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THERMOGRAPHY AS AN ADDITIONAL METHOD IN SMALL ANIMAL IMAGING
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Introduction
Thermography, thermal imaging or thermal video is a type of infrared imaging. The aim of this paper is to present the advantages as well as the limits of thermography in small animal pathology.

Materials and Methods
Clinical cases from our practice were investigated as follows: osteo-articular problems by x-ray and tumors (according to their location) by x-ray, ultrasound scanning, cytology and blood analysis.1,2 All cases were also examined using an infrared camera. Thermographic cameras detect the infrared range of the electromagnetic spectrum roughly between 900-14000 nanometres or 0,9-14 micrometers, and create an image of the subject. The obtained images are processed according to a colour scale where a certain temperature corresponds with a certain colour e. g. the coldest point is pictured in black and the hottest one in red. In this study we used an infrared camera with cryogenic cooled bolometer.

Results: The images obtained by x-ray and ultrasound have a corresponding infrared image. Areas with increased blood supply e. g. tumors appear as hot spots; degenerative areas e. g. osteoarthroses appear as cold spots.

Conclusion
Thermography is a quick, non-invasive, handy imaging technique. This method is very effective in giving instant information in performing a differential diagnosis between inflammatory and degenerative lesion (osteoarthritis vs osteoarthritis). It also will detect abnormal heat in case of abnormal intraabdominal masses (hemangiosarcomas). It is also useful in evaluating healing of a fracture site, avoiding repeated exposures to radiations.

References

USE OF COMPUTED TOMOGRAPHY IN AN ATYPICAL CASE OF LUMBOSACRAL OSTEochondrosis
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A 10-year-old female Beagle was referred for progressive signs of lumbosacral pain and urinary incontinence since 3 months. Neurological examination revealed paraparesis, ataxia, mild muscle atrophy, proprioceptive deficits of the right pelvic limb and lumbosacral pain. Radiographs demonstrated a triangular radiolucent defect at the caudodorsal aspect of the seventh lumbar vertebra (L7) associated with a mineralized opacity in the vertebral canal. Computed tomography (CT) demonstrated a well delineated bone defect at the dorsal aspect of the caudal endplate of L7. A detached fragment was visible within the spinal canal displacing the cauda equina dorsally. Disc bulging was present at the lumbosacral intervertebral disc space. A dorsal laminectomy with removal of the detached bone fragment was performed. A postoperative CT scan demonstrated nearly complete removal of the osteochondrotic tissue. Although the dog recovered remarkable after surgery with resolution of pain and improvement in neurological status, a clinical relapse occurred after several weeks. The owners declined further diagnostic tests and the dog was euthanized. Histopathological examination of the removed tissue was in agreement with a diagnosis of osteochondrosis of L7.

Little information is available about lumbosacral osteochondrosis. It generally affects the sacral endplate and typically occurs in large breed dogs. It has been reported as an incidental finding and it has been suggested that clinical signs are more likely related to secondary degenerative changes rather than to the detached bone fragment itself. Little is known about the specific CT features of this disorder. This case demonstrates that lumbosacral osteochondrosis can be a clinical significant finding and should be considered as a cause of cauda equina compression in medium sized breeds. Further, CT seems very useful in the diagnosis and postsurgical evaluation of this disease.

Reference
Hepatic fibrosis/cirrhosis results from chronic liver injury during which hepatic stellate cells (HSC) proliferate and differentiate into matrix-producing cells. Liver progenitor cell (LPC) activation is seen in the majority of chronic human liver diseases. LPCs seem to be able to survive when mature hepatocytes are lost due to toxic damage or viral infections. Long-time follow-up of individuals allows describing the involved pathomechanisms. COMMD1 deficiency results in copper toxicosis (CT). The precise role of this protein is not clear, but evidence suggests involvement in cellular trafficking, functioning of ATP7B and NF-kB and HIF-1α signalling. Five COMMD1 -/- dogs were used for longitudinal follow-up. Liver biopsies (each 6 months up to 42 months) were used for HE-staining, reticulin stain, rubeanic acid, immunohistochemistry for a-SMA, Ki67 and K19, Q-RT-PCR on gene products involved in fibrogenesis and regeneration and Western Blotting for (non-)phosphorylated Smad2/3 and Stat3.

Time-dependent progressive fibrogenesis was indicated by increased a-SMA and reticulin staining. Increased HIF-1α mRNA expression was followed by increased mRNA expression of TGF-β1 and its receptors. However, the Smad2/3 pathway is not activated. During the progression of the hepatitis increased activity of CK19, but not Ki67 is seen. Although an increased mRNA expression of HGF and cMET is seen during a short period, the Stat3 pathway is increasing activated during aging.

Conclusions: To our knowledge this is the first longitudinal study on fibrogenesis in a large animal model. Results indicated increased expression of TGF-β1 related genes and markers of activated HSCs. HIF-1α and the presence of activated HSCs can be used as early indicators of fibrogenesis and utilized as therapeutic targets. Liver regeneration in CT is mainly derived from the LPC compartment rather than from the adult hepatocyte. This dog model is useful for studying the initial and progressed stages of liver fibrosis and the evaluation of antifibrotic therapies.

Efficiency of Porcine Small Intestinal Submucosa in Cornea Reconstruction Surgery: Sixty-Two Cases

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Introduction
Corneal defect in dogs and cats may have diverse origins: traumatic, infectious (e.g. melting ulcer) or surgical (e.g. feline corneal sequestration after deep keratectomy). Porcine small intestinal submucosa is a biomaterial containing an acellular collagen-based matrix which can be used for corneal repair. This biocompatible matrix is initially invaded by fibroblasts which are further replaced by stromal cells. The efficiency of porcine small intestinal submucosa in cornea reconstruction surgery was evaluated in sixty-two canine and feline cases performed between May 2005 and September 2008. The indications were categorised among deep melting ulcer (thirty-two cases), important traumatic corneal defect (eight cases) and reconstruction after deep keratectomy (twenty-two cases).

Material and Methods
The defects was filled by microsurgical grafting of porcine small intestinal submucosa. A microsurgical suture (absorbable suture 9/0, polyglactin 910) firmly joined biomaterial and adjacent cornea. The cornea is then covered with the nictitating membrane. The animals were examined three, six and twelve weeks after surgery.

Results
The nictitating membrane was detached after three weeks. In every case, corneal vascularisation was observed, the biomaterial implant was well integrated into the cornea and the epithelium was fully reconstituted. Corneal recovery with adequate corneal transparency was achieved without complication in each case.

Conclusions
Corneal grafting of porcine small intestinal submucosa enabled restoration of corneal transparency. It is an excellent alternative to conventional conjunctival graft.

References
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PARTIAL RESURFACING OF THE DISTAL FEMORAL CARTILAGE WITH STEM CELL-SEEDED POLY-VINYL-ALCOHOL (PVA) SCAFFOLD
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The field of tissue engineering has emerged over the past decades to improve the treatments for tissue and organ failure. The objective of this study was to evaluate the biological compatibility of differentiated stem cells embedded in poly-vinyl-alcohol (PVA) scaffolds for repair of distal femoral cartilage defect.

Twelve adult male New Zealand white rabbits were used which were divided into two groups (I, II), six rabbits each. Mesenchymal stem cells (MSCs) were isolated from humerus bone marrow of group I rabbits and were cultured and differentiated on PVA scaffolds to chondrocytes. Scanning Electron Microscopy (SEM) showed well distribution of the cells inside the scaffold. A 4 mm diameter full thickness cartilage defect was created on the central region of bilateral distal femoral joint surface (patellar groove) in all rabbits. In group I the defects were covered with autologous MSCs-seeded scaffolds; whereas the group II rabbits were left without any treatment as control ones. Three rabbits from each group were euthanized after one month and the remaining at 3 months. Histopathologic evaluation of defects was performed with H&E and Trichrome staining.

The findings showed that in group I the defects were filled with smooth, shiny white tissue macroscopically at three months after transplantation. The defects of this group were almost completely filled with hyaline cartilage histopathologically. Despite much connective tissue formed in defect area, there was no evidence of chondrocytes in the control group. There was a significant difference in histopathological grading score between experimental and control groups. The results indicated there is positive possibility for partial resurfacing of cartilage defect using stem cell-seeded PVA scaffolds.

Reference

ECHOCARDIOGRAPH EVIDENCE OF MODERATOR BANDS IN MAINE COON CATS; POSSIBLE CONSEQUENCES FOR BREED SELECTION
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Introduction
The appearance of moderator bands has been described in literature as a non-frequent finding in cats. Several studies report effects of moderator bands on the cardiac diastolic capacity, impulse-conducting system and circulatory kinetics.1 No reports on the prevalence and appearance of moderator bands in this species are known to the authors.

Materials and methods
In three months we found different types of moderator bands in the left ventricle of two European shorthairs, two British shorthairs and five Maine Coons during echocardiograph screening for Hypertrophic Cardiomyopathy (HCM). Besides the presence of moderator bands there was no evidence of a negative effect on the heart function in the examined cats.

Results
One Maine Coon cat, imported into the Netherlands from a Danish breeding line, showed a string from the ventricular septum to the ventricular free wall in the lower part of the left ventricle. In this breeding line three relatives from two generations showed the same type of moderator bands as well.

Conclusion
Maine Coons are routinely examined on the presence of HCM. A new phenomenon is the presence of moderator bands with high incidence in a Danish breeding line of

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Maine Coons. Discussed is the need for new protocols to further standardize the echocardiograph examination in cats to ensure adequate breed selection.

Preference

**FOOTSCAN EVALUATION OF CANINE HINDLIMB LAMENESS**
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Introduction
Pressure plates could provide a practical alternative to force plates by recording simultaneous, consecutive and collateral foot strikes in a single pass over the walkway, requiring fewer trials. This study focuses on the association between visual grading of canine hindlimb lameness and symmetry ratios (Sym) of Peak Vertical Pressure (PVP), Peak Vertical Force (PVF) and Vertical Impulse (VI) under clinical conditions.

Materials and Methods
Fourteen client-owned dogs with unilateral lameness attributable to cranial cruciate ligament disease were walked over the Footscan 3D 2m-system (RsScan International, Belgium) to determine PVP, PVF and VI of both hindlimbs. Simultaneously, lameness was scored visually using a numerical rating scale from 0 to 5 with 0.5 increments. A trial was considered valid if whole footprints of all four limbs were recorded and if velocity was within a preset range. The mean of 5 valid measurements was used to calculate symmetry (lowest/highest value x 100%). Linear regression and Pearson’s correlation coefficient were used to evaluate the association between the visual score and limb-load symmetry ratios (α=0.05).

Results
Correlation between visual grading and both SymPVF and SymVI was very strong (r=-0.874 and -0.886; P<0.0001) while correlation with SymPVP was moderate (r=-0.678; P<0.01). SymPVF and SymVI showed less variability and a better ‘goodness of fit’ to the regression curves compared to SymPVP (r²= 0.7634, 0.7850 and 0.4597).

Conclusions
SymPVF and SymVI are the parameters of choice for further research with the Footscan system as a clinical tool for lameness evaluation in dogs. In contrast, SymPVP most likely should not be used for this purpose. As pressure is force integrated over contact area, dogs can ‘compensate’ the decreased loading of a lame limb by a concurrent decrease in paw contact area of the affected limb and vice versa in the contralateral limb, resulting in a misleadingly high SymPVP.

**AUTOCHTONAL DIROFILARIA REPENS IN A DOG IN THE NETHERLANDS**
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Introduction
In November 2008 a 1.5 year old female English Bulldog was presented with a painful skin lump of 1 cm diameter on her left leg. The nodule contained a few white small (ca. 4 mm) worms of ca. 10 cm length. The dog had never been abroad, but was taken for camping 6 months earlier in an area in the middle of The Netherlands (Urk) where many mosquitoes were present.

Results
Microscopic examination showed nematodes filled with oval eggs with moving larvae. Based on the morphologic characters the diagnosis was Dirofilaria repens. This was confirmed by PCR of the worm. Microfilaria were absent in the blood.

Discussion
D. repens is a zoonotic filarial of the subcutaneous tissue of carnivores (dogs, cats, foxes) in Southern and Eastern Europe, Africa and Asia. Another subgenus is D. immitis (heartworm). D. repens is ovoviviparous and the larvae are transferred as microfilaria through blood-sucking mosquitoes. The disease can cause cutaneous disorders, such as pruritus, dermal swelling and subcutaneous nodules containing the parasites. The prepatent period in the dog is 180 to 240 days. Our patient probably acquired the infection during camping. Adult worms can be removed by surgical excision. To prevent infection, mosquitoes should be controlled and dogs treated with...
anti-filarial anthelminitics, such as moxidectin, selamectin, and milbemycin.

**Conclusion**
The number of zoonotic D. repens infections has increased in the last few decades and the infection may be considered as an emerging zoonosis. The infection is spreading probably as a consequence of climatic changes, together with an increase in the movement of cats and dogs across Europe. This is the first autochtonal case of D. repens infection in The Netherlands, which may be a warning for other North European countries that the infection may be spreading in this direction.

**INCIDENCE OF CONTAMINATION WITH TOXOPLASMA GONDII IN CATS AND THEIR OWNERS**

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Toxoplasma gondii is a species of parasitic protozoa in the genus Toxoplasma. The definitive host of T. gondii is the cat, but the parasite can be carried by the vast majority of warm-blooded animals, including humans.

150 blood samples were collected from indoor cats during 2007 to test for IgM, IgG and antigen serum titer. While collecting the samples, we asked the owners to test their blood to determine if they were affected too. Follow-up samples were taken three weeks later.

Blood samples of cats were tested with toxoplasma rapid test kits and 8 cases were positive (5%). Among the owners, IgM titers indicated acute infection in 15 cases (10%) and chronic infections with high IgG titers were present in 21 cases (14%).

It was found that 37 owners allowed their cats to go outside on a daily basis so they couldn’t control their cat’s nutrition. All of the affected cases were found in this group. Mild normocytic normochromic anemia was demonstrated in 5 cats.

In 3 of these cats, IgM titers were high, which indicated acute disease without clinical signs. Clindamycin was used therapeutically for two weeks. After two weeks of treatment IgM, titers were normal. All of the 15 owners which had high IgM were treated by their physicians.

To prevent contamination with toxoplasma from indoor cats, you should not feed cats with raw meat and not allow them to go outside. If a cat gets outdoors, you should wash your hands after any contact. Promote the use of the cat litter and change it daily. Deworming should be executed every 3 months.

**CTTA: CIRCULAR TIBIAL TUBEROSITY ADVANCEMENT WITH FIXIN FIXATORS**

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**Introduction**
The circular Tibial Tuberosity Advancement (cTTA) is a procedure developed for treatment and dynamic stabilization of cranial cruciate ligament (CCL) deficient stifles in dogs. The cTTA is a technique which integrates the principles and features of a Tibial Tuberosity Advancement (TTA) with the advantage of compression and increased stability at the osteotomy site. The objective is to describe the surgical technique and report on the early results and complications associated with the cTTA procedure.

**Materials and Methods**
In a prospective clinical study, 18 consecutive client-owned dogs with 3 bilateral and 15 unilateral CCL tears were treated with the cTTA procedure. A craniomedial approach to the stifle was used and a radial osteotomy was performed along the tibial tuberosity. The tuberosity was rotated cranially and proximally along the tibia based on pre-operative measurements. The osteotomy was placed in compression and secured with a FIXIN locking plate. Pre-operative and post-operative measurements of the angle between patellar ligament-tibial plateau slope were compared to assess if adequate correction and stifle stabilization was achieved.

**Results**
All the dogs had improved after surgery. Mean time to radiographic healing of the osteotomy site was 8 weeks. Complications occurred in 3 of the 21 stifles (14%) including a tibial fracture distal to the plate, a combined distal tibia and tibial tuberosity fracture, and TT avulsion. All dogs with complications healed uneventfully after surgical revision.

**Discussion/Conclusion**
The cTTA is an alternative to the traditional TTA procedure and provides dynamic stabilization of CCL deficient stifles with acceptable complication rates and a good to excellent clinical outcome.