



# Diagnostic Exercise

## From The Davis-Thompson Foundation

Case #: **211**; Month: **April**; Year: **2023**

### *Answer Sheet*

Title: Disseminated vasculitis, thrombosis and multiple infarcts in a piglet associated with PCV-2 infarct

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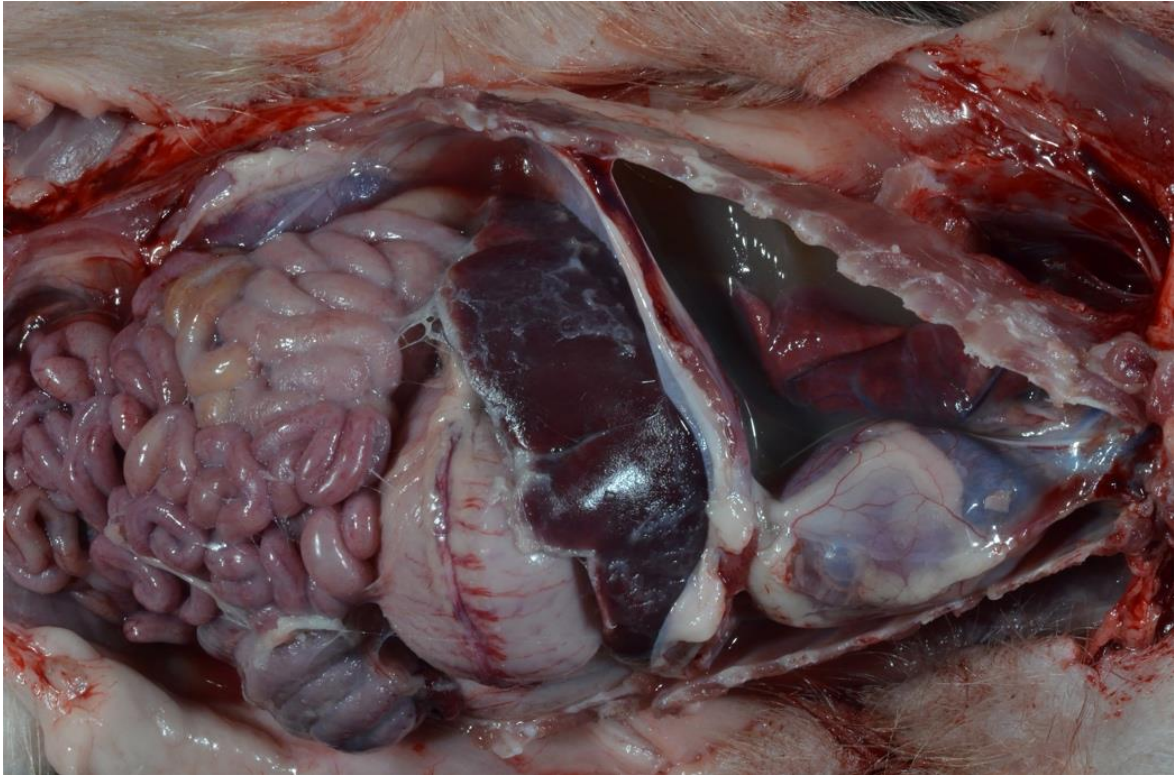
### **Clinical History:**

This 8-week-old, female intact, potbelly piglet had been recently rescued (6 weeks previously). She presented to the VMTH Livestock Medicine Service for dyspnea, and was also inappetent and lethargic. No other medical history was available, except that a littermate had passed the week previously from unknown causes. The morning of presentation, she was found in severe respiratory distress. On physical exam, she was dyspneic and tachypneic (R=120) with cyanotic mucous membranes. Flow-by oxygen therapy was initiated with no improvement of clinical signs. Euthanasia was elected after further diagnostics were declined.

### **Necropsy Findings:**

A 1.4 kg, 8 week old female intact piglet was presented approximately 2 hours after euthanasia.

Mild mucoid discharge leaked from the medial canthi of both eyes. The nasal planum was blue tinged. Both sides of the thoracic cavity contained approximately 30 ml of turbulent, red to tan, watery fluid, the mediastinum was grossly, apparently, complete. All lung lobes were collapsed, wet, heavy, and sunk in 10% buffered formalin. The heart weighed 14.1 g (1.01% of body weight) with a right ventricular free wall thickness, left ventricular free wall thickness, and interventricular septal thickness of 1.5 mm, 4.0 mm, and 4.0 mm, respectively. There was 20 ml of watery slightly opaque effusion in the abdominal cavity. There was an ~15 ml subcapsular to cortical blood clot affecting most of the cranial pole of the right kidney. Lacey, soft, pale tan to white strands (fibrin) coated the diaphragmatic, hepatic, and intestinal surfaces. The liver weighed 40.0 g (2.86% of body weight).



Fibrin strands stretched across the serosal and peritoneal surfaces of the abdomen. The thoracic and abdominal cavities contain slightly viscous, opaque tan fluid  
 Gross: Fibrin strands stretched across the serosal and peritoneal surfaces of the abdomen. The thoracic and abdominal cavities contain slightly viscous, opaque tan fluid.



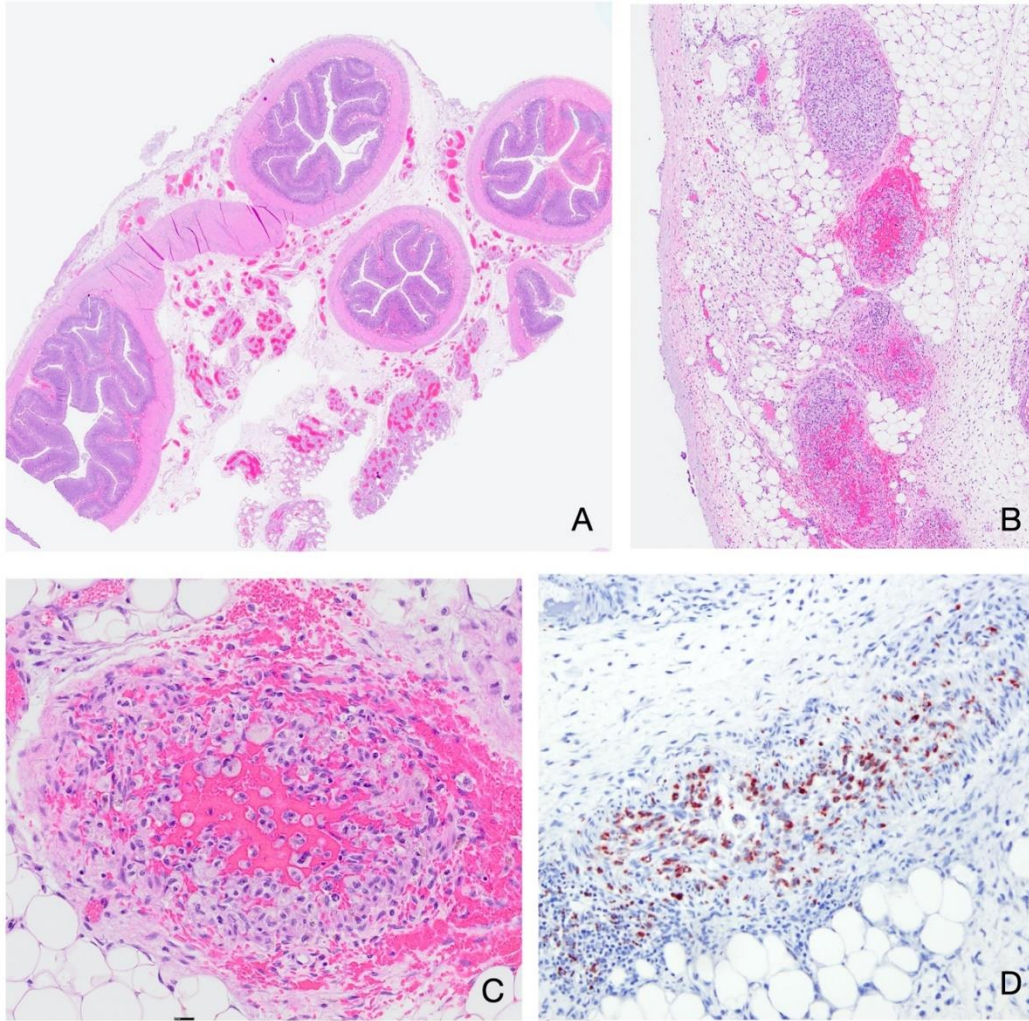
A subcapsular blood clot covers the cranial pole of the kidney In addition to the gross information above, the histology is described/provided here:

#### **Histology and Immunohistochemistry (Figures A-F):**

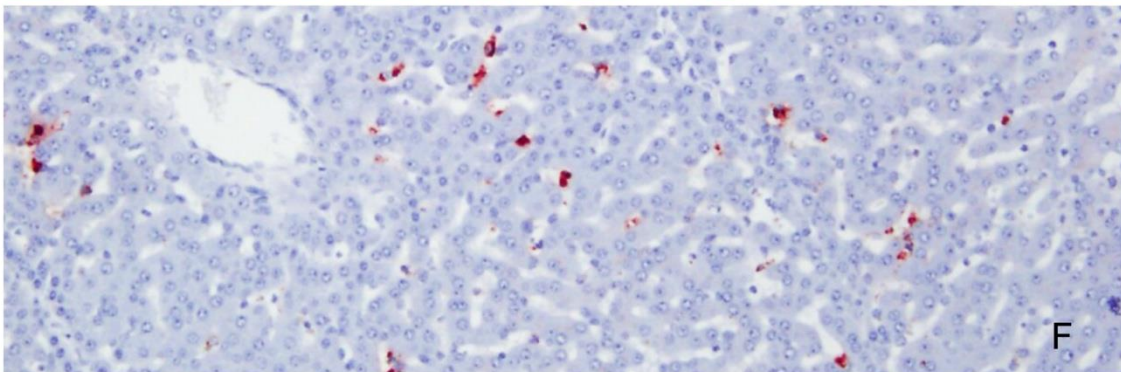
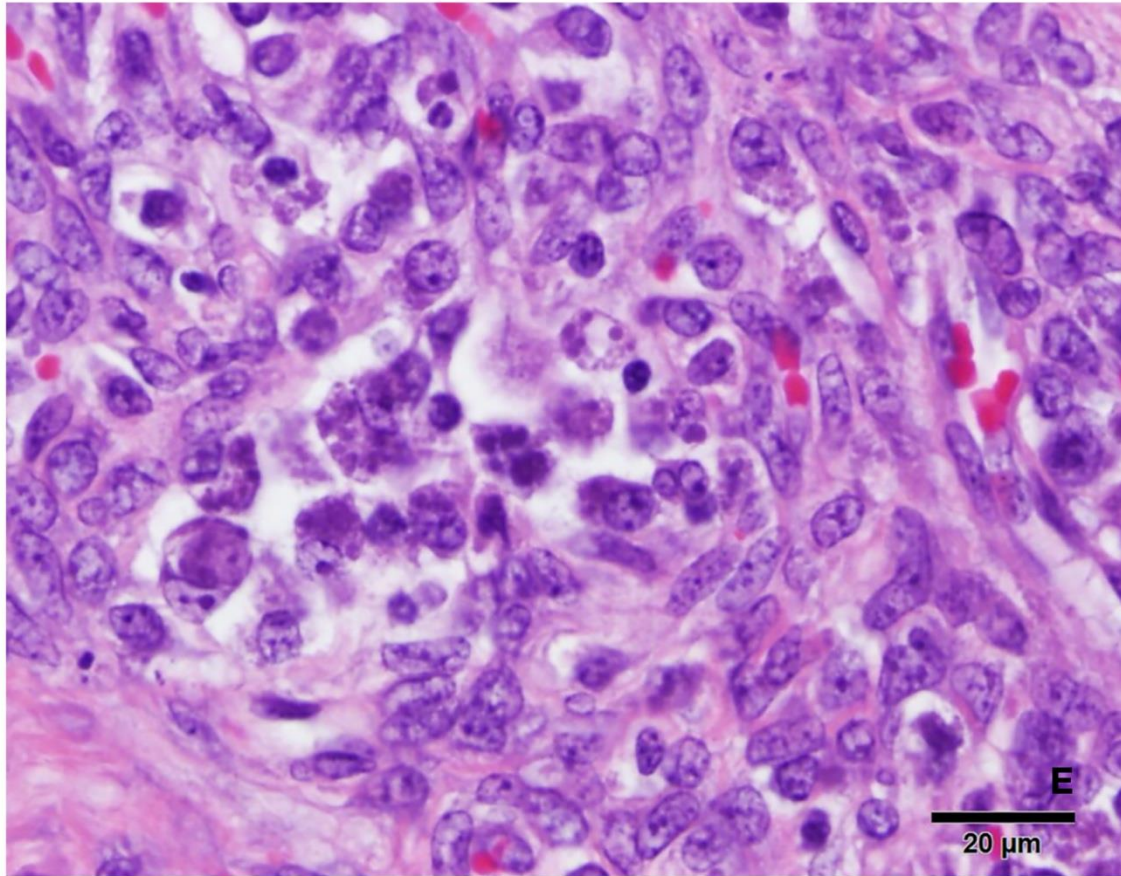
Spiral colon and adjacent mesentery with a partial profile of a lymph node is examined. The mesentery is laced with a complex web of closely apposed vascular structures (rete mirabile). Vessels throughout all tissue sections, including those within the submucosa, serosa, and mesentery, are variably and multifocally expanded by lymphocytes, histiocytes, rare eosinophils, and scattered nuclear fragments that disrupt the vascular wall. Endothelial cells are frequently plump and prominent and protrude into the lumen.

Large caliber vessels within the rete mirabile are the most severely affected, and multifocally contain flocculent, eosinophilic debris admixed with foamy, distended histiocytes that invade and obscure the surrounding wall. A few vessel walls dissociate completely, with separation and effacement of mural fibers by erythrocytes that spill into the adjacent adipose tissue. An aggregate of foamy histiocytes distends and obstructs a subcapsular sinus within the mesenteric lymph node. No distinct follicles are present, and the interstitial tissue is prominent (interpreted as depletion). Sinusoids and medullary cords contain predominantly histiocytes and shattered or lytic lymphocytes.

Within the cross-section of duodenum, the submucosal vessels and lymphatics frequently contain histiocytes with deeply basophilic, botryoid, intracytoplasmic inclusions that peripheralized the nucleus. Vessels are surrounded by small numbers of lymphocytes, plasma cells, and histiocytes, which migrate into the surrounding submucosa and myenteric plexi. Crypts are rarely expanded by aggregates of hypersegmented and fragmented neutrophils with necrotic, cellular debris (crypt abscessation). Neutrophils also multifocally extend up into the mid-lamina propria, which is regionally expanded by clear space (edema). The mesentery and serosal surfaces of all intestinal sections is segmentally coated by fibrillar, poorly- cellular, eosinophilic material (fibrin).



**A.** Images of spiral colon and adjacent mesentery with its complex web of closely-apposed vascular structures (rete mirabile). **B and C.** Vessels throughout all tissue sections, including those within the submucosa, serosa, and mesentery are variably and transmurally expanded by lymphocytes, histiocytes, rare eosinophils, and scattered nuclear fragments that obscure and multifocally disrupt the vascular walls. Where visible, endothelial cells are frequently plump and prominent, and protrude into the lumen. Large caliber vessels within the rete mirabile are the most severely affected, and multifocally contain flocculent, eosinophilic debris admixed with foamy, distended histiocytes that invade and obscure the surrounding wall. A few vessel walls dissociate completely, with separation and effacement of mural fibers by erythrocytes that spill into the adjacent adipose tissue. **D.** An antibody for PCV-2 demonstrated copious viral antigen within the cytoplasm of leukocytes and macrophages of affected vessels.



**E.** An aggregate of histiocytes distends and obstructs a subcapsular sinus within the mesenteric lymph node. On low power, no distinct follicles were present, and the interstitial tissue was prominent (interpreted as depletion). Within the histiocytes were irregular deeply-basophilic, botryoid, intracytoplasmic inclusions that peripheralized the nucleus. **F.** Circulating cells (presumed Kupffer cells) within the liver contain PCV-2 antigen by IHC.

### **Morphologic diagnosis:**

1. Multiple organs (intestines, kidney, liver, diaphragm, heart, mesentery, pancreas, adrenals): multifocal severe acute fibrinohistiocytic vasculitis with thrombosis and focal to extensive infarction and necrosis and multifocal hemorrhage (ihc positive for porcine circovirus 2 (PCV2))

2. Liver: acute moderate to marked paracentral to central submassive necrosis, presumed hypoxia, secondary to #1
3. Immunohistochemistry – PCV-2 positive (all affected tissues)

**Diagnostic work-up:** In this case, any reasonable cause of vasculitis should be considered. For the pig: PCV-2, Salmonella, Erysipelothrix, Hog Cholera, Glasser's, ASF etc etc.

**Discussion:**

Porcine circovirus-2 (PCV2) is a circular, single-stranded DNA virus that commonly affects postweaning piglets and remains one of the most economically important swine pathogens worldwide (1). It produces several different disease syndromes, including PCV2 systemic disease (PCV2-SD). Clinically, PCV2-SD is characterized by wasting, dyspnea, and lymphadenopathy. Due to PCV-2 replication in endothelial cells, vascular lesions such as vasculitis, thrombosis, fibrinoid necrosis, and lymphohistiocytic lymphangitis are common features of PCV-SD, and can be found in multiple organs, including the lymph nodes and kidneys (2). Typical lesions in lymphoid tissue involve lymphoid depletion, histiocytic replacement of follicles, and infiltration of parafollicular areas by histiocytes (3). This destruction of lymphoid tissue causes immunosuppression and is key to PCV2 pathogenesis; increasing levels of PCV2 antigen or nucleic acid within lymphoid tissues has been correlated with both increasing severity of lymphoid depletion, as well as worsening clinical signs (5). Lesions in the digestive system, including necrotizing hepatitis, are also seen with PCV-SD, and can contribute to the death of affected animals (3). This case provides a striking example of classic histopathological lesions, with a combination of vasculocentric disease, lymphoid depletion, and gastrointestinal compromise, and beautifully illustrates the devastating consequences of this preventable condition.

\*The Diagnostic Exercises are an initiative of the **Latin Comparative Pathology Group (LCPG)**, the Latin American subdivision of The Davis-Thompson Foundation. These exercises are contributed by members and non-members from any country of residence. Consider submitting an exercise! A final document containing this material with answers and a brief discussion will be posted on the CL Davis website ([http://www.cldavis.org/diagnostic\\_exercises.html](http://www.cldavis.org/diagnostic_exercises.html)).

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