



Latin Comparative Pathology Group

The Latin Subdivision of the CL Davis Foundation

Diagnostic Exercise

Case #: 61 Month: October Year: 2015

Answer Sheet

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Clinical History: A 4-year-old male mixed breed feral cat was submitted for necropsy after acute onset of depression and icterus.

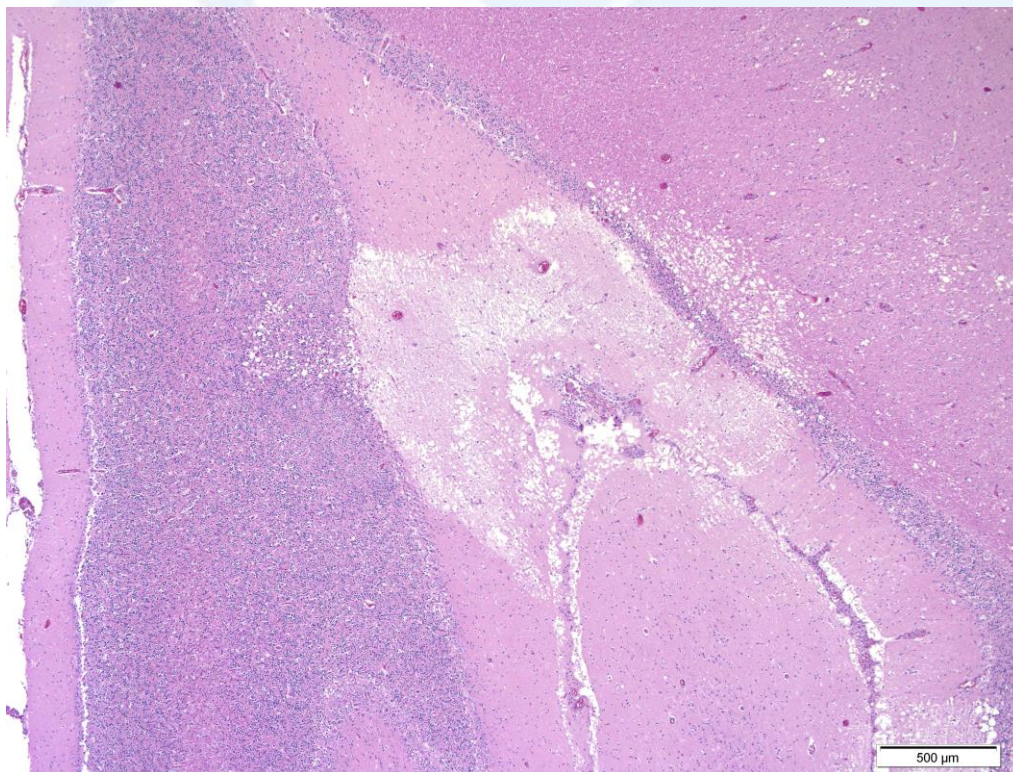


Figure 1

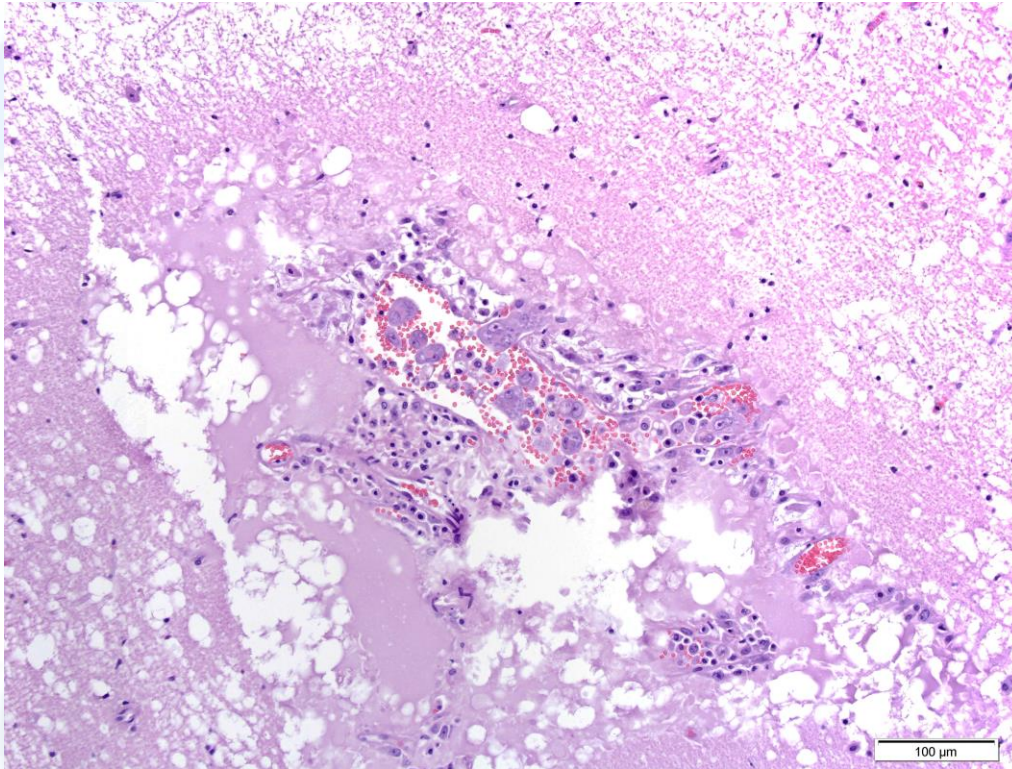


Figure 2

Description: There is a focal, well-demarcated area of necrosis (infarct) affecting the cerebellar molecular layer and to a lesser extent the granular layer, Purkinje cell layer, and underlying white matter. The necrotic tissue is characterized by pallor with maintenance of the overall architecture and areas of vacuolation. Glial cell nuclei are pyknotic. A leptomeningeal venule is partially occluded by macrophages containing cytoplasmic protozoal schizonts and is surrounded by small numbers of lymphocytes and plasma cells and a large amount of eosinophilic proteinaceous fluid. Additional lesions in other organs consisted of multifocal to coalescing pulmonary hemorrhage and edema; multifocal to coalescing hepatic necrosis and hemorrhage; fibrinonecrotic laryngitis with intralesional cocci (not related to the protozoal infection); and reactive erythroid and megakaryocyte hyperplasia in the bone marrow. In addition, blood vessels were partially occluded by schizont-laden macrophages in multiple organs.

Morphologic diagnosis: Focal acute cerebellar infarct, with intravascular schizont-laden macrophages, etiology consistent with *Cytauxzoon felis*.

Cause: *Cytauxzoon felis*.

Proposed pathogenesis: Vascular occlusion by schizont-laden macrophages > hypoxia-ischemia > necrosis.

Typical gross findings:

- Icterus
- Pleural, pericardial, and abdominal effusion
- Serosal hemorrhages, especially affecting the lungs
- Splenomegaly and lymphadenomegaly

Typical microscopic findings:

- Enlarged intravascular macrophages containing intracytoplasmic protozoal shizonts and merozoites
- Multi-organ thrombi with edema, hemorrhage, and infarcts
- Intraerythrocytic protozoal piroplasms

Discussion: Infection with the protozoal organism *Cytauxzoon felis* (cytauxzoonosis) can cause high morbidity and mortality in domestic cats, which are considered a dead end host. The North American bobcat (*Lynx rufus*) is considered the reservoir host for *C. felis*, and infection is generally subclinical in bobcats and other non-domestic felids such as cougars (*Puma concolor*) and Florida panthers (*Puma concolor coryi*). The parasite is transmitted by ticks, and *Amblyomma americanum* (lone star tick) is the primary vector species in North America, but *Dermacentor variabilis* (American dog tick) can also transmit the protozoa. Infections are most common in the southeastern United States, and occur most frequently between March and September. The intrahistiocytic stage of *C. felis* occurs first and is followed days later by the intraerythrocytic stage, which can cause hemolytic anemia and icterus. High fever, pancytopenia, and nonregenerative anemia are also common findings with *C. felis* infection. Occlusion of vessels by enlarged and marginated macrophages with subsequent edema, hemorrhage, and tissue infarction leading to multiorgan failure is the presumed pathogenesis; however, release of vasoactive mediators from infected macrophages and disseminated intravascular coagulopathy may also play a role in disease progression. Neurologic signs are occasionally reported in infected cats and these signs used to be attributed to systemic disease. However, a recent study characterizing the neuropathological changes revealed that affected individuals can develop hypoxic-ischemic lesions in the brain that could explain the occasional neurological signs. A single case of *C. felis* infection in a domestic cat has been reported in Brazil, though a full necropsy was not performed and the parasite was identified only by molecular techniques. *C. felis* was confirmed as the cause of mortality in two captive reared lions in Brazil, and the parasite was detected in clinically healthy wild ocelots (*Leopardus pardalis*), pumas (*Puma concolor*), and a captive jaguar (*Panthera onca*) in Brazil. These findings suggest that *C. felis* is present in South America, though the natural reservoirs and vectors in that region of the world remain unknown.

References:

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- Aschenroich, S. A., Rech, R. R., Sousa R. S., *et al.* Pathology in practice; *Cytauxzoon felis* infection. *J Am Vet Med Assoc.* 2012; 240:159-161.
- Clarke, L. L., and D. R. Rissi. Neuropathology of natural *Cytauxzoon felis* infection in domestic cats. *Vet Pathol.* 2014; Published online ahead of print 8 Jan 2014.
- Maia, L. M. P., Cerqueira, A. M. F., Macieira, D. B. *et al.* *Cytauxzoon felis* and 'Candidatus Mycoplasma haemominutum' coinfection in a Brazilian domestic cat (*Felis catus*). *Rev. Bras. Parasitol. Vet.* 2013; 22(2):289-291.
- Peixoto, P. V., Soares, C. O., Scofield, A., *et al.* Fatal cytauxzoonosis in captive-reared lions in Brazil. *Vet Parasitol.* 2004; 145:383-387.

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