NEURODEGENERATION BUT NO ALZHEIMER’S DISEASE HALLMARKS IN CATS WITH NEURONAL CELL CYCLE REENTRY

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Over the last 2 decades, the cell cycle-associated neuronal death hypothesis has been proposed as a common step for most neurodegenerative diseases in humans, notably for the Alzheimer’s disease. Cats infected by the feline panleukopenia virus (FPV) may display viral proteins in Purkinje cells and/or in brainstem and thalamic neurons. This implies a neuronal cell cycle reentry, and indeed, cell cycle S phase markers have been evidenced in neuron nuclei in the affected areas. FPV-infected cats provide a naturally occurring animal model to stress the relationship between cell cycle reentry and neurodegenerative diseases such as Alzheimer’s disease.

We retrospectively looked for Aβ deposits by Aβ (anti-1-40 and anti-1-42) immunostaining, dense-core plaque formation (Congo red staining) and phosphorylated TAU immunoreactivity (anti-AT8 and anti-PHF1) in the brain of 14 cats (6-week to 208-week-old) with PCR-confirmed brain FPV infection. We also looked for neuronal structural changes (anti-calbindin, anti-ubiquitin, anti-synaptophysin) and gliosis (anti-GFAP) using immunohistochemistry.

Neither Aβ immunoreactivity, nor birefringence on Congo red stained sections, nor phosphorylated TAU could be evidenced. However, loss of Purkinje cell dendritic spines, activated astrocytes, and loss of synapses could be observed in the affected areas.

Among the enrolled cats with perinatal infection, one was four years old, leaving a long period for altered proteins to accumulate. Nevertheless, this study did not support the hypothesis of neuronal cell cycle reentry per se being a trigger for development of neuropathological lesions of Alzheimer’s disease. The neurodegenerative changes observed may be attributed to the action of the virus and/or the inflammation.

INCREASED PREVALENCE OF CANINE COGNITIVE DYSFUNCTION IN DOGS WITH EPILEPSY

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People with epilepsy are at an elevated risk of dementia, with evidence for a bidirectional relationship between the two disorders. Patients with epilepsy show a significantly higher rate of dementia and Alzheimer’s disease compared with controls, and vice versa. Canine cognitive dysfunction (CCD) or ‘canine dementia’ is a neurobehavioral syndrome in aged dogs. The aim of this study was to investigate whether dogs with idiopathic epilepsy (IE), when accounting for age, exhibit increased levels of CCD compared to control dogs.

An online cross-sectional study was conducted, resulting in a sample of 4051 dogs, of which 286 dogs had been diagnosed with IE. Owners completed the Canine Cognitive Dysfunction Rating (CCDR) scale, a validated tool measuring cognitive impairment including deficits in learning, memory and spatial awareness. Owners reported their dog’s seizure history, with dogs classified as affected by IE if they met the International Veterinary Epilepsy Task Force tier I diagnostic criteria.

Dogs with IE had significantly higher CCDR scores than control dogs and were significantly more likely to score above the CCDR threshold for diagnosis of CCD (3.8% vs. 1.4%). In a generalised linear model, factors significantly associated with CCDR were epilepsy diagnosis, age (months), weight (kg) and training history.

These findings are the first to demonstrate an increased risk of CCD in canine epilepsy patients. It is possible that this effect may result from neurodevelopmental abnormalities, or seizure-induced damage to hippocampal circuitry. Further studies detailing the nature, progression and mechanism of cognitive impairment in dogs with epilepsy are required.

MYOCLONUS IN OLDER CAVALIER KING CHARLES SPANIEL – CLINICAL AND HISTOPATHOLOGICAL FINDINGS

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Myoclonus has been reported in the Cavalier King Charles spaniel (CKCS) but its characteristics are not well described. Medical records were searched for CKCS observed to have myoclonic jerks. 40 dogs were identified (25 female). Most had been referred originally for another disease. The event was described as rapid eyelid blinking with head nodding / shuddering and variable extension down the limbs that could result in falling or stumbling. The movement lasted seconds, had no obvious trigger, was most likely when stationary in a sternal or sitting position and did not appear associated with loss of consciousness. Multiple daily episodes were seen and increased in frequency and intensity with time. The median age of onset was 9 years (interquartile range 7-10 years). 29 of 40 CKCS had brain and spinal MRI. All had chiari-like malformation, 23 of 29 had ventriculomegaly and 19 of 29 had syringomyelia. 11 of 40 dogs had epilepsy (generalised tonic clonic seizures) or other paroxysmal event (episodic falling genetic clear). Age of onset of seizures for 8 dogs with epilepsy was +/- 1 year from onset of the myoclonus (median 7 years old). 3 owners reported signs suggesting progressive cognitive dysfunction. Histopathology of the brains from 4 CKCS were unremarkable. Anecdotally myoclonus was improved with levetiracetam and possibly corticosteroids.

Myoclonic jerks are common in older CKCS and should not be assumed to be a consequence of syringomyelia. More evidence is required as to whether there is an association with generalised tonic-clonic seizures and mental deterioration.

O4

3D TEXTURE ANALYSIS OF MAGNETIC RESONANCE IMAGES TO DETERMINE HISTOPATHOLOGICAL GRADING OF CANINE MENINGIOMAS
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Texture analysis of medical images is an analysis technique that calculates several parameters that describe the homogeneity of the signal within a given region of interest (ROI). The aim of this study is to test the possibility to determine the histopathological grading of canine meningiomas by means of 3D texture analysis of Magnetic Resonance (MR) images. Forty cases of histologically confirmed intracranial meningiomas were selected in the databases of Dick White Referrals (20) and Portoni Rossi Veterinary Hospital (20). Histopathological grading was performed according to the World Health Organization (WHO) guidelines. Seventeen lesions were histologically classified as WHO grade I, fifteen were graded as II and four were graded as III. Four lesions were purely cystic and were discarded from the analysis. The images were imported in a DICOM format in the freeware software MaZda. 3D reconstructions were performed on post contrast T1 images using the 3D module embedded in MaZda. A ROI was manually placed on the lesion and texture analysis was performed. The most discriminative texture parameters were selected using an appropriate feature reduction method and imported in the B11 statistical module embedded in MaZda. Using a linear discriminant analysis, the software was able to determine the correct histopathological grading of 100% of the lesions. 3D texture analysis of MR images is possibly a very useful tool to determine the histopathological grading of canine meningiomas. Further studies involving a larger number of cases are needed to develop a clinically usable test.

O5

ROLE OF CAMPYLOBACTER INFECTION IN ACUTE POLYRADICULONEURITIS IN DOGS
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Acute or idiopathic polyradiculoneuritis (APN) is characterised by an acute onset of lower motor neuron signs and is the most commonly recognized peripheral neuropathy in dogs. APN is considered to be the canine equivalent of the human peripheral nerve disorder Guillain-Barré syndrome (GBS) in which the bacterial pathogen Campylobacter is now considered as a major triggering agent. A prospective cohort study was designed to compare the incidence of Campylobacter infection in 47 healthy dogs and 27 dogs suffering from APN. Epidemiology and potential risks factors were also investigated and compared in both groups. Faecal samples were collected from each enrolled animal to perform direct culture, DNA extraction and polymerase chain reaction (PCR) for detection of Campylobacter. In some of the positive cases, species identification was performed by sequence analysis of the amplicon. Faecal samples were positive to Campylobacter spp. in 48.15% of the APN cases compared with 23.4% cases in the control group. The most common Campylobacter species found was C. upsaliensis (60% in the APN group and 80% in the control group) followed by C. jejuni. Almost all of the APN cases (96.3%) were fed with raw chicken, mainly chicken necks and wings. The only APN case that was not fed with raw chicken had daily contact with chickens in his living area. In conclusion, results of this study suggest that raw poultry in diet is a significant risk factor and Campylobacter infection should be considered as a major trigger of APN in dogs.

O6

REM-ASSOCIATED SLEEP DISORDER FOLLOWING GENERALISED TETANUS IN DOGS
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During the REM phase of sleep, major limb muscles are atonic. Breakthrough activity can result in twitching, limb movements or vocalisation associated with “dream” activity. Rarely this breakthrough activity...
is excessive and may be confused with epileptic seizure activity. Previously, a frequency of increased sleep movements post-tetanus was reported in 3/38 (7.9%) dogs. The medical records of 61 dogs diagnosed with generalised tetanus were reviewed. Eleven dogs (18%) did not survive to discharge. Twenty-one of 50 surviving dogs (42%) exhibited increased dream activity compared to pre-tetanus with increased vocalisation (12/19; 63%), running movements (17/19; 89%) and twitching (16/19; 84%). Of these, 83%, 88% and 63% respectively had not exhibited these behaviours during sleep prior to development of tetanus. Owners rated post-tetanus dream activity as moderate or severe in 12/17 (71%) dogs with 6/17 (35%) frequently feeling the need to wake their dog. Two dogs bit a human during an episode with another falling off furniture. Onset of the sleep disorder occurred prior to discharge in 5/21 (24%) dogs, with onset within the first two weeks of discharge in 12/13 (92%) dogs. The severity and frequency either improved (7/13 (54%) and 8/15 (53%) respectively) or was unchanged (6/13 (46%) and 7/15 (47%) respectively) in all dogs with complete resolution in 6/14 (43%) dogs within six months. REM-associated sleep disorder has many similarities to epileptic seizure activity. This disorder is seen in almost half of dogs that survive tetanus and should not be confused with epileptic seizures.

Burkitt JM et al. Risk factors associated with outcome in dogs with tetanus and should not be confused with epileptic seizures. 

O7 PILOT STUDY TO ASSESS EXPRESSION OF 14 MICRORNAS IN CEREBROSPINAL FLUID OF DOGS WITH NEUROLOGICAL DISORDERS

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MicroRNA (miRNA) is a class of non-coding RNA that regulates gene expression at a post-transcriptional level. miRNAs are emerging as early prognostic and confirmatory biomarkers of disease. In human medicine, expression of miRNAs in cerebrospinal fluid (CSF) has been investigated in various neoplastic, inflammatory and degenerative conditions affecting the central nervous system (CNS). The objective of this study was to investigate the expression of a panel of miRNAs in a cohort of dogs with a variety of neurological disorders. We investigated the expression of 14 microRNAs (miR-10b-5p, miR-19b, miR-21-5p, miR-30b-5p, miR-103a-3p, miR-124, miR-128-3p, miR-146, miR-155-5p, miR-181c, miR-210, miR-194-5p, miR-633, and miR-922) in cisternal CSF samples of 20 dogs examined at the Hospital for Small Animals of the University of Edinburgh. Clinical history, neurological examination and a combination of diagnostic procedures including MRI, CSF analysis and histopathology were used to reach a diagnosis. The samples were assigned to 5 groups based on the diagnosis; inflammatory conditions (2 dogs with steroid responsive meningitis-arteritis, 1 suspected necrotizing meningoencephalitis, 1 polyradiculoneuritis), neoplastic conditions (2 with suspected histiocytic sarcoma and 2 gliomas), canine degenerative myelopathy (2), idiopathic epilepsy (6) and 4 dogs with neurological signs not associated with CNS disease (2 idiopathic vestibular disease, 1 otitis, 1 soft tissue sarcoma). Eight of the 14 microRNAs (miR-10b-5p, miR-19b, miR-21-5p, miR-30b-5p, miR-103a-3p, miR-124, miR-128-3p, miR-146) showed a consistent expression among the five groups. In particular, miR-21-5p and miR-146 appeared to be upregulated in dogs with neoplastic conditions compared with dogs in other groups.

O8 MAPPING MORPHOLOGICAL CHANGE IN CAVALIER KING CHARLES SPANIELS WITH SYRINGOMYELIA USING NOVEL MACHINE LEARNING APPROACH

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Syringomyelia (SM) is characterised by fluid filled cavities in the spinal cord. The cavalier King Charles spaniel (CKCS) is predisposed and associated with more extreme Chiari-like malformation (CM). Traits that increase risk of SM in the CKCS include rostral displacement of the atlas and axis, sphen-occipital synchondrosis angulation, reduced occipital crest, increased cervical flexure and odontoid angulation. To better understand morphological change in SM a novel machine learning approach was developed which removes observer bias. 24 CKCS were grouped into SM absent (16 SMO) and clinical SM (8 SM2), based on clinical history and MRI. CKCS with CM associated pain (SMO) were explicitly excluded. A midline sagittal MRI of the head and neck of a typical CKCS with no SM was chosen as a reference. The remaining 23 MR images were mapped to the reference image using DEMONS (non-linear) image registration, producing a 2D deformation map for each case. Pixel direction and magnitude of the mapping deformation were used as candidate features for automatically identifying SM2 morphology from normal SMO using a Support Vector Machine classifier. This produced > 95% sensitivity simultaneously with >92% specificity. The classifier results were mapped back to the reference image, which demonstrated morphological change in the soft palate. The method can be applied on a variety of different neuro-pathologies and breeds to facilitate diagnosis and understand the location of abnormal morphology. The findings from this study will be used to direct future work in improving the diagnosis and understanding the pathogenesis of the condition.

O9 ACCURACY OF A NEW MRI-BASED PATIENT-INDIVIDUAL STEREOTACTIC BRAIN BIOPSY DEVICE IN THE DOG

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Brain biopsy of intracranial lesions is often necessary in order to determine specific therapy. Complexity and vulnerability of the brain, however, require high accuracy during needle placement. The aim of the study was to determine the precision of the new MRI-based patient-individual stereotactic brain biopsy device in the dog.

10 canine cadavers with 20 target points were used to investigate the accuracy. First specific bone anchors and MRI-markers were fixed on dog cadaver heads. Afterwards CT and MRI examinations of the heads were performed. Based on MR-images, patient-individual frames to reach defined target points were constructed and printed with 3D-printer. Two target points were marked in each brain MRI: left caudate nucleus and right piriform lobe. Also trajectories for biopsy needle were plotted on MR-images. The needle was to enter the brain in a gyrus and not to penetrate the ventricles. The frames were fixed on the bone anchors with specific screws. Minimal-invasive access to the brain was created with help of the tool guide. The biopsy needle was placed along pre-planned trajectories. Afterwards CT examinations of the heads with biopsy needles placed in each target point were performed. Needle placement error was determined after fusion of MRI and CT examinations. Error was defined in mm as deviation between achieved and anticipated target points.

The deviation of 20 target points revealed mean needle placement error of 0.58 mm (SD 0.34). Therefore, MRI-based patient-individual stereotactic brain biopsy device reaches higher accuracy than most other described brain biopsy systems.

O10

GREY MATTER VOLUME IN HEALTHY AND EPILEPTIC BEAGLES USING VOXEL-BASED MORPHOMETRY – A PILOT STUDY

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Epileptic Beagles displayed reduced GMV in olfactory bulb and cortex, especially in temporal and occipital lobes. Beagles with IE showed decreased GMV in olfactory bulb, temporal lobe and cingulate gyrus. Beagles with SE mild GMV reduction in temporal lobe (p < 0.05 FWE). These results suggest that, as reported in epileptic humans, focal reduction in GMV also occurs in epileptic dogs.

O11

CONGENITAL VERTEBRAL MALFORMATIONS IN PUGS: ARE WE SELECTING AGAINST EVOLUTION?

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The number of cervical vertebrae in mammals is highly conserved at seven; and homeotic transformations of cervical into thoracic vertebrae are rare in most species. Hox genes are behind this evolutionary conservation because their abnormal expression leads to changes in the number of cervical vertebrae, but also other congenital malformations, neural problems, increased susceptibility to early childhood cancer and stillbirths.

The aims of this retrospective observational study were to describe the frequency and type of C7 homeotic transformation in Pugs, and their association with the presence of other vertebral malformations. Computed tomographic studies of 99 Pugs, 53 whole body and 46 cervico-thoracic vertebral column were reviewed. All dogs were neurologically normal. 49.5% showed C7 homeotic transformation. The changes were unilateral in 32.7% of the cases with the left side affected more frequently (75%). 21.8% showed a small hypertrophic transverse process, 19.2% a large hypertrophic transverse process, 33.3% a small rudimentary rib and 25.7% a large normal rib. At least 83.7% of the cases with C7 homeotic transformation had an abnormal vertebral formula or presence of thoraco-lumbar and/or lumbo-sacral homeotic transformations. We additionally reviewed orthogonal cervico-thoracic vertebral column radiographs of 35 neurologically affected Pugs with clinically relevant thoracic vertebral body malformations and 35.3% showed C7 homeotic transformation. C7 homeotic transformation is common in Pugs and can be associated with other vertebral malformations. Further studies looking at the role of Hox genes in Pugs with vertebral malformations are warranted.

O12

TRANSTHORACIC APPROACH TO THE CANINE THORACIC SPINE: AN ANATOMICAL DESCRIPTION

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In veterinary medicine, surgical management of diseases affecting upper thoracic spine is traditionally performed by means of dorsal approach. However, this approach gives limited access to vertebral bodies, which is necessary for proper implant placement when spinal realignment and/or stabilization are required. The purpose of this study
is to describe a lateral transthoracic approach to T1-T11 vertebral bodies detailing specific neurovascular structures at risk during the procedure (both left and right sides). We also describe implantation corridors in canine T1-T11 vertebral bodies using computed tomography. Vascular anatomy of the thoracic spine was visualized in small and large breed non-braquicephalic canine cadaveric models after liquid colored latex injection. Red latex was injected in the common carotid artery after ligation of the abdominal aorta. Blue latex was injected in the jugular vein after ligation of the vena cava. Then, routine transthoracic approach and dissection was performed to identify relevant neurovascular structures. Afterwards, computed tomography of the spine model was performed to allow determination of safe implant corridors in T1-T10 vertebral bodies. T1-T4 vertebral bodies and their respective dorsal intervertebral arteries and veins were hidden by the longus colli muscles. On the right side, the presence of the azygos vein complicated visualization of vertebral bodies. The surgical technique described here is a relatively simple approach to the upper thoracic spine, allowing an excellent visualization of left side T4-T10 vertebral bodies. Although more challenging, left access to T1-T4 and right access to T1-T10 vertebral bodies, is also possible.

O13

A NOVEL SURGICAL SYSTEM FOR STABILISATION OF CONGENITAL THORACIC SPINAL MALFORMATIONS IN DOGS USING A CUSTOM MADE 3D-PRINTED TITANIUM PLATE AND DRILL GUIDE

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The aim of this study was to develop a novel surgical system for the stabilisation of congenital thoracic spinal malformation with the following objectives: i. titanium implants to facilitate postoperative MRI and avoid potential polymethylmethacrylate complications such as increased risk of infection, ii. easily removable implants to facilitate revision surgery, iii. optimal trajectories for the placement of screws, iv. ease of use and reduced surgical time compared to other techniques. The system utilises a custom-made 3D printed titanium plate and drill guide. CT scans of the vertebrae from four dogs with congenital thoracic spinal malformations and chronic paraparesis were exported into medical image processing software to produce virtual models of the plate and drill guide. The plate was electron beam melting (EBM) manufactured in Ti6Al4V titanium alloy, and was designed to stabilise at least five adjacent vertebrae by contouring the bones. The custom guide was stereolithography (SLA) manufactured in plastic polymer, and designed to drill pilot holes for 2.4 mm or 2.7 mm titanium screws to be inserted through the dorsal aspect of the transverse processes into the pedicles and vertebral bodies. 2.0 mm screws were incorporated into the dorsal spinous processes in later models. Postoperative CT was performed immediately after surgery and at approximately 6 weeks. All dogs improved in their ability to walk postoperatively and had a good outcome with no sign of implant migration. The system underwent several revisions during development to improve accuracy of pilot holes and the most recent version meets our objectives.

O14

SHORT AND LONG-TERM OUTCOME FOLLOWING SURGICAL TREATMENT OF THORACOLUMBAR SPINAL ARACHNOID DIVERTICULA IN PUGS

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More than 90 dogs including 26 pugs with spinal arachnoid diverticula (SAD) have been reported in the veterinary literature. Successful outcome following surgical management was reported in 66% of the cases. Authors’ experience and personal communications have raised concerns if this figure holds true in pugs. The goal of the present investigation was to describe clinical findings and short and long-term outcome in a population of 18 pugs with SAD. Eighteen pugs with thoracolumbar SAD following meningeal (dura mater and arachnoidea) resection surgery were retrospectively evaluated. Pugs were included if they had surgical/histological confirmation of thoracolumbar SAD with full clinical records and follow-up of at least 6 months following surgical management. Short-term outcome was considered at 6 months and long-term outcome – more than 1 year following surgery. Outcome was considered good if dogs improved motor and/or fecal/urine continence function and poor if both or one of these functions were worsened compared to the preoperative status. Male middle-aged and older pugs were predisposed to suffer from thoracolumbar SAD (mean age at presentation 7.4 years, 77.78% males). Short-term outcome was available in 18 dogs and was graded as good in 77.78% of patients. Long-term outcome was available in 15 patients and was graded as poor in 86.67% of dogs, with recurrence of clinical signs affecting 66.67%.

This study suggests that pugs with thoracolumbar SAD do not have a favourable long-term prognosis after surgical treatment for reasons yet to be explored.

O15

LATE ONSET RECURRENTNESS OF NEUROLOGICAL DEFICITS AFTER SURGERY FOR SPINAL ARACHNOID DIVERTICULA

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This case series describes the clinical presentation, magnetic resonance imaging (MRI) findings and outcome in 7 dogs and 1 cat with recurrence of neurological deficits after surgery for spinal arachnoid diverticula (SAD).

The medical records were searched retrospectively. Patients were included if they had an initial improvement but showed signs of deterioration at least 6 months after surgery for SAD and if they underwent repeat MRI. On repeat MRI, 3 cases showed clear regrowth of diverticulum, 2 cases showed mild to moderate dorsal compression at the previous laminectomy site (presumed to be the laminectomy membrane) and 3 cases
showed hemiation of the spinal cord through the laminectomy defect associated with a stellate appearance of the spinal cord with small multiloculated areas of dilation of the subarachnoid space. Half the cases underwent a second surgery and in those in which repeat MRI had revealed SAD recurrence, the clinical signs improved. The other four cases that were managed medically did not show significant improvement of the clinical signs and two of them deteriorated with time.

This case series shows that recurrence of neurological signs after surgery for SAD is not always secondary to diverticulum reformation. Therefore, performing advanced imaging is recommended to identify the cause of the deterioration and decide on the most suitable treatment options. To the authors' knowledge, this is the first case series reporting the repeat MRI findings in cases with late recurrence of neurological deficits after surgery for SAD.

**O16**

**ADMINISTRATION OF RECTAL LEVETIRACETAM (LEV) IN DOGS AFFECTED BY CLUSTER SEIZURES (CS) AND STATUS EPILEPTICUS (SE)**

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CS and SE are frequent reasons of presentation to Emergency Services. LEV has been increasingly used for seizures control in dogs. A previous study proved the achievement of sustained serum drug concentrations after the administration per rectum of LEV in healthy dogs. The purpose of the study was to determine pharmacokinetics of rectally administered LEV in dogs with CS or SE and potentially in treatment with other anti-epileptic drugs. The secondary aim of this study was to obtain preliminary results on its clinical efficacy.

Eight client-owned dogs were enrolled. Plasma concentrations of LEV (measured at 0, 30, 60, 90, 120, 180, 240, 360, 720 and 1440 minutes after drug administration) reached the target range at the second experimental point (T1 - 30 min) in all but 1 patient. At T1 mean concentration was 29.72 ± 16.03 μg/ml. Plasma concentrations remained above the minimum target range (5-40 μg/ml) in all patients until 240 min and in 7/8 patients until 360 min. In 2 patients already administered with phenobarbital (PB) for more than 6 months lower peak concentrations and more rapid clearance of LEV were observed. 75% Of patients didn't experience any seizures in the 24h after the hospitalization.

The results support the use of rectally administered LEV in the management of CS and SE. We hypnotize that the lower concentrations of LEV observed in 2 patients were due to the concurrent administration of PB and to its well known effect of induction of drug-metabolizing enzymes.

**O17**

**ABSENCE SEIZURES IN A RHODESIAN RIDGEBACK WITH JUVENILE MYCLONIC EPILEPSY**

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We recently described a new myoclonic epilepsy syndrome in Rhodesian Ridgebacks characterized by generalized myoclonic seizures with a juvenile age of onset. About one third developed generalized tonic-clonic seizures. Genetic analyses identified a fully penetrant recessive deletion mutation in the DIRAS1 gene with a proposed role in cholinergic neurotransmission.

An eight-month-old female intact Rhodesian Ridgeback was presented for myoclonic seizures and brief staring episodes without visible movement. Genetic testing and one-hour unsedated wireless video-EEG before and after treatment start including photic stimulation were performed. Owners were asked to keep a seizure-diary. Age of onset of both myoclonic seizures and episodes of unresponsiveness was 10 weeks. Neurologic and blood examination were unremarkable. Testing for the DIRAS1 variant revealed a homozygous mutant genotype. Video-EEG demonstrated abundant myoclonic seizures associated with generalized 4-5 Hz spike-wave-complexes, occasional single spikes, and 4-5 Hz slowing. The dog showed also multiple 4 Hz spike-and-wave absence seizures. No photosensitivity was detected. Treatment with levetiracetam was initiated. Owners reported a great improvement from multiple vigorous myoclonic seizures per day to one mild myoclonic twitch per week and a complete cessation of absence seizures. Follow-up EEG two months after treatment start revealed only very few and mild myoclonic seizures and no absence seizures.

Absence seizures represent another seizure-type in juvenile myoclonic epilepsy in Rhodesian Ridgebacks. Our observation strengthens the parallels between juvenile myoclonic epilepsy in Rhodesian Ridgebacks and human juvenile myoclonic epilepsy and its potential to serve as a translational model for the investigation of clinical, therapeutic and genetic aspects.

**O18**

**FIRST-LINE MANAGEMENT OF CANINE STATUS EPILEPTICUS: NEW EVIDENCE AND UPDATE**

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Emergency epileptic seizures, including status epilepticus and severe cluster seizures, commonly occur in dogs. Status epilepticus is a life-threatening condition in dogs and requires immediate and effective management in order to avoid permanent damage to the brain or other
severe systemic complications. Rectal diazepam (R-DZP) is commonly used when there is no intravenous access to control emergency seizures prior to administration of further anti-epileptic drugs. However, the evidence behind its efficacy in dogs is controversial and weak.

A multicenter trial was set-up to assess the efficacy of intranasal midazolam (IN-MDZ) (0.2 mg/kg), administered via a mucosal atomization device, as an alternative to R-DZP (1 mg/kg), as a first-line management option for status epilepticus. Dogs with idiopathic or structural epilepsy were included and randomly assigned to one of the two groups. Drug effectiveness was defined as seizure cessation within 5 minutes.

Twenty dogs were included in the IN-MDZ group and 15 dogs in the R-DZP group. The results showed that IN-MDZ and R-DZP were effective to terminate status epilepticus in 70% and 20% of cases respectively. When compared, IN-MDZ was significantly more effective (P=0.0059). Sedation and ataxia were observed in all dogs.

In conclusion, IN-MDZ is an effective, rapid and safe first-line medication for controlling canine status epilepticus. In this study IN-MDZ showed superior effectiveness in seizure cessation in comparison to R-DZP. This study also suggests that IN-MDZ might be a valuable or even superior alternative to R-DZP for the management of emergency seizures at home prior to hospital admission.

O19

COMPARISON OF THE EEG RECORDING AND HIPOCCAMPAL VOLUME IN CANINE IDIOPATHIC EPILEPSY

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Hippocampal atrophy observed in canine idiopathic epilepsy (IE) is hypothesised to reflect hippocampal sclerosis in human mesial temporal lobe epilepsy (mesial TLE), although TLE is not diagnosed in dogs. EEG in mesial TLE reveals paroxysmal discharges (PD) correlated with the hippocampal sclerosis side. The aim of the study was to analyse the relation of the hippocampal MR volumetric images with PD in EEG recordnings in IE and normal dogs.

The study included 33 dogs, in two groups: IE, dogs with confirmed IE (n=20) and N (normal dogs, n=13). The side of the PD localization was determined in all EEG recordings. The left and right hippocampus was measured (cm³) using MR slice volumetric analysis (semi-automatic method, OsiriX 8, Switzerland, T2W transverse, TR/TE 6032/100ms, FOV 140mm). The hippocampal volume was compared using the asymmetric ratio reported elsewhere.

The hippocampal asymmetric ratio in the IE group was significantly larger than in the N group (p<0.01). In the IE group, 60% (12/20) of the dogs had a unilateral decrease in the hippocampal volume with a 6% cut-off threshold asymmetric ratio. Of those animals, 33.3% (4/12) had PD in the temporal leads, reflecting pathological temporal lobe activity. In 75% (3/4) of those dogs the PD correlated with a decreased hippocampal volume on the same side.

The results indicate an association between the presence of PD and a decrease in the unilateral hippocampal volume in some cases of canine idiopathic epilepsy, reflecting features of human mesial TLE. Further analysis on a larger group is warranted.

O20

QUANTITATIVE EVALUATION OF CANINE PELVIC LIMB ATAXIA USING A WIRELESS ACCELEROMETER SYSTEM

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An inexpensive and easily available method for objectively identifying and grading pelvic limb ataxia in dogs in the clinical setting is urgently needed. An alternative approach to conventional gait analysis techniques is the use of accelerometers attached to the body. They have the advantages of being low cost and allowing non-restrictive evaluation in a normal environment.

The purpose of this prospective study was to perform gait analysis using a lumbar accelerometer in dogs with pelvic limb ataxia and healthy controls; and assess whether the data obtained could be used to differentiate these 2 groups.

Fifty-three dogs (21 healthy controls and 32 dogs with pelvic limb ataxia) of different size breeds were included. All dogs were walked in a straight line, on a non-slippery surface, at a slow walking pace for 50 meters using a short lead. Acceleration signals were measured using a wireless tri-axial accelerometer that was secured with an elastic band at the level of the fifth lumbar vertebra. The average and coefficient of variation of the peak-to-peak amplitude was calculated for each acceleration component (x: Cranio-caudal; y: Latero-lateral and z: Dorso-ventral). Mann-Whitney test was used to compare groups (p<0.05).

A significant difference between affected and control dogs was identified in the coefficient of variation of the x axis (p<0.0001).

The results of the present study suggest that the coefficient of variation of the cranio-caudal axis could represent an objective measure of pelvic limb ataxia in dogs. Further longitudinal studies in a larger number of cases are indicated.

O21

THE SERO-PREVALENCE OF ANTI-GLYCOLIPID ANTIBODIES IN ACUTE CANINE POLYRADICULONEURITIS AND OTHER PERIPHERAL AND CRANIAL NEUROPATHIES, NEUROMUSCULAR DISORDERS AND MYOPATHIES

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ventral plate fixation in VFLs of cats. X-rays, CT and 3D reconstructions were used for preoperative planning. Median laparotomies was performed, fracture/luxation site was reached easily following retraction of abdominal organs and dissection of caudal aorta. Mini dcp or locking plates and preoperatively measured screws were used for stabilization.

In this study, it was seen that ventral stabilization of VFLs were giving great stability to fracture/luxation site. Although it is looking as a challenging approach, it was found that ventral abdominal approach to this region was simple with careful dissection and protection of aorta. Reduction of the fracture/luxation was found easy with direct manipulation of vertebral bodies, and correct preoperative screw length determination and careful drilling is essential but with proper technique there is less risk of iatrogenic neurological damage.

O23

RECONSTRUCTIVE CRANIOPLASTY OF SKULL DEFECTS WITH TITANIUM MESH AND POLYMETHYL METHACRYLATE OR THE LOW PROFILE NEURO SYSTEM®

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Craniplasty is an important step to protect the brain after removal of large tumors or repair of extensive fractures following head trauma. The goal of this study is to compare outcome and complication rate of cranioplasty performed with either a combination of a flexible titanium mesh and polymethylmethacrylate (PMMA) or skull reconstruction with the DePuy Synthes Low Profile Neuro System®. In the titanium-PMMA group a flexible 0.2 mm titanium mesh was trimmed to the size of the skull defect and covered with PMMA to reach sufficient stability. In the Low Profile Neuro System® group rigid mesh or bars and self-tapping screws were used to close the bone defect.

Nine dogs and four cats were enrolled. Median age was 10 years. The causes for craniectomy included osteosarcoma (2/13), multilobular osteochondroma (4/13), meningioma (4/13), fibrosarcoma (1/13), lymphoma (1/13), and trauma (1/13).

In seven dogs and one cat the titanium-PMMA combination was used to cover the frontal sinus (n=2) and lateral skull defects (n=6). Three dogs underwent radiation therapy. Median follow-up time was 12 months. Complications included infection (n=1) and implant migration (n=1). In three dogs, two cats, and two additional dogs from the titanium-PMMA group the Low Profile Neuro System® was used to close the frontal sinus (n=4) and lateral (n=3) defects. Three dogs had radiation therapy. Median observation time was 14 months. Complications included infection (n=1).

Both techniques provide a good long-term outcome with a low complication rate. The Low Profile Neuro System® showed more versatility but is more expensive.

O24

A RETROSPECTIVE REVIEW OF 10 CASES WITH FOLLOW UP OF LUXATION ATLANTOAXIAL USING 2.0 MM PAX LOCKING BUTTERFLY TITANIUM PLATE FOR VENTRAL FIXATION OF ATLANTOAXIAL INSTABILITY IN DOGS

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Atlantoaxial (AA) instability or luxation is in general a congenital or developmental disorder that typically occurs in young and toy breed dogs. Several techniques for surgical treatment in dogs with atlantoaxial luxation have been reported. The use of butterfly locking plate for stabilisation of AA luxation has been reported in 3 dogs. The purpose of this study was to evaluate the applicability, long-term outcome, and major complications following ventral stabilisation in dogs with AA instability using a butterfly titanium locking plate (BTLP).

Medical records of dogs diagnosed with AA luxation were retrospectively reviewed. Inclusion criteria included: a) AA luxation confirmed by XR, CT or MRI, b) ventral stabilisation using BTLP, c) neurological status available at admission, discharge, postoperative (1-4 weeks) and > 6 months follow up.

The atlantoaxial joint of each dog was surgically stabilized through a ventral approach using a titanium 2.0 mm locking butterfly plate. Ten dogs were included. One dog died during the perioperative period. Nine of ten dogs (90%) improved neurologically after surgery (1-4 weeks). After 6 months, re-examination or telephone follow-up results were; 7/9 (80%) of dogs did not present neurological deficits and 2/9 (20%) were ambulatory presenting some residual deficits but improved neurologically. There were no long-term complications resulting in serious neurologic deterioration or that required additional surgery.

Adequate stabilization of the vertebrae and improved neurologic status were achieved in the majority of dogs of this study using ventral stabilization technique with BTLP. This technique is another effective treatment for AA luxation in dogs.

**O25**

**LATERAL FORAMINOTOMY AS TREATMENT OF LUMBOSACRAL FORAMINAL STENOSIS IN FORTY-FIVE DOGS WITH DEGENERATIVE LUMBOSACRAL STENOSIS**

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Degenerative Lumbosacral Stenosis (DLSS) is an acquired multifactorial condition affecting mainly geriatric dogs, with foraminal stenosis being a frequent finding. Lateral lumbosacral foramotomy has been described as a surgical alternative and adjunct to dorsal decompression. A retrospective analysis was undertaken of 45 dogs that had undergone lateral lumbosacral foramotomy. Thirty-four cases were bilateral and a total 30 cases were combined with dorsal laminectomy. None of the cases underwent concurrent discectomy.

All dogs had demonstrable foraminal impingement on MRI imaging and consistent clinical signs. Three dogs had previous surgical therapy via dorsal laminectomy with lateral extension. No major intra or postsurgical complications were identified. All patients showed improvement at short-term follow-up and long-term outcome revealed complete resolution of clinical signs in 97.1% of cases. Recurrence of clinical signs was seen in 4 dogs but was not associated with recurrence of foraminal stenosis on repeat MRI imaging, and all dogs responded well to subsequent treatment.

This study confirms that lateral foramotomy is a safe technique producing excellent short and long-term results. Repeat imaging did not demonstrate secondary development of spondylosis or further foraminal stenosis. Lateral foramotomy is a useful therapy in cases of DLSS with foraminal stenosis.

**FLASH POSTER ABSTRACTS**

**FP1**

**CEREBROSPINAL FLUID ANALYSIS USING THE IDEXX PROCYTE DX® HAEMATOLOGY ANALYSER.**

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Cerebrospinal fluid (CSF) analysis is widely performed in the diagnostic work-up for neurological disease. If specialist laboratory facilities are not available on-site, then these results may not be available for 12-48 hours dependent on the time of sampling. The aim of this pilot study was to evaluate the use of an Idexx ProCyte Dx® haematology analyser for CSF analysis pending the results of external laboratory assessment.

CSF was collected prospectively from 62 dogs and 2 cats during routine diagnostic investigations for neurological disease. An aliquot of each sample was run in-house using a ProCyte Dx® and the remainder sent for external laboratory assessment. A pleocytosis was defined as an external laboratory nucleated cell count (NCC) >5 cells/μL.

Of the 38 samples with a NCC of <5 cells/μL, the ProCyte demonstrated 0 cells/μL in 27 cases (71%), 10 cells/μL (the minimum recordable cell count for this machine) in 10 cases and 30 cells/μL in one case.

Of the 26 samples with a NCC >5 cells/μL, the ProCyte demonstrated ≥10 cells/μL in 24 cases (92%), with in-house cell counts being a mean of 1.52 times higher than the external NCC. Qualitative assessment of the ProCyte dot plots or differential cell counts appeared to correlate well with the external laboratory differential cell counts.

In-house CSF analysis using the Idexx ProCyte Dx® should not currently be used as an alternative to validated external laboratory analysis, but may be of use to support a clinical suspicion in an emergency or out-of-hours setting pending these results.

**FP2**

**IMMUNOHISTOCHEMICAL EXPRESSION OF CYCLOOXYGENASE-2 (COX-2) IN 15 FELINE MENINGIOMAS**

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Meningioma is the most common primary brain tumor in cats and less frequently affects the spinal cord. Cycloxygenase-2 (COX-2) expression has been described in human and canine meningiomas, but there is no information regarding feline meningiomas.
This study was aimed to investigate COX-2 expression in feline meningiomas, and the possible association between COX-2 immunoreactivity and tumor grade. Fifteen samples of histologically confirmed meningiomas were subjected to a standard, two layered, indirect immunohistochemical method using a rabbit polyclonal anti-murine COX-2 antibody. Negative control sections were prepared for each meningioma sample using normal goat serum instead of the primary antiserum. Sections of feline mammary adenocarcinoma were used as positive controls. Following immunolabeling, the neoplastic cells exhibiting positive COX-2 expression were graded according to staining intensity and distribution. The study included 8 low-grade (WHO Grade I) and 7 high-grade (WHO Grade II) meningiomas. All tumors (15/15) were immunoreactive to COX-2. The expression of COX-2 was not significantly correlated with WHO Grade. Interestingly, COX-2 expression was significantly associated with the presence of necrosis. Our study suggests that there are no differences in patterns of COX-2 immunoreactivity between WHO Grade I and Grade II meningiomas in cats, as it happens in dogs. However, the association of COX-2 and necrosis points to a potential area for therapeutic intervention with selective COX-2 inhibitors.

**FP3**

**PLASMA MICRORNAS FOR DIAGNOSTIC BIOMARKERS OF CANINE DEGENERATIVE MYELOPATHY**

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Canine degenerative myelopathy (DM) is a progressive neurodegenerative disease frequently found in Pembroke Welsh Corgi (PWC) dogs in Japan. Most DM-affected dogs are homozygous for the mutant superoxide dismutase 1 (SOD1) allele; however, the genetic screening for the SOD1 mutation does not entirely detect the symptomatic dogs. To identify novel biomarkers for DM, we investigated the profiles of plasma microRNA (miRNA) in PWCs with DM and healthy controls. First, we quantified the plasma levels of 277 miRNAs by using RT-qPCR array in PWCs with DM (N=4) and healthy PWCs (N=4). Second, several miRNAs were selected as candidates based on the Mann-Whitney U test and the subsequent pathway analysis that assessed the functional roles of the dysregulated miRNAs. Finally, receiver operating characteristic (ROC) curve analysis was performed to evaluate the diagnostic accuracy of the selected miRNAs. All procedures were performed in accordance with the guidelines regulating animal use and ethics at Gifu University. Twelve miRNAs were up-regulated, and eight miRNAs were down-regulated in the plasma of DM PWCs. The pathway analysis identified three miRNAs, cfa-miR-26b, cfa-miR-181a and cfa-miR-196a, that potentially regulate several genes associated with SOD1. Cfa-miR-26b had the largest area under the ROC curve in distinguishing DM PWCs from healthy PWCs. These results suggest that plasma cfa-miR-26b is a potential diagnostic biomarker for DM.

**FP4**

**PULSED ELECTROMAGNETIC FIELDS AND POST-OPERATIVE PAIN IN DOGS WITH ACUTE THORACOLUMBAR INTERVERTEBRAL DISC HERNIATION**

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Thoracolumbar intervertebral disc herniation (TL-IVDH) is a common cause of spinal cord injury in dogs and severe injuries are treated by surgical decompression. Pulsed electromagnetic fields (PEMF) have shown efficacy at reducing post-operative pain in people. The aim of this study was to compare the effect of PEMF on post-operative pain, quantified by paraspinal sensory thresholds (MST), following hemilaminectomy in dogs with TL-IVDH. We hypothesized that MST would be significantly higher in dogs receiving PEMF. This randomized, placebo-controlled, blinded, prospective clinical trial included paraplegic, pain perception negative dogs that underwent hemilaminectomy for acute TL-IVDH. Dogs were randomized to receive PEMF (active coil), or placebo, (inactive coil). Treatment started immediately after diagnosis and continued for 2 weeks. Mechanical thresholds were measured by algometer at the surgical site and a control site on days 3, 7, 14 and 42 postoperatively and MSTs were compared between groups using repeated-measures ANOVA, allowing for effects of group and day. Sixteen dogs (8 per group) were recruited. There was no significant difference in control site MST. Injury site MST did not differ between groups at the start of the study but started to diverge at 14 days and by 42 days the mean MST values of treatment and placebo group were 9.13lbs +/- 1.94 and 7.15lbs +/- 2.13 respectively and there was a significant difference between groups (p=0.031). We conclude that PEMF may reduce post-operative pain and/or neuropathic pain in the long term in dogs following hemilaminectomy due to acute TL-IVDH.

**FP5**

**CONSTRICTIVE MENCEGEAL FIBROSIS - A RARE BUT SERIOUS COMPLICATION OF VENTRICULO-PERITONEAL SHUNTING**

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Introduced in 1980s, ventriculo-peritoneal shunting (VPS) resembles a neurosurgical standard treatment of canine hypertensive hydrocephalus. However, the procedure bears a considerable risk of device failure, due to displacement, obstruction or overshunting, and of postoperative morbidities due to infection, seizures and haemorrhage. The case reported herein resembles a hitherto unrecognised VPS complication in dogs.
A 7-week-old, female wire-haired dachshund was presented with progressive forebrain signs including mental retardation and exotropia. MRI showed severe enlargement of lateral ventricles with significant forebrain atrophy and sulcal narrowing. An obstruction of CSF pathways was not seen. The diagnosis of hypertensive biventricular hydrocephalus was made and the dog was subjected to left-sided VPS implantation. Correct placement was confirmed postoperatively via diagnostic imaging.

After surgery, the neurological state improved immediately apart from persistent central visual deficits. After 12 weeks, the dog developed compulsive behaviour including backwards walking and circling, restlessness and stupor. Shunt infection and inflammation were ruled out via CSF analysis. The owners elected euthanasia at 16th week after VPS due to rapid deterioration. Postmortem examination confirmed correct placement and patency of the VPS device while the entire forebrain was encased by a severe diffuse pachymeningeal fibrosis with constriction of venous sinuses and bridging veins. Infection and brain haemorrhage were excluded.

Constrictive meningeal fibrosis (CMF) severely compromises brain perfusion and intracranial pressure. In absence of haemorrhage it can arise from intracranial hypotension and subdural hygroma following VPS and requires to be considered in postoperative neurological deterioration as entity that might be targeted by neurosurgery.

**FP6**

**STRUGGLING WITH IMMUNOHISTOCHEMISTRY IN NERVE BIOPSYES? HOLD ON TO YOUR NERVES!**

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Nerve biopsies can be essential for clinical work-up of neuromuscular patients. Specific diagnoses, however, may warrant markers to address molecular and subcellular targets of neuropathies, confined to the axon, Schwann cell compartments or specific fibre subunits, to be seen in teased fibres only. Detection of certain epitopes requires denaturating retrieval techniques that shorten and coil-up nerve fibres and significantly complicate microscopic evaluation.

In order to facilitate the microscopic approach, to guarantee for representativity, reliability and reproducibility of staining, we evaluated 614 nerve fibres, teased onto standard slides and tip-fixed with four different adhesives. The slides were frozen at -20°C, thawed, and underwent microwave treatment in citrate buffer and coverslipping. The results were evaluated with regards to adhesion of fibres, encasement of fascicles, diffuence of the glue, its thermal and chemical resistance and possible interference with staining.

Out of 4 glues, cyanacrylate and epoxy adhesive both allowed for a representative yield of uncoiled fibres and proper coverslipping. Microwave resistance was 100% in the epoxy compound, but a significant interference with immunostaining was noted. Cyanacrylate allowed for specific immunostaining across all fibres but about 17% of glue dots came off in hot citrate buffer. Urethane based adhesives were discarded for less favourable to poor performance.

Tip-fixation of peripheral nerve fibres using glass adhesive pave the way for representative immunostaining of valuable tissue harvested through nerve biopsies. Easy practice renders broad use in veterinary laboratories realistic and will help to improve intravitam diagnosis and subclassification of neuropathies in domestic animals.

**FP7**

**THORACIC ARTICULAR PROCESSES HYPERTROPHY IN TWO CATS TREATED BY MODIFIED DORSOLATERAL LAMINECTOMY**

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Vertebral canal stenosis due to articular processes hypertrophy has been reported only once in cats and it was thought to be secondary to diffuse idiopathic skeletal hyperostosis, in a phenomenon known as adjacent segment disease. The aim of this report is to describe two cases of thoracic articular processes hypertrophy in cats and their outcome after decompressive spinal surgery by unilateral approach.

A 9 year-old neutered female British Shorthair cat (cat A) and a 13 year-old neutered male Domestic Shorthair (cat B) were referred with chronic T3-L3 myelopathy signs which progressed over 12 months. On presentation Cat A was mildly ataxic and paraparetic whilst cat B was non-ambulatory paraparetic. MRI scan of the spine revealed bilateral enlargement of the articular process joints at T11-T12 in cat A and at T3-T4 in cat B causing dorsolateral spinal cord compression. No concurrent significant spinal disease was documented. Modified dorsolateral laminectomy with partial osteotomy of the spinous process was performed in both cases. The side of the approach was chosen based on the severity of the cord compression.

Surgery resulted in excellent outcome with short hospitalisation times (median 5 days) in both cases. Cat A showed only mild postural reaction deficits and Cat B recovered unassisted ambulation within 4 weeks postoperatively.

In conclusion articular processes hypertrophy should be included in the differential diagnosis of adult cats with chronic slowly progressive myelopathy. Additionally, this report suggests that modified dorsolateral laminectomy might be an appropriate treatment in these cases.

**FP9**

**COMPARISON OF MEDICAL AND SURGICAL TREATMENT FOR ACUTE CERVICAL COMPRESSIVE HYDRATED NUCLEUS PULPOSUS EXTRUSION IN DOGS**

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Although successful outcomes have been reported after medical and surgical treatment for dogs with cervical hydrated nucleus pulposus extrusion (HNPE), it is unknown which treatment option should be preferred. The aims of this study were to compare the clinical presentation and outcome of dogs treated medically or surgically for cervical HNPE.
Thirty-four dogs treated medically (n=18) or surgically (n=16) were retrospectively identified. Signalment, clinical presentation and imaging findings were recorded. Medical management consisted of restricted exercise and physiotherapy. Surgical treatment consisted of a ventral slot procedure. Short-term follow up information was retrieved from medical files and re-examination visits. Long-term outcome was obtained via telephone interviews.

More dogs in the surgical group demonstrated cervical hyperaesthesia (P = 0.045). No other significant differences were noted for signalment, duration, type and severity of clinical signs, affected intervertebral disc space, intraparenchymal spinal intensity changes and degree of spinal cord compression. Two dogs underwent surgical decompression due to an unsatisfactory response to medical management. All cases for which long-term information was available (n=30) were neurologically normal at the time of data collection. There were no significant differences for any of the short or long-term outcome variables between both treatment groups.

This study demonstrated excellent outcomes after medical or surgical treatment for acute compressive cervical HNPE. Although we were not able to identify the most appropriate treatment modality for dogs with cervical HNPE, our results suggest that medical management can be considered despite the presence of severe clinical signs and variables degrees of spinal cord compression.

FP10

ANALYSIS OF RISK FACTORS FOR DEVELOPMENT OF URINARY AND/OR FAECAL INCONTINENCE IN DOGS WITH PRESUMPTIVE THORACOLUMBAR ACUTE NON-COMPRESSIVE NUCLEUS PULPOSUS EXTRUSION

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Long-term urinary (UI) and/or faecal (FI) incontinence have been reported in up to 32% of dogs with T3-L3 acute non-compressive nucleus pulposus extrusion (ANNEP). The aim of this retrospective study was to investigate risk factors for development of UI/FI in dogs with T3-L3 presumptive ANNEP diagnosed based on previously reported clinical and MRI findings. One hundred and forty-three dogs were included. UI/FI occurred in 9% and 23% of dogs respectively. Presenting neurological grade and the need for pharmacological bladder management immediately after diagnosis were the only predictors of long-term UI in multivariate analysis. Presenting neurological grade and a cross-sectional area of the lesion ≥40% of the spinal cord area on T2W MR images were the only variables associated with long-term FI in multivariate analysis. Not administering NSAIDs following diagnosis was significantly associated with both UI and FI in univariate but not multivariate analyses. Spinal cord injury caused by ANNPE at T11-T12, T12-T13 or T3-L1 was significantly associated with FI in univariate but not multivariate analyses compared to ANNPE at L1-L2, L2-L3, L3-L4.

In agreement with previous data on thoracolumbar spinal cord injury in dogs, the presenting neurological grade was the most important predictor of UI/FI in dogs with ANNPE. The cross-sectional area of the lesion appears to play a greater role in predicting the occurrence of incontinence than the longitudinal extension of the lesion, probably reflecting involvement of specific white matter tracts. The roles of the affected spinal cord segment and the administration of NSAIDs following diagnosis deserve further investigation.

FP11

NEW METHOD OF HARVESTING OLFACTORY ENSEATHING CELLS USING ENDOSCOPY VIA NASAL CAVITY

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Olfactory ensheathing cells (OECs) exist in the olfactory mucosa (OM) and can support regeneration of damaged axons. Transplantation of OECs is a new strategy for treatment of spinal cord injury with safety and efficacy data reported in dogs. However OECs harvesting requires a rhinotomy which is invasive. In humans, a method using endoscopy via the nasal passages has been described. Here we investigated whether canine OECs could be harvested in the same manner. This study had ethical approval from Nihon & Bristol Universities and included 16 fresh cadaver dogs and one canine patient (later receiving the OEC transplant). One nasal cavity was flushed with sterile saline and a rigid or flexible endoscope inserted. Three pieces of OM were taken using sterile biopsy forceps and prepared for primary cultures. The cell number at 0 days in vitro (DVI) was 0.42 +/− 0.05 (mean +/− SEM) × 10⁶ and expanded to 7.28 +/− 0.27 × 10⁶ at 21 DIV. Using immunohistochemistry, the proportion of OECs (positively staining to the p75 marker) was ~77% and that of fibroblasts (positively stained with the fibronectin marker) was ~23%, giving 5.54 +/− 0.17 × 10⁶ of OECs. Cell cultures from one cadaver were infected. Here we show that endoscopic harvesting of OECs via the nasal passages is clinically feasible. This technique is less invasive than a rhinotomy and paves the way to dissemination of this therapy and future clinical trials using OECs.

FP12

THE SERO-PREVALENCE OF ANTI-GLYCOLIPID ANTIBODIES IN ACUTE CANINE POLYRADICULONEURITIS AND OTHER PERIPHERAL AND CRANIAL NEUROPATHIES, NEUROMUSCULAR DISORDERS AND MYOPATHIES

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Recent research indicated serum anti-ganglioside antibodies as a potential marker for acute canine polyradiculoneuropathy (ACP), with such antibodies reaching a sensitivity of 60% and a specificity of 97% in a small cohort of Italian dogs (n=25). This multicentre study aims to validate previous results in a larger, geographically more heterogeneous canine population.

In the 3rd and final year of this study, to date 285 serum samples submitted from 12 institutions in five countries have been examined for antibodies against 10 common glycolipids and their hetero-meric dimers with recently developed combinatorial microarrays. These comprised sera from 109 dogs with the presumptive diagnosis of ACP based on clinical and electrophysiological findings (ACP), 8 dogs in which ACP could not be excluded (possACP), 82 dogs with other peripheral and cranial neurological, neuromuscular and muscular disorders (ONM), and 86 neurologically inconspicuous dogs (CTRL).

The predominant binding pattern observed was against gangliosides GM2 and/or GA1 and their associated dimers. Overall, 67/109 ACP-sera contained such antibodies, with 42 dogs exhibiting anti-GM2 reactivity, 6 dogs exhibiting anti-GA1 reactivity and 19 dogs exhibiting both. Additionally, 3/8 possACP-dogs had anti-GM2 or anti-GA1 antibodies, whilst 14/82 ONM-sera and 8/86 CTRL-sera exhibited antibodies with such binding patterns. For anti-GM2 and anti-GA1 antibodies combined, the serum screens at this stage reached a sensitivity of 61.5% and a specificity of 86.9%.

More detailed investigations into the different subgroups are underway and several other institutions have confirmed their intention of contributing to this study. A final update of the results will be provided.

FP13

ASSESSMENT OF THE RELATIONSHIP BETWEEN HEMIVERTEBRA SUBTYPE, BREED AND KYPHOSIS IN NEUROLOGICALLY NORMAL FRENCH BULLDOGS, PUGS AND ENGLISH BULLDOGS

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There is a high prevalence of hemivertebra in French bulldogs, Pugs and English bulldogs. Although the prevalence of hemivertebra is lower in Pugs, its occurrence is more likely associated with clinical disease. The aims of this study were to evaluate if hemivertebra subtype would be associated with breed and spinal kyphosis.

French bulldogs, Pugs and English bulldogs that underwent computed tomography (CT) for reasons unrelated to spinal disease were retrospectively included. CT studies were evaluated for presence and subtype of hemivertebra. Hemivertebra subtypes included ventral hypoplasia (VH), ventral aplasia (VA), ventral lateral aplasia (VLA), symmetrical hypoplasia (SH), lateral hypoplasia (LH), lateral aplasia (LA), ventromedial hypoplasia (VMH), ventromedial aplasia (VMA) and ventrolateral hypoplasia (VLH). Spinal kyphosis was defined as Cobb angles exceeding 10°.

62 French bulldogs, 68 Pugs, and 41 English bulldogs were included. A total of 243 hemivertebrae were diagnosed in the group of French bulldogs, 19 in the group of Pugs and 100 in the group of English bulldogs. Breed was significantly associated with hemivertebra subtype. Pugs were more likely affected by VH and less likely by VMH, while English bulldogs were more likely affected by VMH compared to the other breeds. Hemivertebra subtype had a significant influence on the Cobb angle and occurrence of kyphosis with VH associated with greater Cobb angles and higher likelihood of kyphosis compared to other hemivertebra subtypes.

This study suggests that different screw-tailed brachycephalic breeds are affected by different types of hemivertebra, which are in itself associated with different degrees of spinal kyphosis.

FP14

USE OF BOTULINUM TOXIN TYPE A FOR ADJUNCT TREATMENT OF MUSCLE CONTRACTIONS AFTER BRACHIAL PLEXUS INJURY

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Botulinum neurotoxin acts by interfering with synaptic proteins which are localized in the presynaptic nerve terminal and mediate acetylcholine release at neuromuscular junctions. Repeated botulinum neurotoxin injections are applied to children with spastic cerebral palsy or brachial plexus palsy for treatment of muscle imbalance and muscle contractures.

We hypothesized that botulinum neurotoxin type A would exhibit similar beneficial effects in carpal joint flexion contraction in cats following brachial plexus or radial nerve injury. A male six year old domestic short hair cat was presented for persistent carpal joint flexion contraction following a car accident and brachial plexus injury one year ago. Intense physical therapy had been applied since then. A total of 20 mouse units of botulinum neurotoxin type A (5 mouse units/0.1 ml) were injected into carpal and digital flexor mm. at four injection sites. Increased range of motion of the carpal joint was observed 2-3 days after the injection and the cat was able to place the paw normally and bear weight on it.

Electrodiagnostic examination demonstrated decreased CMAP amplitude one week p. injection. Physical therapy was continued. Botulinum neurotoxin injections were repeated when muscle contractions recurred after 6 months, 9 months later, and then every 12 months over 5 years. An identical response was observed each time. No side effects occurred.

Botulinum toxin is an effective adjunct therapy in the management of carpal joint flexion contraction following brachial plexus injury. Inclusion into physical therapy protocols for treatment of muscle contractures is warranted.
POSTER ABSTRACTS

CAUDAL ARTICULAR PROCESS DYSPLASIA OF THORACIC VERTEBRAE IN NEUROLOGICALLY NORMAL FRENCH BULLDOGS, ENGLISH BULLDOGS AND PUGS: PREVALENCE AND CHARACTERISTICS

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The aims of this study were to evaluate the prevalence and anatomical characteristics of thoracic caudal articular process (CAP) dysplasia in neurologically normal French bulldogs (FB), English bulldogs (EB) and Pugs. It was hypothesized that CAP dysplasia is common in all three evaluated breeds and that breed specific differences exist in its prevalence and anatomical distribution.

In this retrospective descriptive cross-sectional study, CT scans of the thoracic vertebral column of neurologically normal FB, EB and Pugs were reviewed for the presence and location of CAP hypoplasia and aplasia and compared between breeds. 271 dogs met the inclusion criteria: 108 FB, 63 EB and 100 Pugs. 70.4% of FB, 84.1% of EB and 97.0% of Pugs showed evidence of CAP dysplasia. Compared to FB and EB, Pugs showed a significantly higher prevalence of CAP aplasia, but also a lower prevalence of CAP hypoplasia, a higher number of affected vertebrae per dog and demonstrated a generalized and bilateral spatial pattern more frequently. Furthermore, Pugs showed a significantly different anatomical distribution of CAP dysplasia along the vertebral column with a high prevalence of CAP aplasia between T10 and T13. This area was almost completely spared in FB and EB.

As previously suspected, CAP dysplasia is a common finding in neurologically normal Pugs but this also seems to apply to FB and EB. We hypothesize that the higher prevalence of clinical sequelae in Pugs is not only caused by the higher prevalence of CAP dysplasia but possibly also by the breed specific anatomical distribution.

POSTICTAL TRANSIENT HYPERAMMONEMIA IN THREE CATS.

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Postictal transient hyperammonemia is described in human medicine secondary to tonic-clonic seizures. The extensive muscle contractions lead to increased production and thereby increased plasma levels of ammonia. In patients with normal liver function the ammonia is rapidly cleared from the circulation and plasma levels soon return to normal. In humans, it is not related to adverse outcome.

The aim of this case report is to describe postictal transient hyperammonemia in three cats presented at Anicura Läckeby Djursjukhus for generalized seizures (cluster seizures or status epilepticus). At admission, all three cats presented with high plasma levels of ammonia (153, 187 and 195 μmol/L respectively, ref. 0.0-95 μmol/L) that normalized rapidly with seizure control; in one cat within two hours. Two out of three cats were euthanized before discharge due to poor seizure control. The third cat showed no evidence of liver disease when examined further. The authors believe that postictal transient hyperammonemia occurs in cats and that it potentially could lead to incorrect diagnosis of hepatic encephalopathy. Prospective studies should be able to determine how frequent it occurs, its temporal association and its prognostic value in cats with generalized seizures.

AUDIOGENIC REFLEX MYOCOCLUSUS IN A GERIATRIC DOG

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Startle syndromes and reflex epilepsy have been described in humans and animals. These disorders have variable clinical manifestations. This case describes the phenomenology and pathological findings of a dog with a stimulus-induced disorder: audiogenic reflex myoclonus (ARM). A twelve-year-old male castrated canine crossbreed was presented with a recent onset of what the owner described as ‘shock-like twitches’ which were evoked by various high-pitched noises (such as jangling of keys on a chain). Videos of these paroxysms showed the dog experiencing sudden, brief, involuntary (head / body) muscle jerks and blepharospasms after auditory stimuli, not unlike the startle reflex. The episodes occurred daily (10-20 times/day). The dog was subjected to a neurological examination and additional tests were discussed. Levetiracetam was initiated (20 mg/kg thrice daily) with no effect.

Postmortem histopathological evaluation of the dog’s brain showed multifocal age-related changes in the cortex, thalamus, basal ganglia, midbrain and brainstem (lipofuscin deposits and mild gliosis). We postulate that the clinical signs were a consequence of startle reflex-pathway dysfunction leading to ARM. An epileptic nature cannot be excluded. Epilepsy is usually inferred if generalized tonic-clonic seizures occur in the same patient, which was not the case here. This is the first case description of a dog with geriatric onset of reflex myoclonus that has been submitted for pathology.

INVESTIGATING THE USE OF DIETARY SUPPLEMENTS IN DOGS WITH IDIOPATHIC EPILEPSY

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Epilepsy is the most common chronic neurological disorder in dogs. Diet has been shown to have a positive impact upon the seizure activity and behaviour of dogs with idiopathic epilepsy, and commercially available diets or dietary supplements (DS) are increasingly marketed to help manage a variety of health conditions. There remains a lack of data of diet and dietary supplementation of dogs with epilepsy, and how this could impact epilepsy management. An online survey was designed to assess how and why owners of dogs with idiopathic epilepsy use diets and DS. In total, 186 valid responses were received. The study cohort consisted of mainly male neutered (45.2%), pure-breed (83.7%) dogs with a mean age (months) ±SD of 68.9±32.9 months. Over half of owners (52.6%) administered DS; the most common being coconut oil (40.8%), milk thistle (35.7%), fish oil (34.7%), cannabidiol oil (15.3%) and Medium-chain Triglyceride (MCT) oil (13.3%). While only 20% of owners consulted their vet, the most common source advice on DS use was online owner support groups (50.5%). Beside the protection from potential drug side effects (57.3%), owners used DS to try and reduce seizure frequency (79.6%) and severity (56.3%).
As pharmcokinetic properties of anti-epileptic drugs can be influenced by other medications or diets, DS may also affect their efficacy, absorption and clearance. Owners commonly use DS, which should be considered when taking a history, as it might influence epilepsy management. Understanding the complex relationship of medication and diet will improve future management of epileptic patients.

CLINICAL AND GENETIC CHARACTERISATION OF DYSTROPHIN-DEFICIENT MUSCULAR DYSTROPHY IN HARLEQUIN MINIATURE POODLES
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This report describes the clinical, diagnostic findings and novel causal mutation in three Harlequin Miniature Poodles with dystrophin-deficient muscular dystrophy (DD-MD).

Four full-sibling male Poodles were evaluated at 4-19 months of age. One was clinically normal and three were affected. All affected dogs were reluctant to exercise and had diffuse muscle atrophy, a stiff gait and markedly elevated serum creatine kinase activity. Two affected dogs also showed poor development, learning difficulties and episodes of abnormal behaviour. Investigations into forebrain structural and metabolic diseases in these two dogs were unremarkable. Electromyography demonstrated fibrillation potentials and complex repetitive discharges in the infraspinatus, supraspinatus and epaxial muscles.

Histopathology and immunohistochemical analysis of muscle biopsies were consistent with DD-MD.

DNA was obtained from all four full-sibling male Poodles, a healthy female littermate and the dam (which was clinically normal). Whole genome sequencing of one of the affected dogs revealed a >5 Mb deletion on the X chromosome, encompassing the entire DMD gene, leading to lack of dystrophin expression. The exact deletion breakpoints could not be experimentally ascertained. This region was deleted in all affected males, but not in the unaffected dogs. Quantitative PCR confirmed all three affected males were hemizygous for the mutant X chromosome, while the wildtype chromosome was observed in the unaffected dog littermate. The female littermate and the dam were both heterozygous for the mutant chromosome. The finding represents a novel naturally-occurring mutation causing DD-MD in the dog.

PRIMARY NEURON-GLIAL CELL CULTURES FOR NEUROBIOLOGY AND DISEASE RESEARCH
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Collated studies will be presented to demonstrate the development and use of mixed, neuron-glial cell culture models of the mammalian nervous system for neurobiology and disease research.

We developed and used both explant and dissociated methods of neuron-glial cultures of central and peripheral nervous system from mouse tissue.

Using explant cultures of fetal spinal cord we identified the requirement for astrocytes in both axonal outgrowth and myelination. We developed a model of dissociated murine spinal cord in which extensive myelination and synapse formation occurs. This model has been used for neurobiology and disease research, including evaluating the effect of inflammatory cytokines on myelination. It was also used in conjunction with cultures of spinal ganglia to evaluate the neurotoxin found in the plant *Hypochaeris radicata*, grazing of which is associated with Australian stringhalt in horses.

We have found that while single cell type cultures are useful for basic studies, mixed neuron-glial cultures are required to accurately model the nervous system in vitro. Explant cultures retain 3-dimensional cellular relationships but they are technically challenging to establish and interpret. Dissociated cultures are easier to establish, and they form thin layers of cells in which cellular interactions are more easily visualised. We are currently working on optimising a myelinating, synapsing model derived from murine forebrain. This is yielding new neurobiological data.

Cell culture cannot fully mimic nervous system complexity, but it can produce cost-effective, highly defined conditions for the study of normal biology, disease pathogenesis and the effect of therapeutic agents.

SERUM THYROID FUNCTION TESTS IN CATS ON PHENOBARBITAL THERAPY
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Phenobarbital is the drug of choice for control of feline seizures. Whether phenobarbital alters thyroid function tests in cats, like it does in rats, dogs and humans, is unknown. In a prospective study, the serum thyroid function in seven cats suffering from seizures and chronically treated with phenobarbital was evaluated.

The cats had a median age of 8.1 years (range 4.5-11.5). In none of the cats a thyroid nodule was palpated. The median daily dosage of phenobarbital was 2.7 mg/kg (range 1.5-5) and median serum concentration of phenobarbital was 60 μmol/L (range 37.0-84.7). Four of the cats received phenobarbital once daily. The results of the serum thyroid function tests were as follows: median serum total thyroxine 24.5 nmol/L (range 20.6-29.6; reference 12-49), free thyroxine 22 pmol/L (range 18-31; reference 10-31), triiodothyronine < 0.5 nmol/L (reference < 0.05-1.85) and thyroid stimulating hormone 0.09 ng/mL (range < 0.03-0.15, reference < 0.03-0.3). The test results in all seven cats remained within reference intervals established from clinically normal cats.

These findings make it unlikely that these cats would be misdiagnosed as hypothyroid. It is doubtful that hyperthyroidism would be missed, especially in cats with moderate to severe disease. Serum phenobarbitaletal concentrations were lower than the therapeutic concentrations recommended by many, showing that cats can respond satisfactorily to
lower dosages and once daily dosing. A larger prospective cohort study, with serum thyroid hormone measurements before and after phenobarbital administration, is needed to better define the clinical importance of phenobarbital-induced alterations in feline thyroid function.

**STATISTICAL STRUCTURAL ANALYSIS IN FAMILIAL SPONTANEOUS EPILEPTIC CATS USING VOXEL-BASED MORPHOMETRY**

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Voxel-based morphometry (VBM) has been developed as a statistical imaging analysis method to locate brain abnormalities in humans accurately. The familial spontaneous epileptic cats (FSECs) have been advanced as an animal model of mesial temporal lobe epilepsy. In some FSECs, hippocampal asymmetry has been detected using three-dimensional (3D) magnetic resonance (MR) volumetry. In this study, we produced a standard template of the feline brain and compared FSECs statistically using VBM.

This study was approved by the Animal Care and Use Committee of the University. In this study, 3D T1-weighted imaging and the Statistical Parametric Mapping 12 (SPM12 software for VBM) were used. The feline standard template and tissue probability maps were created using 38 scans from healthy cats. Subsequently, the gray matter was compared between FSECs (n = 25) and controls (n = 12) as group analysis and between each FSEC and controls as individual analysis using standard VBM. The feline standard template and tissue probability maps could be created using the VBM tool for humans. Although there was no significant difference in the group analysis, 7/25 (28%) FSECs showed significant decreases in the volume of hippocampal and/or amygdaloid regions compared with controls.

In conclusion, our findings demonstrated that VBM, in addition to establishing feline standard templates, would be available for statistical analysis of feline brains. This is possible most likely due to the comparatively uniform brain shape of this species. Furthermore, similarly to MR volumetry, VBM demonstrated morphometric changes in the hippocampus and/or amygdala in FSECs.

**SACROCAUDAL INTERVERTEBRAL DISC PROTRUSION IN TWO CATS.**

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Reports of caudal and sacrocaudal intervertebral disc disease are rare in the veterinary literature, with only 6 dogs and no cats being reported. We describe the first two cases of sacrocaudal intervertebral disc protrusion in cats.

Medical records of two cats presented at our hospital with S3-Cd1 intervertebral disc protrusion were reviewed for signalment, neurological signs, MRI findings, surgical treatment and post-operative follow-up.

Cat 1 (Bengal cross, MN, 10y) presented for investigation of urinary retention and constipation. Hypotonic anal sphincter, reduced perianal and bulbocavernous reflexes, over-distended bladder, discomfort at lumbosacral palpation were noted on examination. Cat 2 (DSH, 2y, MN) presented with a 1-month history of decreased appetite, reluctance to jump, reduced level of activity and constipation. Discomfort at lumbosacral palpation and reluctance to move were noted on examination. MRI revealed dorsal bulging of the hypo-intense intervertebral disc at S3-Cd1 in both cats. Associated spinal nerve root compression was suspected in both cases. A dorsal decompressive laminectomy with fenestration in cat 1, and dorsal laminectomy alone in cat 2 were successfully performed. Both cats recovered uneventfully with resolution of neurological signs. Recurrence of signs was not observed during a post-operative period of over 20 months.

These are the first two reported cases of sacrocaudal intervertebral disc disease in cats. Intervertebral disc protrusion of the caudal discs should be included in a differential diagnosis for cats presented with urinary retention, constipation, reluctance to move and caudal spinal pain.

**MEASUREMENT OF NEUTROPHIL GELATINASE-ASSOCIATED LIPOCALIN CONCENTRATION IN CANINE CSF AND SERUM AND ITS ROLE IN IMMUNE-MEDIATED NEUROINFLAMMATION**

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Neutrophil gelatinase-associated lipocalin (NGAL) is a multifaceted protein produced by immune cells including neutrophils, astrocytes, endothelial and epithelial cells. It is involved in the immune response via acute-phase-reaction and takes part in immune-mediated CNS disease in humans. Neuroprotective as well as disease exacerbating roles such as neutrophil recruitment are assumed.

Aim of this retrospective study was validation of an ELISA kit for detection of NGAL in canine CSF. Furthermore, CSF- and serum-levels of NGAL in healthy dogs, dogs with inflammatory and other neurological CNS diseases should be compared to prove the hypothesis of increased NGAL levels in CSF of patients with inflammatory compared to non-inflammatory CNS diseases.

NGAL levels in CSF were significantly higher (p < 0.05) in 29 dogs with acute steroid responsive meningitis-arteritis (SRMA) (median: 2.8 ng/ml) and 13 dogs with meningoencephalitis of unknown origin (MUO) (median: 1.79 ng/ml) than in dogs with SRMA in remission (n = 21, median: 0.3 ng/ml), idiopathic epilepsy (n = 21, median: 0.24 ng/ml), intervertebral disc disease (n = 22, median: 0.28 ng/ml) and intracranial neoplasia (n = 16, median: 0.33 ng/ml). NGAL CSF levels in acute SRMA were significantly higher than in the control group (n = 7, median: 0.43 ng/ml). A positive correlation (Spearman) between NGAL level in CSF and white blood cell count in CSF (r = 0.6155; p< 0.0001) was measured.

These results indicate a pathogenic role of NGAL in canine inflammatory CNS disease and highlight its possible role in immune cell recruitment.

**UBIQUITINATED MATERIAL OVERLOAD: A WAY AGED CATS BECOME STUNNED**

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Aerobic metabolism in cells with high energy consumption like neurons produces reactive oxygen species which can damage proteins. With aging, antioxidant and repair mechanisms become less efficient. Oxidized proteins may be ubiquitinated and digested through the proteasome while cross-linked proteins result in lipofuscin deposits. In the perspective of studying age-related brain changes in cats, we retrospectively investigated neuronal lipofuscin accumulation and ubiquitin expression in brains of cats up to 20 years of age.

Five cats (5- to 20-year-old) with no specific brain lesion were included. Beside classical colorations (periodic acid Shiff (PAS), Gallyas silver, autofluorescence), immunostainings were performed using antibodies to phosphorylated TAU, ubiquitin, TAR DNA-binding protein 43 (TDP-43), and to cellular specific proteins (calbindin, microtubules, neurofilaments).

With age, an increasing number of large neurons (among which Purkinje cells, pyramidal neurons of the hippocampal Ammon’s horn and large pyramidal cells of the frontal cortex) containing autofluorescent, PAS-positive granular cytoplasmic inclusions (lipofuscin) was observed. In the oldest cats, ubiquitin-positive deposits in the white matter also increased. A weak (compared to Tg30 mutant tau mice brain) Gallyas-negative reaction for phosphorylated TAU was observed in the same location as the lipofuscin deposits. No cytoplasmic TDP-43 translocation was observed. In the cerebellar vermis of the oldest cat, Purkinje cell loss was easily demonstrated. No cell count was performed for the cortex, but increased capillary density and astrogliosis were viewed as indirect evidence of neuronal degeneration. Our results show an association between lipofuscin accumulation, ubiquitinated material overload, and neuronal loss in the brain of aged cats.

FOREBRAIN NEUROLOCALISATION ASSOCIATED WITH URINARY TRACT INFECTION IN 20 CASES

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Urinary tract infection (UTI) can directly result in encephalopathy in humans, particularly the geriatric population. A retrospective study was performed to evaluate if UTI was associated with encephalopathic signs in dogs and cats. Medical records were reviewed to identify cases with confirmed UTI and a history of seizures and/or neurological deficits consistent with a forebrain localization. Cases included obtundation (3), reduced vestibulo-ocular reflex (2) and reduced menace response (3). Urine culture was positive for E. coli (3) or Enterococcus faecalis and E. coli (1). Elevated serum ammonia was documented in 2 cases. All cases showed marked improvement of neurological deficits following treatment with appropriate antibiotics.

UTIs can result in seizures or other evidence of encephalopathy in veterinary patients. Prompt treatment can elicit a rapid improvement of neurological deficits.

FDG-PET IMAGING AND NOVEL SURGICAL MANAGEMENT FOR SUCCESSFUL TREATMENT OF A DOG WITH DISSEMINATED ASPERGILLUS TERREUS WITH CENTRAL NERVOUS SYSTEM INVOLVEMENT

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A 2.5-year-old Viszla was investigated for progressive tetraparesis and ataxia and neck pain. MRI revealed a lesion infiltrating the para-spinal muscles around the C4/C5 vertebrae and invading the vertebral canal. Abdominal lymphadenomegaly and a hyperchoic right renal lesion were identified on ultrasound. Aspergillus terreus was isolated from urine culture. The patient was treated with intrathecal and intravenous liposomal amphotericin B (AmBisome) as well as oral itraconazole and terbinafine. The patient improved significantly but then relapsed 2-weeks after AmBisome infusions were interrupted. Repeat MRI revealed discospondylitis at C4-C5 while the intramuscular infiltration had resolved. Infusions with AmBisome were restarted and the patient improved quickly and regained its pre-relapse neurological status. Recheck MRIs performed one and two months after the relapse revealed static lesions. Abdominal ultrasound was repeated 2 months after the relapse and revealed a suspected fungal plaque in the right kidney. Surgery was performed, with a modified ventral slot at the C4-C5 intervertebral space. The slot was packed with poloxamer gel impregnated with voriconazole. Right nephrectomy was performed at the same time. The patient was placed on oral voriconazole. The dog recovered and remained neurologically static and almost normal. Six weeks after the intervention, MRI was repeated and demonstrated a static C4-C5 discospondylitis lesion. A full body 18fluoro-2-deoxyglucose positron emission tomography scanning (FDG PET-scan) performed 11 months following diagnosis was unremarkable. Oral medications were ceased. Forty months after the FDG PET-scan, the dog is free of clinical signs.

CLINICAL PRESENTATION AND MAGNETIC RESONANCE IMAGING FINDINGS IN 12 DOGS WITH EOSINOPHILIC MENINGOENCEPHALITIS OF UNKNOWN AETIOLOGY

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The study aim was to describe the clinical presentation, MRI findings and outcome in dogs with eosinophilic meningoencephalitis of unknown aetiology (EMUA).

A retrospective study was performed. Dogs were included if they had: complete medical records, complete neurological examination, MRI
imaging, cerebellomedullary cerebrospinal fluid sample consistent with eosinophilic pleocytosis and negative infectious disease testing. Signalment, clinical presentation and short-term outcome were retrieved from clinical records. Long-term follow-up was by telephone discussion with referring veterinarians.

Twelve dogs were included with a median age of 20.5 months (range 7.6–92.0 months). Ten breeds were represented including two Flat-Coated Retrievers and two Welsh Terriers. Neurological abnormalities included obtundation (n = 10), menace response deficits (n = 9) proprioceptive deficits (n = 8), ataxia (n = 7) and seizures (n = 3). Neuroanatomical localisation was multifocal (n = 8), forebrain (n = 3) or left trigeminal/facial nerves (n = 1). Seven dogs had a peripheral eosinophilia and all had an eosinophilic pleocytosis. Ten dogs had bilateral symmetrical T1W iso/hypointense, T2W and FLAIR hyperintense signal affecting sub-meningeal cortical grey matter with meningeal contrast uptake. Cerebral sulci appeared enlarged with reduced cortical gyri. MRI was consistent with diffuse meningitis and atrophy/necrosis of sub-meningeal cortical grey matter. One dog had a focal intra-axial lesion and 1 dog had increased contrast uptake affecting the left trigeminal and facial nerves. Eleven dogs receiving corticosteroids survived to discharge with 7 receiving additional cytarabine arabinoside. Median survival time was 669 days.

EMUA affects younger larger breed dogs with most having a suspected diffuse meningitis and reduction of sub-meningeal cortical grey matter. Response to immunosuppressive treatments is good.

SURGICAL EXCISION OF A CANINE INTRACRANIAL HAMARTOMA AND LONG TERM FOLLOW-UP

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A 13-year-old female spayed mongrel was referred to our hospital with an acute onset of recurrent opisthotonus.

Physical examination showed bradycardia (76 bpm) and systemic hypertension (190 mmHg). The dog showed obtundation with non-ambulatory tetraparesis and left pleurothotonus. Postural reactions were delayed in all four limbs particularly on the right side. Cranial nerve examination showed vertical nystagmus. A central vestibular lesion was suspected and neoplastic, inflammatory and infectious conditions were considered. Hematology and complete biochemistry profile results were within reference ranges. Pre- and post-contrast CT images of the brain were obtained, which revealed a circumscribed pre-contrast attenuating lesion with ring enhancement affecting the left frontoparietal cortex. There was severe perilesional edema, moderate midline shift and left caudal transtentorial and foramen magnum herniations. A neoplastic lesion with a recent haemorrhagic component was therefore suspected.

Following medical treatment with mannitol bolus and prednisolone for ten days, the neurological examination was considered normal. A dark-grey capsulated mass was removed during left frontoparietal craniectomy. Immediate postsurgical CT confirmed complete excision. Biopsy results showed tortuous vessels consistent with a cerebral hamartoma. At 17 months follow-up the dog is clinically normal and follow-up CT scan revealed no evidence of tumor regrowth.

To the authors’ knowledge, this is the second case of a surgically-treated intracranial hamartoma Complete excision of these tumors is feasible without ultrasonic surgical aspirator and might provide long-term treatment for affected dogs.

CEREBROSPINAL FLUID EOSINOPHILIA IN A DOG WITH CEREBRAL HISTIOCYTIC SARCOMA

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Cerebrospinal fluid (CSF) eosinophilia, defined as a pleocytosis with >20% eosinophils, has been mainly reported in dogs with intracranial nematode migration, infection by Cryptococcus neoformans and Prototheca spp, eosinophilic meningoencephalomyelitis but also in a dog with oligodendroglioma.

A six-year-old neutered female Jack Russell terrier was evaluated for seizure-like activity and intermittent obtundation over the previous 3 weeks. Physical and neurological examinations were unremarkable. Brain MRI revealed mild generalised dilatation of the olfactory recesses, lateral and 3rd ventricle, and mild dilatation of the mesencephalic aqueduct with periventricular oedema. A focal area of mildly increased lepto- and pachymeningeal contrast uptake in the region of the right parietal and occipital lobes was observed. Analysis of cervical CSF revealed severe pleocytosis (635 cells/μL: Ri: <5 cells/μL) and increased total protein (1.38 g/L: Ri: <0.35). Cytology revealed a mixed inflammatory pleocytosis with 22% eosinophils. No atypical cells or microorganisms were identified.

The dog transiently improved with prednisolone and cytosine arabinoside therapy for suspected MUO, but subsequently worsened over the next 6 months and was euthanised. A post-mortem examination was performed. Histopathology and immunohistochemistry revealed a multifocal neoplastic proliferation of cells diffusely and strongly positive for Iba-1 immunostain in the brain, consistent with a diagnosis of histiocytic sarcoma (HS). No other organic lesions were found; therefore the neoplasm was considered a primary HS of the central nervous system.

To the authors’ knowledge this is the first case reported in the literature of CSF eosinophilia associated with cerebral HS.

MENINGOTHelial MENINGiOMAS and ASSOCIATED CEREBRAL INFARCTS IN TWO DOGS

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In dogs meningiomas mostly cause chronic progressive clinical signs due to slow tumor growth and benign biological behavior. In human medicine several cases of meningothelial meningiomas combined with peracute clinical signs due to ischemic cerebral infarcts are reported. Two dogs (13 and 15 years old) were presented with the history of acute generalized tonic-clonic seizures. Both animals showed interictal neurological deficits in accordance with an extensive unilateral forebrain lesion.
Magnetic resonance imaging examinations of both dogs revealed a well delineated extraaxial T2W hyperintense mass compressing one olfactory bulb being iso- to hypointense to surrounding brain tissue in T1W with homogenous contrast enhancement. Additionally, an intraaxial, well demarcated lesion was apparent on the ipsilateral side in the parenchyma supplied by the middle cerebral artery. The lesion was T2W hyper- and T1W isointense with heterogeneous ring enhancement and mild to moderate mass effect. On owners request both dogs were euthanized.

In both cases, necropsy revealed meningothelial meningioma and marked eosinophilic neuronal necrosis, focal malacia, edema and gliosis in the temporal lobe and hippocampus as a consequence of a focal thrombosis of the cerebral artery.

In cases with a slowly growing meningioma acute clinical signs can be associated with ischemic infarcts, a potential complication of meningothelial meningioma in dogs.

**LEUKOENCEPHALOPATHY IN RELATED SCHNAUZER PUPPIES**

E. Huenerfauth, T. Stoerk, W. Baugmgaertner, A. Tipold, J. Nessler.

Leukoencephalopathy is a generic term for several disorders involving the white matter of the brain. These include leukodystrophies which are a heterogeneous group of diseases caused by enzyme deficiencies, resulting in abnormal formation, turnover, or destruction of myelin described e.g. in Weimaraner, Dalmatian, Springer Spaniel, Chow Chow, Lurcher, Samoyed and others.

Four standard Schnauzer puppies out of two related litters were presented at the age of four weeks due to progressive apathy, dysphoric vocalization, hypermetric ataxia, intention tremor, head tilt, circling, proprioceptive deficits, seizures and ventral strabismus consistent with a diffuse intracranial lesion. Magnetic resonance imaging (MRI) in one affected puppy revealed diffuse ill delineated and patchy white matter hyperintensities in T2W, liquid-filled caverns without mass effect, and moderate ventricle asymmetry and dilatation.

Necropsy showed mild hydrocephalus internus of the lateral ventricles, poor demarcation of the white and gray matter of the cerebrum, and edematous white matter changes with loss of normal consistency especially in the cerebrum. In histopathology, the centrum semiovale presented with severe multifocal reduction of myelin formation and moderate diffuse edema without inflammation. Although a toxic etiology cannot be completely excluded, an inherited leukoencephalopathy seems to be the most likely underlying pathogenetic mechanism due to progression of clinical signs and occurrence in several related litters.

**PARADOXICAL NYSTAGMUS ASSOCIATED WITH PERIPHERAL VESTIBULAR DISEASE IN THREE DOGS**

Poad L, Packer R, Smith P.M.

In veterinary patients, vestibular disease is typically divided into peripheral and central disease. The cardinal sign of peripheral disease is ipsilateral vestibular dysfunction, with head tilt directed toward and nystagmus away from the side of the lesion. Conventional central disease causes similar ipsilateral vestibular signs, often with additional neurological deficits. A paradoxical variant of central disease is also recognised in which clinical signs suggest contralateral vestibular dysfunction.

In this study, we describe three dogs with an unusual syndrome of facial paresis and peripheral vestibular dysfunction. Each case had a history of episodic disorientation and collapse. Neurological examination revealed unilateral facial paresis with an ipsilateral head tilt in one individual; no other deficits were present. In each case, an episode of vestibular ataxia and collapse was witnessed, during which there was nystagmus towards the side of the facial paresis. Magnetic resonance imaging showed hyperintensity of the affected facial nerve in all cases, with the ipsilateral vestibulocochlear nerve also abnormal in one dog; there were no CNS lesions. CSF analysis and tests for infectious diseases were negative. All cases were considered to have idiopathic facial neuritis, with concurrent episodic vestibular disease consistent with hyperactivity of the ipsilateral vestibulocochlear nerve.

These three cases suggest that a syndrome of paradoxical nystagmus can occur in dogs with peripheral vestibular disease. Such cases might conventionally have been considered to have an occult central lesion, whereas our findings suggest a benign peripheral condition that appears to carry a favourable prognosis.

**CLINICAL RISK FACTORS FOR EARLY SEIZURE REOCURRENCE DURING HOSPITALISATION IN DOGS SUBMITTED FOR SEIZURE WORKUP OR TREATMENT**

M. Kwiatkowska, A. Tipold, E. Huenerfauth, A. Pomianowski.

The aim of this retrospective study was to evaluate frequency, time and risk factors for early seizure recurrence (ESR) in dogs admitted to hospital for further seizure investigations. The question should be answered, if every dog suffering from seizures should be placed in an intensive care unit (ICU) after performing neurological consultation. Out of 922 records of dogs presented with seizures, 225 fulfilled the inclusion criteria (complete data, 48 hours of hospitalisation). 44.4% of patients had ESR during 48 hours of hospitalisation, seizures reoccurred within a mean time of 3 hours after hospital admission (Minimum -1, maximum: 42 hours). In dogs with idiopathic epilepsy (n = 101) postictal abnormal neurologic examination predicted seizures. In dogs with structural epilepsy (n = 72) clinical signs of prosencephalic lesions, abnormal interictal neurological examination and seizures 72 hours prior to hospital admission predicted ESR. In dogs with reactive seizures (n = 52) long term administration of one anti-epileptic drug was associated with ESR. Analysing all groups together abnormal interictal neurological examination, cluster seizures and/or status epilepticus 72 hours prior to hospital admission predicted ESR. In conclusion, dogs with seizures and identified risk factors should be placed in ICU when admitted to the hospital.
DEGENERATIVE SPONGIOTIC POLIENCEPHALOPATHY IN A OWNED-RED-EARED SLIDER (Trachemys scripta elegans)

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A 12-year-old male Red-Eared-Slider (T.s.elegans) was presented with an acute history of incoordination and abnormal head position. The patient was feed properly and lived in a water-tank with access to the exterior. Neurologic examination revealed circling to the right, horizontal nystagmus, and right head tilt combined with episodes of opisthotonos and hyperextension of the limbs. The turtle had perfect bilaterally menace-response, palpebral reflexes, was able to chew and swallow and had proper nociception. Results of blood-work and survey radiographs were unremarkable. Based on clinical signs, the lesion was provably localized in the vestibular portion of the right brain stem and differential diagnosis includes inflammatory, vascular or metabolic disease and less likely nutritional deficiencies or neoplasm. Do to the severity of clinical signs the owner request the euthanasia and allowed for histologic examination.

On histopathology, multifocal spongiosis of some brain stem nuclei. Were observed with a bilateral and symmetric pattern of distribution. Affected nuclei showed chromatholitic or pyknotic neuronal bodies in a microspongiotic neuropil, associated to a proliferative glial reaction. Immunohistochemically degenerative changes were confirmed. Those lesions were suspected to cause the clinical signs. Little is known about neurologic disease in turtles with some descriptions about bacterial, viral, parasitic and toxic encephalopathy being reported. Neurologic examination is not routinely performed in sick reptiles so neurologic disease in those species may be under diagnosed. To the author knowledge this is the first report of neurodegenerative disease in those reptiles and should be included in the differential diagnosis of neurologic disease in turtles.

C2 CRANIAL DORSAL LAMINOTOMY (DOFFING) IN 9 DOGS

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Objective: To assess the advantages of the surgical elevation of the cranial dorsal process of C2 and evaluate the long term post-operative outcomes of this procedure.

Design: Retrospective case series.

Methods: Nine dogs diagnosed with variety of pathologies - subarachnoid diverticulum (5) syringohydromyelia (2), GME (1) dorsal ligament cartilaginous metaplasia (1) - affecting the dorsal aspect of the spinal cord, underwent C2 cranial dorsal process laminotomy in a similar manner. Following the specific procedure per the underlying pathology, the C2 bone flap was repositioned and fixed into place using absorbable suture material.

Results: The technique was carried out without significant perioperative complications; but one dog was in need of revision surgery secondary to post surgery compressive haemorrhage. All dogs survived to discharge from hospital and continued the medical treatment as indicated based on the underlying pathology. Medium/long term (4 months – 8 years) follow-up is reported in 7 dogs. 6 dogs improved neurologically and still alive, 3 dogs were euthanised at 1 (x2) and 8 months due to the primary neurological diseases Post-operative radiographs confirmed correct placement in 2 dogs with no radiographic evidence of fusion up 2 months; but osteosynthesis was radiologically visible at 1-year follow-up.

Conclusion: This study shows that cranial dorsal laminotomy “doffing” of C2 is a safe surgical technique. We propose that C2 “doffing” gives very good access to the dorsal aspect of cervical spinal cord within the axis without causing any instability. Delayed union of the laminotomy is a complication associated with this technique.

COMPUTED TOMOGRAPHIC MYELOGRAPHY FINDINGS IN THREE DOGS WITH INTRADURAL/INTRAMEDULLARY INTERVERTEBRAL DISK EXTRUSION (IIVDE)

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Intradiscal extrusion with hydrated or degenerated nucleus pulposus penetrating the dura mater is a rare type of intervertebral disk herniation. Extruded disk may be present in the subarachnoid space (intradural/extramedullary disk extrusion) or in the spinal cord parenchyma (intradural/intramedullary disk extrusion). Dogs with IIVDE usually present with peracute onset of neurological signs following a traumatic event or physical activity. IIVDE has been widely described on MRI, however to the authors’ knowledge there is only one case describing CT myelographic findings in the dog. Three cases with IIVDE were identified by means of CT myelography in the present study. Neurological examination showed severe paraplegia with loss of nociception in two dogs, and paraparesis in one dog. Plain CT images showed vacuum phenomenon and narrowing of the affected intervertebral disc space. CT following intrathecal injection of iodinated contrast medium disclosed a linear tract of intramedullary contrast accumulation extending from the ventral subarachnoid space through the cord. Surgical exploration by hemilaminectomy and durotomy confirmed the IIVDE in one dog. In two dogs, medical management was elected by the owner. The paraplegic dogs had an unsuccessful outcome and the paraparetic dog regained normal neurological function in two weeks.

PRELIMINARY VOLUMETRIC ASSESSMENT OF THE TEMPORAL LOBE IN DEAF DOGS

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Neural plasticity has been shown to occur in response to deafness in humans and animals. The influence of unilateral and bilateral deafness on the brain morphology of dogs is currently poorly understood. The aim of this study was to carry out a preliminary volumetric assessment of the temporal lobes and hemispheres in unilaterally and bilaterally deaf dogs and normally hearing controls. The study was carried out on 13 dogs divided into three groups: group A (unilaterally deaf dogs, n = 3), group B (bilaterally deaf dogs, n = 4)
and group C (normally hearing dogs, n = 6). Between 160 and 220 3D T1-weighted MRI images (TR 25; TE 4.8; FS 1.5; voxel size 0.75 × 0.75 × 0.375 mm) of the brain were assessed and the volume of the left and right hemisphere and temporal lobe (ROI, cm³) was segmented using a semi-automatic method (Horos, 2.1.1).

The temporal lobe volume ranged from 2.04cm³ to 4.57cm³ and occupied from 5.8% to 10% of the hemispheric volume in all groups. The intra-individual differences in the temporal lobe volume ranged from 0.9 to 8.6% in group A, B and C. We observed hemispheric asymmetry exceeding 5% in five of seven dogs from group A and B.

Our findings are preliminary and form the basis for a wider study aimed at determining whether deafness induces morphological changes in the canine brain. Neuroimaging may aid in our understanding of the plastic changes occurring in auditory and non-auditory regions of the canine brain in response to congenital and acquired deafness.

MARKED HYPOKALEMIA AS A PRELIMINARY SIGN IN A FELINE MENINGIOMA CASE

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An 11 year-old neutered female Chinchilla cat experienced two episodes of sudden collapse and cervical ventroflexion with marked hypokalemia (<2.5mEq/L). Her serum potassium level returned to normal after potassium supplement and only occasional weakness noted. However, while the patient was still hospitalized receiving potassium supplement, she presented a rapid drop of serum potassium level from 3.8mEq/L to 2.3mEq/L accompanied with neurologic signs including stupor, head turn to right, decreased vestibular eye movement, absent menace of left eye, and decreased left facial sensation. Neuroanatomic localization of right forebrain was made. MRI revealed a well demarcated, strong contrast enhanced extra-axial mass compressing right temporal and occipital lobes and creating trans-midline, trans-tentorial, tentorial craniotomy and histopathological confirmed as meningioma.

After tapering off the potassium supplement, the patient maintained normal to mild decreased serum potassium level post operation. Common causes of hypokalemia were investigated in this cat before the surgery and only the fractional excretion of potassium was found abnormal as high as 38. It is known the renal sympathetic system can be stimulated by intracranial pressure (ICP) surge, and the renin secretion rate is positively regulated by renal sympathetic tone. It was speculated that renal-angiotensin-aldosterone system due to elevated ICP may contribute the drastic change of serum potassium.

Considering intracranial abnormalities for complicated hypokalemic states, ICP elevation may contribute the drastic change of serum potassium. Common causes of hypokalemia were investigated in this cat before the surgery and only the fractional excretion of potassium was found abnormal as high as 38.

Neurological signs (NS) reported secondary to hypothyroidism include generalized polineuropathy, cranial nerves disorders, myasthenia...
Thoracolumbar intervertebral disk herniation (IVDH) with caudal articular process dysplasia/aplasia has been reported in aged Pugs. However, the relationship between the presence of congenital facet aplasia/hypoplasia and occurrence of IVDH currently remains unclear. The aim of this retrospective study was to investigate whether the numbers and severities of thoracolumbar caudal articular process anomalies are associated with IVDH in aged Pugs by examining images obtained using computed tomography. All aged Pugs (> 8 year old) with thoracolumbar CT scans acquired during 2011-2016 were sampled. A total of 42 Pugs were included. Thoracolumbar caudal articular process dysplasia/aplasia affected 37/42 dogs (88.1%). IVDH was detected in 10 dogs (IVDH group), and all the disk herniation sites were concomitant with articular process anomalies. Four dogs had histories of the chronic, progressive ataxia with intact nociception in the pelvic limbs. Thirty-two dogs did not have IVDH (Non-IVDH group), and none of these dogs had neurological deficits in the pelvic limbs.

The grades of thoracolumbar caudal articular process hypoplasia/aplasia determined by the number and severity of articular process anomalies in IVDH group were significantly severer than those of Non-IVDH group (p < 0.001). The occurrence of spondylosis deformans at the anomaly site was significantly higher in IVDH group than Non-IVDH group (p < 0.001). These results indicate that the number and severity of thoracolumbar caudal articular process anomalies correlated with the occurrence of IVDH and formation of spondylosis deformans, suggesting pathogenic roles of articular process anomalies in aged Pugs with progressive pelvic limb ataxia/paresis.

PREVALENCE OF SYRINGOMYELIA IN CAVALIER KING CHARLES SPANIELS OF GERMANY

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Syringomyelia (SM) is a widespread condition in Cavalier King Charles spaniels (CKCS) characterised by alteration of the cerebrospinal fluid flow, which causes formation of fluid-filled cavities within the parenchyma of the spinal cord. Routine magnetic resonance imaging (MRI) scans and recommended breeding programs are implemented for reducing the prevalence of clinical and early disease in Great Britain but is not yet systematically established in Germany. CKCS clubs in Germany basically rely on matching animals with very low degrees of relationship to limit undesired characteristics, with unknown effect on the prevalence of SM in the population.

The purpose of the present study was therefore to investigate the prevalence of SM within the CKCS breed of Germany. A total of 339 asymptomatic CKCS from all over Germany were included. Age ranged from 2.86 month to 11.21 years (mean 3.72 years ± 2.17 years). T1- and T2-weighted MR-images of the head and cranial cervical spine were obtained. Overall, 163 of 339 (48.1 per cent) CKCS had a proved evidence of SM. The results proved findings of other studies, in which an increasing risk of developing SM with age has been found (odds ratio of 1.27 per year; P < 0.0001).

In conclusion almost half of the dogs within the CKCS population of Germany seems to be effected by SM. Although MRI examinations as a basis for breeding strategies are not established for the CKCS in Germany, the prevalence of SM is similar to that of CKCS breed in Great Britain.
Leishmania DNA in the CSF was detected by PCR. An ELISA test for anti-Leishmania antibodies in serum was 1/80 (ref.<1/80) and the proteinogram was normal. Meglumine antimoniate 100mg/kg SID SC for 30 days and allopurinol 10 mg/kg BID PO were initiated. Three days later the dog showed only mild ataxia and four months later, is neurologically normal.

Numerous clinical syndromes have been associated with canine leishmaniasis including intracranial, spinal cord or peripheral nervous system signs. However, only a few reports have shown the presence of inflammation directly linked to the visualization of amastigotes in nervous tissue.

Leishmania-induced arthritis has been reported previously, but never affecting the OAA joint and causing compressive myelopathy. Therefore, leishmania-induced arthritis should be included in the differential diagnoses of compressive myelopathy of the OAA joint in endemic areas, even in the absence of clinicopathological evidence of the disease.

ISOCITRATE DEHYDROGENASE 1 EXPRESSION IN CANINE GLIOMAS

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Isocitrate dehydrogenase 1 (IDH1) catalyses the oxidative decarboxylation of isocitrate to α-ketoglutarate in the citric acid cycle and is the primary producer of NADHP in the brain. A point mutation in the IDH1 gene at codon 132 (IDH1R132H) results in the substitution of amino acid arginine, which reduces α-ketoglutarate production and inhibits IDH1 wild-type activity. In people this mutation occurs in up to 100% of low grade gliomas and secondary glioblastomas. The presence of the IDH1R132H mutation is generally associated with a better prognosis and enhanced chemosensitivity, particularly to temozolomide. The IDH1R132H mutation can be diagnosed by immunohistochemistry and is the target of numerous therapeutic agents under investigation.

The objectives of the current study were to evaluate canine gliomas for IDH1-wild type and the IDH1R132H gene mutation using immunohistochemistry. Additionally, to determine the presence of the IDH1R132H mutation is associated with tumour histologic type and grade.

Formalin-fixed paraffin-embedded canine gliomas were examined for IDH1-wild type and IDH1R132H expression. Specimens were reported as being either positive or negative for expression. Twenty-nine canine gliomas were examined and IDH1-wild type expression was identified in 29/29 (100%) tumours, while IDH1R132H expression was identified in 0/29 tumours. While the IDH1R132H mutation occurs commonly in low grade human gliomas, the mutation was not identified in this study population. Therefore the IDH1R132H mutation may not be a suitable treatment target in canine gliomas. Further investigation is required to determine if other IDH1 point mutations occur in canine glial tumours.

MRI FINDINGS IN TWO WEST HIGHLAND WHITE TERRIER DOGS WITH HEPATIC ENCEPHALOPATHY SECONDARY TO PORTOSYSTEMIC SHUNT

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A portosystemic shunt (PSS) is an abnormal communication between the portal vascular system and the systemic circulation. A significant number of the clinical signs associated with PSS result from hepatic encephalopathy (HE) involving a variety of neurological signs, including changes in behaviour, ataxia, unresponsiveness, pacing, circling, blindness, seizures, coma and death.

We present two West Highland white terrier dogs were diagnosed with hepatic encephalopathy based on clinical signs, bile acid stimulation test and imaging of the abnormal vessel communicating the portal and the systemic circulation. MRI sequences of the brain revealed a poorly marginated and diffuse, bilateral and symmetric hypointense lesions on T2W, FLAIR and DWI sequences relative to the brain parenchyma at the level of the medial longitudinal fasciculus and reticular formation in the brainstem and the thalamic nuclei. No abnormalities were detected on T1W sequences.

Similar MR imaging findings were found in a rat model of hepatic encephalopathy induced by intraperitoneal administration of thioacetamide. These findings were attributed to the production of ammonia and increase in number and size of astrocytes in the nucleus tractus solitarii and the terminal site of baroreceptor afferents in brain stem and rostral ventrolateral medulla, which lead to cytotoxic oedema in the brainstem. We speculate that a similar process occurred in these dogs. This case series reports MRI abnormalities at the level of the brainstem in dogs suffering with hepatic encephalopathy secondary to a portosystemic shunt.

EVALUATION OF THE USE OF A SURGICAL ASPIRATOR OR HYDROXYUREA IN THE LONG TERM SURVIVAL OF DOGS UNDERGOING INTRACRANIAL SURGERY FOR MENINGIOMA RESECTION

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Current literature into the use of a surgical aspirator or hydroxyurea administration as adjuncts to traditional intracranial surgery for canine meningioma resection is limited. Both are thought to be associated with longer survival times and our aim is to evaluate this association further.

Medical records were searched and identified dogs that underwent intracranial surgery for meningioma resection. Dogs were included if they had a histopathologically confirmed meningioma surgically removed with complete medical records. 32/34 dogs identified survived to discharge. Long term follow up was attained for 29/32. The median age was 10 years (range: 5-12.5 years). 59% (17/29) had a surgical aspirator used. 34% (10/29) were administered hydroxyurea with 31% (9/29) having had both. 5/29 dogs are still alive at the time of writing with 24 having died, 17 of which were euthanized due to a worsening of their neurological signs. Kaplan-meier survival analysis was performed with the overall median survival time for all dogs being 20.4 months (range: 2.1-48.1months). The median survival time of the surgical aspirator...
group was 23.1 months (range: 4.4-45months) compared to 13.0 months (range:2.1-48.1months) for those that underwent traditional surgery (P = 0.602). The median survival time for the hydroxyurea group was 21.5 months (range: 4.4-45months) compared to 15.2 months (range:2.1-48.1months) for those that didn’t receive hydroxyurea (P = 0.930).

Whilst the difference in median survival times in dogs that were administered hydroxyurea or had a surgical aspirator used and those that underwent traditional surgery without chemotherapy were not statistically significant, this could be due to the small sample size of the study.

HYPERNATREMIA IN DOGS WITH TRAUMATIC BRAIN INJURY
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HYPERNATREMIA IN DOGS WITH TRAUMATIC BRAIN INJURY is a frequently occurring disease in small animals. For planning treatment and to improve communication with the owners prognostic biomarkers for survival and outcome are useful. In the current study a biomarker which can be measured easily and fast in Intensive Care Units should be evaluated. Serum sodium-levels were chosen because central diabetes insipidus can be induced by traumatic brain injury and is reflected by hypernatremia.

In this retrospective study serum sodium-levels of 158 dogs with TBI and of 169 dogs with trauma without involvement of the head (EHT) were compared.

20.89% of dogs with TBI died and 8.28% with EHT. In 37.34% of TBI-patients and 21.9% of dogs with EHT serum-sodium-levels were increased. In consequence of the trauma, 22.04% with TBI and hypernatremia died, but only 2.69% of EHT with hypernatremia did not survive. The cut-off point for TBI-patients with hypernatremia and non-survival within the first 24 hours was a serum sodium value of >160 mmol/l.

In the current study, TBI-patients had a higher risk to die than dogs with EHT. Dogs with hypernatremia and TBI had a higher mortality rate whereas dogs with normal sodium-levels had a better chance of survival. In conclusion, serum sodium-levels in TBI-patients can be used as prognostic factor in combination with clinical findings.

MYELINOLYSIS (OSMOTIC Demyelinating Syndrome) IN A CAT: CLINICAL PRESENTATION, INITIAL MRI FINDINGS WITH FOLLOW-UP MRI AND OUTCOME
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A 1.5-year-old male neutered domestic short-haired cat was presented for investigation of bilateral central blindness. Relevant history included intermittent hematuria associated with bladder urolith; acute onset anorexia, severe dehydration and azotemia. Blood test at the referring clinic revealed severe hyponatremia (106 mmol/l, normal 150-165), hyperkalemia (8.2 mmol/l, normal 3.5-5.8), hypochloremia (77 mmol/l, normal 109-122), and severe azotemia (BUN and creatinine off scale). Intravenous fluid therapy was commenced: within 26 hours, Na raised to 120 mmol/l and by 72 hours, Na was 143 mmol/l and azotemia resolved. The cat developed blindness 7 days after the initial blood test. Neurological examination revealed intermittent body tremor, twitching of the ear pinnae and ambulatory tetraparesis. Cranial nerve exam revealed bilateral absent menace response, normal PLRs, dazzle reflex was present, normal fundic exam and vestibulo-ocular reflex.

MRI showed bilateral symmetrical lesions in the thalamus, grey matter of the temporal, parietal and frontal lobes. Lesions were hyperintense on T2WI, T2* and T2-FLAIR sequences, hypointense on T1WI with no contrast enhancement. Cerebellomedullary CSF analysis was unremarkable. Repeated MRI performed 11 days later showed reduction of lesion intensity. The cat’s vision had returned to normal although a fine tremor persists. Follow-up 1 month later the cat was clinically normal.

This is the first case report describing a cat with myelinolysis. The thalamic lesions resemble the canine cases, but differs to humans where lesions were confined to the pontine area. The bilateral cerebral lesions in this cat were unique. Follow-up MR showing subsiding lesions correlate well with neurological improvement.

HYPERNATREMIA IN DOGS WITH TRAUMATIC BRAIN INJURY
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In the current study a biomarker which can be measured easily and fast in Intensive Care Units should be evaluated. Serum sodium-levels were chosen because central diabetes insipidus can be induced by traumatic brain injury and is reflected by hypernatremia.

In this retrospective study serum sodium-levels of 158 dogs with TBI and of 169 dogs with trauma without involvement of the head (EHT) were compared.

20.89% of dogs with TBI died and 8.28% with EHT. In 37.34% of TBI-patients and 21.9% of dogs with EHT serum-sodium-levels were increased. In consequence of the trauma, 22.04% with TBI and hypernatremia died, but only 2.69% of EHT with hypernatremia did not survive. The cut-off point for TBI-patients with hypernatremia and non-survival within the first 24 hours was a serum sodium value of >160 mmol/l.

In the current study, TBI-patients had a higher risk to die than dogs with EHT. Dogs with hypernatremia and TBI had a higher mortality rate whereas dogs with normal sodium-levels had a better chance of survival. In conclusion, serum sodium-levels in TBI-patients can be used as prognostic factor in combination with clinical findings.

SPONTANEOUS TENSION PNEUMOCEPHALUS IN A DOG WITH A NASAL MENINGOENCEPHALOCOELE
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In veterinary literature, tension pneumocephalus has only been reported secondary to cranial surgery or trauma. In humans, non-traumatic/spontaneous pneumocephalus has been reported secondary to sinus pathology, otogenic causes and meningoencephalitis. In some cases, clinical and advanced imaging-confirmed resolution has been reported with conservative management.

A 1.5 year old neutered male Border Collie was presented with acute neurological deficits localised to the left forebrain. The dog had a previous history of severe cluster seizure activity associated with a nasal meningoencephalocoele, diagnosed at four months old. MRI revealed the previously described meningoencephalocoele was unchanged. Intraventricular pneumocephalus of the left lateral and third ventricles was present with a gas-filled tract, associated with focal contrast-enhancement, connecting the left olfactory recess to the rostral aspect of the intra-nasal brain parenchyma. CSF analysis was unremarkable and bacterial culture was negative. Surgical intervention was declined by the owner.

Transient improvement, despite MRI-demonstrated progression of pathology, occurred with medical management. The dog was euthanased eight months post-diagnosis due to progressive neurological deterioration. Post-mortem examination confirmed the meningoencephalocoele and unilateral (left) air-filled cavity with concurrent compression and atrophy of the surrounding white and grey matter.

This is the first report of intraventricular tension pneumocephalus secondary to nasal meningoencephalocoele in a dog and the first reported canine case of spontaneous pneumocephalus.

THE UTILITY OF INTRAOPERATIVE SQUASH CYTOLOGY OF INTRACRANIAL GRANULAR CELL TUMORS: 3 CASES
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Histopathology has been the gold standard for diagnosing intracranial neoplasia in veterinary medicine. However, results can take up to 10-14 days, delaying decisions in regard to treatment and prognosis. Alternative methods such as intraoperative squash and touch imprint cytology have been implemented in human medicine and found to have a strong correlation between cytology and histopathology. There is limited data utilizing intraoperative cytology in veterinary medicine, let alone comparing it to histopathology.

Three cases are presented in which intraoperative cytology led to a diagnosis of granular cell tumor (CGT) and were confirmed via histopathology. One adult female spayed and two adult male castrated dogs presented for seizures; all had neurologic examinations consistent with intracranial disease. Magnetic resonance imaging (MRI) of all dogs revealed extra-axial, contrast-enhancing meningeval lesions. Surgical biopsy was performed in all three cases along with intraoperative squash cytology. Cytologic examination was consistent with a diagnosis of GCT and confirmed on histopathology in all three cases. While GCT is the most common intracranial neoplasm in the rat and has been reported extracranially in several species, it is rarely diagnosed in the central nervous system (CNS) of dogs. The cases reported here are unique in that they reveal an accurate intraoperative cytologic diagnosis of a rare CNS canine neoplasm.

In conclusion, intraoperative cytology of intracranial masses may rapidly provide clinicians with important diagnostic information, therefore expediting decisions made intraoperatively. Further research is warranted to determine the diagnostic accuracy of intraoperative cytology for neoplasia in veterinary patients.

A PRELIMINARY ASSESSMENT OF COGNITIVE IMPAIRMENTS IN CANINE IDIOPATHIC EPILEPSY

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In humans, epilepsy and anti-epileptic drug (AED) treatment are observed to induce or accelerate cognitive impairment, with negative impacts on vital areas of cognition including learning and memory. To our knowledge, there remains a lack of research into the impact of idiopathic epilepsy (IE) on cognitive ability in dogs. The purpose of our study was to assess two areas of cognition: problem-solving ability and spatial working memory, in dogs with IE.

Dogs with IE (n = 15) were compared against breed and age-matched controls (n = 14) in their performance in two practical tasks previously validated for the assessment of canine cognitive dysfunction (CCD); a food searching task designed to assess spatial working memory, and a problem-solving task. Each owner also completed a questionnaire, the canine cognitive dysfunction rating scale (CCDR), previously validated for assessment of CCD.

Age did not significantly differ between groups (IE mean age: 6 months, controls: 63 months). All but one of the IE group received AED treatment. Dogs with IE performed significantly poorer than controls on the spatial working memory task but not on the problem-solving task. CCDR scores did not differ between groups, with no dogs reaching the threshold for canine cognitive dysfunction diagnosis.

Our preliminary data suggests that dogs with IE exhibit impairments in spatial working memory, an effect also seen in children with epilepsy and rodent models. Further research is required to confirm this effect in a larger sample, and explore the effect of IE and AEDs on other cognitive abilities e.g. learning speed and attention.

MAGNETIC RESONANCE AND ULTRASOUND FINDINGS IN A CASE OF A LIMBER TAIL SYNDROME (COCCYGEAL MYOPATHY) IN A DOBERMAN

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A two and half-year-old non-docked Doberman dog presented with abnormal tail carriage, suspected lumbosacral pain and hindlimb collapsing episodes following strenuous exercise. Neurological examination revealed a painful parietal tail and biochemistry revealed a raised creatinine kinase. Neuroanatomical localisation was consistent with coccygeal spinal segments, nerve roots, corresponding nerves or muscles.

Magnetic resonance imaging of the lumbosacral region and tail revealed a well-circumscribed lesion in the right epaxial muscles, dorsal to the sacrum at the level of S2. The mass revealed an hyperintense rim surrounding an iso-hypointense center on T1-weighted, T2-weighted and STIR, compared with surrounding normal muscle, with strong peripheral-rim contrast enhancement. Differential diagnosis for a contrast-enhancing lesion affecting muscle included: limber tail syndrome, rhabdomyolysis, abscess, granuloma, foreign body myopathy, myositis or neoplasia.

Ultrasound revealed an irregular appearance with disruption of the normal muscle layering and a relatively well defined, focal lesion with a mixed echogenicity in the region corresponding to MR findings. On fine-needle aspiration cytology no inflammatory cells were found. Based on anamnesis, clinical signs and imaging findings, a presumptive diagnosis of a limber tail syndrome (coccygeal myopathy) was made. The dog was sent home on meloxicam and restricted exercise. At both 1-month recheck at the hospital and 6-months at the referring veterinarian, full resolution of clinical signs and no recurrence were detected.

To our knowledge, this is the first report describing ultrasound characteristics of a coccygeal myopathy in a Doberman with correlated MR findings.

CLINICAL FINDINGS AND OUTCOME OF DOGS WITH UNILATERAL MASTICATORY MUSCLE ATROPHY

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Unilateral masticatory muscle atrophy (MMA) is a consistent clinical feature in dogs with trigeminal nerve sheath tumours (TNST). The purpose of this study was to identify other possible underlying conditions for this presentation and to evaluate progression and outcome of these cases.
Sixty-three dogs that underwent magnetic resonance imaging (MRI) for further evaluation of unilateral MMA were retrospectively included. Presumptive TNST was diagnosed in 30 dogs, other extra-axial mass lesions in 13 dogs, in 18 dogs no abnormalities other than unilateral MMA were seen and two dogs presented with unilateral MMA and sciatic neuropathy. For dogs with TNST, three were euthanised at time of diagnosis and mean survival of the remaining dogs was 7.3 months. Of the dogs diagnosed with other extra-axial mass lesions, six were euthanised immediately following diagnosis, mean survival time of the remaining cases was six months. For the dogs with no other abnormalities than unilateral masticatory muscle atrophy, one was euthanised at the time of diagnosis, four were lost to follow up and 10 did not experience any neurological progression, while the remaining three dogs experienced neurological progression. Although this study confirms that TNST is the most common cause of unilateral MMA, this clinical sign was caused by other conditions in more than half of included dogs. In a proportion of dogs, no additional intracranial abnormalities could be seen on MRI. Although the underlying etiology of these dogs remains therefore unclear, the results of this study suggest a mixture of benign and more malignant underlying conditions.

**MAPPING MORPHOLOGICAL CHANGE IN CAVALIER KING CHARLES SPANIELS WITH CHIARI-LIKE MALFORMATION ASSOCIATED PAIN**

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Chiari-like malformation (CM) is a complex malformation of the skull and cranial cervical vertebrae occurring ubiquitously in the Cavalier King Charles spaniel (CKCS). It is characterized by rostro-caudal bony insufficiency with conformational change of the brain and cervical spinal cord, particularly at the craniocervical junction. Although many dogs are asymptomatic, a proportion have behavioural signs of pain. MRI characteristics of CM-pain are increased brachycephaly, rostral forebrain flattening, short basifrontal and compensatory increased cranial height. However, diagnosis of this complex condition is challenging and previous MRI morphometric mapping studies resulted in only 68% accuracy for correctly classifying the phenotype.

To better understand morphological change in CM a novel machine learning approach was developed: 41 CKCS were grouped into normal and CM pain classes, based on clinical signs, history and MRI. CKCS with syringomyelia were excluded. A midline sagittal MRI of the head and neck of a typical CKCS with CM-pain was chosen as a reference. The remaining 40 MR images were mapped to the reference image using DEMONS (non-linear) image registration, producing a 2D deformation map for each case. Pixel direction and magnitude of the mapping deformation were used as candidate features for automatically identifying CM-Pain from normals using a Support Vector Machine classifier. This produced an accuracy of >84%. The classifier results were mapped back to the reference image, which demonstrated morphological change in the soft palate.

The findings from this study will be used to direct future work in improving the diagnosis and understanding the pathogenesis of the condition.

**DORSAL ATLANTOAXIAL LIGAMENT HYPERTROPHY AS A CAUSE FOR CLINICAL SIGNS IN DOGS WITH INSTABILITY DUE TO DENS MALFORMATION**

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The purpose of this study is to acknowledge atlantoaxial (AA) instability as a cause for dorsal AA ligament hypertrophy responsible for clinical signs in dogs. Clinical database of four dogs with dens malformation and dorsal spinal cord compression at the AA junction was collected.

All dogs presented were elderly (median age 8 years) and showed cervical pain, in three of them associated with tetraparesis. Radiological examination revealed hypoplastic dens in two dogs and a defect in its ossification the other two. Stress views demonstrated AA instability (an increase in the space between the atlas lamina and the spinous process of C2) only in one case. This patient was treated by means of ventral fixation. Instability was suspected in the remaining cases due to the presence of AA ligament hypertrophy. It was confirmed in one of them, in which joint luxation occurred after dorsal decompression. The AA joint was surgically stabilized afterwards. One other dog was treated in a two-step surgical procedure including ventral stabilization and dorsal decompression. Surgery was declined in the remaining dog. Surgical and histopathological examination of compressive tissue confirmed the hypertrophied nature of the ligament. Long term prognosis in the three operated cases was excellent.

In elderly animals a malformative dens can cause subclinical instability, unnoticed in dynamic studies. Soft tissue changes (namely dorsal AA ligament hypertrophy) points out this instability and the need for joint fixation if surgical management is required.

**RECURRENT MAGNETIC RESONANCE IMAGING PATTERN IN RETRIEVER DOGS WITH MENINGOENCEPHALITIS OF UNKNOWN ORIGIN: A NEW BREED-RELATED VARIATION?**

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The etiology of meningoencephalitis of unknown origin (MUO) in dogs is thought to be multifactorial. A genetic component is suspected in view of its breed predisposition. Single cases affecting Retriever-breed dogs seem to have a unique pattern of lesion distribution.

The aim of this retrospective observational study was to describe the clinical and magnetic resonance imaging (MRI) features of MUO in Retrievers. The clinical records and MRI studies of Retriever-breed dogs presented to two referral hospitals between 2006 and 2017 and diagnosed with MUO were reviewed.

Eleven dogs (aged between 1-10 years) were included in the study. Neurological deficits indicated the following anatomic diagnosis: central vestibular (8/11), diencephalon (5/11), brainstem (5/11). MRI revealed extensive diffuse, bilateral asymmetrical, T2W and FLAIR hyperintense to grey matter intra-axial lesions with ill-defined margins and an overall heterogeneous “patchy” appearance in all cases. Distinct multifocal lesions were seen in 3 cases. The MRI lesions involved the thalamus (10/11) and mesencephalon (10/11), extending to the pons (8/11), medulla oblongata (7/11) and basal nuclei (4/11), with a
separate lesion in the cerebellum in one dog. Mild lesion contrast enhancement was noted in 9 cases, meningeal contrast enhancement was seen in 4 cases. All dogs had inflammatory CSF analysis. This characteristic lesion pattern will be compared to other small and large-breed dogs.

Diffuse "patchy" bilateral asymmetrical lesions extending through thalamus and brainstem are a recurring pattern in Retrievers that could constitute a breed-related variation of MUO and holds interesting similarities with the pattern of human Japanese Encephalitis.

ACCUMULATION OF TRANS-CINNAMOYLGLYCINE IN THE URINE OF FIVE CATS WITH NEUROLOGICAL SIGNS

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Two Domestic Shorthaired cats (DSHs), one Persian, one Domestic Longhair (DLH) and one Bengal were evaluated at 0.5-4 years old (the Bengal’s age was unknown).

Both DSHs presented with epileptic seizures, lethargy, impaired vision and pelvic limb ataxia and paresis. One also exhibited poor development, learning difficulties and impaired hearing. The Persian had a history of intermittent paraparesis; examination was consistent with generalised polyneuropathy. The DLH showed poor development, diffuse muscle atrophy, tetraparesis and generalised tremors, and the Bengal presented with intermittent cerebellar ataxia of the pelvic limbs. The DSHs, Persian and DLH developed neurological signs as kittens; age of onset was unknown in the Bengal.

Diagnostic investigations included haematology and serum biochemistry, total T4, bile acid stimulation test, genetic testing for GM1 gangliosidosis, serology for infectious agents, urinalysis, urine culture, abdominal imaging, orthopaedic radiographs, MRI of the brain and spine, CSF analysis, electrodiagnostics, muscle histopathology and metabolic testing including quantitative urine organic acid analysis and plasm amino acid analysis. Urine organic acid analysis revealed accumulation of trans-cinnamoylglycine in all cats. Electrodiagnostics in DSH1 confirmed bilateral hearing impairment. The Persian exhibited neuropathic leukocytosis, struvite crystaluria and electrodiagnostics consistent with axonopathy. Muscle histopathology in the DLH was suggestive of mild denervation and an underlying metabolic abnormality. The remaining investigations were unremarkable.

Follow-up was seven years for the DLH and 1-5 months for the other four cats. No significant progression of neurological signs was observed.

The cause-effect relationship between neuronal dysfunction and accumulation of trans-cinnamoylglycine in urine is currently unknown in cats.

NEGATIVE EFFECTS OF EPILEPSY AND ANTI-EPILEPTIC DRUGS ON TRAINABILITY IN DOGS WITH NATURALLY OCCURRING IDIOPATHIC EPILEPSY

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Epilepsy and anti-epileptic drug (AED) treatment induce or exacerbate underlying cognitive impairments in people, affecting learning ability and attention. Whether idiopathic epilepsy (IE) in dogs impairs cognition has not yet been explored. The aim of this study was to investigate whether IE and/or AED treatment compromise the trainability of dogs with IE compared to controls.

An online cross-sectional study was conducted, resulting in a sample of 4051 dogs, of which 286 dogs had been diagnosed with IE. Owners reported their dog’s trainability using a previously validated research questionnaire, alongside with their dogs’ training and clinical histories. Four factors were significantly associated with trainability in a generalised linear mixed model: (i) epilepsy diagnosis: dogs with IE had significantly lower trainability than controls; (ii) age: dogs aged >12 years had significantly lower trainability than all other age groups; (iii) adult training score: dogs with more experience of training activities had higher trainability; and (iv) training method: dogs whose owners used a mix of both reward- and punishment-based methods had lower trainability than those using reward-based methods exclusively. Within the sub-population of dogs with IE, dogs treated with (i) polytherapy (2 or 3 AEDs), (ii) zonisamide and/or (iii) potassium bromide exhibited lower trainability.

This study provides preliminary evidence of cognitive impairment associated with IE and AEDs, as assessed by a metric of trainability. Further study is required to characterise these deficits. However, if confirmed, more consideration of the effects of AEDs will be required, and strategies to enhance cognition in affected dogs should be explored.

TOXOPLASMA SEROLOGY IN DOGS IN THE UNITED KINGDOM: ESTIMATED SEROPREVALENCE AND CLINICAL SIGNIFICANCE IN NEUROLOGICAL DISEASE

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Toxoplasma gondii is an intracellular protozoan parasite with a worldwide distribution, regarded as an important zoonotic organism and a potential cause of disease in companion animals. In the United Kingdom (UK), screening for serum antibodies against T. gondii is frequently performed in dogs, particularly those presenting with neurological signs. However, the expected seroprevalence and the potential clinical significance of a positive serum titre remain unclear. A retrospective study was performed to estimate the seroprevalence of T. gondii antibodies in UK dogs with a clinical suspicion of protozoal disease. Commercial laboratory database searches yielded a sample of 4052 dogs for which serum was submitted from practices for indirect fluorescent antibody testing (IFAT). Follow up data was gathered on a subgroup of 62 seropositive dogs referred for specialist neurological assessment at four veterinary referral centres.

Serum antibodies to T. gondii were detected in 514 dogs, giving an overall seroprevalence of 12.7% within the group tested (10.6% IgG only, 1.4% IgM only, 0.7% both IgG and IgM). In the follow up group, no dogs (0%) had a final clinical diagnosis of toxoplasmosis. This study is the first to document a seroprevalence for antibodies against T. gondii in UK dogs, within a population most closely
comparable to those presented in clinical veterinary practice. The results suggest the need for caution in the interpretation of a positive serum titre. Further studies are required to determine the clinical significance of T. gondii infection in dogs in the UK and the seroprevalence in the general dog population.

**SURGICAL TREATMENT OF THORACIC SPINAL FRACTURES AND LUXATIONS IN 6 DOGS USING TRANSTHORACIC APPROACH**

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Proper visualization of the vertebral bodies and intervertebral discs is required with surgical management of fractures and/or luxations. In such cases precise implant placement is mandatory to allow stabilization, realignment and/or arthrodesis. Traditional dorsal approach to the upper thoracic spine does not give adequate vertebral body and intervertebral discs exposure. This study describes clinical signs, radiological findings, surgical management, prognosis and complications in 6 dogs with fractures or luxations affecting the thoracic spine managed via transthoracic approach.

All but one dog were paraplegic with intact nociception. Fractures affected T7 and T10 vertebral bodies and luxations affected T4-T5, T8-T9, T9-T10 and T11-T12 intervertebral joints. All lesions were caused by severe thoracic trauma. All dogs had single vertebral lesions except for the dog with T8-T9 luxation that also had dorsal compression due to costovertebral luxation, requiring an additional dorsal approach. Realignment and stabilization was considered adequate with radiographic evidence of proper implant placement in all dogs. None of them neurologically deteriorated after surgical stabilization. Four dogs recovered complete ambulation. Two of them developed late onset discospondylitis (one year after surgery). Two dogs died due to respiratory compromise (pulmonary edema in one case and hemothorax in the other) 5 and 10 days after surgery respectively.

Transthoracic approach provides excellent visualization of thoracic vertebral bodies allowing correct fixation and realignment. Nevertheless this approach should be considered cautiously in cases with severe thoracic trauma with pulmonary disease as it can be exacerbated.

**IMAGING FEATURES OF THORACIC DISCOSPONDYLITIS IN A HORSE**

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Discospondylitis is an infection of the intervertebral disc and adjacent endplates of the associated vertebrae. A 9-year-old Andalusian stallion was presented with a history of progressive back stiffness and unwillingness to lower its head. Physical examination showed marked symmetric epaxial and gluteal muscle atrophy. Neurological examination revealed symmetric hindlimb paresis and severe pain on palpation of the thoracic spine. Scintigraphic examination showed a focal area of marked increased radiopharmaceutical uptake within the vertebral bodies of T16 and T17 and 17th ribs. Subsequent radiographic examination revealed a poliostotic lytic lesion within the ventral portion of the vertebral bodies of T16-T17 surrounded by an ill-defined area of increased opacity. Irregularly-margined bone proliferation surrounding 17th costovertebral junctions was identified on ultrasound. Blood tests showed hyperfibrinogenemia and haemoculture was negative. Main differential diagnosis was discospondylitis, given the poor prognosis the patient was euthanized. On necropsy a solid mass (15 × 10 × 5cm) was identified at T16-T17. The surrounding musculature was severely atrophied. Post-mortem magnetic resonance (MRI) and computed tomography (CT) examinations were performed. The T16-T17 intervertebral disk was distorted, showing increased signal intensity on T2W and STIR images and bulging into the vertebral canal. The opposing vertebral endplates were lytic and had ill-defined mineralization. There was marked irregularly-shaped bone proliferation surrounding the vertebral bodies of T16-T17 and 17th ribs, extending into the vertebral canal. Culture from the disc space was negative. Histopathological examination confirmed the suspicious of T16-T17 discospondylitis. Discospondylitis is infrequently reported in horses. MRI and CT features has not been described before in adult horses.

**LUMBOSACRAL INTERVERTEBRAL DISC EXTRUSIONS IN DOGS: CLINICAL SIGNS, IMAGING CHARACTERISTICS AND OUTCOME FOLLOWING SURGERY**

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Intervertebral disc extrusion (IVDE) is a common condition in dogs. It is generally observed in the cervical and thoracolumbar vertebral column but very rarely reported at L7-S1. The aim of this study was to describe the clinical signs, MRI findings and outcome following surgical treatment of lumbosacral IVDE. Medical records and corresponding MRI studies of dogs with intraoperatively confirmed lumbosacral IVDE presented to two referral hospitals between 2011 and 2017 were reviewed.

Eleven dogs were included in the study. All dogs had lumbosacral pain and nerve root signature, and eight dogs had neurological deficits. MRI revealed lateralized herniated disc material and partial to complete disc degeneration in all cases; the extradural material was not confined to the disc space in eight cases. All dogs underwent an L7-S1 dorsal laminectomy and removal of extruded disc material; nine had concomitant fenestration of the disc. In six dogs, surgery was complicated by spinal nerve thickening and/or adhesions between neural and surrounding tissues including one case of histopathologically confirmed epidural fistula. Satisfactory decompression was achieved in all cases. Re-examination four weeks post-surgery revealed complete resolution (7/11) or improvement (2/11) of clinical signs. At that stage, outcome was graded poor in the remaining two dogs, due to contralateral nerve root signature in one case and to persistent signs in the case with fistula. The latter showed a substantial improvement four months post-surgery.

This is the first case series to report the clinical presentation, MRI features, associated complications and post-operative outcome in dogs with lumbosacral IVDE.
LONG TERM FOLLOW UP RESULTS OF FORAMEN MAGNUM DECOMPRESSION AND SYRINGOSUBARACHNOID SHUNTING COMBINATION FOR THE MANAGEMENT OF SYRINGOMYELIA IN 27 DOGS: CLINICAL CASE STUDY

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Chiari-like malformation (CM) is a congenital developmental malformation of caudal occipital bone causing an overcrowded caudal occipital fossa and cervicomedullar junction, altering cerebrospinal fluid (CSF) flow, and resulting syringomyelia (SM).

Clinical presentation of dogs with SM is variable but pain appears to be the main indication of surgical treatment, and there is a correlation between syrinx width and neuropathic pain. Foramen magnum decompression (FMD) is the most common procedure done to reorganize CSF flow but has almost no effect on present syringomyelia, and shunting is necessary to empty the fluid load in syrinx cavity.

In this study, 27 dogs with CM and severe SM with the symptoms of pain and/or cervical myelopathy were treated by FMD and syringosubarachnoid shunting (SS shunting). After FMD, meningeal marsupialization was also performed in all cases, and for SS shunting, dorsal laminectomies were performed at the level of largest syrinx cavity. After durotomy 5F catheter was placed as one end protrudes to syrinx cavity and other end to subarachnoid space. Catheters were secured to dura to prevent migration.

All cases were followed up postoperatively with neurologic examinations, owner consultations, and magnetic resonance imaging at least for a two years period, and the results compared with preoperative findings. After the study it was concluded that FMD and SS shunting has minimum effect on symptoms like scratching, air licking, facial rubbing etc. but relatively effective on pain and improving neurological symptoms. Severe complications and need for a second surgery is found rare.

EFFECT OF IMEPITOIN WITHDRAWAL IN DOGS WITH IDIOPATHIC EPILEPSY WELL-CONTROLLED WITH IMEPITOIN AND PHENOBARBITAL AND/OR POTASSIUM BROMIDE

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Phenobarbital or potassium bromide (KBr) add-on treatment significantly decreases median monthly seizure frequency (MSF) in dogs with idiopathic epilepsy (IE) refractory to a maximum dose of imepitoin. The importance of continued administration of imepitoin in these patients is currently not known. The goal of this study was to assess whether imepitoin withdrawal would reduce epileptic seizure control significantly.

This study was performed as a prospective clinical trial. Epileptic seizure control was evaluated by comparing the median MSF of 13 dogs with well-controlled IE on a combination of imepitoin and phenobarbital and/or KBr during a period of 3 to 6 months, with a prospective follow-up period of 6 to 12 months after withdrawal of imepitoin. Adverse effects were also recorded before and during the follow-up period. Thirteen dogs with IE were included of which 4 were treated with imepitoin and phenobarbital, 7 with imepitoin and KBr and 2 with imepitoin, phenobarbital and KBr. Imerpitoin was tapered-off over 3 months: 20mg/kg twice daily for 1 month, then 10mg/kg twice daily for 1 month and then once daily for 1 month.

Median MSF did not increase significantly after withdrawal of imepitoin (P = 0.9). Moreover, all owners reported improvement in the amount of adverse effects experienced by their dog after withdrawal of imepitoin.

It is concluded that imepitoin withdrawal in dogs well-controlled with imepitoin and phenobarbital and/or KBr does not affect epileptic seizure control significantly, and may even cause improvement in antiepileptic treatment-related adverse effects.

CANINE SPINAL EPIDURAL EMPIEYA: SURGICAL VS. NON-SURGICAL MANAGEMENT, A RETROSPECTIVE REVIEW OF 27 CASES

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Spinal epidural empyema (SEE) is an accumulation of purulent material between the spinal dura mater and vertebral periosteum. Whether superior outcomes are achieved with surgical or non-surgical treatment remains unknown. Our aim was to compare the outcome in dogs with SEE treated surgically with those treated non-surgically. Both groups received antibiotics and analgesia.

Retrospective analysis of medical records was performed on all dogs diagnosed with SEE between January 2000 and December 2016 at two referral institutions. Twenty-seven cases were reviewed, of which 16 were treated surgically and 11 non-surgically. Median neurological grades at presentation for the surgical and non-surgical cohorts were 3 (mean 2.6 ± 0.9, 1-4) and 2 (mean 1.8 ± 0.4, 1-2) respectively. The median time between the development of the first clinical signs and diagnosis was 10 days (mean 13.7 ± 12.2 days) for the surgically-treated patients and 19 days (mean 19.7 ± 13.9 days) for the non-surgically-treated cases. Among the surgical cohort outcome was successful in 13/16 (81.3%) cases and poor in three (18.8%). In the non-surgical cohort, outcome was successful in 10/11 (90.9%) cases and poor in one (9.1%). Dogs with a successful outcome had median neurological grades at presentation of 1 (mean 1.1 ± 0.9, 0-2) and 0.5 (mean 0.7 ± 0.8, 0-2) in the surgical and non-surgical groups respectively.

In conclusion, both non-surgical and surgical treatments were associated with good outcomes. The difference in cohort size may be due to clinician bias towards surgical treatment in patients with higher neurological grades at presentation.

MRI FINDINGS OF PERACUTE HAEMORRHAGE CAUSING EXTREMEDULLARY COMPRESSION OF THE CERVICAL SPINAL CORD IN A DOG WITH SUSPECTED IMMUNE MEDIATED VASCULITIS

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A 9-month-old female Weimaraner was presented to the emergency service due to episodes of fever and neck pain. Physical examination revealed a stiff neck posture and elevated body temperature. Shortly after clinical examination was performed, the dog developed peracute onset of non-ambulatory tetraparesis compatible with a C1-5 spinal
THE USE OF IMEPITOIN (PEXION®) IN A 21-YEAR-OLD CAT WITH NOCTURAL VOCALISATION – A CASE STUDY

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Nocturnal vocalisation is one of the most disturbing manifestations of feline cognitive dysfunction affecting up to 36% of senior cats. Treatment recommendations have rarely been published previously. A 21-year-old, female neutered domestic shorthair cat was presented because of progressive nocturnal vocalisation and being restless for the past 3 years. A previous trial using phenobarbital (2mg/kg BID) was not effective. Clinical and neurological examinations revealed nothing abnormal apart from small and irregular kidneys. Blood work was normal at 5-month recheck. T4 was within normal range (1.4μg/dl (<2.8μg/dl), Blood pressure was marginally high under excitement (220mmHg), but within normal range when relaxed (140mmHg).

A tentative diagnosis of cognitive dysfunction was made. A renal diet (Hills k/d) and treatment with selegilin (Selgian®) 2.5mg SID was started. Night-time vocalisation and restlessness improved within a month. After 9 months the clinical signs recurred. Medication was switched to imepito (Pexion®) 10 mg/kg BID. After three weeks, nocturnal vocalisation was controlled almost completely and quality of life improved for both cat and owners. Clinical signs did not recur during 11 months and side effects were not noted until the cat was euthanized because of renal failure.

Post-mortem findings reflected advanced age-related degeneration including atrophy of primarily the frontal cortex and thalamus and diffuse intermediate gliosis. No further significant histopathological changes were found suggesting cognitive dysfunction as likely cause of the behavioural problems.

This case suggests that imepito may be a safe and effective treatment for nocturnal vocalisation.

HELCOBACTER ENCEPHALOMYEYLITIS IN A PUPPY

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A 2 mo female Jack Russel-Chihuahua cross puppy presented with acute pain, generalized ataxia and obtundation. The MRI showed marked asymmetry and dilation of the lateral ventricles, extra axial fluid accumulation, areas of hemorrhage and paramagnetic contrast enhancement at the internal (ependymal) and external (subdural) surfaces of the cerebrum, extending to the brain stem and cervical spinal cord. Transfontanelle collected fluid revealed xanthochromia, neutrophilic pleocytosis, and rod-like curved microorganisms. Direct and after enrichment aerobic and anaerobic cultures were negative. PCR based testing was negative for Neospora caninum, Toxoplasma gondii, Ehrlichia canis, Mycoplasma spp. and distemper virus. The DNA from the numerous microorganisms was extracted from the cytology slide. The 16S rRNA PCR gene assay was positive and matched the H. bilis and the unculturable H. canis with a 99% and 98% identification, respectively.

Emergency treatment included methylprednisolone succinate, metronidazole, ceftriaxone followed by amoxycillin-clavulanate and enrofloxacin. The neurological status rapidly improved. Seizures started and were treated with diazepam and levetiracetam (LEV). Two weeks later the puppy was discharged with oral antibiotics, LEV, tapering prednisolone and pregabalin. Improvement continued until clinically normal at 5-month recheck.

To the best of the author’s knowledge, this is the first described case of Helicobacter infection of the nervous system in dogs.

INVESTIGATION OF RISK FACTORS FOR THE DEVELOPMENT OF CANINE NON-INFECTIOUS MENINGOENCEPHALITIDES IN THE UK

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Canine non-infectious meningoencephalitides (NIME) are inflammatory diseases suspected to be caused by aberrant immune responses directed against the central nervous system. This retrospective case-control study aims to discover potential risk factors for the development of NIME, in particular environmental factors.

One hundred and one dogs from the population of neurological cases presented to two referral centres in the UK fulfilled the inclusion criteria established by Granger and others 2010, for presumptive diagnosis of NIME. Two controls matched for year of presentation were randomly selected and allocated for each affected case. Pugs, West Highland White Terriers, Bichon Frise, French Bulldogs, Jack Russell Terriers, Boston Terriers and Border Terriers had significantly increased odds of developing NIME. Age was significantly associated with the development of the disease (p = 0.001) with affected dogs (mean = 57.3 weeks) being younger than controls (mean =
ABSTRACTS

MALIGNANT PERIPHERAL NERVE SHEATH TUMOR IN A DOG

Central nervous system metastasis of an intradural/midline mass is an unusual presentation of malignant peripheral nerve sheath tumor (MPNST). A 9-year-old neutered male West Highland White Terrier was referred for neurological evaluation with a two-month history of anorexia, lethargy, respiratory stridor and dysphagia. On physical examination, we observed left eye and nasal dryness and a large mass in the oropharynx, lateralized to the left. The neurological examination showed a left head tilt; anisocoria with mydriasis and moderate ptosis in the left eye; and absence of direct and consensual pupillary reflexes in the same eye. There was absence of left corneal and oculovestibular reflexes, decreased left palpebral reflex and facial hypalgesia. Haematology, serum biochemistry, urinalysis, thoracic radiography and abdominal ultrasonography did not reveal significant abnormalities. Skull CT showed a mass in the left tonsillar/oropharynx. It caused lytic lesions in the basisphenoid, petrygoid, palate, zygomatic and maxillary left bones, as well as the left mandibular ramus and body. The mass invaded the cranial cavity in the parasellar region. Left tympanic bulla was occupied by fluid material. During recovery from anesthesia due to CT, the animal died by respiratory failure. At the necropsy, tonsillar squamous cells carcinoma (TSCC) was diagnosed. To our knowledge, this is the first report of a dog with MCFS due to TSCC.

HYSTERIA IN A GERMAN SHEPHERD DOG

A six-year-old female neutered German Shepherd Dog was presented with paroxysmal abnormal behavior of two months in duration. The episodes (>5 times a day) were described as (and a video showed): sitting down, ‘drifting of’, suddenly grabbing her tail or licking her hindquarters and then hyperactivity in the form of whining and attention-seeking behavior. The highly concerned owners suspected epileptic seizures to be the cause. A comprehensive physical and neurological exam (unremarkable) were performed. The vulva was swollen and mucosa was pale. A smear showed a predominance of superficial epithelial cells. Progesterone was measured at 1.0 ng/mL. Abdominal ultrasound showed a hypoechoic mass measuring 9x10mm caudolateral to the right kidney. The mass was surgically removed, and histopathology revealed the presence of luteal tissue and cystic epithelial components consistent with remnants of ovarian tissue. The frequency of behavioral signs decreased over several weeks post-surgery. Paroxysmal abnormal behavior should be considered a differential diagnosis for owner-reported ‘seizures’. Primary neuropathology should be excluded as much as possible. This case documents paroxysmal abnormal behavior secondary to ovarian remnant tissue in a dog. Anomalies of sexual behavior and canine ‘hysteria’ (derived from the Greek word ἕστασις (uterus) – no longer an accepted medical term) have been described in literature. Preferred terminology is here suggested to be: ‘paroxysmal abnormal behavior of (suspected) hormonal origin’.

USE OF HIGH-DEFINITION VIDEO TELESCOPE FOR TREATMENT OF SPINAL ARACHNOID DIVERTICULUM IN 3 DOGS

Spinal Arachnoid Diverticulum (SAD) is a focal dilation of the subarachnoid space which can cause progressive compressive...
myelopathy. Surgery is the treatment of choice in dogs with SAD. The use of high-definition video-telescopes with an additional lighting system (VITOM) has been only described in one study for treatment of cervical disc disease and no studies with VITOM have been reported for surgery of SAD in dogs.

The aims of these case series are: to describe the use of VITOM system for treatment of SAD in three dogs, to compare surgical findings and surgical risks with a group of 3 dogs with SAD treated with no VITOM.

Three cases with SAD assisted by VITOM were included, two French bulldogs and one Pug. Three cases with SAD assisted with no VITOM system were included, three French Bulldogs.

In all dogs the lesion was located at the spinal cord segment T3-L3. Dorsal laminectomy followed by durectomy was performed in all of them with significant neurological improvement after surgery (> 6 months follow up).

The use of VITOM provided significant magnification of the neural structures and better illumination as well as excellent visualization of the entire surgical field in comparison with the control group with no VITOM. Mean surgical time did not vary significantly in both groups.

The results of these case series support the use of VITOM in spinal surgery and in dogs with SAD to allow a better identification of the structures minimizing the risk of injury and bleeding.

SOLITARY CARTILAGINOUS EXOSTOSIS IN A NEWFOUNDLAND. MAGNETIC RESONANCE IMAGING FINDINGS AND CLINICAL OUTCOME AFTER SURGICAL TREATMENT

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Cartilaginous Exostosis (CE) is an uncommon benign disorder of cartilage and bone which occurs usually in growing dogs. In most cases this disorder affects different parts of the skeleton, multiple cartilaginous exostoses (MCE) or occurs as a solitary lesion, solitary cartilaginous exostosis (SCE). Magnetic resonance imaging findings (MRI) have only been reported in two dogs with MCE.

The purpose of this case report is to describe the MRI findings and clinical outcome in a dog with SCE.

A 1-year-old male Newfoundland dog was referred for a 5-month history of progressive paraparesis. Imaging (MRI) of the thoracic spinal cord revealed a solitary mass at the level of T2-T3 vertebrae causing severe compression of the spinal cord. The mass seemed to be associated with the synovial joint. The mass was hyperintense on T2W/STIR, hypointense on T1WI and did not enhance after contrast administration.

Dorsal laminectomy at T2-T3 was performed and the mass was completely removed. Histopathology was consistent with CE. Follow up 1 year after surgery, the dog did not present any neurological deficit. Abdominal ultrasound, thoracic radiographs and radiographs of the whole axial and appendicular skeleton did not reveal the presence of other lesions.

To the author’s knowledge, the MRI findings and clinical outcome after surgical treatment of SCE in dogs has not been reported yet in veterinary literature. Solitary CE should be considered in young dogs with a solitary mass affecting the spinal cord with these characteristics. Prognosis of SCE after surgical treatment is excellent if the mass is removed.

HOW TO OVERCOME THE MYELIN SHIELD IN IMMUNOHISTOCHEMISTRY OF PERIPHERAL NERVE FIBRES

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Paucity of nerve tissue in biopsies naturally limits the number applicable tests. To increase the panel, multiple investigations ideally would be carried out on the same sample. In particular, combined assessment of fibre morphology and antigen expression has enlarged our insights into the pathobiology of many neuropathies. Most of recent studies were carried out on nerve sections, while immunostaining of teased fibres has failed yet to gain access into diagnostic laboratories. This is due to the shielding effect of the preserved nerve sheath that hinders antibody penetration and thereby detection of deeply localised epitopes.

Hence, we explored the efficacy of various permeabilisation techniques on neurofilament-200 staining in in fix-tipped nerve bundles after snap-freezing (SF), glycine buffer (GB) treatment, and postfixative immersion in proteinase-K (PK) or dimethylsulfoxide (DMSO). Only SF and GB allowed for consistent, contiguous and specific neurofilament staining throughout. After fixation, PK also evoked reproducible but discontinuous axoplasmic staining. DMSO treatment was ineffective. GB resulted in best structural preservation of both compacted and uncompacted myelin. Myelin sheath specifications became less distinct after SF. Total myelin sheath dispersion after PK impaired any reliable morphological assessment.

Even axonal disease markers can be reliably approached through freezing and GB treatment of nerve biopsies. As the latter does not compromise fibre morphology significantly, immunostaining can be used as an adjunct to conventional teasing studies in one single setting. This approach will help us in particular to identify and understand the molecular pathology of neuropathies in dogs and cats.

SYMPTOMATIC NARCOLEPSY/CATALEXY IN A DOG WITH BRAINSTEM MENINGOECEPHALITIS OF UNKNOWN ORIGIN

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The aim of this report is to describe a case of symptomatic narcolepsy/catalepsy in a dog with clinical and diagnostic findings of brainstem meningoencephalitis of unknown origin.

A four year-old, entire female cocker spaniel presented for acute progressive lethargy/hypersomnia, vestibular signs and collapsing episodes. Neurological examination revealed obtundation, left-sided head tilt and vestibular ataxia. The hands-on examination triggered a catalepsy episode with sudden loss of tone and areflexia in all four limbs. Unresponsiveness, bilateral miosis, convergence-retraction nystagmus and absent vestibulo-ocular and gag reflexes were evident during the episode. Heart rate was 50b/min and systemic blood pressure was 220mmHg. The dog continued to rapidly alternate between hyperexcitement and catalepsy episodes despite administration of mannitol. Haematology and serum biochemistry profiles were unremarkable. MRI of the brain revealed an ill-defined, intra-axial lesion,
MYOCLONUS EPILEPSY IN FRENCH BULLDOGS - ANOTHER BREED SUFFERING FROM LAFORA'S DISEASE

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Two female French Bulldogs were presented because of myoclonic episodes, documented by video tapes. General and neurologic exam, ophthalmic exam, complete blood work, MRI of the brain and CSF tap were unrewarding.

Disease onset in Dog 1 was at 7 years of age. Triggers were rapid light/shadow changes, e.g. during car driving. Severity and frequency of myoclonic phases over time increased dramatically. Treatment by Imepitoin and phenobarbital was ineffective. Hence, 15 months after onset, the dog was euthanized because of constant myoclonic jerks.

Postmortem examination revealed intraneuronal accumulation of somatodendritic polyglucosan bodies throughout all areas of the brain. Similar inclusions were found in isolated myocytes from different skeletal muscles.

In Dog 2, first signs were seen with 9.5 years of age. The owners noted first jerks at dimmed light while watching TV and described them as startle. Muscle biopsies again confirmed presence of polyglucosan bodies within muscle cells. Under Imepitoin therapy frequency and intensity of myoclonic episodes decreased and remain consistent since 7 months. The frequency dropped further after application of NSAIDS during biopsy.

Neurological signs similar to those seen in myoclonic epilepsy of other breeds were observed in two French Bulldogs. In both cases histopathology revealed changes typical of canine Lafora’s disease. To the authors knowledge this is the first report of myoclonic epilepsy in this breed.

A one-year-old female Vizsla presented for progression of neurological signs noted since adoption at 3 months of age. Neurological examination showed depressed mental status, compulsive pacing, left head tilt and circling, positional horizontal nystagmus, left eye positional ventral strabismus and ipsilateral proprioceptive deficits.

MRI of the brain showed an ill-defined intra-axial mass in pituitary and hypothalamic regions. The mass was mildly and heterogeneously hyperintense to T2-weighted images, isointense to gray matter on precontrast T1-weighted images with no postcontrast enhancement. The pituitary fossa appeared enlarged and flattened. The owner refused any further investigation and elected euthanasia.

To our knowledge, this is the first report describing the MRI features of a hypothalamic neuronal hamartoma in a dog.

A PRACTICABLE GUIDELINE FOR STANDARDIZED SAMPLING OF THE EQUINE BRAIN

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Neuropathological exploration of equine brain all too often hampers from poor sampling. Frequent causes are lack of neuroanatomical experience of the investigators, insufficient sampling guidelines and the sheer volume of tissue that precludes examination of contiguous areas and stimulates arbitrary sampling. This leads to poorly representative samples and little understanding of the functional impact of a lesion. Therefore, we elaborated a slicing and sampling protocol that allows for representative sampling of virtually all functional systems without requirement of detailed knowledge in equine neuroanatomy.

Guidelines for systematic brain sampling of other species were reviewed for their applicability and adapted to specificities of equine neuroanatomy. The guideline leads the rater to identification of some crucial external landmarks and guarantees for subsequent accurate slicing simply by geometric instructions. The scheme was provided to different investigators with sparse to excellent knowledge in neuroanatomy and macroscopic evaluation of the brain. The performance was evaluated by revision of brain slabs and histological slides. Troubleshooting and sampling errors were addressed by further adaptions after which the amended protocols were tested again.

The sampling scheme was easily adopted by investigators throughout all experience levels. It proved highly reproducible with regards to the
target regions and orientation of section planes even without specific knowledge of subregional brain anatomy. After 5 repeats, all raters were able to sample all major brain areas in less than 20 minutes. This scheme provides a practical guideline for brain analyses allowing for reproducibility and comparability of results in equine neurological research.

**MENINGOCENCEPHALITIS ASSOCIATED WITH DUAL INFECTION OF EHRLICHA CANIS AND TOXOPLASMA GONDII IN A DOG**

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Meningoencephalitis (ME) is a common disease of canine brain, recognizing infectious and non-infectious etiologies. *Ehrlichia canis* (*E.canis*) can rarely induce ME in dogs, with cases described in the United States, Japan, Brazil, and Thailand.

We describe clinical, imaging and pathological findings of a dual brain infection by *Toxoplasma gondii* (*T.gondii*) and *E. canis* in a dog in the North of Italy.

A 5 years-old neutered-female, mixed breed dog was referred for one-month history of lethargy and anorexia, partially responsive to glucocorticoids. Neurological examination revealed depressed mental status, right head tilt and postural reaction deficits, tetraparesis, consistent with a brainstem neurolocalization. Blood work revealed a non-regenerative anemia, thrombocytopenia, hypoalbuminemia with polyclonal gammapathy. Serological tests resulted positive for ehrlichiosis (antibodies > 1:2560) and toxoplasmosis (IgM: negative; IgG: >1:1024).

Meningoencephalitis is a severe neuroinflammatory disease that can result in neurodegeneration, demyelination and gliosis. Additionally, immune dysregulation due to systemic ehrlichiosis likely exacerbated a latent central nervous system protozoan infection. This unique presentation represents to our knowledge the first description of *E. canis* infection by *T. gondii* in dogs in the North of Italy:

Cerebrospinal fluid (CSF) analysis revealed a severe mixed pleocytosis (5760 cells/mcL), increased protein content and intracytoplasmatic morulae within monocytes. *E.canis* was identified by polymerase chain reaction (PCR) in CSF. The dog was euthanized because of worsening of clinical conditions.

Histopathological examination of the brain showed multifocal histiocytic and lymphoplasmocytoid infiltrates with numerous intraliteral protozoa. Brain PCRs confirmed dual *T. gondii* and *E. canis* infection. Immune dysregulation due to systemic ehrlichiosis likely exacerbated a latent central nervous system protozoan infection. This unique presentation represents to our knowledge the first description of *E. canis* evidence in a dog's brain in Europe.

**SYRINGOMYELIA SECONDARY TO INTRACRANIAL MASSES IN 6 CATS. CLINICAL AND MAGNETIC RESONANCE IMAGING FINDINGS**

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Syringomyelia (SM) has been described in human and veterinary medicine associated with intracranial masses. In cats, only sporadic reports of SM secondary to brain masses have been reported. The purpose of this case series study is to describe the clinical signs and MRI findings in 6 cats with SM associated with brain masses.

Medical records and imaging findings of cats with diagnosis of intracranial mass and secondary SM were retrospectively reviewed. Six cats were enrolled in this study. The MRI findings assessed were; foramen magnum (FM) and caudal transtentorial (CTT) herniation, location of the mass, mass effect, edema and hydrocephalus. Clinical signs were scored as (1) related to the intracranial mass alone, (2) predominance brain versus spinal cord (SC), (3) predominance SC versus brain, and (4) SC signs alone.

All cats presented FM and CTT herniation. All masses were located in the cranial rostral fossa. Moderate hydrocephalus and severe mass effect were present in 4/6 cats and 6/6 cats respectively. Clinical signs scores were; (4) 2/6 cats, (3) 2/6 cats, (1) 1/6 cats, and (2) 1/6 cats. Results of this case series study suggest that FM and CTT herniation might predispose to SM in cats with brain masses. Clinical signs related to the SM are common in cats; 4/6 cats.

An intracranial mass should be considered in cats with only SC clinical signs and SM affecting the spinal cord with no other cause visible on the MRI of the spine. Further studies with more cases and control group are necessary.

**EVALUATING BODY CONDITION SCORE WITH BODY WEIGHT ON SERUM DRUG LEVELS OF PHENOBARBITAL AND POTASSIUM BROMIDE**

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Epilepsy is one of the most common neurological diseases affecting companion animals and seizures are managed with anticonvulsants. Anticonvulsants require regular therapeutic drug monitoring and medication adjustment using a first-order kinetics equation; however, it is not always successful. The aim of this retrospective project was to assess whether a patient’s body condition score (BCS) affects the serum level of phenobarbital and potassium bromide and determine if inclusion of this factor would result in an improved approach for medication adjustments. Data were collected from a retrospective review of canine epilepsy patients at University of Illinois Veterinary Teaching Hospital from January 1, 2000 to July 15, 2016. Records reporting a phenobarbital and/or potassium bromide dosage (mg/kg), serum level, and BCS were included in the study. Among the dogs included in the study (n = 422), there were 325 records of phenobarbital monotherapy, 56 records of potassium bromide monotherapy, and 178 records of polytherapy. An increase in BCS (one out of nine) related to a 305 μg/mL increase in potassium bromide levels of patients with structural epilepsy. An increase in BCS (one out of nine) related to a 1.73 μg/mL increase in phenobarbital level. A novel drug adjustment approach using BCS may assist the clinician with epilepsy management.

**PNS DEFICITS IN DOGS AFFECTED DURING FOOD-ASSOCIATED OUTBREAK OF MEGAESOPHAGUS/POLYNEUROPATHY IN LATVIA**

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In Latvia during 2014-2016 there was an outbreak of megaesophagus/polyneuropathy (ME/PNP) with more than 250 dogs affected. Epidemiological case-control study identified odds ratio of >100 between the development of ME/PNP and intake of certain brand of dog food. Pathological studies indicated intermediate type neuropathy with distal advancement. To characterize clinical defects in PNS, a group of 13 dogs affected in the outbreak were examined neurologically and electrophysiologically (needle EMG and MNVC).

Dysphonia, regurgitation, weakness and/or exercise intolerance were reported in all dogs. In clinical neurological examination the most frequent finding was decreased spinal reflexes in all four limbs and generalized muscle atrophy. EMG showed that distal limb muscles were more frequently affected than proximal muscles. MNCV measured for n.ischiadicus ranged from 31 to 79.3 m/s and was considered decreased in 10 dogs (77%). Recovery was noted in some dogs.

Neurological findings together with pathological findings indicate that dogs most likely have toxic polyneuropathy. Most common causes of ME/PNP, including myasthenia gravis, heavy metals, thallium, acrylamide, ionophores, botulism, mycotoxins and main pesticides have been ruled out. Vitamin B deficiencies were found in sick dogs but cannot be found in the dog food, albeit concentrations were normal in the food. Etiology and pathobiology are still under investigation.

STUDYING CANINE COGNITIVE DYSFUNCTION SYNDROME (CCD) BY ELECTROENCEPHALOGRAPHY (EEG), EYE-TRACKING AND MEASURING DOG ACTIVITY

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Humans and dogs demonstrate parallels in brain aging associated with cognitive dysfunction: the Canine Cognitive Dysfunction syndrome (CCD) can be seen as an analog of human Alzheimer’s disease (AD).

Therefore, the aged dog provide a spontaneous model of AD and can be valuable in identifying mechanisms underlying pathological aging, and also in testing therapeutics to prevent and slow disease progression. Previously, CCD has been studied within behavioral tests related to dog’s learning and memory functions, but the mental and neural processing underlying the cognitive events remains to be clarified. CCD has been connected to changes in dogs’ activity level, which could be further investigated with activity monitors. Commonly, the clinical efficacy of drugs in CCD is evaluated with owner assessment, thus more objective and sensitive measures are needed for the evaluation.

Non-invasive electroencephalography (EEG) and remote eye tracking methods are frequently applied measures in human studies, but these are novel methods in studying dogs’ cognitive functions. In humans, they have been used as diagnostic tools that have potential to detect AD in its early stages. Previously, our group has successfully measured non-invasive EEG and eye gaze of dogs to the images presented on a computer screen.

In the future, we will apply EEG and eye-tracking methods to study memory impairment associated with CCD, e.g. viewing behavior in novelty preference paradigm, and to evaluate the efficacy of medical treatments in CCD dogs. In addition, measuring activity with accelerometers could reveal connections between overall activity of the dog and cognitive impairments.

C2-C3 CONGENITAL SEGMENTATION FAILURE IN TWO SHIH-TZU DOGS: RADIOLOGICAL FINDINGS AND SURGICAL TREATMENT

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Congenital anomalous segmentation failure of the C2 and C3 vertebrae can affect the craniovertebral junction resulting in neural compression and vascular compromise and can manifest itself with abnormal cerebrospinal fluid dynamics.

We present two Shih-Tzu dogs diagnosed with congenital segmentation failure at the level of C2-C3. In both patients, cervical MRI revealed a hyperintense intramedullary spinal cord lesion at this level of C2-C3 segments on T2-weighted sequences. This lesion was compatible with vasogenic oedema presumably secondary to recurrent trauma and/or cervical instability. Spinal CT scans revealed a short axial (C2) vertebral body, C3 had a very pronounced spinous process, mimicking the typical spinous process of C2. This suggested a segmentation failure at the level of the intercentrum 2. The odontoid process was situated normally within the vertebral canal of the atlas (C1) in both dogs. In one dog there was incomplete ossification of the dorsal arch of C1, the transverse processes of C6 and C7 were asymmetrical and the right transverse process of C7 had a shape that resembles a cervical rib. Ventral arthrodesis of C1-3 was achieved in both cases using multiple Imex™ miniature interface pins driven into the abaxial aspects of the atlas, axis and C3, which were enshrouded in a bolus of tobramycin-impregnated polymethylmethacrylate.

Post-operative imaging revealed adequate implant positioning and stability. A six-month post-operatively neurological examination revealed a complete resolution of the clinical signs. To the authors knowledge this is the first report to describe cervical segmentation failure in the breed, surgical treatment and medium-term outcome.

SIGNIFICANT DIFFERENCES BETWEEN METABOLIC PROFILES IN DOGS WITH IDIOPATHIC EPILEPSY ON A MEDIUM CHAIN TRIGLYCERIDE DIET TRIAL

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Epilepsy is the most common chronic neurological disorder in both humans and dogs and despite appropriate antiepileptic drug (AED) treatment, approximately one third of humans and dogs with epilepsy continue experiencing seizures. This emphasises the importance of new treatment strategies to improve the welfare of epileptic patients.

A 6-month prospective, randomised, double-blinded, placebo controlled crossover dietary trial was designed to compare a medium chain triglyceride ketogenic diet (MCTD) to a standardised placebo diet in chronically treated dogs with idiopathic epilepsy. Seizure frequency, clinical and laboratory data were collected prospectively and evaluated. Analysis of canine serum samples were carried out using a metabolomics approach, utilising ultra performance liquid chromatography techniques coupled with mass spectrometry, and both multivariate and univariate methods for subsequent data analysis.

Seizure frequency improved significantly as formerly reported; 3dogs achieved seizure freedom, 7dogs had ≥50% reduction in seizure frequency.
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DEGENERATIVE LUMBOSACRAL STENOSIS ASSOCIATED WITH CONGENITAL VERTEBRAL ANOMALIES IN SCREW-TAILED DOGS: TREATMENT AND OUTCOME
J. Tabanez, N. Fitzpatrick, C.J. Driver. Fitzpatrick Referrals, Eashing, United Kingdom.

Congenital vertebral anomalies of L7 and S1 appear common in screw-tailed dogs and may be associated with early-onset degenerative lumbosacral stenosis (DLSS). Our aim was to describe DLSS in dogs with vertebral anomalies and to report medical and surgical treatment and outcome. MRI, CT and radiographic studies were reviewed and six dogs (three Pugs, three French Bulldogs) met the inclusion criteria. The medical records and diagnostic imaging studies of 13 cats diagnosed with LSS were retrospectively reviewed for lumbosacral abnormalities and compared to findings of 405 cats that underwent computed tomography for reasons unrelated to spinal disease. Clinical signs associated with LSS included lumbosacral pain, low tail carriage, difficulty jumping, and urinary or faecal incontinence. Neurological signs included proprioceptive deficits, ambulatory paraparesis, pelvic limb ataxia, reduced spinal reflexes, and reduced perianal reflex. Duration of clinical signs ranged from 1 day to 10 months (mean of 3 months). Of the 13 cats with LSS, 7 (53.8%) were diagnosed with a LTV. In the control population of 405 cats, 24 (5.93%) were diagnosed with a LTV. Results indicated that LTV were significantly (P<0.0001) more prevalent in cats with LSS, compared to the control feline population (OR 18.52, 95% CI 6.1–62.08). Development of clinical signs of LSS in cats with LTV (mean 10.8 years) was not significantly different from that of cats without LTV (mean 12.7 years). Likewise, there was no significant influence of breed (P=0.99) or gender (P = 0.29) on the occurrence of LTV. Despite LSS being a rare spinal condition in cats, LTV can be considered a risk factor for its development.

CLINICOPATHOLOGICAL FEATURES, DIAGNOSIS AND TREATMENT OF A PATHOLOGICAL VERTEBRAL FRACTURE IN A PUMA YAGOUARONDI.
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A 3-month-old-wild male Yagouaroundi was examined because of a one-week history of proprioceptive ataxia and severe non-ambulatory paraparesis after a traumatic onset. Neurological examination revealed a lesion localized in T3-L3 spinal cord segments. Radiographs showed a severe kyphosis between T9-T11 vertebra with marked low bone density compared with another member of the litter. Based on radiographs and suspected previous history of malnutrition, a pathological vertebral fracture due to nutritional secondary hyperparathyroidism (NSH) was suspected. Other differential diagnoses included rickets, vertebral anomaly, renal secondary hyperparathyroidism (RSH) and osteogenesis imperfecta (OI). Blood work including evaluation of parathormone, calcium, and phosphorus were unremarkable. CT-images revealed vertebral canal stenosis from T9 to T11 vertebrae, confirmed the presence of a consolidated fracture of T10 vertebra and generalized low bone density. Conservative treatment with diet correction was initiated. Five months after diagnosis, the patient improved his neurological status to ambulatory mild paraparesis and regained bone density. The imaging findings, the unknown previous diet and the clinical and radiographic improvement made the diagnosis of NSH very likely. Consumption of a balanced diet could have normalized the PTH concentration within three days and justified the normal values. To the authors’ knowledge, this is the first pathological vertebral fracture reported in a Jaguarundi with clinical improvement and

LUMBAR TRANSITIONAL VERTEBRAE IN CATS AND ITS RELATIONSHIP TO LUMBAR TRANSITIONAL VERTEBRAE CANAL STENOSIS
J. Ball, S. De Decker. Royal Veterinary College, University of London, Hatfield, United Kingdom.

Although a clear relationship has been demonstrated between the presence of lumbosacral transitional vertebrae (LTV) and development of lumbosacral stenosis (LSS) in dogs, this relationship has not been evaluated in cats. The aim of this study was to investigate the relationship between the presence of LTV and LSS in cats.

frequency, 5 had an overall reduction in seizures and 6 showed no response. Consumption of the MCTD not only resulted in significant clinical effects, but also significant metabolic effects seen in the dogs. In particular it was shown that these changes were strongly associated with changes in lipid metabolism, suspected to improve energy delivery and cell membranes. In conclusion the data shown are in accordance with other studies, showing antiepileptic properties of a MCTD, but also correlates antiepileptic effects with significant metabolic changes.

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normalization of bone mineral density following dietary change to a balanced and complete diet. This case report highlights the importance of feeding complete and balanced diets to wildlife kept in captivity, particularly growing animals.

MYOSITIS AND SEGMENTAL MENINGOMYELITIS IN AN ADULT DOG

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A five years old female neutered boxer was presented due to progressive paraparesis over two weeks. The clinical examination revealed ambulatory paralysis, lumbar hyperesthesia, decreased spinal reflexes and proprioceptive deficits of the hind limbs. The neuroanatomical localization included lower motor neuron L4-S3 myelopathy. Differential diagnosis included a degenerative, neoplastic and inflammatory myelopathy. The biochemistry panel showed a severe elevation of the creatine kinase. MRI investigation revealed bilateral, diffuse, heterogenous, linear, T2-, STIR-hyperintense, T1-isointens, moderately contrast enhancing lesions within the musculus gluteus, transversus abdominis, multifidi and quadriceps femoris. Furthermore, there were multiple, heterogenous, ill-defined, T2-hyperintense, T1-hypointense, strongly enhancing lesions within the spinal cord at the level of L2-L4. The differential diagnosis included inflammatory infectious or neoplastic causes. A biopsy of the changed skeletal muscle showed purulent and pyogranulomatous inflammation. Immunohistochemistry revealed Neospora caninum infection. CSF tap showed a mild eosinophilic pleocytosis. Antibodies titer against Neospora caninum was severely increased (Titer 1:800). The final diagnosis was a multifocal myositis and segmental meningomyelitis due to Neospora caninum infection.

After clinical deterioration to non-ambulatory paraparesis therapy with trimethoprim (2.5 mg/kg) /sulfadiazine (12.5 mg/kg) BID, clindamycin (10 mg/kg) TID was started. After one week the dog returned to ambulation. After eight weeks medical therapy was stopped without recurrence of clinical signs.

There are few reports documenting cases with necrotising cerebellitis, myositis or poliradiculoneuritis due to infection with N.caninum. There are few reports documenting cases with necrotising cerebellitis, myositis or poliradiculoneuritis due to infection with N.caninum.

MENINGEAL OSTEOSARCOMA IN AN ALASKAN MALAMUTEN DOG: A CASE REPORT.

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A 11 years-old female Alaskan Malamuten, weighing 28 kg, was referred with an acute onset of progressive ambulatory paralysis.

On clinical examination both cranial and spinal nerves reflexes were normal. The subject presented ambulatory paresis with conscious proprioception reduced in both pelvic limbs. Neurological localization was compatible with a T3-L3 lesion. Haematology and serum biochemistry were unremarkable.

The subject underwent an MRI-scan which revealed a hyperintense structure, compatible with a dorsal intradural (extramedullary) mass at L1-L2 level. The latter was causing a dorsolateral compression of the spinal cord. Differential diagnoses included neoplasia, granuloma and hematoma.

The dog underwent decompressive surgery; a right L1-L2 hemilaminectomy was performed and the mass was successfully excised from the meningeal tissue. The recovery from general anaesthesia was unremarkable and the subject was kept hospitalised. Treatment included fluid therapy, amoxicillin clavulanate (Synulox), firocoxib (Previcox), gabapentin (Gabapentina) and methadone (Metasedin). Two days after surgery neurological findings were similar to the preoperative ones and the dog was discharged with the same medical treatment but with tramadol (Adolonta) instead of methadone (Metasedin). Histological analysis revealed that the mass was a fibroblastic osteosarcoma. At three months re-check, the dog appeared more paretic, and painful. Lumbar radiographies showed an osteolytic lesion at the level of L1. Due to the poor prognosis the owner opted for euthanasia.

To the authors’ knowledge, this is the first case of a meningeal fibroblastic osteosarcoma originating at lumbar spine level in a dog.

PERITUMORAL BRAIN EDEMA IN DOGS WITH MENINGIOMA OF THE FRONTAL LOBE

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Peritumoral brain edema (PTBE) occurs commonly in human and dog patients with meningioma. Many factors including tumor size, histologic differentiation and location have been reported to affect PTBE in human. However few reports have been mentioned about aggrivating factors of PTBE in dogs. In addition use of steroid might reduce the area of PTBE. Therefore we investigate whether tumor size and history of steroid administration (HAS) would influence to PTBE.

Twenty cases which underwent extraction of meningioma in the frontal lobe was included in this study. Investigated parameter were Edema-index (EI: degree of edema), Tumor-index (TI: degree of tumor) and HAS. Influence of TI and HAS to EI were investigated by multivariant analysis.

PTBE was found in 19 of 20 cases, mean of EI was 2.03 and mean of TI was 1.06. Statistical analysis proved that EI was not significantly influenced by TI and HAS.

We assessed PTBE of meningioma of the frontal lobe only to exclude influence of location of tumor to PTBE however this factor, to know if the location would influence to PTBE, is necessary to analyze to make precise relation.

In many cases, meningioma is not diagnosed until it grows large enough and causes neurologic symptoms. Actually TI were similar in all cases, hence there were no significant relation between TI and EI in this study. Because we did not examine the influences of histologic differentiation and blood circulation to PTBE, and case population was small these factors might be also affected to our results.
DISCOSPONDYLITIS DUE TO BRUCELLA CANIS – A RE-EMERGING INFECTIOUS DISEASE IN EUROPE
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Bruccella canis is a gram-negative, intracellular cocobacillus, that can cause late abortion, epididymitis and prostatitis, and less commonly manifests outside the genital tract. Bruccella canis occurs worldwide and stray dogs are suggested to serve as reservoirs, yet there is a lack of data on the current epidemiologic situation in Europe. The hypothesis of the study was that Bruccella canis can be imported into Germany from Eastern and Southern European countries.

A medical records search in the database of our hospital was performed to identify dogs with a diagnosis of brucellosis (2011–2015) and the database of IDEXX was searched for positive Bruccella canis samples by PCR (n = 1667) or antibody detection (n = 2798).

Bruccella canis infection was diagnosed in 4 female spayed dogs (age: 7 months to 2.5 years) with discospondylitis. Diagnosis was based on identification of Brucella spp. in blood culture followed by PCR-based species determination (3 dogs) and in one dog by detection of specific antibodies (IFAT 1:512). All dogs had been imported from Eastern European countries 6 to 23 months prior to presentation. IDEXX database search showed highest prevalence among submitted samples for Brucella canis DNA in Poland (6.5%, 28/432, CI95 4.4–9.2) and Spain (11%, 28/255, CI95 7.4–15.5) and positive antibody titres in samples (sample size >100) from 7 countries (Poland, 3.7%; Germany, 5.4%; Hungary, 4.3%; Denmark, 5.1%; Finland, 6.9%; France, 2.7%; Italy, 7.9%).

Brucella canis seems to be common in some European countries and should be considered in dogs with discospondylitis, even in young female spayed dogs.

SURGICAL TREATMENT OF LUMBOSACRAL FORAMINAL STENOsis IN CATS
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Two client-owned 12 and 13 years old european shorthair cats presented with a chronic history of severe progressive back pain and reluctance to walk or jump.

Case 1 showed severe back pain over the lumbosacral area and a marked lameness of the left hind leg. Orthopedic examination was normal.

Case 2 showed severe back pain over the lumbosacral area and severe paraparesis. Orthopedic examination was normal.

After an initial response to conservative treatment with corticosteroids or nonsteroidal anti-inflammatory drugs both cats worsened progressively over several weeks. Both cats underwent computed tomography and were each diagnosed with transitional vertebra (case 1 asymmetric, case 2 symmetric) at the lumbosacral junction resulting in spondylotic changes and severe bilateral lumbosacral foraminal stenosis and compression of the 7. lumbar nerve root.

In both cats a dorsal laminectomy of the first sacral vertebra was combined with bilateral foraminotomy of the lumbosacral intervertebral foramen. Via a dorsolateral approach the foramina were enlarged cranially and dorsally and the compression of the nerve root released. As suspected on CT all L7 nerve roots of the sciatic nerve were markedly enlarged.

The recovery was uneventful. At suture removal after 10 days one cat was markedly improved, the second cat showed a complete recovery. Both had a good outcome after 6 months.

To our knowledge this is the first report on cats with transitional lumbosacral vertebrae resulting in degenerative lumbosacral stenosis including foraminal stenosis and surgical treatment using foraminotomy.

SYRINGOMYELIA ASSOCIATED WITH A SPINAL ARACHNOID DIVERTICULUM IN A PUG AND A SYRINGOPLEURAL SHUNT PLACEMENT
A. Tauro1, R. Fernandes1, C. Driver1, J. Rose1, C. Rusbridge1,2. Fitzpatrick Referrals, Eashing, UK 2The University of Surrey, Guildford, UK.

The recognition and diagnosis of spinal arachnoid diverticula (SAD) and syringomyelia (SM) is increasing in veterinary medicine; however, SM associated with a SAD is uncommon.

We report a 7-month old male Pug who had a one-month history of progressive tetraparesis and ataxia. Spinal magnetic resonance imaging (MRI) showed the presence of a C2–C3 SAD associated with a SM located caudally to the SAD and centrodorsally within the spinal cord. We suspected that a partial obstruction of the cerebrospinal fluid flow due to the SAD was causing the SM. Therefore, a dorsal laminectomy, durotomy followed by marsupialisation of the diverticulum to the surrounding soft tissue structures were performed. The patient continued to deteriorate.

Spinal MRI performed 3-month post-surgical intervention showed the resolution of SAD, but the worsening of the SM, which was expanding dorsally and caudally. A syringopleural shunt was placed using a CODEMAN™ lumboperitoneal catheter (internal diameter 0.76 mm; external diameter 1.65 mm) with a medium closing pressure 5 to 9 H2O. Post-operative CT confirmed the correct placement of the shunt and the resolution of the syrinx. The patient showed a progressive neurological amelioration; although, his ataxia persisted. CT 3 month after surgery demonstrated the syrinx resolution and the correct placement of the proximal catheter shunt, whilst the distal catheter was coiled within the subcutaneous space and needed a surgical revision.

The pathology of SAD coexisting with SM is unknown, but the results suggest that their CSF flow dynamics are different and both conditions may need to be addressed separately.

ASSESSMENT OF AGE-RELATED DECLINE OF STIMULUS-RESPONSIVENESS IN DOGS
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Diagnosis of Canine Cognitive Dysfunction (CCD) requires differentiation from neurological pathology, including reduced responsiveness to stimuli due to age-related sensory function decline (e.g. vision, hearing). Veterinary neurological examination does not quantify the degree of sensory decline but rather diagnoses
complete loss of function; therefore mild sensory decline might be undetected at early stages.
A within-subject study was designed to pilot a battery of standardised tests ("Sensory Tests") to assess the variability in response to auditory and visual stimuli, and relationship with age, in a cohort of 21 privately owned dogs aged 8+ years. Prior to testing, all dogs underwent standard physical and neurological exams by a qualified veterinary surgeon and were otherwise healthy.
Vision Test scores (i.e. from the Sensory Tests) did not correlate with age, had a strong positive correlation with the outcome of the Veterinary exam, and were significantly lower with a stimulus placed at 2m compared to 0m. Auditory Test scores had a moderate negative correlation with age but not with the Veterinary exam; however, older dogs were less responsive to the "clap" test. None of Veterinary exams correlated with age.
The results highlight dogs’ reduced sensory abilities under certain conditions, which should be measured before cognitive assessment. The Vision Sensory Test and Veterinary exam detected dogs’ response to visual stimuli similarly, while the discrepancies between the Auditory assessments require further investigation. Future research should focus on sensory function alterations specific to age-related pathology (e.g. cataract, high-tone hearing loss) and validate such tests with electrophysiological measures.