

WSC 2019-2020 Conference 22

Case 1. Tissue from a capuchin monkey.

**MICROSCOPIC DESCRIPTION:** Heart, left ventricle and atrium: Multifocally and randomly **(1pt)**, within the epicardium and myocardium, the interstitium is expanded by low to moderate numbers of lymphocytes **(2pt)**, with fewer macrophages **(1pt)**, neutrophils **(1pt)**, and rare plasma cells, separated by moderate amounts of edema **(1pt)**. Adjacent cardiomyocytes often exhibit one or more of the following changes: swelling and pallor and loss of cross-striations (degeneration) **(1pt)**, shrinkage, contraction band formation **(1pt)**, pyknosis **(1pt)**, karyorrhexis, fragmentation **(1pt)** (necrosis) **(2pt)**, and stippling with granular mineral **(1pt)** (dystrophic calcification). Occasionally, necrotic myofibers are engulfed by macrophages **(1pt)**. In areas of cardiac necrosis and inflammation, small myocardial vessels are congested, and often contain increased numbers of neutrophils, which are occasionally paved; the endothelial cells of these vessels are markedly hypertrophic. **(1pt)** Perivascular connective tissue is mildly edematous, and few myocardial arterioles contain low numbers of lymphocytes and histiocytes aggregated within adventitial connective tissue.

**(1pt).**

**MORPHOLOGIC DIAGNOSIS:** Heart, ventricle: Myocarditis, necrotizing **(1pt)** and lymphocytic **(1pt)**, multifocal, random, mild to moderate, with mild lymphocytic epicarditis.

**CAUSE:** Simian cardiovirus (encephalomyocarditis virus) **(3pt)**

**O/C: (1pt)**

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Case 2. Tissue from a rhesus macaque.

**MICROSCOPIC DESCRIPTION:** Lung: Diffusely, the adventitia of pulmonary arterioles is expanded up to and over 1mm, compressing adjacent pulmonary parenchyma and adjacent alveoli. **(1pt)** Collagen fibers are widely separated by a granular to beaded proteinaceous edema fluid and hemorrhage; lymphatics are visible and widely dilated, and low to moderate numbers of neutrophils, macrophages, and lymphocytes are present. The tunica intima and inner media are expanded by edema **(1pt)** and numerous neutrophils **(1pt)** which often form subendothelial aggregates and are admixed with moderate amounts of cellular debris. Endothelial cells are markedly hyperplastic and hypertrophic, **(1pt)** and numerous endothelial cells contain enlarged **(1pt)** nuclei with an oblong 2x6 eosinophilic to basophilic intranuclear **(1pt)** inclusions. **(1pt)** One pulmonary artery contains a large laminated occlusive thrombus **(1pt)** which extends into its branches. Numerous veins **(1pt)** throughout the section have similar endothelial changes with marked hypertrophy and hyperplasia of endothelial cells and intranuclear inclusions, and some contain occlusive or non-occlusive thrombi with mural rupture and extrusion of hemorrhage and fibrin. There is diffuse severe congestion throughout the section and alveolar capillaries contain increased numbers of circulating neutrophils. There is random multifocal septal necrosis **(1pt)** with loss of septal continuity and replacement by aggregated neutrophils, cellular debris, polymerized fibrin, and hemorrhage. Septa often contain fibrin thrombi, and rare karyomegalic viral inclusions are present within the endothelium of septal capillaries and Type 1 pneumocytes. **(1pt)** There is patchy type II pneumocyte hyperplasia **(1pt)** throughout the section. Diffusely, alveoli contain variable combinations and concentrations of hemorrhage, fibrin, edema, neutrophils, and cellular debris, and often increased numbers of alveolar macrophages. **(1pt)** There are scattered areas of alveolar emphysema.

**MORPHOLOGIC DIAGNOSIS:** Lung: Pneumonia, interstitial **(1pt)**, necrotizing **(1pt)** and neutrophilic **(1pt)**, multifocal to coalescing, moderate, with necrotizing vasculitis **(1pt)** and numerous endothelial and pneumocyte karyomegalic viral inclusions. **(2pt)**

**CAUSE:** Macacine herpesvirus-3 (simian cytomegalovirus OK) **(2pt)**

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Case 3. Tissue from an Angolan colobus monkey.

**MICROSCOPIC DESCRIPTION:** Cerebrum: There is a focally extensive 8mm area of lytic necrosis **(1 pt.)** affecting the grey matter and extending multifocally into the white matter of the corona radiata. Centrally within this area, the neuropil is replaced by numerous aggregates of degenerate neutrophils **(1 pt.)**, fewer macrophages, occasional multinucleated foreign body giant cells, abundant cellular debris, hemorrhage **(1 pt.)**, polymerized fibrin, and edema. There are markedly increased numbers of reactive astrocytes and activated microglia throughout this area, **(1 pt.)** and occasional axons are swollen (spheroids). Vessels are often necrotic, **(1 pt.)** with loss of hypertrophied endothelium and hyalinized walls that contain degenerate neutrophils, cellular debris, brightly eosinophilic protein, degenerate smooth muscle cells (vasculitis) **(1 pt.)**, with extrusion of abundant polymerized fibrin and hemorrhage into the surrounding parenchyma. **(1 pt.)** Occasionally, affected vessels are occluded with fibrinocellular thrombi. Within this area, there are occasional 20-30um **(1 pt.)** round amoebic trophozoites **(1 pt.)** with foamy eosinophilic cytoplasm and a prominent centrally located karyosome. Some amoebae are surrounded by neutrophils; aggregates of neutrophils also surround degenerating/necrotic neurons and effete vessels. **(1 pt.)** Peripheral to the zone of lytic necrosis, there is a focally extensive area of liquefactive necrosis **(1 pt.)** which contains numerous individual and aggregated foamy Gitter cells **(1 pt.)** and multinucleated giant cells with up to fifteen nuclei **(1 pt.)** scattered among gliovascular strands. Peripheral to the profoundly inflamed areas, the parenchyma is mildly hypercellular (gliosis) and vessels are multifocally cuffed by 1-5 layers of lymphocytes and macrophages **(1 pt.)**, with fewer neutrophils **(1 pt.)**. Multifocally, meninges, especially overlying the area of necrosis, are markedly expanded by numerous neutrophils and macrophages, and fewer lymphocytes which extend down along Virchow-Robins spaces and infiltrates into the submeningeal grey matter. **(1 pt.)** Similar perivascular infiltrates and gliosis are seen multifocally within the corona radiata. **(1 pt.)**

**MICROSCOPIC DIAGNOSIS:** Cerebrum: Meningoencephalitis, **(1 pt.)** necrotizing and pyogranulomatous, **(1 pt.)** focally extensive, severe with vasculitis, thrombosis, gliosis, and numerous amebae. **(1 pt.)**

Cause: *Balamuthia mandrillaris*, (*Acanthamoeba sp* or *Naegleria fowleri* OK) **(2 pt.)**

O/C - **(1 pt.)**

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Case 4. Tissue from a Geoffrey's spider monkey.

**MICROSCOPIC DESCRIPTION:** Cecum (colon OK) **(1pt.)**: There are multifocal to coalescing areas of partial thickness **(1pt.)** necrosis **(1pt.)** of the mucosa **(1pt.)** of both sections. These areas are composed of large areas of eosinophilic and basophilic cellular debris, **(1pt.)** polymerized fibrin **(1pt.)**, hemorrhage, and numerous colonies of robust bacilli **(1pt.)** adherent to the periphery of clumps of cellular debris. Multifocally, aggregates of necrotic material form fungiform proliferations **(2pt.)** above the level of the mucosa (volcano ulcers). Subjacent to the areas of necrosis, glands are markedly dilated **(1pt.)**, lined by variably degenerate to necrotic epithelium, occasionally dilated, and contain a mix of sloughed epithelium, cellular debris, and small numbers of robust bacilli **(1pt.)** (crypt abscesses). **(1pt.)** The lamina propria is expanded by low numbers of neutrophils, multifocal hemorrhage **(1pt.)** and edema, and cellular debris. Submucosal vessels and lymphatics are multifocal surrounded by a single layer of neutrophils and fewer lymphocytes. **(1pt.)** There is mild lymphocytolysis within Peyer's patches. **(1pt.)**

**MORPHOLOGIC DIAGNOSIS:** Cecum, colon (per contributor): Typhlocolitis, necrotizing **(1pt.)**, multifocal to coalescing, marked, with numerous extracellular bacilli **(1pt.)**.

**CAUSE:** *Clostridium difficile* **(2pt.)**

**O/C:** **(1pt.)**