

Saturday Afternoon Histopathology Conference
44th Annual Meeting
American Association of Veterinary Laboratory Diagnosticians
Saturday, October 3, 2001
3:30 – 6:00 PM
Nigerian Room



3:30 Welcome - Opening Remarks

Co-chairs: Drs. Donal O'Toole and Bill Layton

Part I of Presentations – Dr. D. O'Toole – Moderator

1. DC Bolin, JM Donahue, MM Sebastian. [Bacterial funisitis in premature thoroughbred foal.](#) Slide #25233-B-4.
2. KL Bailey, MJ Kinsel, KA Connell. [Multiple cutaneous leiomas in the perineum of a horse.](#) Slide #01-13169.
3. PG Moisan, ML Porterfield, SD Rushton. [Protozoal colitis in three horses.](#) #1 Rollins Lab.
4. JA Ramos-Vara. [Subcutaneous lymphosarcoma in a horse.](#) #16481-2.
5. GL Watson. [Granulomatous dermatitis in a horse caused by Curvularia spp.](#) No number on slide (#2431838)
6. P Parnell. [Purulent interstitial pneumonia with syncytia in an equine fetus.](#) #01-12900.
7. M Kiupel, RK Maes [Cervid interstitial pneumonia with syncytia.](#) Kiupel-2.
8. A Ellis, E Howerth, D Stallknecht, D Mead, N Gottdenker. [Myocarditis due to West Nile virus in a common grackle](#) DES 261-01-4
9. MC Rebelatto. [Neural larva migrans in a gray squirrel.](#) MO10699-01 MR.
10. J Roberts, RC Giles, M Cibull, KB Poonacha. [Malignant intestinal carcinoid in a rhinoceros viper \(Bitis gabonica rhinoceros\).](#) 32068-G-13.
11. MM Sebastian, RC Giles KB, Poonacha. [Malignant schwannoma in a cat.](#) 34566-K.
12. JA Ramos-Vara, C Franklin. [Bronchitis and bronchiolitis in a cat associated with CAR bacillus-like organisms and intraepithelial globule leukocytes.](#) #14184 – A.

Part II of Presentations – Dr. W. Layton – Moderator

13. MA Miller, JA Ramos-Vara. [Cutaneous melanoma with cartilaginous differentiation in a dog.](#) 24506-00.
14. SD Rushton, PG Moisan. [Thromboembolic encephalitis and myocarditis secondary to Haemophilus somnus septicemia.](#) Rollins Lab –2 (original #B-01 33224).
15. AL Hattel, L Boger, L Hubler [Enterococcolitis in rabbits associated with Lawsonia intracellularis \(Campylobacter\)-like bacteria.](#) 2130142.
16. SD Fitzgerald. [Pulmonary Echinococcus granulosus in a wild white-tailed deer.](#) Michigan DL–1 (original #2357434).
17. R Bildfell. [Canine eosinophilic granulomatosis.](#) #00-10441.
18. M Kiupel, EB Janovitz, JA Ramos-Vara [Choroid plexus papilloma in a Scottish Highland cow.](#) Kiupel-1
19. HL Shivaprasad. [Hepatitis associated with Clostridium difficile in an ostrich chick.](#) F93-2629
20. HL Shivaprasad. [Inclusion body hepatitis associated with adenovirus group I in chickens.](#) F01-2431.
21. LR Carter, TP Mullaney. [Disseminated Mycobacterium bovis infection in a cat.](#) TB-3 (original #2236249 2).
22. K Sakamoto, MKiupel, EB Janovitz. [Tularemia in a beaver.](#) MO-11142-98 KS
23. SD Fitzgerald. [Segmental hemorrhagic and necrotizing jejunitis in a dairy cow.](#) Michigan DL (original #2416648-2.)

Closing remarks - Dr. Layton

25233-B-4

Bacterial Funisitis in a Premature Thoroughbred Foal David C Bolin DVM PhD, J. M. Donahue PhD, Manu M Sebastian DVM MS

Livestock Disease Diagnostic Center Department of Veterinary Science, University of Kentucky, 1429 Newtown Pike, Lexington, KY 40511

A newborn Thoroughbred colt was submitted dead to the University of Kentucky, Livestock Disease Diagnostic Center in Lexington, KY. The foal was born severely depressed with weak respirations and three weeks premature. The presentation and delivery were normal. There was no udder development in the mare.

At necropsy, the amnionic segment of the umbilical cord was mottled red, markedly thickened and edematous and covered with a thin sheet of fibrin. Lungs were partially inflated with multiple variably sized, red, firm areas of pneumonia.

A *Streptococcus* species was cultured in large and moderate numbers from placenta and lung, respectively. Fluorescent antibody and serologic tests for leptospirosis were negative. No nitrate/nitrite was detected in ocular fluid.

Microscopically, the amnionic surface of the umbilical cord is colonized by Gram-positive cocci. Superficial layers are diffusely infiltrated with large numbers of neutrophils. The remainder of the cord is edematous, congested and infiltrated with low numbers of lymphocytes, plasma cells and neutrophils. Small hemorrhages are also present.

During the outbreak of mare reproductive loss syndrome in central Kentucky this spring, bacterial funisitis was a consistent finding in placentas of late-term aborted, stillborn and premature live, moribund foals. The bacteria routinely isolated from fetal/foal tissues and placentas were an alpha-hemolytic *Streptococcus* and/or an *Actinobacillus* species. Interestingly, chorionitis as seen in ascending bacterial placentitis did not occur. The majority of foals also had mild to moderate pneumonia that was characterized by the accumulation of excessive numbers of epithelial squames, neutrophils, macrophages, bacteria and occasionally multinucleated giant cells in the lumens of alveoli and bronchioles.

The cause of the mare reproductive loss syndrome has not been determined.

01-13169
MULTIPLE CUTANEOUS LEIOMYOMAS IN THE PERINEUM OF A HORSE
K. L. Bailey¹, M. J. Kinsel¹, K. A. Connell²

1 Veterinary Diagnostic Laboratory and Department of Veterinary Pathobiology, College of Veterinary Medicine, University of Illinois, Urbana, IL.

2 Don Ryker & Associates, Ortonville, MI.

Multiple cutaneous masses were present in the perineum of a 14-year-old Saddlebred stallion for approximately 5 years prior to presentation. The masses were nodular and ranged in size from 3-9 mm diameter. Clinically, many of the masses were pedunculated, with a broad-based attachment. The masses were not ulcerated, painful, or pruritic. Three of the masses were surgically excised for histopathologic examination.

Microscopically, there was focal expansion of the superficial dermis by non-encapsulated, nodular masses. The masses were composed of haphazardly arranged bundles and fascicles of plump smooth muscle fibers. The overlying epidermis was elevated and slightly thickened, yet separated from the underlying tumor by a thin zone of dermal fibrous tissue. Nuclei of these cells were plump, ovoid, and often had blunt ends. Mitotic figures were not observed. The tumor masses did not appear to be associated with hair follicles. Tumor cells immunoreacted with antibodies directed against smooth muscle actin and desmin; however, no staining was observed with use of antibody directed against myoglobin. The immunohistochemical stains supported the diagnosis of multiple cutaneous leiomyomas.

Dermal leiomyomas are extremely rare tumors of dogs and cats, generally manifested as solitary masses. The origin of such growths is usually unknown, but most are suspected to originate from arrector pili muscle (piloleiomyoma) or vascular smooth muscle. Multiple piloleiomyomas have been described in a cat and humans. The majority of the piloleiomyomas in the cat report were associated with central osteoid metaplasia, a feature not identified in the masses examined from this stallion. The masses in the cat were present on the right side of the neck. Piloleiomyomas in humans are often multiple and associated with a painful response upon manipulation. In man, most lesions develop in adults over 30 years of age with a site predilection for the face, back, and dorsal aspects of the limbs. A familial form of multiple cutaneous leiomyomas exists in humans, with an autosomal dominant inheritance. Tumors in affected individuals range in number from a few scattered lesions to more than 5,000. In horses, leiomyomas have been described in the tunica albuginea, and are well documented in the intestinal and reproductive tracts. To the authors' knowledge, this is the first report of multiple cutaneous leiomyomas in a horse.

Slide: 1 Rollins Lab
Protozoal Colitis in Three Horses.
PG Moisan, ML Porterfield, SD Rushton

Rollins Laboratory , NCDCA, Raleigh, North Carolina

Three unrelated horses from separate farms were presented for necropsy after developing acute terminal diarrhea. The animals were 21 weeks, 6 months and 2 years of age and represented the American quarter horse, mixed breed and Tennessee walking horse breeds, respectively. The youngest horse had been treated with antibiotics for 5 days for a respiratory illness and died 12 hours after the onset of acute diarrhea that started on the fifth day of treatment. The other 2 horses had no known history of recent illness or therapy, and each died shortly after the onset of diarrhea. Necropsy was performed on each animal within a few hours of death. Relevant gross findings consisted of deeply reddened cecal and proximal colonic mucosa with several thousand 1-3mm raised nodules in the colonic mucosa. Severe mesocolonic edema was also present in each horse.

Histopathological features consisted of multifocal lymphoproliferative and eosinophilic to suppurative colitis. The raised nodules consisted of mature lymphoid follicles. The inflammation was associated with myriad ciliated protozoa that were located within the colonic crypts. A single protozoal organism was located within each occupied crypt. Individual protozoa were additionally located within the deep lamina propria and occasionally the colonic submucosa. The organisms were ovoid and 100- μm x 50- μm in size and were most consistent with *Cycloposthium* species. Standard bacteriology procedures failed to identify any other potential pathogens from any of the 3 horses.

Cycloposthium species are recognized as part of the normal flora of the equine and ruminant digestive tracts and are occasionally encountered in histological sections of equine large intestine. The organisms were considered to be in excessive numbers in these patients. Protozoal diarrhea may be more common than originally thought and these commensal protozoa of the equine cecum and colon are opportunistic pathogens that may proliferate and cause disease as a response to some unknown stressor. Unlike other reports about this condition, there were no inflammatory changes within the livers from these animals.

References:

1. French RA, Meier WA, Zachary JF: 1996, Eosinophilic colitis and hepatitis in a horse with colonic intramucosal ciliated protozoa. *Vet Pathol* 33:235-238.
2. Gregory MW, Longstaff JA, Giles CJ: 1986, Tissue-invading ciliates associated with chronic colitis in a horse. *J Comp Pathol* 96:109-114.
3. Kirkpatrick CE, Saik JE: 1988, Ciliated protozoa in the colonic wall of horses. *J Comp Pathol* 98:205-212.

Slide 16481-2

Subcutaneous lymphosarcoma in a horse

José A. Ramos-Vara,¹ Alice D Roudabush,¹ Elena García-Seco,² David A Wilson,² Margaret A Miller¹

¹ Veterinary Medical Diagnostic Laboratory, and

² Veterinary Teaching Hospital, College of Veterinary Medicine, University of Missouri, Columbia, MO 65205. E-mail: amosj@missouri.edu

A 12-year-old Quarter Horse gelding was submitted to the UMC-VTH for clinical examination with a history of weight loss, anorexia, a lump on the jaw and enlarged regional lymph nodes. A peritoneal tap was consistent with a non-septic, mixed inflammatory exudate. A blood analysis (cell count, liver and renal profiles) did not show significant abnormalities. The biopsy of the subcutaneous lump revealed a diffuse proliferation of large, round, polygonal or spindle cells with scant to moderate amount of cytoplasm, large and irregular nucleus with reticulated chromatin and prominent central nucleoli mixed with numerous eosinophils in abundant collagenous stroma. Apoptotic cells were common. Small lymphocytes were also observed. This growth also involved adjacent skeletal muscle. The mitotic index was moderate (less than 4/hpf). Metachromatic granules were not apparent in the neoplastic cells. Neoplastic cells were positive by immunohistochemistry for B-cell marker BLA.36 and negative for CD3. There were large numbers of small lymphocytes adjacent to this growth that were mainly CD3 positive. A diagnosis of lymphosarcoma was made and the owner elected euthanasia.

The necropsy revealed two subcutaneous masses in the left mandible and in the intermandibular space that did not infiltrate bone. A 7 x 7 x 3 cm mass was attached to the parietal pleura to the right of the sternum and a 36-cm diameter, firm, tan/white, multilobular mass with green, soft malodorous areas in the center was attached to the intestinal serosa at the ileoceocolic junction. This mass entrapped a section of intestine but did not obstruct it. Microscopically, these masses resembled the surgical biopsies.

Subcutaneous lymphosarcoma is a fairly common presentation for lymphoma in horses and is usually characterized by multiple sclerotic subcutaneous masses mainly in the face, neck and ventral aspects of the body but sparing the limbs. It has an indolent nature but eventually involves regional lymph nodes. Subcutaneous lymphosarcoma is usually classified as a T-cell-rich B-cell lymphoma. The large numbers of mature eosinophils might be the result of release of IL-5. T lymphocytes (CD4+) can release this interleukin and in this case there were numerous T lymphocytes accompanying neoplastic B lymphocytes. An uncommon feature of equine subcutaneous lymphosarcomas is deep organ involvement. In this case, the intestine and multiple abdominal and thoracic masses, most likely lymph nodes invaded by neoplastic lymphocytes, were infiltrated by neoplastic cells. The lack of tropism for parenchymatous or mucosal tissues prompted us to classify this tumor as stromal lymphosarcoma.

References:

1. Kelley LC, Mahaffey EA (1998) Vet Pathol 35:241-252
2. La Perle KMD, Piercy RJ, Long JF, Blomme EAG (1998) Vet Pathol 35:144-146
3. McClure JT (2000) Vet Clin North Am: Equine Pract 16:165-182

No number on slide
Granulomatous dermatitis in a horse caused by *Curvularia* spp.
Gary L. Watson, DVM, PhD

Animal Health Diagnostic Laboratory, Michigan State University, East Lansing, MI 48824.

Signalment and History: 14 yr old, Quarter horse, gelding. The horse developed an egg-sized region of alopecia and dermal thickening along the mane on the upper neck that was enlarging and spreading.

Histopathology: The skin sections had a deep periadnexal inflammatory response with myriads of lymphocytes and plasma cells in variably sized aggregates with occasional multinucleate giant cells and occasional aggregates of neutrophils. Primarily within the multinucleate cells were cross sections of fungal organisms that had subtle dematiaceous pigment. They resembled yeasts. With GMS/H&E stains there were both yeast-like regions and short hyphal structures, primarily in the cytoplasm of the giant cells. The fungi could not be clearly identified. It was recommended that the practitioner culture the region for fungi.

Fungal Cultures: Skin biopsies from the region were submitted for fungal culture. Both *Curvularia* spp., <50 cfu, and *Candida parapsilosis* <5 cfu were isolated. *Curvularia* has been incriminated in the formation of eumycotic (induced by fungi) mycetomas, and is a member of the "black grain mycetoma" group, with other genera including *Exophiala*, *Leptosphaeria*, *Madurella*, *Phialophora*, *Plenodomus*, and *Pyrenochaeta*. Speciation was not performed. Mycetomas may also be caused by Actinomycetes, including *Actinomadura*, *Nocardia*, *Nocardiosis*, and *Streptomyces*, and "white grain" Eumycetes which include organisms such as *Acremonium*, *Aspergillus flavus*, *Corynespora*, *Fusarium moniliforme*, *Neotestudina*, *Pseudoallescheria boydii*, and *Pseudochaetosphaerionema larense*.

Curvularia are characterized by dematiaceous pigment and the formation of hyphae and chlamydoconidia in a flocculent cement-like matrix, not present here, and often with Splendore-Hoeppli material, also absent in these foci. In addition, the pigmentation of the fungal structures was extremely subtle. *Curvularia* spp. are rare in domesticated animal species and no references could be found of infection with this organism in the horse. *Candida parapsilosis* is a common isolate with nosocomial infections in man associated with indwelling catheters. The organisms found in these sections were most likely the *Curvularia* that were isolated. Isolation of the purported causative agents is the most accurate method of defining a specific etiology.

References:

1. Mycetoma, In: Chandler, FW, Watts, JC, Pathologic Basis of Fungal Infections. ASCP Press, Chicago, 1987, pp. 251-263.

12900-01

Syncytial Cell Pneumonia in an Aborted Equine Fetus
P.G. Parnell¹, S.B. Kleiboeker², J. Wyffels³, L. Hullender⁴

¹ Clemson Veterinary Diagnostic Center, Columbia, SC,

² Veterinary Medical Diagnostic Laboratory, Columbia, MO,

³ Clemson University, Clemson, SC,

⁴ Equicare Veterinary Associates, Hopkins, SC

A late-term equine fetus was submitted for examination. The Paint mare was in good condition without indication of clinical illness. The placenta was not retained, but was not submitted with the fetus. Results of serum chemistry panels and a complete blood count performed at the time of abortion (mare) were all within reference ranges.

The fetus was not autolytic. No congenital defects were observed. Lungs were atelectatic (fetal). No lesions were observed in the remaining tissues or organs examined grossly. Histologically, lesions were confined to the lungs. Throughout the parenchyma, large syncytia are present in alveoli as well as respiratory bronchioles. Exudation of neutrophils and macrophages is less intense. Acid-fast and PAS stains of lung tissue were negative.

Bacterial cultures did not yield significant growth of pathogenic bacteria. Tissue homogenates of lung and liver were tested on RK-13, Vero's, equine fetal kidney, KyED, and mink lung cells without evidence of cytopathogenic effect. Frozen lung sections were tested with fluorescent antibody conjugates against equine herpes 1 and 4, canine distemper, parainfluenza-3, bovine respiratory syncytial virus, malignant catarrhal fever virus, and equine adenovirus. All FA tests were negative.

PCR/RT-PCR was performed using primers against influenza A, equine morbillivirus, and parainfluenza-3 virus. Faint bands from the herpesvirus PCR were noticed, cloned/sequenced, and analyzed using TBLASTX. The sequence weakly matches a group of gammaherpesviruses, with strongest correlation to alcelaphine herpesvirus 1 (55%). Electron microscopy performed on lung tissue failed to confirm the presence of viral particles in the syncytial cell nuclei or cytoplasm. Cells contained abundant mitochondria and smooth endoplasmic reticulum.

The etiology of the syncytial cell pneumonia has not been definitively determined although a viral etiology is a strong consideration. The lesion may be an unusual reaction to aspirated meconium/amniotic fluid, or to ingestion of a toxic plant such as hairy vetch by the mare. Foreign material was not observed in significant quantities histologically to support the former, nor do the histological lesions have the classic granulomatous response of hairy vetch toxicity to support the latter.

Kiupel-2
Interstitial pneumonia with syncytia in deer.
M. Kiupel¹, R. K. Maes²

¹ Animal Health Diagnostic Laboratory and Department of Veterinary Pathobiology and Diagnostic Investigations, Michigan State University, East Lansing, MI 48824,

² Animal Health Diagnostic Laboratory and Department of Microbiology and Molecular Genetics, Michigan State University, East Lansing, MI 48824

Carcasses from two 1-year old deer fawns with a history of respiratory disease and diarrhea were submitted for necropsy to the AHDL, Michigan State University. Both deer originated from a herd of approximately 400 deer with a history of acute severe respiratory disease and weight loss affecting approximately 60-70 % of the animals.

At necropsy the gross lesions of both deer appeared similar. Both lungs were heavy, non-collapsed, wet and meaty with pronounced interlobular septa due to edema fluid. The cranioventral lobes were dark red, consolidated and firm. Frothy fluid leaked from the trachea and smaller airways on cut section. Parietal and pulmonary pleura were covered by large amounts of fibrin. The pericardial sac of each deer contained approximately 25 ml of a fibrinous exudate. The small intestine contained dark stained watery fluid and the mucosa was diffusely hyperemic.

Microscopic examination revealed a diffuse interstitial pneumonia, secondary suppurative bronchopneumonia and fibrinous pleuritis in both deer. The alveolar septa and the interlobular connective tissue were distended with edema fluid. Alveoli and alveolar ducts contained large amounts of edema fluid admixed with fibrin, neutrophils, macrophages and fewer lymphocytes. Bronchi, bronchioli and arteries were surrounded by hyperplastic lymphoid tissue and the lumen of bronchi and bronchioli was occluded by large numbers of neutrophils and sloughed epithelial cells. Especially in the cranioventral lobes large numbers of multinucleated syncytial cells, occasionally containing more than 20 nuclei, were found in alveoli and commonly associated with terminal bronchioli. Commonly irregular clusters of eosinophilic proteinaceous material were observed in the abundant cytoplasm of syncytial cells, but no viral inclusions were recognized. No microscopic lesions were found in sections of small intestine.

Lesions in the lungs were characteristic of a respiratory syncytial virus infection similar to lesions caused by bovine respiratory syncytial virus (BRSV) in cattle. In addition a secondary bacterial pneumonia was suspected and *Pasteurella* spec. has been isolated from samples of lungs. Immunofluorescent antibody tests and PCR for BRSV were negative on samples of lungs that contained large numbers of syncytial cells. Interestingly, 2 different antigen detection enzyme immunoassays for human respiratory syncytial virus (HRSV) were positive. Based on our current knowledge we speculated that a respiratory syncytial virus other than BRSV caused severe respiratory disease in this deer herd. The cause of diarrhea remains unknown.

Respiratory syncytial viruses are classified as pneumoviruses in the family paramyxoviridae. Members of the genus pneumovirus have been described in humans (HRSV), cattle (BRSV), sheep (ORSV), goats (CRSV), mice (mouse pneumovirus) and turkeys (turkey rhinotracheitis virus). So far a deer-specific respiratory syncytial virus or infection of deer with a known pneumovirus have not been described. Current investigations, to be presented at the meeting, are aimed at identifying the etiology of the described interstitial pneumonia with syncytial cells in deer.

References:

1. Baker JC, Ellis JA, Clark EG: 1997, Bovine respiratory syncytial virus. *Vet Clin North Am: Food Anim Pract* 13: 425-454.
2. Bryson DG, McNulty MS, Logan EF: 1983, Respiratory syncytial virus pneumonia in young calves: clinical and pathological findings. *Am J Vet Res* 44: 1648-1655.
3. Valarcher J-F, Schelcher F, Bourhy H: 2000, Evolution of bovine respiratory syncytial virus. *J Virol* 74: 10714-10728.
4. Walsh EE, Falsey AR, Swinburne IA, Formica MA: 2001, Reverse transcription polymerase chain reaction (RT-PCR) for diagnosis of respiratory syncytial virus infection in adults: use of a single-tube "hanging droplet" nested PCR. *J Med Virol* 63: 259-263.

DES 261-01-4

Myocarditis Due to West Nile Virus in a Common Grackle

Angela Ellis^{*1}, Elizabeth Howerth¹, David Stallknecht², Daniel Mead³, Nicole Gottdenker³

¹ University of Georgia College of Veterinary Medicine Department of Pathology

² University of Georgia College of Veterinary Medicine Department of Medical Microbiology

³ Southeastern Cooperative Wildlife Disease Study

West Nile virus has been reported to cause inflammation and necrosis in a wide variety of tissues in birds. However, some tissues appear to be more reliable than others for diagnosis of the disease. This case shows some of the typical lesions seen in birds infected with West Nile virus.

A common grackle (*Quiscalus quiscula*) was submitted to the Southeastern Cooperative Wildlife Disease Study for necropsy (Case #DES-261-01). On gross examination, there was pallor of multiple organs, including diffuse pallor of the heart, and an enlarged spleen. Sections of heart, brain, spleen, and intestine were submitted in 10% formalin for histopathologic examination.

The submitted slide is a single section of heart. Mild inflammation and necrosis are present in the endocardium and myocardium. These areas of inflammation primarily contain large, foamy cells thought to be macrophages.

On histopathologic examination of other tissues, necrotizing myocarditis and meningoencephalitis were noted as well as necrosis in the spleen and wall of the intestine. Severe pericardial and endocardial inflammation was seen on some sections of heart, and inflammatory cells from these areas appeared to invade the myocardium. Areas of inflammation were again primarily composed of the same large, foamy cells seen on the submitted slide.

PCR and virus isolation were performed using tissue from the brain and heart. Both PCR and virus isolation were positive for West Nile virus. Immunohistochemistry was also performed and positive staining was present in the heart, brain, intestine, and spleen.

Although virus is typically detected in multiple organs by immunohistochemistry, the heart appears to be the most reliable organ for diagnosis. Cardiac lesions are widespread, there is typically little or no nonspecific staining in the heart, and the staining cells can be easily identified. While staining is frequently present in other organs such as spleen, liver, and kidney, nonspecific staining is often present and individual cells may be difficult to identify. Lesions in brain are mild and limited in distribution. Thus, brain is less reliable for diagnosing West Nile using immunohistochemistry, and immunohistochemistry is frequently negative in birds that have positive staining in other organs.

MO10699-01 MR
Neural larva migrans in a gray squirrel
Marlon C. Rebelatto

Department of Veterinary Pathobiology, Animal Disease Diagnostic Laboratory, Purdue University, West Lafayette, IN

Several squirrels from a park in Indiana showed neurologic signs and others were found dead. One squirrel was captured alive and presented to the local veterinary clinic for evaluation. The squirrel had signs of incoordination, extension of the head and neck, falling over, and eventually died. At necropsy, no gross lesions were observed. Histologically, the principal alteration was granulomatous encephalitis, characterized by areas of necrosis, microcavitation, surrounded by areas of marked gliosis, and astrocytic hypertrophy. The neuropil were infiltrated by macrophages, few lymphocytes, eosinophils, and multinucleated giant cells. There was mild lymphocytic perivascular cuffing. One longitudinal section of an ascarid larva was present within a microcavity in the neuropil, immediately adjacent to an area of granulomatous inflammation. The larva had a thin, smooth cuticle, lateral alae, prominent excretory column, and measured approximately 60 μm in diameter, features consistent with *Baylisascaris* sp. There was also multifocal Wallerian-type degeneration of a few axons around areas of inflammation. Nematode larvae were also observed in a focal area of granulomatous epicarditis.

Neural larva migrans can be caused by a variety of helminths, of which the ascarids are the most important group. *Baylisascaris procyonis*, the common roundworm of the small intestine of raccoons, is the most commonly recognized cause of clinical larva migrans in animals and is an important zoonosis, producing visceral, ocular, and neural larva migrans in humans, which is often fatal.

32068-G

Malignant intestinal carcinoid in a rhinoceros viper (*Bitis gabonica rhinoceros*)

J. F. Roberts, R.C. Giles, M. Cibull K.B. Poonacha

University of Kentucky, Livestock Disease Diagnostic Center, Lexington KY 40511

A 20-year-old, 110 cm long, female rhinoceros viper used for exhibition purposes died without showing obvious clinical signs except refusal of food for one month. Gross necropsy revealed large amounts of intraceolomic fat, active ovarian follicles and minimal gastrointestinal content. The colon had a 4 x 3 x 2 cm soft brown circumferential mass in the area adjacent to the kidney. The liver and kidney had uniformly dispersed multiple white, 0.25-1.25 cm diameter slightly raised areas. The spleen had pinpoint white foci. *Salmonella arizona* was cultured from the trachea, liver, spleen, kidney, ovary and intestine. Fecal examination for parasite ova and cryptosporidia was negative. Microscopic examination of the colon shows an extensive proliferation of uniform cell clusters in a thick trabecular fibrous network, with extensive coalescing areas of necrosis, replacing the submucosa and mucosa. Rare epithelial cells, bacterial colonies and occasional heterophils occupy the mucosal surface of the neoplasm. The parenchyma of the liver, kidney and spleen is invaded and compressed by multifocal well-defined neoplastic proliferations with multifocal areas of necrosis. Cords of cells with polygonal and oval anisocytotic vesicular nuclei with a single nucleolus, and a nuclear: cytoplasm ratio of 1:0.75, are lining a fine trabecular network containing a well-developed vasculature. The fibrous trabeculae are forming compartments that are surrounding central clusters of undifferentiated cells. Two to four mitotic figures are seen per high power field. Hepatocytes have severe diffuse vacuolization. Immunohistochemistry is positive for anti-NSE and anti-S-100 antibodies. Tumor cells contain cytoplasm granules when stained with Sevier silver procedure. Although the immunohistochemical staining characteristics of reptile tissue using mammalian derived antibodies is not well established, the microscopic features and staining characteristics of this neoplasm suggest neuroendocrine origin and intestinal carcinoid tumor is suspected.

References:

1. Kulke, Matthew H, Mayer, Robert J: Carcinoid Tumors. *The New England Journal of Medicine*. 340:858-868, 1999.

34506-00
MALIGNANT SCHWANNOMA IN A CAT
Sebastian M. M., Giles, R.C., Poonacha, K.B.

Livestock Animal Diagnostic Center, College of Agriculture, University of Kentucky, 1429 Newtown Pike, Lexington, KY.

A malignant peripheral nerve sheath tumor was diagnosed on the eyelid of an 11-year old Domestic Shorthair cat. The mass recurred after 9 months of first surgical removal. Histologically, mass occupied the dermis and consisted of a densely cellular, well-demarcated, multinodular, unencapsulated, infiltrative growth with few cells extending to the surgical borders. The cells were arranged in interwoven bundles of small, wavy spindle cells with palisading and whorls similar to Antoni type A features. The cells were relatively uniform with moderate amount of eosinophilic fibrillary cytoplasm. Nuclei were mostly spindle-shaped and also had plump round appearance in some areas with hyperchromatic staining. Nuclei had single nucleolus with 1 mitotic figure/2-3 hpf. The tumor had mild vascularity. Few areas had nerve fibers. Immunohistochemical staining showed strongly positive staining for S-100 and NSE with weak staining for GFAP.

On the basis of histological and immunohistochemical staining, the tumor was diagnosed as a schwannoma. Schwannomas, also known as peripheral nerve sheath tumors, are rare tumors of dog and cat of which there are two ultrastructural and histopathological type, neurofibroma and neurilemmoma. The skin form consists of dermal nodules that are malignant in cats but tend to be benign in dogs. These often recur after removal, which was observed in this case. Schwannomas in cats rarely metastasize.

References

1. Hendrick MJ, Mahaffey EA, Moore FM et al 1998, Tumors of peripheral nerves. In: Histological classification of mesenchymal tumors of skin and soft tissues of domestic animals, pp. 27-36., Armed Force Institute of Pathology, Washington D.C.
2. Pumarola M, Anor S, Borrasm D, Ferrer I: 1996, Malignant epithelioid schwannoma affecting the trigeminal nerve of a dog Vet Pathol 33:4,434-436.
3. Tanimoto T, Ohtsuki Y.1993, Cutaneous plexiform schwannoma in a pig. J Comp Path 109, 231-240.

14184-3

Bronchitis and bronchiolitis in a cat associated with CAR bacillus-like organisms and intraepithelial globule leukocytes

José A Ramos-Vara,¹ Craig Franklin,² Catherine Pennington³

¹ Veterinary Medical Diagnostic Laboratory, University of Missouri, Columbia, MO, and

² Research Animal Diagnostic and Investigative Laboratory, University of Missouri, Columbia, MO.

This 10-year-old, intact male DSH cat died during anesthesia for a routine dental exam. The necropsy by the attending veterinarian revealed hypertrophic cardiomyopathy and peribronchial fibrosis. Formalin-fixed samples of heart, lung, liver, and kidney were submitted to the VMDL for histopathology.

Histologically, the right and left cardiac ventricles had changes consistent with hypertrophic cardiomyopathy. Microscopic changes in the lung were confined to the airways. There was prominent thickening of many bronchi and large to medium-sized bronchioles with infiltration of the lamina propria and submucosa by lymphocytes and plasma cells with fewer neutrophils and rare eosinophils. Leukocytes usually formed complete cuffs around airways. There were 20-30 µm mononuclear cells within the respiratory epithelium containing abundant cytoplasm filled with 1-5 µm in diameter eosinophilic globules that were PAS, Warthin-Starry, and PTAH-positive; these cells were interpreted as globule leukocytes. Globule leukocytes were also present in airways without inflammatory changes, usually in higher numbers. Hyperplastic and metaplastic changes in the respiratory epithelium were occasionally seen as well as bronchiectasis associated with fibrosis of the airway wall. The lumen of airways contained abundant cell debris, macrophages, and scant mucus. There was marked perivascular edema around medium to large-sized pulmonary vessels. Neither smooth muscle hyperplasia, eosinophils in airways, nor hyperplasia of bronchial glands were prominent. Warthin-Starry stain demonstrated numerous bacilli adhered to the apical border of the respiratory epithelial cells in inflamed and no inflamed airways, mainly bronchi. Bacilli were clumped or evenly disseminated and lying parallel to cilia, a pattern of colonization similar to that seen in rodent cilia-associated respiratory (CAR). The luminal exudate also had numerous bacilli. Some of these organisms appeared slightly twisted. PCR for rat and rabbit CAR bacillus, *Helicobacter* sp., *Mycoplasma* sp., and *Lawsonia* sp. on paraffin sections was negative. Globule leukocytes were negative for CD3, lysozyme, and feline CD18 by immunohistochemistry. Feline herpesvirus 1 was not detected by immunohistochemistry.

The main causes of bronchitis in cats are allergic, bacterial, and parasitic. Allergy was ruled out in this case due to the lack of typical changes (smooth muscle hyperplasia, numerous eosinophils, and hyperplasia of bronchial glands) of this disease. Parasites were not observed in multiple sections of lung. The presence of bacilli colonizing the ciliated respiratory epithelium in association with bronchitis is characteristic of CAR bacillus infection in mice, rats, and rabbits. CAR bacillus, a descriptive name for filamentous, gram-negative, gliding bacteria that colonize the ciliated respiratory epithelium, has been also detected in cattle, goats and pigs. There are no reports of CAR bacillus in cats. We could not confirm a diagnosis of CAR bacillus infection with PCR. We speculate that genomic variability of CAR bacillus organisms among animal species, as reported in laboratory animals, might account for this negative result. Whether this bacillus was responsible for the bronchitis and bronchiolitis is not clear. CAR bacillus can be found in domestic animals without respiratory signs. The presence of intraepithelial cells with morphologic characteristics of globule leukocytes is intriguing. Globule leukocytes have been reported mainly in the intestinal and biliary tracts of cats but not in the respiratory tract although they have been identified in the respiratory tract of cattle, sheep, goat, deer, and rat.

24506

Cutaneous melanoma with cartilaginous differentiation in a dog
Margaret A. Miller, José A. Ramos-Vara

Veterinary Medical Diagnostic Laboratory, University of Missouri – Columbia

A 5-mm diameter nodular dermal mass excised from the prepuce of a 10-year-old castrated male miniature Dachshund was received in formalin. The referring veterinarian suspected hemangioma (presumably because of the pigmented appearance). Instead, the tumor was a melanoma with junctional activity, myxomatous matrix, and cartilaginous differentiation. The associated skin was sparsely haired with lightly pigmented epidermis. The tumor abutted the epidermis; nests of intra-epithelial tumor cells were observed in basilar epidermis and follicular epithelium. Tumor cells were oval to polyhedral with an oval hypochromic nucleus, distinct nucleolus, 1 mitotic figure per twenty 400 x fields, and ample pale eosinophilic cytoplasm with light to moderate melanin pigmentation. Heavily pigmented melanophages were scattered among the neoplastic melanocytes, especially at the periphery of the nodule. Cells within myxomatous stroma and cartilage had little pigment, smaller nuclei, and less distinct nucleoli. Alcian blue strongly stained myxomatous stroma and cartilage at pH 2.5 and 1.0, indicating the presence of sulfated glycosaminoglycans. Immunohistochemically, neoplastic cells were positive and differentiated chondrocytes were negative for the melanocytic differentiation antigen, Melan A. Both melanocytic cells and chondrocytes were positive by immunohistochemistry for vimentin and S-100 and negative for cytokeratins. The tumor was well demarcated, confined to the dermis, and did not extend to surgical margins. This dog had concurrent thyroid adenoma that was excised simultaneously. The referring veterinarian reported no recurrence of either tumor 9 months after excision.

Formation of cartilage is mentioned as a rare trait in canine cutaneous melanomas (Gross TL, 1992), and osteoid (but not cartilage) was described in a miniature Dachshund with oral melanoma (Chenier S and Dore M, 1999). In that dog, neoplastic cells were immunoreactive for S-100 and vimentin, but negative for cytokeratins. S-100 immunoreactivity was not detected, however, in the osteoid matrix. Two of 129 tumors in a retrospective study of canine oral melanomas had chondroid differentiation (Ramos, et al, 2000).

Cartilaginous or osteocartilaginous differentiation is also rare in human melanomas; only 21 cases have been reported. All but one tumor with cartilaginous differentiation also had osteoid formation. Most human melanomas with osseous or cartilaginous differentiation are unpigmented and in acral skin; many are subungual. Immunohistochemically, tumor cells and cartilaginous foci have been S100-positive and cytokeratin negative. Chondroid differentiation is a rare feature of canine oral and cutaneous melanomas that could hamper diagnosis in the case of unpigmented tumors. Although cartilage is almost always accompanied by osteoid in human melanomas, this has not necessarily been the case in canine melanomas. Too few dogs have been followed to determine whether chondroid differentiation has prognostic significance. Previously reported cases of canine melanoma with osseous or cartilaginous differentiation have been considered malignant, but the tumor in this dog was noninvasive and has not recurred.

Rollins Lab 2 (B-01 33224)
Thromboembolic encephalitis and myocarditis secondary to Haemophilus somnus septicemia.
Steven D. Rushton and Peter G. Moisan

Rollins Diagnostic Laboratory, Raleigh, North Carolina

A 7-month old, 300-kg Angus heifer was submitted to the Rollins Animal Disease Diagnostic Laboratory for necropsy. The heifer had been lethargic and dyspneic for the last couple of days. None of 600 other calves in the herd were similarly affected. Upon gross examination, 5-10 milialy 1-cm multifocal abscesses were identified within the myocardium, mainly within the left ventricular wall and concentrated in the papillary muscles. In the brain a 3 x 3 x 3-cm diameter black focus of malacia was located within the thalamus. Histologically the lesions in the myocardium consisted of large, randomly scattered abscesses with central areas of necrotic myofibers admixed with large numbers of degenerate neutrophils and occasional colonies of coccobacilli. The areas were surrounded by large numbers of immature fibroblasts admixed with lymphocytes and plasma cells. In the brain, leukocytoclastic vasculitis was multifocal and blood vessels within the midbrain contained fibrin thrombi surrounded by necrotic hyalinized tunica media and pyknotic endothelial cells. Large numbers of degenerate neutrophils were located within the surrounding neuropil and within the necrotic vascular walls. Marked hemorrhage was identified adjacent to the affected blood vessels. There was also spongiosis and neuronal necrosis located within the adjacent neuropil along with small to moderate numbers of gitter cells. In the kidney, similar fibrin thrombi were located within the arcuate arteries and were associated with necrosis of the adjacent parenchyma and large numbers of degenerate neutrophils. Bacterial cultures of the brain and myocardium yielded *Haemophilus somnus* in pure culture.

Haemophilus somnus is a fastidious gram-negative bacterium that commonly resides in the upper respiratory and urogenital tracts of normal bovines. Infections are thought to arise from genital discharge of bacteria to the respiratory tract of mainly young, stressed feedlot cattle. *Haemophilus somnus* commonly causes septicemia with vasculitis, thrombosis, and necrosis as the main squeal. Common sites of infection in cattle are the brain (thromboembolic meningoencephalitis), myocardium, lungs, and conjunctiva.

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2130142

Enterococcolitis in rabbits associated with *Lawsonia intracellularis* (Campylobacter) -like bacteria

Art L. Hattel, Lore Boger, Lola Hubler

Animal Diagnostic Laboratory, Pennsylvania Animal Diagnostic Laboratory System, Department of Veterinary Science Pennsylvania State University, University Park, PA. 16802

Six New Zealand White rabbits (2 mature adults, 4 juveniles) were presented to the Animal Diagnostic Laboratory (PADLS-PSU) in January 2001 for postmortem examination. The rabbits had previously exhibited clinical signs including anorexia, intermittent diarrhea, dehydration and fetal abortion. Approximately 30% of the affected rabbits died.

On gross postmortem examination, all rabbits exhibited severe dehydration. The ceca and sacculated colon of each rabbit were markedly dilated with fecal material. The distal 1/3 of the sacculated colon also contained large amounts of clear gelatinous material. Marked thickening of the wall of the distal 1/2 of the ileum and the ileocecal junction was also evident in 3 rabbits.

Bacteriologic cultures and rotaviral agglutination procedures performed on intestinal samples were negative for *Salmonella* sp, *Clostridium* sp and rotaviral antigen. Fecal parasitology procedures revealed 600 coccidial oocysts per gram of feces in a pooled sample from 2 rabbits. The remaining 4 rabbits did not contain significant intestinal parasites. Histologic lesions within the intestine included severe histiocytic hyperplastic enteritis and necrotizing typhilitis, mild colitis and the presence of numerous cryptal abscesses within the ileum. Ziehl-Neelsen staining procedures performed on intestinal tissue exhibiting histiocytic lesions were negative for the presence of acid-fast bacteria. Warthin-Starry staining procedures were performed on affected intestinal tissues and revealed numerous short and curved bacterial organisms consistent with *Lawsonia intracellularis* (*Campylobacter* sp). within the apical cytoplasm of cryptal and villar epithelial cells.

Diarrheal diseases are included among the most important causes of sickness and death in domestic rabbits. Bacterial organisms consistent with *Lawsonia intracellularis* (*Campylobacter*) have been associated with enteric lesions such as histiocytic enterococcolitis, proliferative enterococcolitis and necrosuppurative cecocolitis in rabbits and are considered an important etiologic agent in this species.

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Animal Health Diagnostic Laboratory –1 (original: 3574-134)
Pulmonary Echinococcus granulosus in a wild white-tailed deer.
Scott D. Fitzgerald, DVM, PhD

Animal Health Diagnostic Laboratory and Department of Pathobiology and Diagnostic Investigation, College of Veterinary Medicine,
Michigan State University, East Lansing, Michigan 48824, USA.

An adult male white-tailed deer (*Odocoileus virginianus*) was shot during the fall hunting season by a private hunter, and the lungs were submitted to the Animal Health Diagnostic Laboratory, Michigan State University, East Lansing, Michigan, as part of an ongoing tuberculosis surveillance program. The lungs were filled with dozens of 1-3 cm diameter fluid-filled cysts. On opening, the cysts were surrounded by a dense white fibrous capsule, and contained a thin translucent capsule filled with clear fluid and pinpoint white sand-like material. Samples were collected and fixed in 10% formalin for routine histology.

Echinococcus granulosus larvae (metacestodes) are found within the pulmonary parenchyma, and consist of discrete unilocular cysts surrounded by a thick fibrous connective tissue capsule produced by the host, and a thin parasitic membrane composed of an outer acellular laminated layer, and inner germinal layer. The germinal layer gives rise to brood capsules and daughter cysts both containing protoscoleces, which form the "hydatid sand" or white granular material seen grossly.

In cervid hosts, the hydatid cysts are found almost exclusively in the lungs. This strain of *Echinococcus* is present throughout most of Canada and Alaska, and extends into portions of the Northern continental United States. In Michigan, a well-established focus of endemic infection is present on Isle Royale; the wild wolf population on Isle Royale serves as the principal definitive host and moose are the intermediate hosts. The deer in this case report was harvested from Delta County in Michigan's Upper Peninsula. A retrospective review of 1059 lungs submitted from wild white-tailed deer and examined by the Michigan Department of Natural Resources personnel between 1985 and 2001 revealed only one other deer with *Echinococcus* cysts; that deer was also from Michigan's Upper Peninsula, specifically Iron County. Since both moose and wolves are rare in this region of Michigan, it is likely that the parasite is maintained in the wild coyote and deer populations. This is a zoonotic disease, although the metacestode stage is not infectious to people.

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00-10441
Eosinophilic granulomatosis in a dog.
Rob Bildfell¹ and Todd Browning²

1 Oregon State Veterinary Diagnostic Laboratory, Corvallis, OR

2 Riverbrook Animal and Eye Clinic, Eugene, OR

A 3-year-old intact female mixed-breed dog was presented with a history of mild weight loss and severe respiratory distress. A CBC revealed a moderate leukocytosis with neutrophilia. A diffuse, bronchointerstitial pattern was observed in chest radiographs. The owner opted to have the dog euthanized in view of the poor prognosis and cost considerations.

At necropsy, multiple 1 – 2 cm diameter, firm nodules containing a green, caseous material were scattered throughout the lung field. Several 1 – 3 mm diameter white plaques were visible in the mucosa at the tracheal bifurcation. The periaortic fat was brown, dry and firm. Mesenteric fat adjacent to several segments of jejunum was of a similar character but grossly normal fat was also visible in the abdomen, thorax and subcutis. There was circumferential thickening of several 2- 4 cm long segments of the small intestine. Other changes included enlargement of mesenteric lymph nodes and spleen, plus reddening of bone marrow.

Microscopically, the lung nodules corresponded to foci of granulomatous inflammation, oriented mainly around dilated bronchioles. Lakes of mucus were common within the tissue and bronchioles were sometimes lined by vacuolated epithelial cells. Foamy macrophages filled the alveoli surrounding damaged bronchioles but large numbers of neutrophils and eosinophils were also present, especially in bronchiolar lumina. The material at the core of many granulomas often had a laminated character – central eosinophilia with more peripheral brown coloration. Although most granulomata contained necrotic cellular debris, some were centered on an acellular, eosinophilic to brown, finely granular substance. Many macrophages and multinucleate giant cells also contained a brown granular cytoplasmic pigment that was PAS positive but negative with Prussian blue and acid-fast stains. PAS and GMS stains of various tissues for fungal hyphae were negative. Intestinal changes included segmental transmural infiltration with eosinophils. Eosinophilic granulomas were visible in the submucosal and muscular layers. The abnormal fat tissue also contained pigment-laden macrophages and multiple coalescing granulomatous nodules, some of which contained necrotic cells assumed to be eosinophils. The bone marrow had an increased M:E ratio due to increased numbers of eosinophil precursors but mature eosinophils remained visible, as did representative cells of other lines.

Culture of lung, liver, spleen and lymph node yielded no significant bacterial isolates. A fungal culture of the lung was also negative.

The clinical and pathologic findings in this case had a strong similarity to the condition known as eosinophilic pulmonary granulomatosis (EPG). However, EPG is most often associated with heartworm infection and concurrent alterations in the adipose tissue have not been described. A systemic mycosis could not be demonstrated and the histologic changes were not typical of lymphoid granulomatosis, another important clinical rule-out for EPG. Extrapulmonary changes have not been reported for the condition “pulmonary infiltrates with eosinophilia (PIE)”, also known as eosinophilic bronchopneumopathy. It is assumed that the lesions seen in this dog reflect a hypersensitivity reaction to an unidentified antigen. Interestingly, another dog (related) in this household has recently developed respiratory disease with a similar radiographic pattern.

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Kiupel-1
Choroid plexus papilloma in a Scottish Highland cow
M. Kiupe^{1, 2}, E. B. Janovitz^{3, 4} J.A. Ramos-Vara⁵

1 Animal Health Diagnostic Laboratory and

2 Department of Veterinary Pathobiology and Veterinary Diagnostic Investigations, Michigan State University, East Lansing, MI 48824,

3 Animal Disease Diagnostic Laboratory and 4 Department of Veterinary Pathobiology, Purdue University, West Lafayette, IN 47907,

5 Veterinary Diagnostic Laboratory, School of Veterinary Medicine, University of Missouri, Columbia, MO 65211

A 560 pound 4-year-old Scottish Highlander cow with a history of a right head tilt, progressing ataxia over the last months, ventral-medial strabismus and suspected hypersensitivity was submitted dead for necropsy to the ADDL, Purdue University. The cow had been euthanized following when the ataxia had worsened and the cow had fallen several times.

Necropsy revealed no significant lesions in abdominal or thoracic organs. But in the brain, a 3-cm in diameter, multinodular, tan, friable, spherical mass was attached to the choroid plexus of the fourth ventricle. This mass partially obstructed the lumen fourth ventricle and compressed, but did not invade the adjacent cerebellum and brainstem.

The submitted slide contains a cross section of this mass from the choroid plexus. It has morphologic features typical of a choroid plexus papilloma characterized by an exaggeration of the arboriform architecture of the choroid plexus. The numerous, densely packed papillae are composed of a vascular stroma that is lined by single or multiple layers of cuboidal to low columnar epithelium. Neoplastic cells are well differentiated and monomorphic, with moderate amounts of eosinophilic cytoplasm, indistinct margins, and oval nuclei with coarsely clumped chromatin.

The principal differential diagnosis for a choroid plexus papilloma is a papillary ependymoma. Immunohistochemistry and electron microscopy may be necessary to distinguish between them. In this tumor, neoplastic epithelial cells were strongly positive for S-100 protein, and keratin (AE1/AE3), and, in some areas, positive for CEA, but were negative for GFAP and vimentin. This staining pattern is characteristic of choroid plexus papillomas. Ependymomas generally express GFAP but not cytokeratin. Ultrastructural features of this tumor included prominent apical intercellular junctional complexes characterized by tight junctions (zonula occludens) associated with zonula adherens. These structures are characteristic for epithelial cells of the choroid plexus. In contrast cilia and basal bodies but not tight junctions are characteristics of ependymal cells.

Choroid plexus papillomas originate from the primitive medullary epithelium and are related embryologically to ependymal cells. They have been described as uncommon in dogs and horses and as extremely rare in other animal species. Choroid plexus papillomas are expansile but rarely invade nervous tissue. Based on the age and the described clinical signs, one differential diagnosis for this case included bovine spongiform encephalopathy. In a recent survey of 200 clinically suspected cases of bovine spongiform encephalopathy in which pathognomonic vacuolar changes were absent, neuroectodermal tumors were present in five cases (2.5 per cent). Three of these tumors were diagnosed as atypical ependymomas.

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F93-2629

Hepatitis associated with *Clostridium difficile* in an ostrich chick.

H. L. Shivaprasad

A live 19-day-old male ostrich chick was necropsied. It was one of 12 chicks in a group in which 8 had died with a history of anorexia and weight loss. The birds had been treated with Amikacin, Pipracillin, Baytril and Bactrim. Necropsy of the ostrich chick revealed dehydration, mild ascites and serous atrophy of fat around the heart. Liver had numerous yellow-tan foci on the capsular surface as well as on the cut surface. Contents in the ceca were watery. Microscopically liver had multifocal necrosis of hepatocytes some associated with infiltration of heterophils mixed with fibrin and a few lymphocytes and giant cells in the periphery. Gram stain revealed a few Gram-positive bacilli. *Clostridium difficile* was isolated from the liver. Toxin A was detected by ELISA.

F01-2431

Inclusion body hepatitis associated with adenovirus group I in chickens.

H. L. Shivaprasad

Several 26-day-old broiler chickens were necropsied. History included unevenness and increased mortality in the flock. Necropsy revealed enlarged pale or yellow tan livers some with petechiae. Kidneys were enlarged and pale in a few birds. Histopathology of the liver revealed various degrees of necrosis, fibrin exudation and infiltration primarily by lymphocytes and a few heterophils. Livers contained few to many distinct basophilic intranuclear inclusion bodies in the hepatocytes. Electron microscopy of the liver confirmed adenovirus particles in the nucleus of hepatocytes. Adenovirus was isolated from the liver and confirmed as group I by serology.

TB Michigan diagnostic laboratory (original #2236249 2)
Disseminated Mycobacterium bovis infection in a cat
L.R. Carter and T.P. Mullaney

Fixed and fresh lung, liver, kidney, spleen, lymph node and heart from a 7-year-old mixed breed cat were submitted to the Animal Health Diagnostic Laboratory, Michigan State University. The cat had dyspnea of unknown duration, and died two hours after presentation to the referring veterinarian. On post-mortem examination, the cat was thin. Multiple yellow foci were present throughout the liver and lungs.

Histologically, the submitted lymph node had a severe multifocal and coalescing granulomatous lymphadenitis. Lesions were characterized by variably sized areas of caseous necrosis surrounded by zones of histiocytic cells, and occasional multinucleated giant cells. In the lung, there was severe and diffuse granulomatous pneumonia. Mild to moderate multifocal granulomatous splenitis and hepatitis were also present. In Ziehl-Neelsen stained sections, many acid-fast bacilli were found in areas of caseous necrosis. *Mycobacterium bovis* was isolated from the lymph node. RFLP analysis of the isolate indicated that it was identical to strains of *M. bovis* previously isolated from cattle and deer in northeast Michigan.

The affected cat had frequent outdoor access and lived in an area where there is endemic infection of white-tailed deer with *M. bovis* and approximately one mile from a *M. bovis* infected cattle herd.

MO-11142-98 KS
TULAREMIA IN A BEAVER
K. Sakamoto, M. Kiupel, E.B. Janovitz

Animal Disease Diagnostic Laboratory, Purdue University, Lafayette, IN 47907

Six adult beaver were found dead, with no obvious signs of trauma, at the Muscatuatuck Natural Wildlife Reservoir in Southern Indiana. A 16-kg adult pregnant female was submitted for necropsy. Gross findings included fibrinous effusion in the pleural and peritoneal cavities, fibrinous serositis, and yellowish-white nodular foci scattered throughout the liver, spleen, diaphragm, mesentery and mesenteric lymph nodes. The uterus contained 3 full-term fetuses and the endometrium was diffusely edematous with segmental necrosis.

Microscopic evaluation of the liver, spleen, mesenteric lymph nodes and uterus revealed multifocal to coalescing, randomly scattered areas of coagulative necrosis with dystrophic calcification, and necrotizing vasculitis and fibrinous polyserositis.

Francisella tularensis was isolated by the NVSL from multiple organs. Tularemia is a worldwide zoonotic disease that affects a wide variety of mammals, birds, reptiles and fish. It is a common disease in wild rabbits and rodents. Of the two strains of *F. tularensis*, *F. tularensis* subsp. *tularensis* (type A) and *F. tularensis* subsp. *palaeartica* (type B), type B is more commonly isolated from beavers.

Michigan Animal Health Diagnostic Laboratory – 2 (original: 76648-8)
Segmental Hemorrhagic and Necrotizing Jejunitis in a Dairy Cow
Scott D. Fitzgerald, DVM, PhD

Animal Health Diagnostic Laboratory and Department of Pathobiology and Diagnostic Investigation, College of Veterinary Medicine,
Michigan State University, East Lansing, Michigan 48824, USA.

A 30-month-old Holstein cow was presented moribund to the Animal Health Diagnostic Laboratory. This cow had been milking for approximately 4.5 months, had produced 90 pounds of milk the prior evening, and on the morning of presentation had dropped to only 10 pounds. There were dark tarry feces, a subnormal temperature, the cow failed to respond to therapy and was recumbent and moribund within 48 hours. Three other high producing cows in this herd have exhibited similar signs and died during the last two months.

On necropsy, this 1200 pound cow had a single 3-4 foot segment of proximal jejunum that was dilated, thin-walled, diffusely congested on its mucosal surface, and the lumen was filled with blood. The remainder of the gastrointestinal tract had scant contents. Microscopically, this segment of jejunum had marked mucosal epithelial necrosis, multifocal ulceration, crypts dilated with neutrophils, and scattered remaining enterocytes were large and atypical. There was marked transmural hemorrhage in this segment of jejunum. All other sections of small and large intestine were morphologically normal.

A syndrome described as “jejunal hemorrhage syndrome” has been recently reported from the diagnostic laboratory at Washington State University as a newly emerging syndrome of unknown etiology in dairy cattle. This is the first such case we have seen at Michigan State University. We were fortunate to receive this animal live so that the intestinal lesions were well preserved. Microbiological testing has eliminated *Salmonella* sp., and bovine viral diarrhea virus from the differential. *Clostridium perfringens* has been isolated from the affected intestinal segment in high numbers, and additional characterization of this organism is in progress. The marked segmental nature and rapid course of this syndrome are somewhat unusual, as its predilection for mid-lactation high-producing dairy cattle. We recommend that other veterinary diagnosticians be on the alert for this emerging disease syndrome.

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