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ABSTRACTS OF SELECTED REPORTS

Preliminary Assessment of the Effect of Diet and L-Carnitine Supplementation on Lipoma Size and Bodyweight in Budgerigars (*Melopsittacus undulatus*). De Voe, R. S., M. Trogdon, and K. Flammer. J. Avian Med. Surg. (2004) 18: 12–18.

A study was conducted on budgerigars (*Melopsittacus undulatus*) to determine if diet changes and supplementation with L-carnitine would have an effect on lipoma size. Seventeen adult male and female budgerigars with lipomas and 15 control budgerigars without lipomas were studied. The lipoma budgerigars (LB) and the nonlipoma budgerigars (NLB) were divided into different diet groups: 1) 100% commercial budgerigar seed mixture, 2) commercial low-fat pelleted diet, and 3) the same pelleted diet with L-carnitine supplementation at an ideal level of 1,000 mg L-carnitine/kg of feed. A radioenzymatic method determined that the supplemented diets contained 632.9, 829.5, and 1,021.1 mg/kg of L-carnitine. Due to poor palatability of the pelleted diet, half tablespoon of seed mixture was added per quarter cup of pelleted feed. The addition of this seed to increase palatability later complicated analysis, since there was no way to determine the amount of seed, which was ingested by the birds receiving the primarily pelleted diet. The study length was 102 days, and packed cell volume and total solids did not change during this time. Baseline weight and cervical lipoma measurements were recorded at 2–4 wk intervals. Weight gain of >10% occurred in four of six NLB and in six of six LB on L-carnitine supplement pellets. The L-carnitine possibly enhanced fat metabolism, with mobilization of adipose tissue. There were no obvious adverse affects seen with consumption of an L-carnitine–supplemented diet. There was no change in lipoma size or animal's body weight by dietary change alone, and since supplementation with L-carnitine resulted in decreased lipoma size, L-carnitine may be a useful adjunct to medical management of lipomas in budgerigars.

Physiologic Responses of Amazon Parrots (*Amazona* Species) to Manual Restraint. Greenacre, C. B., and A. L. Lusby. J. Avian Med. Surg. (2004) 18: 19–22.

The purpose of the study was to determine changes in heart rate, respiratory rate, and cloacal body temperature during the stress of manual restraint for six adult blue-fronted (*Amazona aestiva*) and 11 adult Hispaniolan Amazon (*Amazona ventralis*) parrots. The thermistor thermometer had an upper limit of 120.6°F and was found to be 0.05°C higher than a mercury thermometer, therefore 0.05°C was subtracted from each study temperature reading. The values were recorded every minute for a total of 15 min. Results showed that mean cloacal temperature increased from 106.9 ± 1.7°F to 111.1 ± 1.8°F over 15 min but that a significant temperature increase occurred within the first 4 min of restraint. The mean respiratory rate increased to 252 ± 54 breaths/min over 15 min, which was seven times higher than the mean resting respiratory rate. The Hispaniolan Amazon parrots had higher respiratory rates and seemed to resist restraint more than the blue-fronted Amazon parrots. The increased respiratory rate is attributed to sympathetic stress stimulation, as well as to dissipation of heat by panting. The mean heart rate of this study, 383 ± 67 beats/min did not change significantly during the restraint, although this value was higher than previously published Amazon parrot heart rates. This study provides clinically useful information regarding manual restraint in Amazon parrots. Ideally, restraint time should be limited and animals should be monitored closely.

Avian Mycobacteriosis in Free-living Raptors in California. Tell, L. A., S. T. Ferrell, and P. M. Gibbons. J. Avian Med. Surg. (2004) 18: 30–40.

Avian mycobacteriosis has a worldwide distribution and was previously thought to be rare in raptors; this manuscript describes six cases of mycobacteriosis in free-living raptors, which presented to the University of California–Davis, Veterinary Medical Teaching Hospital. The raptors were red-tailed hawks ($n = 4$), red-shouldered hawk ($n = 1$), and a great horned owl ($n = 1$). The birds were found on the ground, unable to fly, in poor body condition, and dehydrated. Two of the birds had abnormal coelomic palpation with coelomic distension, swelling, or a discrete mass. In general, complete blood counts revealed anemia, often nonregenerative, and leukocytosis characterized by heterophilia, lymphopenia, monocytosis, and eosinophilia. Chemistry results, besides hypoproteinemia, were not of diagnostic value. Useful antemortem diagnostic tests included radiographs, coelomic ultrasound, and coelomoscopy. Magnetic resonance imaging (MRI) was performed in three birds (one antemortem and two postmortem) and accurately identified all the lesions found at necropsy. However, MRI is not widely available or economically feasible. Two birds had liver biopsies performed, and both samples were positive for acid-fast bacilli; only one of these birds had an acid-fast positive smear. Postmortem exams revealed yellow-white to tan caseous nodules ranging from 1 mm to 3 cm throughout the coelomic organs. Histopathology confirmed granulomatous inflammation with intralesional acid-fast bacilli in numerous organs, most notably the liver ($n = 5$), lung–bone marrow ($n = 4$), and spleen–gastrointestinal tract–air sacs ($n = 3$). The finding of granulomatous myelitis (bone marrow) appears to be a potential feature of mycobacteriosis in raptors. Likewise, signs of central nervous system (CNS) dysfunction could be attributed to mycobacteria granulomatous lesions in the CNS. Although detection of acid-fast bacilli in biopsy or necropsy specimens allows a presumptive diagnosis of mycobacteriosis, definitive diagnosis requires positive mycobacterial culture or polymerase chain reaction (PCR). During this study, four mycobacterial cultures were submitted from grossly ab-

normal tissue and all yielded positive cultures; three of these cases had positive PCR results for *Mycobacterium avium* complex.

Research on the Anatomy and Pathology of the Psittacine Heart. Krautwald-Junghanns, M. E., S. Braun, M. Pees, J. Straub, and H. P. Valerius. J. Avian Med. Surg. (2004) 18: 2–11.

This study consisted of two portions: first, a cardiac anatomy and morphometric investigation of 14 budgerigars (*Melopsittacus undulates*) and five Australian king parrots (*Alisterus scapularis*), which were euthanized due to feather abnormalities and second, an investigation of the gross and histologic pathology of 107 caged psittacine hearts. During the anatomy study, multiple measurements were taken, including heart shape, size, weight, wall thickness, and length. Some helpful gross anatomical findings were that the right ventricle wrapped around at least one-half of the left ventricle. The left ventricular free wall and interventricular septum had increased thickness toward the center and became thinner toward the cardiac apex. The aorta separated the brachiocephalic arteries and then curved toward the right dorsal abdominal cavity. Hyaline cartilage was found at the base of the aorta. Because it is often difficult to compare birds of different sizes, cardiac measurements were evaluated in relation to the length of the sternum since this length was determined to be less variable than body mass. In healthy birds from this study, the mean thickness of the apical myocardium of the left ventricle was between 2.3 and 2.85% of the sternal length. This information is presented so that the presence of cardiac abnormalities can be more easily determined at necropsy for these species. The 107 necropsy cases were from a wide variety of psittacine species and were not preselected for heart disease. In 36% of birds, there were macroscopic changes in the heart, major vessels, or both. In 99% of birds examined, there were at least low-grade histologic changes in the heart, major vessels, or both. Inflammatory mixed cellular infiltrates of the myocardium (lipomatis cordis) was present in 49% of birds. Congestive heart failure, atherosclerosis, and calcification of major vessels were also observed. In some cases, atherosclerosis was not visible grossly but present in major vessels histologically. The authors suspect that a high percentage of the pathologic cardiac changes were related to lack of exercise, obesity, and nutritional deficiencies.

Comparison of Functional Aspects of the Coagulation Cascade in Human and Sea Turtle Plasmas. Soslau, G., B. Wallace, C. Vicente, S. J. Goldenberg, T. Tupis, J. Spotilac, R. George, F. Paladino, B. Whitaker, G. Violetta, and R. Piedrah. Comp Biochem Physiol B (2004) 138: 399–406.

This report demonstrates that five species of turtles possess only one branch of the mammalian coagulation pathway, the extrinsic pathway. Mixing studies of turtle plasmas with human factor–deficient plasmas indicate that the intrinsic pathway factors VIII and IX are present in turtle plasma. These two factors may play a significant role in supporting the extrinsic pathway by feedback loops. The intrinsic factors, XI and XII, are not detected, which would account for the inability of reagents to induce coagulation via the intrinsic pathway in vitro. The analysis of two turtle factors, factor II (prothrombin) and factor X, demonstrates that they are antigenically–functionally similar to the corresponding human factors. The turtle coagulation pathway responds differentially to both pH and temperature relative to each turtle species and relative to human samples. Sea turtles are often exposed to rapidly altered environmental conditions during diving periods, which may reduce their blood pH during prolonged hypoxic dives. The coagulation time (prothrombin time) increases as the temperature decreases between 37 and 15°C. The increased time follows a linear relationship, with similar slopes for loggerhead, Kemps ridley, and hawksbill turtles as well as for human samples. Leatherback turtle samples show a dramatic nonlinear increased time below 23°C, and green turtle sample responses were similar but less dramatic. All samples also showed increased prothrombin times as the pH decreased from 7.8 to 6.4, except for three turtle species. The prothrombin times decreased, to varying extents, in a linear fashion relative to reduced pH with the rate of change greatest in leatherbacks $>$ green $\gg$ loggerhead turtles. All studies were conducted with reagents developed for human samples.

Coronavirus Infection of Spotted Hyenas in the Serengeti Ecosystem. East, M. L., K. Moestl, V. Benetka, C. Pitra, O. P. Honer, B. Wachter, and H. Hofer. Vet. Microbiol. (2004). 102: 1–9.

Sera from 38 free-ranging spotted hyenas (*Crocuta crocuta*) in the Serengeti ecosystem, Tanzania, were screened for exposure to coronavirus of antigenic group 1. An immunofluorescence assay indicated high levels of exposure to coronavirus among Serengeti hyenas: 95% when considering sera with titer levels of $\geq$1:10 and 74% when considering sera with titer levels of $\geq$1:40. Cubs had generally lower mean titer levels than adults. Exposure among Serengeti hyenas to coronavirus was also confirmed by a serum neutralization assay and an ELISA. Application of RT-PCR to 27 fecal samples revealed viral RNA in three samples (11%). All three positive fecal samples were from the 15 juvenile animals ($<$24 mo of age) sampled, and none from the 12 adults sampled. No viral RNA was detected in tissue samples (lymph node, intestine, lung) from 11 individuals. Sequencing of two amplified products from the S protien gene of a positive sample revealed the presence of coronavirus-specific RNA with a sequence homology to canine coronavirus of 76 and 78% and to feline coronavirus type II of 80 and 84%, respectively. Estimation of the phylogenetic relationship among coronavirus isolates indicated considerable divergence of the hyena variant from those in European, American, and Japanese domestic cats and dogs. From long-term observations of several hundred known individuals, the only clinical sign in hyenas consistent with those described for coronavirus

infections in dogs or cats was diarrhea. There was no evidence that coronavirus infection in hyenas caused clinical signs similar to feline infectious peritonitis in domestic cats or was a direct cause of mortality in hyenas. To our knowledge, this is the first report of coronavirus infection in Hyaenidae.

Herpesvirus-like Particles in the Skin of a Saltwater Crocodile (*Crocodylus porosus*). McCowan, C., C. Shepherdley, and R. F. Slocombe. Aust. Vet. J. (2004). 82: 375–377.

Skin lesions were seen on the limbs and ventrum of 20 farm-raised saltwater crocodiles. Poxvirus was seen by light microscopy and electron microscopy in the majority of animals. One animal showed an area of necrosis that contained amphophilic intranuclear inclusions and no poxvirus-like inclusions. Electron microscopy revealed the presence of particles consistent with a herpesvirus in this animal.

Detection of Mycobacteria and Chlamydiae in Granulomatous Inflammation of Reptiles: A Retrospective Study. Soldati, G., Z. H. Lu, L. Vaughan, A. Polkinghorne, D. R. Zimmerman, J. B. Huder, and A. Pospischil. Vet. Pathol. (2004). 41: 388–397.

A retrospective study on reptile tissues presenting with granulomatous inflammation was performed to detect the possible presence of mycobacteria and chlamydiae in these lesions. Ninety cases including 48 snakes, 27 chelonians, and 15 lizards were selected. Mycobacteria were detected by Ziehl–Neelsen (ZN) staining and a broad-range polymerase chain reaction (PCR) followed by DNA sequencing. To detect chlamydiae, immunohistochemistry with monoclonal antibodies against chlamydial lipopolysaccharide (LPS) and a Chlamydiales order-specific PCR and sequencing were applied. Acid-fast bacilli were found in 14 cases (15.6%) by ZN staining and in 23 cases (25.6%) by PCR. Sequence analysis revealed the presence of Mycobacteria other than *Mycobacterium tuberculosis* complex (MOTT). Chlamydial LPS antigen was observed within granulomas from five samples (5.6%), whereas the PCR screen revealed 58 positive cases (64.4%). Of these, nine cases (10%) showed 98–99% similarity to *Chlamydophila* (*Cp.*) *pneumoniae* and 49 cases (54.4%) displayed a high similarity (88–97%) to the newly described ''Chlamydia-like'' microorganisms *Parachlamydia acanthamoeba* and *Simkania negevensis*. Results from this study confirm, on the one hand, that MOTT is probably the most important infectious etiology for granulomatous inflammation in reptiles. On the other hand, they indicate that chlamydia infects reptiles and that *Cp. pneumoniae* should be considered an etiological agent of granulomatous lesions of reptiles. Because both MOTT and *Cp. pneumoniae* are human pathogens, the potential of zoonotic transmission from reptiles to humans has to be considered. In contrast, the significance of Chlamydia-like isolates remains completely open, and further studies are needed to evaluate their role.

Severe Hypoxaemia in Field-Anaesthetised White Rhinoceros (*Ceratotherium simum*) and Effects of Using Tracheal Insufflation of Oxygen. Bush, M., J. P. Raath, D. Grobler, and L. Klein. J. S. Afr. Vet. Assoc. (2004) 75: 79–84.

White rhinoceros anesthetized with etorphine and azaperone combination develop adverse physiological changes including hypoxia, hypercapnia, acidosis, tachycardia, and hypertension. These changes are more marked in field-anesthetized rhinoceros. This study was designed to develop a technique to improve safety for field-anesthetized white rhinoceros by tracheal intubation and oxygen insufflation. Twenty-five free-ranging white rhinoceros were anesthetized with an etorphine and azaperone combination for translocation or placing microchips in their horns. Once anesthetized, the rhinoceros were monitored prior to crating for transportation or microchip placement. Physiological measurements included heart and respiratory rate, blood pressure, and arterial blood gas samples. Eighteen rhinoceros were intubated using an equine nasogastric tube passed nasally into the trachea and monitored before and after tracheal insufflation with oxygen. Seven rhinoceros were not intubated or insufflated with oxygen and served as controls. All anesthetized rhinoceros were initially hypoxemic (percentage arterial hemoglobin oxygen saturation ($\%O_2$ Sa) = 49% ± 16 (mean ± SD) and PaO_2 = 4.666 ± 1.200 kPa (35 ± 9 mm Hg), hypercapnic ($PaCO_2$ = 8.265 ± 1.600 kPa [62 ± 12 mm Hg]) and acidemic (pHa = 7.171 ± 0.073). Base excess was −6.7 + 3.9 mmol/L, indicating a mild to moderate metabolic acidosis. The rhinoceros were also hypertensive (systolic blood pressure = 21.861 + 5.465 kPa [164 ± 41 mm Hg]) and tachycardic (HR = 107 ± 31/min). Following nasal tracheal intubation and insufflation, the $\%O_2$ Sa and PaO_2 increased while blood pHa and $PaCO_2$ remained unchanged. Tracheal intubation via the nose is not difficult, and when oxygen is insufflated, the PaO_2 and the $\%O_2$ Sa increases, markedly improving the safety of anesthesia, but this technique does not correct the hypercapnia or acidosis. After regaining their feet following reversal of the anesthesia, the animals' blood gas values return toward normality.