigating game changing automation enhancement to run on the platform in the future.

Staff member using the barn login

OBESE, SNORING MINI PIGS SHOW HOW AIR FLOWS THROUGH THE THROAT DURING SLEEP APNEA

With a small snout, a short and curled tail, and a big, round stomach, mini pigs are the epitome of cute -- and sometimes, they snore. Now, researchers think these snoring pigs can be used to study obstructive sleep apnea. A study appearing January 19 in the journal Heliyon found that obese Yucatan mini pigs do have naturally occurring sleep apnea and that MRI scans taken while they're in sedated sleep can be used to gain new insights into what happens in the airways during sleep apnea episodes via computational flow dynamic (CFD) analysis.

"These are very fat pigs," says first author Zi-Jun Liu, a research professor and principal investigator in the Department of Orthodontics at the University of Washington.
Because sleep apnea -- a common obstruction of the airway that in humans causes someone to repeatedly wake up -- currently has only a few cumbersome or invasive treatments, Liu and colleagues sought to better understand the mechanism behind the disease.

They looked at Yucatan mini pigs, two obese and three of normal weight, in part because they're comparable in both airway structure and size to humans. These pigs might be "mini," but they're still 100 pounds at normal weight. The obese pigs are even heavier. "To give some context, normal human body mass index (BMI) range around 25-28, with obesity reached at over 30-35. In pigs, normal BMIs range from 30 to 35, with obesity reached over 50," says Liu.

But even more importantly, obesity in mini pigs can actually cause them to get sleep apnea. In other animal models, like rats and rabbits, the researchers either have to make the animal gain weight to have sleep issues, which still wouldn't confirm sleep apnea in the animal, or they block the airway to make unnaturally occurring sleep apnea.

"That's the most important finding," says Liu. "This naturally occurring sleep apnea in these Yucatan mini pigs was validated."

After sedating the subjects, Liu and colleagues observed multiple episodes of sleep apnea per hour in both obese pigs, while only one of the normal weight pigs displayed episodes. In natural sleep, only the obese mini pigs had sleep apnea episodes -- and had as many as 35 per hour. While the researchers did not witness any episodes of snoring in the normal weight mini pigs, the obese pigs emitted a low, dinosaur-like snoring in both sedated and natural sleep.

Liu and colleagues also studied all five mini pigs in an MRI machine while they were in sedated sleep. Sleep apnea is known to be caused by anatomical restrictions of the nose and throat that cause stoppages of airflow, but the dynamics of how air flows through these passages and the mechanisms that cause the airflow to stop are not well understood. The researchers used the MRI scans they took to construct a 3D replica of the pigs' airways, finding that the obese pigs had significantly more narrowing in the throat and that there was a 25% increase in airflow velocity through these narrowest regions.

One of the researchers' hypotheses was that the sleep apnea was caused by what's known as "turbulence" in the airway. "You might be familiar with the term turbulence from when you ride an airplane. It's air that's circulated in just the local area, which of course on an airplane causes it to jump up and down," says Liu. In the airways of the pigs, turbulence formation could be caused by a combination of an abrupt change in the shape of the airflow pathway and high airflow velocity -- and the researchers hypothesised that it might be the reason that air stops flowing in sleep apnea. The findings from the pigs, however, showed that was not the case: despite the narrowing of the pharynx and the increase in airflow velocity, the researchers didn't find any turbulence in the pigs' airways.

Liu says that conducting this research came with numerous challenges. It required monitoring 150-200 pound obese mini pigs, with all the bells and whistles of human sleep monitoring: devices to monitor the air flow dynamics, the chest and abdomen movements, the brain and muscle activity, oxygen saturation, and more needed to be hooked up to the pigs at all times to get proper data.

The researchers add that, while this research showed that mini pigs can provide a naturally occurring animal model to examine sleep apnea and gave a greater understanding to how sleep apnea affects the body, more must be done to find a long-term solution for and mechanisms behind this disease. "Despite our findings, the sleep apnea mechanism is still not quite understood," says Liu. "There are of course anatomic reasons, but the functional reasons behind it are still up for debate."

This work was supported by a grant from National Institute of Dental and Craniofacial Research (NIDCR) and the Morell Research Fund for the Summer Research Fellowship (SURF) from University of Washington School of Dentistry.

Journal Reference:

Zi-Jun Liu, Tiffany Do, Hanson Fong. Airflow dynamics in obese minipigs with obstructive sleep apnea. Heliyon, 2021; 7 (1): e05700 DOI: 10.1016/j.heliyon.2020.e05700

VACCINE SHOWS POTENTIAL AGAINST DEADLY LEPTOSPIROSIS BACTERIA

Scientists have designed a single-dose universal vaccine that could protect against the many forms of leptospirosis bacteria, according to a study published today in eLife.

An effective vaccine would help prevent the life-threatening conditions caused by leptospirosis, such as Weil's disease and lung haemorrhage, which are fatal in 10% and 50% of cases, respectively.

Leptospirosis is caused by a diverse group of spirochetes called leptospires. A broad range of mammals, including rats, harbour the bacteria in their kidneys and release them into the environment through their urine. Humans and animals can then get infected after coming into contact with contaminated water or soil. In addition to having a major impact on the health of vulnerable human populations, leptospirosis is an economically important animal health problem, making it a significant One Health challenge. This means that collaborative efforts are needed across disciplines and sectors to improve public health outcomes against leptospirosis infection.

The Leptospira family of bacteria is made up of 64 species with 300 different varieties (called serovars). This makes developing a vaccine challenging, because researchers need to find a common feature of the bacteria that will trigger an immune response.

"We have recently identified a novel protein called FcpA in the flagella of Leptospira which enables it to move and penetrate human and animal tissues," explains first author Elsio Wunder Jr, Associate Research Scientist in Epidemiology (Microbial Diseases) at Yale School of Public Health, Yale University, New Haven, US.

"With this study, we wanted to see whether using engineered Leptospira that lacks a functional FcpA molecule has the potential for a vaccine that could provide major public health benefit."

The mutated FcpA Leptospira was tested as an attenuated vaccine – a live vaccine that cannot cause disease. After the vaccine was given to hamsters and mice, it disseminated throughout the body before being cleared within seven days in the hamsters and after two weeks in the mice. No traces of the mutated Leptospira could be detected in kidney tissue or blood after this time point, showing that the attenuated vaccine is cleared by the immune system before it results in disease or death.

To test whether the vaccine candidate could protect against all types of Leptospira infection, they tested a single dose of the mutant Leptospira and compared this against heat-killed Leptospira to see whether they could prevent infection and disease by a range of similar and different serovars. Immunisation with the heat-killed vaccine gave partial protection against similar serovars but not against different serovars of Leptospira. By contrast, the attenuated vaccine (mutated Leptospira) provided cross-protection against serovars belonging to three different species of Leptospira, which encompass the majority of serovars of importance to human and animal health.

Further analysis of the mice and hamsters after vaccination showed that they generated antibodies that recognised a wide range of proteins across the different species of Leptospira. Moreover, by studying the antibody response in detail, the team identified 41 different proteins that could be targets for future vaccines. The majority of these proteins (70%) looked similar across all 13 disease-causing species of Leptospira studied, suggesting they are likely to be important to the microbes' survival and would make effective future vaccine candidates.

"In this proof-of-concept study, we have shown that a universal leptospirosis vaccine candidate can prevent both death and kidney colonisation in animal models," concludes author Albert Ko, Department Chair and Professor of Epidemiology (Microbial Diseases) at Yale School of Public Health. "These findings take us one step closer to achieving the holy grail for the field, which is an effective vaccine that protects against the many Leptospira species and can be deployed as a broad solution to the human and animal health challenge caused by leptospirosis."

Journal Reference:

Elsio A Wunder, Haritha Adhikarla, Camila Hamond, Katharine A Owers Bonner, Li Liang, Camila B Rodrigues, Vimla Bisht, Jarlath E Nally, David P Alt, Mitermayer G Reis, Peter J Diggle, Philip L Felgner, Albert Ko. A live attenuated-vaccine model confers cross-protective immunity against different species of the Leptospira genus. eLife, 2021; 10 DOI: 10.7554/eLife.64166

PETCLOUD LAUNCHES AUSTRALIA'S FIRST PET TAXI APP

Australian startup PetCloud has launched the nation's first dedicated pet taxi service and in a first for Australia, the new Pet Taxi App allows pets to ride unaccompanied.

Whether they're arranging a taxi to a grooming appointment, vet check-up, or a lift home from a wedding, pet owners who use the Pet Taxi App can rest assured that every driver is insured, trained in animal handling and has undergone a police-check, and their pet is properly secured during each trip.

Like other ride share services, users simply download the app and book a pet taxi on demand or schedule a pick-up up to 72 hours in advance. Pet owners can track their pet's ride in real time through the app's GPS system and get fare estimates before they book. Pet businesses such as vet clinics and grooming salons can also book pet taxis on behalf of their clients.

With pets in two-thirds of Australian households, PetCloud CEO Deb Morrison said it was about time they had their own ride share service.

There are more pets than people in Australia with last estimates at around 30 million, which adds up to a lot of pet health and grooming appointments. Whether a pet needs a ride home from a mid-morning grooming appointment or a ride to the vet for a dental check-up, pet owners can't always stop half-way through their workday to pick up their pets, and we know that not all pet owners have a car. PetCloud's mission has always been to remove barriers to pet ownership and make responsible pet care easy and we are proud to say we have found a new way to do this through our Pet Taxi App,"
Ms Morrison said.

While PetCloud has been offering pet taxis through its pet sitting platform for a couple of years, Ms Morrison said increased interest in the service, especially among Australia's growing aging population, showed the nation was ready for its first dedicated pet taxi service.

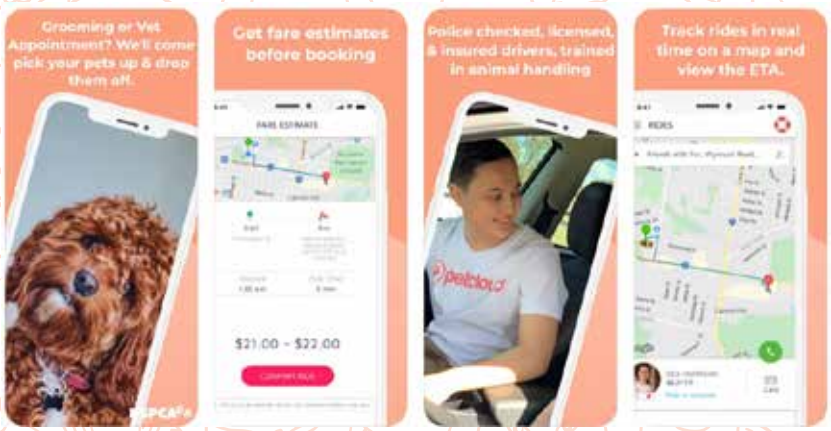
"Pets bring so much joy and comfort to people's lives and we don't want anyone to miss out on that special relationship because they can't drive or have a busy job. By offering a pet taxi service we're paving the way for more Australians to be able to care for a pet regardless of their life situation," she said.

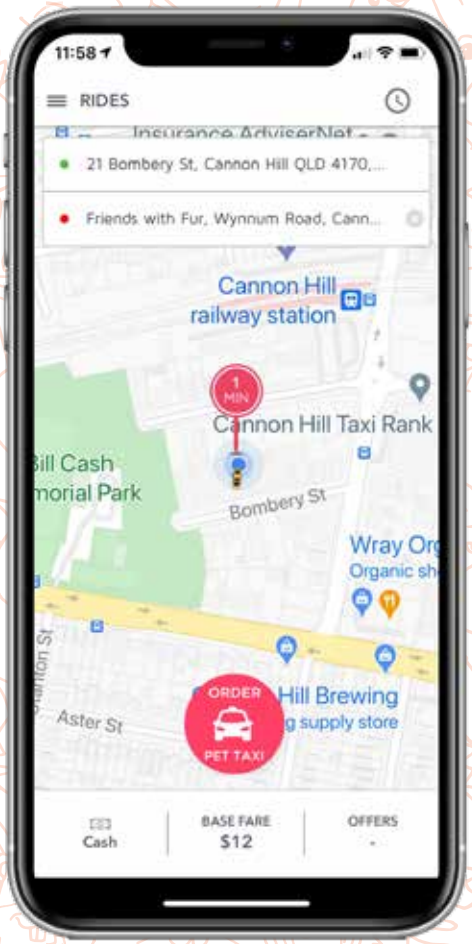
"We already have more than 1100 pet-loving drivers across Australia gearing up to drive Miss Daisy to her next appointment and welcome anyone else looking to make some spare cash as a pet taxi driver."

In line with PetCloud's regulations, Pet Taxi App drivers have all had police checks, are trained in animal handling, insured, and have the backing of Australia's most respected animal welfare charity, with RSPCA Queensland a part owner of PetCloud.

The Pet Taxi App is now available to download, pet taxi drivers can sign up here and pet businesses can access the pet taxi business portal here.

For more information on PetCloud visit www.petcloud.com.au





PETS HELPING MENTAL HEALTH

The humble hound and friendly feline have proven during the pandemic how important they are to our everyday lives. Pet Insurance Australia takes a look at the research behind how our pets can help improve our mental health and overall wellbeing.

“For experienced pet owners, and new fur parents, it comes as no surprise how good they are for our mental health,” Nadia Crighton from Pet Insurance Australia says.

“Not only do they make a great distraction from all the doom and gloom, but they also provide us with a good excuse to unplug and click off.”

With the current global climate and the effects being felt concerning Covid-19 the benefits of having a companion animal around the home have certainly increased.

“For many years it’s been clear that having a pet around can help with depression, anxiety while also allowing for social interaction with others,” Crighton says. “Even during a lockdown situation, pet owners seek advice and conversation from social media pet-specific groups and take pride in sharing their stories of their four-legged companions.”

Pets are particularly important in helping combat loneliness, they make wonderful companions to those who live alone and the elderly that could be struggling with finding safe interactions.

“There are some wonderful research papers that indicate how much pets help owners who are feeling stressed or suffering from mental health struggles,” Crighton says. “Pet owners can manage their feelings better as their pets provide powerful connections and distractions from stress and possible triggers.”

The Human Animal Bond Research Institute (HABRI) is a non-profit organisation that funds research into the health benefits of pets and human-animal interaction. Their research indicates that anyone suffering from mental health concerns, benefit greatly when they have access to the correct services, care, and support. This includes interaction with companion animals.

A paper from biomedcentral.com looked at a total of 17 studies in their review with evidence relating to the benefits of pet ownership. Their conclusion found that pets provide benefits to those with mental health conditions.

“It comes as no surprise with this type of reach why therapy dogs play such an important role in the lives of so many, including children,” Crighton says. “As the pandemic continues to rage around the globe the role many companion animals are currently playing should be celebrated and noted.”

A UK survey from The Mental Health Foundation alongside Cats Protection found that 87% of people who owned a cat felt it had a positive impact on their wellbeing. Because of the company of their feline companion, 76% said they could cope better with everyday life, while half of the cat owners felt that their cat’s presence and companionship was helpful.

“Even just stroking a pet can help alleviate stress and give a calming effect,” Crighton says. “As the global population struggles due to the huge stress of living with COVID-19 and its restrictions with travel, family gatherings, and many in lockdown, focusing on what can help is vital for health and wellbeing. Knowing our pets play such an important role in the mental wellness of our everyday and, ever-evolving lives brings comfort to many pet lovers.”

Benefits of pet ownership:

- Reducing stress
- Reducing blood pressure
- Reducing anxiety and depression
- Increasing social skills
- Increasing self-esteem
- Increasing communication skills
- Increasing motor skills
- Encourages movement and stretching
- Decreasing boredom
- Decreases feelings of isolation and aloneness

“When you look at the proven benefits of pet ownership, and the current stresses we are all feeling due to Covid-19, our companion animals are proving daily the importance of the bond they share with their owners and the greater community.”

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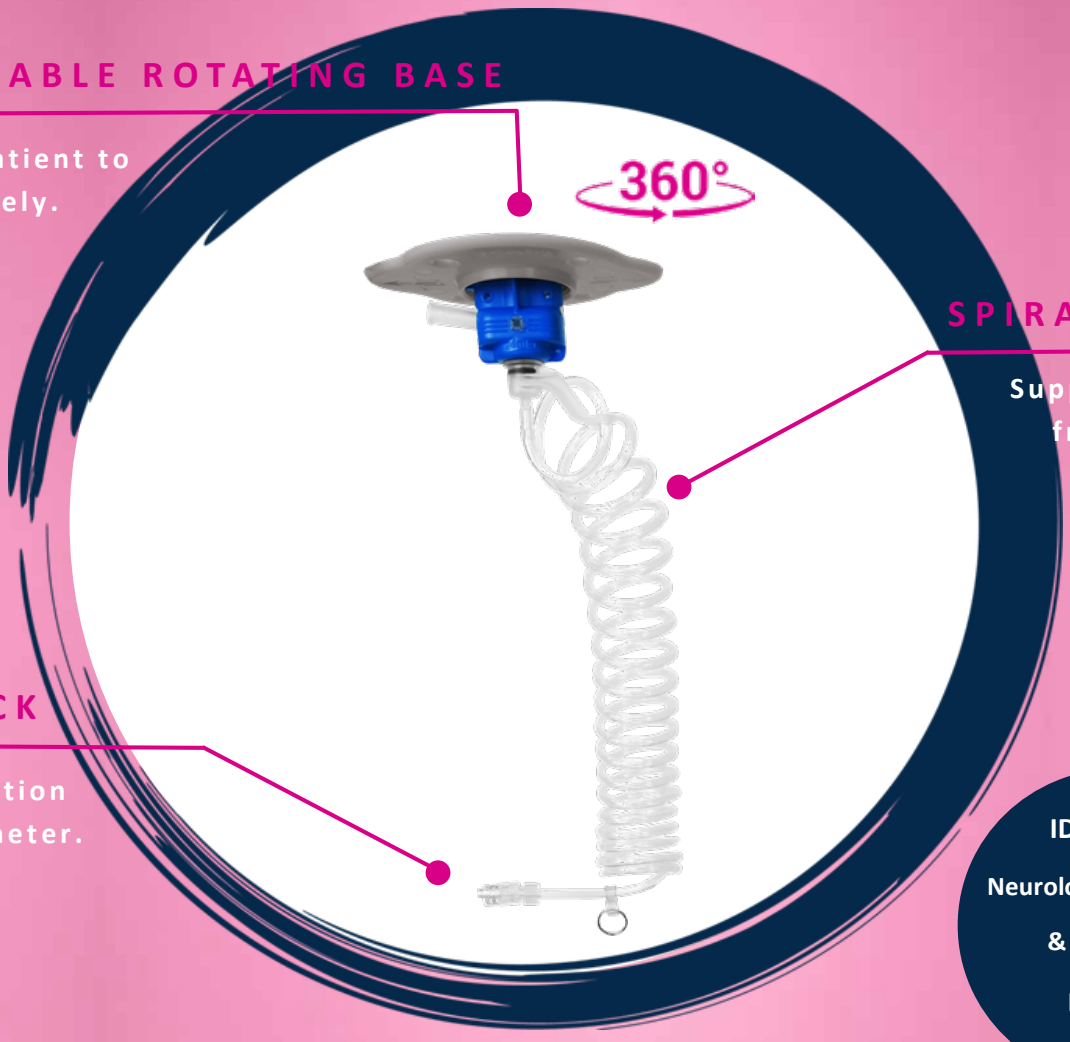

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PLAY AND MEATY FOOD REDUCE HUNTING BY CATS

Hunting by cats is a conservation and welfare concern, but methods to reduce this are controversial and often rely on restricting cat behaviour in ways many owners find unacceptable.

The new study -- by the University of Exeter -- found that introducing a premium commercial food where proteins came from meat reduced the number of prey animals cats brought home by 36%, and also that five to ten minutes of daily play with an owner resulted in a 25% reduction.

“Previous research in this area has focussed on inhibiting cats’ ability to hunt, either by keeping them indoors or fitting them with collars, devices and deterrents,” said Professor Robbie McDonald, of Exeter’s Environment and Sustainability Institute.

“While keeping cats indoors is the only sure-fire way to prevent hunting, some owners are worried about the welfare implications of restricting their cat’s outdoor access.

“Our study shows that -- using entirely non-invasive, non-restrictive methods -- owners can change what the cats themselves want to do.

“By playing with cats and changing their diets, owners can reduce their impact on wildlife without restricting their freedom.”

Play in the study involved owners simulating hunting by moving a feather toy on a string and wand so cats could stalk, chase and pounce. Owners also gave cats a toy mouse to play with after each “hunt,” mimicking a real kill.

It is not clear what elements of the meaty food led to the reduction in hunting.

“Some cat foods contain protein from plant sources such as soy, and it is possible that despite forming a ‘complete diet’ these foods leave some cats deficient in one or more micronutrients -prompting them to hunt,” said Martina Cecchetti, the PhD student who conducted the experiments.

“However, meat production raises clear climate and environmental issues, so one of our next steps is to find out whether specific micronutrients could be added to cat foods to reduce hunting.

“We also plan to investigate whether different kinds of play have different effects, and whether combining strategies can reduce hunting even further.”

The study – based on a 12-week trial of 355 cats in 219 households in south-west England – also examined the effect of existing devices used to limit hunting by cats.

Colourful “Birdsbesafe” collar covers reduced numbers of birds captured and brought home by 42%, but had no effect on hunting of mammals.

Cat bells had no discernible overall effect – although the researchers say the impact on individual cats varied widely, suggesting some cats learn to hunt successfully despite wearing a bell.

Lisa George, from Helston in Cornwall, who looks after Minnie, a three-year-old tabby cat who took part in the trial, said: “Minnie loves to hunt. More often than not, she will bring her prey home and let it go in the house. We’ve had birds in the bedroom, rats in the waste paper bin (which took us three days to catch), rabbits in the utility room.

“On changing Minnie’s food (previously supermarket own-brand), to Lily’s Kitchen, I found she hardly hunted at all. This continued the whole time she was on this food. I can honestly say I couldn’t believe the difference as regards her hunting behaviour.”

George Bradley, from project sponsors SongBird Survival, said: “This latest study we have funded is excellent news for birds.

“The data show that cat owners (like me) can make a few small and easy steps to really improve the health and happiness of our pets as well as make a really big difference for all our wildlife, especially our beloved songbirds.

“Making these easy-to-implement changes will be a win-win for birds, cats and cat owners.”

Dr Sarah Ellis, Head of Cat Advocacy at iCatCare, which is part of the advisory group for this research project, said: “We are really encouraged by the findings of this study.

“While many cat owners are wildlife lovers and find the killing and injuring of wild animals by their cats upsetting, many owners also feel that keeping their cats indoors or restricting their outdoor access would impact negatively on their cats’ quality of life.

“At iCatCare, we are particularly excited about the positive effects of play – this is an activity that owners can easily introduce at no or little cost, takes little time and is very cat-friendly.

“The mental and physical stimulation of predatory-like play are likely to help keep a cat in tip top condition and provide an appropriate behavioural outlet for its predatory behaviours.”

Dr Adam Grogan, Head of Wildlife at the RSPCA, welcomed the results of the study.

“The RSPCA cares for both cats and wild animals and we want to provide advice to cat owners that will benefit both cat and wild animal welfare,” he said.

“This project provides us with alternatives for cat owners that are simple and effective and so easy to adopt.”

Journal Reference:

Martina Cecchetti, Sarah L. Crowley, Cecily E.D. Goodwin, Robbie A. McDonald. Provision of High Meat Content Food and Object Play Reduce Predation of Wild Animals by Domestic Cats Felis catus. Current Biology, 2021; DOI: 10.1016/j.cub.2020.12.044

Q&A ON MEDICINAL CANNABIS

COMMONLY ASKED QUESTIONS ANSWERED

In the past year or two, there has been an influx of hemp and illegal CBD products available for Australian pets. This has left many pet owners and even vets wondering about the safety profile of these products, where they can access CBD for animals through legal channels, and how hemp or CBD oil might have a therapeutic application for their beloved pets and patients.

CBD Vets Australia is Australia's first veterinary clinic and a telehealth service where pet owners can access legal medicinal cannabis under the careful observation of an Australian registered vet practitioner. It aims to help sift through the vast information - and misinformation - to provide both education and research on this topic.

The difference between hemp seed and CBD oil
Hemp seed oil and CBD oil are both derived from cannabis plants.

Hemp seed oil or hemp oil is extracted from the seeds of cannabis plants (extracted much like any other cold-pressed cooking oil). It contains less than 0.0075% CBD and 0.005% of the intoxicating THC and can therefore be classed as a food source which may contribute towards general well-being as a supplement (for a healthy coat, for example), but it is not considered to possess therapeutic value.

CBD oil differs in that it is extracted from the flowers and stalks of the hemp, as well as other cannabis varieties, and is widely researched for its potential therapeutic properties.

Conditions treated with CBD oil
Cannabidiol or CBD is a cannabinoid that has been extensively researched in humans, now research into CBD and medical cannabis for our furry friends is also kicking up a notch.

The symptoms or conditions where CBD may be prescribed for a pet include but are not limited to:

- Pain
- Epilepsy
- Osteoarthritis
- Anxiety

CBD oil isn't right for every medical condition or every animal and just like any other medicine may have side effects.

What does the research say?
One study shows CBD to reduce pain measures and improve mobility in dogs with osteoarthritis at a dose of only 2mg/kg twice per day. This offers a cost effective and viable alternative or adjunct therapy to some other conventional pain medications.

Another piece of research shows that CBD administered to dogs with epilepsy reduced seizure frequency by approximately 33%. Read more on our blog.

Investigations into the safety of CBD and other cannabinoid formulations for animals is still in its infancy. Research so far, says it's possibly safe for dogs in high doses of as much as 10-20mg/kg/day.

However, there is very limited clinical evidence on CBD in cats. We do know that cats metabolise CBD differently to dogs.

Safety
People are buying CBD oil products for their pets online yet unless it is prescribed through a legal veterinary channel from a legitimate and trusted pharmaceutical product supplier, there is no guarantee what they say on the label is accurate. It may contain substances (such as pesticides and heavy metals), contaminants or additives that can be poisonous to animals.

Precision Pharmaceutical is leading the way in allowing veterinarians access to legal CBD for the first time in Australia. Vets who are affiliated with Precision Pharma can prescribe medicinal cannabis preventing them from ingesting black market CBD products which may be untested, illegal and in some cases, do not contain CBD at all.

Side Effects
Like with all medications, some pets may experience side effects. Dogs most commonly experience gastrointestinal symptoms like loose stools. This however is considered to occur infrequently and is why careful dosing for animals is essential and needs to be managed by a vet.

Human vs Pet medicinal cannabis
In Australia, CBD oil in low-doses for humans has recently been legalised by the Australian government to be available over the counter in Australian pharmacies, with products likely becoming available either late this year or next. Neither this nor prescription medicinal cannabis for humans should be given to pets.

It's essential that animals receive the most appropriate dose and formulation for their size, weight and condition, in order to have peace of mind that it's safe. This is why all pet owners should be encouraged to visit their local vet and contact CBD Vets Australia to be prescribed CBD from Precision Pharma.

Human medicinal cannabis products can cause vomiting and diarrhea in animals as their stomach treats certain ingredients like additives differently.

Pets (particularly dogs) have an increased sensitivity to the cannabinoid THC which can sometimes be found in human medicinal cannabis formulations and black market products. This puts them at risk of adverse effects which range from loose stools to the severe end of the scale like static ataxia or even death in the rare case of overdose or THC toxicity.

Medicinal cannabis is an exciting new therapeutic area for the treatment of symptoms of certain health conditions in pets along with their general health and well-being. Although it does warrant further exploration via clinical research and trials, Australian pet owners are already using prescribed CBD oils for their furry friends as a treatment option.

CBD Vets Australia and its compound medication partner Precision Pharma is dedicated to helping improve the health and well-being of our animals through greater education and awareness of options available.

Vets can visit www.cbdvetsaustralia.com.au for more information or if they are interested in prescribing medicinal cannabis products please contact info@cbdvetsaustralia.com.au or call (02) 8294 9303.

CBD Vets Australia
Medicinal Cannabis for Pets

PROTECTING SHEEP HEALTH AND PRESERVING ANTIMICROBIALS

Animal Medicines Australia (AMA) continues to support the responsible use of antimicrobial veterinary medicines with the recent development of prescribing guidelines for veterinarians working with the sheep industry.

The prescribing guidelines, developed by an independent expert panel, will be a valuable resource for veterinarians, building on previously published guidelines for the poultry and pig sectors. The development of antimicrobial prescribing guidelines for livestock is a joint initiative of the Australian Veterinary Association and AMA.

Executive Director of Animal Medicines Australia Ben Stapley said AMA had worked with industry partners to ensure that antimicrobials continue to be available for veterinary use when needed to protect animal health and welfare.

“Antimicrobial stewardship is critical to demonstrating the commitment of the broader animal health industry to livestock production systems that protect animal health and welfare, whilst reducing the risks of antimicrobial resistance to human health and the environment.

“The prescribing guidelines identify the core principles of appropriate use of antimicrobial agents ranging from pre-treatment principles such as disease prevention, to drug selection, drug use and post treatment activities.

“These guidelines are an important resource for veterinarians that will help to reduce inappropriate antimicrobial use, reduce selection pressures favouring resistant organisms and protect the effectiveness of antimicrobials for the future,” Mr Stapley said.

“Research leading to the development of the sheep guidelines found the most common conditions veterinarians prescribed antimicrobial treatments for included kerato-conjunctivitis, foot abscess, pneumonia, virulent ovine footrot and dermatophilosis.

“I would like to thank the expert panel members who have worked on these guidelines to help Australian veterinarians provide best practice care to sheep.”

The expert panel that developed the antimicrobial prescribing guidelines for sheep comprised Dr Ray Batey, Dr Paul Nilon, Professor Jacqueline Norris, Dr Stephen Page, Professor Glenn Browning.

The funding for the prescribing guidelines was provided by Australian Veterinary Association, Animal Medicines Australia, Meat & Livestock Australia, Sheep Producers Australia, Wool Producers Australia and Animal Health Australia.

SNAKES EVOLVE A MAGNETIC WAY TO BE RESISTANT TO VENOM

Certain snakes have evolved a unique genetic trick to avoid being eaten by venomous snakes, according to University of Queensland research.

Associate Professor Bryan Fry from UQ’s Toxin Evolution Lab said the technique worked in a manner similar to the way two sides of a magnet repel each other.

“The target of snake venom neurotoxins is a strongly negatively charged nerve receptor,” Dr Fry said.
“This has caused neurotoxins to evolve with positively charged surfaces, thereby guiding them to the neurological target to produce paralysis

“But some snakes have evolved to replace a negatively charged amino acid on their receptor with a positively charged one, meaning the neurotoxin is repelled.

“It’s an inventive genetic mutation and it’s been completely missed until now.

“We’ve shown this trait has evolved at least 10 times in different species of snakes.”

The researchers found that the Burmese python -- a slow-moving terrestrial species vulnerable to predation by cobras -- is extremely neurotoxin resistant.

“Similarly, the South African mole snake, another slow-moving snake vulnerable to cobras, is also extremely resistant,” Dr Fry said.
“But Asian pythons which live in trees as babies, and Australian pythons which do not live alongside neurotoxic snake-eating snake, do not have this resistance.

“We’ve long known that some species -- like the mongoose -- are resistant to snake venom through a mutation that physically blocks neurotoxins by having a branch-like structure sticking out of the receptor, but this is the first time the magnet-like effect has been observed.”

“It has also evolved in venomous snakes to be resistant to their own neurotoxins on at least two occasions.”

The discovery was made after the establishment of UQ’s new $2 million biomolecular interaction facility, the Australian Biomolecular Interaction Facility (ABIF).

“There’s some incredible technology at the ABIF allowing us to screen thousands of samples a day,” Dr Fry said.

“That facility means we can do the kinds of tests that would have just been science fiction before, they would have been completely impossible.”

The Australian Biomolecular Interaction Facility (ABIF) was funded through a $1 million Australian Research Council Linkage Infrastructure, Equipment and Facilities (LIEF) grant, with $1 million contributing funding from UQ, Griffith University, Queensland University of Technology, James Cook University, and the University of Sunshine Coast.

Journal Reference:

Richard J. Harris, Bryan G. Fry. Electrostatic resistance to alpha-neurotoxins conferred by charge reversal mutations in nicotinic acetylcholine receptors. Proceedings of the Royal Society B: Biological Sciences, 2021; 288 (1942): 20202703 DOI: 10.1098/rspb.2020.2703

ROBOTS COULD REPLACE REAL THERAPY DOGS

Robotic animals could be the 'pawfect' replacement for our real-life furry friends, a new study published today by the University of Portsmouth has found.

Animals, especially dogs, can have therapeutic benefits for children and young people. A new paper, published in The International Journal of Social Robotics, has found that the robotic animal, 'MiRo-E', can be just as effective and may even be a better alternative.

Dr Leanne Proops from the Department of Psychology, who supervised the study said: "We know that real dogs can provide calming and enjoyable interactions for children -- increasing their feelings of wellbeing, improving motivation and reducing stress.

"This preliminary study has found that biomimetic robots -- robots that mimic animal behaviours -- may be a suitable replacement in certain situations and there are some benefits to using them over a real dog."

Dogs are the most commonly used animals for therapy because of their training potential and generally social nature. However, there are concerns about using them in a setting with children because of the risk of triggering allergies or transmitting disease, and some people do not like dogs, so may not be comfortable in the presence of a real therapy dog.

Olivia Barber, who owns a therapy dog herself, and is first author of the paper, said:

"Although lots of people in schools and hospitals benefit greatly from receiving visits from a therapy dog, we have to be mindful of the welfare of the therapy dog. Visits can be stressful and incredibly tiring for therapy dogs, meaning that we should be exploring whether using a robotic animal is feasible."

There are lots of positives to using a robotic animal over a therapy dog. They can be thoroughly cleaned and can work for longer periods of time. They can also be incredibly lifelike, mirroring the movements and behaviour of a real animal, such as wagging their tails to show excitement, expressing "emotions" through sounds and colour, turning their ears towards sounds and even going to sleep.

The researchers used real dogs and a biomimetic robot in a mainstream secondary school in West Sussex to interact with 34 children aged 11-12.

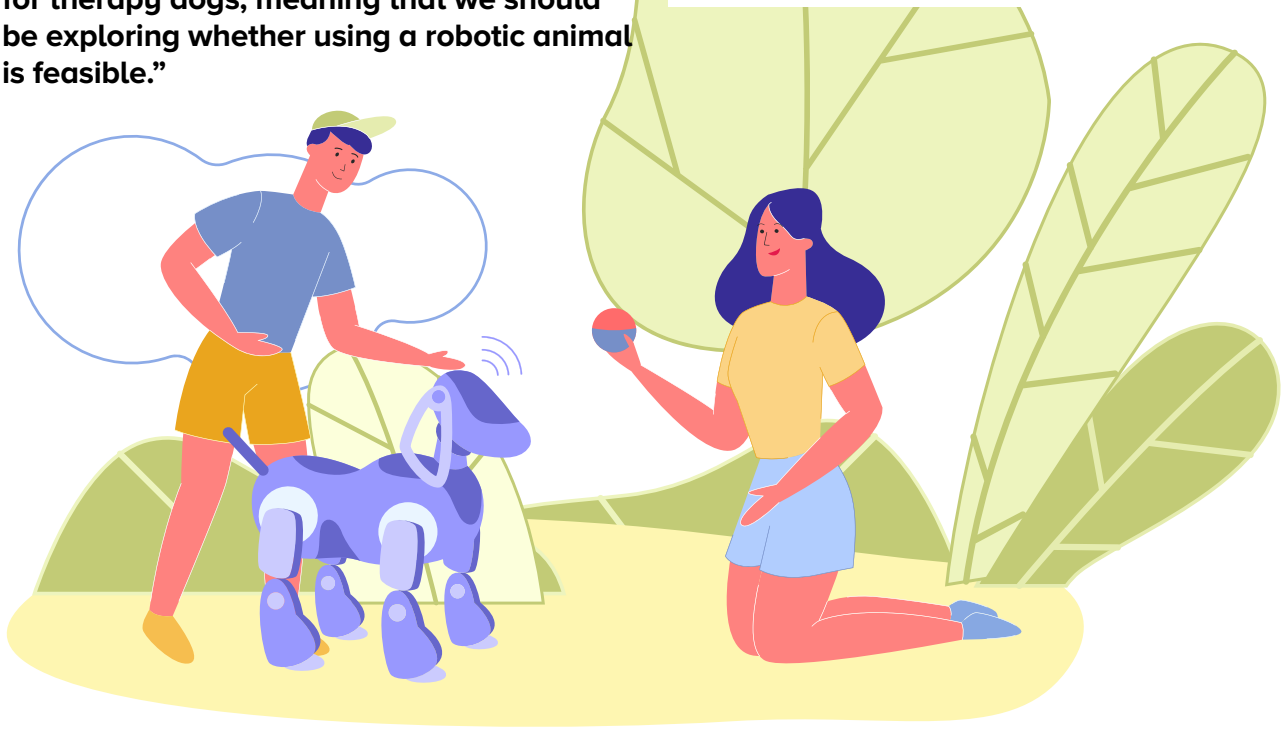
The two real-life therapy dogs were a three-year-old Jack Russell crossed with a Poodle and a 12-year-old Labrador-retriever from the charity Pets as Therapy. The robot was a MiRo-E biomimetic robot developed by Consequential Robotics.

The children were asked to complete a questionnaire about their beliefs and attitudes towards dogs and robots, before they took part in two separate free-play sessions, one with a real-life dog and one with a robot.

The researchers found the children spent a similar amount of time stroking both the real-life dog and the robot, but they spent more time interacting with the robot.

Despite the children reporting they significantly preferred the session with the living dog, overall enjoyment was high and they actually expressed more positive emotions following interaction with the robot. The more the children attributed mental states and sentience to the dog and robot, the more they enjoyed the sessions.

Dr Proops said: "This is a small-scale study, but the results show that interactive robotic animals could be used as a good comparison to live dogs in research, and a useful alternative to traditional animal therapy."



Journal Reference:

Olivia Barber, Eszter Somogyi, Anne E. McBride, Leanne Proops. Children's Evaluations of a Therapy Dog and Biomimetic Robot: Influences of Animistic Beliefs and Social Interaction. International Journal of Social Robotics, 2020; DOI: 10.1007/s12369-020-00722-0

INTOXICATING CHEMICALS IN CATNIP AND SILVER VINE PROTECT FELINES FROM MOSQUITO BITES

Rubbing against catnip and silver vine transfers plant chemicals that researchers have now shown protect cats from mosquitoes.

The results also demonstrate that engaging with nepetalactol, which the study identified as the most potent of many intoxicating iridoid compounds found in silver vine, activates the opioid reward system in both domesticated felines and big jungle cats.

While nepetalactol had been previously identified, these studies directly illuminate its extremely potent effect on cats. And by revealing the biological significance of well-known feline behaviours, the study opens the door to further inquiry into how nepetalactol's twin effects - pest repellence and intoxication - may have driven the evolution of these behaviours.

Catnip and silver vine are known to hold a special place in felines' hearts. When cats encounter these plants, they rub their heads and faces against them and roll around on the ground, displaying undeniable enjoyment.

Afterward, the cats lounge around in a state of intoxicated repose. But while pet owners around the world gift their cats toys laced with catnip or silver vine leaves, the biological significance of these plants and the neurophysiological mechanism triggered when cats sniff and rub against them has not been known.

To investigate, Reiko Uenoyama and colleagues tested how 25 laboratory cats, 30 feral cats, and several captive big cats, including an Amur leopard, two jaguars, and two Eurasian lynx, responded to filter paper impregnated with nepetalactol, finding that the cats showed a more prolonged response than they did with untreated control filter papers.

In contrast, dogs and laboratory mice showed no interest in the nepetalactol-containing papers. Next, the researchers compared how 12 of the cats responded to each of the known bioactive iridoids, finding that nepetalactol is the most potent compound in silver vine leaves.

To test whether feline responses to nepetalactol are regulated by the opioid system, they examined changes in plasma levels of ?-endorphin 5 minutes before and 5 minutes after 5 cats were exposed to nepetalactol, and later to a control stimulus, finding elevated endorphin concentrations only after exposure to the iridoid. When the researchers pharmacologically inhibited the cats' ?-opioid receptors, the cats no longer showed a rubbing response to the iridoid.

Finally, they tested whether silver vine leaves repelled Aedes albopictus mosquitoes when cats rubbed against the plant, finding that significantly fewer mosquitoes landed on cats that exhibited this behaviour. Uenoyama et al. note that nepetalactol might also be used as a repellent to protect humans from mosquitoes and suggest it could also repel the Aedes aegypti species, which transmits yellow fever, dengue, and Zika viruses.

AS DEADLY CAT DISEASE SPREADS NATIONALLY, MU VETERINARIAN FINDS EFFECTIVE TREATMENT

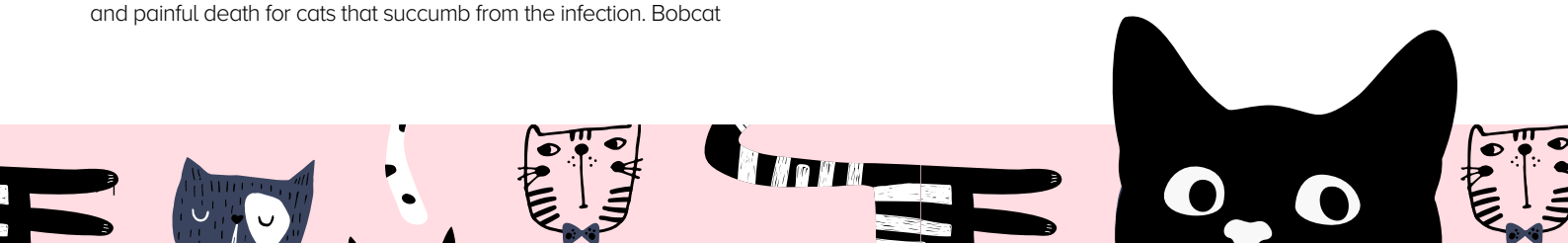
Lone Star ticks, which are notorious carriers of many diseases including cytauxzoonosis, or "bobcat fever," have been spreading across the nation in recent years. As a result, cats across much of the country are now exposed to the deadly disease. University of Missouri veterinarian Leah Cohn, a small animal disease expert, and Adam Birkenheuer from North Carolina State University, have found an effective treatment for the dangerous disease.

"Previous treatment methods have only been able to save less than 25 percent of infected cats, but our method, which is now being used by veterinarians across the country, has been shown to save about 60 percent of infected cats," Cohn said. "While that number isn't as high as we'd like due to the deadly nature of the disease, our method is the first truly effective way to combat the disease."

Routinely carried by bobcats and mountain lions, Cohn and Birkenheuer also found that bobcat fever can even infect tigers. All types of cats, but only cats, can catch bobcat fever. Cohn calls the disease the "Ebola virus for cats," saying that it is a very quick and painful death for cats that succumb from the infection. Bobcat fever is easily spread between cats through tick bites, but Cohn and Birkenheuer found that the disease is not readily passed down through birth like malaria and many other protozoan diseases.

"Bobcat fever affects healthy outdoor cats the most, because they are the most likely to get bitten by ticks," Cohn said. "The disease acts very quickly and can kill a cat less than a week after it begins to show signs of being sick, so it is important to get treatment from a veterinarian as soon as the cat appears ill."

Cohn says the best way for cat owners to prevent their cats from catching bobcat fever is to keep them indoors as much as possible. Early symptoms of the disease include sluggishness and refusal to eat. Pet owners who also have dogs should use tick collars, because while dogs are not susceptible to the disease, they can bring infected ticks into contact with house cats. Cohn says tick preventatives for cats also can help, but owners should be sure to check with their veterinarians to make sure they use cat-specific products, as tick collars for dogs can be harmful to cats.



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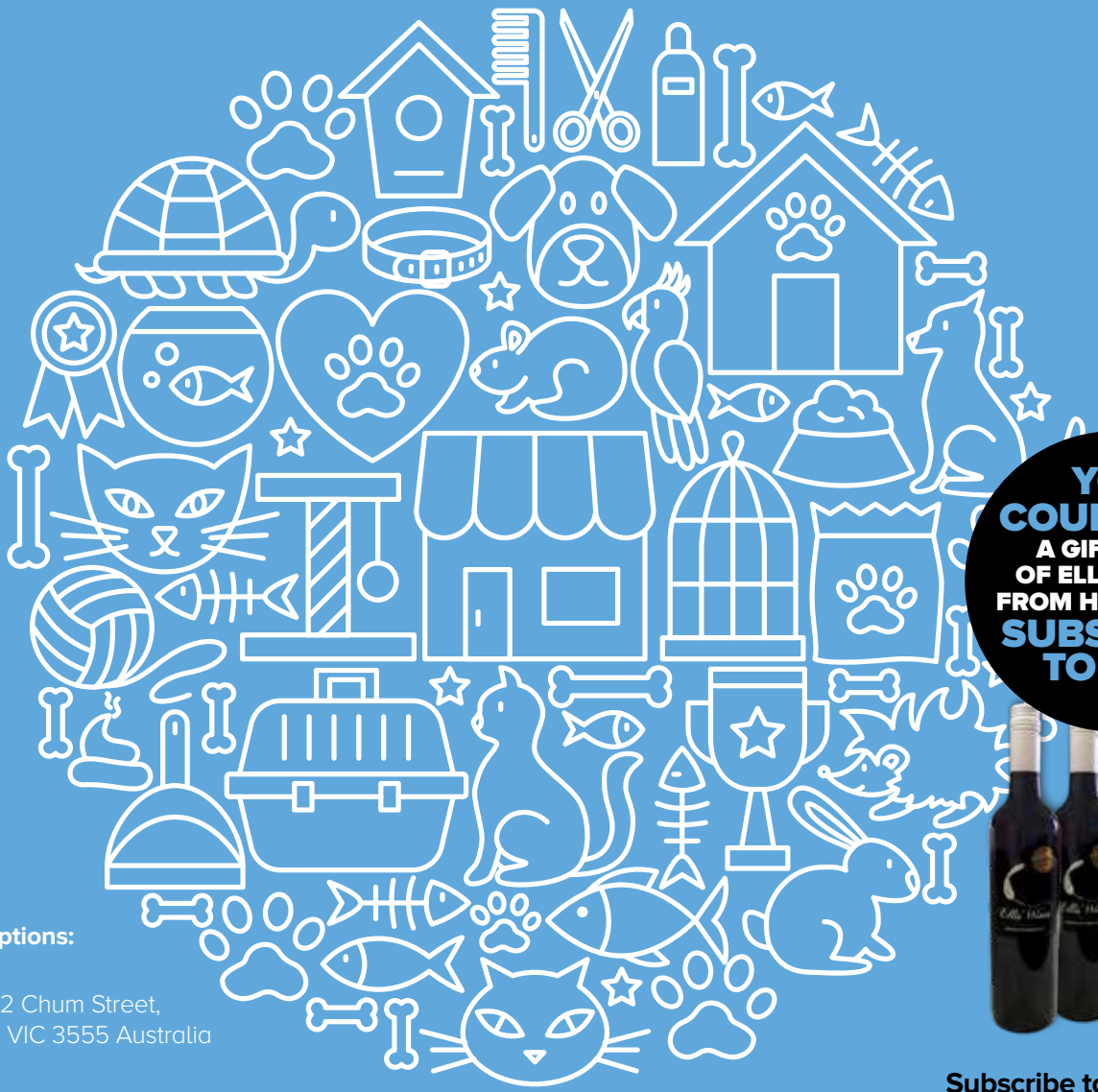

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WHY YOU SHOULD DESEX YOUR CAT BEFORE PUBERTY

New research finds Australia is doing well in the desexing arena. But the age of desexing needs to be brought forward from six months to four months to close a "pregnancy gap" and prevent unwanted litters of kittens.

Australians are being urged to get their cat desexed before the age of four months, instead of the standard six months, to close the "pregnancy gap" between puberty and surgery. Routine early-age desexing of cats could lessen the impact of unwanted litters. A new study has found that early-age desexing is on the increase in Australia.

Julia Beatty, Professor Emerita at the University of Sydney's School of Veterinary Science, said the good news is Australia is doing well in the desexing arena. The study found more than 83 percent of cats presented to veterinarians in Australia were desexed, which is among the highest reported internationally.

However, the study also found that desexing at four months or younger, was carried out in only 21.5 percent of female cats, while only 59.8 percent of female cats had been desexed by six months of age, the traditional and the most common recommendation by vets in Australia.

"This creates a potential pregnancy gap between the time the female cat reaches puberty and the age at surgery," Professor Beatty said. "It's a gap that could be closed if desexing before four months of age were routine in vet practices, not just in shelters."

The findings are published in the prestigious journal Scientific Reports.

Unwanted kittens

Professor Beatty said early-age desexing was important to prevent unwanted kittens heading into overburdened and under-resourced shelters or into the stray cat population which is detrimental to their wellbeing and puts additional stress on wildlife already impacted by other predators, habitat loss and global warming.

"We really hope this research encourages the pet owning public to have their cats desexed before they reach four months of age," Professor Beatty said.

"This would be a win:win for cat welfare and wildlife welfare by helping to reduce the number of unwanted kittens."

Kristina Vesk, CEO of Cat Protection Society NSW, said: "Cat Protection has practised and advocated early-age desexing for more than 20 years. It is not only safe but protective against diseases including some cancers and it is behaviourally positive for the cat and their owners."

Dr Sarah Zito, Senior Scientific Officer for RSPCA Australia, said: "Desexing cats before they can reproduce plays an integral role in reducing cat overpopulation. In addition, the extensive evidence of the benefits and safety of desexing cats before four months of age (before puberty) shows that there are also many health and welfare benefits for individual cats. RSPCA Australia advises owners to have their cats desexed before four months of age and advocates desexing of all cats before puberty as routine and normal practice."

The research

A team of researchers at the University of Sydney studied anonymous medical records of over 52,000 cats brought into vet clinics, including pet cats, breeding cats, cats owned by shelters and semi-owned cats. Stray cats, without a human carer, were not included.

The study found the practice of desexing younger cats is increasing, however, only 59.8% of female cats had been desexed by six months of age.

Female cats were less likely than males to be desexed (at all) or to have undergone early-age desexing, which is suboptimal for preventing unwanted litters. A female can give birth to up to three litters, of up to six kittens each year.

"That's a lot of cats - way more than the number of homes," said Dr Lara Boland, from Sydney School of Veterinary Science and co-author on the paper. "While the economic impact of dealing with the oversupply of cats and dogs may be hard to quantify, someone somewhere is paying."

Credit: The university of Sydney

BIRDS LIVING IN NATURAL HABITS CAN HELP INFORM CAPTIVE CARE

Birds are the most diverse group housed by zoos around the world, but zoo-based research tends not to focus on birds.

A new article published in the journal Birds, by Dr Paul Rose of the University of Exeter, suggests zoos can improve management of birds by looking at how species live in their natural habitats.

Likewise, birds living under the care of humans can also help guide and develop conservation action for those living in the wild.

"Research into wild birds is extremely useful for furthering how birds are managed in zoos," said Dr Rose.

"For species of conservation concern, zoo professionals can be linked with field biologists to share information on how to best care for these species in captivity and how to develop and formulate conservation actions.

"We can use proxy species -- those common in zoos -- to develop practices for conservation that can be used for less familiar species that might be of concern and need help from information gathered through things such as captive breeding.

"Or we can promote the threats that these not-in-the-zoo species face by using the commoner species as an ambassador.

"We do this through my work at the Wildfowl & Wetlands Trust, promoting the rarer species of flamingo that are in the wild using the commoner ones we keep in the living collection."

In the review, Dr Rose uses hornbills as an example, a species of bird that is essential to the long viability and sustainability of biodiversity in the rainforest.

The helmeted hornbill, a critically endangered species, plays an important role in the dispersal of seeds within pristine, undistributed areas of south-east Asian rainforests.

The population decline of the helmeted hornbill has been caused by poaching of the birds for their "ivory," the large casque on the bird's head and bill that can be up to 10% of its overall body mass.

Whilst the helmeted hornbill is not found in captivity, other species of large hornbill are.

By looking at the ecological role of the helmeted hornbill in its natural habitat, zoos have been able to design enclosures that will increase chances of reproduction.

For example, by identifying the temperature and humidity range of hornbill nesting sites in the wild which are more likely to hatch eggs, zoos have been able to use this data to enable them to match these environmental conditions as closely as possible.

A similar situation happened with the Guam kingfishers, a species that is extinct in the wild and reliant on captive breeding for its survival.

Data from the nesting locations of the closely related Pohnpei kingfisher, found on a neighbouring island, showed that temperatures were hotter than those sometimes provided for captive Guam kingfishers.

The findings led to zoos raising the temperature to improve nesting success amongst the species.

Zoos have also been able to guide conservation action for hornbills living in the wild by monitoring the behaviour of these birds and discovering that using nest boxes enhances the quality of habitats for hornbills to breed in, which has led to these boxes being built in areas of the helmeted hornbill's range in Borneo.

Expertise and financial support has been provided by several large zoological collections in European Association of Zoos and Aquaria (EAZA) and North American Association of Zoos and Aquariums (AZA) that has successfully seen wild rhinoceros hornbills, listed as vulnerable, fledge a chick from an artificial nest box in the Bornean rainforest.

"The effect of visitors on zoos can also help direct future research questions and increase understanding of birds under human care," adds Dr Rose.

"Developing zoo bird exhibits to theme them around specific conservation messages can be used to promote wider understanding of the threats faced by wild birds specifically and hopefully encourage human behaviour change that benefits ecosystem health."

Journal Reference:

Paul Rose. Evidence for Aviculture: Identifying Research Needs to Advance the Role of Ex Situ Bird Populations in Conservation Initiatives and Collection Planning. Birds, 2021; 2 (1): 77 DOI: 10.3390/birds2010005

NEW STEM CELL THERAPY IN DOGS -- A BREAKTHROUGH IN VETERINARY MEDICINE

Dogs have been faithful human companions ever since their domestication thousands of years ago. With various improvements in veterinary medicine in the past decades, their life expectancy has increased. However, an unfortunate side effect of this longevity, much like in humans, has been an increase in the occurrence of chronic and degenerative conditions.

In humans, modern efforts to fight such diseases have culminated in the development of regenerative therapies, largely based on stem cells. These "baby" cells have the potential to differentiate and mature into many specialized cell types-- called "pluripotency." By transplanting stem cells and guiding their differentiation into desired cell types, researchers are effectively able to regenerate damaged tissues, thereby reversing the course various complex diseases. Although this technology is widely studied in humans, the potential for stem cell therapy in dogs is lacking.

To this end, a research team from Japan, led by Associate Professor Shingo Hatoya from Osaka Prefecture University, has been working on isolating "induced pluripotent stem cells" (iPSCs) from canine blood samples. iPSCs are a type of stem cell that can be "programmed" from a developed (or "differentiated") cell by introducing a specific set of genes into them. These genes code for proteins called "transcription factors," which induce the change from a differentiated to a pluripotent stem cell, which then have the ability to mature into various cell types. iPSCs can proliferate very rapidly, providing a reliable supply of suitable stem cells for regenerative therapies. "We successfully established an efficient and easy generation method of canine iPSCs from peripheral blood mononuclear cells" explains Dr. Hatoya. He highlights the significance of these findings for veterinary science, stating he hopes that in the near future, "it may be possible to perform regenerative medicinal treatments in dogs." These findings were published in the journal Stem Cells and Development.

The previous attempts by these scientists to generate iPSCs from canine blood cells, using viral "vectors" to deliver the pluripotency-inducing transcription factors, were not as effective as hoped. Therefore, in this study, they tested a different combination of inducing factors, which they believe were key to harvesting the full potential of these cells. Most importantly, the researchers needed to control how the reprogrammed cells replicated in the host body. Viral vectors that encode pluripotency-inducing transcription factors can be used to infect cells obtained from the blood and convert them into iPSCs; however, the researchers needed to be cautious: because these vectors integrate into the host genome, re-expression of these pluripotency factors in the host cell can cause tumor formation when these cells are transplanted in patients. To avoid this, the team developed "footprint-free" stem cells by using a particular type of viral vector that can generate iPSCs without genomic insertion and can be automatically "silenced" via "microRNAs" expressed by the cells. Then, they grew these cells in a special type of medium that contained various factors enhancing their pluripotency (including a "small-molecule cocktail"). Indeed, these cells grew and successfully developed germ layers (which form the basis of all organs).

Fascinatingly, these findings have paved the way for an easy stem cell therapy technique for man's best friends.

"We believe that our method can facilitate the research involving disease modelling and regenerative therapies in the veterinary field," says Dr. Hatoya.

Furthermore, the authors also believe that additional research into regenerative therapies for canines might have some ripple effects for human medicine. "Dogs share the same environment as humans and spontaneously develop the same diseases, particularly genetic diseases."

Translating findings from one field to another might mean veterinarians are able to find treatments, maybe even cures, for some of the diseases that still plague humanity.

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1. Kirkby Shaw, K, et al. Vet Med Sci. 2016;2:3-9.

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