Botulinum toxin type a for the treatment of muscle contractures secondary to acute spinal cord injury in a young cat

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TIMETABLE OF THE SYMPOSIUM

FRIDAY 19TH SEPTEMBER

08.00: **Registration**

FELINE NEUROLOGY

09.00 **Welcome to the meeting**

09.15: **INVITED SPEAKERS SESSION**

Margie Scherk
'NEUROLOGICAL MANIFESTATION OF SYSTEMIC DISEASES' PART I

10.00: Margie Scherk
'NEUROLOGICAL MANIFESTATION OF SYSTEMIC DISEASES' PART II

10.45: Coffee break, exhibition and poster session

11.15: **FREE COMMUNICATIONS RESEARCH ABSTRACTS. SPINAL CORD DISEASE**

1) ATLANTO-OCCIPITAL DISLOCATION IN 4 DOGS: MAGNETIC RESONANCE IMAGING FINDINGS AND SURGICAL TREATMENT
M. Dolera, L. Malfassi, G. Mazza, M. Sala

2) ATLANTOAXIAL INSTABILITY WITH INCONGRUENCE: MAGNETIC RESONANCE IMAGING FINDINGS AND SURGICAL TREATMENT IN 5 DOGS
M. Dolera, M. Malfassi, S. Marcarini, G. Mazza, M. Sala

3) EVALUATION OF RISK FACTORS FOR EARLY POSTOPERATIVE NEUROLOGICAL DETERIORATION IN DOGS UNDERGOING CERVICAL DORSAL LAMINECTOMY OR HEMILAMINECTOMY
F Taylor-Brown, T Cardy, P Kenny, H Volk, S De Decker

4) DORSAL LAMINECTOMY TO RELIEVE SPINAL CORD COMPRESSION IN A CAPTIVE SYRIAN BEAR (URSUS ARCTOS SYRIACUS)
A. Rosenzweig-Bueler, Y. Merbl, Y. Kushnir, Z. Aizenberg, O. Chai, Y. Chamisha, I. Horowitz, M.H. Shamir

5) ASSOCIATION BETWEEN CEREBROSPINAL FLUID ANALYSIS AND OUTCOME IN DOGS WITH THORACOLUMBAR DISC HERNIATION AND ABSENT DEEP PAIN SENSATION
Y. Chamisha, I. Aroch, I. Srugo, T. Bdolah-Abram, O. Chai, M. Christopher, Y. Merbl, M.H. Shamir

6) DIFFUSION TENSOR IMAGING OF THE SPINAL CORD IN PARAPLEGIC DOGS WITH INTERVERTEBRAL DISC HERNIATION BEFORE AND AFTER DECOMPRESSIVE SURGERY
A. Wang-Leandro, P. Dziallas, S. Kramer, M.K. Hobert, V. Stein, A. Tipold

7) SURGICAL DENERVATION OF THE INTERNAL URETHRAL SPHINCTER FOR THE TREATMENT OF REFLEX DYSSYNERGIA IN A DOG WITH A SACROCOCCYGEAL LUXATION
M.V. Bahr Arias, P.V.T. Marinho, C.C. Zani

13.00: Lunch, exhibition and poster session (Posters attended by authors)

14.30: INVITED SPEAKERS SESSION

Amanda Boag
'GLOBAL ASSESSMENT OF THE PATIENT WITH TRAUMATIC BRAIN INJURY'

Sorrel Langley-Hobbs
'CLINICAL AND DIAGNOSTIC APPROACH TO LAMENESS IN CATS'

16.00: Coffee break, exhibition and poster session

16.00: FREE COMMUNICATIONS MAIN TOPIC: LABORATORY BASED RESEARCH

8) EFFECTS OF HUMAN BONE MARROW-DERIVED MESENCHYMAL STEM CELLS ON CUPRIZONE INDUCED DEMYELINATION
J. Neβler, K. Bénardais, V. Gudi, A. Hoffmann, L. Salinas Tejedor, S. Janβen, P. Chittappen Kandiyil, W. Baumgärtner, A. Kavelaars, C.J. Heijnen, C. Van Velthoven, F. Hansmann, T. Skripuletz, M. Stangel

9) PROTEOMIC ANALYSIS OF CEREBROSPINAL FLUID IN CANINE CERVICAL SPONDYLOMYELOPATHY
P. Martin-Vaquero, R.C. Da Costa, M.J. Allen, S.A. Moore, J.K. Keirsey, K.B. Green

10) SPATIOTEMPORAL DISTRIBUTION OF CANNABINOID RECEPTOR TYPE 1 (CB1) INNORMAL CANINE CENTRAL AND PERIPHERAL NERVOUS SYSTEM
J. Freundt Revilla, K. Kegler, W. Baumgärtner, A. Tipold

11) CHEMOKINE LIGAND 2 AND MATRIX-METALLOPROTEINASE-2 AND -9 BUT NOT PRO-INFLAMMATORY OR T-CELL CYTOKINES DOMINATE IN THE EPIDURAL COMPARTMENT FOLLOWING INTERVERTEBRAL DISC EXTRUSION
P. Karli, V. Martlé, K. Bossens, A. Summerfield, M.G. Doherr, M. Vandevelde, F. Forterre, D. Henke

17.30: ANNUAL GENERAL MEETING (AGM) OF THE EUROPEAN SOCIETY AND COLLEGE OF VETERINARY NEUROLOGY

18:30: Closing of the day

SATURDAY 20TH SEPTEMBER

08.30: Registration

09.00: FREE COMMUNICATIONS RESEARCH ABSTRACTS. MAIN TOPIC: BRAIN DISEASE

12) DANCING EYES SYNDROME IN AN ADULT ENGLISH SPRINGER SPANIEL
E.J. Ives, A.E. Vanhaesebrouck

13) CANINE MENINGIOMA: COMPARISON OF PALLIATIVE THERAPY, SURGERY AND STEREOTACTIC RADIOSURGERY
M. Dolera, L. Malfassi, S. Marcarini, G. Mazza, M. Sala

14) LONG-TERM FOLLOW-UP OF SURGICAL RESECTION ALONE FOR INTRACRANIAL TUMORS IN DOGS: 27 CASES (2002–2013)
A. Suñol, J. Mascort, C. Font, A. Rami, M. Pumarola, A. Luján

15) BETA-GALACTOSIDASE DEFICIENCY IN A JAPANESE DOMESTIC CAT: A NEW FORM OF FELINE GM1 GANGLIOSIDOSIS
H. Ueno, O. Yamato, M. Kohyama, T. Sugiura, K. Miyoshi, K. Matsuda

16) CORONAL CRANIOSYNOSTOSIS CAUSING SEVERE BRACHYCEPHALY IN PERSIAN CATS – CORRELATION BETWEEN THE DEGREE OF BRACHYCEPHALY AND INTERNAL HYDROCEPHALUS
MJ Schmidt, S Gralla, D Gorgas, J Lang, E Ludewig, D Farke, C Staczyk, KH Amort, A Fischer, A Meyer Lindenberg, M Kramer, N Ondreka

17) CHIARI-LIKE MALFORMATION IN THE CAT: CLINICAL AND MRI FINDINGS IN TWO CASES AND SURGICAL TREATMENT IN ONE CASE
S. Minato, M. Baroni

18) PROGNOSTIC PARAMETERS IN EQUINE HEAD TRAUMA (1999–2014)
N. Wettstein, D.W. Hague, K.M. Lascola, S.M. Reed

10.45: Coffee break, exhibition and poster session

11.15: Danièlle A Gunn-Moore
'INFECTIOUS CNS DISEASE'

12.00: FREE COMMUNICATIONS RESEARCH ABSTRACTS. MAIN TOPIC: SEIZURES

19) PREVALENCE AND CLINICAL CHARACTERISTICS OF IDIOPATHIC EPILEPSY IN THE ITALIAN SPINONE IN THE UK
L. de Risio, J. Freeman, A. Shea

20) THE INFLUENCE OF PHENOBARBITAL ON SERUM ACTIVITY OF LIVER ENZYMES IN CATS
S.A.E. Van Meervenne, P. Verhoeven, U. Christerson, H.A. Volk, C. Rohdin

21) LAFORA'S DISEASE IN THE MINIATURE WIREHAIRED DACHSHUND
L. Swain, A. Tauro, G. Key, J. Turnbull, B. Minassian, C. Rusbridge

22) FELINE EPILEPSY: DOES LUPUS ERYTHEMATOSUS BE INCLUDED IN DIFFERENTIAL DIAGNOSIS?
C. Escriou, A. Drut, J. Sonet, M. Hugonnard, L. Chabanne

13.00: Lunch, exhibition and poster session

14.30: INVITED SPEAKERS SESSION

Danièlle A Gunn-Moore
'FELINE COGNITIVE DYSFUNCTION'

15.15: FREE COMMUNICATIONS RESEARCH ABSTRACTS. INFLAMMATORY DISEASES

23) EVALUATION OF A PCR METHOD FOR THE DETECTION OF GURLTIA PARALYSANS IN SERUM AND CSF IN DOMESTIC CATS
M. Gómez, F. López, C. Hermosilla, J. Hirzmann, A. Taubert, M. Mieres, M. Moroni, P. Muñoz, F. Morera, G. Acosta-Jamett

24) FIRST REPORT ON CEREBRAL MUCORMYCOSIS DUE TO DISSEMINATED RHIZOPUS INFECTION IN A CAT
R. Cappello, A. Groth, S.W.M. Greijdanus-Van der Putten, M. Rosati, K. Tintelnot, K. Matiasek

25) AQUAPORIN-4 AND MYELIN-OLIGODENDROCYTE GLYCOPROTEIN AUTOANTIBODIES ARE ABSENT FROM THE SERUM OF DOGS WITH MENINGOENCEPHALOMYELITIS OF UNKNOWN ORIGIN
C.J. Cooper, P. Waters, R. Goncalves, P.M. Smith

16.00: Coffee break, exhibition and poster session

16.30: FREE COMMUNICATIONS RESEARCH ABSTRACTS. MAIN TOPIC: NEUROPATHY

26) UNILATERAL MYOKYMIA ASSOCIATED WITH FACIAL NEURITIS
S. Keegan, S. Guilherme, P.M. Smith

27) FACIAL AND VESTIBULAR NEUROPATHY OF UNKNOWN ORIGIN: SIGNALMENT, CLINICAL DESCRIPTION, DIAGNOSTIC FINDINGS, AND LONG-TERM FOLLOW-UP IN 21 DOGS
A. Jeandel, J.L. Thibaud, S. Blot

28) DEMYELINATING POLYNEUROPATHY IN MINIATURE SCHNAUZERS: A CLINICAL AND GENETIC UPDATE
A. Luján, C. Bertolani, J. Mascort, J. Gorraiz, G.D. Shelton, O. Forman, C. Spicer, J. Hersheson, H. Houlden, N. Granger

29) BOTULINUM TOXIN TYPE A FOR THE TREATMENT OF MUSCLE CONTRACTURES SECONDARY TO ACUTE SPINAL CORD INJURY IN A YOUNG CAT
K. Marioni-Henry, T. Schwarz, D. Gunn-Moore

17.30: Boehringer Ingelheim and John Presthus Awards

18.00: Closing remarks

ORAL PRESENTATIONS

ATLANTO-OCCIPITAL DISLOCATION IN 4 DOGS: MAGNETIC RESONANCE IMAGING FINDINGS AND SURGICAL TREATMENT. M. Dolera, L. Malfassi, S. Marcarini, G. Mazza, M. Sala. La Cittadina Fondazione Studi e Ricerche Veterinarie, Romanengo CR, Italy

Atlanto-occipital dislocation can occur in dogs following vehicle trauma. Various surgical techniques have been proposed, sometimes with disappointing results. Aim of this work is to propose a new surgical technique for atlanto-occipital dislocation in dogs.

Four dogs suffering from atlanto-occipital dislocation were considered.

All dogs exhibit varying degrees of quadriplegia and dyspnea. Head and neck 1.5T MRI showed atlanto-occipital dislocation, with disruption of atlanto-occipital ligaments and spinal cord compression. Surgery was performed immediately. Each patient, anesthetized and mechanically ventilated, was placed in sternal recumbency. Four surgical accesses were carried out at the zygomatic processes and at the atlas wings on each side. Once these structures had been exposed, a 2-mm diameter hole was drilled in each atlas wing 5 mm caudal to the cranial margin and 10 mm medially to the margin. A nylon monofilament was inserted in the hole and an O-shaped ligature was carried out externally to the skin through the ipsilateral zygomatic arch. Once the anatomical reduction of the dislocation was controlled by fluoroscopy imaging, the surgical openings were sutured. Two weeks after surgery patients regained ambulatory status. Ligatures were removed after 2 months. Gentle manipulations aimed to verify the atlanto-occipital stability; a slight reduction in the physiological excursion in flexion and extension was observed. On follow up examinations (up to 24 months) all dogs were found normal.

Surgical technique that we developed is safe and simple to perform if compared to other described in veterinary literature. However, the limited number of cases requires further studies.

ATLANTOAXIAL INSTABILITY WITH INCONGRUENCE: MAGNETIC RESONANCE IMAGING FINDINGS AND SURGICAL TREATMENT IN 5 DOGS. M. Dolera, L. Malfassi, S. Marcarini, G. Mazza, M. Sala. La Cittadina Fondazione Studi e Ricerche Veterinarie, Romanengo CR, Italy

Atlantoaxial instability is described in toy breeds dogs. Aim of this study is to describe MRI/CT imaging findings and a novel surgical technique for atlantoaxial instability associated with incongruence in dogs.

Five dogs with atlantoaxial instability associated with articular incongruence were considered.

At clinical examination all dogs showed tetraparesis and ataxia. At MRI/CT, the articular surface of the atlas was larger than the articular surface of the axis and laxity of atlantoaxial ligaments was noted; in flexion position the dislocation of the axis dorsally and cranially was evident. Spinal cord showed focal hyperintensities in T2W sequences and various degrees of syringomyelia. For surgery dogs were positioned in ventral recumbency, with a slight traction applied at maxillary canine teeth. The reduction of subluxation was verified by fluoroscopy. A dorsal approach was performed. Two 2.7 mm self tapping cortical screws were inserted on atlas wings on each side in a dorsal-ventral direction. Three 2.0 mm self tapping cortical screws were inserted transversally in the dorsal process of the axis. All screws were fused with polymethylmethacrylate. Serial clinical and imaging controls were made.

No intra-operative complications were observed. Functional improvement occurred in all dogs. Serial CT examinations showed a stable reduction of dislocation and residual mild spinal cord compression.

The surgical technique that we described is simple and safe and showed good results for the treatment of atlantoaxial dislocation with articular incongruence. Since the means of synthesis can injure the spinal cord, it is restrict to atlantoaxial inongruence and further studies are needed.

EVALUATION OF RISK FACTORS FOR EARLY POSTOPERATIVE NEUROLOGICAL DETERIORATION IN DOGS UNDERGOING CERVICAL DORSAL LAMINECTOMY OR HEMILAMINECTOMY. F.E. Taylor-Brown, T.J. Cardy, P.J. Kenny, H.A. Volk, S. De Decker. Royal Veterinary College, London, UK

Early postoperative neurological deterioration is a well-known complication following dorsal cervical laminectomies and hemilaminectomies in dogs. The aim of this study was to evaluate potential risk factors for neurological deterioration following such surgical procedures.

Medical records of dogs that had undergone a cervical dorsal laminectomy or hemilaminectomy were analysed retrospectively. Assessed variables included signalment, clinical presentation neurological examination findings, diagnosis, type, location, extent and duration of surgery. Outcome measures were neurological status immediately after surgery, duration of hospitalisation, and neurological status at time of discharge and re-examination. Univariate statistical analysis was performed.

Sixty-eight dogs were included. Diagnoses included osseous associated cervical spondylomyelopathy (OACSM, n = 25), acute intervertebral disk extrusion (IVDD, n = 23), meningioma (n = 7), vertebral arch abnormalities (n = 7), subarachnoid diverticulum (n = 4) and sub/intra-dural haemorrhage (n = 2). 55% of dogs (n = 36) were neurologically worse postoperatively. Other complications included postoperative death (n = 3), euthanasia due to deterioration (n = 2), respiratory compromise (n = 1), wound infection (n = 2) and severe intraoperative haemorrhage (n = 1). Younger dogs ($p = 0.007$) and those with a longer duration of clinical signs ($p = 0.025$) were more likely to demonstrate early postoperative neurological deterioration. Dogs with OASCM were more likely to demonstrate early postoperative neurological deterioration ($p = 0.002$) and had longer post-operative hospitalisation times ($p = 0.006$) compared to dogs with IVDD. Heavier dogs were less likely to be ambulatory immediately after surgery ($p = 0.05$). Longer surgery time was associated with a longer hospitalisation time ($p = 0.048$).

Patient age, size and diagnosis are significant in determining early postoperative neurological outcome. This information can aid in the management of expectations of clinical staff and owners with dogs undergoing these surgical procedures.

DORSAL LAMINECTOMY TO RELIEVE SPINAL CORD COMPRESSION IN A CAPTIVE SYRIAN BEAR (URSUS ARCTOS SYRIACUS). A. Rosenzweig[1], Y. Merbl[2], Y. Kushnir[2], O. Chai[2], Y. Chamisha[2], I. Horowitz[1], M.H. Shamir[2]. [1]The Israeli Wildlife Hospital, Zoological Center Tel-Aviv Ramat Gan, Israel, [2]Koret School of Veterinary Medicine, The Hebrew University of Jerusalem, Rehovot, Israel

A 19 year old captive male Syrian bear (Ursus arctos syriacus), became lame on his right hind limb that progressed over three weeks to a non-ambulatory bilateral pelvic limbs paraparesis. Cerebrospinal fluid analysis revealed mild mix pleocytosis with total protein of 23 mg/dl. Lateral plane radiographs showed malalignment at T3 and T4 vertebrae that was proved to be an area of focal stenosis of the spinal canal and spinal cord compression following myelogram. Due to the progressive nature of the paresis and lack of improvement with conservative treatment, decompression surgery was elected. Dorsal laminectomy of the third and fourth thoracic vertebrae was conducted exposing the dorsal aspect of the spinal cord. The bear recovered from surgery uneventfully and started demonstrating neurological improvement 10 days after surgery. During the following three weeks the bear regained ambulation and strength on his hind limbs.

Spinal cord compression was previously reported in three captive bears, two 15 years old grizzlys (Ursus Arctos Horribilis) and one 17 years old black bear (Ursus Americanus). The two grizzly were euthanized due to lack of improvement following medical treatment whereas the black bear underwent surgical decompression and recovered. All bears suffered from spinal cord compression in the area of cranial thoracic vertebrae (T2–T3/T3–T4) and were showing clinical signs at a similar age.

We concluded that paresis on the hind limbs in a captive bear when occurs with no history of trauma and around the age of 15–20 years is most likely be due to spinal cord compression at the

level of the cranial thoracic vertebrae. A decompressive surgery should be attempted and can be rewarding.

ASSOCIATION BETWEEN CEREBROSPINAL FLUID ANALYSIS AND OUTCOME IN DOGS WITH THORACOLUMBAR DISC HERNIATION AND ABSENT DEEP PAIN SENSATION. Y. Chamisha[1], I. Aroch[2], I. Srugo[1], S. Kuzi[2], T. Bdolah-Abram[3], O. Chai[1], M. Christopher[4], Y. Merbl[1], M.H. Shamir[1]. [1]Department of Neurology and Neurosurgery, Koret School of Veterinary Medicine, Jerusalem, Israel, [2]Department of Small Animal Internal Medicine, Koret School of Veterinary Medicine, Jerusalem, Israel, [3]Teaching Services Unit, Faculty of Medicine, Hebrew University of Jerusalem, Jerusalem, Israel, [4]Department of Pathology, Microbiology and Immunology, School of Veterinary Medicine, University of Davis California, Davis, California

The prognosis for functional recovery in paraplegic dogs presented with absent deep pain sensation (DPS) due to acute thoracolumbar intervertebral disc herniation is variable, therefore better prognostic indicators are needed.

The association between cerebrospinal fluid (CSF) analysis and functional outcome in this population was retrospectively evaluated in 29 dogs.

Signalment, CSF parameters such as total nucleated cell count, differential cell percentages and protein concentration, were evaluated. CSF analysis was compared between dogs that have failed to regain DPS and dogs that regain DPS within different time frame post-operative and with association with short and long-term outcomes.

CSF pleocytosis (>5 cells/μl) was present in 79% of the dogs. The total nucleated cell count, percentage of CSF macrophages and macrophage to monocyte ratio were higher in dogs that have failed to regain DPS within 10 days post-operative compared with dogs that regain DPS within this time frame ($p = 0.003, 0.020, 0.003$) and in dogs that have failed to regain ambulation compared with dog that have regain ambulation at the end of the study period ($p = 0.005, 0.043, 0.007$, respectively). Receiver operator characteristics curve analysis yielded a cut-off point of 0.73 macrophage to monocyte ratio with a sensitivity of 50% and specificity of 100% respectively, for prediction of a negative outcome.

In conclusion, the macrophages to monocytes ratio may be used as a prognostic indicator for regaining ambulation following surgical decompression in dogs that have lost deep pain sensation due to acute thoracolumbar intervertebral disc herniation.

DIFFUSION TENSOR IMAGING OF THE SPINAL CORD IN PARAPLEGIC DOGS WITH INTERVERTEBRAL DISC HERNIATION BEFORE AND AFTER DECOMPRESSIVE SURGERY. A. Wang-Leandro, P. Dziallas, S. Kramer, M.K. Hobert, V. Stein, A. Tipold. Department of Small Animal Medicine and Surgery, University of Veterinary Medicine Hannover, Germany

Intervertebral disc herniation (IVDH) is a common neurological disorder in dogs causing a contusive-compressive lesion of the spinal cord (SC) leading to axonal injury, edema, inflammation, demyelination, ischemia and necrosis. Diffusion tensor imaging (DTI) allows the quantitative evaluation of structural changes of the spinal cord by means of fractional anisotropy (FA) and apparent diffusion coefficient (ADC), as well as by the description of three dimensional images of the nerve fibres, known as fibre tracking.

The aim of this prospectively designed study was to compare FA and ADC values in paraplegic dogs with IVDH in the thoracolumbar segment of the spinal cord before and 3 months after hemilaminectomy. The hypothesis should be proven, that FA and ADC values can be used as markers for spinal cord de- and regeneration.

Magnetic resonance imaging was performed twice in 13 paraplegic dogs suffering from IVDH and improving after decompressive surgery. Transversal and sagittal T2-weighted sequences as well as DTI sequences were in all cases performed. Regions of interest (ROI) were placed in the grey and white matter of the SC at the compression site in the lesion epicenter, one vertebral body (VB) cranially, one VB caudally from any compression and in apparently normal SC.

FA values were significantly higher in the epicentres ($p \leq 0.0001$), at VB cranially ($p = 0.0004$), and VB caudally ($p = 0.0054$) before surgery in comparison to the measurements in the same ROIs 3 months after treatment and recovery, indicating a restrained direction of the water molecules within the axonal bundles due to the compression. These findings could also be correlated with either fibre deviation and/or mechanical disruption present in the tractographies. However, FA values were significantly lower than the apparently normal tissue 3 months after surgery ($p = 0.0274$) most probably still reflecting presence of demyelinisation, necrosis and neural tissue degeneration that characterises a secondary wave SC lesion. ADC values were found to be significantly lower in the epicenters and in the ROIs at the level of VB cranially to any compressive lesion before surgery in comparison to the time point measured after surgery ($p = 0.0001$ and $p = 0.0167$ respectively) reflecting the reduction of strength in the free water molecule diffusion because of mechanical water flow interruption.

In conclusion, FA and ADC values are reliable markers for SC compression in acute cases of IVDH. FA values additionally might reflect microstructural neural tissue degeneration not visible by conventional MRI sequences.

SURGICAL DENERVATION OF THE INTERNAL URETHRAL SPHINCTER FOR THE TREATMENT OF REFLEX DYSSYNERGIA IN A DOG WITH A SACROCOCCYGEAL LUXATION. M.V. Bahr Arias, P.V.T. Marinho, C.C. Zani. Department of Veterinary Clinics, Universidade Estadual de Londrina-PR, Brazil

Reflex dyssynergia occurs when detrusor contraction is not synchronized with urethral relaxation. A lesion affecting the upper motor neuron pathways is the most common neurogenic cause.

The aim of this report is to describe the occurrence of reflex dyssynergia in a dog with a sacrococcygeal luxation that did not respond to medical treatment.

A 5-year-old intact female Dachshund was referred with incapacity to urinate after being hit by a car. On clinical examination it was observed that the bladder was distended. Neurological examination showed a flaccid tail, lack of sensation in the perineal region, absence of perineal reflex and pain over the sacrum. The lateral survey radiographs of sacral region showed a sacrococcygeal luxation. The bladder was emptied with intermittent bladder catheterization, and the animal received analgesia with tramadol, and a muscle relaxant, diazepam. Two drugs were used consecutively in a period of two weeks aiming to relax the internal urethral sphincter, both without success, acepromazine and prazosin. As the patient was refractory to medications, surgery of urethral sphincter denervation was performed. After a celiotomy, a castration was performed and a bipolar cautery was used to cauterize the nerve bundles in the internal urethral sphincter region. On the day following the surgery it was possible to empty the bladder with abdominal massage, and after the fifth day the patient had spontaneous urination. The patient is urinating normally 20 months after surgery.

This case demonstrates an atypical presentation of a sacral lesion, and the effectiveness of the surgical technique described.

EFFECTS OF HUMAN BONE MARROW-DERIVED MESENCHYMAL STEM CELLS ON CUPRIZONE INDUCED DEMYELINATION. J. Neßler[1,2], K. Bénardais[1], V. Gudi[1], A. Hoffmann[2], L. Salinas Tejedor[1], S. Janßen[1], P. Chittappen Kandiyil[1], W. Baumgärtner[1], A. Kavelaars[3,4], C.J. Heijnen[3,4], C. van Velthoven[4], F. Hansmann[2], T. Skripuletz[1], M. Stangel[1]. [1]Hannover Medical School, Hannover, Germany, [2]University of Veterinary Medicine Hannover, Hannover, Germany, [3]Department of Symptom Research, University of Texas, Houston, USA, [4]Laboratory for Neuroimmunology and Developmental Origins of Disease, University Medical Center Utrecht, Utrecht, The Netherlands

Diseases of the central nervous system (CNS) with severe demyelination, such as canine distemper encephalitis in dogs or multiple sclerosis in humans, do have a common feature despite different pathology: no treatment is currently available to enhance regeneration and remyelination in the CSN. Mesenchymal stem cells (MSC) were shown to increase neuroregeneration in several animal models of CNS diseases with an impaired blood brain barrier (BBB).

The aim of the current study was to investigate the effects of intravenous and intranasal application of human MSC in an animal model with an intact blood brain barrier.

An appropriate model for this approach is cuprizone induced demyelination. In this mouse model the toxic agent cuprizone leads to a complete loss of oligodendrocytes without an impact on the BBB (permission for animal experiment: AZ 33.14-42502-04-11/0450). The demyelination is followed by an inflammatory response. At the peak of the inflammation human fluorescent labeled MSC were injected intranasally or intravenously. CNS was analyzed to detect injected MSC via fluorescent microscopy. Immunohistochemical staining of myelin and oligodendrocytes shows the severity of demyelination, staining of activated astrocytes and microglia reveals immunological response while the amount of oligodendrocyte precursor cells marks the regeneration.

After intravenous injection only a few MSC were visible in the CNS but not in the main lesions in the white matter. No impact on inflammatory glial response or de- and remyelination could be shown. This indicates that MSC cannot provide regeneration in the cuprizone model after systemic application, which has to be considered, when potential use of MSC to treat naturally occurring diseases in dogs is under debate.

PROTEOMIC ANALYSIS OF CEREBROSPINAL FLUID IN CANINE CERVICAL SPONDYLOMYELOPATHY. P. Martin-Vaquero[1], R.C. da Costa[1], M.J. Allen[1], S.A. Moore[1], J.K. Keirsey[2], K.B. Green[3]. [1]Department of Veterinary Clinical Sciences, The Ohio State University, Columbus, OH, USA, [2]Mass Spectrometry and Proteomics Facility, The Ohio State University, Columbus, OH, USA, [3]Department of Chemistry, University of Florida, Florida, FL, USA

The investigation of the proteins expressed in cerebrospinal fluid (CSF) may provide insight into the pathomechanisms underlying canine cervical spondylomyelopathy (CSM). The purpose of this prospective study was to compare the CSF proteome of clinically normal (control) and CSM-affected Great Danes (GDs).

Cerebellomedullary cistern CSF was collected from 15 control and 15 CSM-affected GDs. Protein separation was performed with two-dimensional gel electrophoresis. A Student's t-test was used to detect significant differences between groups ($p < 0.05$). Three comparisons were made: 1) control vs. CSM-affected GDs, 2) control vs. non-corticosteroid treated CSM-affected GDs, and 3) non-corticosteroid treated CSM-affected vs. corticosteroid treated CSM-affected GDs. Protein spots exhibiting at least a statistically significant 1.25-fold change between groups were selected for subsequent identification with capillary-liquid chromatography tandem mass spectrometry.

Ninety-six spots exhibited an average change of at least 1.25-fold in one of the three comparisons. Compared to the CSF of control GDs, the CSF of CSM-affected GDs demonstrated increased expression of eight proteins including vitamin D-binding protein, angiotensinogen, alpha-2-HS-glycoprotein, calsyntenin, SPARC (osteonectin), complement C3, creatine kinase B-type, and gelsolin, and decreased expression of apolipoprotein E, pigment epithelium-derived factor, and prostaglandin-H2 D-isomerase. In the CSF of CSM-affected dogs, corticosteroid treatment increased the expression of cystatin C-like, haptoglobin, clusterin, apolipoprotein E, and transthyretin 2 isoform, and decreased the expression of alpha-2-HS-glycoprotein, angiotensinogen, and gelsolin.

The CSF proteins upregulated in CSM-affected GDs are associated with damaged neural tissue or bone turnover, supporting the potential of these proteins as biomarkers for canine CSM and their involvement in the disease pathogenesis.

SPATIOTEMPORAL DISTRIBUTION OF CANNABINOID RECEPTOR TYPE 1 (CB1) IN NORMAL CANINE CENTRAL AND PERIPHERAL NERVOUS SYSTEM. J. Freundt Revilla[1], K. Kegler[2], W. Baumgärtner[2], A. Tipold[1]. [1]Department Small Animal Medicine and Surgery, University of Veterinary Medicine Hannover, Hannover, Germany, [2]Institute for Pathology, University of Veterinary Medicine Hannover, Hannover, Germany

The endocannabinoid system is a regulatory pathway consisting of two main types of cannabinoid receptors (CB1 and CB2) and their endogenous ligands, the endocannabinoids. Since endocannabinoids were shown to be elevated in cerebrospinal fluid of epileptic dogs, the knowledge about the species specific CB receptor expression in the central nervous system (CNS) had to be increased. The CB1 receptor is highly expressed in both the central and peripheral nervous systems (PNS) in mammalians and is involved in neuromodulatory functions. In dogs, CB1 has only been identified in the salivary glands, hair follicles, lymph nodes, hippocampus and skin via immunohistochemical evaluation; its presence has been evidenced through autoradiography in a few regions of the CNS. Therefore, in the current study the spatiotemporal distribution of CB1 receptors in the normal canine CNS and PNS should be examined for future comparative studies in diseased dogs.

Tissue samples of several regions of the brain, spinal cord and peripheral nerves from a 4 weeks old puppy, three 6 months old dogs, and one 10 years old dog, without clinical or pathological evidence of neurologic or infectious disease were processed for immunohistochemistry using a rabbit polyclonal anti-human CB1 antibody (Abcam®, England), crossreacting with canine CB1.

In the CNS of all dogs, strong dot-like immunoreaction was observed in the neuropil of cerebral cortex, cingulate gyrus of the hippocampus, thalamus, midbrain, cerebellum, medulla oblongata and grey matter of the spinal cord. Neurons in the basal nuclei and substantia nigra showed strong cytoplasmic immunoreactivity, as well as ependymal cells lining the ventricles. Astrocytes were constantly positive in all examined brain regions. CB1 labelled neurons and satellite cells of the dorsal root ganglia, and myelinating Schwann cells in the PNS.

In conclusion, these results represent the first detailed localization of CB1 receptors in the normal canine CNS and PNS and are basic findings for further studies elucidating the physiological consequence of this particular anatomical and cellular localization and their implication in pathological conditions as well as emerging target for pharmacotherapy.

CHEMOKINE LIGAND 2 AND MATRIX-METALLOPROTEINASE-2 AND -9 BUT NOT PRO-INFLAMMATORY OR T-CELL CYTOKINES DOMINATE IN THE EPIDURAL COMPARTMENT FOLLOWING INTERVERTEBRAL DISC EXTRUSION. P. Karli[1], V. Martlé[2], K. Bossens[2], A. Summerfield[3], M.G. Doherr[4], M. Vandevelde[1], F. Forterre[5], D. Henke[1]. [1]Division of Neurological Sciences, Department of Clinical Veterinary Neurology, Vetsuisse Faculty, University of Bern, Bern, Switzerland, [2]Department of Small Animal Medicine and Clinical Biology, Faculty of Veterinary Medicine, Ghent University, Belgium, [3]Institute of Virology and Immunoprophylaxis [IVI], Research Department, Switzerland, [4]Department of Clinical Research and Veterinary Public Health, Vetsuisse Faculty, University of Bern, Bern, Switzerland, [5]Department of Clinical Veterinary Medicine, Division of Clinical Surgery, Vetsuisse Faculty, University of Bern, Bern, Switzerland

In canine IVD disease only little is known about the inflammatory response in the epidural space. The purpose of this prospective study was to determine mRNA expression of selected cytokines, chemokines and matrix metalloproteinases (MMP) qualitatively and semi-quantitatively in extruded IVD material and to correlate results to neurological status, duration of clinical signs, and outcome.

mRNA expression of IL-1β, IL-2, IL-4, IL-6, IL-8, IL-10, TNF, IFNγ, MMP-2, MMP-9, CCL2, CCL3, and housekeeping genes was determined by Panomics 2.0 QuantiGene Plex technology in 70 affected dogs and 24 controls. Relative mRNA expression and fold changes were calculated. Relative mRNA expression was correlated statistically to clinical parameters.

TNF, IL-1β, IL-2, IL-4, IL-6, IL-10, IFNγ and CCL3 were significantly lower ($p < 0.001$), whereas MMP-2 and CCL2 were significantly higher ($p = 0.012/0.001$) expressed in the affected group. Fold changes of TNF, IL-1β, IL-2, IL-4, IL-6, IL-10, IFNγ, CCL3 were clearly down-regulated in all stages of the disease. MMP-9 was down-regulated in the acute stage and up-regulated in the subacute and chronic phase. IL-8 was up-regulated in acute cases. MMP-2 showed mild and CCL2 strong up-regulation over the whole course of the disease.

In dogs with severe pain, CCL3 and IFNγ were significantly higher compared to dogs without pain ($p = 0.017/0.020$). Dogs pre-treated with non-steroidal anti-inflammatory drugs revealed significantly lower mRNA expression of IL-8 ($p = 0.017$).

The high CCL2 levels and up-regulated MMP's combined with down-regulated T-cell cytokines and suppressed pro-inflammatory genes indicate that the epidural reaction is dominated by infiltrating monocytes differentiating into macrophages with tissue remodeling functions.

DANCING EYES SYNDROME IN AN ADULT ENGLISH SPRINGER SPANIEL. E.J. Ives, A.E. Vanhaesebrouck. The Queen's Veterinary School Hospital, Department of Veterinary Medicine, University of Cambridge, Cambridge, UK

A 5-year-old female neutered English Springer spaniel presented with a 3-week history of lethargy, increased nervousness, and apparent visual impairment.
On examination, a subtle right head tilt, involuntary eye movements and intermittent, involuntary contractions of the muscles of facial expression were observed. Eye movements were characterized by rapid, conjugate saccades occurring in all directions. Ophthalmological examination was otherwise unremarkable.
Haematology, serum biochemistry, serum electrolytes, thoracic radiography, abdominal ultrasonography, brain MRI and cisternal cerebrospinal fluid analysis were unremarkable. All involuntary muscle contractions disappeared under general anaesthesia.
The clinical signs remained static for 4 weeks before showing complete, spontaneous resolution. No relapse or other medical problems were reported 1 year after initial presentation.
This case showed remarkable similarity to a rare movement disorder reported in humans called Dancing Eyes Syndrome (also known as opsoclonus-myoclonus syndrome). This syndrome is typically characterized by an acute onset of involuntary, multidirectional eye movements (opsoclonus), myoclonus of the trunk, limb or head muscles, and behavioural changes. An autoimmune aetiology is suspected, resulting in disinhibition of the fastigial nuclei in the cerebellum. The syndrome is often seen as a paraneoplastic manifestation of neuroblastoma in children, or of lung and breast carcinomas in adults. In many adults however, the cause is considered idiopathic (presumed parainfectious/viral), with spontaneous remission reported within 4–6 weeks, similar to that observed in this case. This case represents the first veterinary report of Dancing Eyes Syndrome.

CANINE MENINGIOMA: COMPARISON OF PALLIATIVE THERAPY, SURGERY AND STEREOTACTIC RADIOSURGERY. M. Dolera, L. Malfassi, S. Marcarini, G. Mazza, M. Sala. La Cittadina Fondazione Studi e Ricerche Veterinarie, Romanengo, Italy

Meningiomas represent about half of primary intracranial tumours in dogs. There are limited comparative studies regarding the various treatment modalities. Aim of this study was to compare palliative therapy, surgery and stereotactic radiosurgery treatment.

Data were collected retrospectively from 198 dogs referred to one institution over a 15-year period with histopathologically confirmed or MRI consistent with meningioma.

Dogs were grouped by anatomical site (supratentorial – E, infratentorial – T, spinal – S) and by therapeutic option (palliation – P, surgery – S, radiosurgery – R). Surgery goal was total tumour resection. LINAC based VMAT radiosurgery was performed in 1–5 fractions. Serial clinical and MRI examinations were conducted. Signalment, clinical signs, neuroanatomic tumour location, relapse specifics, adverse events, best response and overall survival (OS) time were evaluated. OS estimates were calculated using Kaplan-Meier method and the differences between groups compared using logrank analysis. Multivariate analysis was performed using Cox regression.

91 dogs (51 E, 33 T, 7 S) had been palliated, 69 dogs (33 E, 31 T, 5 S) had been treated with stereotactic radiosurgery, 38 dogs (32 E, 1 T, 5 S) with surgery. OS in PE was 190 days, in PT 38 days, in PS 89 days, in RE 781 days, in RT 654 days, in RS 813 days, in SE 567 days, in ST 3 days, in SS 210 days. Variables predictive of OS are localisation and therapy option.

Dogs suffering from meningioma undergoing stereotactic radiosurgery had superior outcome to those treated with surgery or palliation.

LONG-TERM FOLLOW-UP OF SURGICAL RESECTION ALONE FOR INTRACRANIAL TUMORS IN DOGS: 27 CASES (2002–2013). A. Suñol Iniesta[1], J. Mascort Boixeda[1], C. Font Nonell[1], A. Rami Bastante[2], M. Pumarola Batlle[3], A. Luján Feliu-Pascual[1]. [1]Hospital Ars Veterinaria, Barcelona, Spain, [2]Neuroscience Institut, Barcelona, Spain, [3]Department of Medicine and Surgery, Faculty of Veterinary Medicine, Barcelona, Spain

A retrospective study was designed to compare survival times (ST) for dogs with extra-axial tumors (EAT) and intra-axial tumors (IAT) treated with surgical resection alone (SRA), and assess prognostic factors associated with these tumors in dogs.

Medical records of dogs with intracranial tumors treated with SRA in our hospital were reviewed (2002–2013). For each dog, signalment, clinical signs and duration, imaging findings, tumor location, surgery, treatment and histologic assessment were obtained from the medical record. Clients and referring veterinarians were contacted via telephone for information on recurrence of clinical signs and postoperative survival time.

Twenty-nine dogs with histological diagnosis survived >7 days: 15(52%) EATs and 14(48%) IATs. All tumors had a rostrotentorial location. All 15 EATs were meningiomas. IATs represented oligodendroglioma(7), astrocytoma(2), ependymoma(1) and anaplastic glioma(4). In EATs median age was nine years and in IATs was 10.5 years. Twenty-one dogs (73%) were examined because of seizures. Median ST for dogs with EATs was 361 days (mean 729 days; range 10–2735 days). Median ST for dogs with IAT was 75 days (mean 125 days; range 10–730 days). Two dogs with an EAT had more than one surgery. One had three surgeries performed and died after 7.6 years. The other had two surgeries and is still alive 4.8 years after diagnosis. Of the data collected, only histologic subtype had prognostic value.

Results of this study suggest that SRA might be an appropriate treatment for dogs with intracranial tumors, particularly with extra-axial location when radiation therapy is not readily available.

BETA-GALACTOSIDASE DEFICIENCY IN A JAPANESE DOMESTIC CAT: A NEW FORM OF FELINE GM1 GANGLIOSIDOSIS. H. Ueno[1], O. Yamato[2], M. Kohyama[2], T. Sugiura[3], K. Miyoshi[1], K. Matsuda[1], T. Uchide[1]. [1]Division of Small Animal Clinical Sciences, Department of Veterinary Medicine, Rakuno Gakuen University, Ebetsu, Japan, [2]Laboratory of Clinical Pathology, Department of Veterinary Medicine, Joint Faculty of Veterinary Medicine, Kagoshima University, Kagoshima, Japan, [3]Sugiura Pet Clinic, Sapporo, Japan

A 4-month-old Japanese domestic cat was referred for a 6-week history of progressive hindlimb ataxia and head tremor. Although voluntary walk was possible, the cat showed ataxia with hypermetria. The postural reaction was normal except for the wheel barrowing and extensor postural thrust tests. Spinal nerve was hyperreflexia. Cranial nerve reactions are normal except for the loss of both side menace response. Optic disappearance of both sides was confirmed. The blood cell counts and serum chemistry appeared to be within normal ranges. Peripheral blood lymphocytes showed the presence of multiple empty vacuoles. Magnetic resonance imaging showed hyperintensity on T2-weighted and fluid-attenuated inversion recovery images in the white matter of the forebrain. The encephalatrophy of both olfactory bulbs and temporal lobes were detected. Gadodiamide did not enhance the lesions on T1-weighted image. CSF analysis appeared to be within normal ranges. Blood leukocytes enzyme assay revealed a very low beta-galactosidase activity level as compared to an unaffected parent (dam) and litter cats. The cat was died at 10 months of age.
Histologically, neurons with distended, pale, slightly granular perikaryon were detected throughout the brain. Demyelination and gemistocytic astrocytosis was evident in the white matter. The accumulation of GM1 ganglioside was demonstrated by immunohistochemical stain with cholera toxin B. Ultrastructually, membranous cytoplasmic bodies were observed in lysosomes of neurons.
Genetic analysis did not detect GLB1:c.1448G>C, which is known as a causative mutation of feline GM1 gangliosidosis suggesting that the cat is affected with a new form of the disease.

CORONAL CRANIOSYNOSTOSIS CAUSING SEVERE BRACHYCEPHALY IN PERSIAN CATS – CORRELATION BETWEEN THE DEGREE OF BRACHYCEPHALY AND INTERNAL HYDROCEPHALUS. M.J. Schmidt[1], S. Gralla[1], D. Gorgas[2], J. Lang[2], E. Ludewig[3], D. Farke[1], C. Staczyk[4], K.H. Amort[1], A. Fischer[5], A. Meyer Lindenberg[5], M. Kramer[1], N. Ondreka[1]. [1]Department of Veterinary Clinical Sciences, Clinic for Small Animals, Justus-Liebig University, Giessen, Germany, [2]Department of Clinical Veterinary Medicine, Division of Clinical Radiology, Vetsuisse-Faculty, University of Berne, Bern, Switzerland, [3]Department of Small Animal Medicine, University of Leipzig, Germany, [4]Institute for Veterinary Anatomy, Histology and Embryology Justus-Liebig University, Giessen, Germany, [5]Small Animal Medical Clinic, Department of Veterinary Sciences, Ludwig-Maximilians-University of Munich, Munich, Germany

Internal hydrocephalus is frequently diagnosed in Persian cats. This breed shows different degrees of brachycephaly. MRI and CT series of 67 Persian cats were prospectively (Permit Number: V54-19c2015 h 02GI 18/17 Nr.A 20/2013) and retrospectively examined. Facial length, cranial length (CL), cranial width (CW), skull-base length (SBL), and cranial cavity length (CCL) were measured. From these measurements the cranial and facial index as well as the skull base index was calculated. A high cranial index and a low facial index and skull base index characterize a high grade of brachycephaly. The volumes of the lateral ventricles were determined.

Skull measurements were compared between cats with (group1) and without hydrocephalus (group 2) using Mann-Whitney tests. The correlation between all measurements was determined using Pearsons-correlation.

There was a significant difference between the CI ($p < 0.0001$, median group 1: 1.14, median group 2: 0.68) and facial index ($p = 0.002$, median group 1: 0.23, median group 2: 0.36) and a significant correlation between CI and ventricular volume ($r = 0.71$; $p = 0.0016$).

In this study group hydrocephalus only occured in cats with an extremely high degree of brachycephaly.

Comparison of CT based 3D models of the skull of Persian cats with age matched mesaticephalic cats showed closure of the coronal suture (fronto-parietal suture) in cats with extreme CI as early as 4 weeks. Other sutures of the skull were present in all cats. Coronal craniosynostosis seems to be the cause of severe brachycephaly and a predisposing factor for the development of internal hydrocephalus in Persians.

CHIARI-LIKE MALFORMATION IN THE CAT: CLINICAL AND MRI FINDINGS IN TWO CASES AND SURGICAL TREATMENT IN ONE CASE. S. Minato, M. Baroni. Clinica Veterinaria Valdinievole. Pistoia, Italy

Chiari-like malformation (CM) is a malformation of the hindbrain and the surrounding caudal cranial fossa. CM is common in dogs, especially in brachycephalic toy breeds like CKCS and Griffon Bruxellois. Here, we describe clinical presentation, MRI scan in two cats and surgical procedure in one cat with CM. A 2-year-old male DSH cat was examined because of a 5 month history of four limbs ataxia. A 2-year-old male DSH cat was presented for evaluation with a 6 months history of slowly progressive paraparesis. Both MRI scan showed overcrowding of the caudal cranial fossa and cerebellar indentation through the foramen magnum, without evidence of syringomyelia (SM).

The first cat's clinical condition suddenly worsened one year later, and the second cat's neurological condition slowly progressed to ambulatory tetraparesis. A second MRI, one year after the first MRI study for both cats, confirmed the previous findings. Unfortunately the first cat had a respiratory arrest during the MRI scan and died. No post mortem examination was allowed. The second cat underwent a foramen magnum decompression as described in dogs. After the surgical procedure the cat had a slowly and complete recovery. At six months follow up the cat showed normal neurological conditions.

To the author's knowledge this is the first description of cats with CM including MRI findings and follow up after surgical treatment.

PROGNOSTIC PARAMETERS IN EQUINE HEAD TRAUMA (1999–2014). N. Wettstein[1], D.W. Hague[1], K.M. Lascola[1], S.M.Reed[2]. [1]University of Illinois College of Veterinary Medicine, Illinois, USA, [2]Rood and Riddle Equine Hospital, Kentucky, USA

While the Modified Glasgow Coma Scale (MGCS), steroid use, and seizure frequency have been evaluated in humans and dogs with head trauma, little research has been done in horses to assess its prognostic value and outcome. The purpose of this retrospective study was to correlate measureable parameters to an outcome prognosis in equine patients with head trauma.

The medical records from 1999 to 2014 from the University of Illinois Veterinary Teaching Hospital ($n = 61$) and Rood and Riddle Equine Hospital ($n = 42$) were selected by the following search terms: 'head trauma', 'injury of the head, 'open head wound', 'fracture of bone of head' and 'closed wound of head'. Information evaluated included: signalment, final diagnosis, medications administered, blood glucose concentrations within 24 h of admission, seizure activity and outcome. Each case retrospectively assigned a MGCS, a Small Animal Coma Score (SACS) and a modified MGCS (mMGCS) based on information present in the records.

Outcomes were reported in 99 horses: 87 alive, 3 died and 9 euthanized. There was no significant different in treatment with steroid medication (34 cases) compared to those not treated with steroid medication ($p = 0.8$). There does not appear to be a significant difference in prognosis as indicated by the MGCS ($p = 0.8$) or the SACS ($p = 0.3$) compared to survival. There does appear to be a significant negative correlation between seizure activity and decreased survival ($p = 0.02$) with head trauma in horses.

PREVALENCE AND CLINICAL CHARACTERISTICS OF IDIOPATHIC EPILEPSY IN THE ITALIAN SPINONE IN THE UK. L. De Risio, J. Freeman, A. Shea. Neurology Unit, Animal Health Trust, Newmarket, UK

The prevalence and clinical characteristics of idiopathic epilepsy (IE) in the Italian Spinone have not been previously investigated.

The owners of all United Kingdom (UK) Kennel Club registered Italian Spinoni (IS) born between 1st January 2000 and 31st December 2011 were sent a letter inviting them to participate in the study. They were asked to complete an initial questionnaire (phase I) to investigate if there IS had ever had 2 or more seizures, age at seizure onset, seizure aetiology and survival. Consent was asked to contact their primary veterinarian. All owners of IS with IE were invited to complete a phase II questionnaire containing 110 questions on various aspects of epilepsy.

The invitation to participate to the study was sent to the owners of 3331 IS. Of these, 1192 returned phase I questionnaire (response rate 36%). Following revision of phase I questionnaire, the primary veterinarian's, and, when available, the veterinary neurologist's medical records, 63 (5.3%) IS were identified with IE. Mean age at first seizure was 39 ± 19 months. Twenty-one IS were females (15 spayed) and 42 were males (19 neutered). The phase II questionnaire was returned for 47 IS. Of these, 26 IS developed behavioural abnormalities (most commonly associated with abnormal perception and anxiety) at epilepsy onset. Based on the owner's open description and response to specific questions on seizure phenomenology, all IS had generalised tonic-clonic seizures with impaired consciousness. Autonomic manifestations were reported in 50 of 52 IS for which the data was available. Rhythmic running movements were reported in 52 of 58 IS. Pre and post-ictal signs were reported in 31/49 and 51/51 IS, respectively. Cluster seizures and status epilepticus occurred in 85% and 22% IS, respectively. Mean seizure frequency before antiepileptic treatment (AET) was 3.4 ± 3.2 seizures per month. 57/63 IS were administered one or more antiepileptic medications (AEMs) (1 AEM = 22 IS; 2 AEMs = 18 IS; 3 AEMs = 12 IS; 4 AEMs = 3 IS; 5 AEMs = 2 IS). Phenobarbitone and bromide were the most commonly used AEMs. 6/63 IS were not on AET. At the time of study completion 26/63 (41%) IS were dead. Of these, 8/26 (31%) died of causes unrelated to epilepsy (mean survival time 62 ± 38 months) and 18/26 (69%) were euthanised because of poorly controlled IE or severe adverse effects of AEMs (mean survival time 22 ± 17 months).

The estimated prevalence of IE in the IS (5.3%) is higher that the prevalence of probable IE in dogs (0.6%) in the UK. The male to female ratio is 2:1. The majority of IS have cluster seizures. 61% of IS required more than one AEM and seizure control was often challenging. Epilepsy-related mortality rate was 29% (18/63). Genetic studies to identify causal mutations are in progress.

THE INFLUENCE OF PHENOBARBITAL ON SERUM ACTIVITY OF LIVER ENZYMES IN CATS. S.A.E. Van Meervenne[1,2], P. Verhoeven[3], U. Christerson[4], H.A. Volk[5], C. Rohdin[6]. [1]Läckeby Djursjukhus, Läckeby, Sweden, [2]Ghent University, Faculty of Veterinary Medicine, Department of Small Animal Medicine and Clinical Biology, Merelbeke, Belgium, [3]Academic Core, University College Roosevelt, Middelburg, The Netherlands, [4]Kalmar Djursjukhus, Kalmar, Sweden, [5]Department of Clinical Science and Services, Royal Veterinary College, London, UK, [6]Djursjukhuset Albano, Danderyd, Sweden

Phenobarbital causes hepatic enzyme induction, resulting in non-clinically significant increases in alkaline phosphatase (ALP), alanine aminotransferase (ALT) and γ-glutamyltransferase (γ-GT) in dogs and humans. Induction of cytochrome P450 in dogs has been related to hepatotoxicity. Only limited cytochrome P450 induction has been reported in cats and hepatotoxicity secondary to phenobarbital has not been described, but changes in liver enzyme activities have. Wrong interpretation of blood results may influence continuation of phenobarbital in a species without many other alternatives.

The goal of this retrospective, multicenter study was to evaluate serum liver enzymes in cats on phenobarbital treatment. Dosage, serum concentrations of ALP, ALT, bile acids, albumin and phenobarbital were recorded.

Ninety-one visits in 28 cats were included. ALP was recorded 46 times in 23 cats (mean 43.9 U/l, ref 10–90), with one elevation (114 U/l). ALT was measured 64 times in 25 cats (mean 80.1 U/l, ref 20–100) and elevated 16 times in 10 cats (mean 147 U/l, range 100–307). Albumin was normal in 30 measurements in 16 cats (mean 32.4 g/l, ref 22–44). Bile acids were elevated four times in three cats (mean 34.7 μmol/l, range 28–50.7) of 50 measurements in 22 cats (mean 4.4 μmol/l, ref 0–20). No patient was diagnosed with liver failure.

ALT was most commonly (40%) increased in cats on phenobarbital and probably clinically insignificant. No statistically significant difference was found in dosage or serum concentration of phenobarbital between cats with normal and elevated ALT. ALP was rarely (4%) elevated in contrast to dogs.

LAFORA'S DISEASE IN THE MINIATURE WIREHAIRED DACHSHUND. L. Swain[1], A. Tauro[1], G. Key[2], J. Turnbull[3], B. Minassian[3], C. Rusbridge[1,4]. [1]Fitzpatrick Referrals, Godalming, Surrey, UK, [2]Lafora Dogs, Bristol, UK, [3]The Hospital for Sick Children, University of Toronto, Canada, [4]School of Veterinary Medicine, University of Surrey, Guildford, Surrey, UK

Lafora disease (LD) is an autosomal recessive late onset, progressive myoclonic epilepsy with a high prevalence in the miniature wirehaired Dachshund (MWHD). Recent breed-wide testing suggests a carrier rate as high as 36%. EPM2B gene mutation results in intracellular accumulation of abnormal glycogen (Lafora bodies). A characteristic feature of the disease is spontaneous and reflex myoclonus however clinical signs and disease progression are not well described.

A questionnaire was submitted to owners of MWHD which 1) were homozygous for EPM2B mutation (breed club testing program) (24 dogs) 2) had late onset reflex myoclonus and veterinarian suspicion for LD but without genetic confirmation (17 dogs).

Forty-one responses were received. 71% showed clinical signs consistent with LD, with 59% having a positive genetic test. 12 dogs had genetic susceptibility but had yet to develop signs of LD; these dogs were excluded leaving 29 dogs for analysis (12 male; 17 female). Average age of onset was 7 years (3.5–12). The most common presenting sign was photosensitive myoclonus (72%). Other early signs included sleep myoclonus (52%) and generalized seizures (41%). Less common signs were 'jaw smacking' (31%), focal seizures (24%), fly catching (24%), anxiety (24%), impaired vision (14%), aggression towards other dogs (14%) and people (14%). Late signs (2 years or more after initial presentation) included dementia (24%), deafness (14%), faecal (14%) and urinary (14%) incontinence. Veterinary knowledge was poor; with 91% of primary veterinarians failing to recognise the signs of LD.

FELINE EPILEPSY: DOES SYSTEMIC LUPUS ERYTHEMATOSUS BE INCLUDED IN DIFFERENTIAL DIAGNOSIS? C. Escriou, A. Drut, J. Sonet, M. Hugonnard, L. Chabanne. Small Animal Department, VetAgro Sup, University of Lyon, Marcy l'Etoile, France

Seizures are considered as an important manifestation of neuropsychiatric Systemic Lupus Erythematosus (SLE) in humans. Between 10% and 20% of SLE patients develop epileptic seizures at some point in their illness. Seizures can occur even years before the clinical onset of SLE. We report the cases of 2 cats presented initially for seizures and who developed clinical and biological signs strongly evocative of SLE.

A 3-years-old Siberian female cat was presented for partial and generalized seizures from one-year evolution. Complete biochemical and hematological profile excluded all causes of reactive seizures. Brain MRI and CSF analysis were normal. Control of epilepsy imposed the use of phenobarbital and levetiracetam. 5 months later, the cat presented dependent edema and nephrotic syndrome was diagnosed. Owners declined renal biopsy and immunosuppressive treatment (steroids and cyclosporine) allowed to control the disease until euthanasia for recurrent seizures 4 months later. Antinuclear antibodies were negative. A 1.5-year-old DSH male cat was presented for partial and generalized seizures from six months evolution. Complete investigations as for case one failed to detect any abnormalities. Seizures were controlled with phenobarbital. One year later during scheduled follow up, hypoalbuminemia, proteinuria anemia and systemic inflammation (CRP, SAA) were revealed. Renal biopsy displayed immune complex glomerulo-nephritis. Antinuclear antibodies were positive. Steroids and cyclosporine allowed controlling the disease (6 months follow up).

Small vessel vasculitis ('lupus cerebritis') is thought to be responsible of brain ischemia and epilepsy in humans. These 2 cases raise question about possible implication of SLE in some cases of feline epilepsy.

EVALUATION OF A PCR METHOD FOR THE DETECTION OF GURLTIA PARALYSANS IN SERUM AND CSF IN DOMESTIC CATS. M. Gómez[1], F. López[1], C. Hermosilla[2], J. Hirzmann[2], A. Taubert[2], M. Mieres[3], M. Moroni[4], P. Muñoz[4], F. Morera[1], G. Acosta-Jamett[5]. [1]Instituto de Farmacología y Morfofisiología, Universidad Austral de Chile, Valdivia, Chile, [2]Institute of Parasitology, Justus-Liebig University of Giessen, Giessen, Germany, [3]Instituto de Ciencias Clínicas Veterinarias, Universidad Austral de Chile, Valdivia, Chile, [4]Instituto de Patología Animal, Universidad Austral de Chile, Valdivia, Chile, [5]Instituto de Medicina Preventiva, Facultad de Ciencias Veterinarias, Universidad Austral de Chile, Valdivia, Chile

Gurltia paralysans (Metastrongyloidea: Angiostrongilidae) is a vascular parasite that causes chronic meningomyelitis in domestic cats of South America. Clinical signs associated with G. paralysans infection include progressive pelvic limb ataxia, paraparesis, paraplegia, fecal or urinary incontinence and/or tail paralysis. However, definitive diagnosis of feline gurltiosis is challenging and only possible after necropsy by detection of adults of G. paralysans within leptomeningeal veins and based on morphological characterization of the nematodes. The present study described for the first time the development of a semi-nested PCR technique for molecular detection of feline G. paralysans DNA in CSF and serum by using the D1-D2 segments of the 28S rRNA.

For the current study, CSF and serum samples collected from 6 domestic cats with clinical signs compatible of feline gurltiosis were prospectively analyzed. Additionally, from all animals CNS samples were obtained during necropsy. The semi-nested PCR technique was evaluated in CSF and serum samples. The gene was amplified using the primers D2A: 5′-ACAAGTACCGTGAGGGAAAGTTG-3′ (28S forward primer) and D3B: 5′-TCGGAAGGAACCAGCTACTA-3′ (28S reverse primer) corresponding to 717 bp from the sequence available in the GenBank (accession number JX975484).

Presence of the nematodes and lesions consistent with G. paralysans infection were observed in histological section of spinal cord of all investigated cats. DNA fragments of G. paralysans were successfully detected in all samples of serum and in 4 CSF samples. According to these results seminested PCR in serum and CSF samples seem to be a useful diagnostic tool for G. paralysans infection in domestic cats and useful for the confirmatory clinical diagnosis of feline gurltiosis.

FIRST REPORT ON CEREBRAL MUCORMYCOSIS DUE TO DISSEMINATED RHIZOPUS INFECTION IN A CAT. R. Cappello[1], A. Groth[1], S.W.M. Greijdanus-van der Putten[2], M. Rosati[3], K. Tintelnot[4], K. Matiasek[3]. [1]North Downs Specialist Referrals, Bletchingley, UK, [2]Laboratorium voor Pathologie en Histologie GD, Deventer, The Netherlands, [3]Section of Clinical and Comparative Neuropathology, Centre for Clinical Veterinary Medicine, Ludwig-Maximilians-University of Munich, Munich, Germany, [4]Robert Koch Institute, Berlin, Germany

An 8 year-old male-neutered Ragdoll cat was presented because of circling, behavioral changes, depression and visual deficits of 3 days duration. Neurologic examination was suggestive of right forebrain disease. The physical examination including fundic examination was normal. Blood work including tests for Felv/FIV and chest radiographs were normal.

MRI showed an intra-axial mass within the right dorsal cerebral hemisphere, which extended from the frontal to the occipital lobe. There was secondary right sided vasogenic oedema and an increase in intracranial pressure characterized by subtentorial and foramen magnum herniation. Differential diagnosis for the mass included fungal granuloma, protozoal granuloma or neoplasia.

Brain biopsy showed a granulomatous and necrohaemorrhagic encephalitis with intralesional branching, pseudoseptated rhizoids, sporangiophores and basophilic spores consistent with fungi of the order mucorales. Rhizopus nigricans was subsequently cultured and PCR-based sequencing of ITS2 identified intralesional Rhizopus microsporum.

Following the surgical biopsy the cat received an i.v. bolus of dexamethsone (0.3 mg/kg) and was discharged on cephalexin (20 mg/kg)and phenobarbitone (3 mg/kg) twice daily. After detection of the fungal organism treatment with fluconazole at 50 mg/kg was started. The cat responded poorly to treatment and deteriorated rapidly; euthanasia was elected by the owners.

Mucormycosis accounts for 8.3–13% of fungal infections in humans at autopsy and usually affects immunocompromised patients. If diagnosed early, treatment with amphotericin B shows fair results. Ante mortem diagnosis however is achieved in less than 10% of patients. The aetiological diagnosis in this cat required a brain biopsy, however, the identification of the fungus was delayed and antifungal treatment was ineffective. There was no indication of immunocompromise in this cat.

AQUAPORIN-4 AND MYELIN-OLIGODENDROCYTE GLYCOPROTEIN AUTOANTIBODIES ARE ABSENT FROM THE SERUM OF DOGS WITH MENINGOENCEPHALOMYELITIS OF UNKNOWN ORIGIN. C.J. Cooper[1], P. Waters[2], R. Goncalves[1], P.M. Smith[3]. [1]Small Animal Teaching Hospital, University of Liverpool, Neston, UK, [2]University of Oxford, Oxford, UK, [3]Davies Veterinary Specialists, Higham Gobion, Hertfordshire, UK

Meningoencephalomyeltis of unknown origin (MUO) is a common inflammatory condition of the canine central nervous system. The granulomatous form shares many characteristics with neuromyelitis optica (NMO), an inflammatory CNS condition in humans that is characterised by the presence of antibodies to either aquaporin 4 (AQP4) or myelin-oligodendrocyte glycoprotein (MOG). In view of these similarities, we investigated whether autoantibodies to AQP4 and MOG were present in dogs with MUO.

Serum samples were collected from 38 dogs presenting to the University of Liverpool and Davies Veterinary Specialists between 2007 and 2013. The diagnosis of MUO was made using clinical history and examination, neurological examination, magnetic resonance imaging, cerebrospinal fluid analysis and negative testing for infectious disease. A diagnosis of granulomatous meningoencephalomyelitis (GME) was confirmed in two dogs that underwent post-mortem examination. Dogs receiving immunosuppressive therapy prior to referral were excluded.

Serum samples were analysed in two groups. In the first, samples were taken from 27 dogs with MUO, showing a variety of neurological deficits; all of these samples were negative for anti-AQP4 antibodies. In the second group, serum was taken from 11 dogs with clinical and MRI evidence of myelitis and/or optic neuritis, including one dog with both. Samples were tested for the presence of antibodies to AQP4 and MOG, again yielding negative results. This suggests that anti-AQP4 and anti-MOG antibodies are not common in dogs with MUO, though it remains possible that a subset of affected dogs might have antibodies to these or other antigens.

UNILATERAL MYOKYMIA ASSOCIATED WITH FACIAL NEURITIS. S. Keegan, P Smith. Davies Veterinary Specialists, Higham Gobion, Hertfordshire, UK

A 6 year old male neutered Staffordshire bull terrier presented with a two month history of left-sided facial twitching. Muscle twitching was present at all times, even persisting during sleep, and was reported to worsen after exercise. There was no history suggestive of systemic disease and no reports of other neurological abnormalities.

A general physical examination was largely unremarkable but neurological examination revealed paresis of the left facial nerve, with no other deficits. There was fasciculation of the facial muscles on the left side of the face throughout the examination, with a writhing pattern typical of myokymia. Electromyography showed spontaneous activity in the left facial muscles, with motor unit potentials grouped as doublets and triplets. An MRI scan of the brain showed an enlarged left facial nerve, with hyperintensity following contrast administration.

Routine testing revealed no underlying causes of facial neuropathy and a presumptive diagnosis of facial neuritis with secondary myokymia was made. The dog was treated with prednisolone (1 mg/kg once daily for 7 days, reducing to 0.5 mg/kg once daily for 7 days), resulting in cessation of muscle fasciculation within two weeks.

Myokymia is a rarely reported phenomenon in dogs that is most commonly recognised as part of a hereditary condition affecting certain breeds. The current case shows that structural diseases of the motor unit should also be considered in affected dogs, particularly in those with focal abnormalities.

FACIAL AND VESTIBULAR NEUROPATHY OF UNKNOWN ORIGIN: SIGNALMENT, CLINICAL DESCRIPTION, DIAGNOSTIC FINDINGS, AND LONG-TERM FOLLOW-UP IN 21 DOGS. A. Jeandel[1], J.L. Thibaud[2], S. Blot[1]. [1]Université Paris-Est Créteil, Ecole Nationale Vétérinaire d'Alfort, Neurology unit, Maisons-Alfort, France, [2]MICEN-Vet, Créteil, France

Otitis media interna and hypothyroidism are common reported causes of both facial paralysis (FP) and peripheral vestibular syndrome (PVS) in dogs, but there is no study focused on facial and vestibular neuropathy without identified origin. The aim of the study was to describe signalment, clinical presentation, diagnostic findings and long-term follow-up in dogs with facial and vestibular neuropathy of unknown origin (FVNUO).

Medical records of our institution were searched for dogs with FVNUO. Inclusion criteria were FP with PVS, thyroid function exploration, and normal brain and tympanic bullae magnetic resonance imaging examination.

In the 21 dogs that met the inclusion criteria, 16 dogs were male. Male were significantly overrepresented ($p < 0.03$). Predisposed breeds were American Staffordshire Terrier ($p < 0.001$) and Boxer ($p < 0.02$). Acute onset (<72 h) was reported in all dogs. Thyroid function exploration was normal in all dogs. Cerebrospinal fluid (CSF) examination revealed mild albuminocytologic dissociation in 14 dogs. Long-term follow-up (median 24 months, from 6 to 118) was available for 17 dogs. PVS improved in all but 1 dog, but permanent or intermittent head tilt was reported in 14 dogs. FP improved in 14 dogs, with a facial hemispasm identified in 6 dogs. Relapse was identified for 2 dogs and suspected for 2 other dogs.

The statistically significant higher prevalence of male, American Staffordshire Terrier, and Boxer dogs warrants further investigation. CSF albuminocytologic dissociation might argue for an

inflammatory origin. FVNUO shares similarities with idiopathic FP, suggesting a common origin with a different clinical expression.

DEMYELINATING POLYNEUROPATHY IN MINIATURE SCHNAUZERS: A CLINICAL AND GENETIC UPDATE. A. Luján Feliu-Pascual[1,2], C. Bertolani[3], J. Mascort Boixeda[3], J. Gorraiz[3], G. Diane Shelton[4], O. Forman[5], C. Spicer[6], J. Hersheson[6], H. Houlden[6], N. Granger[7]. [1]Hospital Veterinario Valencia Sur, Silla, Spain, [2]Hospital Ars Veterinaria, Barcelona, Spain, [3]Canis Hospital Veterinari, Girona, Spain, [4]Comparative Neuromuscular Laboratory, La Jolla, California, USA, [5]Animal Health Trust, Newmarket, UK, [6]Institute of Neurology, University College London, London, UK, [7]The School of Veterinary Science, University of Bristol, Langford, UK

Demyelinating Polyneuropathy with folded myelin sheaths was reported in three Miniature Schnauzers in France in 2008 and predicted to represent a naturally occurring 'canine form' of Charcot-Marie-Tooth (CMT) disease. Here we provide new data on disease long-term clinical progression in a group of affected Miniature Schnauzers and preliminary genetic results.

Seven Miniature Schnauzers (4 males/3 females) were presented between March 2013-April 2014 at four Spanish hospitals with regurgitation (7/7), aphonic bark (6/7), and mildly delayed postural reactions (5/7) and weak flexor reflexes in the pelvic limbs (4/7). Age of onset and presentation were 3–18 months and 4–96 months respectively. All dogs had megaesophagus. Electrodiagnostic studies (5/7) revealed slow conduction velocity (range 20–42 m/s), polyphasia and low compound muscle action potential amplitudes. Muscle and nerve biopsies (1/7) confirmed the disease reported previously with inappropriately thin myelinated nerve fibers and scattered hypermyelinated fibers (presumptive tomacula) present. Treatment consisted in head elevation during meals and antacids. Clinical signs from onset were unchanged for 3–88 months with aspiration pneumonia developing occasionally (2/7). One dog died of progressive anorexia 26 months after onset.

PMP22 and P0 myelin genes were sequenced and ruled out. Genome wide association screen pointed towards myotubularin-related protein 13 (MTMR13) gene and a splicing mutation in exon 19 was identified in Spanish and French cases. MTRM13 mutations cause CMT4B2 in humans who present similar signs to these dogs. This is the first confirmation of a spontaneously and naturally occuring demyelinating inherited CMT polyneuropathy in another species. Genetic screening is now possible.

BOTULINUM TOXIN TYPE A FOR THE TREATMENT OF MUSCLE CONTRACTURES SECONDARY TO ACUTE SPINAL CORD INJURY IN A YOUNG CAT. K. Marioni-Henry, T. Schwarz, D. Gunn-Moore. Hospital for Small Animals, Royal Dick School of Veterinary Studies, Midlothian, UK

A 4-month old male entire DSH cat presented for sudden onset of right thoracic monoparesis following a jump; within 18 hours, the clinical signs progressed to right hemiplegia with loss of sensation in the distal right thoracic limb and left hemiparesis. MRI revealed changes consistent with a small-volume-high-velocity traumatic C6-7 disc extrusion with suspected secondary C5-7 spinal cord haemorrhage. Rehabilitation exercises were started immediately after the diagnosis of acute spinal cord trauma. The cat displayed significant improvements with return of sensation in the right thoracic limb and, with the help of a splint applied to the right thoracic limb, the cat was ambulatory on four limbs. Ten days following the onset of clinical signs, the cat manifested progressive discomfort on manipulation of the right elbow and carpus and developed a valgus deviation of the right carpus. Radiographs of the thoracic limbs did not reveal any skeletal abnormalities and muscle contractures were suspected.

Severe wrist and finger flexor stiffness is not uncommon in human stroke patients. In subacute stroke patients with a non-functional arm early botulinum toxin type A (BTX-A) forearm injection appears to prevent disabling finger stiffness 6 months later, possibly by minimizing the development of contractures.

Two weeks following the onset of clinical signs, the kitten's right thoracic limb was injected with 100 IU of BTX-A . No complications were associated with the procedure and 24 hours following the injection the carpal valgus resolved. The effect of BTX-A peaked approximately 2 weeks following the injection leading to severe hypotonia of the distal limb and requiring the constant use of a splint. The effects of BTX-A are still present 2 months after the injection and the kitten tolerates well the splint.

Poster Presentations

ASSOCIATION BETWEEN THE IDENTIFICATION OF A SYRINX IN ASYMPTOMATIC CAVALIER KING CHARLES SPANIELS AND THE SUBSEQUENT DEVELOPMENT OF CLINICAL SYRINGOMYELIA. A. Vanhaesebrouck, L. Doyle, M. Holmes, T. Williams, E. Ives. The Queen's Veterinary School Hospital, Department of Veterinary Medicine, University of Cambridge, Cambridge, UK

The aim of this study was to determine whether the presence of a syrinx on pre-breeding MRI screening in an asymptomatic Cavalier King Charles Spaniel (CKCS) could predict the likelihood of a dog developing clinical signs consistent with syringomyelia in later life.

Owners of CKCS that were screened for the presence of a syrinx on MRI between 2006 and 2009 were asked to complete a questionnaire regarding signalement, general health and common syringomyelia symptoms in 2013. Only dogs that were reported to be asymptomatic at the time of MRI were included, and dogs with concurrent diseases were excluded from the study. MRI scans of the craniocervical region were reviewed in random, blinded fashion. The data were analyzed by binary logistic regression.

Seventy-nine questionnaires fulfilled the inclusion criteria. Dogs were scanned at a median age of 2.6 years [IQR 2.2–3.5 years], with a syrinx identified on MRI in 32% of dogs. Sixteen percent of dogs developed clinical signs compatible with syringomyelia, with a median age at onset of 5 years [IQR 4–7 years]. A higher proportion of dogs with a syrinx visible on MRI screening developed clinical signs consistent with syringomyelia in later life (36%), when compared to dogs without a visible syrinx (7%) (Hazard ratio, 6.1; $p = 0.003$). None of the other variables entered in the logistic regression analysis reached statistical significance.

The presence of a syrinx on MRI screening appears to represent a risk factor for the subsequent development of clinical signs consistent with syringomyelia in CKCS.

SURGICAL TREATMENT (ULZIBAT-TECHNIQUE) OF SPASTIC PARAPARESIS IN A CAT FOLLOWING SPINAL CORD INJURY. M. Deutschland. Neurologische Überweisungspraxis, Berlin, Germany

A twelve month old entire female Domestic shorthaired cat was presented in March 2014 with a history of so called Trapped Hopper Window-syndrome. At the time of presentation six months post trauma she was mainly walking on her thoracic limbs with flexed pelvic limbs, atrophic extensor muscles and hypertonic moderately atrophic flexor muscles. Neurological examination revealed normal to increased segmental reflexes but absent cutaneous trunci reflexes caudal to the thoraco-lumbar junction and hypersensitivity of the pelvic limbs. These findings would be consistent with a lesion between T3 and L3 which had caused high spasticity of the pelvic limb flexor muscles and secondary contractures of affected muscles and joint deformation.

Magnetic resonance imaging (MRI) revealed a diffuse hyperintensity (T2-weighted images) within the epaxial muscle of the thoraco-lumbal spine and a small hyperintense (T2-weighted images) lesion within the dorsal funiculus of the spinal cord at the level of L1/L2.

Percutaneous myofasciotomy (Ulzibat-Technique) of the quadriceps femoris, cranial tibial and hamstring muscles followed by intramuscular injection of botulinum toxin (4 units of LD 50 dose) into each muscle and the digital flexor muscles (one injection per site) was performed. The muscles showed different degrees of relaxation and joint extension. In particular the left stifle joint showed complete extension while the digital joints of both hindfeet remained unchanged in flexion. The first results are very encourag-

ing suggesting that the method may help to treat longstanding spastic muscles and contractures.

Reference: P Bernius[1]: The Ulzibat method – a new surgical technique. Neuropediatrics 2013; 44 – PS11_1127 DOI: 10.1055/s-0033-1337765. [1]Schön-Klinik München-Harlaching, Zentrum für Kinderorthopädie und Neuroorthopädie, Munich, Germany.

PHENOBARBITAL INDUCED ERYTHEMA MULTIFORME IN A DOG. I. Cornelis, S. Vandenabeele, D. Dunon, L. Van Ham. Department of Medicine and Clinical Biology of Small Animals, Faculty of Veterinary Medicine, Ghent University, Ghent, Belgium

Erythema multiforme (EM) is a rare skin disease in animals caused by a cell mediated hypersensitivity reaction against various antigens including drugs, viruses or bacteria. Phenobarbital is the most commonly used anti-epileptic drug in dogs. Side effects are common, and concurrent superficial necrolytic dermatitis has already been described. This is the first case report describing phenobarbital induced EM in a dog.

A 4-year-old Great Dane presented with acute onset of painful, symmetrical skin lesions on all 4 footpaths, head, groin, axillae and oral mucosae 6 weeks after initiation of phenobarbital therapy for suspected idiopathic epilepsy. Lesions consisted of vesicles, ulcerated or exudative lesions with an erythematous rim. Histopathology revealed a lymphocytic interface dermatitis and apoptotic keratinocytes, with presence of lymphocytic satellitosis. A diagnosis of drug-induced EM was made. Phenobarbital therapy was discontinued and loaRegding with potassium bromide over 5 days was initiated, with concurrent gabapentine and prednisolone treatment. Skin lesions were topically treated with iodine dipping and chlorhexidine footbaths. Lesions went into regression after two weeks, and after three weeks only some crust formation and scar tissue was left.

Drug-induced EM is an important differential diagnosis in dogs recently started on phenobarbital treatment presenting with typical skin lesions. Improvement is seen without antibacterial treatment and topical iodine dipping after discontinuation of phenobarbital. Prognosis for the skin lesions can be considered good to excellent.

NEUROIMAGING IN DIAGNOSTIC WORKUP OF CANINE EPILEPSIES: A PROSPECTIVE OBSERVATIONAL STUDY. M. Dolera, L. Malfassi, S. Marcarini, G. Mazza, M. Sala. La Cittadina Fondazione Studi e Ricerche Veterinarie, Romanengo, Italy

Few veterinary reports have focused on the role of neuroimaging in the diagnostic workup of canine epilepsies.

The aim of this work is to investigate the prevalence of canine epilepsies by an imaging-guided classification. A prospective observational single institution study was conducted on 201 dogs referred for recurrent seizures.

Clinical examinations, blood cell counts, biochemical profiles and urine analyses were conducted. All the patients underwent a total body high field of 1.5T MRI. Further laboratory exams in case of specific infectious diseases. Functional epilepsy was identified when no brain lesions were detected by MRI and no metabolic disorders were identified by laboratory work. If abnormal MRI findings not referable to pre-existing brain diseases were detected, patients were assigned to a sub-group of functional epilepsy. Structural epilepsy was indicated when brain abnormalities were detected by MRI. Metabolic epilepsy was indicated when metabolic disorders with compatible MRI findings were detected.

Epilepsies were classified as structural (62%), functional (24%) and metabolic (14%). Among symptomatic patients, the categorization was: neoplastic (35%), inflammatory (32.2%), malformative (14%), vascular (12.6%), traumatic (4.8%) and degenerative (2%). In our population 36.6% of patients with idiopathic epilepsy showed post-ictal changes.

The systematic use of high field MRI give a substantial contribution to the classification of canine epilepsies. Findings from imaging together with complete clinical and laboratory exams lead to effective therapeutic strategies and prognosis.

This is the first study conducted through the systematic use of MRI for canine epilepsies classification. Further studies will be required to validate this neuroimaging-guided classification.

NECK PAIN IN DOGS AND CATS. M. Dolera, L. Malfassi, S. Marcarini, G. Mazza, M. Sala. La Cittadina Fondazione Studi e Ricerche Veterinarie, Romanengo, Italy

A retrospective study examined 178 animals referred between 2009 and 2012 for neck pain. The aim was to define the causes of neck pain in dogs and cats and to establish a diagnostic workup.

Inclusion criteria were: the presence of neck pain at clinical examination, MRI and/or CT imaging of head, neck and chest, confirmed diagnosis based on cytology-histopathology or surgical findings or lab work, complete follow up. Lab works included blood cells count, biochemical profile and in selected cases cerebrospinal fluid (CSF) analysis or PCR tests. We considered: localization of lesions, type of pathology, primary or indirect involvement of Nervous System, neurological or systemic signs.

Neurological pathologies were detected in 95% of patients whereas 5% were non-neurological. Lesions were localized in the neck in 72.5% of cases and in 17.4% both head and neck were involved. In 9% of cases the lesions were only in the head. Intervertebral degenerative disc disease was diagnosed in 52.5% of dogs, 19.5% were classified as neoplastic, 14.5% inflammatory, 8.5% traumatic, 2.5% malformative, 2.5% vascular. Regarding to the cats 66.6% were neoplastic, 22.2% traumatic, 11.2% inflammatory.

In conclusion, lesions responsible for neck pain can localise in the neck, head or chest. Pain and lesion localization does not always correlate. There are differences in the prevalence and localization in dogs and cats.

Based on the results, a complete diagnostic workup for animals with neck pain should include clinical examination, advanced imaging of the head, neck and chest. If appropriate, CSF analysis have to be performed.

CASE REPORT – INTRAMEDULLARY SPINAL HAEMANGIOBLASTOMA IN A DOG. A. Cauduro[1], P. Favole[1], M. Opreni[1], M. Dondi[1,2], C. Cantile[3], V. Lorenzo[4]. [1]Associazione Professionale Neurovet, Legnano, Italy, [2]Università Medicina Veterinaria Parma Italy, [3]Università Medicina Veterinaria. Pisa. Italy, [4]Neurologia Veterinaria, Getafe, Spain

A 6 year old male crossbreed dog was presented for a chronic progressive hind limb left hemiparesis. Neurolocalization of the lesion was cervico-thoracic spinal segment (C6-T2) with left side more pronounced impairment.

Magnetic Resonance Imaging showed an intramedullary, left-sided expanding mass at the level of C6, with marked displacement of the midline spinal cord structures and oedema of the surrounding spinal cord (C5-T1 segment). The patient underwent C5-C6-C7 dorsal laminectomy. A durotomy was performed to visualize the entire mass and the mielotomy was necessary to remove the lesion en-block under microscopy surgery.

Hystopathological examination of the sample (entire mass) was examinated and intramedullary spinal hemangioblastoma diagnosis was done.

The patient showed marked but transient post-surgical deterioration (non-ambulatory tetraparesis) and, after a period of intensive physiotherapy, a progressive improvement to a partial recovery within 2 months (left fore limb slight monoparesis). Nine months after surgery the patient conditions were still good and there were no signs of recurrence. This last intramedullary kind of spinal tumours is rare in dogs and considered to have a poor outcome. To our knowledge there are no reports of surgically treated hemangioblastoma in pets. The good outcome with no recurrence for more than 9 months post surgery suggests that surgical treatment can be effective and should be considered as in Human medicine.

SPINAL CORD ANGIOMATOSIS IN DOGS. Z. Lončar, I. Hadžić, M. Dragomirov. Veterinary Clinic Novak, Veselina Masleše, Serbia

Spinal cord angiomatosis as a rare condition that can be treated successfully.

Mixed breed dog, male, 3 years old was presented at the hospital with history of 3 month of back pain. Clinical signs progressed to ambulatory paraparesis in last month. Neurology exam showed

ambulatory paraparesis, worse on right side. Segmental reflexes in hind limbs were increased. Dog showed marked pain in lumbal region. Neurolocalisation was made according to the exam and it was Th3-L3. MRI findings suggested spinal cord lesion which was localized intradural/ extramedullary. Distribution of the lesion was Th8-Th13 to the right. Lesion showed high signal intensity in T2 sequence and iso signal intensity in t1 sequence. Contrast intake was heterogenic. It was supposed that the lesion is slowly progressive, because of discrepancy between size of lesion and neurological deficits which were mild. It was supposed that clinical signs, MRI findings was suggesting neoplastic lesion, probably nephroblastoma. Dog was treated surgically. Hemilaminectomy was performed on 5 intravertebral spaces. Histopathology exam suggested angiomatosis of spinal cord. The dog showed complete recovery to ambulatory state after 3 month period.

The dog returned to ambulatory state with minimal proprioception deficits.

Spinal cord tumors in dogs can be successfully treated with aggressive surgery and can show good outcome. Less common type of tumors can be find in spinal cord and to make final diagnosis histopathology is needed. Prognosis depends on type of the lesion. Angiomatosis is a rare condition in spinal cord and the lesion is usually extradural, which makes this case unique. Lesion is benign and there is no sex or breed predisposition. Further investigations are needed in terms of larger case study and longer follow up.

NORMALITY INDEX FOR DORSAL ATLANTOAXIAL DISTANCE IN TOY DOGS. E.A. Tudury, A.C. Silva, B.M. Araújo, M.A.S. Lacerda, M.M.A. Amorim, J.E.B. Leite. Department of Veterinary Medicine, Federal Rural University of Pernambuco, Recife, Brazil

The objective was to determine the normality index of the dorsal atlantoaxial distance of toy breed dogs, using a formula of dimensional correlation coefficient, and verify the effectiveness of this normality index in the diagnosis of this condition in dogs.

Thirty normal dogs were used (10 Pinschers, 10 Yorkshires, and 10 Poodles). The cervical spine was imaged in lateral projection with 90 degrees of flexion. The smallest distance between the dorsal arch of the atlas and the cranioventral border of the spinous process of the axis were measured, as well as the length of the spinous process of the axis. We used the following formula DCC = AMD÷ASPL, determining the normality index, where: DCC = Dimensional Correlation Coefficient; AMD = Atlantoaxial Minimal Distance; ASPL = Axis Spinous Process Length. In the second stage, radiographic images in lateral projection with 90 or more degrees of flexion of 28 dogs with atlantoaxial subluxation were analised.

The formula used was developed in order to determine one index for the normal atlantoaxial distance through a correlation coefficient, where variables such as weight, size, and breed were cancelled. The normal index mean value obtained was 0.06 with a standard deviation of 0.02 (maximum normal value 0.10). The index values obtained in affected dogs ranged from of 0.12 to 0.62, with mean value of 0.28, presenting significant statistical difference ($p < 0.0001$).

The DCC index is effective in radiographic assessment of toy dogs with atlantoaxial subluxation and may be routinely used in the diagnosis of this disease.

CONSEQUENCES OF INTRAOPERATIVE SPINAL CORD MANIPULATION IN THE RECOVERY OF DOGS WITH THORACOLUMBAR INTERVERTEBRAL DISK DISEASE. E.A. Tudury[1], C.C.Diogo[1], B.M. Araújo[1], M.L.Figueiredo[1], M.A. Bonelli[1], T.H.T. Fernandes[1], M.V.B. Arias[2]. [1]Universidade Federal Rural de Pernambuco, Recife, Brazil, [2]Universidade Estadual de Londrina, Londrina, Brazil

Few studies have been conducted to correlate the animal's postoperative neurologic status with the number of contacts to the dural sheath. Our objective was to evaluate if contacts to the dural sheath during the hemilaminectomy, as well as spinal cord manipulation to remove the compressive disc material, influence on early or delayed neurologic recovery in dogs.

Twenty paraplegic (deep pain present) or paraparetic dogs with thoracolumbar IVDD, diagnosed using myelography and/or CT, were submitted to hemilaminectomy. Meningeal contacts during surgery were quantified for each patient. They were assessed before surgery and postoperatively at 24 and 48 hours, 7, 15, 30, 60 and 90 days.

Paraplegia and paraparesis were observed before surgery in 65% and 35% of the dogs, respectively. At the end of the study 85% were normal, 5% had paraparesis, and 10% had paraplegia (only one had no nociception). There was no correlation between the intervertebral disc space and the number of extradural contacts. Immediately (24 hours) after surgery, 68% of the dogs had the same neurological grade, 21% improved (6 to 24 contacts), and 11% worsened. Ninety days after surgery, 89% of dogs showed neurological improvement and 11% had worsened. There was no statistical difference between neurologic stage seen in the preoperative and early postoperative period and there was a low correlation between the number of contacts and neurological condition during recovery.

The neurologic outcome showed no direct correlation with the number of extradural contacts observed during surgery, but rather with the degree of preoperative neurologic damage.

CRANIAL TIBIAL AND EXTENSOR CARPI RADIALIS REFLEXES BEFORE AND AFTER ANESTHETIC BLOCK IN CATS (FELIS CATTUS). E.A. Tudury, M.L. Figueiredo, T.H.T. Fernandes, B.M. Araújo, M.A. Bonelli, C.C. Diogo, C.R.O. Santos. Departamento de Medicina Veterinária, Universidade Federal Rural de Pernambuco, Recife, Pernambuco, Brazil

The extensor carpi radialis and cranial tibial reflexes are considered myotatics, however this has recently been called into question in dogs. The present study aimed to evaluate these reflexes in cats, demonstrating whether they depend on the myotatic reflex arc.

Fifty-five healthy cats were divided into two groups. A: 26 animals, where the cranial tibial reflex was tested in both hindlimbs after anesthetic induction (ketamine-xylazine-tramadol) and 15 minutes after epidural anesthetic block with 2% lidocaine (0.22 ml/kg). Group B, 29 animals, the extensor carpi radialis reflex was tested in one of the forelimbs after same anesthetic induction and 15 minutes after brachial plexus block (peripheral nerve stimulator) with 2% lidocaine at a dose of 3.5 mg/kg diluted in saline solution. Using pain sensibility, patellar and flexor reflexes were confirmed the occurrence of these blocks.

In group A, 14.81% of the cats had a decreased cranial tibial reflex before the anesthetic block, while 85.19% were considered normal. After the block, 25.93% were considered decreased and 74.07%, normal. In group B, 55.17% were considered as having a decreased extensor carpi radialis reflex and 44.83%, normal before the brachial plexus block. After the block, 68.96% showed a decreased reflex, and 27.59%, normal. The decrease reflexes were likely due to xylazine. None of the cats showed absent reflexes before or after the blocks. The statistical difference in both moments was not significant.

The responses may not be strictly myotatic. It is possible that these reflexes in cats are idiomuscular responses, as is cited in human literature.

SPINAL NEOPLASIA IN DOGS: STUDY OF 27 CASES. L.G. Valentim[1], R.A. Marcasso[2], A.P.F.R.L. Bracarense[2], M.V. Bahr Arias[1]. [1]Department of Veterinary Clinics, Universidade Estadual de Londrina-PR, Brazil, [2]Department of Veterinary Preventive Medicine, Laboratory of Animal Pathology, Universidade Estadual de Londrina-PR, Brazil

Spinal tumors are relatively common in dogs and they can be classified into primary or secondary tumors. This provides information as to whether the disease is localized or systemic, thus affecting treatment and prognosis.

The aim of this study was to evaluate in dogs diagnosed with spinal or vertebral column tumors treated between January 2007 and May 2013 the information about the signalment, clinical history, physical examination, neurological syndrome, results of complementary exams, the type and source of the mass, presence of metastases and clinical outcome.

27 animals were studied, and in 19 cases the presence of spinal neoplasia was initially suspected with the aid of radiographs, myelography or tomography and then confirmed by necropsy, biopsy, histopathology and in some cases immunohistochemistry. In the

other eight animals the presumptive diagnosis was made according with clinical and neurological signs and by observing changes in plain/chest radiographs and myelography. Six dogs underwent surgery, and the results were good in two, who remained free of disease until now.

The breeds most affected were mixed breeds (22.2%), Poodle (18.5%) and Boxer (14.8%), between the ages of five and ten years, and 66.66% of cases were on female dogs. The thoracolumbar region was the most affected (50%). Metastatic spinal tumor was the most common, especially originated from breast (38.46%) and skin (34.61%) and among the primary neoplasms the meningioma predominated.

In dogs with spinal disorders, the veterinary practitioner should suspect cancer, especially if there is a history of excision of neoplasms in other systems.

CHOROID PLEXUS CYST, CORTICOCEREBRAL NECROSIS AND HYDROSYRINGOMYELIA IN A DOG. F. Balducci[1], M.T. Mandara[2], A. Reginato[2], M. Bernardini[1,3]. [1]I Portoni Rossi Veterinary Hospital, Zola Predosa, Italy, [2]Department of Veterinary Medicine, University of Perugia, Italy, [3]Department of Animal Medicine, Productions, and Health, University of Padua, Italy

A twenty-month-old Springer Spaniel presented with a history of episodic left head tilt appeared after physical effort six months before. The dog received oral prednisolone 0.8 mg/kg SID with improvement.

After the neurological examination a cervical spinal cord/posterior fossa localization was suspected. When the prednisolone treatment was tapered off the neurological status deteriorated and was consistent with a diffuse cerebral localization. The magnetic resonance imaging of the brain revealed a well-defined mass (cm $1.7 \times 1.2 \times 2.3$) within the fourth ventricle, hyperintense on T2-weighted images (T2WI) and hypointense on pre and post contrast T1-weighted images (T1WI); in T2WI a severe, diffuse, poor defined cortical hyperintensity in both cerebral hemispheres and in the dorsocaudal part of the cerebellar vermis. These areas were mildly hypointense in T1WI and enhanced diffusely on post-contrast T1WI. T2WI of the cervical spine showed a severe hydrosyringomyelia and a diffuse hyperintensity of the spinal cord.

Histophatological investigation confirmed a widespread bilateral and symmetrical necrosis of cortical grey matter, a focal cystic lesion in the fourth ventricle consistent with a choroid plexus cyst (CPC), and a marked dilation of the central canal of the cervical spinal cord with two adjacent syrinx (hydrosyringomyelia).

To our knowledge this is the first case reporting in the same patient two rare conditions as diffuse cerebrocortical necrosis and CPC. We suspected a peracute worsening of a chronic impairment in cerebrospinal fluid flow at the foramen magnum, due to the CPC, a sudden increase of the intracranial pressure causing a diffuse ischaemic lesion of the cerebral cortex.

FELINE SPINAL DISEASES. L. Malfassi, S. Marcarini, M. Sala, N. Carrara, G. Mazza, S. Finesso, M. Dolera. La Cittadina Fondazione Studi e ricerche veterinarie, Romanengo CR, Italy

The aim of this study was to establish the prevalence of feline spinal diseases with regard to etiopathology, clinical aspects and anatomical localization.

Clinical records of cats referred from 1998 to 2013 were reviewed. Inclusion criteria were the presence of a spinal lesion demonstrated by clinical examination and confirmed by MRI and the availability of laboratory works, cito/histopathology, or surgical records. The signalment, anatomical site and the presenting complaints were considered. Cox test was performed ($p < 0.05$).

Seventy-one cats (39 female and 32 male) were included. Mean age was 6.8 years (range 3 months - 13 years). Lesions were classified as follows: 35/71 traumatic,10 of each were spinal contusions without discal or vertebral involvment, 16/71 neoplastic, 10/71 inflammatory, 8/71 Intervertebral Disc Disease (IVDD) and 4/71 vascular. Anatomical localizations were 32/71 L3-S3, 16/71 T3-L3, 10/71 C1-C5, 8/71 sacro-coccigeal and 2/71 C6-T2. No gender predisposition was observed. IVDD was more common in Persiano breed (5/8), traumatic lesions in young cats (mean age 4.1 years), neoplastic lesions in older cats (mean age 9.6 years). Fractures and IVDD were found more frequent in T3-L3 ($p = 0.41$).

The systematic use of MRI allowed the anatomical localization of spinal diseases in cats. Comparing data with published literature, IVDD and inflammatory conditions still represents unfrequent causes of spinal diseases in cats as trauma and neoplasia have been diagnosed in more than 50% of cats.

REACTIVE OXYGEN SPECIES PRODUCTION BY MICROGLIA CELLS IN A RAT MODEL OF EPILEPTOGENESIS. S. Bienas[1], M.L. Rettenbeck[2], R. Carlson[1], E.L. von Rueden[2], V.M. Stein[1], A. Tipold[1], H. Potschka[2]. [1]Department of Small Animal Medicine and Surgery, University of Veterinary Medicine Hannover, Germany, [2]Institute of Pharmacology, Toxicology and Pharmacy, Ludwig-Maximilians-University, Munich, Germany

Microglia cells seem to play a pivotal role in the pathophysiology of epilepsy. However, the exact mechanism how they influence the development of an epileptogenic network is still not completely understood. The purpose of this study was to characterize the time course of functional microglia alterations during epileptogenesis in a rat post-status epilepticus (SE) model (permission number 55.2-1-54-2532-173-11). We focused on reactive oxygen species (ROS) production.

A self-sustained SE was induced in female Sprague Dawley rats ($n = 45$) by electrical stimulation of the right basolateral amygdala. All animals developed chronic seizures during the observation period. Two days, ten days and twelve weeks after SE animals were euthanized and microglial cells were isolated by density gradient centrifugation and compared to cells acquired from control animals ($n = 45$). Microglia was identified and its purity assessed by expression of selected surface markers (CD11b, CD18, CD45low). Surface markers and release of reactive oxygen species were measured by flow cytometry techniques using the conversion of dihydrorhodamine 123 to rhodamine by cell membrane-adapted myeloperoxidase. The extension of myeloperoxidase-activity serves in this test as an indirect measurement for the release of ROS.

Analysis of size, complexity and ROS production of microglial cells revealed an early activation two days following status epilepticus. The high ROS production was related to the occurrence of a subpopulation of cells with high complexity, an increased size and CD45high expression at this time point. This subpopulation was not identified during the other study time points and in the control animals. Because of the CD45high expression this cell population could be highly activated microglial cells or migrated macrophages.

The data indicate that production of ROS by microglial cells is limited to the early phase following status epilepticus and does not occur in rats with chronic seizures. This might on one hand reflect a reaction to the pronounced neuronal death and on the other hand also contribute to neuronal damage. Based on these data the application of radical scavenging approaches might only be beneficial, when applied during a short time window following the epileptogenic insult.

SURGICAL EXCISION COMBINED WITH CHEMOTHERAPY IN THE TREATMENT OF TRANSMISSIBLE VENEREAL TUMOR CAUSING SPINAL CORD COMPRESSION IN A DOG. M.V. Bahr Arias, L.G. Valentim, B. Ishikawa. Department of Veterinary Clinics, Universidade Estadual de Londrina-PR, Brazil

Canine transmissible venereal tumor (TVT) is a contagious round cell tumour of dogs, which is almost always located on the external genitalia. Occasionally lesions may be present in other parts of the body, and rarely they may be found in the central nervous system.

The aim of this report is to describe the occurrence of TVT causing spinal cord compression in a dog.

A male six years-old Dalmatian dog was referred because of nonspecific abdominal pain. Laboratory examination showed no abnormalities, while survey radiographs revealed moderate faecal retention. The dog received painkillers and dietary guidelines; however after nine days he was brought due to paraplegia, with the left limb worse than the right, with nocoception preserved. There was a cutaneous trunci reflex cut-off over the T10 vertebrae, worst in the left side, together with spinal thoracolumbar hyperaesthesia. During tracheal intubation for general anaesthesia, it was observed a mass in the palatine tonsil. The cerebrospinal fluid

examination showed albuminocytologic dissociation, while in the myelography an asymmetrical epidural compression over T8 was observed. The cytological diagnosis of the mass was TVT. A lateral approach to the T8 vertebra was performed and an epidural mass was found and completely excised. The diagnosis of TVT was further supported by histopathology and immunohistochemistry. He was treated with three weekly cycles of vincristine, and after a year he presents only a mild spinal ataxia.

This case demonstrates an atypical location of TVT which was successfully treated by surgery and chemotherapy.

MALIGNANT MYOSITIS OSSIFICANS IN A CAT PRESENTING WITH SEVERE HIND LIMB RIGIDITY. E.J. Ives, K. Hughes, H. Rudorf, A.E. Vanhaesebrouck. The Queen's Veterinary School Hospital, Department of Veterinary Medicine, University of Cambridge, UK

An adult female neutered domestic shorthair cat presented with a 6-month history of progressive stiffness of both hind limbs.

On examination, both hind limbs were held in rigid extension and the cat was unable to flex either stifle joint on testing of the hind limb withdrawal reflexes due to apparent mechanical restriction. Marked discomfort was apparent on palpation of both hind limbs, with firm enlargement of the quadriceps femoris muscles.

Doppler ultrasonography demonstrated normal arterial blood flow in the terminal aorta and iliac arteries. Radiography of the lumbar spine and hind limbs showed soft tissue swelling and organised foci of mineralisation in the quadriceps and hamstring muscles bilaterally. A diagnosis of the rare feline condition fibrodysplasia ossificans progressiva was suspected based on the clinical and radiographic findings.

The cat was subsequently euthanased on economic and welfare grounds. Post-mortem histopathological examination demonstrated metastases from an adenocarcinoma to the hind limb musculature, with macroscopic, histological and immunohistochemical findings most consistent with an adrenal cortical origin.

This case represents the first report of ossifying skeletal muscle metastases in a cat. This condition, also known as malignant myositis ossificans, is considered to be rare in human medicine. Suggested mechanisms underlying the heterotopic ossification include osteoblastic metaplasia of mesenchymal or tumour cells, and local induction of osteogenesis secondary to traumatic invasion of the muscle, thrombosis or haemorrhage. Malignant myositis ossificans should be considered as a rare differential diagnosis in animals presenting with progressive stiffness and foci of mineralisation in the skeletal muscles on diagnostic imaging.

PAPILLARY MENINGIOMA IN THE DOG: A BENIGN HISTOTYPE WITH AGGRESSIVE BEHAVIOUR. A. Reginato[1], M. Baroni[2], F. Poli[2], N. Gasparinetti[3], M. Bernardini[4], M.T. Mandara[1]. [1]Department of Veterinary Medicine, University of Perugia, Italy, [2]Valdinievole Veterinary Hospital, Monsummano Terme PT, Italy, [3]Pedrani Veterinary Clinic, Zugliano VI, Italy, [4]I Portoni Rossi Veterinary Hospital, Zola Predosa BO, Italy

Papillary meningioma (PM) is one of the most aggressive variants of meningioma in humans and classified as grade III (WHO) based on brain invasion, local recurrence and distant metastases. To date the biological behaviour of PM is still not clear in dogs.

This study correlates the histomorphological findings and cell adhesion (E-cadherin, N-cadherin) and invasion molecule (Doublecortin) expression investigated by IHC with follow up data of 16 PMs of dogs obtained by surgical excision (8 cases) or necropsy (8 cases). FFPE 5 μm sections were stained with H&E. Additional 4 μm sections were used for IHC (ABC method, Dako, Milan, Italy).

PMs accounted for 18% of our archived meningiomas. Based on histological criteria adopted by human WHO classification, 7 tumors (43.8%) and 9 tumors (56.2%) were morphologically classified as grade I and as grade II, respectively. In surgical cases recurrence was observed in 87.5% and the mean survival time (MST) was 10.8 months. Five recurrent surgical PMs showed necrosis up to 50% of the tumor. Non-surgical cases showed a MST of 24 days. An apparent negative correlation between E-cadherin and N-cadherin expression was found in tumors with low survival time.

Despite benign histological findings, we observed an aggressive behavior of PM also in dogs, especially for animals that were not submitted to surgery. Therefore surgical resection is strongly recommended. As in humans, the biological malignancy of canine PM seems to be correlated to intratumoral necrosis. Finally, we might suppose a 'cadherin-switch' involvement in the biological progression of canine PM.

MULTIFOCAL ISCHEMIC BRAIN INFARCTIONS SECONDARY TO SPONTANEOUS BASILAR ARTERY OCCLUSION IN A DOG WITH SYSTEMIC THROMBOEMBOLIC DISEASE. F. Salger[1,2], C. Stahl[3], M. Vandevelde[1,2], A. Piersigilli[4], D. Henke[1,2]. [1]Division of Neurological Sciences, University of Bern, Switzerland, [2]Division of Clinical Neurology, University of Bern, Switzerland, [3]Division of Clinical Radiology, Department of Clinical Veterinary Medicine, University of Bern, Switzerland, [4]Department of Veterinary Pathology, Vetsuisse Faculty, University of Bern, Switzerland

In veterinary medicine, strokes have been increasingly identified over the last decade as the cause of acute neurologic signs in dogs.

A 6-year-old, male intact Chihuahua was presented after experiencing a generalized seizure for the first time. Otherwise the clinical findings were consistent with multifocal intracranial disease with involvement of the forebrain and brainstem.

MRI revealed multifocal intra-axial, sharply delineated lesions, mainly affecting the grey matter in the cerebellar vermis, right brainstem, left thalamus, right caudate nucleus, and dorsolaterally in the area of the right parietal and occipital lobes without mass effect. These lesions were hyperintense on T2w and FLAIR sequences, and hypointense on T1w sequences with no contrast enhancement. The lesions were hyperintense on diffusion weighted images, and hypointense on the apparent diffusion coefficient map. MRI findings were compatible with multifocal, acute, ischemic infarction.

Histopathologic examination of the brain revealed multiple ischemic infarctions and global brain ischemia due to basilar artery occlusion (BAO). There were additional thromboemboli with subsequent infarctions in the kidneys and myocardium. Possible causes such as hypertension, hypercoagulability, hypothyroidism, chronic kidney disease, diabetes mellitus, hyperadrenocorticism and local atherosclerosis could be excluded. In the liver, there was venous luminal narrowing by round cells suggestive of dendritic cells, representing a possible origin of thromboembolism.

In summary, the findings of this case reveal many similarities to those described for BAO in people and, although rare, BAO should be considered in dogs with suspected multiple brain infarctions and CT or MR angiography should be performed.

LUMBAR VERTEBRAL ANGIOMATOSIS IN A CAT. C. Ricco, B. Bouvy, E. Gomes, L. Cauzinille. Centre Hospitalier Vétérinaire Frégis, Arcueil, France

A 3.5 year old cat was presented for hind limb paresis of 2 months duration. No response was observed to non-steroidal anti-inflammatory treatment.

Neurological examination revealed hind limb ataxia. Considering segmental spinal reflexes and cranial nerves assessment within normal limits, the lesion was localized to the T3-L3 spinal cord tract. Survey radiographs revealed a modified aspect of the fifth lumbar vertebra and contrast medium at myelography did not progress cranially to that point. A CT myelography enabled to confirm the presence of a left sided extra-dural mass in continuity with the body of the fifth vertebra. Since the lesion was surrounded by adipose tissue at MRI, surgery was performed in the view of removing this mass. Unfortunately intraoperatively the lesion appeared infiltrative and was highly vascularized, consequently the owner elected for euthanasia.

Angiomatosis was confirmed at histopathology. To the author's knowledge there are only 5 cases of angiomatosis in cats reported in literature which were all at the level of the caudal thoracic vertebra on animals between 1 and 2 years of age. This case presents many peculiar features : the age at diagnosis, the lesion localisation and the first report of an MRI investigation. Considering the age of onset of clinical signs, the possibility of an acquired anomaly rather than a developmental physiopathology is suggested.

URINARY AND SERUM C-REACTIVE PROTEIN AND NERVE GROWTH FACTOR CONCENTRATIONS IN DOGS WITH MICTURITION DISORDERS. U. Kordass[1], R. Carlson[1], K. Rohn[2], V.M. Stein[1], A. Tipold[1]. [1]Department of Small Animal Medicine and Surgery, University of Veterinary Medicine Hannover, Hannover, Germany, [2]Department of Biometry, Epidemiology and Information Processing, University of Veterinary Medicine Hannover, Hannover, Germany

Lack of voluntary control of micturition is a common complication in disorders of the nervous system. C-reactive protein (CRP) and nerve growth factor (NGF) are potential biomarkers for lower urinary tract disorders. In the current study (permission number: 33.4-42502-04-13A374) the hypothesis should be proven that CRP and NGF in serum or urine help to distinguish neurogenic and non-neurogenic micturition disorders and are useful for assessing prognosis and initiating appropriate treatment.

Concentrations of CRP and NGF were measured using ELISA assays in urine and serum samples of 76 dogs. The patients were assigned to four different groups: spinal cord disorder with physiological micturition (n = 15), spinal cord disorder with micturition dysfunction (n = 27), other neurological diseases (n = 14) and healthy dogs (n = 20). In 10 dogs with spinal cord disease and associated micturition dysfunction urine samples were measured a second time, when the animals regained the ability to urinate by themselves. In the urine of 10 dogs leukocytes and/or bacteria could be detected and were compared to the others. All values measured in urine samples were normalized to urine creatinine levels.

CRP in serum was detectable in 32/76 and in urine samples in 40/76 patients. NGF could be measured in all serum and in 70/76 urine samples. Urinary CRP concentrations were significantly higher in dogs with micturition disorders ($p = 0.008$) and in dogs with other neurological diseases ($p = 0.0018$) compared to the control group. However, comparing dogs with spinal cord disorders with and without associated micturition dysfunction no significant difference could be detected for NGF and CRP values in urine or serum samples. Furthermore, values did not decrease significantly, when measured a second time in dogs regaining the ability to urinate properly (urinary NGF $p = 0.7962$; urinary CRP $p = 0.078$). Urine samples with bacteria and/or leukocytes had no significant increase in urinary NGF ($p = 0.373$) or CRP ($p = 0.999$) concentrations.

In summary, high urinary CRP values were found in dogs with micturition dysfunction compared to control dogs. This phenomenon can be explained by unspecific extrahepatic CRP production by smooth muscle cells in the dilated bladder. Since no statistical differences between diseased groups were detected, serum und urinary CRP and NGF values cannot be considered as reliable biomarkers for micturition disorders in the dog, but their production might be part of the pathogenesis.

LUMBOSACRAL EXTRADURAL GANGLION CYST IN A CAT. F. de Strobel[1], M. Rosati[2], O. Taeymans[1], A. De Stefani[1], K. Matiasek[2], G.B. Cherubini[1]. [1]Dick White Referrals, Six Mile Bottom, Cambridgeshire, UK, [2]Institute of Veterinary Pathology, Veterinary Faculty, Munich, Germany

Spinal extradural synovial and ganglion cysts arising from the articular facets and the surrounding connective tissues have never been reported in cats. It is unclear whether the two conditions are separate entities, or if these may represent a same entity at different stages of development. Histologically, synovial cysts have a synovial lining, whereas ganglion cysts contain myxoid material with a fibrous wall.

We report a case of a ganglion cyst in a 16-year-old neutered female domestic shorthair cat, presented for a 2 weeks history of reluctance to jump, stiffness of the tail, and low back pain. Neurological examination revealed pelvic limb ataxia and lumbosacral pain. On MRI, a rounded structure of 3 mm in diameter at the level of the L7-S1 right epidural space was identified. The lesion was hyperintense to spinal cord parenchyma in T2W, hypointense in T1W images, and therefore consistent with a fluid-filled cyst-like structure. Significant displacing of the filum terminale was associated with the lesion. A L7-S1 dorsal laminectomy was performed. A clear-fluid-containing structure was identified between the right L7 nerve root and the cauda equina. Following surgical excision, histopathology revealed thick disorganized sheaths of fibrocollagenous tissue, collagen necrosis, and infiltration of lymphohistiocytes and siderophages. The luminal parts were lined by flattened mesenchymal cells. A diagnosis of intraspinal ganglion cyst was made. The cat recovered uneventfully, and has not been showing neurological deficits up to 3 months following surgery.

Extradural cysts should be considered in the differential diagnosis of radiculopaty or myelopathy in cats.

SECONDARY POLYCYTHEMIA DUE TO CONGENITAL CARDIAC DISEASE CAUSING A CEREBELLAR HEMORRHAGIC STROKE IN A YORKSHIRE TERRIER. C. Loeffler, S. Marsilio, G. Oechtering, K. Baldauf. Department of Small Animal Medicine, University of Leipzig, Germany

A 5-year-old yorkshire terrier was presented with acute onset of severe generalized ataxia and left head tilt. The dog had a history of bidirectional cardiac shunt due to an atrial septal defect combined with still severe pulmonary stenosis after balloon dilation. On presentation, neurological examination revealed absent postural reactions on the right side and a positional rotatory nystagmus. Based on these findings a paradoxical vestibular disorder was suspected. CBC showed a PCV of 79% with a reticulocytosis of 153 k/µl. Arterial blood gas analysis showed systemic hypoxemia with a pO2 of 47 mmHg and a sO2 of 84%. These findings were consistent with secondary erythrocytosis.

MRI revealed a well demarcated intraparenchymal lesion involving almost the whole right cerebellar hemisphere. The lesion centre was hypointens on T2 and hyperintense on precontrast T1 weighted images. There was mild contrast enhancement and a clear susceptibility artifact on T2* weighted images. CSF showed normal protein (0.18 g/l) and a mixed pleocytosis of 49 cells/µl. Based on the dog's history, laboratory results and MRI findings erythrocytosis-associated hyperviscosity syndrome resulting in a hemorrhagic stroke was suspected.

The dog was treated with intravenous fluids initially and recurrent phlebotomies thereafter and recovered with time. Due to the dog´s intolerance of frequent phlebotomy medical treatment using hydroxyurea (50 mg/kg PO q48 h) was initiated resulting in a PCV between 60–70%. Medical therapy was well tolerated with only mild clinically silent thrombocytopenia. To the authors' knowledge this is the first report of hemorrhaghic stroke due to hyperviscosity syndrome in a dog.

TISSUE FACTOR EXPRESSION IN CANINE MENINGIOMAS. C. Font, C. de la Fuente, M. Pumarola, E. Blasco, F. Fernández, J. Viu, S. Añor. Departament de Medicina i Cirurgia Animal, Facultat de Veterinària. Universitat Autònoma de Barcelona, Spain

The role of the different components of the haemostatic system in cancer biology has been recognized to influence angiogenesis, tumour growth and metastasis. Tissue factor (TF) expression has been demonstrated in human neoplasias, including meningiomas. In veterinary medicine, TF expression and its association with malignancy grade has been recently demonstrated in canine gliomas, but there is no information regarding canine meningiomas. The aim of this study was to investigate TF expression in canine meningiomas by means of immunohistochemistry, and to correlate the results with histological type and malignancy grade. TF expression was graded semiquantitatively based on the estimated proportion of tumour cell population that showed positive staining for TF.

Twenty-nine meningioma samples were included and graded according to the human WHO classification of tumours of the CNS. There were 9/29 grade I meningiomas, 8/29 grade II meningiomas, and 12/29 grade III meningiomas.

All but three meningiomas expressed TF and most of them showed a heterogeneous pattern. All samples that did not show TF expression were from grade I meningiomas. No statistical differences in TF expression were found between different malignancy grades ($p = 0.07$), or between different histological subtypes of grade I meningiomas ($p = 0.2$), but there was a tendency to stronger TF expression in transitional meningiomas. When meningiomas were grouped into low-grade (grade I) and high-grade (grades II and III), TF expression was significantly higher in high-grade meningiomas ($p = 0.01$) than in low-grade meningiomas.

The results of this preliminary study support further investigations to elucidate the potential role of TF in canine meningiomas.

JUVENILE LEUKOENCEPHALOMYELOPATHY WITH SPHEROIDS IN AN ARDENNES' CATTLE DOG. M. Lejong[1], J.P. Brion[2], L. Poncelet[1]. [1]Department of Anatomy, Université Libre de Bruxelles, Belgium, [2]Department of Histology, Université Libre de Bruxelles, Belgium

Neuroaxonal dystrophies represent a group of neurodegenerative disorders characterized by the occurrence of axon swellings (spheroids). A female Ardennes' cattle dog developed from the age of five months a progressively worsening gait disturbance that was dominated by cerebellar and upper motor neuron signs. At the age of eight months, the owner requested euthanasia and allowed partial necropsy.

Brain and cranial cervical spinal cord were harvested. Immunostainings were performed by targeting several neuronal proteins, ubiquitin and glial fibrillary acidic protein.

Spheroids, 10–35 μm in diameter, and phagocytes containing vacuoles, were found in all investigated levels. Spheroids were prominently present in the white matter and were most abundant in the cerebellar peduncles and cerebellar white matter, in the lemnisci, and in the internal capsule.

They were uncommon in grey matter nuclei and their proximity with neuronal perikarya was exceptional as evidenced by double immunostainings. Phosphorylated neurofilament epitope was strongly expressed in spheroids while they remained negative for microtubule associated protein 2 supporting the hypothesis that they derived from axons only. Some spheroids displayed ubiquitin immunoreactivity at their periphery, possibly as a cell attempt to clear accumulated proteins.

This distribution of axonal spheroids contrasts with the distribution reported in neuroaxonal dystrophies of dogs since spheroids were overwhelmingly found in grey matter nuclei in these entities. Some homology exists with the leukoencephalopathy with spheroids described in humans.

GENERATION OF A PURIFIED CANINE SCHWANN CELL POPULATION FROM SPINAL NERVE BIOPSIES FOR AUTOLOGOUS CELL TRANSPLANTATION IN SPINAL CORD INJURED PARAPLEGIC DOGS. N. Steffensen[1], A. Lehmbecker[2], L. Roland[1], W. Baumgärtner[2], A. Tipold[1], V.M. Stein[1]. [1]Department of Small Animal Medicine and Surgery, University of Veterinary Medicine Hannover, Germany, [2]Department of Pathology, University of Veterinary Medicine Hannover, Germany

As a prerequisite for a study with autologous Schwann cell transplantation into spinal cord lesions of paraplegic dogs the feasibility of isolation, purification, and expansion of canine Schwann cells from a spinal nerve biopsy needed to be evaluated.

Twenty-eight dogs with thoracolumbar intervertebral disk disease underwent standard surgery (hemilaminectomy) with additional spinal nerve biopsy of a 2–3 mm long sample. After a predegeneration period about 5–7 days followed by enzymatical and mechanical disintegration of the spinal nerve, the obtained mixed cell population was purified twice by Magnetic Activated Cell Sorting (MACS) with selection of p75-neurotrophin-receptor (p75NTR) expressing cells such as canine Schwann cells (anti human p75 antibody, monoclonal; hybridom cell line, mouse; HB-8737; ATCC (American Type Culture Collection); Manassas, USA). The purity of the resulting Schwann cell population was determined after each MACS by Fluorescence Activated Cell Scanner (FACS) for expression of p75NTR. The results were confirmed by immunocytochemistry.

The purity of the Schwann cell population after the first MACS was 76.5 % p75NTR+ cells (median; range: 11.8–93.8 %). After the second MACS a purity of 92.7 % p75NTR+ cells (median; range: 47.8–99.8 %) was reached in culture. The entire culturing period from spinal nerve biopsy to second FACS analysis took 24 days (mean; range: 18–31 days) on average and resulted in an amount of 3.4 x 106 Schwann cells (median; range: 1.0–26.3 $\times$ 10^6 cells) for transplantation.

In conclusion, the isolation, purification, and proliferation of canine Schwann cells from small spinal nerve biopsies is feasible and a twofold selection of p75NTR+ cells by MACS leads to a highly purified Schwann cell population combined with a sufficient cell count that can be used for autologous Schwann cell transplantation.

DIAGNOSIS AND MANAGEMENT OF A DOMESTIC LONG HAIR CAT WITH SUBDURAL CEREBRAL EMPYEMA LIKELY CAUSED BY HAEMATOGENOUS SPREAD FROM MULTIFOCAL PNEUMONIA. T.J.A. Cardy, P. McLaren, L.M. Peters, M. Matas Reira, R. Lam, S. De Decker. Royal Veterinary College, London, UK

Subdural empyema is infrequently reported in small animals and has high mortality rates. Mechanisms of infection include inoculation from penetrating bite wounds, migrating foreign bodies, local infections, or, rarely, haematogenous spread from distant sites.

An 8-year male neutered domestic longhaired cat presented with tachypnea with normal thoracic auscultation, progressive vestibular ataxia, obtundation, left sided head tilt and multiple cranial nerve deficits. Neuro-anatomical localisation was multifocal with central vestibular involvement.

Magnetic resonance imaging revealed diffuse separation of pachymeninges and leptomeninges. The space between these meningeal layers was hyperintense on T2-weighted TSE and T2-weighted FLAIR images and hypointense on T1-weighted TSE images. Meninges were thickened, with marked contrast enhancement. These changes were most evident in the middle cranial fossa. Cisternal CSF-analysis revealed a predominance of degenerate neutrophils with with a monomorphic population of intracellular bacilli. Computed tomography confirmed intracranial findings and revealed multiple pulmonary nodules. Bacterial blood cultures were negative. Findings were consistent with subdural empyema and pneumonia.

Intravenous antibiotics (22 mg/kg clindamycin q24 hr, 5 mg/kg enrofloxacin q24 hr) and dexamethasone (0.2 mg/kg IV q24 hr for two days) were administered. Signs of elevated ICP required mannitol administration (0.5 mg/kg IV) four times in the first 24 hours. After 48 hours mentation and neurological signs started to improve. The patient was discharged after five days of hospitalisation on oral antibiotics. A neurological examination three weeks later was unremarkable.

This case is the first reported successful medical management of a cat with subdural empyema likely caused by haematogenous spread from a multifocal pneumonia.

CLINICAL CHARACTERISATION OF CAUDAL INTERVERTEBRAL DISC EXTRUSIONS IN ENGLISH COCKER SPANIELS. T.J.A. Cardy, C. Tzounos, H.A. Volk, S. De Decker. Royal Veterinary College, London, UK

Intervertebral disc extrusion (IVDE) is the most common spinal disease in dogs. Recent data suggests that English Cocker Spaniels (ECS) have a higher frequency of caudal lumbar IVDE than Dachshunds. The aims of this study were to characterise the clinical presentation and outcomes of ECS with caudal lumbar IVDE's.

81 ECS were included in this retrospective study. Details regarding signalment, clinical presentation, neurological examination findings, imaging data, management and outcomes were recorded and included in the analysis. Dogs were divided into three groups according to lesion localisation: thoracolumbar (T10-L2 intervertebral disk space (IVDS), mid-lumbar: (L2-L5 IVDS) and caudal-lumbar: (L5-S1 IVDS). Univariate statistical analyses were performed.

51 males (41 neutered) and 30 females (25 neutered) aged 82 $\pm$ 32 months (Mean$\pm$SD) were included. 37 ECS presented with thoracolumbar IVDE's, 25 with mid-lumbar IVDE's and 19 with caudal lumbar IVDE's. Compared to ECS with thoracolumbar and mid-lumbar IVDE's dogs with caudal-lumbar IVDE's had a longer duration of clinical signs and frequently had lameness as the presenting problem. ECS with caudal-lumbar IVDEs were often neurologically normal or had a lower neurological grade with strongly lateralised clinical signs. Caudal-lumbar IVDE's were less frequently associated with epidural haemorrhage and dogs had shorter hospitalization times compared to those with thoracolumbar and mid-lumbar IVDE's. All dogs with caudal-lumbar IVDE's were ambulatory at discharge.

Over 75% of ECS presented with thoracolumbar or mid-lumbar IVDE's. In contrast, caudal-lumbar IVDE were more chronic in onset, lateralised, with milder clinical signs and rapid post-surgical recovery. This study is the first to show two clear clinical phenotypes in ECS with IVDE.

INTRAMEDULLARY CAVITATIONS SUBSEQUENT TO SPINAL CORD INJURY IN DOGS. N. Alisauskaite, S. Kramer, R. Dening, P. Dziallas, V.M. Stein, A. Tipold. Department of Small Animal Medicine and Surgery, University of Veterinary Medicine Hannover, Hannover, Germany

Post-traumatic intramedullary myelopathies and subsequent cavitations are well described lesions following spinal cord injury (SCI) in humans and were detected in histopathological evaluations in dogs. In humans such lesions are associated with deterioration of clinical signs, have progressive pattern and have incidence of up to 22% of spinal cord injury patients. Canine intervertebral disc extrusions share similarities with SC injuries in humans.

To identify new treatment options for chronic paraplegic dogs, the purpose of the current study was to retrospectively evaluate magnetic resonance imaging (MRI) features of chronic intramedullary myelopathies/cavitations in the canine patient. MRI findings should be correlated with the time interval between injury and imaging and with clinical data. Thirty-four dogs with T3-L3 spinal cord lesions and one or more 3Tesla MRI investigations not less than three weeks after SCI were included. Extent of intramedullary myelopathies and cavitations were evaluated in sagittal and transversal MRI planes (T1, T2, FLAIR and mFFE sequences).

30/34 (88.24%) of our study patients had developed intramedullary myelopathies and 28/34 (82.35%) dogs had cavitations in their spinal cords. Length of intramedullary lesions and cavitations significantly correlated with neurological outcome of the patients ($p < 0.0001$), severity of neurological deficits ($p < 0.0001$) and number of surgeries performed ($p < 0.0001$). Patients with negative outcome, paraplegia without deep pain perception at presentation and more than one surgery performed were more likely to develop intramedullary lesions and cavitations in their spinal cords than dogs regaining ambulation after one decompressive surgery. Extent of intramedullary myelopathies and cavitations increased with time ($p < 0.0002$ and $p < 0.0001$, respectively).

The present study might contribute to explain the pathophysiology of intramedullary spinal cord lesion formation after SCI, help formulating the prognosis and stimulate the discussion about new treatment options.

INTER- AND INTRAOBSERVER AGREEMENT IN DIAGNOSING FIBROCARTILAGINOUS EMBOLISM AND ACUTE NON-COMPRESSIVE NUCLEUS PULPOSUS EXTRUSION IN DOGS USING MAGNETIC RESONANCE IMAGING (MRI). J. Fenn, R. Drees, H.A. Volk, S. De Decker. Department of Clinical Science and Services, Royal Veterinary College, London, UK

Fibrocartilaginous embolism (FCE) and acute non-compressive nucleus pulposus extrusion (ANNPE) are common causes of acute myelopathy in dogs. Antemortem diagnosis is based on combining clinical presentation with characteristic MRI findings. The aim of this study was to evaluate the inter- and intraobserver agreement for presumptive MRI diagnosis of FCE or ANNPE.

MRI studies were reviewed for dogs diagnosed with either FCE or ANNPE, yielding 127 suitable cases. To evaluate intraobserver agreement, 60 of these studies were randomly selected and duplicated. 187 randomized and anonymized studies were then presented to two assessors. Using previously described MRI criteria the assessors were asked to diagnose lesions as FCE or ANNPE. Kappa, weighted Kappa and Bland-Altman analysis were used to assess inter- and intraobserver agreement.

Interobserver agreement in diagnosing FCE or ANNPE was moderate (Kappa = 0.56) and intraobserver agreement was moderate to good (Assessor 1 Kappa = 0.79, Assessor 2 Kappa = 0.47). The strongest interobserver agreement was in identifying a lesion as overlying a vertebral body, lesion lateralisation and presence of extradural changes. 94% of lesions diagnosed as FCE were overlying a vertebral body, whereas 85% of ANNPE lesions were overlying an intervertebral disc. ANNPE lesions were significantly more often associated with reduced nucleus pulposus volume and extradural changes ($p < 0.05$).

These findings show that there is moderate inter- and moderate to good intraobserver agreement in using previously described MRI criteria to differentiate between FCE and ANNPE. However in a cohort of cases differentiating between these two diagnoses using MRI may be challenging.

TREATMENT IN CANINE EPILEPSY – A SYSTEMATIC REVIEW. M. Charalambous[1], D. Brodbelt[2], H.A Volk[2]. [1]Cornell University Hospital for Animals, College of Veterinary Medicine, Cornell University, Ithaca, USA, [2]Department of Clinical Science and Services, Royal Veterinary College, University of London, London, UK

A systematic review was designed to evaluate existing evidence for the effectiveness of antiepileptic drugs (AEDs) for presumptive canine idiopathic epilepsy (IE).

Electronic searches of PubMed and CAB Direct were carried out without date or language restrictions. Proceedings of ECVN/ACVIM annual congresses were searched. Peer-reviewed full-length studies describing objectively the efficacy of AEDs in dogs with IE were included. Studies were evaluated on the grounds of their quality of evidence (study group sizes, subject enrolment quality and overall risk of bias) as well as outcomes measures (evidence from the studies statements and % proportion of dogs with ≥50% - 100% reduction in seizure frequency based on 95% confidence interval).

Twenty-eight clinical trials and observation cases series studies, including two conference proceedings, were identified. Heterogeneity of study designs and outcome measures made meta-analysis inappropriate. Only three blinded randomized clinical trials (bRCTs) were detected and considered to offer moderate to higher quality of evidence among the studies. A good level of evidence supported the efficacy of oral phenobarbital and fair level of evidence supported the efficacy of oral potassium bromide, levetiracetam and imepitoin. For the remaining AEDs, favorable results were reported regarding their efficacy, but there was insufficient level of evidence in order to support this due to lack of bRCTs.

In conclusion, oral phenobarbital, potassium bromide, levetiracetam and imepitoin are likely to be effective for the treatment of IE. However, variations in baseline characteristics of the dogs involved, significant differences between study designs and several potential sources of biases preclude definitive recommendations. Therefore, there is a need for greater numbers of adequately sized, blinded, randomized controlled trials evaluating the efficacy of AEDs for IE.

DEMYELINATING POLYNEUROPATHY SECONDARY TO AN ERLICHIA CANIS INFECTION IN A DOG. A. Recio Caride. Clinica Veterinaria Levante, San Javier, Murcia, Spain

Erlichia Canis is a gram negative and intracelullar bacteria that affects monocytes. It is transmitted by ticks. In chronic stages can affect the Central Nervous System (CNS). It can also potentially affect the Peripheral Nervous System (PNS), producing polymyositis.

A 4-year-old intact male Bodeguero Andaluz, was observed over one week with a progressive acute ambulatory tetraparesis and weakness.

Clinical examination was normal. On neurological examination, proprioception didn't show any change. Patellar, tibial cranial and extensor carpo-radial reflexes were absent, with decreased flexor reflexes bilaterally.

Neuroanatomic localization was peripheral and multifocal. The differential diagnosis included inflammatory/infectious, toxic/metabolic and degenerative processes. The blood analysis revealed a decrease in platelets (76.000/mcl) and hyperproteinemia (9.1 g/dl), with increased globulins (5.8 g/dl). The electrormiography showed prolonged insertion activity and P waves in the cranial tibial, plantar and palmar interosseous muscles (21 m/s). Evoked potentials of the peroneal and ulnar nerves, showed decreased conduction velocity. F Waves and Repetitive Nerve Stimulation were normal.

Serological studies (IFI) were performed against Leishmania (negative) and Ehrlichia canis (1/5000).

The dog was treated with doxycycline (10 mg/kg BID) for 20 days, showing a remarkable improvement after one week of treatment and a full recovery at 30 days.

For ethical reasons, could not possible to take a biopsy, although Electrophysiological findings and clinical signs would confirm that allow as occurs in Ehrlichia infections in humans, in certain circumstances it is possible that not only affects the muscles, producing polyneuropathy with loss of myelin sheath.

DIFFUSE IDIOPATHIC SKELETAL HYPEROSTOSIS IN A NINE-YEAR-OLD CAT. K. Bossens[1], S. Bhatti[1], I. Van Soens[1], I. Gielen[2], L. Van Ham[1]. [1]Department of Small Animal Medicine and Clinical Biology, Ghent University, Belgium, [2]Department of Medical Imaging and Orthopedics of Small Animals, Ghent University, Belgium

A nine-year-old female domestic shorthair cat was evaluated for weakness in the hind limbs and behavioral changes such as increased aggressiveness towards its owner. On neurologic examination the cat showed mild paraparesis, ataxia on both hind limbs and severe spinal hyperesthesia, corresponding to a T2-L3 lesion. Computed tomography of this region showed marked dorsolateral stenosis of the vertebral canal at the level of T4-T5 due to degenerative changes of the facet joints and a contiguous amount of smooth new bone formation ventral and lateral to the vertebrae extending from the cranial thoracic area to the lumbosacral junction, appearing similar to canine diffuse idiopathic skeletal hyperostosis (DISH). Blood examination, including vitamin A concentration, showed no abnormalities. In cats, hypervitaminosis A can cause generalized new bone formation throughout the spinal column and the large peripheral joints.

DISH is a systemic non-inflammatory disease affecting the axial and appendicular skeleton of both humans and dogs. It is characterized by ossification of soft tissues, including the spinal ventral longitudinal ligament and the entheses. DISH is suspected to cause spinal pain and stiffness, but clinical importance is difficult to ascertain since this disorder has also been found in asymptomatic dogs. Multiple etiologic factors have been postulated but none have been proven. The prevalence of DISH in dogs was established at 3.8% in a large-scale study.

To the authors knowledge this is the first published report of feline DISH.

SUSPECTED BENIGN JUVENILE IDIOPATHIC EPILEPSY IN CAPTIVE IBERIAN LYNX (LYNX PARDINUS) IN THE EX SITU CONSERVATION PROGRAMME (2005–2013). J.J. Mínguez[1,2], R. Canales[3], N. Gonçalves[4], J.L. Mendoza[5], M.J. Perez[6], A. Godoy[7], R. Serra[8], V. Lorenzo[2]. [1]Hospital Veterinario Guadiamar,, Sevilla, Spain, [2]NeurologiaVeterinaria, Madrid, Spain, [3]El Acebuche Iberian Lynx Breeding Center, Matalascañas, Huelva, Spain, [4]National Centre for Captive Breeding of the Iberian Lynx, Silves, Portugal, [5]Breeding center of captive Iberian Lynx Granadilla, Caceres, Spain, [6]Breeding Center of captive Iberian Lynx La Olivilla, Jaen, Spain, [7]Doñana Biological Station CSIC, Sevilla, Spain, [8]Iberian Lynx Ex Situ Conservation Program Coordination, Portugal

Benign childhood epilepsy is a disorder with an autosomal dominant inheritance that tends to be self-limited, with seizures generally controlled with a single anticonvulsant. This condition has been reported in veterinary medicine in dogs and foals. Seizures have been mentioned occasionally in morbidity studies in captive Iberian lynx (Lynx pardinus), or as an undesired effect of chemical immobilization, but epilepsy has not been categorized in this species.

The objectives of this study are: to report the occurrence of seizures in Iberian Lynx and to classify the seizure activity.

A total of 171 lynxes were born in the Iberian lynx captive breeding program 2005–2013 from 41 ancestors. Partial complex and partial simple seizures were recorded in 10 juvenile lynxes (prevalence 5.85%). No significant alterations were found in the diagnostic tests performed, that included complete blood count, serum chemistry panel, and toxic and infectious disease testing for all cases. Neither MRI (2 patients) nor CSF (3 patients) showed any alteration. The mean age of onset were 81.4 days (81.4 ± 8). A total of 145 seizures were recorded with an average number of episodes per lynx of 14 (3–40). Seizure activity was controlled approximately one week (1–26 days) after starting anticonvulsant (phenobarbital 2 mg/kg BID). Phenobarbital was progressively reduced (25% monthly) after 6–8 months without seizure activity and finally withdrawn. At present, 5/10 are still alive and free of seizures (1–4 years after treatment stopped), 2/10 seizure-free patients died due to renal disease, 2/10 died of unknown cause and 1/10 died due to pneumonia.

The clinical features and the self-limited course are consistent with a benign juvenile idiopathic epilepsy. Although a genetic cause could not be established from the limited data, its inheritance pattern is compatible with an autosomal recessive condition. Additional genetic investigation should be considered to confirm a genetic origin.

FUNCTIONAL SCORING SYSTEM FOR DEGENERATIVE MYELOPATHY. M. Saito[1], H. Kamishina[2], G. Togawa[1], E. Takeda[1], R. Watanabe[1], O. Yamato[3]. [1]Azabu University, Kanagawa, Japan, [2]Gifu University, Gifu, Japan, [3]Kagoshima University, Kagoshima, Japan

We developed a new functional scoring system for degenerative myelopathy (DM) by modifying 'Olby score' (Olby et al. 2001). The purpose of this study was to evaluate our 'DM score (DMS)' as a potential DM biomarker of Pembroke Welsh Corgis (PWC).

Fifteen PWCs were prospectively enrolled. Inclusion criteria were aged PWC with non-painful progressive T3-L3 myelopathy for <1 year, SOD1:c.118A/A, non-significant spinal cord MRI and CSF findings, and agreement of frequent (<3 months) hospital visits and videotaping. Some dogs received levocarnitine chloride (LCC group). All animal protocols were approved by each university's committee. Two observers reviewed videotapes separately and scored (0–13) based on four-limb movement and pain-sensation level. Inter-observer reliability for DMS was assessed with ICC.

Mean period from the disease onset to most recent visit was 28 (11 to 49) months. This is an ongoing study and most dogs were still alive. Two were histopathologically confirmed with DM. Gaits from total 131 visits were videotaped and scored. DMS decreased over time in all dogs. Inter-observer ICC for DMS was 0.99. There was a significant difference ($p = 0.044$) in the slope of front-limb DMS during 24-month disease course between LCC ($n = 4$, mean 0 points/month) and non-LCC groups ($n = 8$, mean -0.35 points/month).

This study suggests DMS as a valuable DM biomarker and warrants further investigation of LCC in DM.

LONG INTRAMEDULLAR SPINAL CORD ANAPLASTIC OLIGODENDROGLIOMA IN A DOG. L. Espino[1], M. Vila[1], M. Pumarola[2], E. Blasco[2], N. Miño[1], R. Bermúdez[1]. [1]Department of Ciencias Clínicas Veternarias, Universidad de Santiago de Compostela, Lugo, Spain, [2]Department of Medicina i Cirurgia Animals, Universitat Autónoma de Barcelona, Barcelona, Spain

Intramedullar spinal cord tumors are described infrequently in dogs and comprise approximately 16% of all tumors of the spinal cord. The incidence of holocord or longitudinally extensive tumors involving the cervical, thoracic, and/or lumbar spine is less than 1% in humans and to the author's knowledge only two cases have been reported in veterinary medicine. This report describes the clinical signs, computed tomographic and histopathological findings and treatment of a long spinal cord anaplastic oligodendroglioma in a dog.

A 9-year-old female non spayed French bulldog was examined because of a four-month history of gradual reluctance to exercise and increasing stumbling on the thoracic limbs. On neurological examination, mild tetraparesia, decreased postural reactions in all four limbs, diminished spinal reflexes in the thoracic limbs and increased in the pelvic limbs and cervical pain were noted. The neuroanatomic diagnosis was a lesion between C6-T2. Computed tomography revealed an isodense intramedullar lesion with a mild heterogeneous enhancement after intravenous contrast administration from the level of C5 to T8 located eccentrically and associated with a mild degree of spinal cord expansion. On the basis of CT findings, a presumptive diagnosis of intramedullar neoplasia was made although infectious and non-infectious meningomyelitis were also considered. A surgical biopsy removal was refused by the owner and the dog was treated with prednisone and lomustine and

six months after diagnosis underwent euthanasia. On light microscopy, disappearance of the central canal was observed, accompanied by extensive necrosis and neoplastic clusters of rounded cells with hyperchromatic nuclei and lightly stained cytoplasm, as well as microvascular proliferation. Tumor cells were positive against VIM and Oligo2 antibodies and negative against CK and GFAP, so a presumptive diagnosis of anaplastic oligodendroglioma was done.

Astrocytomas and gangliogliomas are the most frequent reported holocord tumors in humans. Oligodendrogliomas of the spinal cord are rare in dogs and although the majority of these tumors shows limited spread in the spinal canal they should be included in the differential diagnosis of longitudinally extensive spinal cord neoplasias.

COMPARATIVE INVESTIGATION OF METHODS TO MEASURE PHENOBARBITAL LEVEL IN SERUM AND CEREBROSPINAL FLUID IN DOGS. D. Kostic[1], E. Huisinga[2], R. Carlson[1], A. Tipold[1]. [1]Department Small Animal Medicine and Surgery, University of Veterinary Medicine Hanover, Germany, [2]Vet Med Labor GmbH, Division of IDEXX Laboratories, Ludwigsburg, Germany

Phenobarbital reduces excitatory synaptic responses by acting on GABA receptors. Therapeutic levels in serum range from 15–40 µg/ml. Cerebrospinal fluid (CSF) levels are not routinely evaluated, but could give some insights in patients with unsatisfactory treatment response. For dogs in status epilepticus under phenobarbital treatment fast information on serum levels would help to decide early on a potential new treatment regimen. Easy to use 'bedside' equipment providing fast and accurate information on phenobarbital levels could be an ideal complementary tool to improve individual treatment decisions for epileptic dogs.

Therefore, the aim of the current study was to compare different methods for measurement of phenobarbital levels in serum and CSF to prove that Catalyst Dx®, a new 'bedside' equipment, provides equally accurate data as a Chemiluminescence Immunoassay (CLIA; Immulite 2000 analyzer, Siemens) and high performance liquid chromatography (HPLC; Agilent 1100 Series HPLC Value System), the standard method. The Catalyst® phenobarbital test (Catalyst Dx® Chemistry Analyzer, IDEXX) is an enzymatic competitive immunoassay and takes less than 15 minutes for one measurement using a sample size of 60 µl.

Fifty serum and CSF (n = 17) samples from dogs receiving phenobarbital were included in the current study. Samples were frozen upon collection, kept at -80°C and defrosted immediately before measuring. Measurements were performed by manufacturer instructions.

Results were analysed to verify the correlation between these three methods using the Pearson's product-moment coefficient (r). High correlation could be found for serum and CSF samples between the CLIA method and Catalyst Dx® (serum r = 0, 96; CSF r = 0, 98), HPLC method and Catalyst Dx® (r = 0, 89), CLIA method and HPLC (r = 0, 87).

In conclusion, all three methods can be equally used to evaluate serum and CSF phenobarbital levels because of the strong correlation. Advantages of the new test system are easy handling and quick results.

EFFECTS OF ANESTHESIA WITH ISOFLURANE OR PROPOFOL ON SELECTED BIOCHEMICAL MARKERS IN CEREBROSPINAL FLUID OF HEALTHY DOGS. B.E. Carletti[1,2], A. Galan[1,2], J. Morgaz[1,2], S. Quiros[1], F. Funes[1], M.M. Granados[1,2]. [1]Department of Animal Medicine and Surgery, University of Córdoba, Spain, [2]Teaching Veterinary Hospital, University of Córdoba, Spain

The study of CSF brain energy metabolism (BEM) and neuronal function markers as lactate, glucose, glutamate and ions related with brain diseases is sparking great interest in veterinary medicine. Anesthetic agents effects on BEM are poorly understood, although an influence on CSF-BEM markers has been reported in rats. The aim of this prospective random study was to determine the influence of two anesthetics and anesthesia time on CSF markers in dogs.

Eight healthy dogs (48 ± 7 months and 13.4 ± 0.18 kg) underwent general anaesthesia with isoflurane (EtIso 1.3–1.5% (group ISO) and propofol (0.4–0.6 mg/kg/min (group PRO). Cisternal CSF and blood were collected for lactate, glucose and ions analysis at 15 min (T0) and 3 h (T3) after induction. CSF glutamate analysis was also performed. The study was according to European legislation (86/609/EU). Statistical analysis by t-Student test between groups and over time was carried out, significance was set at $p \leq 0.05$.

CSF lactate (CSFL) concentration was significantly lower in T3 compared to T0 in group PRO, in group ISO it has a trend to increase without significance during anesthesia. CSFL at T3 was significantly lower in group PRO than in ISO, this change was also shown in plasma lactate. Glutamate, glucose and ions remained constant over time and between groups.

This small pilot study demonstrates that CSFL and plasma lactate concentrations in dogs varied depending on either propofol or isoflurane and on anesthesia time. A larger group of dogs and the evaluation of others drugs is needed to further investigate the influence of anesthesia on CSF metabolites.

MAGNETIC RESONANCE IMAGING CHARACTERISTICS OF THORACOLUMBAR NUCLEUS PULPOSUS EXTRUSIONS AND ANULUS FIBROSUS PROTRUSIONS IN LARGE BREED DOGS. S.A. Gomes[1], H.A. Volk[2], R.M.A. Packer[2], P.J. Kenny[2], E. Beltran[3], S. De Decker[2]. [1]Department of Veterinary Medicine, The Queen's Veterinary School Hospital, University of Cambridge, UK, [2]Department of Veterinary Clinical Sciences, Royal Veterinary College, University of London, London, UK, [3]Animal Health Trust, Newmarket, UK

Several studies have reported MRI-findings in dogs with thoracolumbar intervertebral disk (IVD) disease. However, little is known about specific MRI-variables aiding in the differentiation between nucleus pulposus extrusions (NPE) and anulus fibrosus protrusions (AFP). The aim of this study was to investigate MRI-variables that could potentially be associated with NPE or AFP.

Medical records and MRI-studies (1.5T) of large breeds dogs (>20 kg) with surgically confirmed thoracolumbar NPE or AFP were reviewed. All MRI-studies were blinded and randomly assessed by one of the authors (SDD). Assessed MRI variables were: number of affected IVD, location, extent, shape, and lateralization of extradural disk material, presence of nuclear clefts, clear distinction between nucleus pulposus (NP) and anulus fibrosus (AF), AF contour, degree of IVD degeneration, presence of extradural hemorrhage, degree of spinal cord compression expressed by compression ratio and remaining spinal cord (SC) area, occurrence and grade of intraspinal intensity changes, occurrence and grade of vertebral endplate changes, SC swelling, and SC atrophy.

Ninety-two dogs with 95 surgically confirmed NPE (n = 52) and AFP (n = 43) were included. Univariable statistical methods demonstrated that most assessed MRI variables were significantly different between NPE and AFP. Multinomial logistic regression demonstrated that a diagnosis of AFP was more likely if disk material was not lateralized, multiple disk associated SC compressions were present, partial instead of complete IVD degeneration was present and if disk material was confined to the IVD space or vertebral endplates.

This study identified potential MRI-variables that could be useful in differentiating thoracolumbar NPE from AFP.

COMPARISON OF THORACOLUMBAR AND LUMBAR INTERVERTEBRAL DISK EXTRUSIONS BETWEEN ENGLISH COCKER SPANIELS AND DACHSHUNDS. S. De Decker, T.J. Cardy, H.A. Volk. Royal Veterinary College, University of London, London, UK

Many studies have described thoracolumbar intervertebral disk extrusion (IVDE) in Dachshunds. Although this disorder also affects English Cocker spaniels (ECS), little is known about specific disease characteristics in this breed. The aim of this study was to compare thoracolumbar and lumbar IVDE between ECS and Dachshunds.

Eighty-one ECS with thoracolumbar or lumbar IVDE were retrospectively included. An equal number of Dachshunds was randomly selected for comparison. Age, gender, duration, type, progression and severity of clinical signs, affected intervertebral disk space (IVDS), presence of epidural haemorrhage, type of

treatment and duration of hospitalisation time were compared between the two breeds. The affected site was also recorded as IVDE affecting the thoracolumbar (T10-L2), mid-lumbar (L2-L5) or caudal lumbar (L5-S1) IVDS.

ECS were older at the time of diagnosis ($p = 0.006$), had more often progressive clinical signs ($p = 0.03$) and more often had spinal hyperaesthesia or unilateral pelvic limb lameness as the predominant clinical sign ($p = 0.013$). Dachshunds demonstrated more often neurological deficits ($p = 0.029$), were more likely to have IVDE's that extended over two or more IVDS's ($p = 0.009$) and were more often surgically treated ($p = 0.04$). ECS more often had IVDE affecting the mid-lumbar or caudal lumbar IVDS's. More specifically, ECS more often had IVDE affecting the L5-L6 ($p = 0.017$), L6-L7 ($p = 0.001$), and L7-S1 ($p = 0.005$) IVDS while Dachshunds had more often IVDE affecting the T11-T12 ($p = 0.007$) and L1-L2 ($p = 0.009$) IVDS.

This study demonstrates that ECS are predisposed to mid-lumbar or caudal lumbar IVDE compared to Dachshunds. The differences in clinical presentation could be related to the difference in anatomical disease distribution.

VERTEBRAL MINERAL BONE DENSITY IN BOXERS WITH AND WITHOUT DISSEMINATED IDIOPATHIC SKELETAL HYPEROSTOSIS (DISH). S. De Decker[1], R. Lam[1], R.M.A Packer[1], I.M.L.V. Gielen[2], H.A. Volk[1]. [1]Royal Veterinary College, University of London, London, UK, [2]Faculty of Veterinary Medicine, Ghent University, Merelbeke, Belgium

People with DISH are at risk of developing spinal fractures after relative minor trauma. The exact reason for this predisposition is currently unknown. The aim of this study was to compare the thoracic and lumbar bone mineral density (BMD) between Boxers with and without DISH.

Computed Tomography (CT) studies of Boxers with and without DISH were retrospectively studied. For each vertebral body, three regions of interest (ROI) were selected by one of the authors (RL). These ROI corresponded with the cranial, middle and caudal part of the respective vertebral body. The BMD for each vertebral body was represented by the mean value of the three measured ROI.

Fifty-nine boxers with ($n = 30$) or without ($n = 29$) DISH were included. The overall, thoracic and lumbar BMD values were significantly lower in Boxers with DISH compared to the overall, thoracic and lumbar BMD values of Boxers without DISH (all $p < 0.0001$). In the group of Boxers with DISH, the overall BMD of affected vertebral segments was significantly lower compared to the BMD of unaffected segments ($p = 0.02$) and the BMD of affected lumbar vertebrae was significantly lower than the BMD of unaffected lumbar vertebrae (<0.0001). The group of Boxers without DISH was significantly younger than Boxers with DISH ($p = 0.005$), but there was only a very weak correlation between older age and BMD ($p = 0.009$; $r = -0.14$).

This study suggests that DISH in Boxers can be associated with a decreased BMD. It is currently unknown if this lower BMD increases the risk of spinal fractures after relative minor trauma.

TETHERED CORD SYNDROME ASSOCIATED WITH A THICKENED FILUM TERMINALE IN A DOG. S. De Decker, T. Gregori, P.J. Kenny, C. Hoy, K. Erles, H.A. Volk. Royal Veterinary College, University of London, London, UK

Tethered cord syndrome (TCS) is characterised by an abnormal caudal position of the conus medullaris, resulting in traction on the lumbosacral spinal cord segments. Although TCS can be associated with a variety of congenital anomalies, it can also be associated with a thickened filum terminale without other spinal malformations.

A one-year-old English Cocker Spaniel was presented with a 9 months history of progressive right pelvic lameness. Neurological examination was suggestive for a painful disorder affecting the L4-S3 spinal cord segments. MRI and CT demonstrated caudodorsal displacement of the conus medullaris. Medical management did not result in clinical improvement. A dorsal lumbosacral laminectomy was performed, which revealed a ligamentous structure between the conus medullaris and the dorsal lamina of S2. This caused caudodorsal displacement and traction of the conus medullaris. After sectioning this ligamentous structure, the conus medullaris regained a more cranial position. Histopathological evaluation revealed a combination of elastin and collagen fibers in parallel arrangement. The imaging, surgical – and histopathological findings were considered diagnostic for tethered cord syndrome associated with a thickened filum terminale. A neurological examination 10 weeks after surgery was unremarkable. According to the referring veterinary surgeon, the dog was free of clinical signs 4 months after surgery.

This report describes the first canine case of TCS associated with a thickened filum terminale without other spinal malformations. TCS associated with a thickened filum terminale could be considered a rare differential diagnosis for lumbosacral spinal cord dysfunction in a young dog.

DIAGNOSTIC YIELD AND ACCURACY OF NON-SELECTIVE CYTOLOGICAL SAMPLING FROM BRAINS OF NEUROLOGICAL PATIENTS. S. Wuensche, K. Matiasek. Section of Clinical and Comparative Neuropathology, Centre for Clinical Veterinary Medicine, Ludwig-Maximilians University, Munich, Germany

All too often clarification of CNS disorders requires pathomorphological investigation via brain biopsy or post-mortem examination. Even though being cost-effective and fast, the use of brain cytology is restricted to diagnosis of mass lesions and suspected septic meningitis. The possibility that brain cytology may be used as adjunct to histology has not been explored yet.

This study aimed to clarify the diagnostic value of non-invasive imprint cytology as routine procedure in postmortem brain examination. Superficial smears were taken from cerebral hemispheres and cerebellum, air dried and stained with modified Wright stain and haematoxylin-eosin. The slides were evaluated microscopically and findings were compared to full brain histology with regards to their resemblance, discrepancy and diagnostic validity.

The study included 168 cases (33 controls). Histology identified inflammatory disorders in 45.9%, neoplasia in 11.9% and non-infiltrative diseases (NID: degenerative, metabolic, vascular, trauma) in 42.2%. Cytology obtained pathological changes in 56.3% of these. The histological diagnosis was reproduced in 41.5%, the majority of which was inflammatory (78.6%). In 8.9% of cases, distinct cytological but sub-diagnostic features were seen. Unclear phenomena were observed in 3.7% of cases. In 43% of histologically affected brains, cytology proved inferior, providing negative results. These were particularly prevalent in NID (69.0%), followed by inflammation (22.4%) and neoplasia (8.6%). On the contrary, 6% of histological controls showed cytological abnormalities.

Cytological sampling from CNS adds to the sensitivity of neuropathological investigations, even if restricted to non-invasive surface imprints. The diagnostic accuracy exceeds 40% with a 4:1 ratio for infiltrative versus non-infiltrative disorders.

THE SUBVENTRICULAR ZONE AS A NEUROGENIC AREA IN ADULT DOG: HISTOLOGICAL, IMMUNOHISTOCHEMICAL AND ULTRASTRUCTURAL STUDIES. F. Fernández[1], M. Duran-Moreno[2], D. Fondevila[1], R. Rabanal[1], E. Blasco[1], J.M. García-Verdugo[2], M. Pumarola[1]. [1]Department of Animal Medicine and Surgery, Universitat Autònoma de Barcelona, Barcelona, Spain, [2]Comparative Neurobiology Laboratory, Institut Cavanilles de Biodiversitat i Biologia Evolutiva, Universitat de València, Valencia, Spain

The subventricular zone (SVZ) is the principal neurogenic area in the adult mammalian brain, Neural stem cells can be detected in the SVZ organized in niches close to capillaries. They can generate neuroblasts and glial precursors which will migrate and provide new neurons and glial cells. This neurogenic potential declines during aging. The aim of this study is to describe the histological, immunohistochemical and ultrastructural features of the rostral canine striatal subventricular wall and their changes along life.

The SVZ of 5 normal dogs aged between 3 months and 17 years were histological, immunohistochemical and ultrastructurally studied. The antibodies used were Nestin, as stem cell marker; Doublecourtin (DCx) and βIII-Tubulin, as immature neuronal markers; Neurofilaments (Nfts), as mature neuronal marker; Glial fibrillary acidic protein (GFAP), Olig2, Iba1 and S100 proteins, as neuroglial markers; Laminin and Collagen type IV for

the evaluation of the basal lamina of blood vessels and Ki67 as a proliferation index marker.

Canine SVZ is organized in layers: Ependimal, subependimal and deep glial layers. Perivascular niches were mainly detected in the subependimal layer and were composed by Nestin+ and DCX+ cells. Some of them showed GFAP+ processes growing between the ependimocytes and invading the ventricle. Ultrastructurally, hypocellular areas were detected in the subependimal layer with astrocytic processes associated with precursor migrating cells. Aged dogs showed decreased and disorganized neural precursors in the SVZ. These results indicate that canine and human subventricular zone have a similar organization and cellular composition, including aging changes.

PRIMARY FRONTAL SINUS SQUAMOUS CELL CARCINOMA IN A DOG. M. Moral[1], C. Blanco[1], J. Martinez[1], J. Minguez[1], F. Fernández[2], M. Pumarola2, V. Lorenzo[1]. [1]Neurología Veterinaria, Madrid, Spain, [2]Unitat de Patologia Murina i Comparada, Dpt. Medicina i Cirurgia Animal, Universitat Autònoma de Barcelona, Bellaterra, Spain

Squamous cell carcinoma (SCC) primary originated from the frontal sinus, is a very rare neoplasm in humans and dogs. In veterinary medicine, there's only one published paper. We report the clinical signs, MRI findings, histopathology and treatment of a primary frontal sinus squamous cell carcinoma (pFS-SCC) in a dog.

A 9-year old spayed female Alaska Malamute was admitted with a frontal bone deformity and severe head pain. Complete blood count, serum biochemical profile, thoracic radiographs and abdominal ultrasonography were unremarkable. MRI of the head showed a well delineated mass in the right frontal sinus extending along the dorsal, ventral and caudal inner surfaces. The mass was inducing osteolysis of the frontal bone and medial septum with extrasinusal and contralateral sinus extension respectively and caudally infiltrated the ethmoidal bone. The relaxometry was heterogeneous both in the basal and postcontrast studies. There were no signs of macroscopic involvement of the nasal cavity. Differential diagnosis mainly included neoplasia of osseous or epithelial origin.

A frontal osteotomy was performed to remove the mass and obtain samples. Histological studies showed an epithelial-origin neoplasia with high criteria of malignancy, producing osteolyisis and infiltrating into the dura mater. Lymphangitic carcinomatosis was observed. The final diagnosis was a SCC. Two days after the surgery the dog was discharged with amoxicillin/clavulanic acid (25 mg/kg/12 h PO), meloxicam (0.1 mg/kg/24 h PO) and tramadol (2 mg/kg/12 h PO). One week later the dog was asymptomatic, treatment was started with carboplatin (every 21 days) and piroxicam (daily). One month after surgery, the dog remains asymptomatic.

This is a case of a pFS-SCC without nasal involvement. The cytoreductive surgery is recommended to help pain control and to make the chemotherapy more effective.

CAUDAL CEREBELLAR ARTERY INFARCTION IN A CAT. S. Spencer, F. De Strobel, O. Taeymans, A. De Stefani, G.B. Cherubini. Dick White Referrals, Six Mile Bottom, Cambridgeshire, UK

The clinical signs and magnetic resonance (MR) findings of a caudal cerebellar artery infarction are reported for the first time in a cat.

An 11-year-old male neutered domestic shorthair cat was presented with acute vestibular signs. Physical examination revealed tachycardia. Neurological examination revealed vestibular ataxia with drifting and falling to the left side, a left-sided headtilt, positional vertical nystagmus and exaggerated postural reactions. Neuroanatomical localisation was consistent with central vestibular/cerebellar disease. Haematology, serum biochemistry, pre-prandial bile acids, and T4 were normal. Blood pressure monitoring during general anaesthesia was unremarkable. MRI of the brain revealed a wedge-shaped T2-weighted hyperintense and T1-weighted isointense lesion in the caudal third of the left cerebellar hemisphere and vermis. This area showed minimal contrast enhancement after gadolinium administration and restricted diffusion on diffusion-weighted sequences. A presumptive diagnosis of a non-haemorrhagic left caudal cerebellar artery infarct was made. The cat's neurological status progressively improved over four days of hospitalisation and he was discharged with continued antioxidant therapy. Re-examination at one month showed no neurological deficits.

This is the first report of a caudal cerebellar arterial infarct in the cat. Vascular supply to the cerebellum in cats differs from that of dogs as maxillary blood is carried caudally by the basilar artery to the cerebellum. Cerebellar infarcts are an important differential diagnosis in cats with acute vestibular/cerebellar signs and the diagnostic value of MR is highlighted.

REFLEX EPILEPSY MANIFESTING AS SITUATIONAL SEIZURES IN DOGS AND CATS. L. Shell[1], R. Scariano[1], M. Rishniw[2]. [1]Department of Clinical Sciences, Ross University School of Veterinary Medicine RUSVM, St. Kitts, USA, [2]Veterinary Information Network, Davis, CA, USA

While most epileptic seizures are unpredictable, 'reflex' seizures can be predictably provoked by specific stimuli. In humans, reflex seizures have been provoked by external stimuli (e.g. flashing lights from television, strobe, billboards, etc.) or internal ones (mental mathematical calculation, reading, thinking, etc.). The time from the stimulus to the onset of seizure is short (seconds) and the stimulus is specific. Most of the time seizures do not occur in the absence of the stimulus, but some cases of human reflex epilepsy have occurred in individuals who have had another form of epilepsy (Ferlazzo, 2005).

There are very few examples of reflex epilepsy in the veterinary literature. We documented and characterized reflex epilepsy in dogs and cats using cases reported on the Veterinary Information Network's (VIN) message boards. We searched the VIN database using a variety of search phases ('reflex epilepsy', 'reflex seizure', 'situational seizure', 'seizure at veterinary clinic', 'seizure at groomers') and identified 12 cases of reflex epilepsy in dogs and 9 cases in cats. From the case material provided, we were able to determine the stimulus and whether or not seizures occurred at other times. For the dog cases, we also evaluated the type of treatments used to prevent the reflex seizure and the success or failure of such treatments.

The majority of situations provoking seizures were visits to the veterinary clinic (VC) or groomers (G). Four of 12 dogs (33%) and 5/9 (55%) cats experienced a seizure with only one situational stimulus: VC (3 dogs and 1 cat), G (1 dog and 2 cats), or automobile ride (1 cat) or cat carrier (1 cat). The remaining 8 dogs and 4 cats experienced seizures in multiple, but specific and repeatable, situations. Overall 11/12 dogs and 5/9 cats had reflex seizures when visiting a VC, 8/12 dogs and 5/9 cats when visiting the G, and 5/12 dogs and 4/9 cats when in other situations. Examples of other situations included automobile rides, getting bathed at home, visits to other homes or pet stores, or visits from house call veterinarian. Some cases started with one stimulus situation and expanded to other situations. Four of 12 dogs (33%) and 3/9 (33%) cats had seizures at times unassociated with the situational seizures. A variety of antiepileptic drugs were used in 9/12 dogs to try to prevent the situational seizures. In 6 of these, maintenance antiepileptic drugs were used and failed to prevent the situational seizures in all but one case.

In summary, our retrospective study suggests the existence of reflex epilepsy in dogs and cats, often associated with stressful situations (e.g. visits to the veterinary clinic or groomer). While the majority of affected pets only seized in the particular situation(s), one-third of the cases manifested seizures at other times. Trying to prevent such situational seizures with maintenance antiepileptic drugs did not appear to be beneficial but more cases need to be studied.

ISCHEMIC NEUROMYOPATHY IN A CAT WITH ADENOSQUAMOUS LUNG CARCINOMA. L. Kalogianni[1], N. Soubasis[1], D. Psalla[2], I. Panopoulos[3], A. Kostantinidis[4], I. Kavarnos[4], Z. Polizopoulou[1], L. Papazoglou[1], L. Tentoma-Zervou[4]. [1]Companion Animal Clinic, Faculty of Veterinary Medicine, Thessaloniki, Greece, [2]Laboratory of Pathology, Faculty of Veterinary Medicine, Thessaloniki, Greece, [3]Department of Diagnostic Imaging, Faculty of Veterinary Medicine, University of Bologna, Italy, [4]Small Animal Clinic, Lesvos, Greece

A 15-year-old, neutered female domestic shorthaired cat that had been missing for 3 days was found with acute hind limb paral-

ysis. Complete physical examination revealed absent femoral pulses, pale paw pads, poor body condition and depression. Neurological examination revealed lower motor neuron dysfunction in both hindlimbs. Complete blood count, serum biochemistry and urinalysis were normal except for markedly elevated creatinine phosphokinase. Echocardiography was unremarkable. Lateral radiographs showed a mixed lung pattern, interstitial and alveolar, in the accessory lung lobe or caudal mediastinum. Thoracic computed tomography (CT) revealed a well-demarcated hyperintense mass (18mmx22 mm) in the accessory lung lobe spreading on the central/caudal part of the lobe with a peripheral halo sign, while the lumen of both iliac arteries was narrow. Cytologic evaluation of CT-guided fine needle aspirates showed squamous cell carcinoma. Lobectomy of the accessory lung lobe was performed, and histopathological diagnosis was adenosquamous lung carcinoma.

Enoxaparin and clopidogrel were administered. Three weeks later, the cat was walking normally, with proprioceptive deficits only in the left hind limb. One month post lobectomy, the cat died suddenly and surgical margin obtained samples were infiltrated by neoplastic cells on post mortem histopathology. Moreover, embolization by neoplastic cells and recanalization were detected in both iliac arteries. The heart was macroscopically and microscopically normal.

In conclusion, although the most common cause of arterial thromboembolism is hypertrophic cardiomyopathy, lung tumors should be included in the differential diagnosis in geriatric cats as well.

BENIGN, MULTIPLE, OSTEOLYTIC BONE LESIONS OF THE SKULL IN A DOG WITH SEIZURES. M. Svensson[1], M. Rapp[2], S.A.E. Van Meervenne[1]. [1]AniCura Läckeby Djursjukhus, Läckeby, Sweden, [2]Evidensia Specialistdjursjukhuset Strömsholm, Strömsholm, Sweden

Differential diagnosis for multiple, osteolytic bone lesions of the skull in a dog presenting with seizures include neoplasia (e.g. multiple myeloma), hyperparathyroidism and haematogenous infections. This case adds another differential to the list.

A seven-year-old male Labrador retriever was presented with a history of generalized seizures. Clinical work-up only revealed a mild, right-sided exophthalmos. Initial radiographs of the thorax and abdomen were within normal variation except for three small gunshot pellets detected in the subcutaneous tissues. Additional radiographs of the skull showed diffuse radiolucent lesions with irregular cortical defects and new bone formation with thickening of the calvarium. Similar but less pronounced lesions were diagnosed in the bones of pelvis and spine. CBC, serum biochemistry, thyroid- and parathyroid hormone panels and serum and urine protein electrophoresis were unremarkable. Computed tomography (CT) and magnetic resonance imaging (MRI) of the head confirmed the described extensive radiographic changes, showed a normal brain parenchyma and a small mass in the right orbit. Twenty-one months later the dog was euthanized due to progressive exophthalmos with no documented seizures during the last 16 months without anti-convulsive treatment. On autopsy no significant brain changes were found and the skull lesions were defined as fibrous osteopathy, different from fibrous dysplasia. The intraorbital mass was diagnosed as a peripheral nerve-sheath tumor.

This is the first case report of fibrous osteopathy in a dog, adding a benign' differential to the list of diffuse, osteolytic lesions of the skull in dogs.

MULTICENTRIC OSTEOSARCOMA IN A COCKER SPANIEL: A CASE REPORT. B. Parzefall, S. De Decker, S. Carvalho, K. C. Smith, A. Lara. Royal Veterinary College, University of London, London, UK

Multicentric osteosarcoma (MOS) is a rare malignant neoplasm of the axial and/or appendicular skeleton in humans. Bone lesions may occur simultaneously or sequentially and visceral metastases are not a typical feature of this tumor. Treatment includes surgery, chemo- or radiotherapy with median survival times ranging from 14–43 months.

An 8 year old, male neutered Cocker Spaniel was referred for a one year history of reluctance to exercise and spinal pain. The patient had a hunched posture, diffuse spinal hyperaesthesia, and a short stride pelvic limb gait in the absence of neurological deficits. A complete blood count and urine analysis were unremarkable and serum biochemistry showed mild hypoalbuminemia and mildly to moderately increased inorganic phosphorus, ALT and ALP. An MRI and CT scan of the spine revealed multifocal osteolytic lesions involving the vertebral column, ribs, sternum and pelvis. Bence-Jones proteins were negative and serum electrophoresis and bone marrow aspirates were unremarkable. As fine needle aspirates of the bone lesions were non-diagnostic, a surgical biopsy was obtained and was consistent with osteosarcoma. Immunohistochemistry showed positive staining for vimentin and osteocalcin and was negative for MUM-1 and CD79a. Treatment consisted of multimodal pain relief, bisphosphonate, chemo- and radiotherapy. A repeat CT scan showed progression of the neoplasm whilst maintaining a good quality of life and pain control seven months after diagnosis.

To the author's knowledge, this is the first report describing MOS in a dog, which presents a rare differential diagnosis for multiple myeloma.

COMPARISON OF THE INTEROBSERVER AGREEMENT OF THE PATELLAR- AND BICEPS TENDON REFLEX IN CATS. F. Giebels, B. Kohn, S. Loderstedt. Clinic of Small Animals, Faculty of Veterinary Medicine, Freie Universität Berlin, Berlin, Germany

The reliability of the biceps tendon reflex (BTR) is often assumed to be low in small animal medicine. The physiological reflex-response of the BTR is a flexion of the elbow and/or a twitching movement of the biceps brachii musle. In contrast, the evaluation of patellar tendon reflex (PTR) by assessment of stifle extension is agreed to have a high reliability and thus is used within neurological examination in cats.

The goals of this prospective study were two-folded: (1) evaluation and comparison of the interobserver agreement of the feline BTR and PTR and (2) identification of influencing factors on interobserver agreement of both reflexes.

Thirty-seven thoracic limbs and thirty-eight pelvic limbs of nineteen cats were examined by one examiner (F.G.). The examinations were video recorded in a standardized manner, anonymized and evaluated by two observers (S.L., F.G.). The observers had to evaluate the reflex-presence (0;1) and the reflex-briskness using an accepted scoring system (0 = absent to 4 = clonic). Additionally for the BTR the observers had to evaluate the presence of elbow-flexion (0;1) and the presence of M. biceps brachii-contraction (0;1). The interobserver-agreement was calculated using Kappa (K)-analysis. Correlation between interobserver-agreement and the covariates sex, age, weight, fur length and fur colour was analysed using binary logistic regression.

The interobserver-agreement of the reflex-presence was perfect (K = 1) for the BTR and the PTR. For the reflex-briskness, the interobserver-agreement was fair (K = 0.34) for all reflex-examinations, poor (K = −0.06) for the BTR and moderate (K = 0.58) for the PTR. The interobserver-agreement for the flexion of the elbow (K = 0.45) and for the M. biceps brachii-contraction (K = 0.44) was within the moderate-level, but no correlation to the interobserver-agreement of the reflex-briskness could be calculated for both parameters. None of the evaluated factors had a significant influence on the interobserver-agreement of the BTR or PTR.

Within the neurological examination the PTR can be assessed much more reliable than the BTR in cats. Although the interobserver-agreement on the presence of reflex-response of the PTR and BTR is perfect, the grading of reflex-briskness might be challenging.

PRELIMINARY INVESTIGATION OF THE FELINE INTERVERTEBRAL DISC. L. Smolders[1], L. Ettinger-Ferguson[2], G. Grinwis[3], K. Hurter[1], F. Steffen[1]. [1]Clinic for Small Animal Surgery, Vetsuisse Faculty, Zürich University, Zürich Switzerland, [2]Muskuloskeletal Research Unit MRSU, Vetsuisse Faculty, Zürich University, Zürich, Switzerland, [3]Department of Pathobiology, Pathology Division, Faculty of Veterinary Medicine, Utrecht University, Utrecht, The Netherlands

Cats are rarely affected by degenerative intervertebral disc (IVD) disease, the reasons for which are currently unknown. Knowledge about the factors that keep the feline IVD relatively

'protected' may be valuable for developing new treatment strategies for IVD disease. The purpose of this study was to perform a preliminary macroscopic and histopathological investigation of the feline IVD and to assess whether the feline IVD is subject to degenerative changes as observed in dogs.

Cervical, thoracic, and lumbar IVDs (32 discs in total) were collected from 4 cats, ranging from 4 months to 16 years of age, euthanized for reasons unrelated to spinal disease. IVDs were macroscopically and histologically evaluated using established grading schemes for dogs (Thompson and Bergknut grading, respectively).

Macroscopic evaluation showed that most IVDs in all cats were non-degenerated (Thompson Grade I). Some IVDs showed signs of degeneration of the nucleus pulposus (NP) and annulus fibrosus (AF), but higher stages of degeneration (>Thompson grade III) were not observed. As in dogs, histopathology showed that the healthy and degenerated feline NP contained mainly notochordal cells and chondrocyte-like cells, respectively. However, the AF of both healthy and degenerated discs showed distinct depositions of glycosaminoglycans, perpendicularly oriented to the annular lamellae, and contained a high degree of chondrocyte-like cells ranging into the outer AF.

This preliminary study shows that the feline IVD can be subject to mild degenerative changes as observed in dogs. Although the NP appears histologically similar between the two species, the feline AF seems to have distinct differences.

SURVIVAL AFTER A DIAGNOSIS OF EPILEPSY IN A LARGE POPULATION OF INSURED SWEDISH DOGS. L. Heske[1], A. Nødtvedt[2], M. Berendt[3], A. Egenvall[4], K. Hultin Jäderlund[1]. [1]Department of Companion Animal Clinical Sciences, Faculty of Veterinary Medicine and Biosciences, Norwegian University of Life Sciences, Oslo, Norway, [2]Department of Production Animal Clinical Sciences, Faculty of Veterinary Medicine and Biosciences, Norwegian University of Life Sciences, Oslo, Norway, [3]Department of Veterinary Clinical and Animal Sciences, Faculty of Health and MedicalSciences, University of Copenhagen, Frederiksberg, Denmark, [4]Department of Clinical Sciences, Faculty of Veterinary Medicine and Animal Husbandry, Swedish University of Agricultural Sciences, Uppsala, Sweden

Agria, the main Swedish insurance company for companion animals, covers 40% (2012) of the entire Swedish dog population, and the Agria database provides an excellent platform for epidemiological studies. The objective of the present study was to use the Agria insurance data (1995–2006) to analyze survival after a diagnosis of epilepsy (including idiopathic and symptomatic cases), and to evaluate the effect of potential risk factors; age at diagnosis, sex and breed.

Survival analysis was performed for 3655 dogs less than 10 years of age that had a veterinary care claim for epilepsy. The dogs were followed from the date of epilepsy diagnosis until the date of death or censoring (due to either exit from the database or end of the study-period). During the study-period, 978 dogs (63.4%) died of epilepsy, and 565 (36.6%) died of other reasons.

The median survival time after a diagnosis of epilepsy was 1.5 years (range: 1 day–9.2 years). Overall, 197 different breeds were represented in the dataset. The probability of survival varied for the breeds represented with most cases (>80). In general, breeds kept solely for companionship lived longer than those with dual-purposes, such as hunting, shepherd and working breeds. The effect of breed on survival was highly significant. Females lived longer than males after a diagnosis of epilepsy. Dogs diagnosed with epilepsy at a high age had a shorter survival time after diagnosis. This study revealed prognostic factors for survival, which can be used by clinicians when consulting with owners of dogs with epilepsy.

LOWER BACK PAIN AND BEHAVIOURAL CHANGES IN CATS: A SHORT TERM FOLLOW UP AFTER ORTHOMANUAL TREATMENT. J. Heukels, D.C. Aharon. Practice for Orthomanual Veterinary Medicine, The Netherlands

Chronic back pain in cats is a common and underestimated problem. Orthomanual medicine assumes that spinal pain may be caused by a misalignment of consecutive vertebrae and consequential facet joint subluxation. It is designed to correct these misalignments.

Twenty-one cats admitted with behavioural changes indicative of back pain were included. Presence of lower back pain was assessed by elicitation of pain on digital palpation of the lumbosacral region. In all cats, one or more vertebral misalignments in the lumbosacral region were detected clinically by inspection and palpation by an orthomanual veterinarian. These vertebral misalignments were treated with orthomanual therapy. Owners were asked to complete a questionnaire before and 14 days after the treatment involving an assessment of the degree of behavioural changes on a scale from 1 to 10. Scores were analyzed using a Wilcoxon signed rank test ($p < 0.05$).

The most common owner complaints were reluctance to jump (38%) and signs of pain when touching the cat's lower back (24%). A misalignment of S1 was found and corrected in16 cats (76%) and of L7 in 6 cats (29%). There was a statistically significant improvement in the owners' overall questionnaire scores from a mean of 5.3 at baseline to 4.2 at 14 days ($p < 0.0001$). These findings suggest that orthomanual treatment in cats with lower back pain may provide pain relief.

NEOSPOROSIS WITH CEREBRAL AND CEREBELLAR INVOLVEMENT IN AN ADULT DOG. A.M. Coelho, N. Shihab, H. Scott. Southern Counties Veterinary Specialists. Hampshire, UK

Neosporosis is a polysystemic, potentially fatal protozoal disease in dogs. In puppies < 6 months, N. caninum has a predilection for lumbosacral spinal nerve roots. Adult dogs more often develop meningoencephalitis, affecting predominantly the cerebellum. MRI in such dogs is characterized by cerebellar atrophy.

A 5-year-old greyhound presented with a 6-month history of progressive lethargy, ataxia, and depression. Eight weeks before presentation, deterioration in mentation and gait were noticed. The patient had a cerebellar ataxia and intermittent absence episodes. Neuroanatomic localization indicated cerebellar and cerebral disease. MRI revealed an increase of CSF volume in the subarachnoid space and ventricular system. The cerebral sulci were widened and deeper than normal. Increased space between the cerebellar folia was apparent. The interthalamic adhesion was narrowed. FLAIR sequence revealed an asymmetrical hyperintense signal throughout the cerebral cortex. T1-weighted images following contrast administration, revealed multifocal enhancement of the cerebellum, cerebral white and grey matter and meninges. A mixed cell pleocytosis was present on CSF analysis. Serology for N. Caninum was positive with a titre of >1:800. Treatment with clindamycin resulted in clinical improvement within 24 h. Progressive recovery was apparent over the following six months at which point a titre of 1:400 was obtained. One year after presentation serology is negative and improvement has plateaued.

This case documents the presence of marked cerebral in addition to the more typical cerebellar atrophy on MRI in association with N. Caninum infection. Although treatment resulted in marked long term improvement complete resolution of dysfunction was not achieved.

EVALUATION AND COMPARISON OF N-TERMINAL PRO BRAIN NATRIURETIC PEPTIDE (NT-PROBNP) AT PERIOPERATIVE PERIOD OF INTRACRANIAL SURGERY IN DOGS WITH MENINGIOMA. N. Tanaka[1,2], D. Ito[1], S. Seki[1], M. Kitagawa[1]. [1]School of Veterinary Medicine, Nihon University, Kanagawa, Japan, [2]Grace Animal Hospital, Tokyo, Japan

Perioperative management during/after brain surgery is thought to be important in dog, and biomarkers which relate to brain damage and prognosis would be required for the management. In humans, it had been reported that N-terminal pro brain natriuretic peptide (NT-proBNP) concentration was increased in patient with acute cerebrovascular events such as a subarachnoid hemorrhage, and not elevated in patient with intracranial neoplastic lesion. However it was described that NT-proBNP concentration increased after intracranial surgery resecting brain tumor. Moreover, it had been shown that mass effect of brain tumor might be associating with elevating NT-proBNP concentration at postoperative period. We estimate these increase of NT-proBNP might be related to outcome in patient with brain tumor. Therefore the purpose of this study is to measure NT-proBNP concentration at pre- and post-operative period in dogs with meningioma, and compare

the concentration between the periods to examine the effect of brain manipulation. Serum/plasma NT-proBNP concentration was measured in 5 dogs that were underwent intracranial surgery and pathologicaly diagnosed meningioma at Nihon University Animal Medical Center. Three old dogs which underwent surgery for other disease were used as a control. Blood sample was obtained at pre-surgery, post 1 day and post 7 days after the surgery, and serum/plasma NT-proBNP concentration was determined by the sandwich ELISA (cardiopet pro BNP, IDEXX Laboratories). Mitral valve insufficiency (ISACHC class1a) and chronic renal failure (IRIS class I) was diagnosed in a dog (MVI/CRF dog) at preoperative evaluation. Preoperative NT-proBNP concentration in 4 dogs apart from MVI/CRF dog (mean 761; 241–1305pmol/l) was higher than that in control (mean 412; 250–605 pmol/l). NT-proBNP concentration at post 1 day in these 4 dogs (mean 1523; 742–2342 pmol/l) was higher than that in control (mean 388; 317–406 pmol/l). Preoperative NT-proBNP concentration in MVI/CRF dog was highest (3714pmol/l) and post 1 day was 2998pmol/l. NT-proBNP concentration at post 7 days in 3 dogs except MVI/CRF dog was mean 835; 423–1105 pmol/l, and the concentration in control dogs was mean 418; 250–734; pmol/l.

The results showed that NT-proBNP concentration was increased after the removal of brain tumor similar to human, and the increase might be occurred due to cerebral damage by brain manipulation. No dogs showed decrease of the concentration at post 7 days comparing to pre-surgery. This might imply that the influence of brain damage was continued.

In this study, mass effect seemed not to be related to increase of NT-proBNP after surgery. NT-proBNP concentration at pre-surgery in 2 dogs including MVI/CRF dog was comparatively high concentration. The reason would be that the dogs had massive size of tumor and extensive brain oedema, and this leaded to brain damage, although the heart and kidney disease might affect to the change in MVI/CRF dog.

In conclusion, it might be possible to estimate the brain damage due to both tumor and/or surgical manipulation by measuring NT-proBNP concentration and NT-proBNP might become a helpful biomarker at perioparetive management.

DEVELOPMENT OF POSTTRAUMATIC EPILEPSY IN CATS. S. Hoppe[1], J. Weber[1], W. Löscher[2], A. Tipold[1]. [1]Department of Small Animal Medicine and Surgery, University of Veterinary Medicine Hannover, Hannover, Germany, [2]Institute of Pharmacology, Toxicology and Pharmacy, University of Veterinary Medicine Hannover, Hannover, Germany

In human medicine, preceding traumatic brain injury (TBI) is a common cause of symptomatic epilepsy. We could show in a recent study that 6.6 % of dogs suffering from TBI developed posttraumatic epilepsy (PTE) and the risk of PTE increased with severity of TBI. The risk of epilepsy after TBI in cats was described to be very low by Grohman et al., 2012. The authors examined 52 cats with TBI. Since in our hospital population several cats developed PTE, we performed a retrospective study including 617 patients referred to our clinic to evaluate occurrence and time point of PTE in cats. Two groups were evaluated: group I (n = 64) consisted of cats with recurrent seizures. In this group the focus was laid on the history of a head trauma. Group II (n = 332) included cats with head trauma to evaluate the development of seizures after the trauma. A control group consisted of cats suffering from trauma without involvement of the head (n = 221). Data for this study were obtained and analysed from our clinical database, questionnaires sent to the cats' owners, and owner interviews.

In group I, 10 cats (10/64 cats; 15.6%) and in group II, 16 cats (16/332 cats; 4.8%) developed recurrent seizures after traumatic brain injury. In the control group only one cat developed epilepsy (1/221 cats; 0.45%). In group I, one cat (1/10) started seizuring directly after the trauma (immediate seizures) and the other nine cats (9/10) had their first seizure event more than one week after the TBI. In group II, 8 (8/16) cats developed immediate seizures, 3 (3/16) cats suffered from early seizures (in the first week following the injury) and 5 cats (5/16) developed late seizures. Mortality of cats with PTE and immediate or early seizures was high and 8/16 cats died. Risk factors to develop PTE were anisocoria, nystagmus, mydriasis, intracranial haemorrhage, impression fracture of the skull and herniation of the cerebellum.

The present study emphasizes that head trauma is also associated with seizure development in cats. Similar to the canine species new treatment strategies have to be developed to prevent epileptogenesis.

CHRONIC STEROID RESPONSIVE CANINE IDIOPATHIC POLYNEUROPATHY: EPIDEMIOLOGICAL, CLINICAL AND ELECTROPHYSIOLOGICAL DESCRIPTION: 12 CASES. V. Mayousse, A. Jeandel, S. Blot. [1]Unité de Neurologie, Université Paris-Est Créteil, Ecole nationale vétérinaire d'Alfort, Maisons Alfort, France

Current envisioned etiology for chronic canine polyneuritis may be infectious or immune-mediated. The latter disease, also called chronic demyelinating polyradiculoneuritis (CDP), has been sporadically reported and long term follow-up sparsely described. We report a case series of chronic polyneuropathy with clinical, electrophysiological and histological features resembling CDP.

Medical records were searched for acquired chronic steroid responsive canine polyneuropathy. Inclusion criteria consisted in clinical signs of at least 2 weeks duration, progressive locomotor weakness or exercise intolerance, an electrophysiological examination demonstrating a generalized motor polyneuropathy, a positive response to steroids and exclusion of an endocrine, paraneoplastic or infectious origin. A CSF examination was performed and muscle/nerve biopsies were collected.

Twelve cases were identified between 1998 and 2013, 8 dogs were male. The median age of onset and weight were 7 years and 27.7 kg respectively. The median duration of clinical signs before presentation was 2 months. A dysphonia and/or a stridor were observed in 8 cases. Spontaneous abnormal electrical activity was recorded in all cases. Motor NCV were below usual values but sensory NCV were unaffected. CSF examination revealed an albuminocytologic dissociation in 7 out of 11 cases. Biopsies revealed atrophied angular muscle fibers with type grouping (n = 10) and endoneural fibrosis, axonal degeneration and few cellular infiltrations in nerve samples (n = 6).

All animals improved under corticosteroid therapy with 2 mg/kg/d as starting dose. A complete remission was achieved for 5 dogs but at least one relapse was observed in 5 out of 12 cases requiring a dose adjustment.

MAGNETIC RESONANCE CHANGES IN A CAT WITH GLOBAL BRAIN ISCHAEMIA. M.K. Müller[1], E. Ludewig[1], K. Matiasek[2], T. Flegel[1]. [1]Department of Small Animal Medicine, University of Leipzig, Leipzig, Germany, [2]Section of Clinical and Comparative Neuropathology, Centre for Clinical Veterinary Medicine, Ludwig Maximilians University, Munich, Germany

A 2-year-old European shorthair cat was presented due to progressive disorientation, lack of reaction to loud noises and blindness starting 3 day after castration. Anaesthesia and surgery were reportedly uneventful. The neurological examination revealed reduced consciousness, reduced postural reactions in the hind limbs and a bilaterally absent menace response. Complete blood cell count and serum biochemical profile were unremarkable. Over the following 12 h the cat additionally developed focal and generalised seizures and was euthanized due to lacking response to therapy and further progression of symptoms.

Magnetic resonance imaging, using a 3T-magnet, revealed hyperintensity of the entire cortical grey matter on T2-weighted and FLAIR images with strong enhancement after contrast administration (0.2 mmol/kg gadopentetate dimeglumine) and reduced diffusion in DWI-images. Additionally signs of increased intracranial pressure were detectable. A 5 × 2 mm large bilaterally symmetric lesion was educible in the brainstem, hyperintense on T2- and isointense on T1-weighted images. This lesion showed no contrast enhancement.

On post-mortem examination the brain showed selective neuronal necrosis, diffusely affecting the middle isocortical laminae and hippocampal pyramidal cell layer. They intermingle with multiple cortical and subcortical lacunar infarcts. Further pan-necrotic foci are seen bilaterally symmetrical within the brainstem tegmentum. Findings were consistent with global ischaemia.

UNILATERAL TRIGEMINAL NEURITIS MIMICKING PERIPHERAL NERVE SHEATH TUMOUR IN A HORSE. E. Beltran, R. Grundon, J. Stewart, M. Biggi, A. Holloway, C. Freeman. Animal Health Trust, Newmarket, UK

A sixteen-year-old Warmblood gelding presented with a two week history of a non-healing corneal ulcer in the left eye. A mid-depth stromal ulcer with a 4–5 mm fringe of peri-limbal vascularisation and severe corneal oedema was reported at presentation. There was minimal ocular discharge and the eye was open and comfortable. The right eye was unremarkable to ocular examination. Neurological examination revealed normal mental status, posture, and gait. Postural reactions were normal in all four limbs. Cranial nerve examination revealed decreased sensation at the medial and lateral canthus of the left eye, the cornea of the left eye, over the maxilla on the left, and in the left nostril. Palpebral reflex was decreased in the left eye, but the menace response was present. Direct pupillary light reflex could not be assessed in the left eye due to the severity of the corneal ulcer and oedema. The rest of the neurological examination was unremarkable. Based on the history, ophthalmic and neurologic examination, a lesion affecting the maxillary and ophthalmic branches of the left trigeminal nerve was suspected. The main differential diagnoses were neoplasia and inflammatory/infectious. Magnetic resonance imaging (MRI) of the head revealed enlargement of the ophthalmic and maxillary branches of the left trigeminal nerve from the level of middle cranial fossa, through the orbital fissure and round foramen respectively. The infraorbital branch of the maxillary branch of the trigeminal nerve was markedly enlarged along the length of the infraorbital canal. The nerve was iso- to hypointense to grey matter on both T1-weighted and T2-weighted fast spin echo sequences with moderate heterogeneous, mainly peripheral enhancement on T1-weighted sequence after paramagnetic contrast administration. There was bony remodeling and secondary enlargement of the left orbital fissure, round foramen and infraorbital canal. Cerebrospinal fluid was collected from the cerebellomedullary cistern and the analysis (nucleated cell count, total protein and cytology) was within normal limits. Based on these results, the most likely differential diagnosis was a trigeminal [cranial nerve (CN) V] nerve sheath tumour affecting the ophthalmic and maxillary branches.

The ulcer progressed to a large descemetocoele, which required a surgical repair or enucleation. Given the suspected guarded prognosis, the owner elected to have the horse euthanized. Post mortem examination confirmed gross enlargement of left orbital fissure, round foramen and infraorbital canal and the ophthalmic and maxillary branches of left CN V. Histopathology demonstrated a severe granulomatous neuritis affecting the ophthalmic and maxillary branches of the left trigeminal nerve.

It is concluded that granulomatous neuritis should be considered as a differential diagnosis in horses with MRI findings suggestive of a trigeminal nerve sheath tumour. A surgical/tru-cut biopsy may be indicated to further characterize these lesions in order to plan the best treatment approach.

NEUROLOGICAL SIGNS IN 24 DOGS WITH ROSTRAL CEREBELLAR INFARCTION. B. Thomsen[1], L. Garosi[2], G. Skerritt[3], C. Rusbridge[4], T. Sparrow[4], M. Berendt[1], H. Gredal[1]. [1]Department of Veterinary Clinical and Animal Sciences, University of Copenhagen, Denmark, [2]Davies Veterinary Specialists, Hertfordshire, UK, [3]ChesterGates Referral Hospital, Chester, UK, [4]Fitzpatrick Referrals, Surrey, UK

Studies on canine ischemic stroke suggest an overrepresentation of cerebellar cases. Although not the leading localization in humans, a cerebellar stroke syndrome characterized by vertigo, ataxia, nystagmus, and headache is described. Purpose of the present study was to characterize neurological signs in dogs with cerebellar infarction.

A retrospective multicenter study of dogs examined 2010–2014 was performed. Dogs with acute non-progressive neurological deficits and magnetic resonance imaging suggestive of cerebellar infarction were eligible for inclusion.

Twenty-four dogs (16 females, 8 males) with a median age of 8 years (range 3–11 years) were included. Breeds comprised the Cavalier King Charles Spaniel (n = 9), Greyhound (n = 3), Labrador Retriever (n = 2), and ten other breeds. In all dogs, infarcts were located to the rostral cerebellum and the territory of the rostral cerebellar artery (left n = 13, right n = 10, midline n = 1). Common neurological deficits were ataxia (n = 24), hypermetria (n = 12), contralateral head tilt (n = 13), nystagmus (n = 8), reduced postural reactions (n = 8), and decreased menace response (ipsilateral n = 4, bilateral n = 2). Four dogs had additional non-cerebellar brain infarcts.

Six dogs had a history suggestive of a possible transient ischemic attack.

Cerebellar ischemic stroke should be considered an important differential diagnosis in dogs with acute vestibular signs. A syndrome of canine cerebellar ischemic stroke caused by infarction in the territory supplied by the rostral cerebellar artery with neurological deficits resembling its human counterpart does seem to exist.

OTITIS MEDIA IN CATS: A RETROSPECTIVE STUDY OF 9 CASES. C. Dor[1], M J. Seurin[2], E. Viguier[3], C. Carozzo[3], C. Escriou[1]. [1]Department of Medicine of Small Animals, University of Veterinary Medicine, Lyon, France, [2]CIRMA, VetAgroSup, University of Veterinary Medicine, Lyon, France, [3]Department of Surgery of Small Animals, University of Veterinary Medicine, Lyon, France

Otitis media in cats are responsible for about 50% of peripheral and 15% of central vestibular syndrome when intracranial extension arose.

A retrospective study of 9 cats diagnosed with otitis media (8 cats with MRI and one with CT) was designed to describe their particularities: clinical presentation, intracranial extension, aetiology and outcome.

5 cats were less than 4 years and 4 more than 8 years (bimodal distribution), with no sex predisposition. Otitis media was bilateral in 7 cats. Vestibular syndrome associated with otitis was present in 6 cases (3 asymptomatic cases). An external otitis was noted only in two older cats. Concurrent infectious disease was found in 4 cats: 2 bronchopneumonia, 1 rhinitis, and 1 conjunctivitis. In 6 symptomatic cases, Pasteurella multocida (2), Staphylococcus sp. (2), and Mycoplasma were isolated. Intracranial extension (empyema affecting the cerebellum/brainstem) was observed in 4 cats. None cat was found FeLV/FIV positive but PCR for calicivirus, herpesvirus or mycoplasma from oropharyngeal swab were positive in 3 cats. Outcome was good in 4 of the 6 treated cats (flushing with video otoscopy (3) or trepanation (1) associated with antibiotics).

This study highlights as previously described the frequency of bilateral otitis media, and the frequency of their intracranial extension in cats. Aetiology of feline otitis seems to be rather oro-pharyngeal or pulmonary inflammation/infection than external otitis infrequent in this species. Exhaustive research of oro-pharyngeal or pulmonary infection/inflammation including PCR for main infectious feline disease (calicivirus, chlamydophyla, mycoplasma, herpes) should systematically be realised to determine their real incidence.

LONG TERM SURVIVAL ASSOCIATED WITH SUSPECTED CEREBROSPINAL FLUID PATHWAYS DISSEMINATION OF AN OLIGODENDROGLIOMA IN A DOG. M. Menchetti[1], L. Mandrioli[1], F. Rossi[2], P. Laganga[2], C. Bianco[1], A. Gallucci[1], C. Cantile[3], G. Gandini[1]. [1]Department of Veterinary Medical Sciences, Bologna University, Bologna, Italy, [2]Veterinary Oncologic Centre, Bologna, Italy, [3]Department of Veterinary Sciences, Pisa University, Italy

A six-year-old male Corso dog with a history of one week daily generalized clusters seizures and neurological abnormalities had a Magnetic Resonance Imaging (MRI) diagnosis of an intraaxial space-occupying lesion involving the right olfactory and frontal lobes compatible with a glioma. The dog was successfully treated with radiotherapy using a 4 weeks protocol of 50 Grey in 20 fractions. Marked improvement of the clinical signs lasted fourteen months, when the dog relapsed and a second MRI showed two space-occupying lesions at the level of the fourth ventricle and cervical spinal cord. Euthanasia was then performed for humane reasons. Post mortem examination showed a soft, gray and poorly demarcated mass expanding from the fourth ventricle with an infiltrative pattern consisting of clusters of prominent branching vessels and scattered astrocytes interspersed within the neoplastic

cells. Occasionally, glomeruloid pattern was detected. Remnants of the primary mass localization consisted of necrotic tissue surrounded by a glial scar. Neoplastic cells colonizing the ependymal surface of the fourth ventricle, piriform lobe, diencephalon and spinal leptomeninges were immunoreactive to Olig-2. GFAP-immunoreactive cells were interspersed among them. Definitive diagnosis was oligodendroglioma.

In humans, the spread of oligodendrogliomas along the cerebrospinal fluid pathways is a well known complication appearing long time after the initial diagnosis. To date, there are no similar reports in long-term survival dogs. In our case, despite the lack of initial histological diagnosis, it is likely that the oligodendroglioma had spread along the CSF pathways, suggesting that longer survival time may lead to glial neoplastic dissemination.

SELECTIVE VULNERABILITY OF INDIVIDUAL SPINAL NERVE ROOT SUB-SEGMENTS TO COMPRESSION RADICULOPATHY IN DOGS. U. Foitzik[1], T. Gödde[2], M. Rosati[1], F. Steffen[3], H. Volk[4], T. Flegel[5], R. Cappello[6], K. Matiasek[1]. [1]Section of Clinical and Comparative Neuropathology, Ludwig-Maximilians-University, Munich, Germany, [2]Neurology Referral Service, Tierarztpraxis Staufeneck, Piding, Germany, [3]Neurology Unit, Tierspital, Vetsuisse Faculty, University of Zurich, Switzerland, [4]Clinical Science and Services, Royal Veterinary College, London, UK, [5]Section of Neurology, Department of Small Animal Medicine, University of Leipzig, Leipzig, Germany, [6]North Downs Specialist Referrals, Bletchingley, UK

Individual parts of spinal nerve roots vary by their fibre composition, fascicularity, type of sheath, vascular supply, metabolic demands, attaching ligaments, range of motion and exposure to mechanical stress. These factors very likely render individual regions particularly susceptible to mechanical damage, which may explain the clinical presentation of entrapment syndromes.

In order to elucidate locoregional differences of reaction pattern and vulnerability, we mapped and compared histopathological changes across prae-ganglionic dorsal (PGDR) and ventral root (PGVR), dorsal root ganglion (DRG), subganglionic ventral root (SGVR) and common nerve root (CNR) of 41 dogs suffering from neuroforaminal stenosis (NFS). The samples derived from cervical, thoracic, lumbar and sacral areas and reflected entrapment and impingement radiculopathy occurring between entry zone and 'far out' area of the neuroforamen.

Altogether eleven histopathological determinants of degeneration, inflammation and tissue remodelling were obtained per sample and scored by three raters.

Across all investigated roots and 8/11 parameters, CNR segments were most severely lesioned, followed by DRG and PGDR. Ventral root segments were relatively spared, with PGVR being least affected. For all parameters, a decreasing dorsoventral gradient was identified ($p \leq 0.0001$). This and the proximodistal features were evident throughout all NFS subtypes. Affection of the individual sub-segments, furthermore, was independent of the primary compression site.

Longitudinal investigation of nerve root sub-segments identified convergent histopathological alterations that arise independent of spinal segment, type and level of nerve root compression. Lesions were most extensive in large diameter, pauci-fascicular areas and those with high metabolic demands, namely the CNR and DRG.

STRUCTURAL OR FUNCTIONAL? APPROACHING VASCULAR FACTORS IN LUMBOSACRAL COMPRESSION RADICULOPATHY IN DOGS. M. Menchetti[1,2], M. Rosati[1], T. Gödde[3], F. Steffen[4], U. Foitzik[1], H. Volk[5], T. Flegel[6], R. Cappello[7], G. Gandini[2], K. Matiasek[1]. [1]Section of Clinical and Comparative Neuropathology, Ludwig-Maximilians-University, Munich, Germany, [2]Department of Veterinary Medical Science, University of Bologna, Italy, [3]Neurology Referral Service, Tierarztpraxis Staufeneck, Piding, Germany, [4]Neurology Unit, Tierspital, Vetsuisse Faculty, University of Zurich, Switzerland, [5]Clinical Science and Services, Royal Veterinary College, London, UK, [6]Section of Neurology, Department of Small Animal Medicine, University of Leipzig, Leipzig, Germany, [7]North Downs Specialist Referrals, Bletchingley, UK

Neuroforaminal stenosis results in compression and deformation of nerve roots with possible consequences to their microcirculation. Malperfusion and impaired venous drainage have been associated with nerve root dysfunction in rodents. However, the evidence and clinical impact of ischaemia and changes to the vascular supply of compressed nerve roots remain to be documented.

To approach circulatory impairment, we evaluated the vascular density and expression of the vascular endothelial growth factor (VEGF) in DRG of dogs with chronic nerve root compression using brightfield microscopy, immunohistochemistry and digital image analysis. Altogether, 14 L7-DRG were evaluated from eight dogs suffering from painful lumbosacral neuroforaminal stenosis. The results were compared to age-/breed-matched non-compressed DRG. Histological examination identified thickening of arterial walls (7/14) and endothelial prominence (4/14) within the endoneurium as well as dilatation of capsular veins (2/14). On stereological analysis, there was not difference of vascular density in between DRG of affected dogs and control nerve roots ($p \geq 0.33$). All entrapped DRG, however, showed a significant increase of endothelial VEGF expression throughout the endoneurium ($p = 0.0002$) and perineurium ($p = 0.0003$). Furthermore, a focal increase of neuronal VEGF expression was seen in entrapped DRG ($p = 0.006$) with an emphasis on subcapsular areas.

Nerve root compression goes with morphological changes of entrapped blood vessels while the vascular density remains unchanged even though endothelial expression of the angiogenic factor VEGF is widely increased. Local increase of neuronal VEGF expression, on the other hand, indicates hypoxia and therefore supports the hypothesised circulatory impairment in entrapped nerve roots.

ASSESSMENT OF MENACE RESPONSE IN NEUROLOGICAL AND OPHTHALMOLOGICAL HEALTHY CATS. P. Quitt[1], S. Reese[2], A. Fischer[1], S. Bertram[1], C. Tauber[1], L. Matiasek[1]. [1]Section of Neurology, Centre for Clinical Veterinary Medicine, Ludwig-Maximilians-University, Munich, Germany, [2]Department of Veterinary Sciences, Ludwig-Maximilians-University, Munich, Germany

Assessment and interpretation of menace response (MeR) in cats can be challenging, and the prevalence of abnormal MeR in healthy cats is unknown. The aim of this study was to prospectively evaluate MeR in neurological and ophthalmological healthy cats.

Thirty-seven cats without history or clinical evidence of neurologic or ophthalmologic disease were included. Each was assessed in arbitrary order by two examiners: (A) standing behind the cat, (B) standing in front, and (C) standing in front while covering the opposite eye. MeR was scored from 1 (absent) to 5 (normal). Differences between left and right side were calculated (Wilcoxon-test). Modes of examination were compared and reproducibility of first and second examination assessed (kappa-analysis). Video-footage allowed self-reevaluation and evaluation of the other examiner. Inter-rater agreement for intra-observer and inter-observer variability was tested (kappa-analysis).

MeR was always elicited with at least one of the approaches. There was no significant difference between left and right eye ($p \geq 0.129$). Comparing examination modes, variants (A) and (B) achieved about 60% (44–46/74) normal MeR (score 5) in the first and second examination. With variant (C), 33.8% (25/74; first examination) and 45.9% (34/74; second examination) were normal. Exact score reproducibility of first and second examination is poor to fair ($k = 0.167$–0.36). Inter-rater agreement for intra-observer variability is good ($k = 0.611$–0.649) and for inter-observer variability moderate to good ($k = 0.548$–0.732).

Depending on examination mode, about 2/3 of healthy cats show reduced MeR independent of the examiner. This should be considered, when assessing a feline patient for neurologic disease.

EVALUATION OF COMPUTED TOMOGRAPHY FOR THE DIAGNOSIS OF SPINAL DISORDERS. A STUDY OF 136 CASES. A.M. Hernández-Guerra[1], P. Cava[2], J.M. Carillo[1]. [1]Department of Animal Medicine and Surgery, Universidad CEU-UCH, Valencia, Spain, [2]Technology Animal Center, Valencia, Spain

Computed Tomography is a well known diagnosis technique for spinal pathology in dogs. A retrospective study was designed to describe the findings of 136 dogs referred for CT examination of

the spine due to suspected myelopathy. All cases had neurological deficits compatible with the scanned area. The diagnoses were all based on CT findings previously described for that pathology. All dogs have a noncontrast computed tomography, followed by a CT-Myelography only if results of noncontract CT were inconclusive. A double slice CT Scanner was used; image acquisition varied according with weight and scanned area. Contrast was administered by lumbar o cistern magna puncture depending on the anatomic area studied. CT acquisition was performed throughout the region of neurolocalization.

All cases with findings compatible with disc herniation causing compressive myelopathy were grouped together regardless its cronicity. Dogs without obvious findings in ct scan presenting compatible clinical signs with fibrocartilaginous embolism (FCE) or traumatic disc disease (type III, or low volume/high velocity) were grouped together; all of these cases had a clinical progression of signs typical of either pathology. Disorders affecting cauda equina (from the sixth lumbar vertebra to lumbosacral junction) were grouped apart regardless its etiology and were termed ELS.

A total of 136 dogs were scanned, 64 females and 75 males. French bull dogs were the most frequently represented breed (35 dog, 26%) followed by crossbreed dogs (n:20, 15%), Dachshunds (n:10, 7%) and Yorkshire Terrier (n:8.6%). CT-Myelography was necessary in 39 dogs (29%). Compressive disc disease was the most common pathology (n:83, 61%); of these, only 16 (19%) needed myelography to ascertain diagnosis. As expected, in condrodystrophic breeds, myelography was less frequently needed for diagnosing compressive disc disease (only 2 of 52 cases, 4%). No condrodystrophic breed needed myelography 16 of 31 cases (52% of case). Other common diagnoses were traumatic disc disease/FCE (12 cases), fracture/traumatic luxation (7 cases), discoespondilitis (6 cases). In five cases (4%), CT scan was unable to find a diagnosis, although in one, owners did no consent to perform myelography for the hypothetical health risks.

In this study, CT scan has been able to diagnose most cases with spinal disorders. Compared to MRI, is unable to distinguish between FCE and traumatic disc disease. However in treatment is on both cases based on ohysioterapy. In most cases (such as condodystrophic breeds disc disease, fractures, and discoespondilitis), is able to reliably diagnose without large anaesthetic times with less finantial burden than MRI.

FELINE OSTEOINVASIVE MENINGIOMA WITH EXTRACRANIAL EXPANSION. T. von Klopmann[1], M. Konar[2], G. Delfs[1], K. Jores[1], S. Rupp[1], K. Matiasek[3]. [1]Small Animal Clinic Hofheim, Department of Neurology, Germany, [2]MR Support Service, Marina di Massa, Italy, [3]Section of Clinical and Comparative Neuropathology, Ludwig-Maximilians-University, Munich, Germany

Feline osteoinvasive meningioma is rarely described in the literature. Only one recent case report deals with a feline osteoinvasive meningioma with extracranial expansion (Karlie 2013).

In this case report we present an eleven-year-old male European shorthair cat with neurological deficits typical for a right-sided forebrain lesion. MRI of the brain under general anesthesia revealed a right-sided extraaxial mass in the parietal region. Laterodorsally it perforated the bone and extended beneath the temporal muscle. Medioventrally it compressed the parietal lobe and showed a cystic component invading the lateral ventricle. By a right-sided temporal approach the tumor was visualized and resected. Post-surgery MRI confirmed total removal of the tumor and showed significant decompression of the forebrain and intraventricular hemorrhage. Histopathology of the mass revealed an osteoinvasive meningothelial tumor with otherwise low-grade cytomorphology.

The patient recovered from anesthesia uneventfully and was discharged from our clinic three days later. Three weeks later, megavoltage external–beam Cobalt-60 (Co-60) radiation therapy was started. A total dosis of 45 Gy was applied in 15 daily fractions (3 Gy per fraction).

Neurologic recheck one year after first presentation revealed a reduced left sided menace response only. Control MRI of the brain showed a mildly enlarged lateral.

EPIDURAL NEOPLASTIC EMBOLISM AND DIFFUSE MONONUCLEAR LEPTOMENINGITIS IN A DOG. A.M. Wahle[1], K. Matiasek[2], M. Leipig[2], K. Jurina[1]. [1]Small Animal Clinic, Haar, Germany, [2]Section of Clinical and Comparative Neuropathology, Centre for Clinical Veterinary Medicine, Ludwig-Maximilians-University of Munich, Germany

A variety of inflammatory and neoplastic conditions are reported to affect the meninges in dogs. On magnet resonance images (MRI) they are commonly characterised by a variable degree of meningeal enhancement in postgadolinium T1-weighted images. However, achieving a final diagnosis can be challenging, even in combination with cerebrospinal fluid analysis, while a definite intravitam diagnosis may require a meningeal biopsy.

This case report describes MRI characteristics and histopathological features of a 11 year old male Large Munsterlander dog that showed evidence of meningeal disease on MRI.

The dog presented with lethargy and generalised ataxia. Neurological examination revealed a depressed level of consciousness and reduced proprioceptive placing in both pelvic limbs. Haematology, biochemistry, thoracic radiographs and abdominal ultrasound were unremarkable. Brain MRI revealed marked generalised meningeal enhancement in postgadolinium T1-weighted images, involving the sulcal and gyral subarachnoid spaces. Cerebrospinal fluid analysis showed mild mononuclear pleocytosis and increased protein levels. Temporal craniotomy was performed and biopsies of the temporal bone, meninges and superficial cortex were taken. Histopathological examination revealed moderate infiltrates of lymphocytes, histiocytes and plasma cells in the subarachnoidal space. Additionally, neoplastic epithelial cell emboli were identified in the cerebral and intraosseous venous sinuses, leading to the diagnoses of epidural neoplastic embolism and mixed mononuclear leptomeningitis. As the owner declined chemotherapy, the dog was treated with prednisolone and was in good condition one month after surgery.

This case report highlights the value of brain biopsies in veterinary neurology, since without biopsies, the epidural and intraosseous pathology would have been missed.

ASTROCYTIC REACTIONS TO BRAIN OEDEMA IN FELINE HYPERTENSIVE ANGIO-ENCEPHALOPATHY (FHAE). S. Bertram[1,2], L. Matiasek[1], M. Rosati[2], E. Wagner[2], H.A. Volk[3], A. Fischer[1], K. Matiasek[2]. [1]Neurology Section, Ludwig-Maximilians-University of Munich, Germany, [2]Clinical and Comparative Neuropathology, Centre for Clinical Veterinary Medicine, Ludwig-Maximilians-University of Munich, Germany, [3]Clinical Science and Services, Royal Veterinary College, London, UK

Brain oedema (BO) due to blood-brain-barrier disruption and microangiopathy is a major player in hypertensive encephalopathy. Apart from locoregional consequences for the extracellular homeostasis, BO contributes to intracranial pressure and is a broad marker for pervasive disturbance. Fluid accumulation, on the other hand, may be masked by aquaporin 4 (AQP4)-mediated astrocytic reabsorption.

It was the aim of this study, (1) to assess the true extent of BO in confirmed and suspected FHAE via AQP4-expression analysis, (2) to compare this expression to the astrocyte marker GFAP and (3) the histological evidence of BO. The study involved 14 FHAE-cases plus 15 cats with suspected FHAE, due to chronic renal disease, hyperthyreoidism, phaeochromocytoma and peripheral target organ damage.

AQP4 was markedly upregulated in subcortical white matter (WM) showing extracellular BO ($p \leq 0.05$) and in neocortex and caudate nucleus with FHAE-associated vasculopathic features ($p \leq 0.01$). AQP4 expression, in grey matter (GM), was mainly perivascular and seen without concurrent cellular oedema. AQP4-expression in FHAE was bilaminar in subpial and inner cortical layers with an emphasis on perisulcal cortex. Expression in WM was perivascular-protoplasmic and correlated to GFAP expression ($p \leq 0.01$), while in GM of cingulate, marginal and piriform gyri expression was inverse to GFAP. Neither AQP4 nor GFAP expression differed in between confirmed and suspected FHAE-cases of this study ($p \geq 0.095$).

AQP4 expression allows for estimation of reabsorbed BO in vascular encephalopathies and indicates the true extension of pervasive effects. Thus AQP4-expression facilitates identification of prelesional FHAE-stages in systemic hypertension.

IMMUNOHISTOCHEMICAL MAPPING OF NEUROPEPTIDE Y EXPRESSION IN EPILEPTIC CATS WITH HIPPOCAMPAL SCLEROSIS. M. Rosati[1], E. Wagner[1], A. Fischer[2], L. Matiasek[2], T. Flegel[3], K. Matiasek[1]. [1]Clinical and Comparative Neuropathology, Ludwig-Maximilians-University, Munich, Germany, [2]Neurology Section, Ludwig-Maximilians-University, Munich, Germany, [3]Section of Neurology, Department of Small Animal Medicine, University of Leipzig, Leipzig, Germany

Neuropeptide Y (NPY) is a widely distributed polypeptide in the brain and an interesting target for its role in epilepsy. Immunohistochemical studies in rodents and humans showed an increased NPY expression following chronic seizures and suggest an endogenous anticonvulsant effect. In order to approach the relevance of NPY in feline epilepsy we elucidated its expression in cats with hippocampal sclerosis (HS).

The immunohistochemical pattern of NPY expression was assessed in 46 feline hippocampi with seizure-associated HS and compared to non-neurologic controls. Analytical algorithms comprised topography of NPY positive cells within dentate gyrus and cornu ammonis (CA), its subcellular distribution (synaptic, dendritic, perikaryal) and staining intensity.

In epileptic hippocampi the synaptic NPY signal clearly was decreased in CA4, CA2 and CA1 ($p \leq 0.05$). On the contrary, the intensity of perikaryal and dendritic staining subsignificantly was increased in all CA-segments ($p \geq 0.06$). Independent of the CA-segment degenerating neurons consistently stained strongly NPY-positive ($p \leq 0.001$).

Depletion of immunopositive synaptic buttons, some of which deriving from the perforant path, may be explained by synaptic reserve exhaustion during the downstream inhibiton of Calcium influx and glutamate release exerted by NPY after seizures. One of HS hallmarks is represented by seizure induced neuronal death. Immunopositivity of degenerating neurons found in the present investigation may suggests ineffective neuroprotection by NPY against glutamate excitotoxicity and subsequent apoptotic pathways activation leading to neuronal loss. Prevention of neuronal death through enhancement of endogenous neuroprotective mechanisms should therefore be considered as an adjuvant therapy to conventional antiepileptic treatments.

GRANULE CELL DISPERSION IN CATS WITH AND WITHOUT EPILEPSY. E. Wagner[1], M. Rosati[1], A. Fischer[2], L. Matiasek[2], T. Flegel[3], K. Matiasek[1]. [1]Clinical and Comparative Neuropathology, Ludwig-Maximilians-University, Munich, Germany, [2]Neurology Section, Ludwig-Maximilians-University, Munich, Germany, [3]Section of Neurology, Department of Small Animal Medicine, University of Leipzig, Leipzig, Germany.

Dentate gyrus (DG) lesions frequently segregate with hippocampal sclerosis (HS) in people suffering from pharmacoresistant temporal lobe epilepsy (TLE). Apart from promotion of seizures, DG pathology is thought to have a special impact on comorbidities of epilepsy such as cognitive decline. Since HS also affects one third of epileptic cats, this study aimed to elucidate the occurrence of DG changes in feline epilepsy.

Hence, the DG of 103 epileptic cats with and without HS was re-evaluated for histoarchitectural abnormalities. The interneurononuclear distance (INND), the thickness of the DG and number of cell-layers were obtained via image analysis of non-curvature DG branches.

Compared to both control (Co) (mean 70.5 μm) and no-HS cats (mean 72.7 μm), HS-positive cases showed a significant increase in DG thickness (mean 90.5 μm; $p = 2.2 \times 10^{-5}$ for both). Absence of concurrent increase in cell layers (5.7 versus 6.3 (Co) and 5.3 (no-HS) and the mildly but significantly (p = 0–007) reduced density, compared to controls, (INND 21.5 μm versus 18.5 μm (Co) and 20.7 μm (no-HS)) indicate the possibility of an underlying granule cell dispersion (GCD). GCD, indeed, was identified in 87.5% HS-positive cats, 65.5% of no-HS epileptics but also 35.3% of age matched controls.

GCD is a very prevalent abnormality in epileptic and non-epileptic cats. However the degree of GD increase is associated with HS-positive epileptics. Its relevance for neurological abnormalities and in particular for progression of epilepsy in this species requires further investigations.

MR FEATURES OF THE FELINE HIPPOCAMPUS IN EPILEPTIC VERSUS NON-EPILEPTIC CATS. A BLINDED RETROSPECTIVE MULTIOBSERVER STUDY. A. Classen[1], S. Kneissl[2], J. Lang[3], A. Pakozdy[1]. [1]Clinic for Internal Medicine, University of Veterinary Medicine, Vienna, Austria, [2]Clinical Unit of Diagnostic Imaging, University of Veterinary Medicine, Vienna, Austria, [3]Division of Clinical Radiology, University of Bern, Bern, Switzerland

Temporal lobe signal (TLS) abnormalities detected by MRI are frequent findings in epileptic cats, however studies grading TLS alterations systematically do not exist. TLS alterations are highly variable in shape and size and of different severity, which may lead to diverse evaluations among specialists.

The aim of this study was (1) to find out, if there is a difference between the TLS of epileptic and non-epileptic cats and (2) whether there is a correlation between abnormal TLS and seizure semiology (temporal lobe seizures with orofacial automatisms (OA)) or other clinical findings among epileptic patients. We also investigated (3) the interobserver agreement among three specialists.

1.5 Tesla MR studies, including T1 pre- and postcontrast, T2 and FLAIR sequences, of 27 epileptic cats and 19 non-epileptic feline patients were evaluated regarding TLS alterations by three observers independently and blinded for clinical information, using a multiparametric scoring system.

No significant difference between the TLS of epileptic and non-epileptic cats was found; however, the TLS of epileptic cats with OA were scored significantly higher by all three observers, than those of both epileptic cats without OA and non-epileptic cats. The interobserver agreement was fair (κ=0.236 to κ=0.384).

Our findings imply that there is a strong correlation between the TLS abnormalities and the occurrence of temporal lobe seizures in cats. Furthermore, mild TLS alterations might be difficult to interpret and lead to different assessments among observers in contrast to severe changes, which are described similarly among specialists.

CORRELATION BETWEEN CLINICAL SIGNS AND MAGNETIC MOTOR EVOKED POTENTIALS AFTER TRANSCRANIAL MAGNETIC STIMULATION IN DOGS WITH INTERVERTEBRAL DISK HERNIATION. H.L. Amendt[1], N. Steffensen[1], U. Kordass[1], K. Rohn[2], A. Tipold[1], V.M. Stein[1]. [1]Department of Small Animal Medicine and Surgery, University of Veterinary Medicine Hannover, Hannover, Germany, [2]Department of Biometry, Epidemiology and Information Processing, University of Veterinary Medicine Hannover, Hannover, Germany

Transcranial Magnetic Stimulation (TMS) is a non-invasive method to determine the functional integrity of the spinal cord in dogs with thoracolumbar spinal cord disease. This prospective study (permission 33.14-42502-04-13/1277) was designed to prove the hypothesis that TMS findings reflect different severities of neurological deficits in dogs with intervertebral disk herniation (IVDH) and can document the functional motor recovery during therapy progression making it therefore a valuable tool for therapy-monitoring and prognostic evaluation.

Magnetic Motor Evoked Potentials (MMEP) were recorded after TMS (Magstim200², Carmarthenshire, UK) in the front legs from the Musculus extensor carpi radialis and in the hind legs from the Musculus tibialis cranialis in 50 dogs suffering from IVDH with different severity of neurological signs. Of these, 19/50 dogs showed a paraparesis that was further categorized according to Sharp and Wheeler (2005) in grade I (n = 6), grade II (n = 7) and grade III (n = 6) and 31/50 dogs displayed paraplegia with (grade IV, n = 14) and without (grade V, n = 17) deep pain sensation. 33/50 dogs underwent repeated TMS. The first examination was performed before treatment, the follow-up studies took place at the day of neurological improvement and three and six months after decompressive surgery. Ten healthy Beagle dogs served as controls.

MMEPs in the front legs could be generated in 50/50 dogs. A significant increase in onset latency ($p < 0.005$) and decrease in peak-to-peak amplitude ($p < 0.004$) was detected in the hind leg MMEPs of dogs suffering from IVDH (grades I-III) compared to the control dogs. No MMEPs were measurable in the hind legs of paraplegic dogs (grades IV-V). However, MMEPs with increased

onset latency and decreased peak-to-peak amplitude could be evaluated in hind limb muscles in 15/19 dogs that improved after therapy.

In conclusion, MMEPs were recordable after TMS and can reflect the severity of neurological deficits with grades I to III and therefore the functional impairment of the spinal cord in dogs with IVDH. TMS may serve as a prognostic tool in paraplegic dogs and as a potential tool for monitoring functional motor recovery in the course of treatment.