

## Clinical History:

A 49-year-old male presented with the chief complaint of increasing leg swelling for the past 3 weeks. In the past 6 weeks, he had also experienced increasing abdominal girth with distention, discomfort, and constipation. He reported dyspnea on exertion, intermittent lightheadedness, fatigue, and anorexia. He believed he gained about 50 pounds in the past 6 weeks. The patient is morbidly obese with a short medical history of diverticulosis and asthma. He has been a 1 pack/day smoker for the past 20 years. His mother, also a smoker, died of lung cancer.

Imaging studies, including abdominal MRI and abdominal CT with contrast, showed a mass almost completely filling the right atrium and obstructing the tricuspid valve. The architecture of the liver was heterogeneous, suggesting hepatitis. There were also 2 masses in the liver and multiple small nodules in the lungs. The patient had bilateral pleural effusions, a pericardial effusion, ascites, and diffuse subcutaneous tissue edema. He underwent resection of the atrial mass to alleviate his volume-overload symptoms.

## Gross Findings:

The 110 g, 7.0 x 6.9 x 4.5 cm soft tissue mass was lobulated white-tan to red. A distinct pedicle or resection margin was not identified. The cut surface was variegated tan-pink and soft with intermittent areas of hemorrhage and necrosis. One section per cm of greatest dimension was submitted for histologic evaluation.



Figure 1. Resected mass from right atrium.

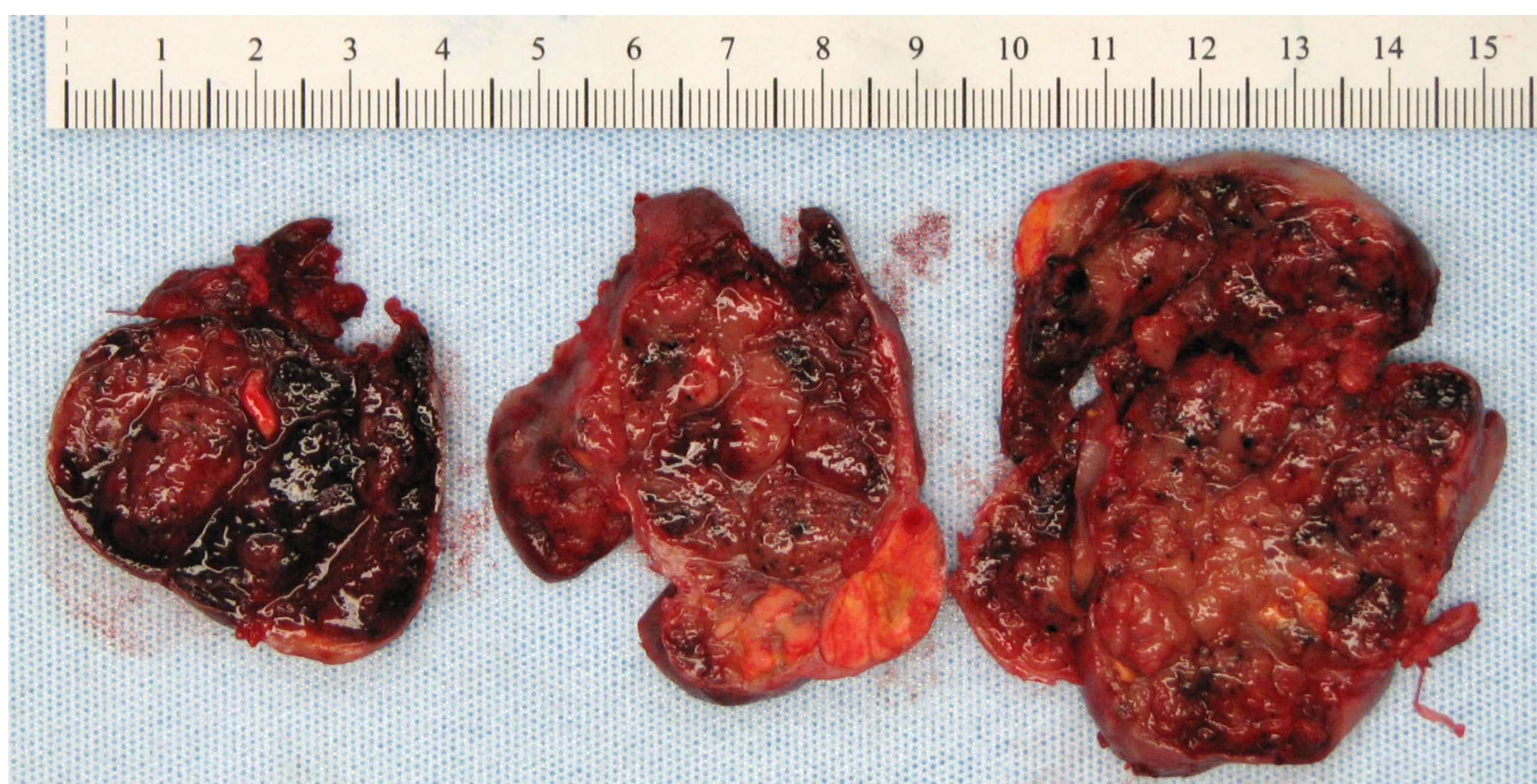


Figure 2. Cut surface of mass demonstrating hemorrhagic and necrotic areas.

## Microscopic Findings:

Frozen section yielded a diagnosis of “tumor present, favoring carcinoma.” Routine processing revealed the mass was composed of round to cuboidal cells with pleomorphic nuclei organized in thickened trabeculae. Immunohistochemistry revealed the cells were diffusely positive for HepPar1, cytokeratin 8, and cytokeratin 18. CD10 showed a pericanalicular staining pattern, while CD34 stained the endothelium lining the sinusoids. The cells were negative for EMA and glypican3. The patient was diagnosed with hepatocellular carcinoma tumor thrombus, moderately differentiated.

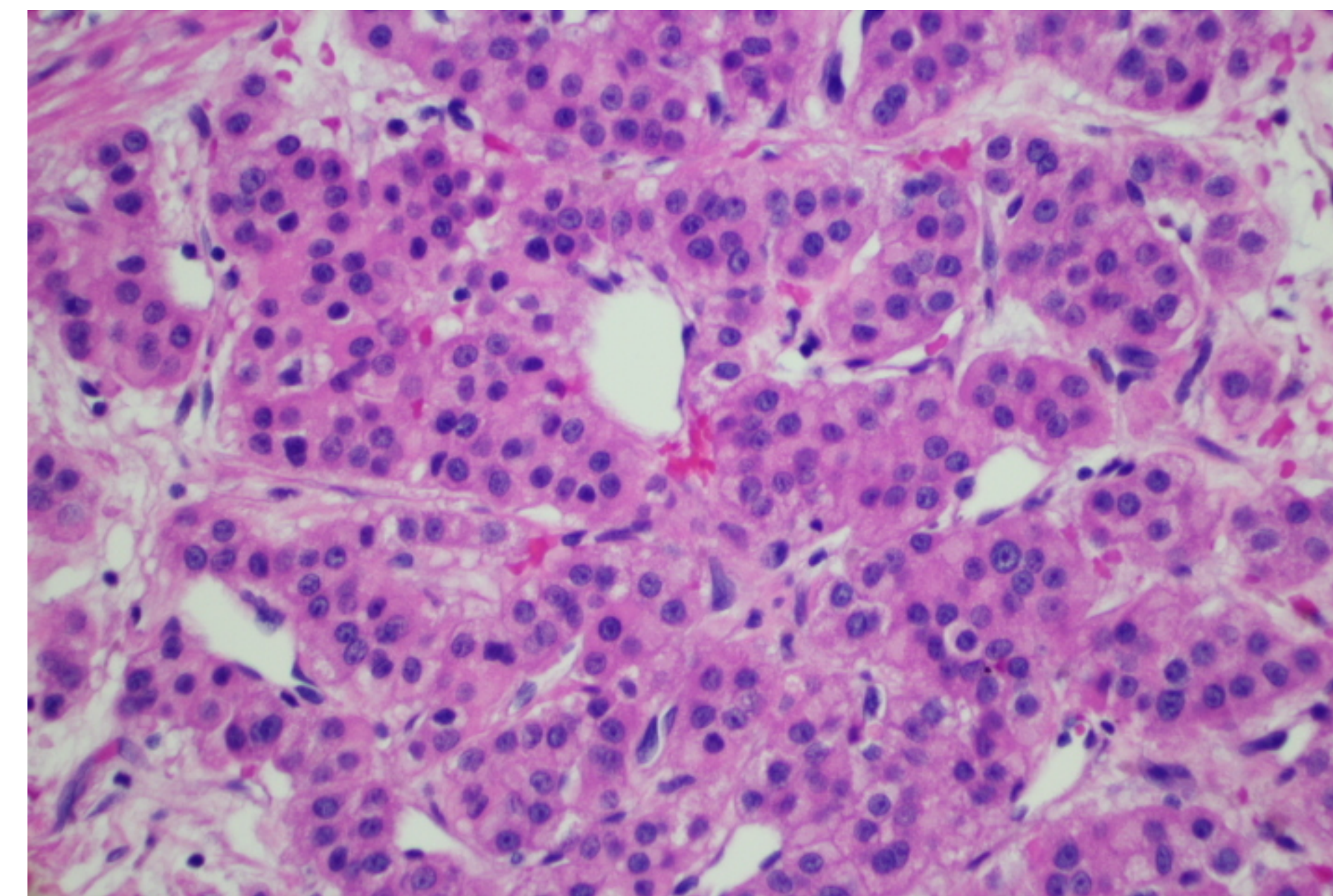


Figure 3. Representative mass stained with hematoxylin and eosin.

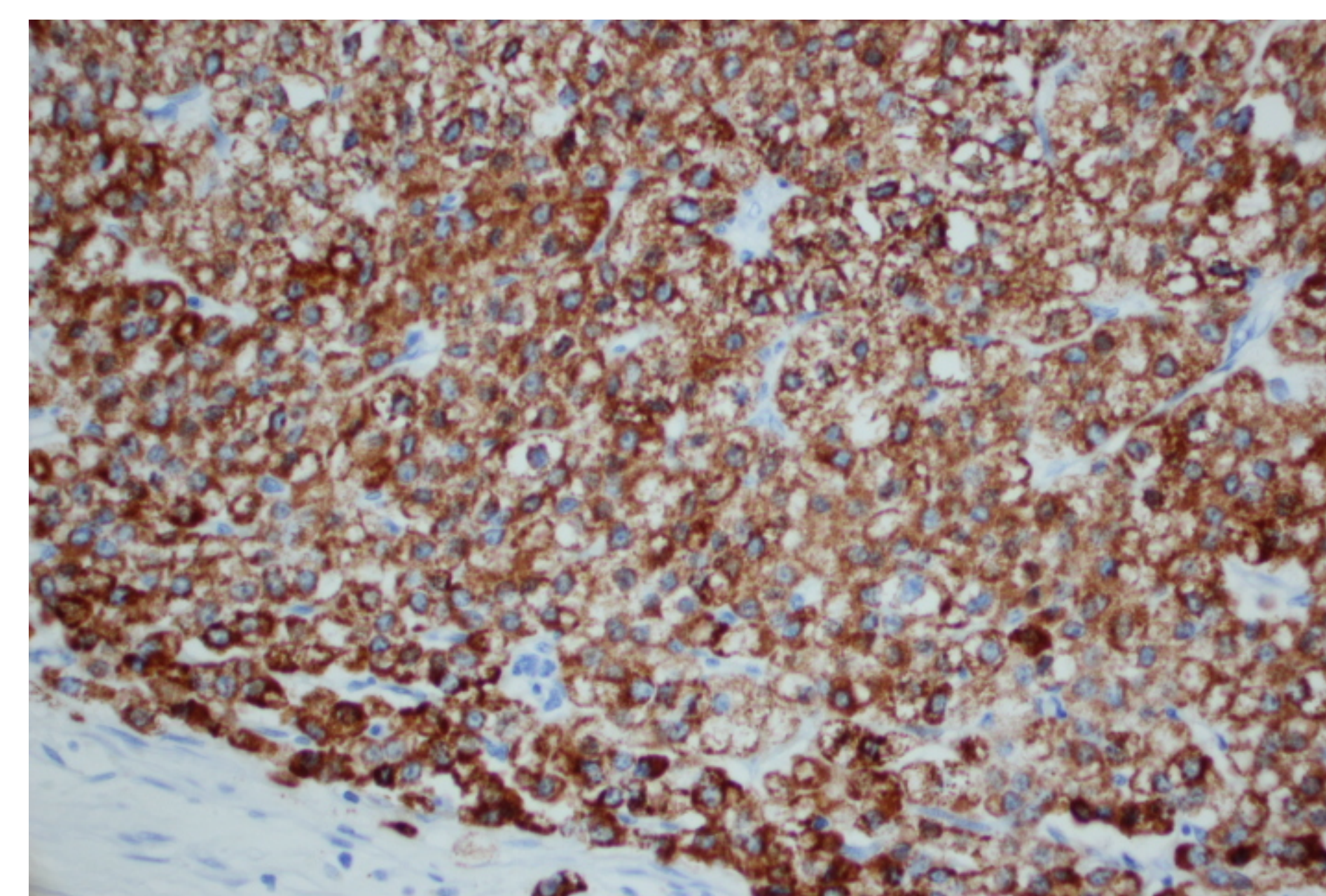


Figure 3. Representative mass HepPar1 immunostain demonstrating diffuse positivity.

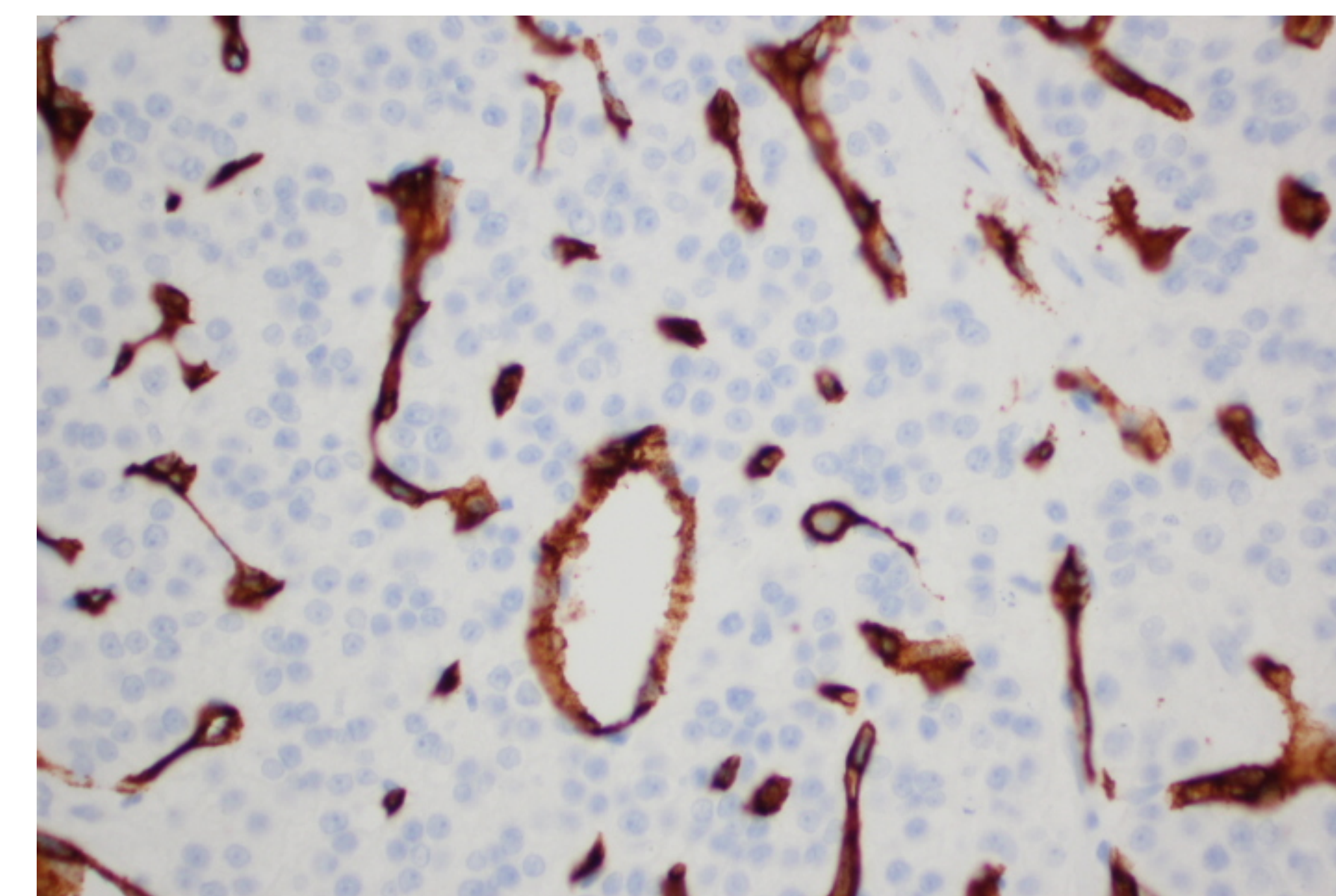


Figure 3. Representative mass CD34 immunostain demonstrating positivity in sinusoidal endothelial cells.

## Discussion:

Hepatocellular carcinoma accounts for 80-90% of primary liver cancers, with 80% of cases occurring in sub-Saharan Africa and east Asia. The incidence of HCC in the United States has tripled since the 1980s, but it is still 8-30 times lower than some countries in Asia. Table 1 compares HCC epidemiology in the United States to the rest of the world. Symptoms of HCC are non-specific and include upper abdominal pain, malaise, fatigue, and weight loss. This neoplasm metastasizes by vascular invasion, usually through the portal system. The most common sites for metastasis are lungs, abdominal lymph nodes, and bone. Metastasis to the heart is rare and occurs via the inferior vena cava.

Table 1. Comparison of hepatocellular carcinoma in the United States vs. worldwide

United States	Worldwide
6 <sup>th</sup> leading cause of cancer-related death	3 <sup>rd</sup> leading cause of cancer-related death
90% of patients have underlying cirrhosis	50% of patients have underlying cirrhosis
Average age > 60 years old	Average age 20-40 years old
Male: Female ratio = 3:1	Male: Female ratio 3:1 – 8:1
Major risk factors: Chronic Hepatitis C infection, alcohol abuse, non-alcoholic fatty liver disease	Major risk factors: Chronic Hepatitis B infection, aflatoxin B1 exposure

For patients with known cirrhosis, a surveillance ultrasound is recommended every 6 months. Nodules greater than 1 cm can be diagnosed as HCC if they display a characteristic imaging pattern on contrast CT or MRI. Liver biopsy is reserved for nodules without this imaging pattern, or for nodules in a non-cirrhotic liver. Prognosis depends not only on the stage, but also the degree of functional liver impairment. Treatment options at an early stage include ablation, resection, or liver transplant. Intermediate to advanced stage options are chemoembolization and tyrosine-kinase inhibitors. Unfortunately, most patients die within 2 years of their diagnosis, and treated patients have 70% recurrence after 5 years.

## Conclusion:

Because of the poor prognosis associated with hepatocellular carcinoma, the most important treatment is prevention. Exposure to HBV can be prevented with vaccination, and exposure to Hepatitis B and C viruses can be prevented with universal precautions and safety, such as proper sharps disposal. Avoiding excessive alcohol consumption and maintaining a healthy weight are also important. Exposure to aflatoxin B1 is harder to prevent, although initiatives are being taken in other countries to prevent its growth, such as thoroughly drying crops before storage. For patients with known risk factors, screening becomes very important. The patient's prognosis is best when the cancer is caught early, so imaging modalities may be used to monitor the liver.

## References:

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