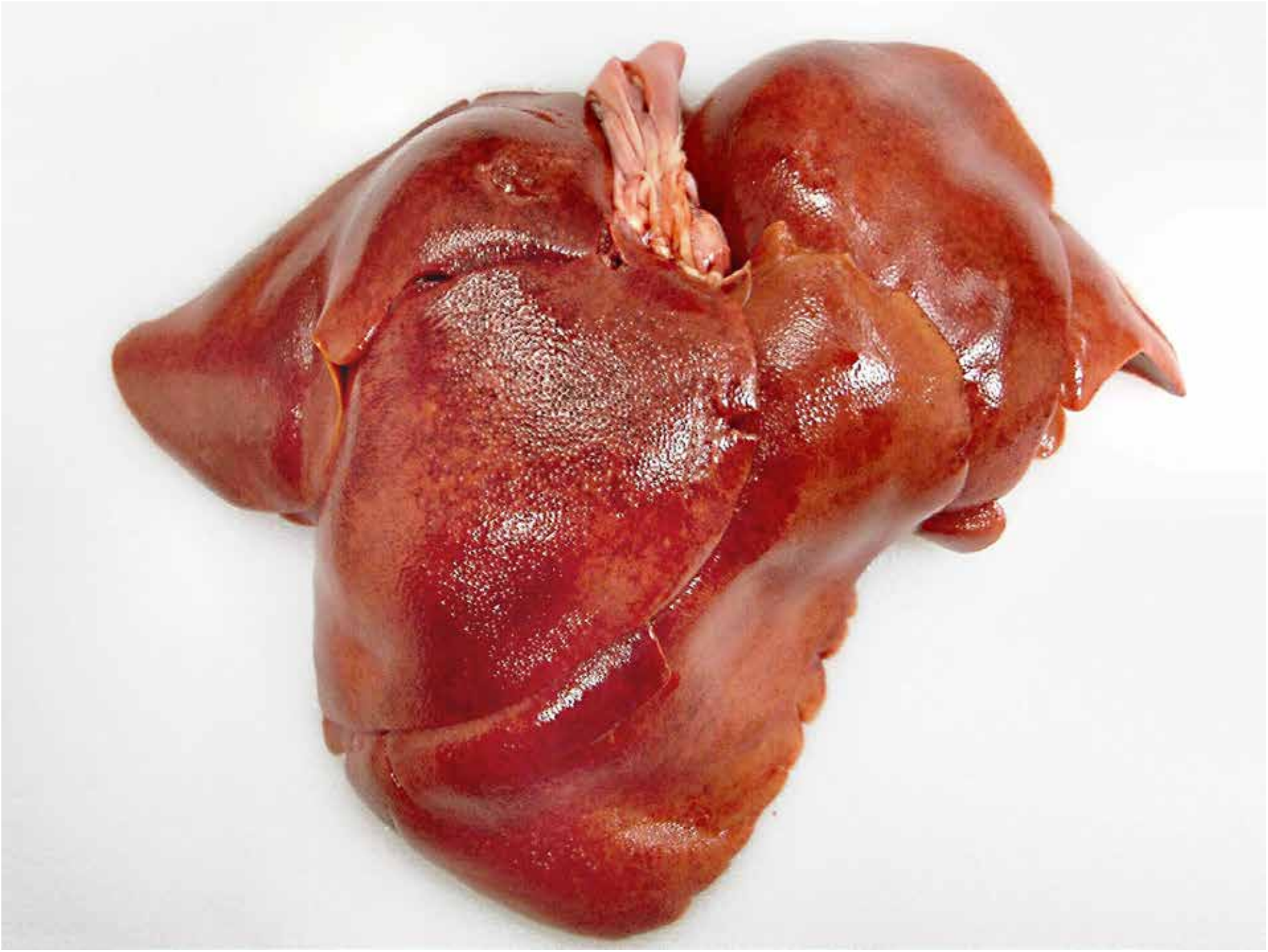
2012-1-3

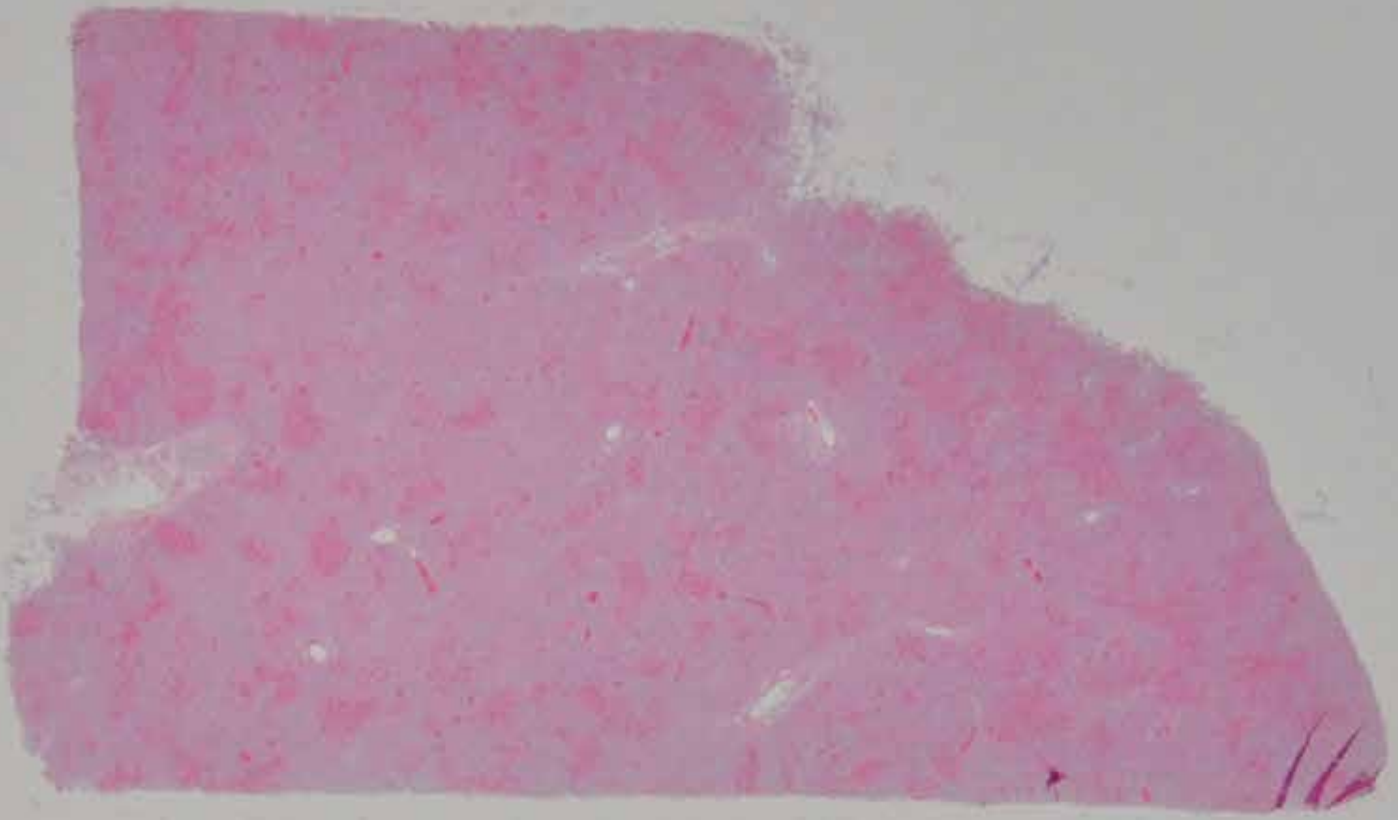
Canine Liver

Eneku Wilfred

Bovine Pathology

- **Contributor**: New Mexico Department of Agriculture Veterinary Diagnostic Services
- **Signalment**: 5 month old male Weimaraner dog *(Canis familiaris)*
- **History**: The dog was presented for anorexia and developed melena. Other clinical abnormalities included thrombocytopenia, anemia, and worsening hepatopathy. The dog was euthanized because of non responsiveness to therapy and poor prognosis.
- **Gross Pathology**: The dog was in good body condition with minimal postmortem change at autopsy and the carcass was icteric. The liver was enlarged, friable, mottled yellow, tan and dark red in random coalescing foci and in a reticular pattern with small numbers of petechiae. Multiple lymph nodes (submandibular, mediastinal, pancreatic, and mesenteric) were dark red with hemorrhage. The lungs were congested and edematous. There were petechiae observed on the endocardium, both kidneys, brain, mucosa of the stomach and some segments of small intestines. The stomach, small intestine, and large intestine contained digested blood (melena).
- **Histopathologic Description:** The liver contains numerous foci of centrilobular to midzonal necrosis with occasional bridging necrosis. The sinusoids in the foci of necrosis are dilated and filled with blood. There is a sharp distinction between the foci of necrosis in the centrilobular areas and the intact periportal areas that do contain rare apoptotic hepatocytes and swollen vacuolated hepatocytes. The necrotic foci and the adjacent sinusoids contain small numbers of macrophages with lesser numbers of leukocytes. The portal areas contain small numbers of macrophages, lymphocytes, and rare neutrophils. Moderate numbers of Kupffer cells and macrophages and lesser numbers of intact hepatocytes contain magenta to basophilic intranuclear inclusion bodies with occasional karyomegaly. There is apoptosis of small numbers of macrophages and Kupffer cells.

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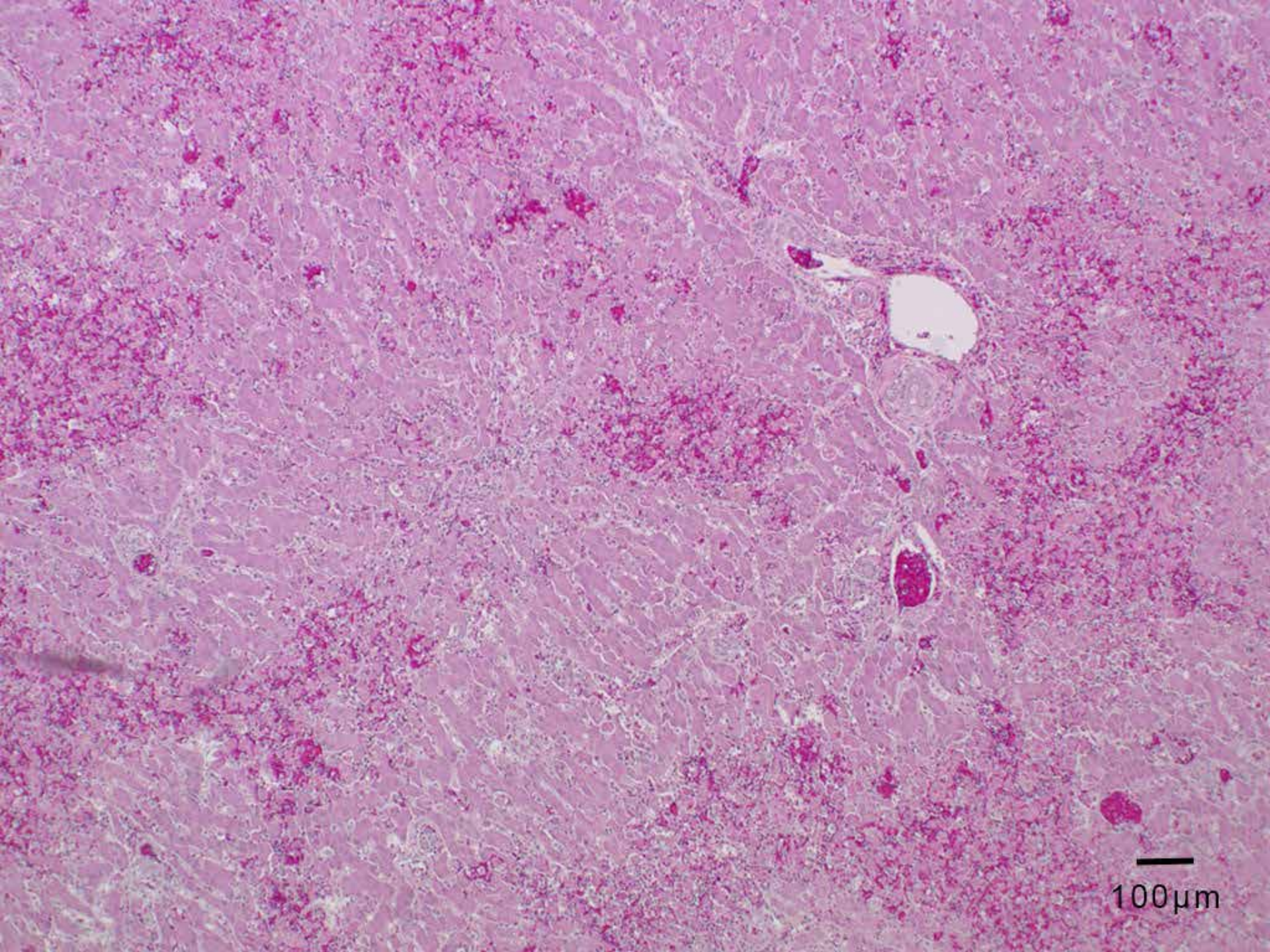
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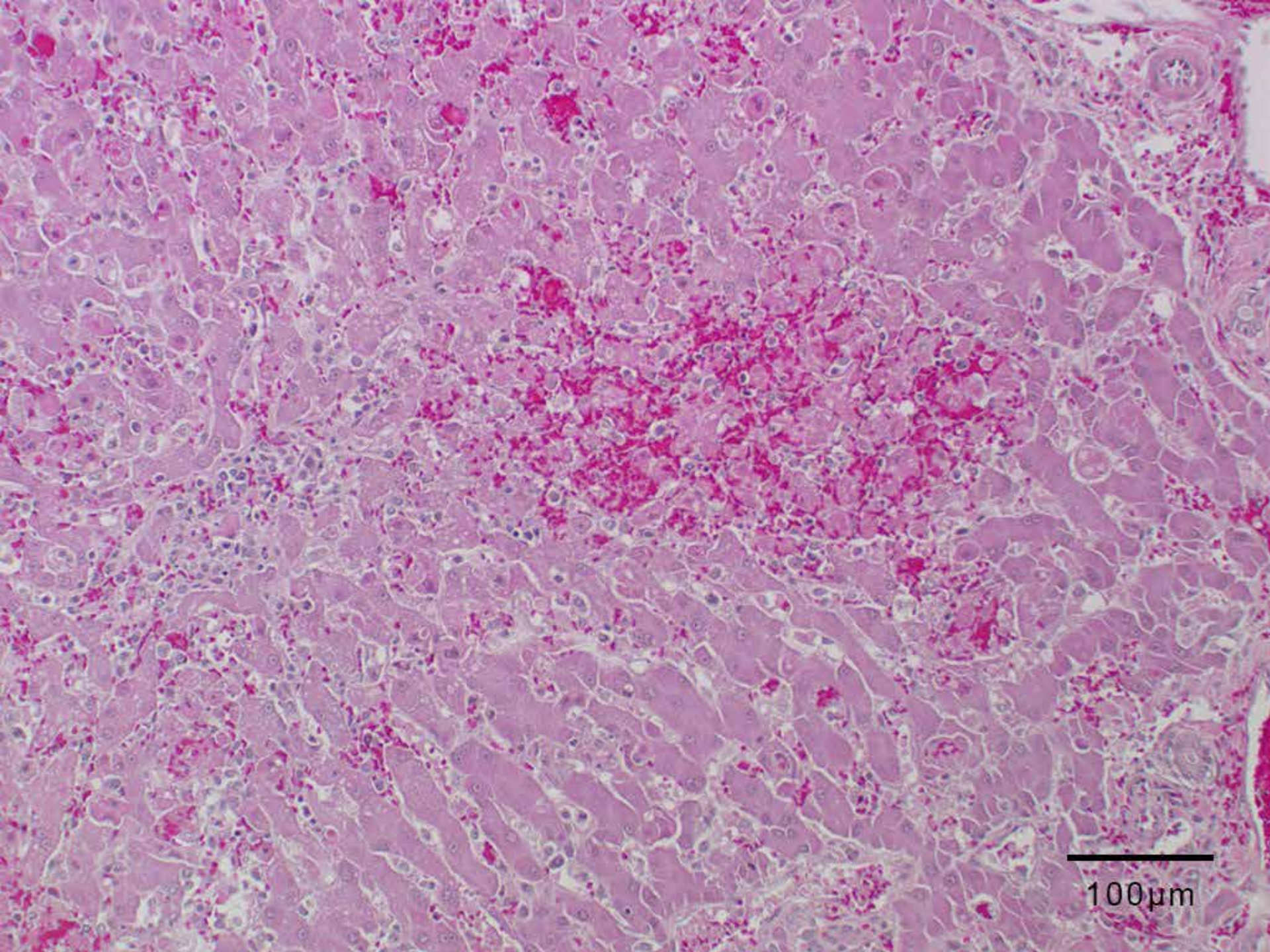
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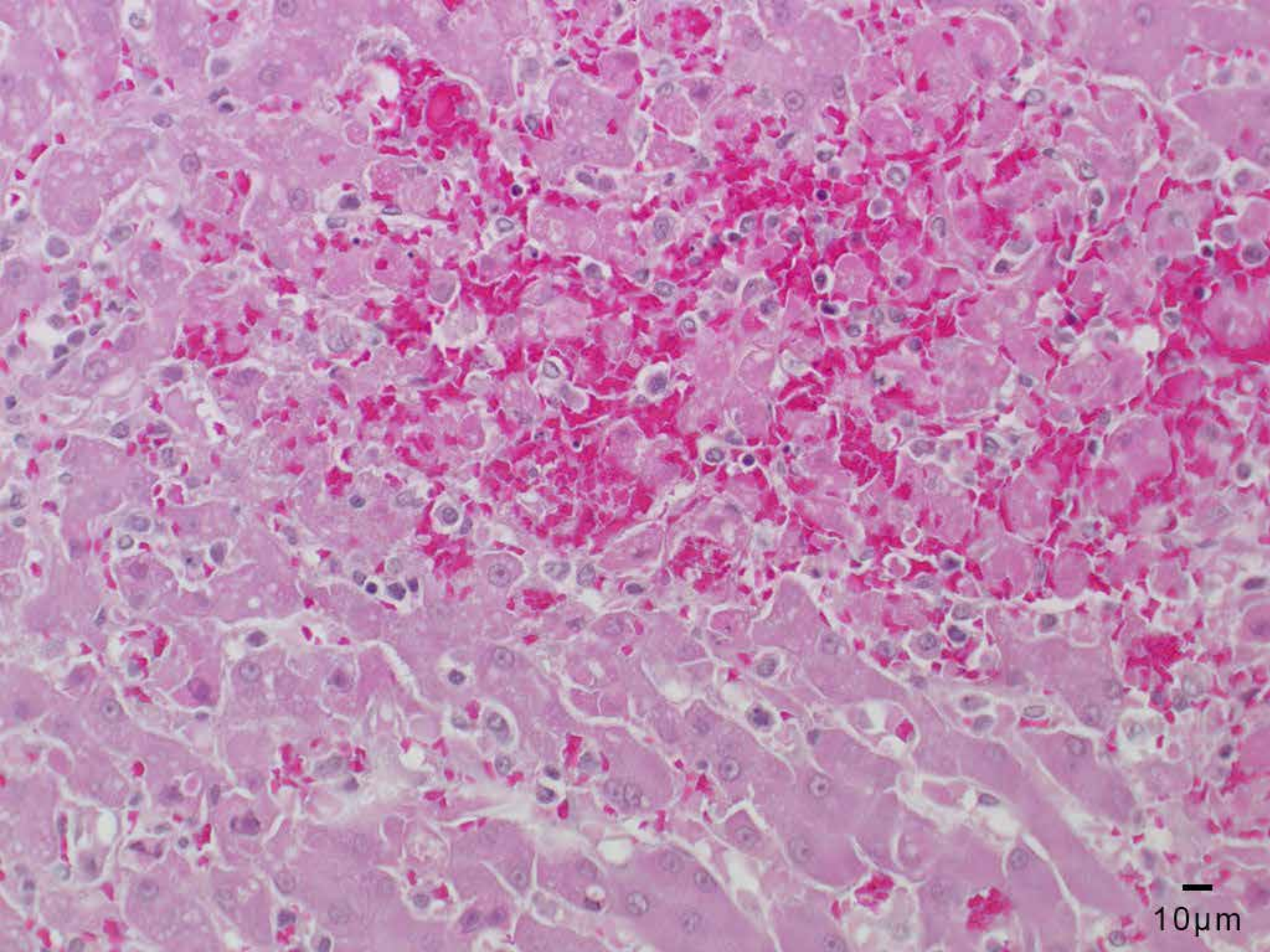
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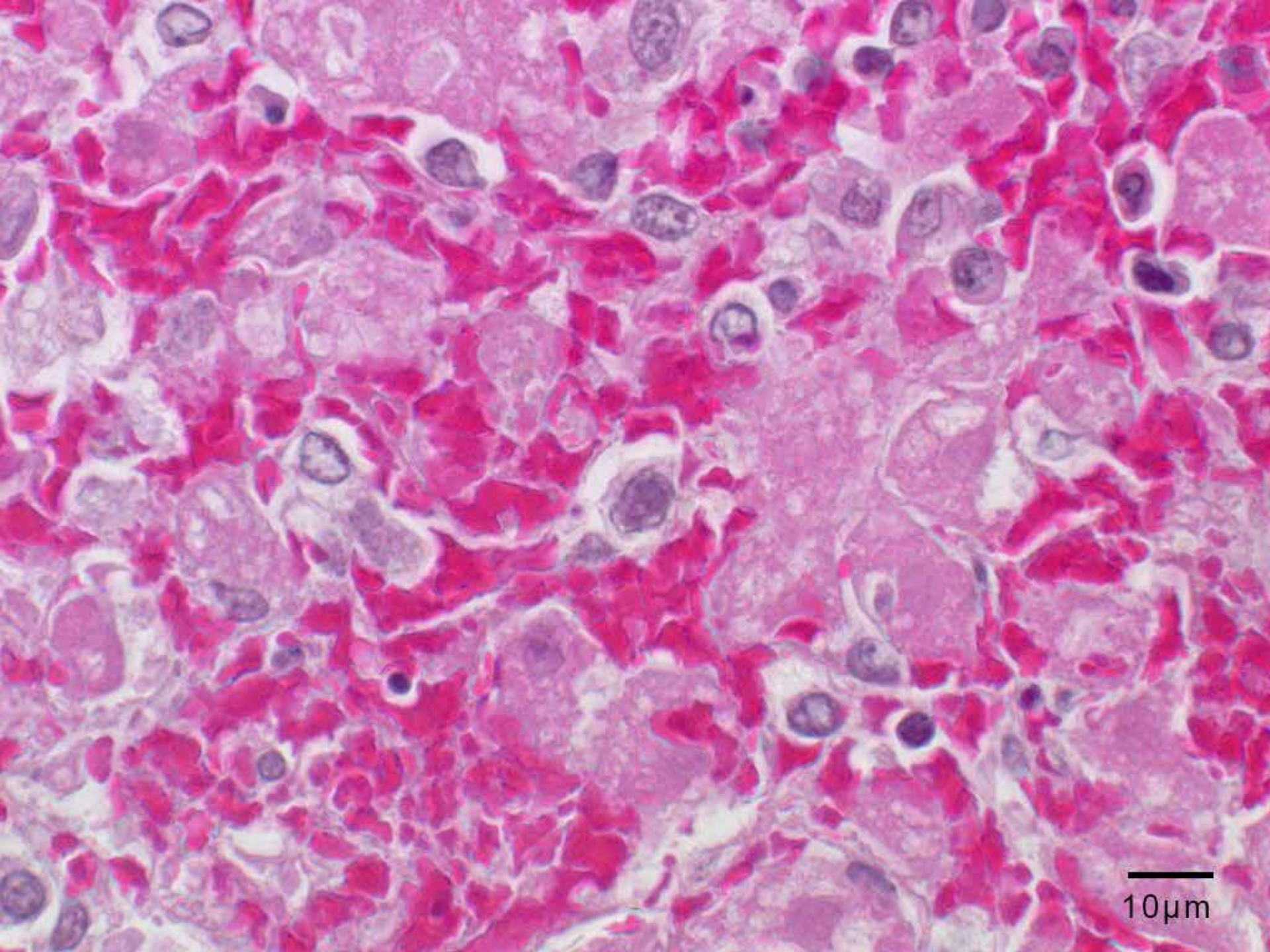
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- **Contributor's Morphologic Diagnosis:** Severe, acute, centrilobular to midzonal bridging hepatic necrosis with mild lymphohistiocytic hepatitis and magenta to basophilic intranuclear inclusion bodies; etiology consistent with canine adenovirus type 1; infectious canine hepatitis.

- **Contributor's Comment:** of the two types of Canine adenoviruses (CAV-1 and CAV-2), CAV-1 is the causative agent of infectious canine hepatitis (ICH) in Canidae and Ursidae. CAV-2 causes kennel cough (infectious tracheobronchitis).

  ICH may range from subclinical to fatal infection depending on immune status of the dog. Clinical ICH is not common now in domestic dogs due to routine vaccinations although sporadic individual cases and outbreaks in unvaccinated groups occur. The virus transmitted oronasally enters the tonsils and regional lymph nodes then to blood where the viremia lasts for 4 to 8 days. During viremia, the hepatocytes and vascular endothelial cells of many tissues are damaged due to CAV-1 replication leading to disseminated intravascular coagulation (DIC), often causing death in immunocompromised dogs.

- The gross and microscopic lesions of ICH described are consistent with cellular tropism of CAV-1 and its pathogenesis. However, the predominant lesions are in liver in fatal cases, generally taking the form of centrilobular to midzonal necrosis with dilated sinusoids filled with blood in the areas of necrosis. There is often sharp distinction between the foci of necrosis and the normal liver in the periportal areas. Normal periportal areas often have apoptotic hepatocytes. There is mild infiltration of neutrophils and mononuclear cells around necrotic foci. Intranuclear inclusion bodies can be seen in the intact hepatocytes, Kupffer cells, macrophages, endothelial cells, renal tubular epithelial cells, lymphoid follicles, red pulp of the spleen, and macrophages throughout the body.

- **JPC Diagnosis:** Liver: Hepatitis, necrotizing, centrilobular to midzonal, diffuse, acute, with intranuclear viral inclusions.

  The contributor's diagnosis and JPC diagnosis were similar with regard to lesion type and distribution.

- **Conference Comment:** Conference participants discussed the classic distribution of this disease (centrilobular to midzonal) in comparison to the often random distribution of other viruses associated with hepatitis. There was disparity among participants regarding the morphologic diagnosis, with some participants favoring "degeneration and necrosis" because of the presence of so few inflammatory cells; however, the majority of the group felt that "hepatitis" was more appropriate.

  CAV-1 can affect dogs, foxes, wolves, coyotes, and bears. Common lesions include hepatitis, anterior uveitis with corneal edema, and interstitial nephritis. Chronic changes seen in animals that survive the initial infection include hepatic fibrosis, interstitial fibrosis, glaucoma, and/or phthisis bulbi.