

Case 1. Tissue from a cynomolgus monkey.

MICROSCOPIC DESCRIPTION: Kidney: Multifocally, the walls of small-to medium-caliber arterioles **(2pt.)** are expanded by moderate amounts of pale pink homogenous protein **(1pt.)** and extruded erythrocytes which dissect between markedly hypertrophic and disorganized smooth muscle cells **(1pt.)**. The lumen is occluded **(1pt.)** and endothelial cells are hypertrophied. Affected vessels are often surrounded by low numbers of lymphocytes and plasma cells **(1pt.)**. Scattered through the cortex, low numbers of tubules are dilated **(1pt.)** and contain variable amounts of a brightly eosinophilic pink protein **(1pt.)** admixed with low numbers of erythrocytes. Throughout the cortex, tubular epithelium is mildly swollen with granular pink cytoplasm (degeneration) **(1pt.)** and scattered epithelial cells are pyknotic and or sloughed into the lumen (necrosis) **(1pt.)**. Rare mitotic figures are present within tubular epithelium. Diffusely, glomeruli are mildly enlarged and the walls of glomerular capillaries are mildly expanded by a small amount of pink hyaline basement membrane **(1pt.)**, are mildly hypercellular, and there is moderate hypertrophy of parietal epithelium **(1pt.)**. There is mild multifocal interstitial fibrosis **(1pt.)**, often adjacent to damage tubules or vascular lesions.

MORPHOLOGIC DIAGNOSIS:

1. Kidney, arterioles: Arteritis, proliferative, diffuse, moderate. **(2pt.)**
2. Kidney, tubules: Degeneration and necrosis, multifocal, mild with tubular ectasia and protein casts. **(2pt.)**
3. Kidney: Glomerulonephritis, membranous, diffuse, moderate. **(2pt.)**

O/C - (1pt)

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Case 2. Tissue from a pig.

MICROSCOPIC DESCRIPTION: Colon: Diffusely, there is multifocal necrosis **(1pt.)** and loss of superficial epithelium and marked expansion **(1pt.)** of the lamina propria by large numbers of lymphocytes **(1pt.)**, plasma cells **(1pt.)**, and fewer histiocytes and neutrophils **(1pt.)**. The luminal epithelium is covered by a thick mat of 2-3um plump rods **(1pt.)** which occasionally adhere to the apical border of luminal epithelium, and similar bacilli are present within crypts. Crypts are occasionally dilated **(1pt.)** and contain variable combinations and concentration of sloughed, necrotic epithelial cells, cellular debris, and bacilli as previously described (crypte abscesses) **(1pt.)**. There is scattered single cell necrosis and markedly increased numbers of mitotic figures **(2pt.)** within crypt epithelium (hyperplasia). The crypt epithelium is infiltrated by low numbers of lymphocytes **(1pt.)**, and goblet cells are moderately decreased in number **(1pt.)**. The submucosa is expanded by moderate numbers of neutrophils, lymphocytes, and plasma cells. **(1pt.)**

MORPHOLOGIC DIAGNOSIS: Colon: Colitis, necrotizing, subacute, diffuse, moderate, with marked crypt hyperplasia. **(4pt)**

CAUSE: *Brachyspira* sp. (dysenteriae or pilosicoli both OK, but due to the very mild necrosis, pilosecoli is a better choice) **(2pt.)**

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

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Case 3. Tissue from a goat.

MICROSCOPIC DESCRIPTION: Liver: This section of liver contains four discrete abscesses **(2pt.)** measuring up to 1cm in diameter **(1pt.)**. The abscesses are characterized by a large central area of eosinophilic cellular and karyorrhectic debris admixed with occasional deep blue globules of clumped DNA **(1pt.)**. Peripheral to this is a rim of largely degenerate neutrophils **(1pt.)**, a thin rim of epithelioid macrophages and a capsule composed of concentric rings of mature fibrous connective tissue **(1pt.)**, which contains moderate numbers of macrophages, lymphocytes **(1pt.)**, and plasma cells **(1pt.)**, as well as plump fibroblasts). There is extensive fibrosis **(1pt.)** adjacent to the abscesses which entraps and replaces many hepatocytes. Remaining hepatocytes are shrunken and atrophic **(1pt.)**. Fibrous connective tissue also extends into portal areas, resulting in marked biliary hyperplasia **(1pt.)**; these areas also contain low to moderate numbers of lymphocytes and plasma cells. Multifocally, effaced portal areas often contain globular aggregates of a waxy, homogenous pink material **(1pt.)** (amyloid) **(1pt.)** which separates proliferating biliary profiles and is often engulfed by macrophages. In areas of surviving hepatocytes, large round macrophages within sinusoids contain a greenish globular pigment (bile). **(1pt.)**

MORPHOLOGIC DIAGNOSIS:

Liver: Abscesses, multiple, with marked hepatocellular fibrosis, hepatocellular atrophy and loss, biliary hyperplasia, and amyloid formation. **(3pt)**

CAUSE: *C. pseudotuberculosis* or *C. ovis* **(2pt.)**

O/C - (1pt)

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Case 4. Tissue from a rhesus macaque.

MICROSCOPIC DESCRIPTION: Lung: Affecting approximately 50% of the section in a patchy distribution **(1pt.)**, alveolar septa are expanded **(1pt.)** by moderate numbers of macrophages **(1pt.)**, fewer neutrophils **(1pt.)**, lymphocytes and plasma cells, and are often lined by cuboidal epithelial cells (type II pneumocyte hyperplasia) **(1pt.)**. Alveolar lumina contain numerous alveolar macrophages **(1pt.)** with pink vacuolated cytoplasm and few neutrophils and lymphocytes, admixed with small amounts of cellular debris, and wispy to polymerized fibrin **(1pt.)**. Multifocally within alveolar spaces, there are numerous syncytial giant cells **(2pt.)** up to 90um in diameter, with moderate amounts of granular, eosinophilic cytoplasm and up to 20 nuclei. Airways are occasionally dilated and lined by attenuated epithelium and rarely contain low numbers of sloughed epithelial cells, inflammatory cells, erythrocytes, fibrin and/or edema. There is mild perivascular edema with ectatic lymphatics, and there are several small perivascular aggregates of lymphocytes and fewer plasma cells. Rarely alveolar macrophages contain a single 2-4um deep magenta viral inclusion **(1pt.)** that expands the nucleus (cytomegalovirus) **(1pt.)**.

MORPHOLOGIC DIAGNOSIS: 1. Lung: Pneumonia, interstitial, histiocytic, with numerous viral syncytial giant cells. **(3pt.)**

2. Lung, alveolar macrophages: Intranuclear viral inclusions, rare. **(1pt.)**

CAUSE: Simian lentivirus (simian immunodeficiency virus) **(2pt.)**, Simian cytomegalovirus **(1pt.)**

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