Syllabus

VETERINARY PATHOLOGY DEPARTMENT
ARMED FORCES INSTITUTE OF PATHOLOGY

Wednesday Slide Conference

1976-1977

ARMED FORCES INSTITUTE OF PATHOLOGY

Washington, D.C. 20306

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PREFACE

The Department of Veterinary Pathology, Armed Forces Institute of Pathology, has conducted the annual Wednesday Slide Conference for more than two decades. The cases presented each Wednesday throughout the academic year are also distributed to nearly 70 active participants, including military and civilian veterinary pathologists throughout the United States and Canada, as well as several foreign countries. The list of active contributors continues to grow. The diagnosis for each case and a synopsis of the discussion for most cases are forwarded to participants weekly.

This study set has been assembled in an effort to make the material presented at our weekly conferences available to a wider range of interested pathologists and other scientists.

A selection of 97 cases, including 100 slides, has been made from the 124 cases studied during the 1976-1977 conferences.

We wish to thank each contributor for his or her participation and for the permission to use cases in this study set.

LIST OF SLIDES

Slide number	Animal	Tissue	Diagnosis
1	Dog	Liver	Metastatic chemodectoma
2	Cat	Tongue	Calicivirus infection
3	Cat	CNS	Hereditary neuroaxonal dystrophy
4	Dog	Lung/CNS	Metastatic mammary adeno-carcinoma
5	Dog	Lymph node	Aspergillosis
6	Dog	Heart	Verrucous endocarditis associated with systemic lupus erythematosus
7	Ewe	Liver/Kidney	Algae toxicosis
8	Cow	CNS	*Haemophilus somnus* infection
9	Cow	Liver	*Fascioloides magna* infestation
10	Pig	Snout	Vesicular stomatitis
11	Dog	Stomach	Gastric amyloidosis
12	Piglet	Lung	Fibrinohemorrhagic pneumonia caused by *Bordetella bronchiseptica*

13	Chicken	CNS	Marek's disease
14	Dog	Lung	Adiaspiromycosis
15	Reindeer	Bone	Phycomycosis
16	Pheasant	Cecum	Nodular typhlitis
17	Sheep	CNS	Locoweed toxicity
18	Foal	Liver	*Bacillus piliformis* (Tyzzer's disease)
19	Foal	Spleen/Lung	Combined immunodeficiency syndrome
20	Blesbok	Lymph node	*Yersinia pseudotuberculosis* infection
21	Cat	Lung	Cytauxzoonosis
22	Coyote	Liver	Tyzzer's disease
23	Pig	Colon	Swine dysentery
24	Cat	Lung	*Aelurostrongylus*
25	Dog	Mandible	Craniomandibular osteopathy
26	Deer	Heart/Lymph node	Malignant catarrhal fever
27	Rabbit	Kidney	Encephalitozoonosis
28	Horse	GI	Granulomatous enteritis
29	Dog	Lung	Lymphosarcoma and dirofilaremia
30	Pigeon	Liver	Chlamydiosis (psittacosis)

31	Ewe	Liver	Pseudorabies caused by *Herpesvirus suis*
32	Cat	CNS	GM_2 gangliosidosis
33	Dog	Liver	*Mesocestoides* infestation
34	Dog	GI	Adenocarcinoma
35	Dog	Nasal passage	*Rhinosporidium* infection
36	Dog	Lung	Distemper
37	Parakeet	Liver	Pacheco's parrot disease, with erythroblastosis
38	Fox	CNS	Rabies
39	Cow	CNS	Prickly ash toxicity from *Xanthoxylum americanum*
40	Dog	Tumor	Parathyroid carcinoma
41	Pig	Kidney	Ethylene glycol toxicity
42	Dog	Scrotum	Mesothelioma
43	Cat	Placenta	Normal tissue
44	Ox	CNS	Lead toxicity
45	Cow	Skin	Maduromycosis
46	Baboon	Mediastinum	Spindle cell thymoma
47	Mouse	GI	LIVIM (mouse hepatitis virus) infection

48	Rhesus monkey	Liver	Actinomyces infection
49,50	Mouse	Uterus/Spleen	Hemangiosarcoma
51	Goat	CNS	Viral leukoencephalomyelitis of goats
52	Chicken	Bursa	Cryptosporidiosis
53	Pig	Liver	Toxic necrosis
54	Calf	Lung	Sarcocystosis
55	Dog	Tumor	Islet cell tumor
56	Horse	Lung	Chronic mucoid bronchitis
57	Ewe	GI/Lymph node	Sclerosing intestinal adeno-carcinoma
58	Heifer	CNS	Progressive ataxia of Charolais cattle
59	Rhesus monkey	Salivary gland	Aspergillosis
60	Cat	Liver	Myeloproliferative disorder
61	Dog	Bone	Giant cell tumor of bone
62	Rat	Kidney	Metastatic squamous cell carcinoma
63,64	Chinchilla	Uterus/Lung	Trophoblastic embolism

65	Meadow vole	Tumor	Granulosa cell tumor
66	Rhesus monkey	Subcutaneous mass	Glomus tumor
67	Rat	Mass	Medullary thyroid carcinoma
68	Pig	Heart	Selenium or vitamin E deficiency
69	Pig	Colon	Cryptosporidiosis
70	Dog	Subcutis	Liposarcoma
71	Dog	Retroperitoneal mass	Ganglioneuroblastoma
72	Dog	Abdominal mass	Dysgerminoma
73	Guinea pig	Lung	Thrombosis (probably DIC)
74	Guinea pig	Kidney	Chloroquine toxicity
75	Dog	Skin	Basal cell tumor
76	Skunk	Eye	Distemper inclusions
77	Calf	Lung	PI-3 virus
78	Dog	Membrana nictitans	Solid carcinoma
79	Dog	Urinary bladder	Embryonal rhabdomyosarcoma
80	Rat	Heart	Adriamycin cardiomyopathy
81	Dog	Liver	Amyloidosis

82	Clam	Gross section	Carcinoma
83	Flounder	GI	Glugea cysts
84	Rat	Kidney	Embryonal nephroma
85	Guinea pig	Lung	Renal secondary hyperparathyroidism
86	Rat	Abdominal mass	Adrenal cortical carcinoma
87	Calf	CNS	Hereditary neuraxial edema
88	Rat	Subcutaneous mass	Malignant fibrous histiocytoma
89	Rabbit	Lung	Desquamative interstitial pneumonia
90	Horse	Lung	Pneumocystosis
91	Mouse	Kidney	Bilateral renal cell carcinoma
92 & 2x2	Dog	Abdominal mass	Leiomyosarcoma
93	Dog	CNS	Encephalitozoonosis
94	Kangaroo	GI	Coccidiosis
95	Mouse	Liver	Reticulum cell sarcoma (Dunn's type A)
96	Calf	CNS	Cerebral theileriosis
97	Calf	Kidney	Sarcocystosis
98	Horse	CNS	Rabies
99	Dog	CNS	CNS infarction caused by Dirofilaria immitis

COMMENTARY ON SLIDES

Slide 1

History. This 9-year-old boxer dog had been unsuccessfully treated for "seizures" over the months prior to euthanasia.

Diagnosis. Metastatic chemodectoma.

Comment. The association of these tumors with brachycephalic dogs is well documented. Some reports indicate that approximately 25 percent of the heart-base chemodectomas will metastasize.

Contributor. Walter Reed Army Institute of Research, Washington, D.C.

Slide 2

History. This section of tongue was taken from a domestic long-hair cat. Many cats from this colony were exhibiting moderate to severe upper respiratory symptoms.

Diagnosis. Ulcerative glossitis caused by feline calicivirus (Picornaviridae).

Comment. The contributor indicated that 15 of 17 male cats affected by the upper respiratory infection developed feline urolithiasis syndrome (FUS) within 5 weeks of the respiratory disease. The role of calicivirus in FUS is controversial.

Suggesting reading

Fabricant, C. G.: Urolithiasis: a review of recent viral studies. Feline Pract. 3(1): 22-25, 1973.

Jackson, O. F.: The case against a viral aetiology in feline urolithiasis. Vet. Rec. 97: 70-71 (July 26) 1975.

Contributor. Letterman Army Institute of Research, San Francisco, California.

Slide 3

History. A domestic short-hair cat had suffered blindness and gait ataxia from birth.

Diagnosis. Hereditary neuroaxonal dystrophy.

Comment. This recently described entity is thought to be due to an inborn error of metabolism. It is characterized clinically by an abnormal coat color and development of progressive ataxia. The disease is inherited in an autosomal recessive manner. A similar disease occurs in children; both are characterized histologically by marked ballooning of nerve cell processes within specific regions of the brain stem and atrophy of the cerebellar vermis.

Suggested reading. Woodard, J. E., Collins, G. H., and Hessler, J. R.: Feline hereditary neuroaxonal dystrophy. Am. J. Pathol. 74: 551-566, 1974.

Contributor. Animal Medical Center, New York.

Slide 4

History. Tissue is presented from a 12-year-old bitch that developed frequent convulsions and was euthanized.

Diagnosis. Metastatic mammary adenocarcinoma.

Comment. The primary mammary adenocarcinoma was verified by the contributor.

Contributor. Veterinary Service Laboratory, Ministry of Agriculture, Guelph, Ontario, Canada.

Slide 5

History. This mediastinal lymph node was removed from a 2-year-old German shepherd canine.

Diagnosis. Granulomatous lymphadenitis caused by a fungus.

Comment. *Aspergillus* was cultured from this lymph node as well as from lesions in the lung, kidney, and vertebral column.

Contributor. Colorado State University.

Slide 6

History. This is tissue from a 6-year-old spayed German shepherd bitch that experienced posterior weakness and pain over the 4 months prior to her death. Although she had a good appetite, she lost weight steadily and developed polydipsia and polyuria.

Diagnosis. Nonbacterial verrucous endocarditis associated with systemic lupus erythematosus.

Suggested reading. Lewis, R. M.: Canine systemic lupus erythematosus. Blood 25: 143-160, (Feb.) 1965.

Contributor. Animal Medical Center, New York.

Slide 7

History. Liver and kidney sections are presented from a ewe. This animal was found dead in her pasture; depression and occasional emesis were noted in several other sheep in the flock.

Diagnosis. Algae toxicosis.

Comment. Sheep showing clinical signs had elevated BUN, SGOT, and CPK values. The contributor identified the algae as an Anabena sp. and indicated that filtrates of pond water from the pasture were lethal to mice injected intraperitoneally.

Suggested reading

Gorham, P. R.: Toxic waterblooms of blue-green algae. Can. Vet. J. 1: 235-245 (June) 1960.

Carmichael, W. W., Biggs, D. F., and Gorham, P. R.: Toxicology and pharmacological action of Anabaena flos-aquae toxin. Science 187: 542-544, 1975.

Contributor. South Dakota State University.

Slide 8

History. Tissue from a heifer is presented. Four animals had died in this herd of 10-month-olds. Central nervous system signs were noted prior to death.

Diagnosis. Thromboembolic meningoencephalitis caused by Haemophilus somnus.

Comment. Microabscessation and vasculitis with septic thrombi and petechiation in both neuropil and meninges are the hallmarks of this condition.

Suggested reading. Panciera, R. J., Dahlgren, R. R., and Rinker, H. B.: Observations on septicemia of cattle caused by a haemophilus-like organism. Vet. Pathol. 5: 212-226, 1968.

Contributor. Montana State Diagnostic Laboratory, Bozeman, Montana.

Slide 9

History. These lesions were found incidentally during the slaughter of a bovine.

Diagnosis. Periportal fibrosis with mononuclear and eosinophilic infiltration as well as dark pigment deposition produced by the migration of Fascioloides magna.

Comment. The natural definitive host of this fluke is feral deer. In cattle, the larval flukes migrate aberrantly and can be found in numerous organs. The life cycle is not completed in cattle and, therefore, they represent dead-end hosts.

Contributor. Montata State Diagnostic Laboratory, Bozeman, Montana.

Slide 10

History. Tissue from the snout of a pig is presented.

Diagnosis. Vesicular stomatitis (VS). (The animal had been inoculated intradermally 72 hours previously with VS virus.)

Comment. Clinically and histopathologically the various vesicular diseases of swine (vesicular stomatitis, vesicular exanthema, swine vesicular disease, and foot and mouth disease) are indistinguishable. Virus isolation, particularly from vesicle fluid, complement fixation, fluorescent antibody tests, and experimental animal inoculation are means by which the specific virus can be identified.

Suggested reading. Proctor, S. J., and Sherman, K. C.: Ultrastructural changes in the bovine lingual epithelium infected with vesicular stomatitis virus. Vet. Pathol. 12: 362-377, 1975.

Contributor. National Animal Disease Center, Ames, Iowa.

Slide 11

History. This is tissue from an 11 1/2-year-old poodle-cross. The dog had clinical signs of lethargy, vomiting, polydipsia, pale mucous membranes, and bloody diarrheic stools before being put to death.

Diagnosis. Gastric amyloidosis. Marked depositions of amyloid were also noted in the renal glomeruli. Other necropsy observations included acute pancreatitis and cardiac dilatation.

Suggested reading. Cheville, N. F.: Gastric amyloid in the dog. Vet. Pathol. (in press).

Contributor. National Animal Disease Center, Ames, Iowa.

Slide 12

History. Sections of lung from a 17-day-old piglet.

Diagnosis. Hemorrhagic pneumonia of piglets caused by Bordetella bronchiseptica.

Comment. The fibrinous nature of this predominantly bronchopneumonia indicates a bacterial etiology. Pasteurella and Haemophilus organisms should be considered in the differential diagnosis, as they too are fibrin-producing agents.

Contributor. South Dakota State University.

Slide 13

History. Tissue is presented from a 6-week-old white leghorn pullet showing central nervous system signs.

Diagnosis. Sclerosing encephalomalacia associated with Marek's disease. At necropsy the splanchnic nerves were found enlarged.

Comment. Diseases which could present similar histopathologic lesions are avian encephalomyelitis, Newcastle disease, and nutritional encephalomalacia. The possibility of concurrent Marek's and chronic vitamin E deficiency is a tempting hypothesis.

Contributor. Oregon State University.

Slide 14

History. Tissue is presented from an 8-month-old male Yorkshire terrier that had been hospitalized for anorexia and a distended abdomen.

Diagnosis. Multifocal pulmonary granulomas caused by Emmonsia organisms (adiaspiromycosis). The contributor indicated that the dog also had evidence of nephrosis, with lesions of uremia, including metastatic calcification in the gastric mucosa, capsule of the spleen, and in the lungs.

Comment. Emmonsia is normally found in feral rodents. The fungus can be differentiated from others by its large size (up to 270 um) and by the fact that Emmonsia does not reproduce itself in tissue--no external or internal budding structures can be seen.

Suggested reading. Koller, L. D., Patton, N. M., and Whitsett, D. K.: Adiaspiromycosis in the lung of a dog. J. Am. Vet. Med. Assoc. 169: 1316-1317, 1976.

Contributor. Oregon State University.

Slide 15

History. Presented is bone tissue from a 4-month-old female reindeer that died after developing a skin rash and swollen joints.

Diagnosis. Necrotizing osteomyelitis produced by Absidia corymbifera (phycomycosis). The fungus was also found in the skin lesions and in focal granulomatous lesions in the lung.

Comment. Members of the Phycomycetes group tend to stain well with H&E and poorly with many of the bound-glycogen staining techniques. Nonparallel hyphal walls, numerous bulbous structures, and sparse, irregularly spaced septae are characteristics of this group of fungi.

Suggested reading. Rippon, J. W.: Mycomycosis. In Medical Mycology. Philadelphia, W. B. Saunders Co., 1974, chap. 21, pp. 430-447.

Contributor. National Zoological Park, Washington, D.C.

Slide 16

History. This is tissue from a 10-month-old female golden pheasant. The bird was noted to have been in poor condition for over a week.

Diagnosis. Nodular typhlitis caused by Heterakis isolonche.

Suggested reading. Griner, L. A., Migaki, G., Penner, L. R., and McKee, A. E., Jr: Heterakidosis and nodular granulomas caused by Heterakis isolonche in the ceca of gallinaceous birds. Vet. Pathol. 14: 582-590, 1977.

Contributor. National Zoological Park, Washington, D.C.

Slide 17

History. Tissue is presented from a sheep which died, along with several others. The entire flock was "acting poorly"; mild central nervous system signs were noted. Cattle on the same range were apparently unaffected.

Diagnosis. Locoweed toxicosis.

Comment. The neuronal vacuolation coupled with the history in this case makes the diagnosis relatively simple. Cytoplasmic vacuolation in numerous epithelial cells is produced by the toxic element of Astragalus and Oxytropis species (locoweed). Cattle are less susceptible to poisoning than are sheep.

Suggested reading. Van Kampen, K. R., and James, L. F.: Pathology of locoweed poisoning in sheep. Vet. Pathol. 6: 413-423, 1969.

Contributor. Montana State Diagnostic Laboratory, Bozeman, Montana.

Slide 18

History. A 21-day-old foal was found dead. The animal had appeared normal the previous day.

Diagnosis. Multifocal necrotic hepatitis produced by Bacillus piliformis (Tyzzer's disease).

Comment. Tyzzer's disease has been reported in numerous species but not yet in man. The bacillus is difficult to culture but stains well with Giemsa and GMS as well as other techniques in tissue.

Suggested reading

Pulley, L. T., and Shively, J. N.: Tyzzer's disease in a foal. Light- and electron-microscopic observations. Vet. Pathol. 11: 203-211, 1974

Harrington, D. H.: Bacillus piliformis infection (Tyzzer's disease) in two foals. J. Am. Vet. Med. Assoc. 168: 58-60, 1976.

Contributor. Montana State Diagnostic Laboratory, Bozeman, Montana.

Slide 19

History. Tissue is presented from a 1-week-old foal found in a weak condition. The mare would not accept it. Respiratory problems developed rapidly and the foal died.

Diagnosis. Splenic lymphoid depletion and acute interstitial pneumonia consistent with the combined immunodeficiency (CID) reported in Arabian foals.

Comment. It is difficult to diagnose CID without evidence of lymphopenia and a deficiency of immunoglobulins. Maternal antibodies received in colostrum are generally catabolized within 30 days in the foal. The splenic lesion in this case is equivocal; does it represent agenesis (CID) or lymphocytic depletion compatible with a viral infection?

Suggested reading. McGuire, T. C., Poppie, M. J., and Banks, K. L.: Combined (B- and T-lymphocyte) immunodeficiency--A fatal genetic disease in Arabian foals. J. Am. Vet. Med. Assoc. 164: 70-76, 1974.

Contributor. University of Nebraska.

Slide 20

History. Tissue is presented from a 10-month-old male blesbok, one of three antelope-like ruminants that died after an acute, febrile illness.

Diagnosis. Necropurulent lymphadenitis caused by Yersinia pseudotuberculosis.

Comment. Rats and birds are known to be reservoir hosts for this bacterium. Infection is believed to occur by ingestion of contaminated material. Primary lesions usually occur in the small intestine with secondary mesenteric lymphadenitis leading, in some cases, to septicemia, with infectious emboli producing typical purulent lesions in many organs.

Suggested reading

Obwolo, M. J.: A review of yersiniosis (Yersinia pseudotuberculosis infection). Vet. Bull. 46: 167-171, 1976.

Baskin, G. B., Montali, R. J., Bush, M., Quan, T. J., and Smith, E.: Yersiniosis in captive exotic mammals. J. Am. Vet. Med. Assoc. 17: 908-912, 1977.

Contributor. National Zoological Park, Washington, D.C.

Slide 21

History. Lung tissue is presented from a 5-month-old cat that died after an illness characterized by anorexia, listlessness, icterus, and bilateral protrusion of nictitating membranes. The body was dehydrated and icteric at postmortem.

Diagnosis. Interstitial pneumonia with edema and parasitemia caused by a Cytauxzoon-like protozoan.

Comment. The recent discovery of Cytauxzoon-like organisms in tick-infested cats which have died of an acute, febrile illness in Missouri, Oklahoma, and Georgia has produced much interest. The organisms have been

noted in erythrocytes and in reticuloendothelial cells where schizogony occurs. The occurrence of schizogony in reticuloendothelial cells sets species of Cytauxzoon apart from the other genera of the Theileriidae family, which replicate in lymphocytes.

Suggested reading. Wagner, J. E.: A fatal cytauxzoonosis-like disease in cats. J. Am. Vet. Med. Assoc. 168: 585-588, 1976.

Contributor. University of Georgia.

Slide 22

History. Tissue is presented from a coyote. The animal had received an immunosuppressive drug.

Diagnosis. Multifocal necrotic hepatitis caused by Bacillus pilifocmis (Tyzzer's disease).

Contributor. Kansas State University.

Slide 23

History. Eight feeder hogs out of a pen of thirty had loose stools containing excess mucus and flecks of blood.

Diagnosis. Fibrinonecrotic colitis compatible with swine dysentery.

Comment. The lesions in this case are very mild and might better be described as a mucoid colitis with mucosal erosions. Although lesions of swine dysentery are usually more severe, the presented lesion from a euthanized pig could represent a mild or early form of the disease. The contributor indicated that numerous treponemal organisms were observed in a direct smear of the colonic mucosa stained with Victoria Blue 4R.

Suggested reading. Hughes, R., Olander, H. J., and Williams, C. B.: Swine dysentery: Pathogenecity of Treponema hyodysenteriae. Am. J. Vet. Res. 36: 971-977, 1975.

Contributor. University of Missouri.

Slide 24

History. Tissue is presented from a cat that had a history of sporadic convulsions after eating, with rapid return to normal. The owner requested euthanasia.

Diagnosis. Multifocal pyogranulomatous pneumonia caused by Aelurostrongylus abstrusus.

Contributor. University of Georgia.

Slide 25

History. This is tissue from the jaw of a 7-month-old poodle-mix canine.

Diagnosis. Craniomandibular osteopathy.

Comment. The mosaic pattern produced by the numerous reversal lines (cement lines) in the new bone of craniomandibular osteopathy is a morphologic aid in differentiating this condition from fibrous osteodystrophy. The absence of clinical evidence of renal malfunction or history of malnutrition, coupled with breed and age considerations, should lead one toward the diagnosis. Craniomandibular osteopathy is most often seen in small terrier

breeds from 4 to 8 months of age. Affected mandibular processes and tympanic bullae mechanically obstruct the action of the jaw in many cases. Periodic exacerbations are common.

Contributor. University of Missouri.

Slide 26

History. Tissue is presented from a captive juvenile white-tailed deer. This animal and several others became ill during the same four-week period. Ocular and nasal discharges were clinical features of the disease.

Diagnosis. Malignant catarrhal fever.

Comment. The diffuse infiltration/proliferation of fairly uniform lymphocytes in the heart and lymph node sections is suggestive of lymphoma; however, the lymphocytes are not the monotonous population one expects with lymphoma, and evidence of a segmental arteritis is noted in many sections of the kidney.

Suggested reading. Clark, K. A., and Adams, L. G.: Viral particles associated with malignant catarrhal fever in deer. Am. J. Vet. Res. 37: 837-840, 1976.

Contributor. Walter Reed Army Institute of Research, Washington, D.C.

Slide 27

History. This tissue is from a 6-week-old male New Zealand black rabbit that failed to grow at a normal rate.

Diagnosis. Chronic active nephritis caused by Encephalitozoon cuniculi.

Comment. It is necessary to differentiate E. cuniculi in tissues from Toxoplasma gondii. Although Toxoplasma affects renal tissue less commonly than Encephalitozoon organisms, both produce similar lesions in the central nervous system. Staining characteristics and electron-microscopic morphology are used to differentiate the two.

Contributor. University of Arizona.

Slide 28

History. A section of small intestine from a horse is presented. This standardbred filly had suffered a severe loss of weight for 2 months prior to examination. Edema, hypoproteinemia, and anemia were evident on clinical examination.

Diagnosis. Equine granulomatous enteritis.

Comment. The etiology of this disease is not yet clarified. Atypical mycobacteria and possible altered immune responses produced by the protein-losing aspect of the condition and/or inborn errors in the immune response are possible explanations for the pathogenesis of the lesions.

Suggested reading. Gimpcich, R. E.: Equine granulomatous enteritis. Vet. Pathol. 11: 535-547, 1974.

Contributor. Department of Veterinary Pathology, University of Montreal, Canada.

Slide 29

History. Tissue is presented from a 3-year-old male mixed-breed dog that had a temperature of 103-105°F for 3 to 4 weeks. Physical examination revealed lymphadenopathy and hepatosplenomegaly.

Diagnosis. Malignant lymphoma with dirofilaremia. In addition to the neoplastic infiltration there are numerous microfilaria in the blood as well as intimal proliferation in several pulmonary arteries.

Comment. The pure population of somewhat immature lymphocytes (prolymphocytes) infiltrating perivascular and peribronchiolar tissue, coupled with information provided by the physical examination, leads one to the diagnosis.

Contributor. Department of Comparative Medicine, Southwestern Medical School, University of Texas.

Slide 30

History. An adult male blue-crowned pigeon, housed in a zoo for over 3 years, died unexpectedly. Routine cultures for bacteria were negative.

Diagnosis. Chlamydiosis (psittacosis). (Electron microscopy revealed organisms identical to the published accounts for chlamydial agents.)

Comment. Unusual in this case are the large numbers of chlamydial organisms visible in the cytoplasm of reticuloendothelial cells in the H&E sections. The contributor indicated that lesions similar to those in the

Suggested reading. Orthoefer, J. G., Baker, N. F., and Kennedy, P. C.: Peritonitis due to an intermediate stage of cestode in a dog with lymphosarcoma. J. Am. Vet. Med. Assoc. 165: 537-538, 1974.

Contributor. University of California at Davis.

Slide 34

History. Tissue is presented from a parasite-free 3-year-old female pointer dog that continued to lose weight despite a good appetite. A large mass was palpated in the mid-abdominal area.

Diagnosis. Mucus-secreting, sclerosing adenocarcinoma of intestinal origin.

Contributor. Kentucky Department of Agriculture, Diagnostic Laboratory, Hopkinsville, Kentucky.

Slide 35

History. Tissue is presented from a dog that had a unilateral nasal discharge.

Diagnosis. Granulomatous polypoid rhinitis caused by Rhinosporidium seeberi.

Comment. Small spores (4u) and very large sporangia (up to 300u) filled with endospores are seen in the section. Infections with Rhinosporidium species have been reported in horses, cattle, water fowl, and man as well as dogs. Animal-to-animal transmission apparently does not occur.

Suggested reading. Davidson, W. R., and Nettles, V. F.: Rhinosporidiosis in a wood duck. J. Am. Vet. Med. Assoc. 171: 989-990, 1977.

Contributor. University of Florida.

Slide 36

History. Tissue is presented from a thin 5-year-old foxhound. The lungs were pink/red and failed to collapse when the thorax was opened.

Diagnosis. Interstitial pneumonia with giant cells caused by canine distemper virus.

Comment. Both cytoplasmic and intranuclear inclusion bodies are seen in the section--particularly in the giant cells.

Contributor. Comparative Pathology Section, National Institutes of Health.

Slide 37

History. Tissue from a hooded parakeet is presented.

Diagnosis. Pacheco's parrot disease (Herpesvirus infection) with concomitant erythroblastosis.

Suggested reading. Simpson, C. F., Hanley, J. E., and Gaskin, J. M.: Psittacine Herpesvirus infection resembling Pacheco's parrot disease. J. Infect. Dis. 131: 390-396, 1975.

Contributor. California Veterinary Laboratory Services, San Gabriel, California.

Slide 38

History. This tissue is from a 10-week-old female fox. The animal appeared healthy but was unable to move her hind limbs.

Diagnosis. Subacute encephalomyelitis with neuronal degeneration. The areas of the brain where microscopic lesions were observed (spinal cord and pons) were positive for rabies virus antigen by fluorescent antibody testing. The fox had received modified live virus rabies vaccine 2 weeks prior to the onset of posterior paralysis.

Comment. A diagnosis of rabies is difficult to make histologically. The disease can present a variety of histologic lesions, and definitive diagnosis must be based on FA and mouse inoculation tests.

Contributor. Letterman Army Institute of Research, San Francisco, California.

Slide 39

History. Tissue is presented from a cow. This cow had clinical signs suggestive of a central nervous system disorder. Fifteen cows from the herd were sick or dead.

Diagnosis. Cerebrocortical necrosis presumed to result from Xanthoxylum americanum (prickly ash) toxicity.

Comment. The contributor indicated that feeding tests strongly implicated bark from prickly ash trees growing in the herd's pasture.

Contributor. University of Georgia.

Slide 40

History. A male German short-hair pointer dog was presented with dyspnea. Radiography revealed a mediastinal mass. Tissue is presented from that mass.

Diagnosis. Parathyroid carcinoma. (This diagnosis was confirmed by electron microscopic studies.)

Comment. The relationship of hypercalcemia (reported in this dog) and parathyroid tumors is obvious. Hypercalcemia has been associated with several other types of tumors in dogs, but the mechanism responsible for this phenomenon is not well understood.

Contributor. Animal Medical Center, New York.

Slide 41

History. Recently purchased gilts became ill (muscle weakness, anorexia, and bloody diarrhea were exhibited) and died several weeks after being placed in a remodelled shed. The BUN of one gilt was 348 mg/100 ml.

Diagnosis. Ethylene glycol poisoning.

Comment. Antifreeze was mixed with the drinking water as a result of a plumbing malfunction.

Contributor. Kansas State University.

Slide 42

History. Tissue is presented from the scrotum of an 8-year-old dog.

Diagnosis. Mesothelioma.

Comment. Controversy surrounds this case. Senior staff members at the AFIP feel that this tumor is a poorly differentiated adenocarcinoma of sweat gland origin. The glandular nature of the growth and its location, in the dermis, tends to support this diagnosis.

Contributor. Edgewood Arsenal Biomedical Laboratory.

Slide 43

History. A section from an "abdominal mass" in a mature domestic short-hair cat.

Diagnosis. Normal placenta.

Contributor. Pfizer, Inc. Groton, Connecticut.

Slide 44

History. This section is from the brain of a 5-year-old ox with clinical signs of blindness, head pressing, and pharyngeal paralysis.

Diagnosis. Lead poisoning.

Comment. Lesions in this case are minimal. In some areas the neurons are shrunken and have eosinophilic cytoplasm. Some endothelial hypertrophy was also noted in cerebral capillaries. The level of lead in the blood was 1.07 ppm and in the kidney, 75.6 ppm.

Contributor. Oklahoma State University.

Slide 45

History. This nodule was removed from the skin of the base of the tail of a 5-year-old cow. Similar nodules were noted on the skin in other areas. Nasal bleeding had been noted.

Diagnosis. Maduromycosis.

Comment. A fungal pyogranulomatous inflammation of the dermis is discernible; however, the exact identification of the fungus is not possible without special staining procedures and/or fluorescent antibody techniques.

Suggested reading. Roberts, E. D., McDaniel, H. A., and Carbrey, E. A.: Maduromycosis of the bovine nasal mucosa. J. Am. Vet. Med. Assoc. 142: 42-48, 1963.

Contributor. Oklahoma State University.

Slide 46

History. This is a section from a mass in the upper mediastinum which was adhering to the left upper lobe of the lung of a baboon.

Diagnosis. Spindle cell thymoma.

Comment. Myasthenia gravis (MG) has been associated with thymomas in man and possibly canines as well. It appears that MG patients produce antibodies against determinants in their own skeletal muscles. It is speculated that "hyoid" cells, known to be present in the developing fetus and sometimes found in thymomas, provide an antigenic stimulus when they degenerate, thus triggering an immune response (reference).

Reference. Robbins, S. L.: Pathologic Basis of Disease. Philadelphia, W. B. Saunders Co., 1974, chap. 15, pp. 631-632.

Suggested reading

Parker, G. A., and Casey, H. W.: Thymomas in domestic animals. Vet. Pathol. 13: 353-364, 1976.

Palmer, A. C., and Barker, J.: Myasthenia in the dog. Vet. Rec. 95: 452-454, 1974.

Contributor. University of Alabama.

Slide 47

History. Tissue from a 3-week-old mouse is presented. The colony had a history of deaths during the nursing period.

Diagnosis. Lethal intestinal virus of infant mice (LIVIM).

Comment. The etiologic agent of this disease is a member of the Coronavirus genus and is indistinguishable from the mouse hepatitis virus. LIVIM virus is known to be transmitted by air.

Suggested reading. Bigger, D. C., Kraft, L. M., and Spinz, H.: Lethal intestinal virus infection of mice (LIVIM). An important new model for study of the response of the intestinal mucosa to injury. Am. J. Pathol. 45: 413-422, 1964.

Contributor. University of Alabama.

Slide 48

History. This is tissue from a mature Macaca mulatta used in a study of chronic radiation effects. The monkey became moribund and died.

Diagnosis. Actinomycosis.

Comment. A Gram stain serves to differentiate Actinomyces and Actinobacillus, which can produce similar lesions. Nocardia and Actinomyces organisms are both Gram-positive; however, Nocardia is frequently acid-fast and is not usually associated with the club-shaped, eosinophilic organisms of the Splendore-Hoeppli phenomenon, seen often with Actinomyces colonies.

Contributor. School of Aerospace Medicine, Brooks Air Force Base, Texas.

Slides 49 and 50

History. Tissue is presented from the uterus (slide 49) and the spleen (slide 50) of a moribund 622-day-old BALB/c female mouse. Multiple nodules were noted in the kidney and spleen at necropsy.

Diagnosis. Malignant hemangioendothelioma.

Comment. In the mouse, the body of the uterus and the cervix are common sites of origin for this tumor as well as its benign counterpart. The marked extramedullary hematopoiesis in the spleen probably reflects the accelerated destruction of erythrocytes in abnormal neoplastic vascular structures, leading to anemia.

Contributor. National Center for Toxicological Research.

Slide 51

History. Tissue is presented from a 5-month-old female Toggenberg kid (goat) that developed progressive posterior paralysis.

Diagnosis. Diffuse leukomyelitis compatible with viral leukoencephalomyelitis of goats.

Comment. Listeriosis and copper deficiency are to be considered in the differential diagnosis in this case. Microabscesses in the posterior brain and cord associated with Gram-positive rods would implicate Listeria, and copper deficiency is characterized by hypomyelinogenesis and a lack of inflammatory cell infiltration.

Suggested reading. Cork, L. C.: Differential diagnosis of viral leukoencephalomyelitis of goats. J. Am. Vet. Med. Assoc. 169: 1303-1306, 1976.

Contributor. University of Arkansas.

Slide 52

History. Tissue is presented from a 2-week-old chicken, one of many with respiratory distress and diarrhea.

Diagnosis. Cryptosporidiosis of the bursa of Fabricius.

Suggested reading. Fletcher, O. J., Munnell, J. F., and Page, R. K.: Cryptosporidiosis of the bursa of Fabricius of chickens. Avian Dis. 19 (3): 630-639, 1975.

Contributor. Ellington Agriculture Center, Nashville, Tennessee.

Slide 53

History. Tissue is presented from a 2-month-old male pig. Clinical signs included anorexia, depression, and extreme thirst.

Diagnosis. Centrilobular to massive hepatic necrosis.

Comment. This represents a rather severe toxic hepatosis. Gossypol, coaltar pitch, and cocklebur could produce such necrosis. A complete history would be helpful in reaching a definitive diagnosis. Hepatosis dietetica (vitamin E/selenium deficiency) is an additional consideration; however, a variegated appearance, produced by affected lobules adjacent to normal ones, is usually observed in this condition.

Contributor. Gillette Medical Evaluation Laboratories.

Slide 54

History. These tissues are from a 2-week-old calf that exhibited dyspnea prior to death.

Diagnosis. Diffuse interstitial pneumonia and mild nonsuppurative myocarditis probably caused by Sarcocystis infection.

Comment. Schizonts filled with basophilic organisms can be observed within endothelial cells in the lung. Some sections reveal cystlike forms in myocardial fibers associated with little inflammatory reaction. The early onset of clinical disease in this case suggests that vertical transmission should be investigated.

Suggested reading. Johnson, A. J., Hildebrandt, P. K., and Fayer, R.: Experimentally induced Sarcocystis infection in calves: Pathology. Am. J. Vet. Res. 36: 995-999, 1976.

Contributor. Oregon State University.

Slide 55

History. Tissues are presented from a 7-year-old poodle that was taken to a veterinarian. The dog had convulsions following exercise.

Diagnosis. Islet cell carcinoma.

Comment. The contributor indicated that the blood sugar levels ranged between 38 and 52 mg./100 ml. Islet cell carcinomas frequently metastasize to the liver. Hypoglycemic convulsions are produced by functional (insulin-secreting) beta cell tumors. Demonstration of beta cell granules can be accomplished with the aldehyde-fuchsin technique.

Suggested reading. Njoku, C. O., Strafuss, A. C., and Dennis, S. M.: Canine islet cell neoplasia: A review. J. Am. Anim. Hosp. Assoc. 8: 284-290, 1972.

Contributor. University of Missouri.

Slide 56

History. An aged quarter horse mare was presented in severe respiratory distress following a prolonged illness.

Diagnosis. Chronic mucoid bronchitis and bronchiolitis.

Comment. Chronic bronchitis with excess mucus production, often attributed to hypersensitivity, can lead to alveolar emphysema. Fibrosis of septal walls as a result of the emphysematous process (not appreciated in

this case) is thought to produce the typical "heaves" of "broken wind," which is a forced, second effort by the horse to expel the remaining tidal volume from the compromised lungs.

Contributor. Ohio State University.

Slide 57

History. This is tissue from a "stunted" 1-year-old ewe.

Diagnosis. Sclerosing intestinal adenocarcinoma with metastasis to a mesenteric lymph node.

Comment. This condition occurs rather frequently (in up to 6 percent of sheep slaughtered) in endemic areas of New Zealand, Iceland, Australia, and Scotland. Distinct geographic variations in prevalence may be due to breed susceptibility, environmental factors, or differences in herd management. The role of nitrosamines, which can be produced from nitrites in the gastrointestinal tract, is currently under investigation.

Suggested reading. Simpson, B. H., and Jolly, R. D.: Carcinoma of the small intestine in sheep. J. Pathol. 112: 83-92, 1974.

Contributor. University of California at Davis.

Slide 58

History. Tissue is presented from a 1 1/2-year-old Charolais heifer that had posterior ataxia for about 1 year, terminating with hind limb paresis.

Diagnosis. Disordered myelin associated with progressive ataxia in Charolais cattle.

Comment. The lacy appearance of myelin tracts in the neuropil and small plaques of eosinophilic fibrillar material are the lesions of note.

Suggested reading. Blakemore, W. F., Palmer, A. C., and Barlow, R. M.: Progressive ataxia of Charolais cattle associated with disordered myelin. Acta Neuropathol. 29: 127-139, 1974.

Contributor. Oklahoma State University.

Slide 59

History. A juvenile male Macaca mulatta had firm, raised cutaneous nodules measuring up to 20 mm. in diameter. The nodules were solid and yellow on the cut surface.

Diagnosis. Systemic aspergillosis.

Comment. The granulomatous nature of the lesions, with numerous giant cells containing fungal elements, suggests a diagnosis of granulomatous dermatitis of fungal etiology. Aspergillus fumigatus was cultured from several nodules.

Contributor. Pfizer Inc., Groton, Connecticut.

Slide 60

History. This is tissue from a 5-year-old intact male domestic short-hair cat. The animal was said to be listless.

Diagnosis. Myeloproliferative disorder.

Comment. Large myeloblastic cells can be seen in the periportal areas of the liver. The presence of numerous nucleated red blood cells is probably a response to the anemia--extramedullary erythropoiesis.

Suggested reading. Giles, R. C., Bubles, W. C., and Montgomery, C. A., Jr.: Myeloproliferative disorder in a cat. J. Am. Vet. Med. Assoc. 165: 456-457, 1974.

Contributor. School of Medicine, University of Rochester.

Slide 61

History. A 9-year-old female German shepherd was presented because of a slowly growing lesion on the metacarpal bone.

Diagnosis. Malignant giant cell tumor.

Comment. Radiographs of this tumor revealed a cystic, lytic lesion in the metaphysis. The cystic appearance is compatible with osteoclastoma (giant cell tumor), but these tumors usually arise from the epiphyseal areas of bones and do not usually metastasize. The contributor indicated that this neoplasm had spread to pelvic bones, a lymph node, and to the lungs.

Suggested reading. Misdorp, W., and Van der Heul, R. O.: Tumours of bones and joints. Bull. W.H.O. 53: 265-282, 1976.

Contributor. School of Medicine, University of Rochester.

Slide 62

History. Tissue is presented from an adult rat that had been exposed to volatile inhalant at weanling age. At necropsy the lungs were seen to have numerous nodules, and a similar nodule was noted in a kidney.

Diagnosis. Metastatic squamous cell carcinoma (epidermoid carcinoma).

Comment. Adenomatoid change in the lungs of rats in response to respiratory irritants is a commonly observed phenomenon. Squamous metaplasia and neoplasia occur in these areas, but only rarely do epidermoid carcinomas metastasize, as was the case with this rat.

Contributor. Pathology Branch, Toxic Hazards Division, Wright-Patterson AFB, Ohio.

Slides 63 and 64

History. This chinchilla had a mild alopecia and displayed a lack of vigor. Sections are from the uterus (slide 63) and the lung (slide 64).

Diagnosis. Trophoblastic embolism (uterus and lungs).

Comment. This condition is reported in several species, including man, and is associated with hemo-chorial placentation, in which the chorion is directly exposed to the maternal blood. Surprisingly, clinical signs are rare.

Contributor. Veterinary Laboratory Services, State of California.

Slide 65

History. Sections from a mass in the abdominal cavity of a meadow vole.

Diagnosis. Granulosa cell tumor.

Comment. The solid nature of this tumor with only occasional follicle-like structures makes the diagnosis difficult. Granulosa cell tumors rarely metastasize but are, in many species, endocrine-active. The nature of the endocrine activity can vary from estrogenic (nymphomania seen in cows)

to progesterone-like (reported in the bitch) to androgenic (stallion-like mares). These variations are understandable since all of the steroid sex hormones are biochemically similar and readily interconvertible.

Contributor. Division of Pathology, Bureau of Biologics, Federal Department of Agriculture.

Slide 66

History. The tissue presented is from a subcutaneous nodule on the elbow of an 18-year-old male rhesus monkey.

Diagnosis. Glomus tumor.

Comment. These tumors arise from specialized cells of the glomus bodies. These bodies apparently regulate blood flow; however, their mode of operation and the origin of the cells of the glomus bodies are matters of speculation. Two months after the biopsy (tissue presented), this monkey was put to death because of his rapid physical deterioration. Metastatic foci of glomus tumor were found in many organs.

Suggested reading. Robbins, S. L.: Pathologic Basis of Disease. Philadelphia, W. B. Saunders Co., 1974, chap. 15, pp. 631-632.

Contributor. Institute of Experimental Gerontology, Rijswijk, The Netherlands.

Slide 67

History. This 23-month-old female WAG/Rij (Wistar-derived) rat had been exposed to a single dose (25 rads) of x-irradiation at 2 months of age. The rat was killed when found moribund.

Diagnosis. Medullary thyroid carcinoma.

Comment. Differentiating these tumors from tumors of follicular cell origin can be difficult at times. The Sevier-Munger silver stain is useful in such instances. The argentaffin secretory granules of parafollicular cells can be identified by light microscopy.

Suggested reading. Boorman, G. A., and Hollander, C. F.: Medullary carcinoma of the thyroid. Animal model of human disease. Am. J. Pathol. 83: 237-240, 1976.

Contributor. Institute of Experimental Gerontology, Rijswijk, The Netherlands.

Slide 68

History. These are sections from a 60-pound feeder pig. Several pigs had died without clinical signs.

Diagnosis. Vitamin E/selenium deficiency.

Comment. Myocardial fiber damage can result directly from the oxidation of membranes brought about by the deficiencies and/or indirectly from ischemia caused by the microangiopathy, also a result of vitamin E/selenium deficiencies. The roles of selenium, vitamin E, and sulfur-containing amino acids in protecting lipid-rich cell membranes is discussed in the reference.

Reference. Van Fleet, J. F., Ruth, G., and Ferrans, V. J.: Ultrastructural alterations in skeletal muscle of pigs with selenium-vitamin E deficiency. Am. J. Vet. Res. 37: 911-922, 1976.

Contributor. University of Missouri.

Slide 69

History. Sections are presented from the colon of a pig on experimental study.

Diagnosis. A minimal chronic colitis associated with the presence of numerous cryptosporidial organisms.

Comment. Cryptosporidial infections have been reported in a variety of species and associated with chronic diarrhea in several, including calves as described in the cited reference. In most infections, clinical signs are absent or overlooked. The role of Cryptosporidia in the production of diarrhea in various species and the possible pathogenic mechanisms involved are currently under study.

Reference. Pohlenz, J., Moon, H. W., Cheville, N. F., and Bemrick, W. J.: Cryptosporidiosis as a probable factor in neonatal diarrhea in calves. J. Am. Vet. Med. Assoc. 172: 452-457, 1978.

Suggested reading. Kennedy, G. A., Kreitner, G. L., and Strafuss, A. C.: Cryptosporidiosis in three pigs. J. Am. Vet. Med. Assoc. 170: 348-350, 1977.

Contributor. Kansas State University.

Slide 70

History. Tissue is presented from a 10-year-old male Spitz-cross canine that had an irregular firm mass in the subcutis of the shoulder. The growth was tan and homogeneous on the cut surfaces.

Diagnosis. Liposarcoma.

Comment. Liposarcomas rarely metastasize. Metastatic foci, when they occur, are found in the liver and/or lungs.

Contributor. Merck Institute for Therapeutic Research.

Slide 71

History. These are sections from a 1 1/2-year-old female Labrador-cross that was dyspneic and had pale mucous membranes and a palpable mass in the left flank region. Surgery revealed an extensive infiltrating soft tissue mass involving the retroperitoneum, primarily in the area of the adrenal.

Diagnosis. Ganglioneuroblastoma (differentiating neuroblastoma).

Contributor. Merck Institute for Therapeutic Research.

Slide 72

History. Tissue is presented from a mass in the abdomen of an 8-year-old female dog.

Diagnosis. Dysgerminoma.

Comment. The histologic similarity of this tumor and seminoma of the testis is obvious. All dysgerminomas are considered potentially malignant. The tumor is fairly rare but has been reported in dogs, cats, and cows.

Contributor. Biomedical Laboratory, Edgewood Arsenal.

Slide 73

History. This tissue was taken from a 2-year-old male guinea pig with a chronic pododermatitis.

Diagnosis. Multiple pulmonary thrombosis, probably representing the condition of disseminated intravascular coagulation secondary to Staphylococcus aureus septicemia.

Contributor. Pennsylvania State University.

Slide 74

History. This tissue was taken from a weanling female guinea pig that had a Balantidium coli infestation which was treated. The animal died on the third post-treatment day.

Diagnosis. Acute tubular necrosis caused by chloroquine HCL. Other guinea pigs given the same dose (.25 mg./gr.) remained well.

Suggested reading. Read, W. K., and Bay, W. W.: Basic cellular lesion in chloroquine toxicity. Lab. Invest. 24: 246-259, 1971.

Contributor. Pennsylvania State University.

Slide 75

History. Sections are presented from a firm lobulated mass in the skin on the medial aspect of the hind leg of a mature German shepherd dog.

Diagnosis. Basal cell tumor.

Suggested reading. Strafuss, A. C.: Basal cell tumors in dogs. J. Am. Vet. Med. Assoc. 169: 322-324, 1976.

Contributor. Merck Institute for Therapeutic Research.

Slide 76

History. Tissue is presented from a skunk found in the basement of a home. The animal appeared blind.

Diagnosis. Infection with canine distemper virus.

Comment. Mild acute conjunctivitis, acute ulcerative keratitis with corneal edema hypopyon, and dacryoadenitis are the lesions of note. Numerous intranuclear and intracytoplasmic inclusion bodies are seen in the epithelial cells of the lacrimal gland. Retinal changes, sometimes associated with canine distemper, are not prominent in this section. The corneal lesions are most likely traumatic in origin.

Contributor. Biomedical Laboratory, Edgewood Arsenal.

Slide 77

History. A 4-month-old calf from a dairy herd had a nasal discharge, was "breathing hard," and had a "deep cough."

Diagnosis. Subacute non-suppurative interstitial pneumonia caused by parainfluenza-three virus.

Comment. Numerous syncytial cells with intranuclear and intracytoplasmic eosinophilic inclusion bodies are the pathognomonic features of this case.

Contributor. University of Nebraska.

Slide 78

History. This section was taken from a mass removed from a 10-year-old male dachshund.

Diagnosis. Solid carcinoma of the superficial glands of the membrana nictitans.

Comment. This carcinoma probably originated in the seromucous glands of the membrana nictitans. Some pre-existing seromucous glands are noted at the periphery of the mass, and acinar structures with transitional-appearing cells can be appreciated. Vascular invasion is apparent in most sections.

Contributor. Army Medical Research Institute of Infectious Diseases, Ft. Detrick, Maryland.

Slide 79

History. This represents tissue taken from an 8-month-old male German shepherd dog that was having difficulty with urination and passed blood-tinged urine. Surgery revealed a mass attached to the mucosal surface of the bladder.

Diagnosis. Embryonal rhabdomyosarcoma.

Suggested reading

Kelly, D. F.: Rhabdomyosarcoma of the urinary bladder in dogs. Vet. Pathol. 10: 375-384, 1973.

Halliwell, W. H., and Ackerman, N.: Botryoid rhabdomyosarcoma of the urinary bladder and hypertrophic osteoarthropathy in a young dog. J. Am. Vet. Med. Assoc. 165: 911-913, 1974.

Contributor. Comparative Medical and Veterinary Services, Los Angeles County Department of Health.

Slide 80

History. This 4-month-old F344 rat lost weight while in an experimental program.

Diagnosis. Cardiomyopathy induced by adriamycin.

Comment. The most striking lesion in this case is the atrial thrombus, which apparently is the cause of death in many cases of adriamycin-induced cardiomyopathy in rats. The suggested readings describe the cellular changes associated with adriamycin. Numerous cells in the body are affected, and lesions in the myocardium include myofiber vacuolation, interstitial edema, and fibrosis, generally oriented around vessels.

Suggested reading

Young, D. M.: Pathologic effects of adriamycin in experimental systems. Cancer Chemother. Rep. 6: 159, 1975.

Olson, H. M. Young, D. M., Prieur, D. J., et al.: Electrolyte and morphologic alterations of myocardium in adriamycin-treated rabbits. Am. J. Pathol. 77: 439-454, 1974.

Contributor. National Cancer Institute.

Slide 81

History. Tissue is presented from a 1-year-old female Irish setter who had painful, swollen joints and a leukocytosis over the 4-month period prior to her being put to death.

Diagnosis. Hepatic amyloidosis.

Comment. A Mycoplasma organism was isolated from the synovial fluid of this dog. At necropsy, a chronic suppurative polyarthritis was noted. The occurrence of secondary amyloidosis as a sequela to chronic suppurative infections is well documented. In this case, amyloid can be appreciated in the space of Disse throughout the section.

Contributor. Colorado State University.

Slide 82

History. This is tissue from a clam (Macoma balthica) from the Tred Avon River, Chesapeake Bay, Maryland.

Diagnosis. Carcinoma, probably originating in the gill.

Suggested reading. Christensen, D. J., Farley, C. A., and Kern, F. G.: Epizootic neoplasms in the clam Macoma balthica (L.) from Chesapeake Bay. J. Natl. Cancer Inst. 52: 1739-1749, 1974.

Contributor. National Marine Fisheries Service.

Slide 83

History. This is a winter flounder. Multiple white-yellow nodules on the surface and embedded in the wall of the intestine were noted at necropsy.

Diagnosis. Multiple cysts produced by the microsporidian Glugea stephani.

Comment. Microsporidial infection is not uncommon in fish. Several genera of the family Nosematidae, including Nosema and Glugea can infect fish. The cysts arise from parasitized cells, which expand in response to the proliferating organisms.

Suggested reading. Sprague, V., and Vernick, S. H.: The ultrastructure of Encephalitozoon cuniculi (Microsporida, Nosematidae) and its taxonomic significance. J. Protozool. 18: 560-569, 1971

Contributor. National Marine Fisheries Service.

Slide 84

History. This mass was noted protruding from the surface of the kidney of a control Charles River albino rat used in a toxicologic experiment. The rat was 4 months old.

Diagnosis. Embryonal nephroma.

Comment. This tumor apparently arises from a pluripotential "nephroblast" cell of the mesonephric bud (embryonic mesoderm). It is one of the most common tumors reported in swine and is fairly common in chickens also. The tumor in chickens has been associated with the avian oncornavirus. Because of the pluripotentiality of the cell of origin, a wide range of histologic patterns can be seen in these tumors, from primarily glandular with tubules and glomerular differentiation to predominantly stromal with fibrous tissue or even cartilage and bone. Embryonal nephromas occur in younger animals and grow to a large size without metastasis, except in dogs, in which over half the reported cases involved metastases. Carcinogens such as nitrosamines can induce embryonal nephromas in young rats if the compound is given during a specific period in the rodent's development.

Contributor. Industrial Bio-Test Laboratories, Inc., Northbrook, Illinois.

Slide 85

History. Tissue is presented from an adult guinea pig killed because of poor condition. The animal was severely emaciated and had diffuse alopecia.

Diagnosis. Severe diffuse interstitial fibrosis and mineralization of the lung.

Suggested reading

DeLuca, H. F.: Vitamin D endocrinology. Ann.Intern. Med. 85: 367-377, 1976.

Sparschu, G. L., and Christie, R. J.: Metastatic calcification in a guinea pig colony: A pathological survey. Lab. Anim. Care 18: 520-526, 1968.

Contributor. Letterman Army Institute of Research, San Francisco, California.

Slide 86

History. Presented is a section from a mass in the abdomen of a Charles River albino male rat used in a low-level toxicologic experiment. The rat was 2 years old.

Diagnosis. Adrenal cortical carcinoma. The tumor was considered to be spontaneous in origin.

Contributor. Industrial Bio-Test Laboratories, Inc.

Slide 87

History. Brain stem sections are presented from a 4-day-old Polled Hereford calf. This calf was one of four, all sired by the same bull; the calves were born unable to rise and exhibited tonic convulsions.

Diagnosis. Hereditary neuraxial edema.

Comment. The lesion in the section is best described as a spongiform or vacuolar encephalopathy. The history indicates an inherited condition, and the references provide excellent reviews of this entity.

References

Cordy, D. R., Richards, W. P. C., and Stormont, C.: Hereditary neuraxial edema in Hereford calves. Vet. Pathol. 6: 487-501, 1969.

Davis, G. B., Thompson, E. J., and Kyle, R. J.: Letter: Hereditary neuraxial oedema of calves. N. Z. Vet. J. 23: 181, 1975.

Contributor. South Dakota State University.

Slide 88

History. An adult rat was presented for necropsy in a moribund condition. The ventrum of the neck contained a large cystic mass in the subcutis.

Diagnosis. Malignant fibrous histiocytoma.

Comment. The proliferating cells are histologically compatible with histiocytes and appear to be producing collagen; therefore, the tumor is very similar to the human entity called malignant fibrous histiocytoma. Such a tumor is not a well-recognized entity in veterinary pathology and should not be confused with canine cutaneous histiocytoma. The most popular theory concerning the pathogenesis of the fibrous histiocytoma is based on the pluripotentiality of the histiocyte, which can apparently take on fibroblastic functions such as collagen production. This could explain the fibrous nature of these tumors.

Contributor. Pathology Branch, Toxic Hazards Division, Wright-Patterson Air Force Base, Ohio.

Slide 89

History. Tissue is presented from an albino rabbit that died several days after receiving an immunogenic intravenous injection of killed bacteria.

Diagnosis. Desquamative interstitial pneumonia.

Suggested reading. Deodhar, S. D., and Bhagwat, A. G.: Desquamative interstitial pneumonia-like syndrome in rabbits. Arch. Pathol. 84: 54-58, 1967.

Contributor. University of Florida.

Slide 90

History. A 3-month-old quarter horse filly had signs of respiratory distress beginning on 14 May. Broad spectrum antibiotic treatment was unsuccessful and the horse died on 22 June.

Diagnosis. Pneumonia caused by Pneumocystis carinii.

Comment. The immunologic status of this animal was most likely impaired, possibly the result of a genetic defect. When the passively acquired maternal antibodies waned, the protozoan was able to proliferate.

Suggested reading. McGuire, T. C., Poppie, M. J., and Banks, K. L.: Combined (B- and T-lymphocyte) immunodeficiency: A fatal genetic disease in Arabian foals. J. Am. Vet. Med. Assoc. 164: 70-76, 1974.

Contributor. Ohio State University.

Slide 91

History. Tissue is presented from a moribund 622-day-old BALB/C female mouse. Necropsy revealed multiple hard greyish masses in the parenchyma of the kidneys and enlarged abdominal lymph nodes. The spleen also had multiple nodules in the parenchyma.

Diagnosis. Renal cell carcinoma (renal adenocarcinoma). Tumor was present in both kidneys. This animal also had nodular hematopoiesis in the spleen and reticulum cell sarcoma (type B) in the abdominal lymph nodes.

Comment. Certain BALB/C sub-strains have a high spontaneous occurrence of renal adenocarcinomas. The tumor can be induced in low-occurrence strains of mice by carcinogenic compounds such as urethane.

Contributor. National Center for Toxicological Research, Jefferson, Arkansas.

Slides 92 and 2x2

History. A 10-year-old male German shepherd was presented with tenesmus and urinary incontinence. An abdominal mass (slide 92) was noted at surgery.

Diagnosis. Leiomyosarcoma of the urinary bladder with metastasis to multiple organs.

Comment. The 2x2 slide represents an electron microscopic (EM) section of the tumor. The presence of myofilaments (mostly in perinuclear cytosol), pinocytotic vesicles, and gap junctions are the EM characteristics which influence the diagnosis. The notable number of mitotic figures seen in the light microscopic sections is considered unusual for smooth muscle tumors.

Suggested reading. Seely, J. C., Cosenza, S. F., and Montgomery, C. A.: Leiomyosarcoma of the canine urinary bladder, with metastases. J. Am. Vet. Med. Assoc. 172: 1427-1429, 1978.

Contributor. Walter Reed Army Institute of Research, Washington, D.C.

Slide 93

History. A 3-month-old female "Toypom" was presented for postmortem examination. The animal was slightly emaciated, and clinical records revealed that no distemper vaccination had been given.

Diagnosis. Granulomatous meningoencephalitis caused by Encephalitozoon-like organisms. This dog also had multifocal granulomatous myocarditis, nephritis, and hepatitis.

Comment. Encephalitozoon organisms belong to the family Nosematidae. This family also contains the genus Nosema. With few exceptions, organisms of Nosema species parasitize invertebrates such as bees (Isle of Wight disease) and silkworms (pebrine disease), while those of Encephalitozoon species are parasites of a variety of vertebrates, including many mammals. Electron microscopy is necessary to separate the two genera, since documented, albeit rare, cases of nosematosis have been reported in mammals. The presence of a polar filament in microsporidians (includes Nosematidae) serves to differentiate Nosema and Encephalitozoon species from Toxoplasma, a protozoon of similar size which produces comparable lesions. The Gram-positivity of mature Encephalitozoon spores makes them easily differentiated from Toxoplasma organisms.

Suggested reading. Sprague, V., and Vernick, S. H.: The ultrastructure of Encephalitozoon cuniculi (Microsporida, Nosematidae) and its taxonomic significance. J. Protozool. 18: 560-569, 1971.

Contributor. Department of Geographic Pathology, Armed Forces Institute of Pathology, Washington, D.C.

Slide 94

History. Tissue is presented from a kangaroo that died in a small zoo. Prior to death the animal was listless and had diarrhea.

Diagnosis. Coccidiosis (some sections also contain Strongyloidea-like nematodes).

Comment. Cells in the schizont stage are abundant in this case; it is surprising that other stages of the enteroepithelial cycle are not observed.

Contributor. Veterinary Laboratory, Department of Agriculture, British Columbia, Canada.

Slide 95

History. Sections of liver are presented from a 25-month-old male C57BL/Ka mouse that died spontaneously.

Diagnosis. Reticulum cell sarcoma (Dunn's type A).

Comment. Widespread hepatic necrosis is a common feature of this neoplasm in mice.

Contributor. Institute of Experimental Gerontology, Rijswijk, The Netherlands.

Slide 96

History. This central nervous system tissue was taken from a 6-month-old Afrikaner-cross calf that had been "walking stiffly" in a circling pattern.

Diagnosis. Bovine cerebral theileriosis.

Comment. Extensive thrombosis of meningeal vessels as well as masses of intravascular lymphoreticular cells appears to occlude vascular lumina. Areas of hemorrhage and malacia are notable in the neuropil. Mitotic figures among the lymphoreticular cells suggest a neoplastic process, and malignant lymphoma must be on one's list of differential diagnoses. Malignant catarrhal fever is an additional consideration. Theileria mutans, the causative agent in this case, is a common infectious protozoan in many regions of the Republic of South Africa, but it seldom causes disease. The agent is spread by ticks--in particular the brown eartick (Rhipicephalus appendicularis). Under certain poorly understood circumstances, a fulminating disease, as represented in this slide, occurs. Impression smears of such brains, when stained with the Giemsa technique, will reveal intracytoplasmic schizonts (Koch's bodies) in the proliferating lymphoreticular cells. Koch's bodies are not easily seen in tissue sections.

Suggested reading. Van Rensburg, I. B. J.: Bovine cerebral theileriosis--report of five cases with splenic infarction. J. S. Afr. Vet. Assoc. 47: 137-141, 1976.

Contributor. Geographic Pathology Division, Armed Forces Institute of Pathology, Washington, D.C.

Slide 97

History. Sections of kidney are presented from a bovine calf used to study a particular infectious agent.

Diagnosis. Bovine sarcocystosis.

Comment. Schizont-like protozoal accumulations are observed in the endothelial cells of the glomerular capillaries.

Suggested reading

Dubey, J. P.: A review of Sarcocystis of domestic animals and of other coccidia of cats and dogs. J. Am. Vet. Med. Assoc. 169: 1061-1078, 1976.

Prelier, P., Mayhew, I. G., Fayer, R., and Lunde, M. N.: Sarcocystosis: A clinical outbreak in dairy calves. Science 195: 1341-1342, 1977.

Johnson, A. J., Hildebrandt, P. K., and Fayer, R.: Experimentally induced Sarcocystis infection in calves: Pathology. Am. J. Vet. Res. 36: 995-999, 1975.

Contributor. Walter Reed Army Institute of Research, Washington, D.C.

Slide 98

History. An 11-year-old gelding had a temperature of 103°F for several days, followed by staggering and headpressing. The horse was put to death soon after the central nervous system (CNS) signs appeared, and sections from the cerebrum are presented.

Diagnosis. Non-suppurative meningoencephalitis. (CNS tissue was rabies-positive by FA and mouse inoculation tests.)

Comment. The non-specific nature of the lesions is a reminder that a sample of CNS tissue should be frozen (for subsequent virus isolation) from all animals that die or are killed following central nervous system symptoms. The equine encephalitides should also be considered. Although there is considerable variation, the equine encephalitides are characterized by more polymorphonuclear leukocyte infiltrates. This is particularly true of the Venezuelan and eastern varieties. Inclusion bodies do not represent a dependable feature of any of these viral diseases.

Contributor. Louisiana State University.

Slide 99

History. Tissue is presented from a 4-year-old male German shepherd that had begun to circle.

Diagnosis. Cerebral infarction caused by Dirofilaria immitis (adult organisms).

Contributor. Louisiana State University.