

GIT BLOCK

PATHOLOGY PRACTICAL

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Objectives:

At the end of these practical sessions, the students will be able to:

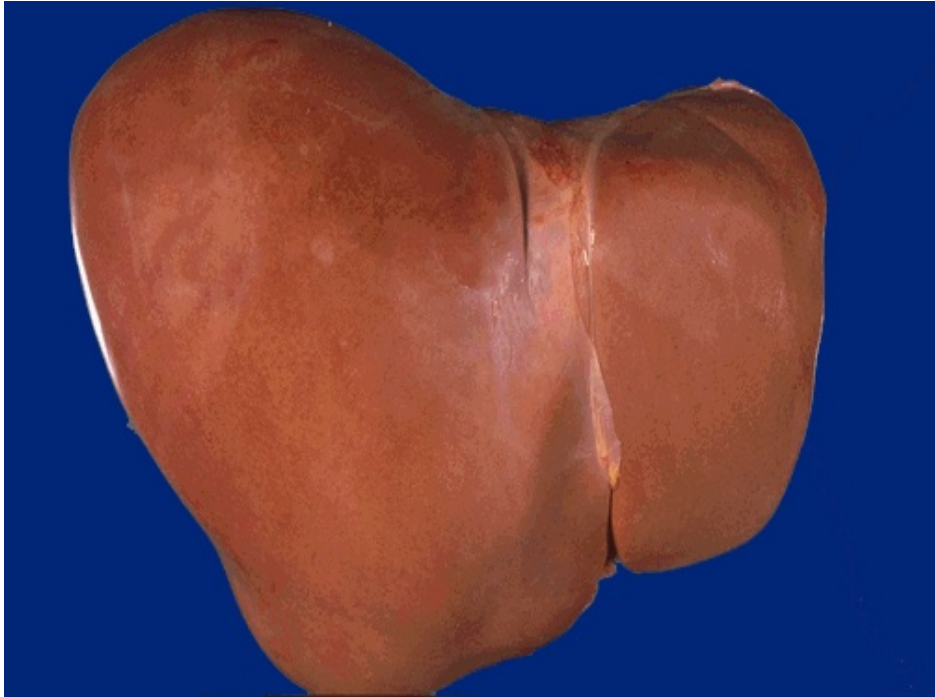
- Recognize, describe and understand the morphological appearance (both macroscopic and microscopic) of some of the common diseases of the hepatobiliary system and pancreas.

Contents

- Hepatobiliary system:
 - Chronic hepatitis.
 - Hepatic cirrhosis.
 - Hepato-cellular carcinoma.
 - Chronic cholecystitis with stones.
- Pancreas:
 - Chronic pancreatitis.
 - Pancreatic adenocarcinoma.

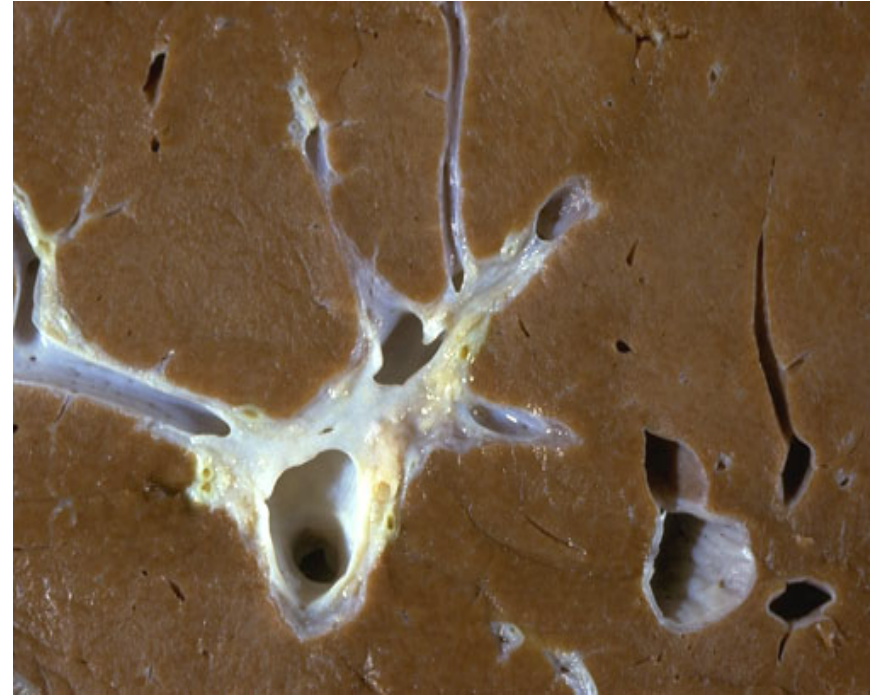
Normal Liver anatomy - Gross & Cut surface

External surface

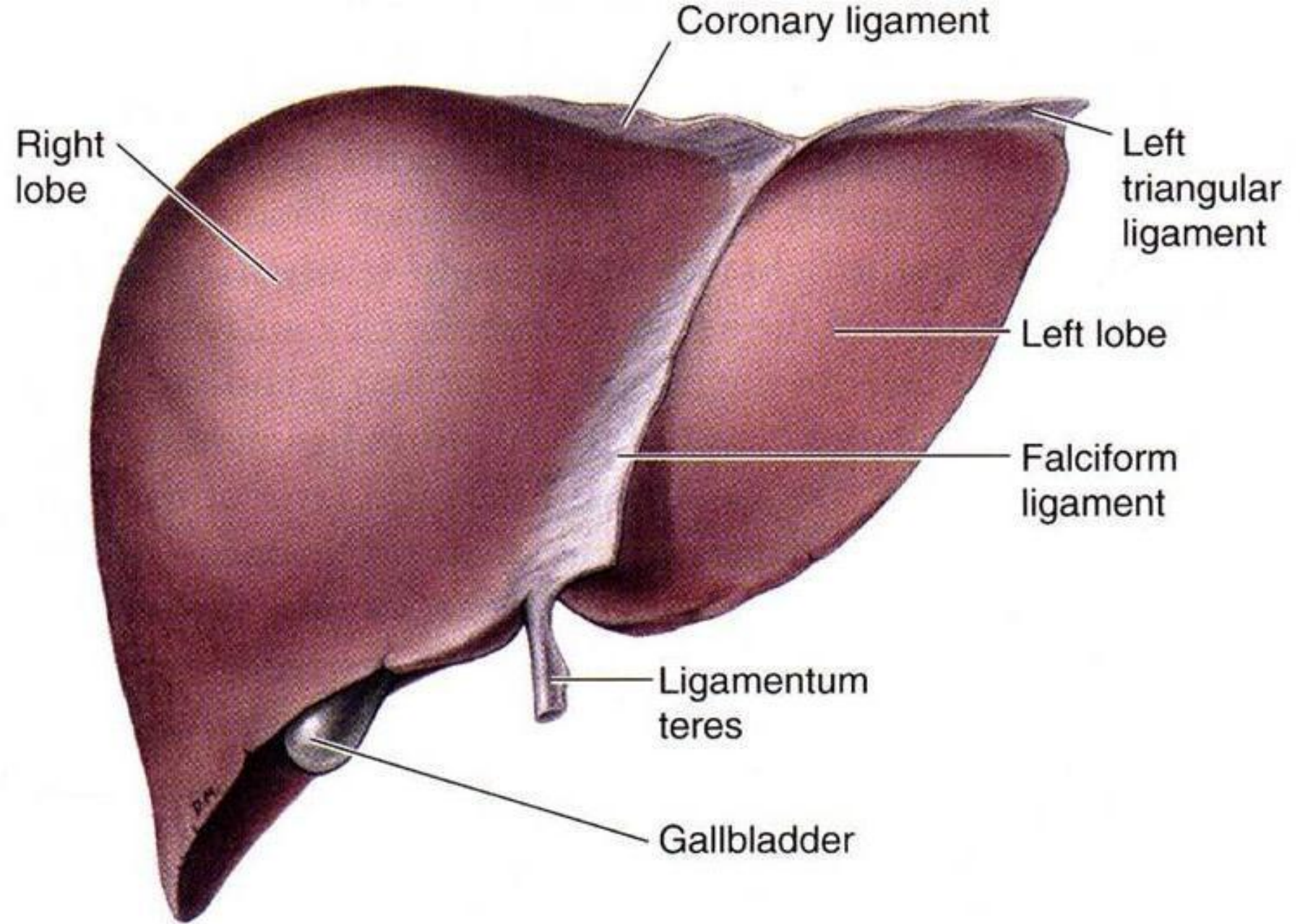


This is the external surface of a normal liver. The color is brown, and the surface is smooth. A normal liver is about 1200 to 1600 grams.

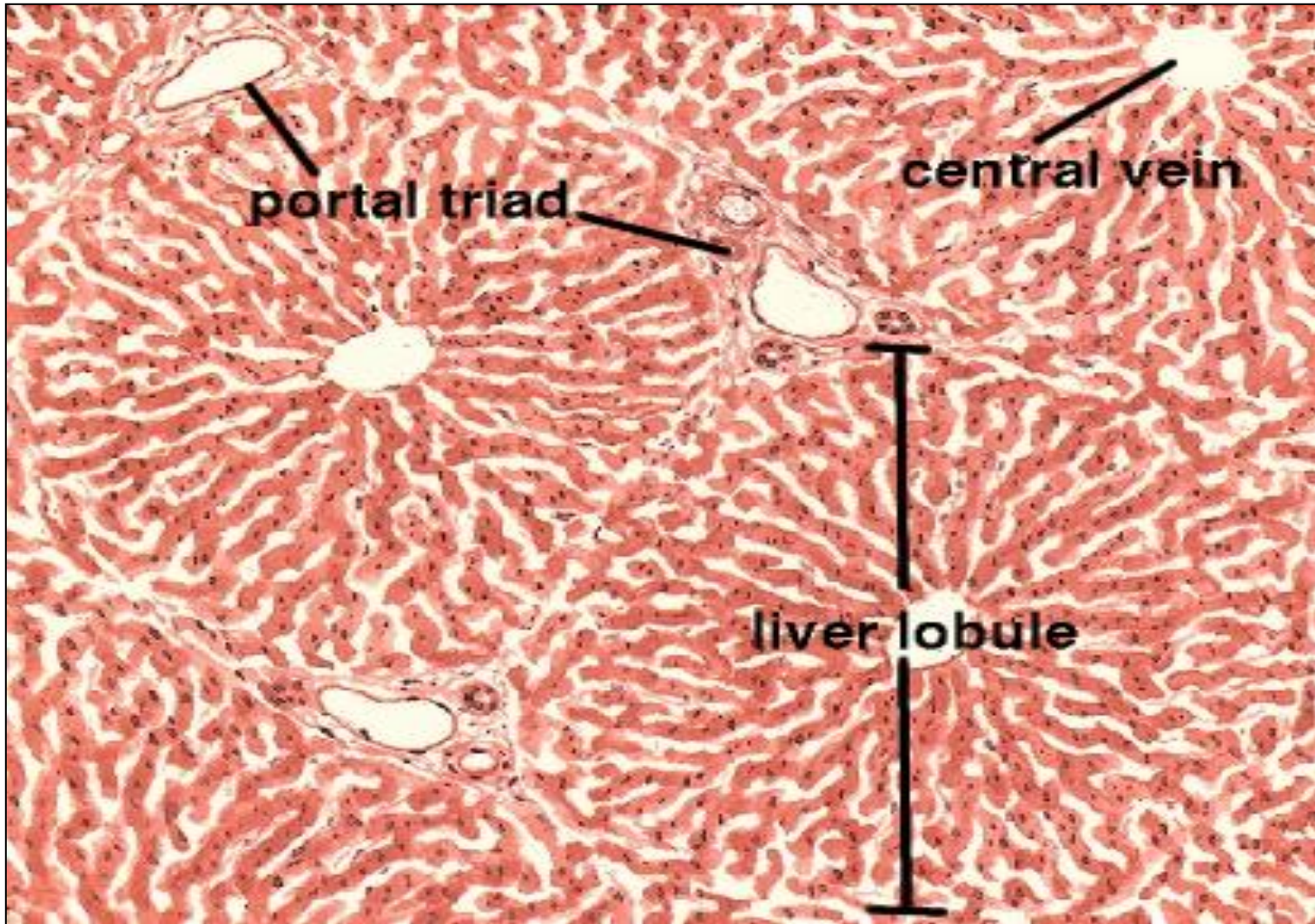
Cut surface



Near the hilum, note the portal vein, which branches at center left, with accompanying hepatic artery and bile ducts. At the lower right is a branch of hepatic vein

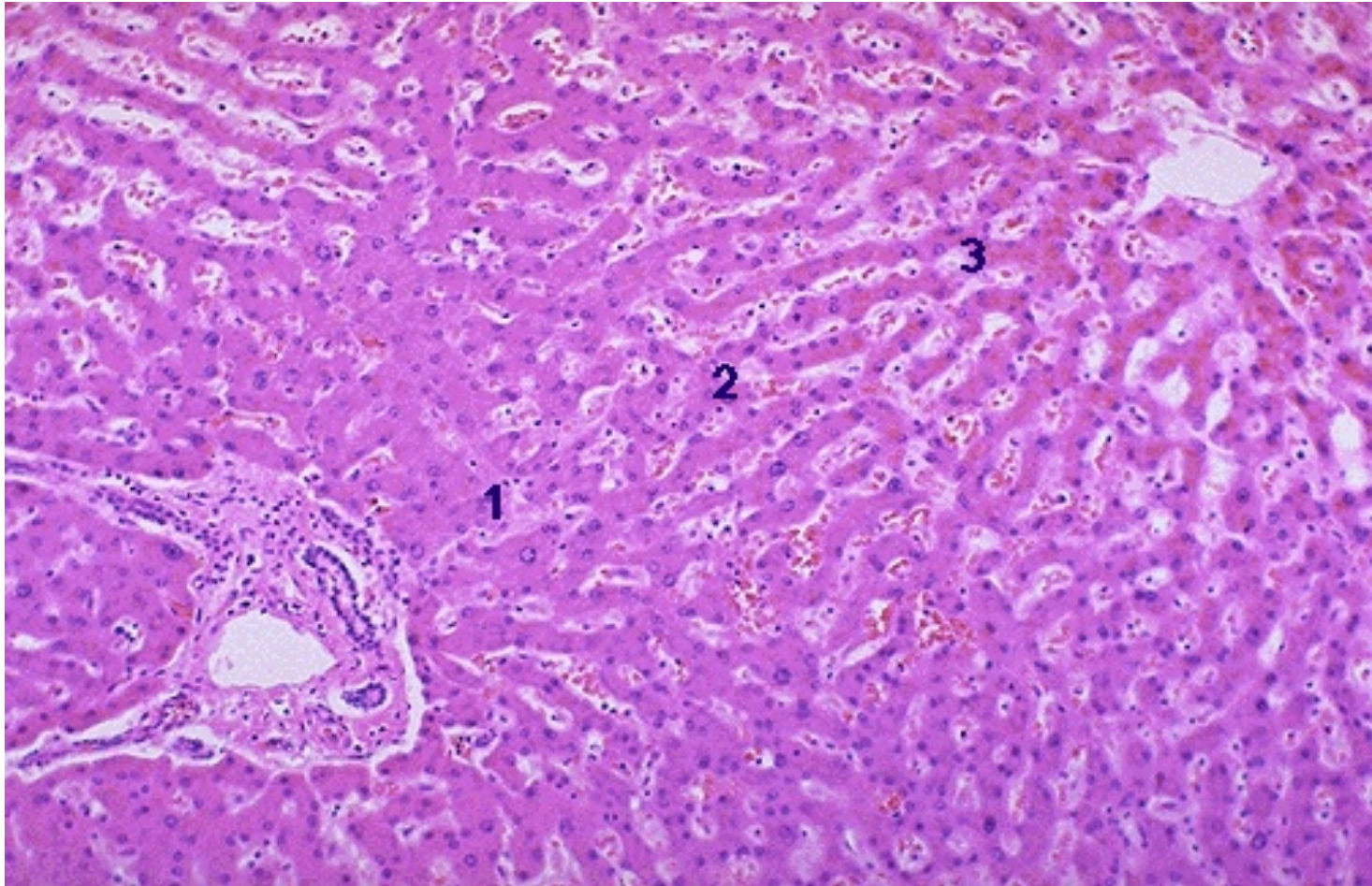


Normal Liver Histology - Gross



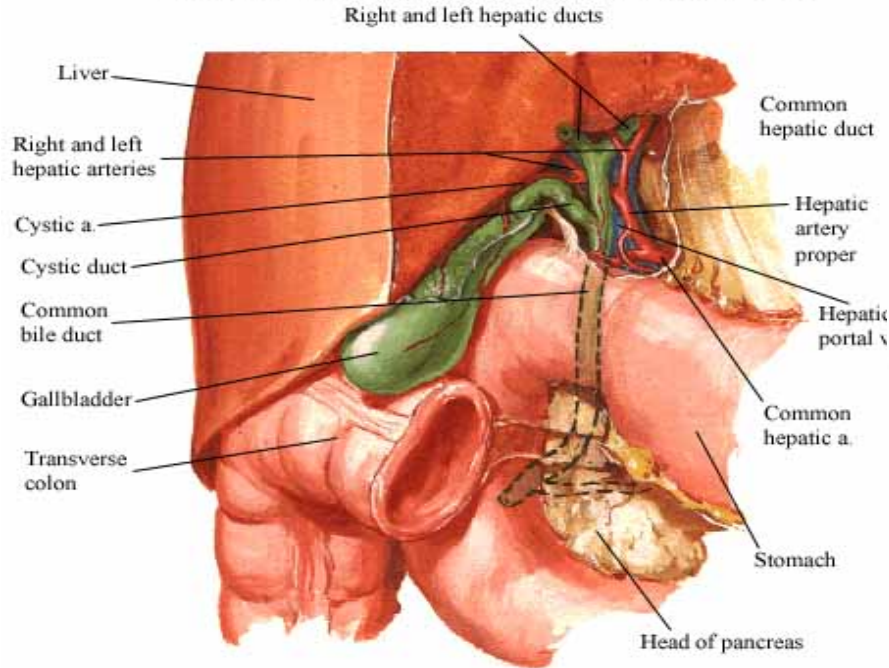
The classical view of liver tissue from a liver biopsy, H&E stained

Normal Liver Histology



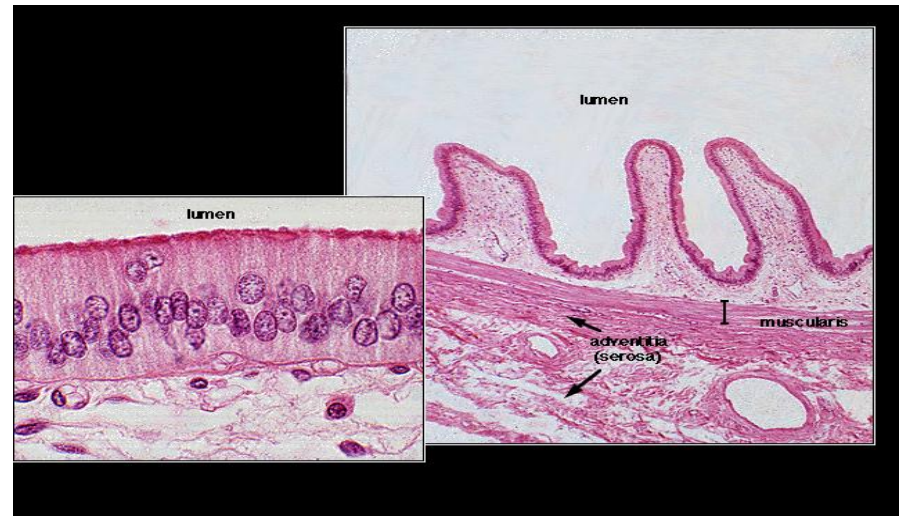
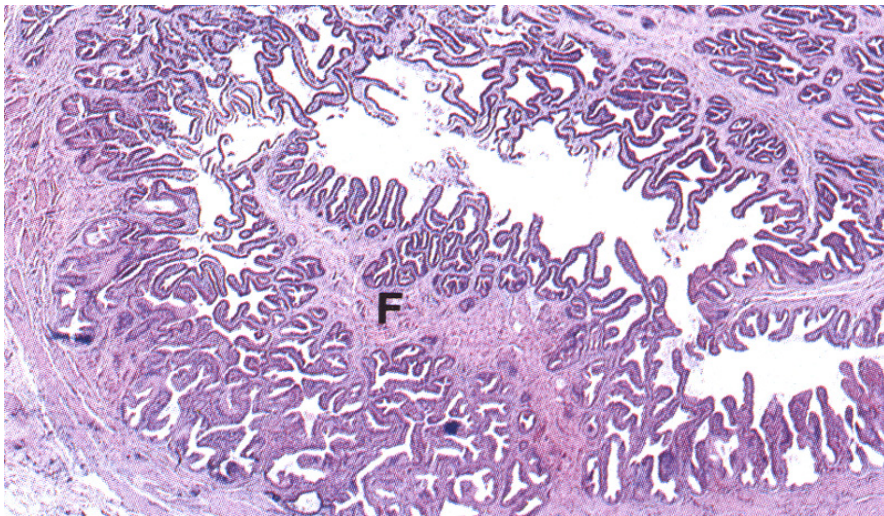
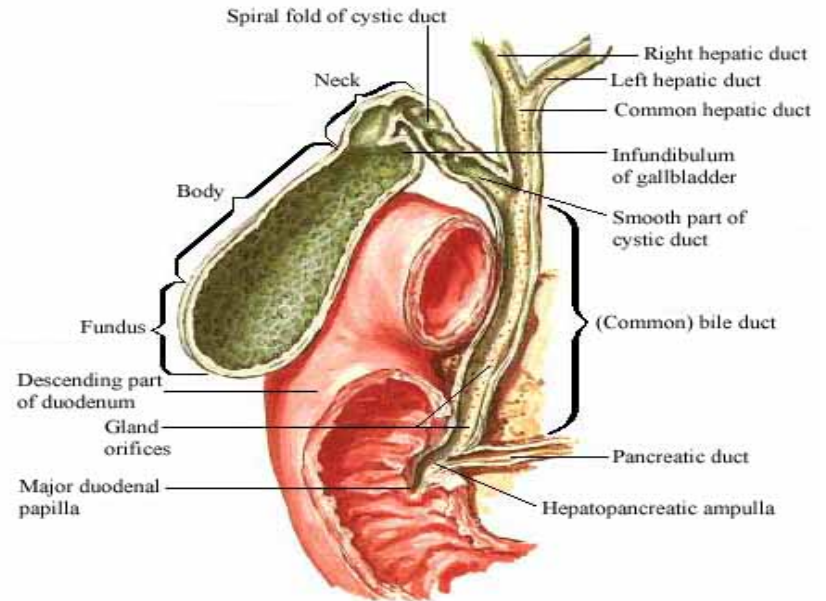
Liver is divided histologically into lobules. The center of the lobule is the central vein. At the periphery of the lobule are portal triads. Functionally, the liver can be divided into three zones, based upon oxygen supply.

Gallbladder and Extrahepatic Bile Ducts



Gallbladder and Extrahepatic Bile Ducts

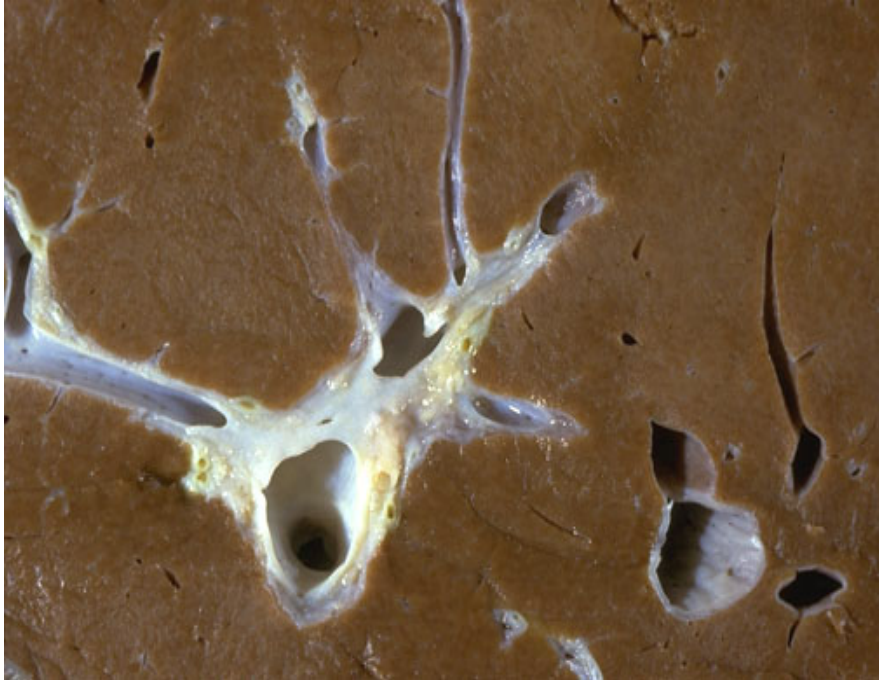
Sectioned



Gross and histopathology

Chronic VIRAL hepatitis (HBV & HCV)

Cut Section of Normal Liver & Ch. Hepatitis

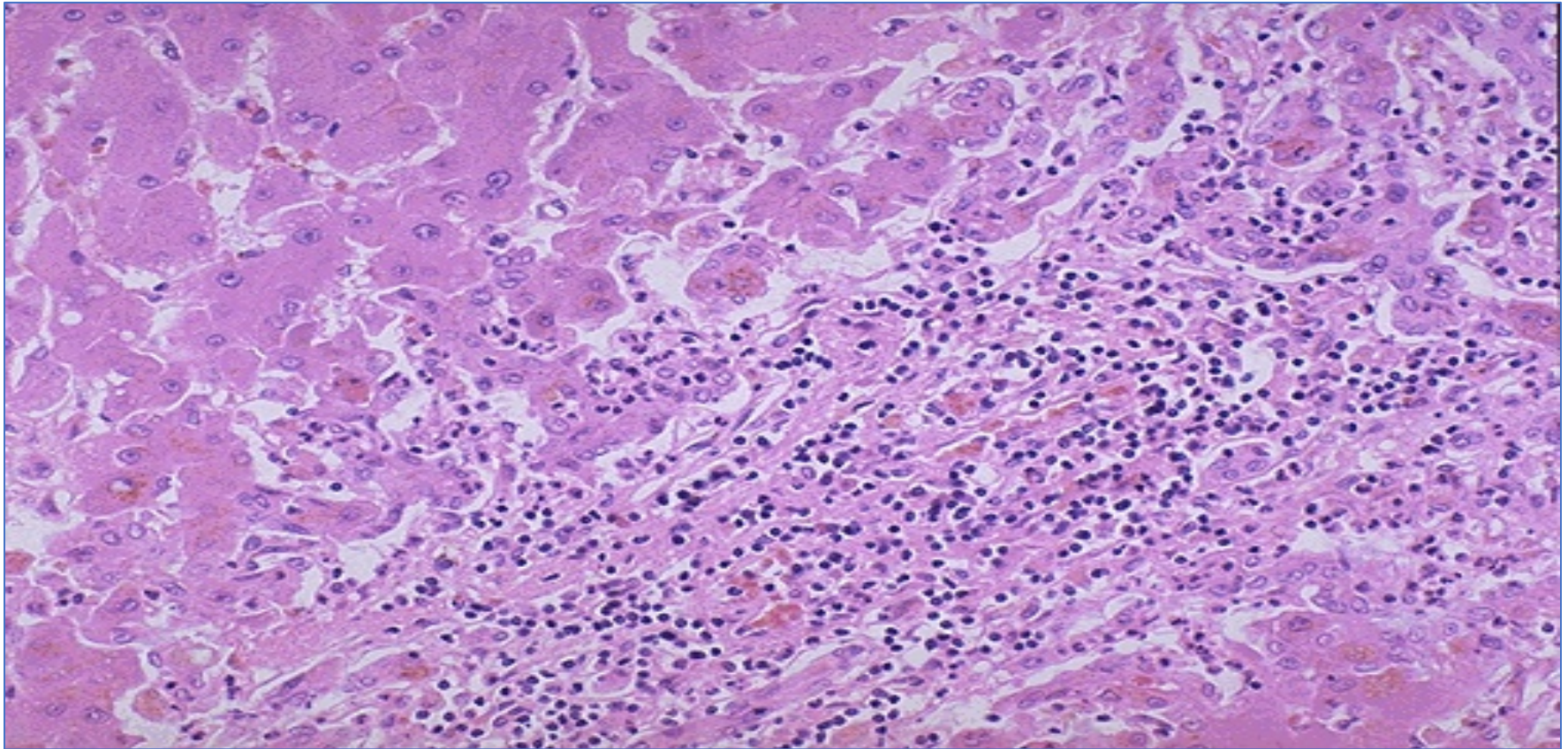


Normal Liver: has a brown color. Near the hilum here, note the portal vein carrying blood to the liver, which branches at center left, with accompanying hepatic artery and bile ducts. At the lower right is a branch of hepatic vein draining blood from the liver to the inferior vena cava.



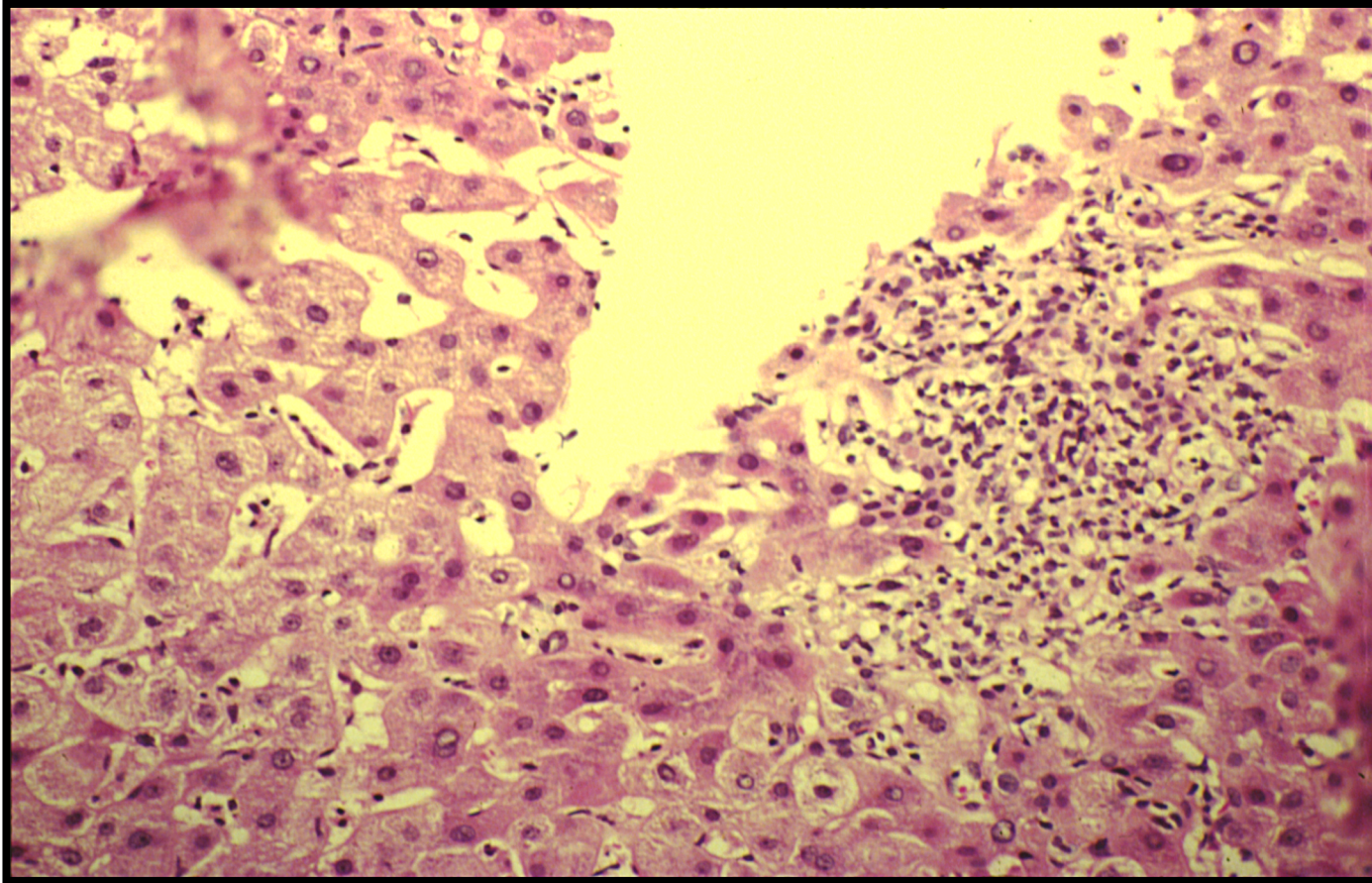
Chronic Hepatitis: The necrosis and lobular collapse is seen here as areas of hemorrhage and irregular furrows and granularity on the cut surface of the liver.

Chronic Viral Hepatitis B – Microscopic view



Viral hepatitis leads to liver cell destruction. A mononuclear inflammatory cell infiltrate extends from portal areas and disrupts the limiting plate of hepatocytes which are undergoing necrosis, the so-called "piecemeal" necrosis of chronic active hepatitis. In this case, the hepatitis B surface antigen (HBsAg) and hepatitis B core antibody (HBcAb) were positive.

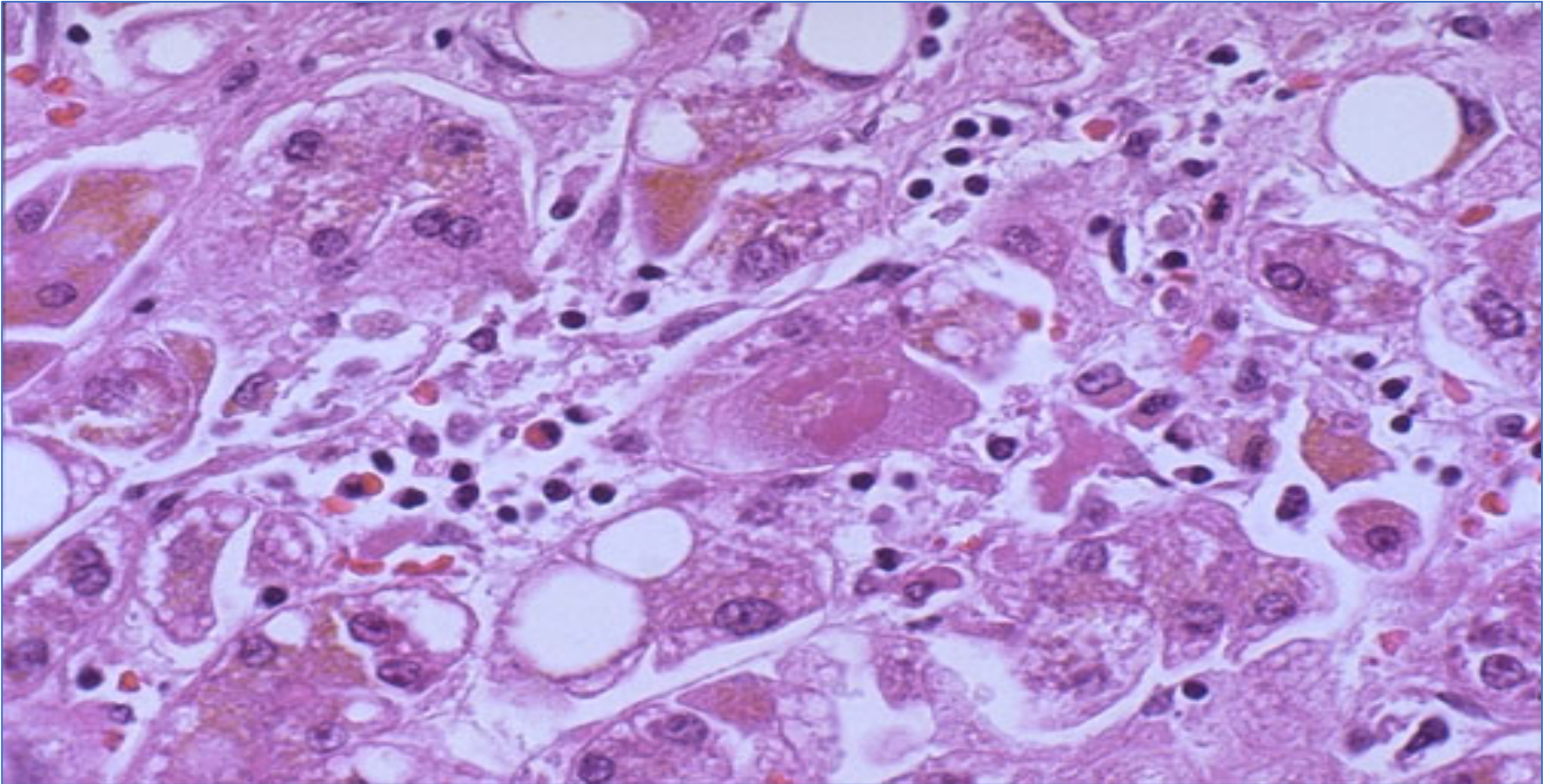
Chronic Viral Hepatitis B – HPF



Moderate chronic inflammatory cells infiltration consisting of lymphocytes and histiocytes in both portal tracts and liver parenchyma. Piecemeal necrosis, hepatocytes swelling, and “spotty” hepatocytes necrosis are also noticed.

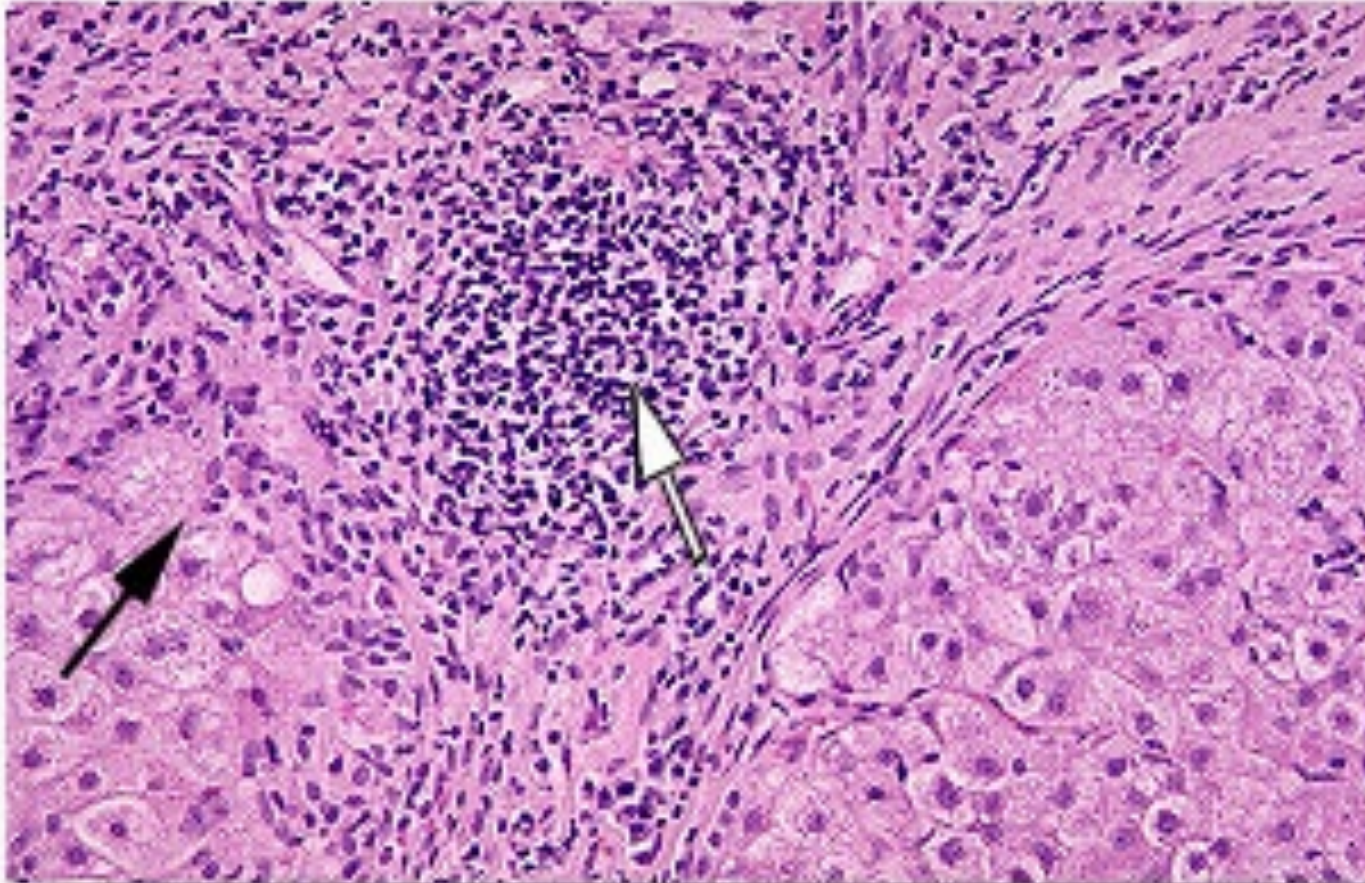
No evidence of cirrhosis or malignancy noted

Chronic Viral Hepatitis C – HPF



This is a case of viral hepatitis C, which in half of cases leads to chronic liver disease. The extent of chronic hepatitis can be graded by the degree of activity (necrosis and inflammation) and staged by the degree of fibrosis. In this case, necrosis and inflammation are prominent, and there is some steatosis as well.

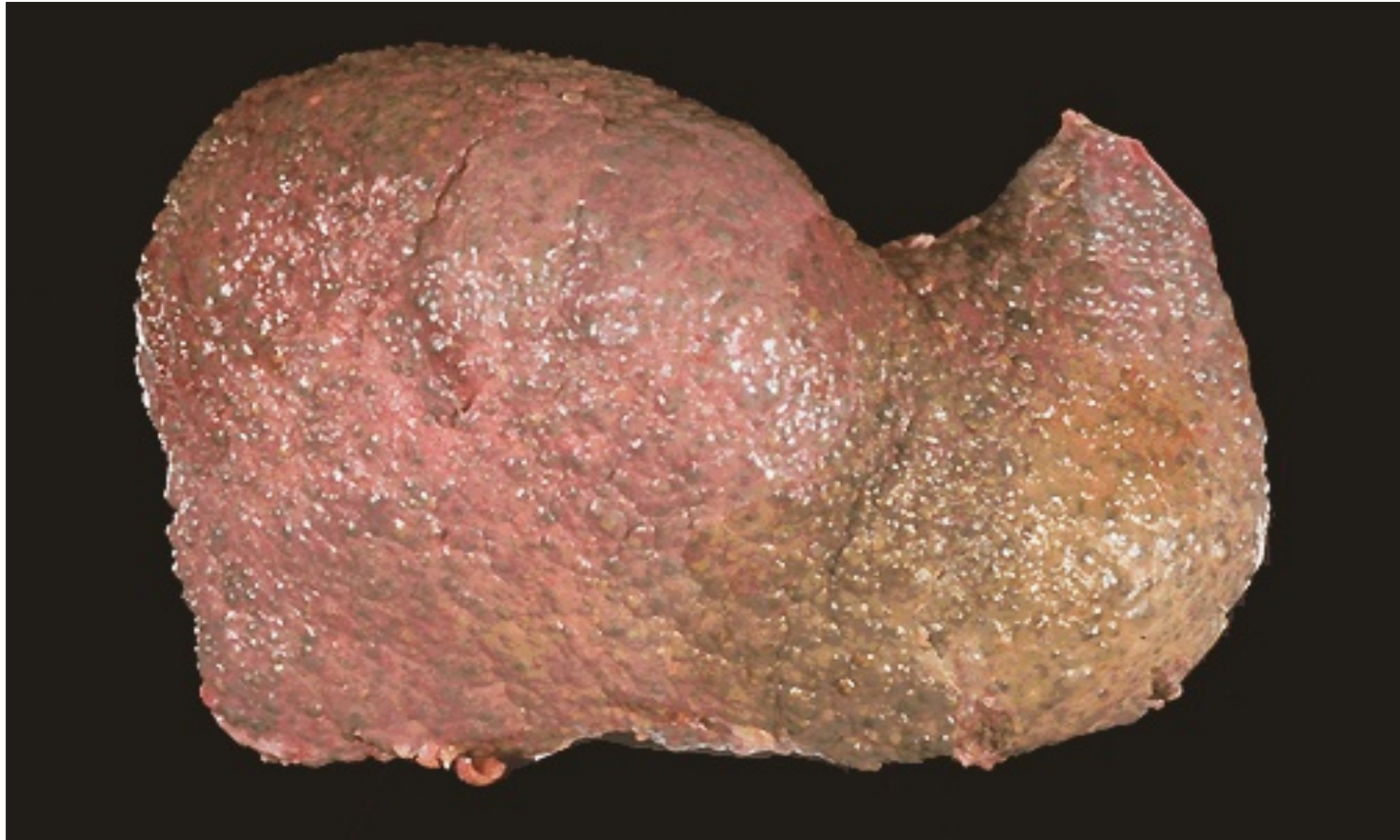
Portal Inflammation in Chronic Hepatitis - HPF



More severe portal infiltrates with sinusoidal infiltrates also

Hepatic cirrhosis

Micronodular Hepatic Cirrhosis - MRI



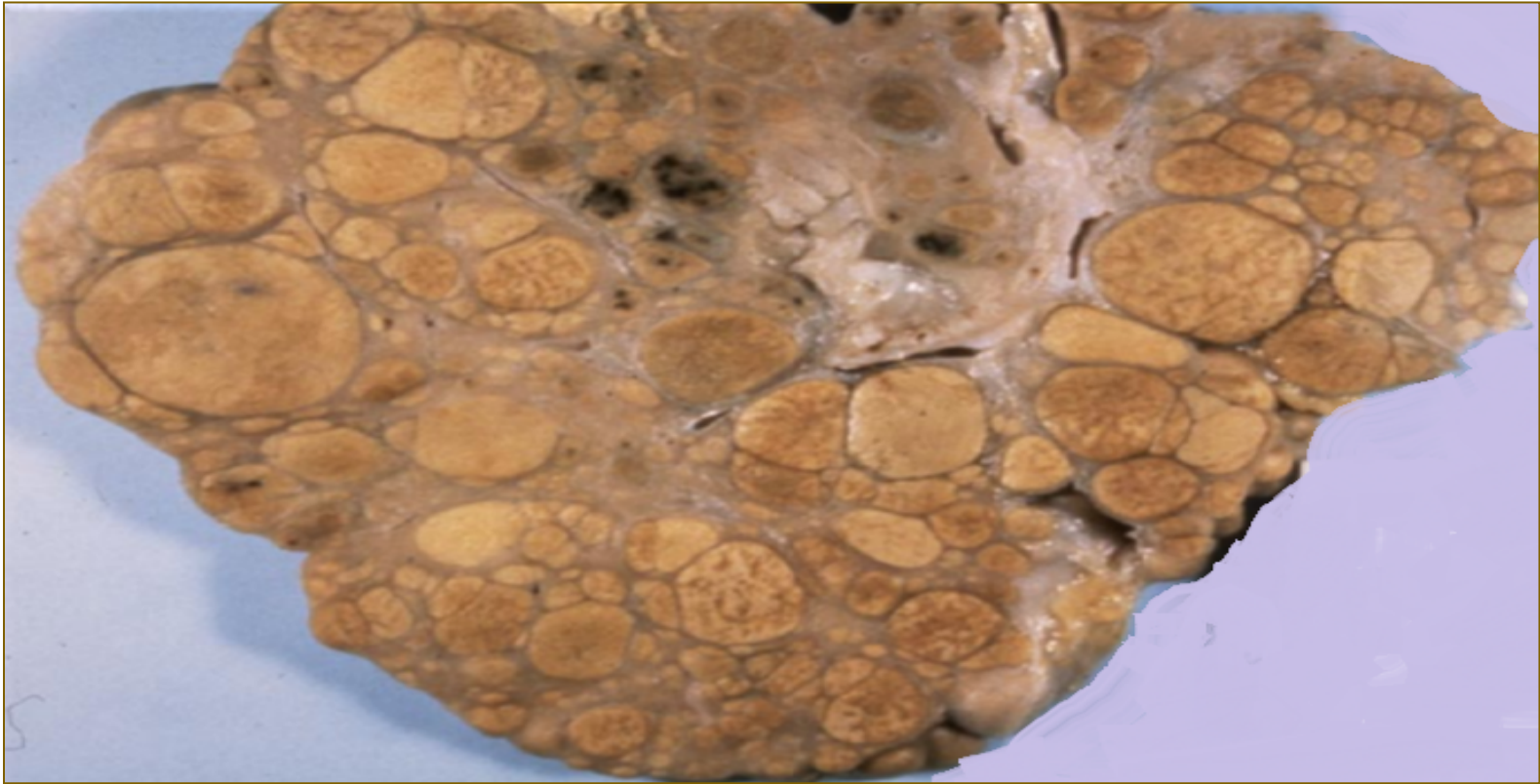
***This is an example of a micronodular cirrhosis.
The regenerative nodules are quite small, averaging less than 3 mm in size.
The most common cause for this is chronic alcoholism. The process of
cirrhosis develops over many years.***

Micronodular cirrhosis with fatty liver- Gross



A close-up view of a micronodular cirrhosis in a liver with fatty change demonstrates the small, yellow nodules. Micronodular cirrhosis may also be seen with Wilson's disease, primary biliary cirrhosis, and hemochromatosis.

Hepatic Macronodular Cirrhosis – Gross

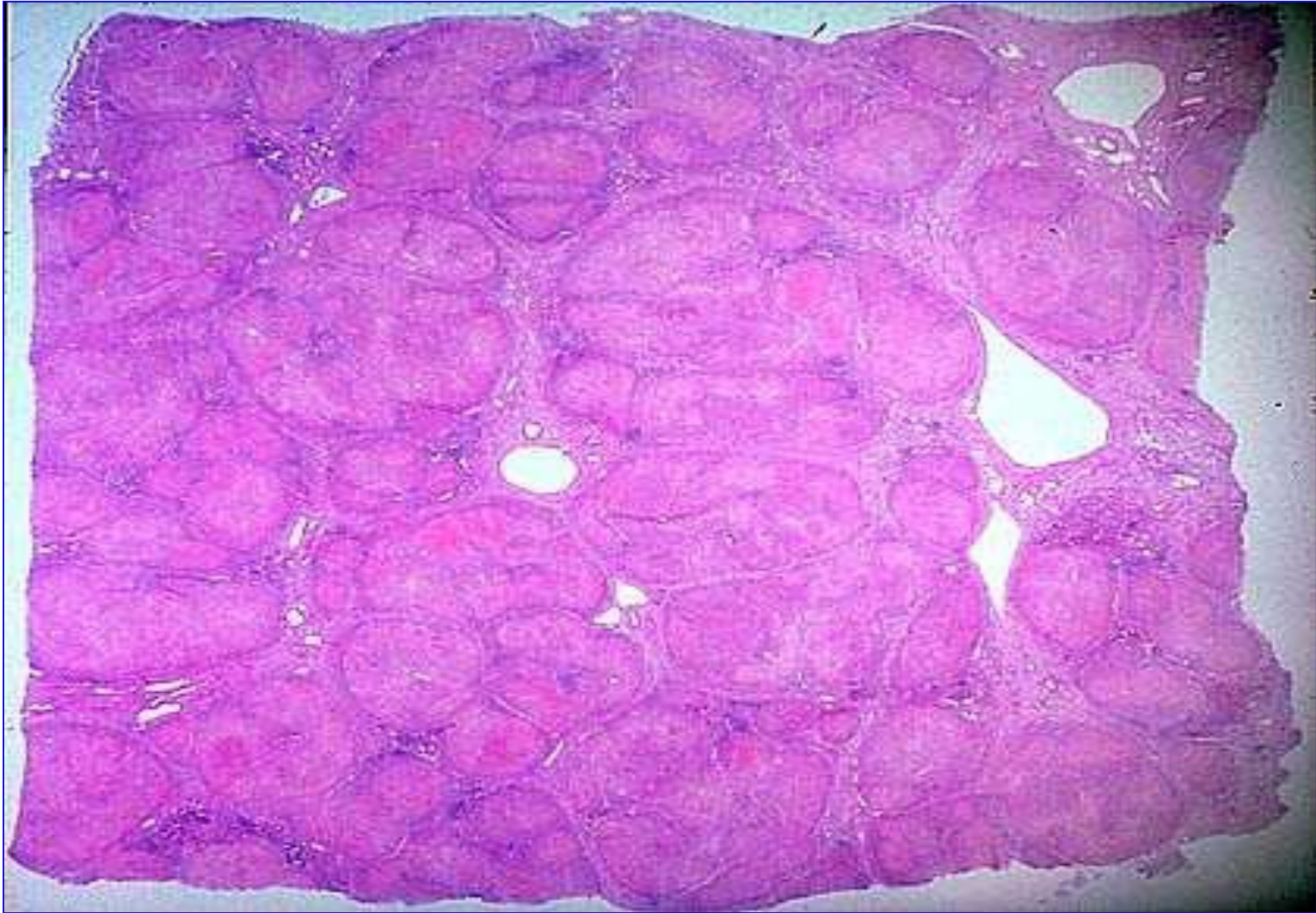


Gross picture shows multiple nodules of variable sizes with fibrosis.

Complications:

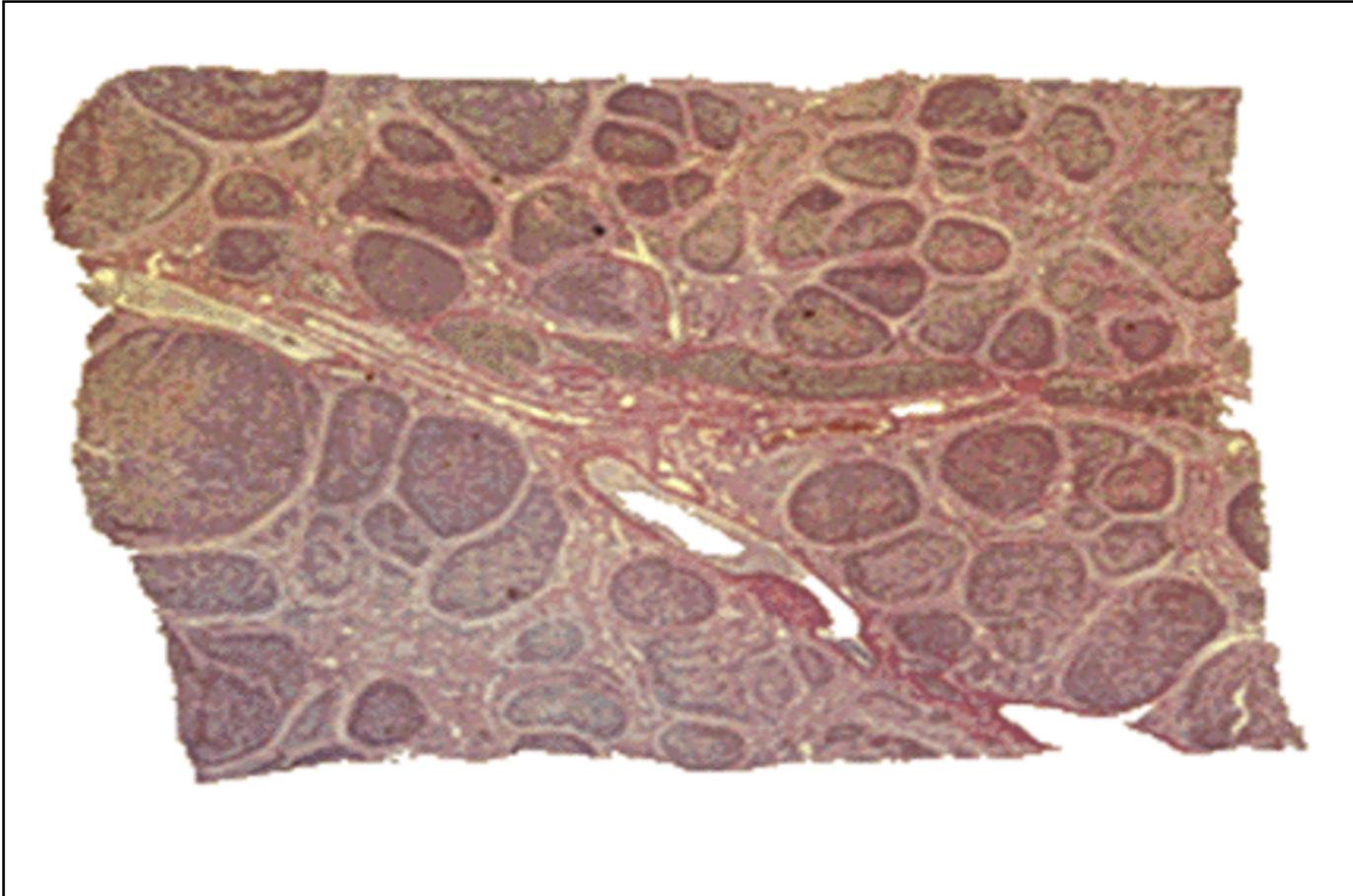
- Portal hypertension
- Esophageal varices
- Hepatic failure
- Liver cell dysplasia and carcinoma
- Gynecomastia

Hepatic cirrhosis – LPF



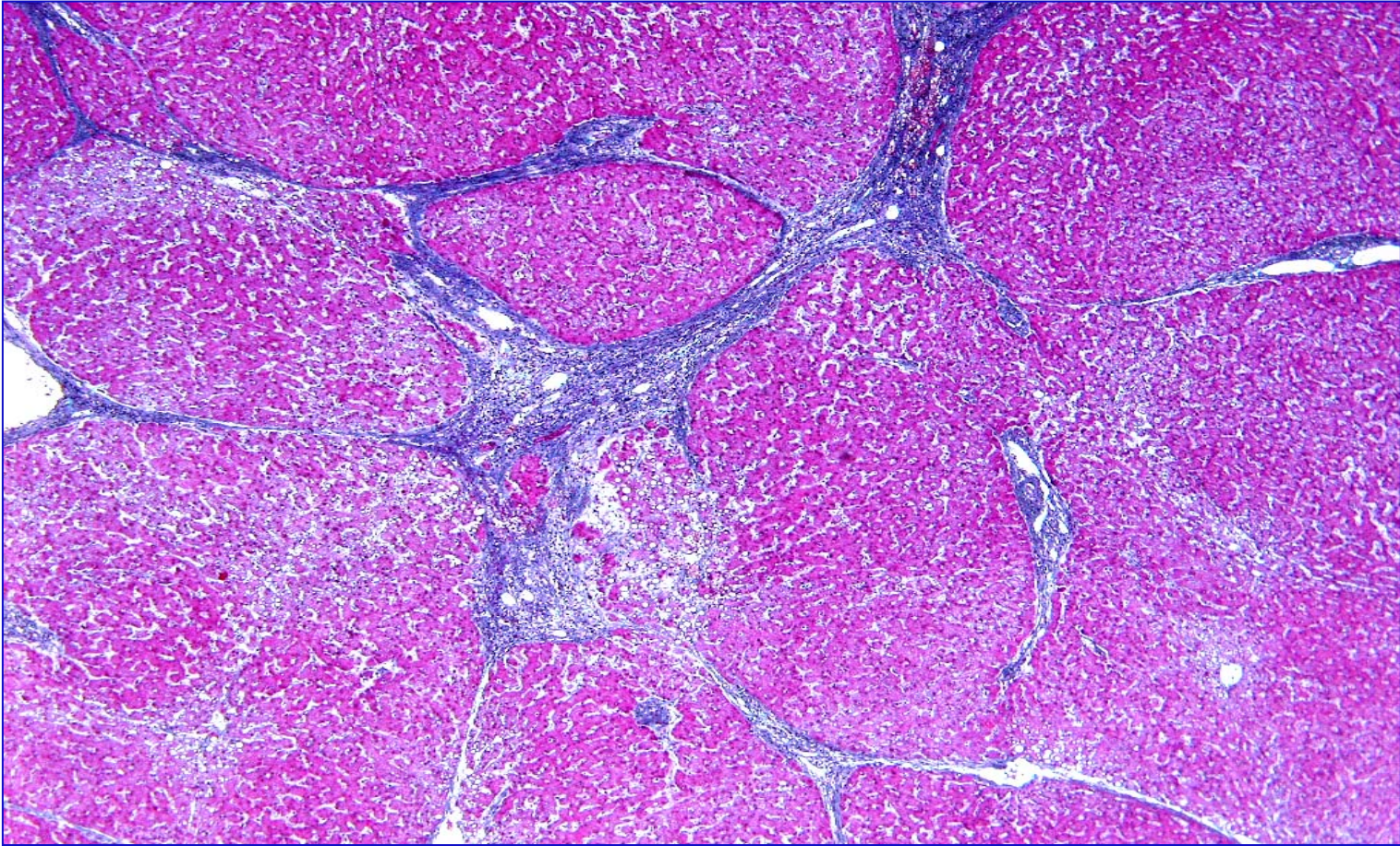
Irregular nodules separated by Portal-to-Portal fibrous bands

Hepatic cirrhosis – LPF



- ***The parenchyma shows darker tan nodules of varying sizes.***
 - ***These nodules are composed of hepatocytes.***
 - ***The paler areas in between are collagen.***

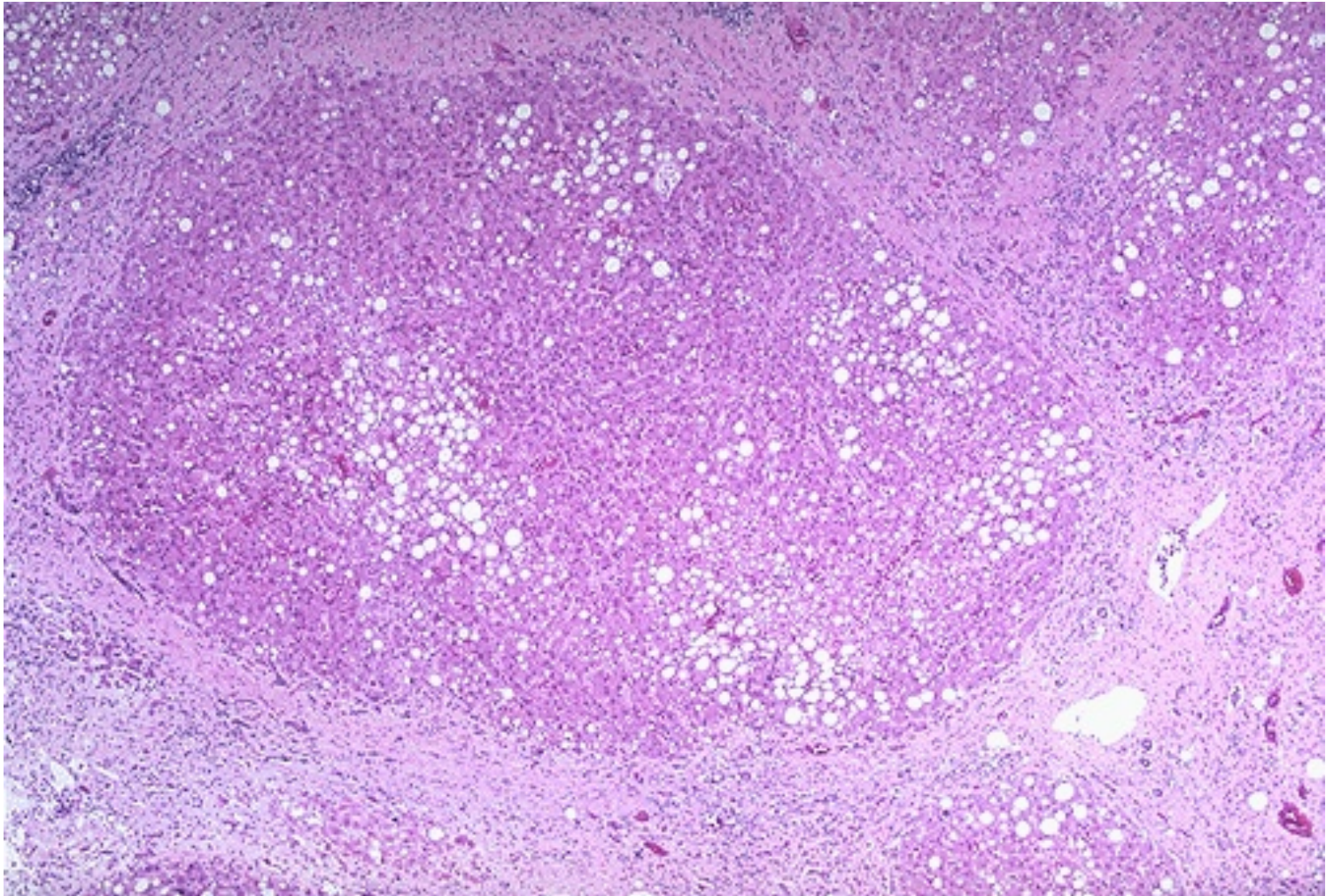
Cirrhosis – Masson trichrome stain



Loss of lobular architecture and formation of *regenerative hepatic nodules* of variable size and shape, surrounded by *fibrosis*.

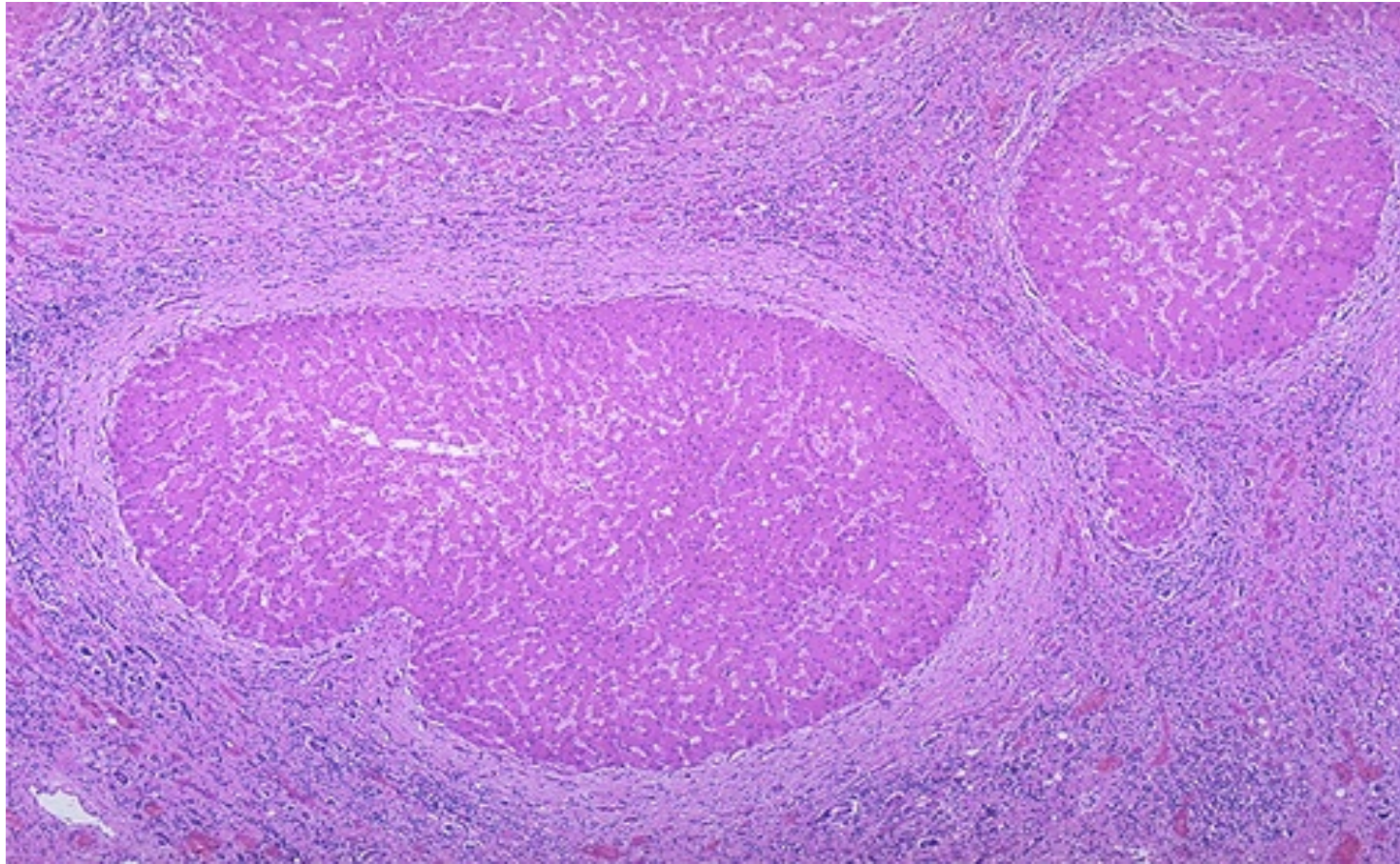
Each nodules consists of liver cells without any arrangement and with no central vein. Large number of proliferated bile ducts and chronic inflammatory cells are present in fibrous tissue.

Micronodular cirrhosis with fatty liver- LPF



Micronodular cirrhosis is seen along with moderate fatty change. Note the regenerative nodule surrounded by fibrous connective tissue extending between portal regions.

Hepatic cirrhosis – LPF



Microscopically with cirrhosis, the regenerative nodules of hepatocytes are surrounded by fibrous connective tissue that bridges between portal tracts. Within this collagenous tissue are scattered lymphocytes as well as a proliferation of bile ducts

HEPATIC ADENOMA

Hepatic Adenoma - Gross



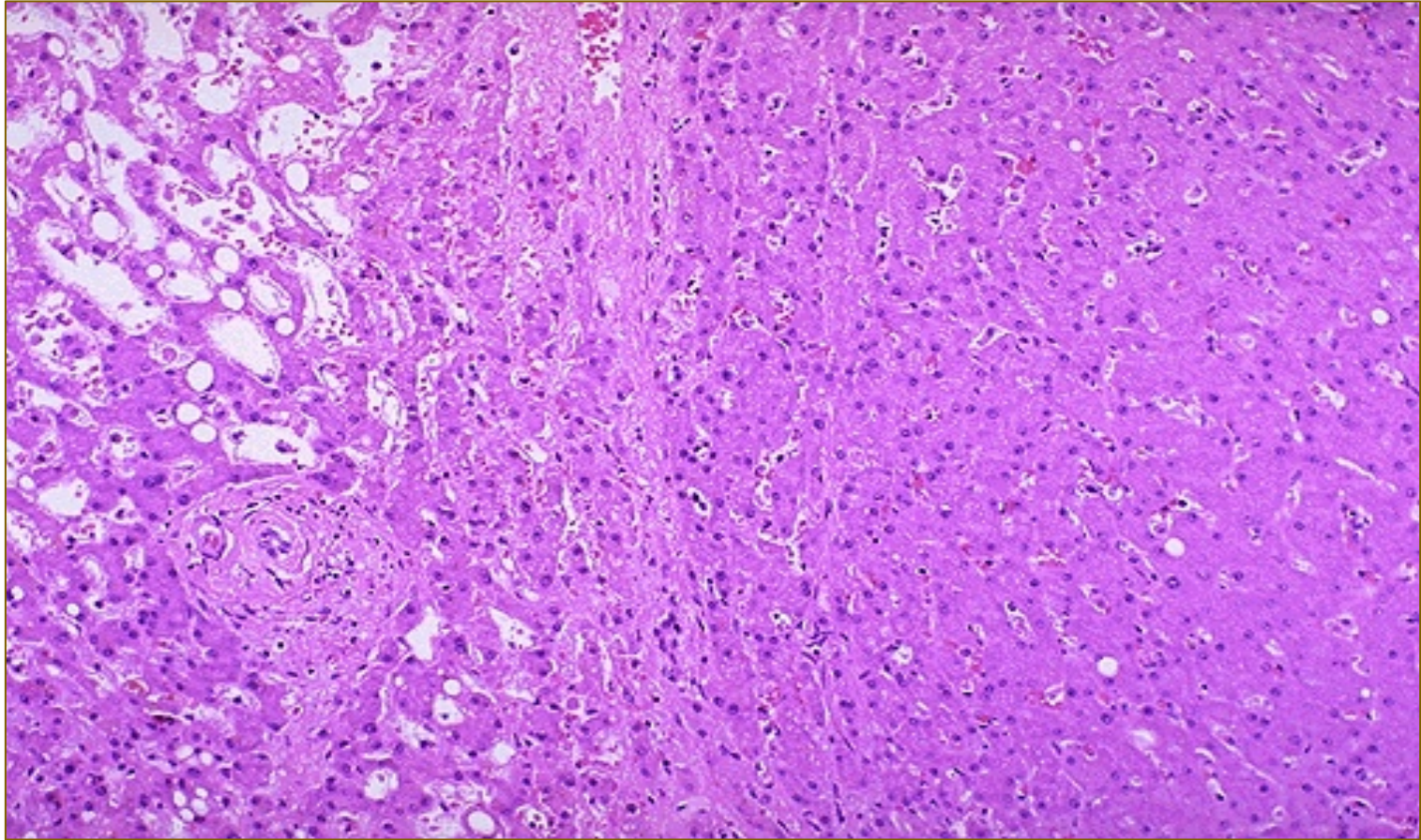
At the upper right is a well-circumscribed neoplasm that is arising in liver. This is an hepatic adenoma.

Hepatic Adenoma – Cut Section Gross



The cut surface of the liver reveals the hepatic adenoma. Note how well circumscribed it is. The remaining liver is a pale yellow brown because of fatty change from chronic alcoholism.

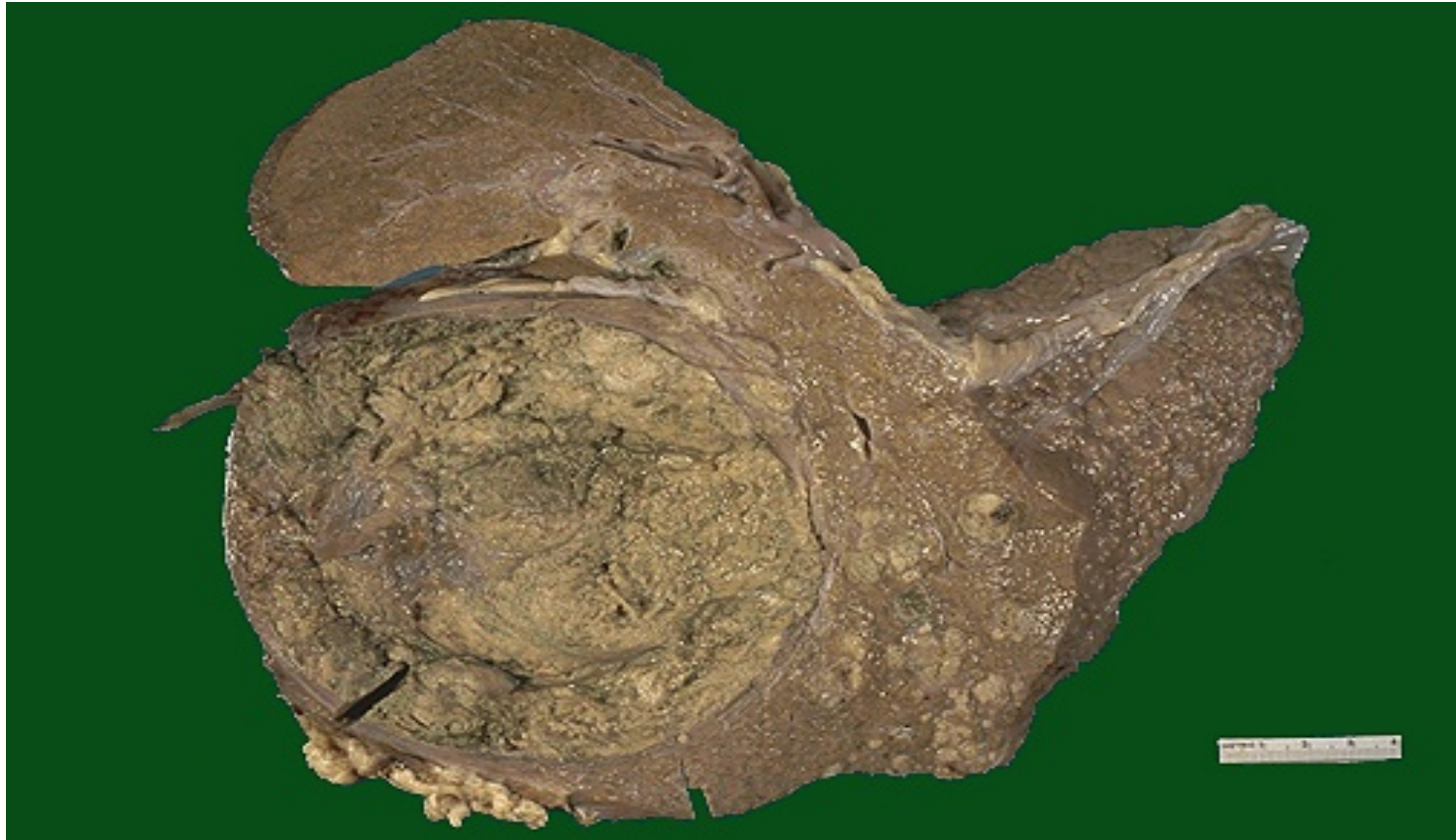
Hepatic Adenoma – Microscopic view



Normal liver tissue with a portal tract is seen on the left. The hepatic adenoma is on the right and is composed of cells that closely resemble normal hepatocytes, but the neoplastic liver tissue is disorganized hepatocyte cords and does not contain a normal lobular architecture.

HEPATOCELLULAR CARCINOMA

Hepatocellular Carcinoma - Gross



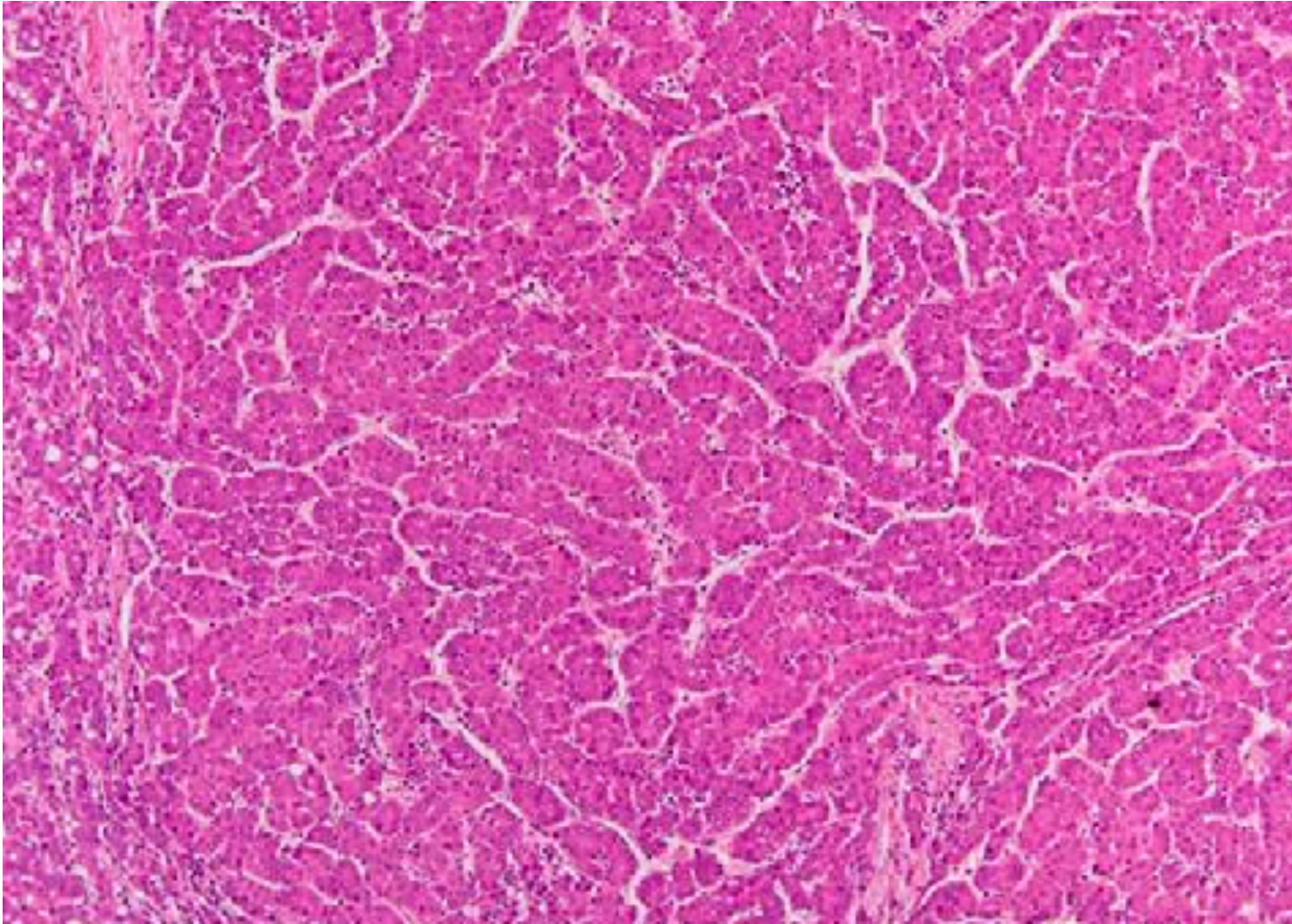
Here is a hepatocellular carcinoma. Such liver cancers arise in the setting of cirrhosis. Worldwide, viral hepatitis is the most common cause, but in the U.S., chronic alcoholism is the most common cause. The neoplasm is large and bulky and has a greenish cast because it contains bile. To the right of the main mass are smaller satellite nodules.

Hepatocellular Carcinoma - Gross



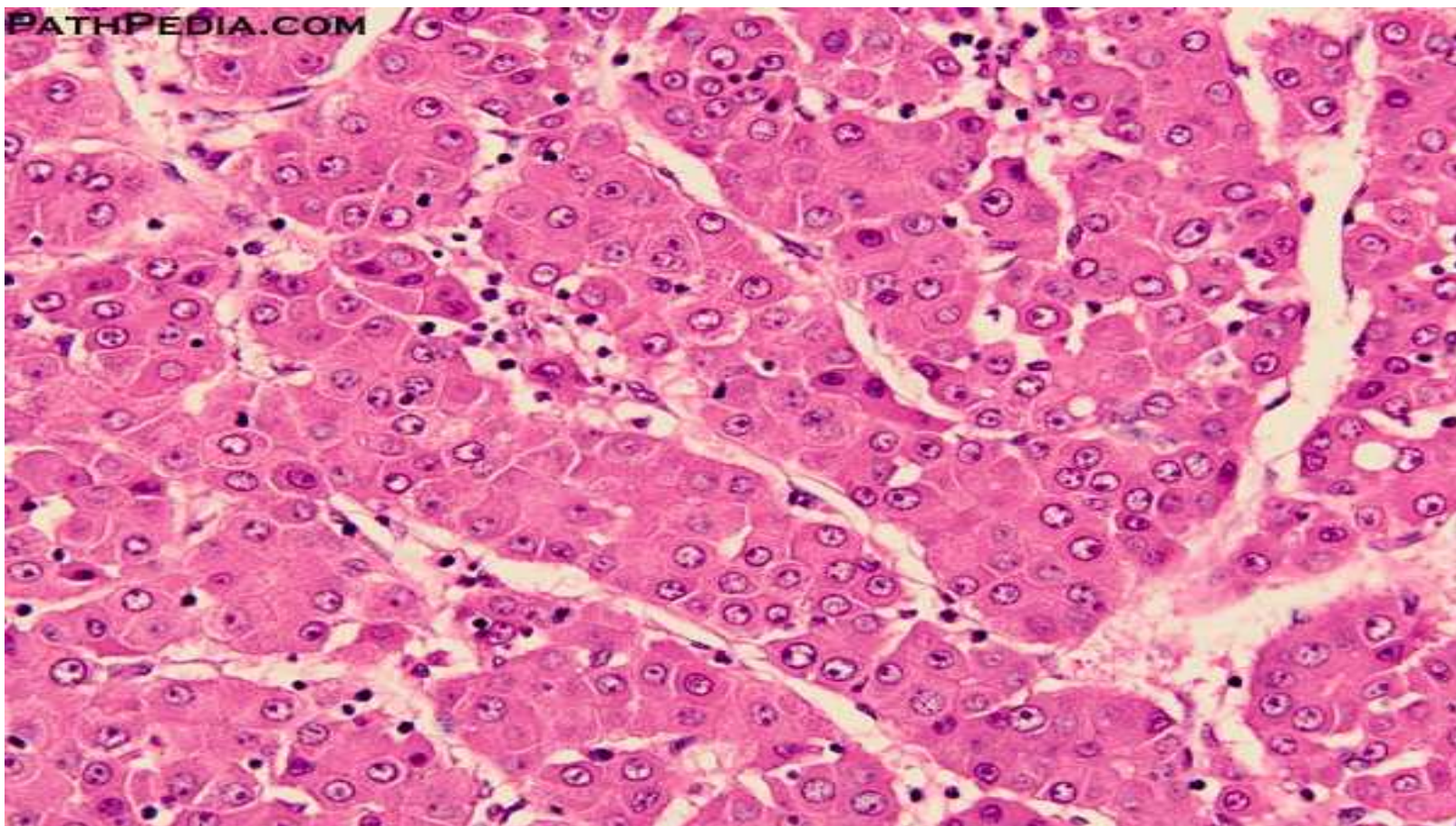
Here is another hepatocellular carcinoma with a greenish yellow hue. One clue to the presence of such a neoplasm is an elevated serum alpha-fetoprotein. Such masses may also focally obstruct the biliary tract and lead to an elevated alkaline phosphatase

Hepatocellular Carcinoma - LPF



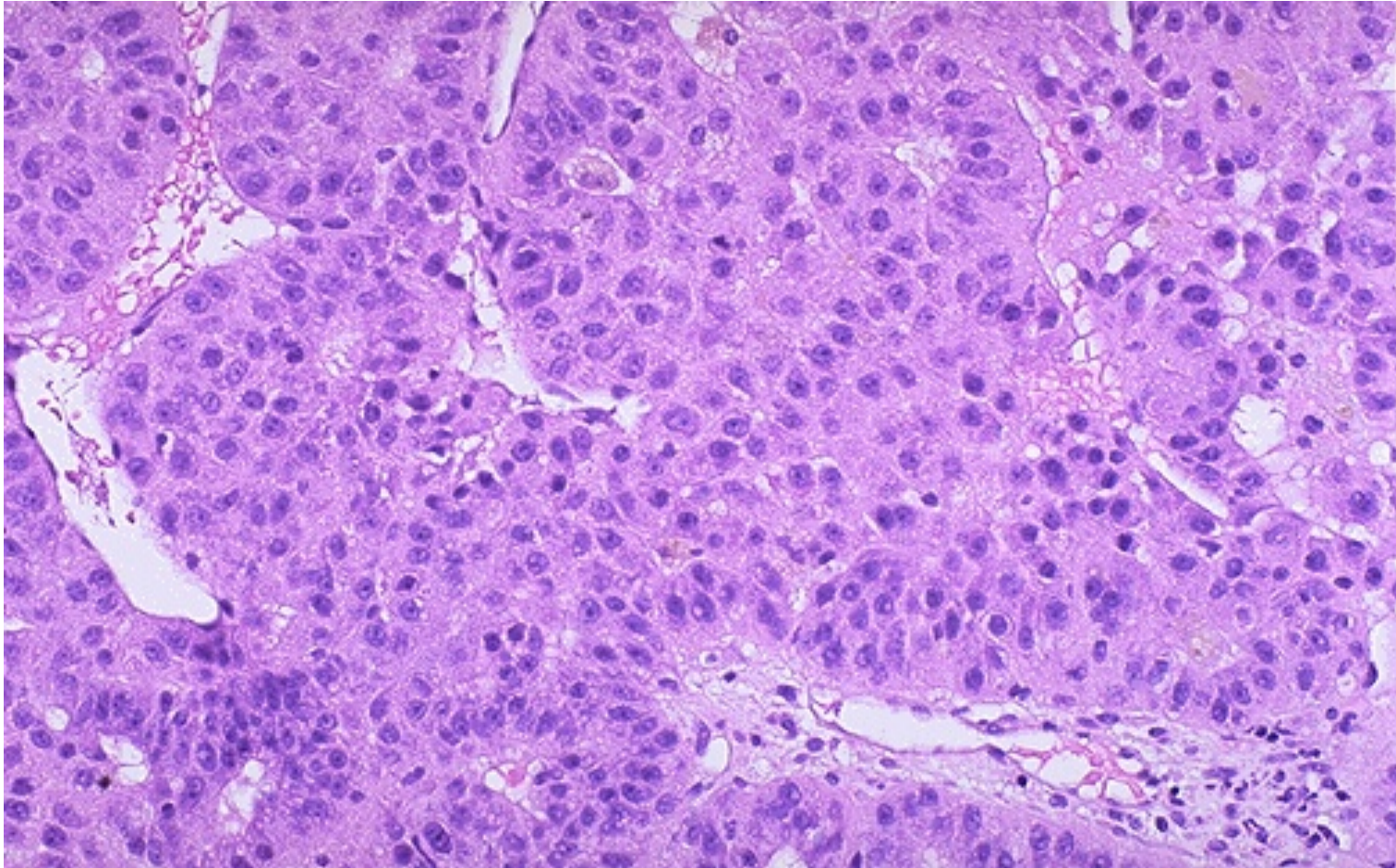
This example of well-differentiated HCC shows a trabecular pattern with intervening sinusoids.

Hepatocellular Carcinoma - MPF



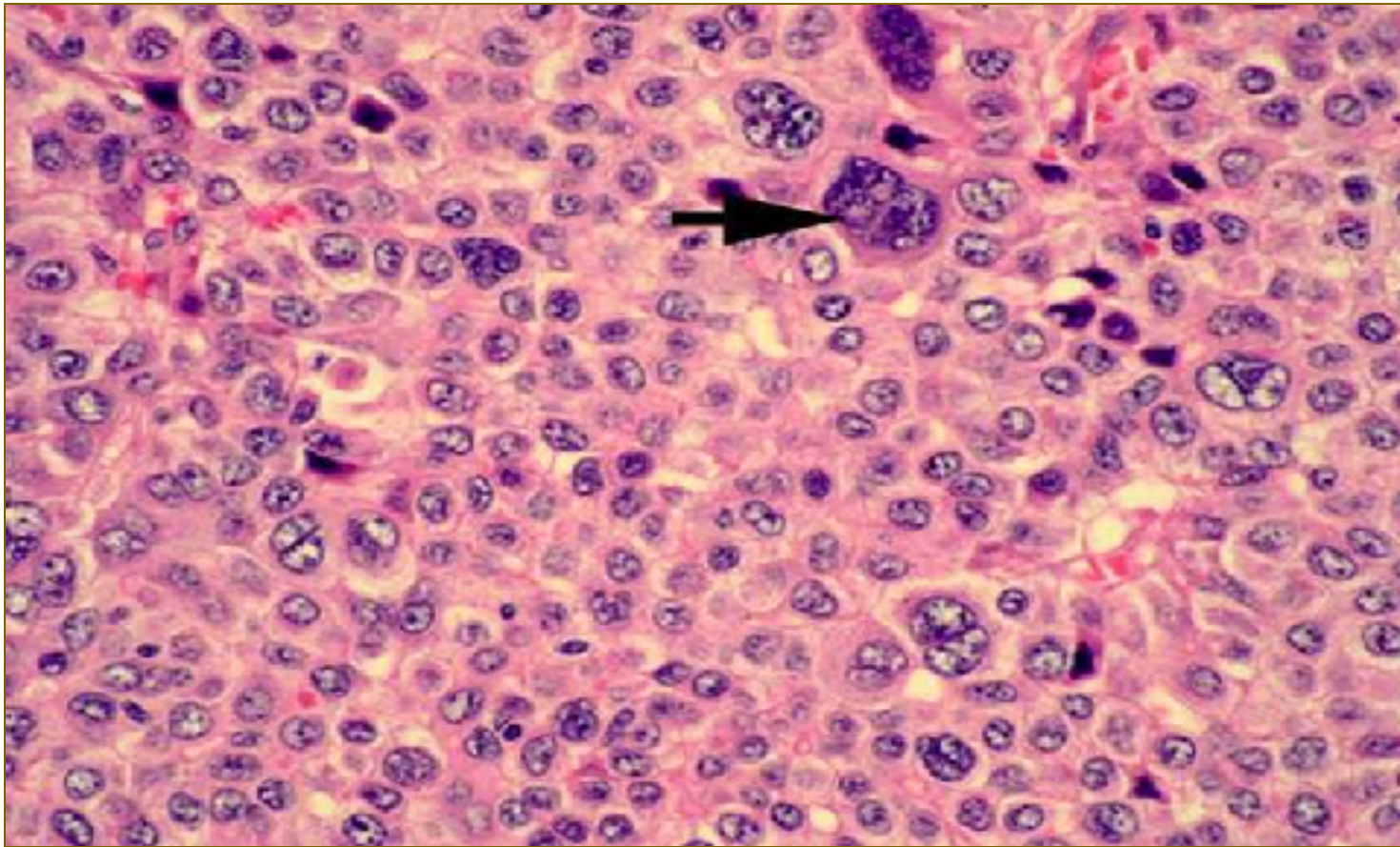
*The key to the identification of HCC is its resemblance to hepatocytes, the presence of more than 2-3 cell-thick hepatocellular plates/cords composed of **malignant hepatocytes**, nuclear atypia, and absence of portal tracts. Note the hepatic plates are separated from each other by **sinusoids**.*

Hepatocellular Carcinoma - MPF



Note that this hepatocellular carcinoma is composed of liver cords that are much wider than the normal liver plate that is two cells thick. There is no discernable normal lobular architecture, though vascular structures are present.

Hepatocellular Carcinoma - Microscopic



Anaplastic tumor giant cells can be seen in poorly differentiated HCC (arrow). Mitoses are numerous. Malignant liver cells are pleomorphic, binucleated or forming giant cells with hyperchromatic nuclei.

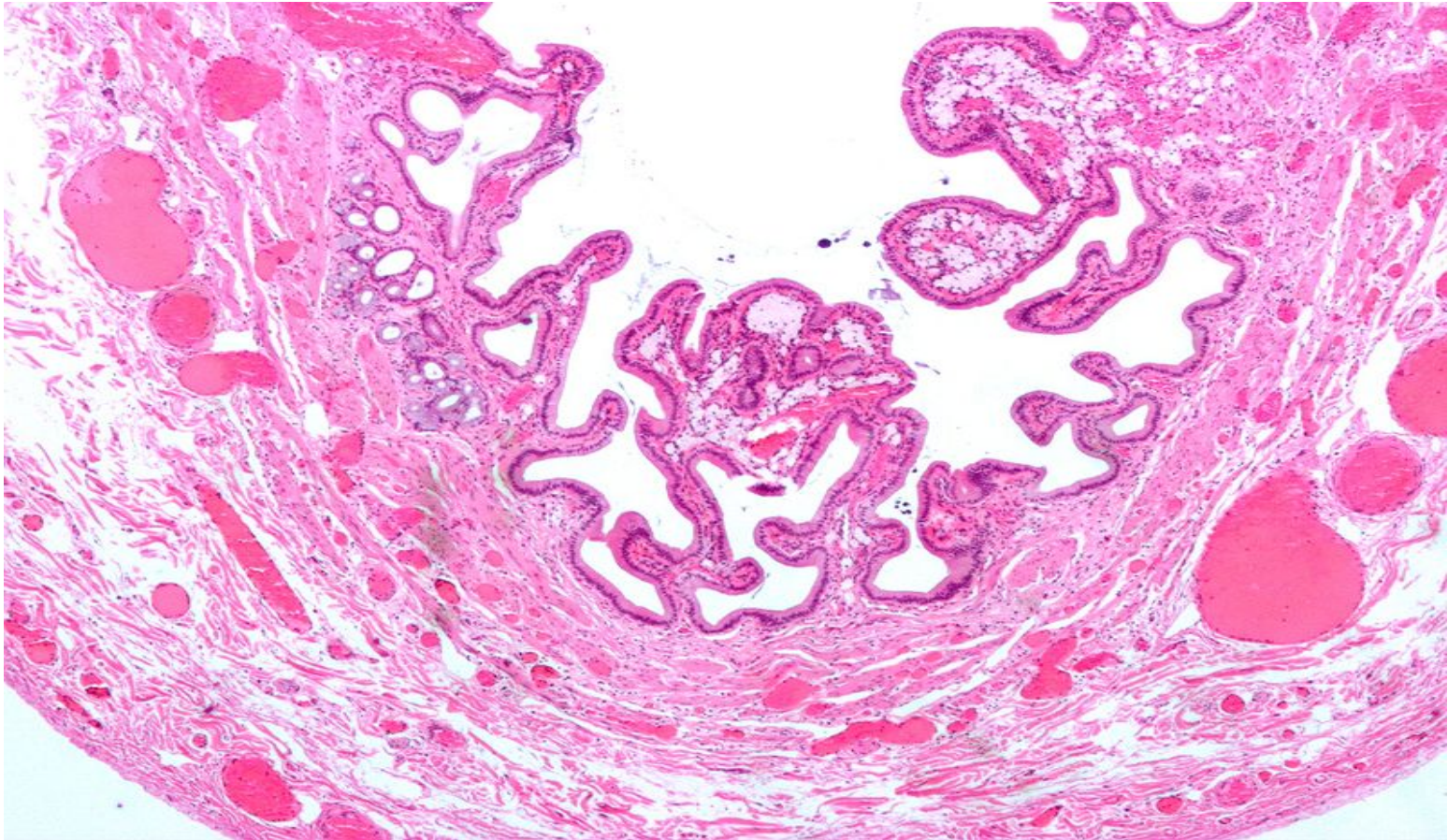
CHRONIC CHOLECYSTITIS WITH STONES

Chronic Cholecystitis with Gall stones - Gross



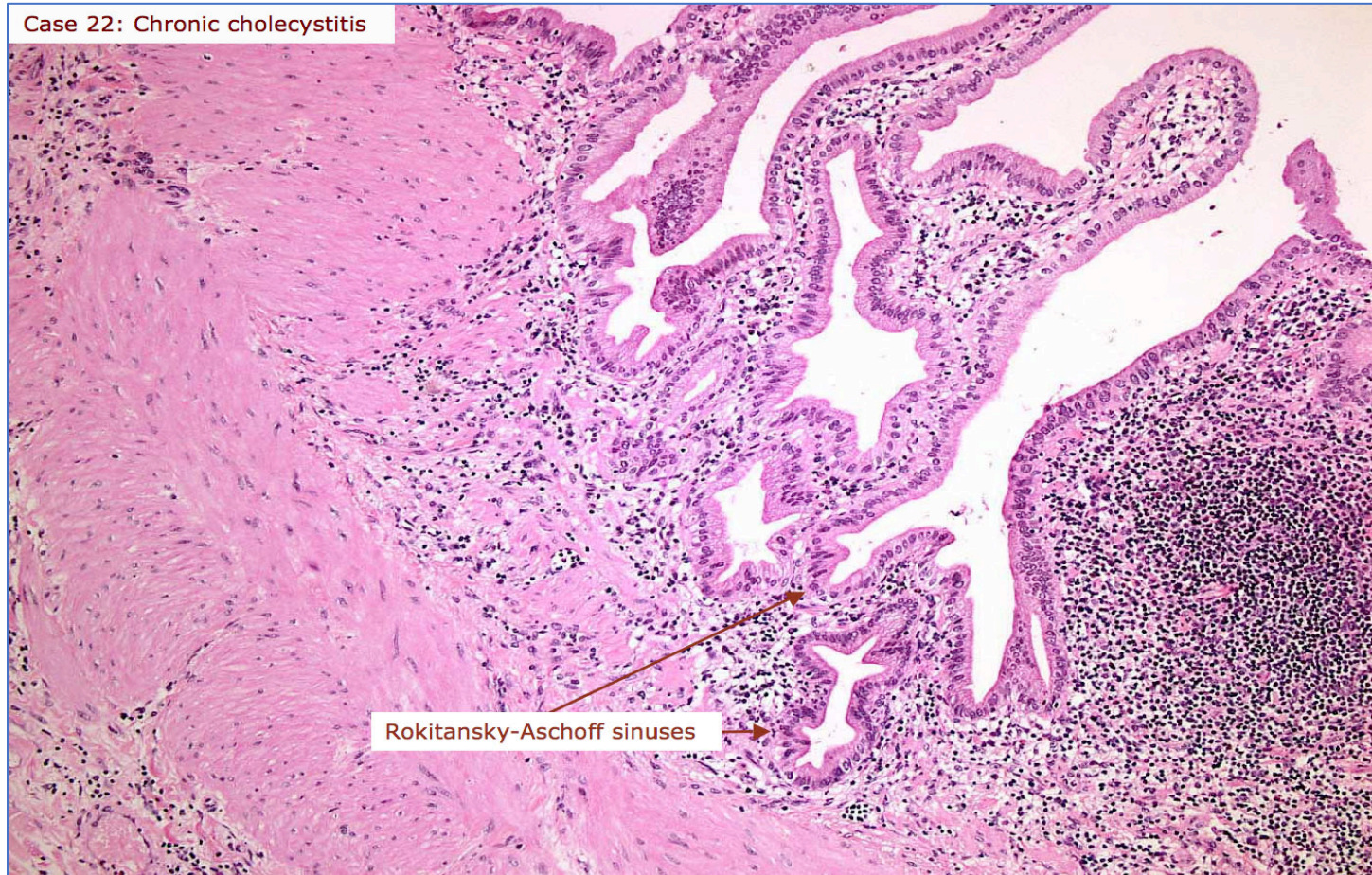
Gross appearance of gallbladder after sectioning longitudinally. Notice thickness of gallbladder wall, abundant polyhedral stones and small papillary tumor in the cystic duct.

Chronic Cholecystitis – Microscopic view



Dead lipid laden macrophages (foam cells) are seen in the finger-like projections into the gallbladder lumen. It should be apparent that this is gallbladder, as no muscularis mucosae is present (as elsewhere in the gastrointestinal tract). The blood vessels are congested and the subserosa edematous.

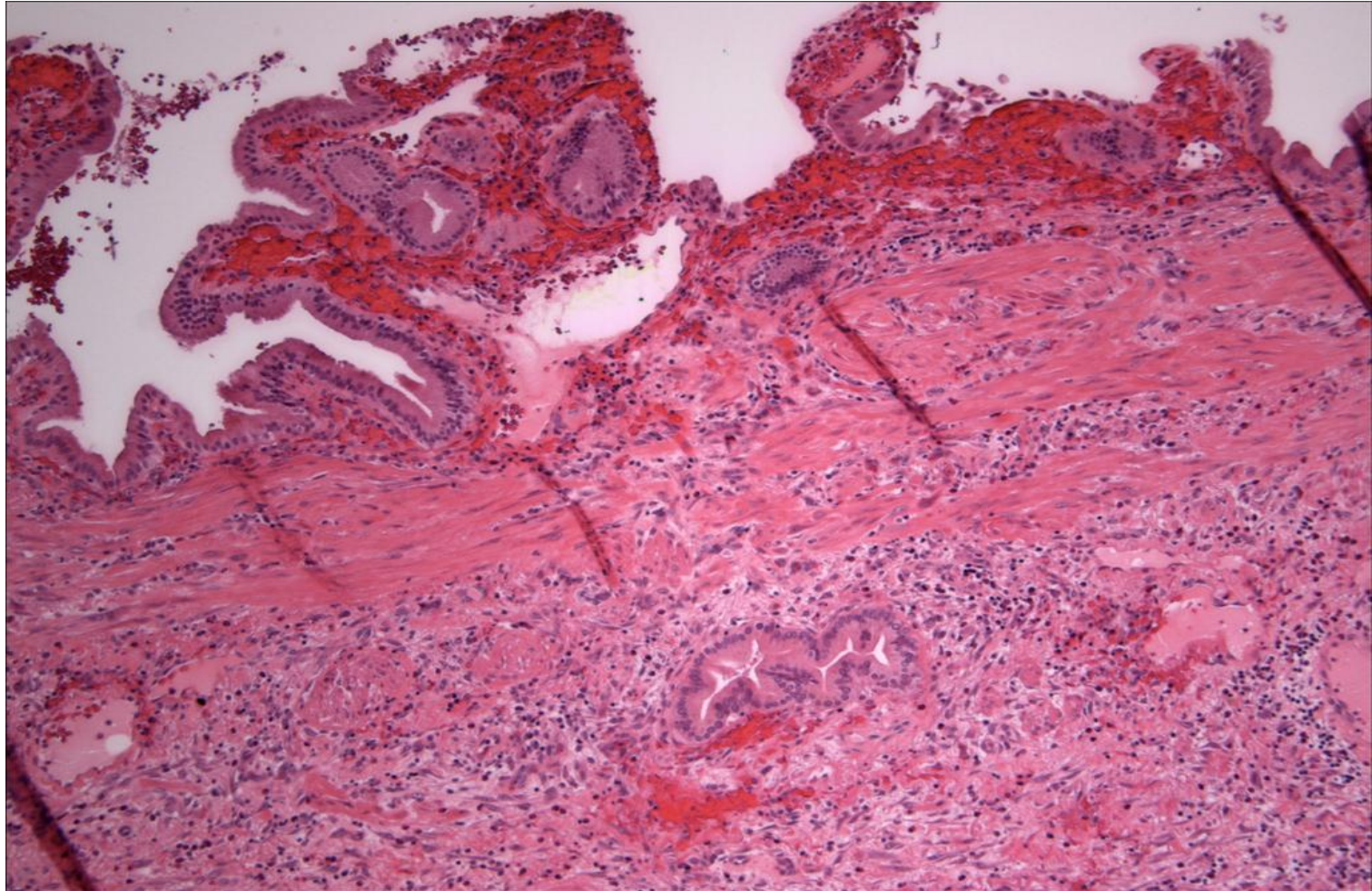
Chronic Cholecystitis – Microscopic view



***Irregular mucosal folds and foci of ulceration in mucosa.
Wall is penetrated by mucosal glands which are present in
muscle coat (Rokitansky- Aschoff sinuses).***

All layers show chronic inflammatory cells infiltration and fibrosis.

Chronic Cholecystitis – Microscopic view

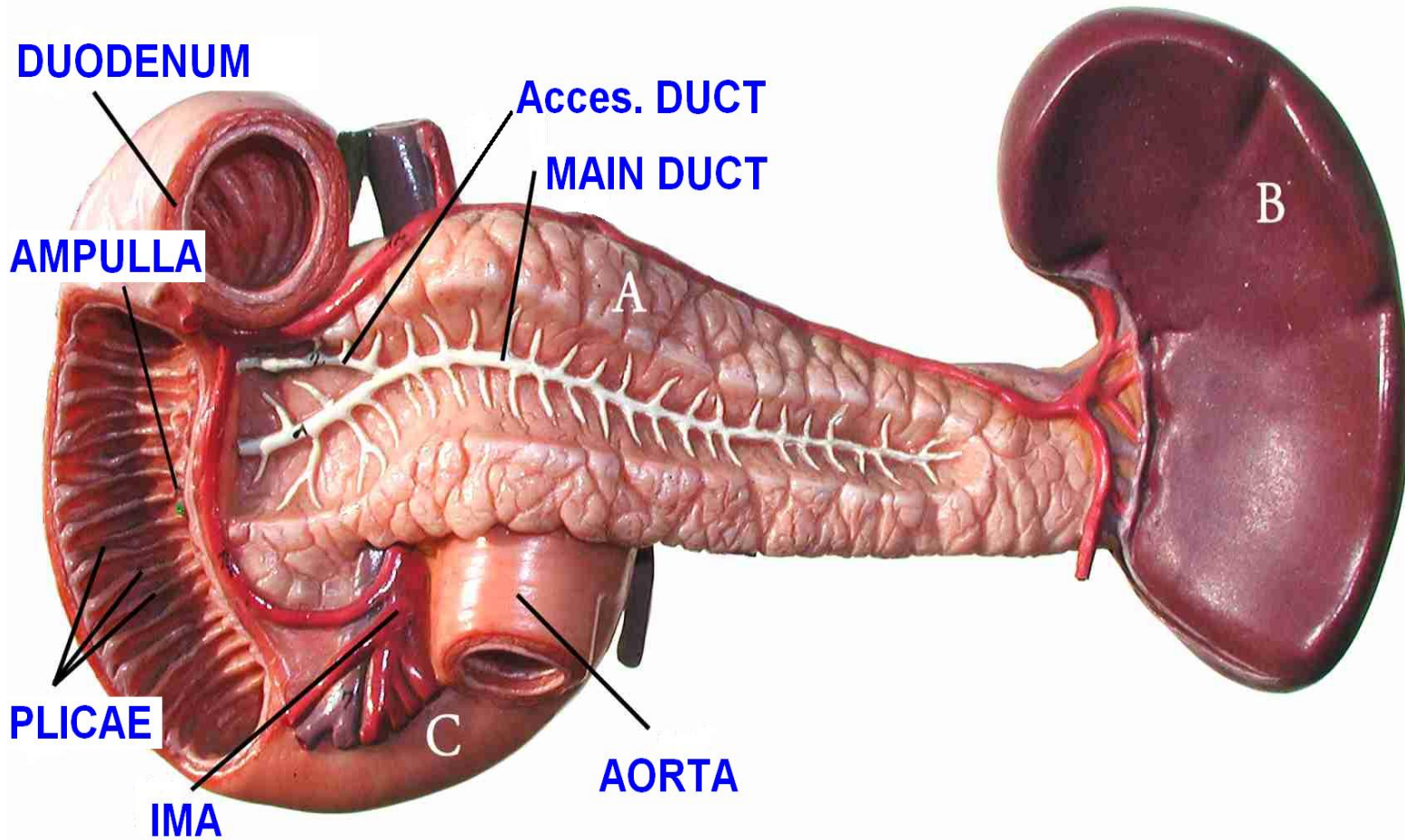


Mucosa wall is penetrated by mucosal glands which are present in muscle coat (Rokitansky- Aschoff sinuses).

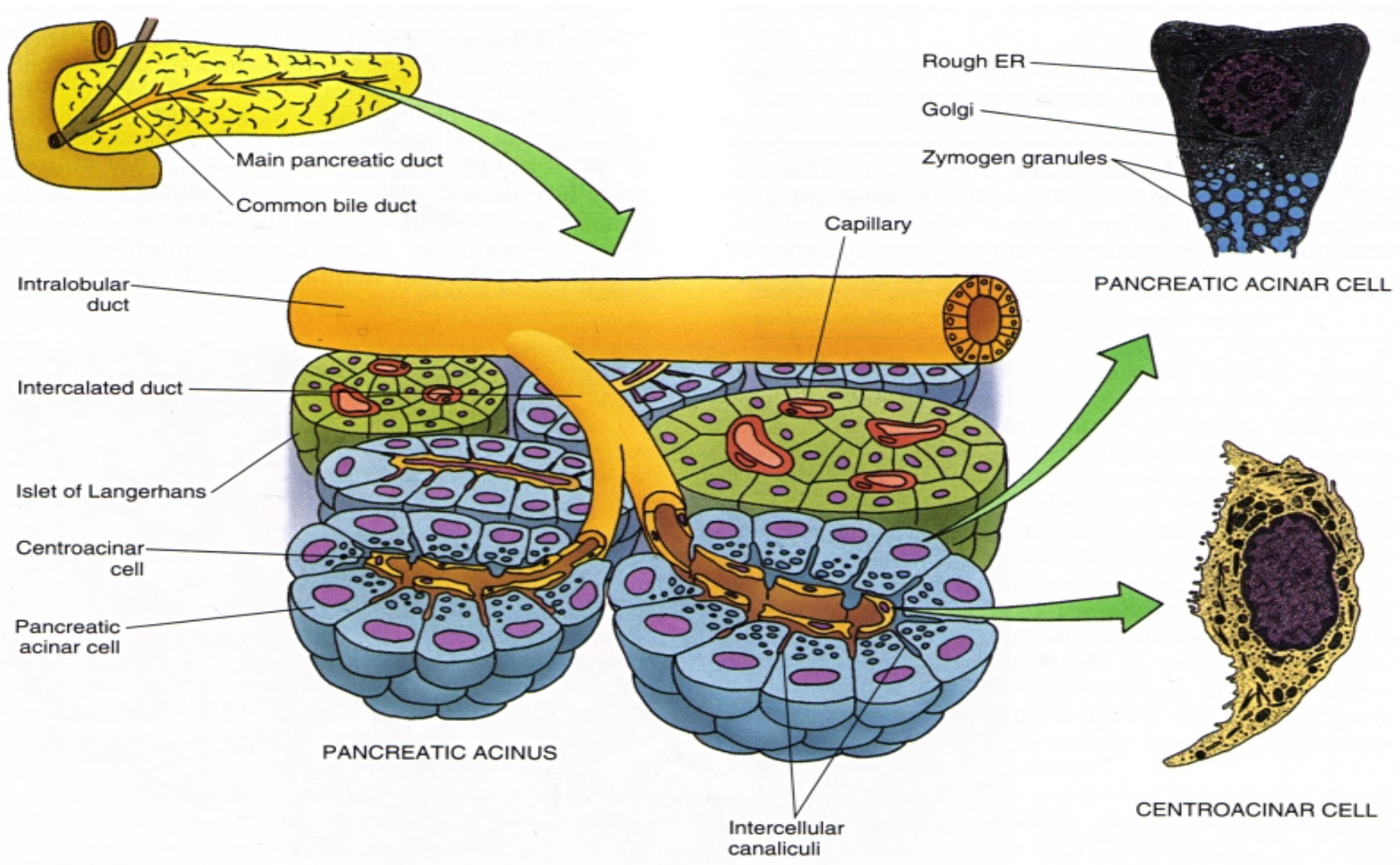
All layers show chronic inflammatory cells infiltration and fibrosis.

PANCREAS

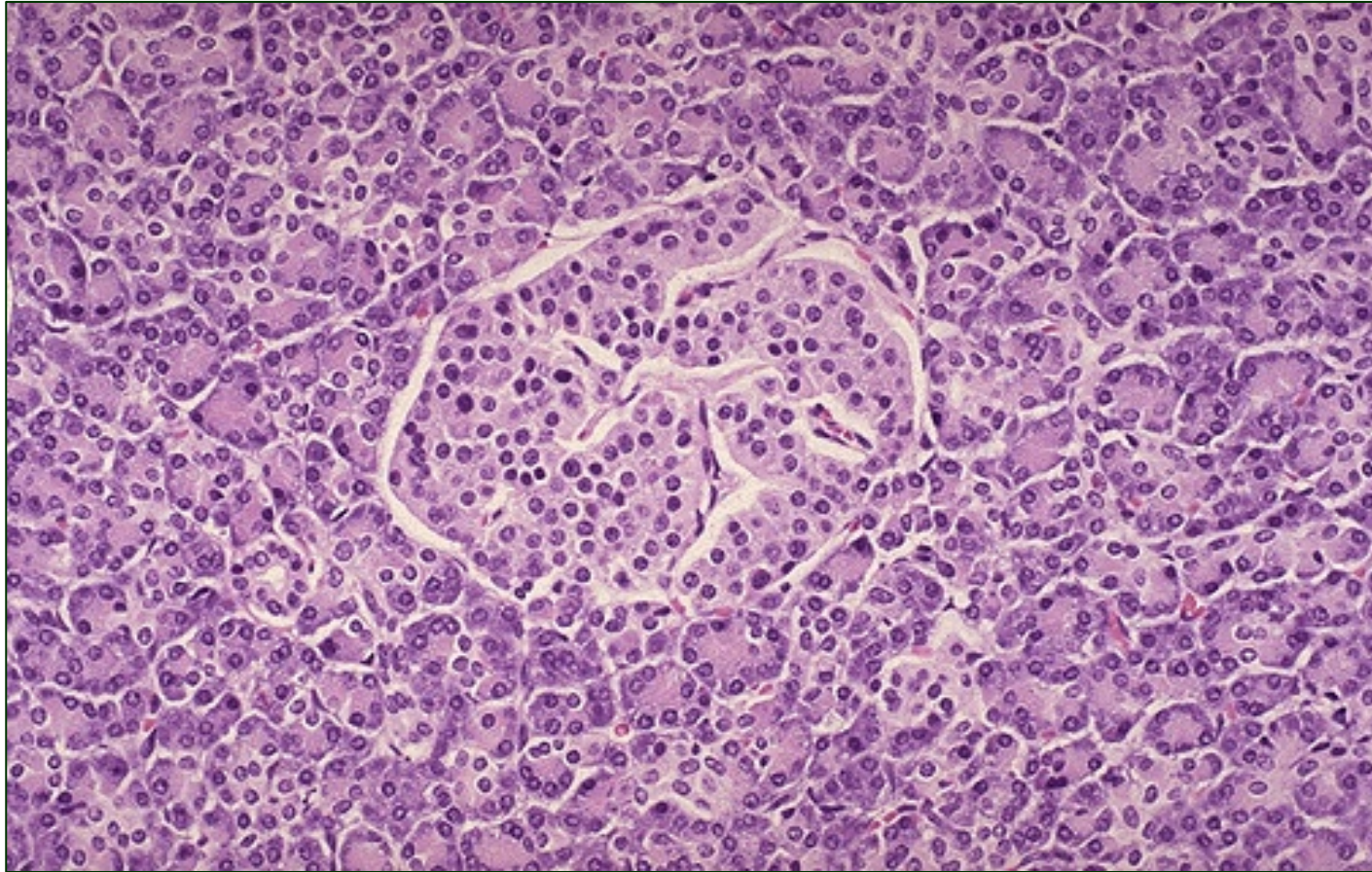
PANCREAS – Normal Anatomy



PANCREAS – Normal Histology (Diagram)

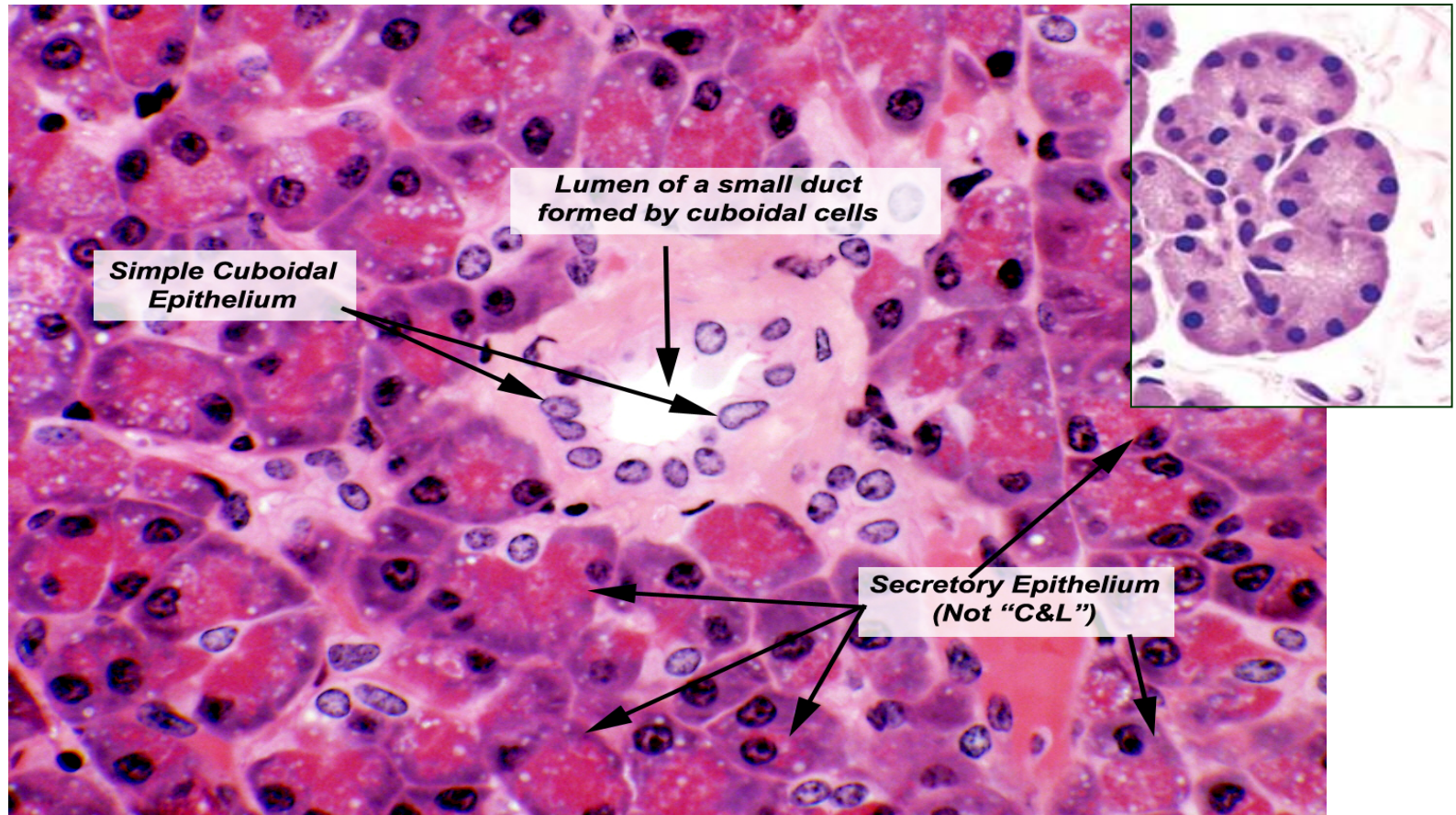


PANCREAS – Normal Histology -LPF



Here is a normal pancreatic islet of Langerhans surrounded by normal exocrine pancreatic acinar tissue. The islets contain alpha cells secreting glucagon, beta cells secreting insulin, and delta cells secreting somatostatin.

PANCREAS – Normal Histology -HPF

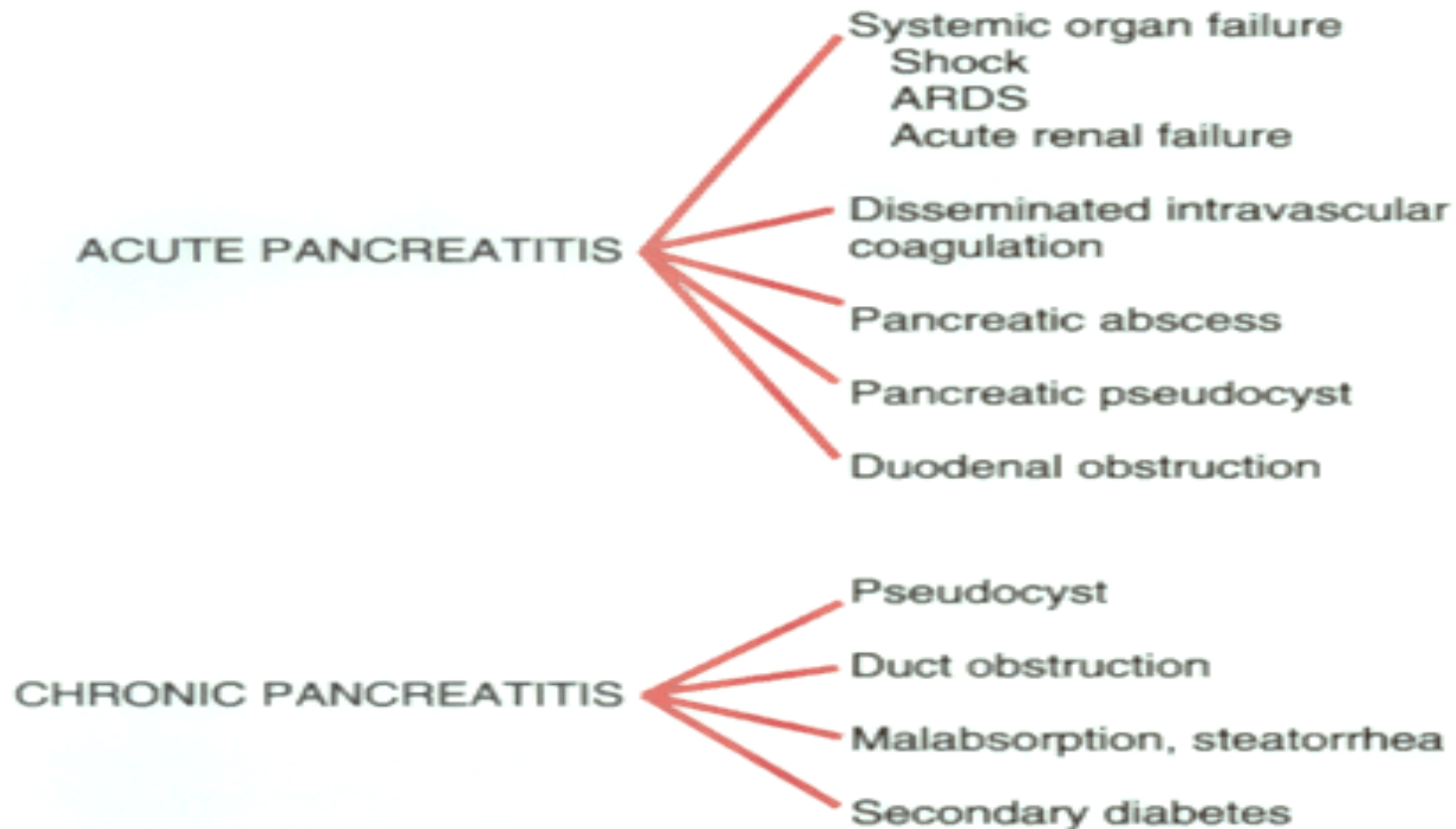


This section of pancreas shows a small duct in the center of the field. The wall of the duct is made of simple cuboidal epithelium. Exocrine gland ducts of this type are made of cuboidal cells arranged like bricks in a wall. As the duct enlarges there may be a transition from cuboidal to a columnar shape

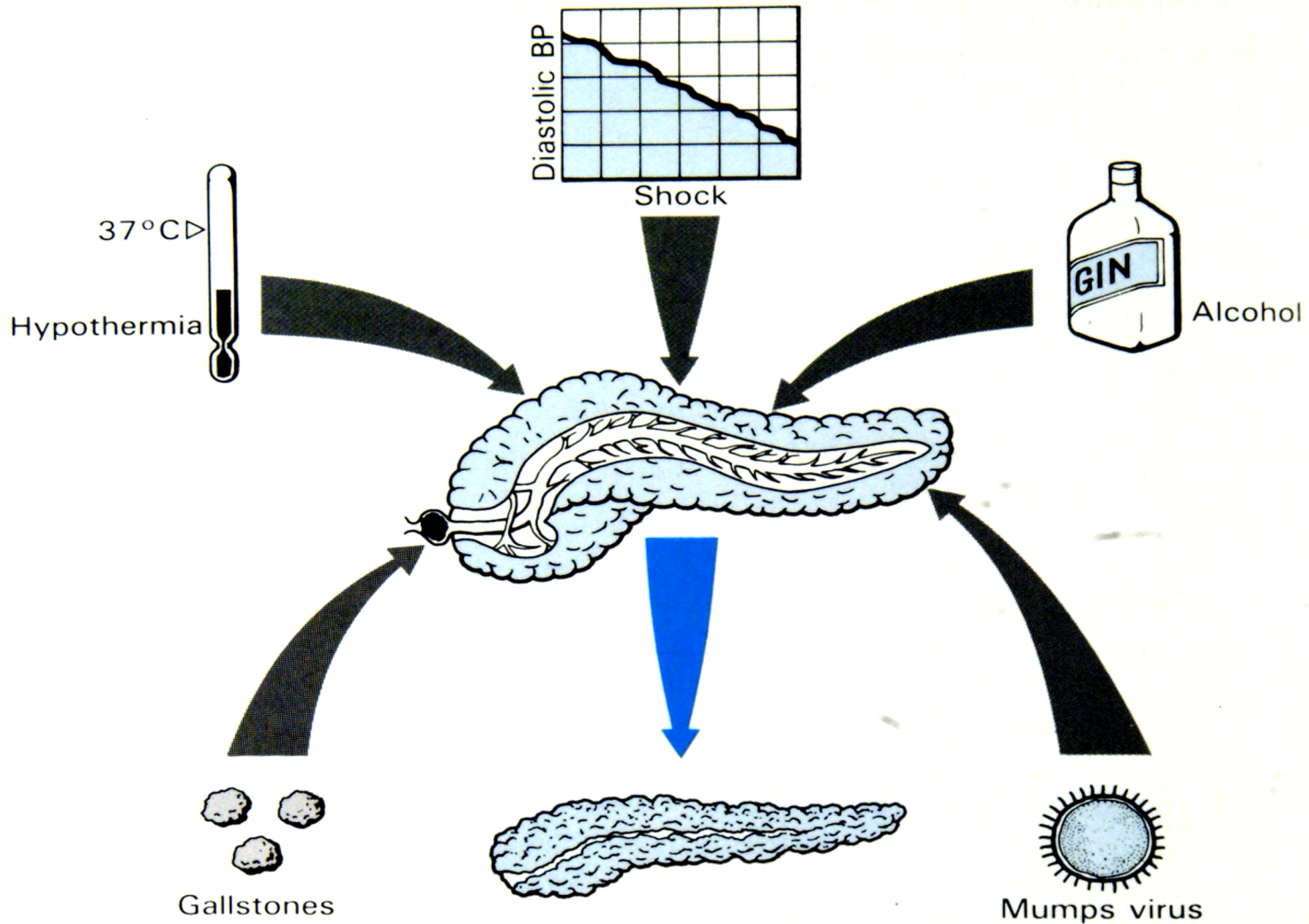
GROSS & HISTOPATHOLOGY

PANCREATITIS - Types

- **ACUTE** (*Very serious*)
- **CHRONIC** (*Calcifications, Pseudocyst*)



PANCREATITIS – Common causes



Acute pancreatitis

ACUTE PANCREATITIS - Causes

- ***Alcoholism***
- ***Bile reflux***
- ***Medications (thiazides)***
- ***Hypertriglyceridemia, hypercalcemia***
- ***Acute ischemia***
- ***Trauma, blunt, iatrogenic***
- ***Genes: PRSS1, SPINK1***
- ***Idiopathic, 10-20%***

ACUTE PANCREATITIS – Clinical Features

- ***SEVERE ABDOMINAL PAIN***
- ***Extreme Emergency Situation***
- ***High Mortality***

- ***The MOST important lab test is.....????? →***
α – AMYLASE estimation

ACUTE PANCREATITIS – Consequences

- ***EDEMA***
- ***FAT NECROSIS***
- ***ACUTE INFLAMMATORY INFILTRATE***
- ***PANCREAS AUTODIGESTION***
- ***BLOOD VESSEL DESTRUCTION***
- ***“SAPONIFICATION”***

ACUTE PANCREATITIS – Gross



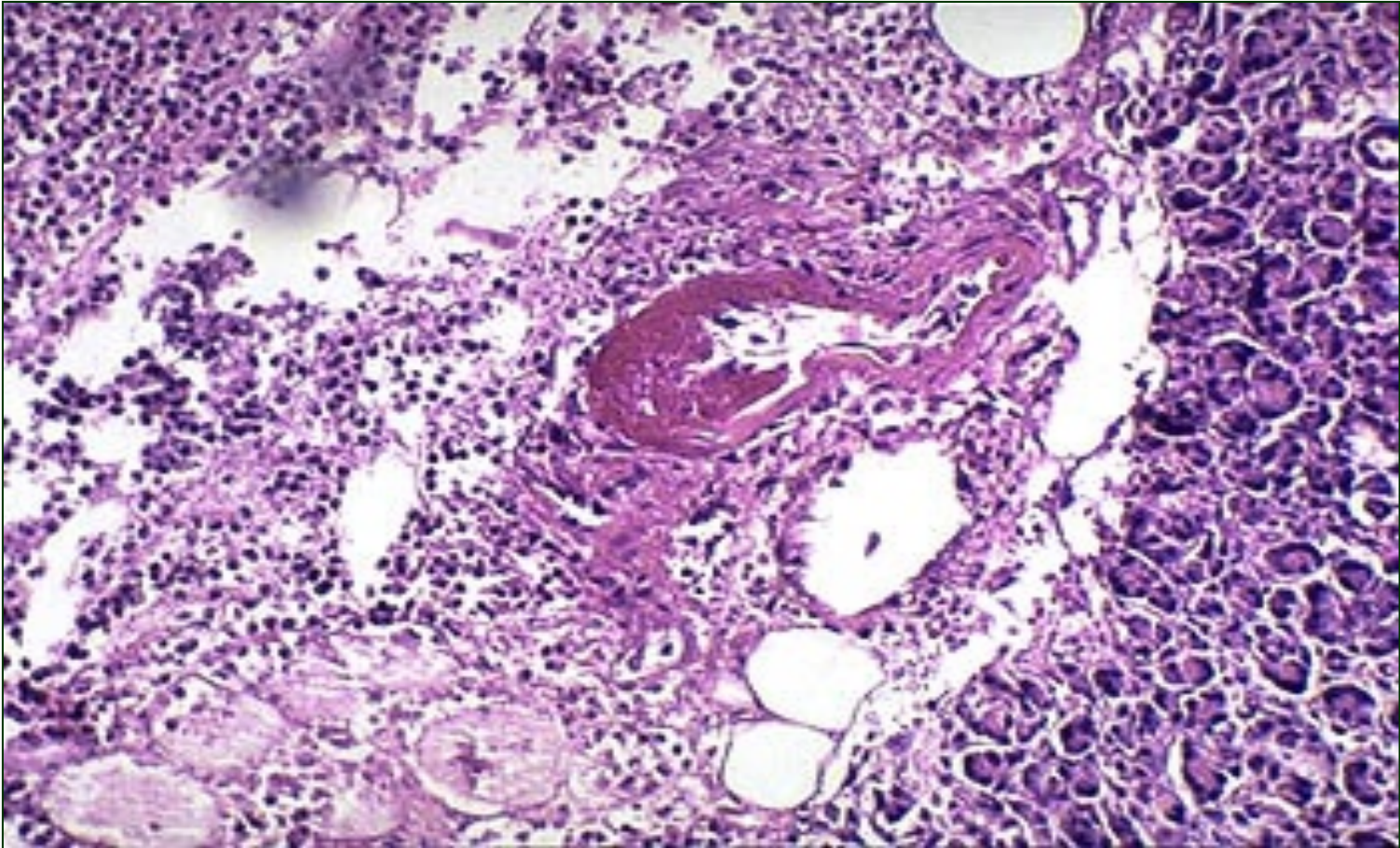
Acute Pancreatitis : Fat necrosis appears as chalky white calcium soaps.

ACUTE PANCREATITIS – Gross



In severe acute pancreatitis, black areas of hemorrhage are present within the pancreas as well as chalky, yellow-white areas of fat necrosis. Pancreatic parenchyma is soft and gray-white due to necrosis

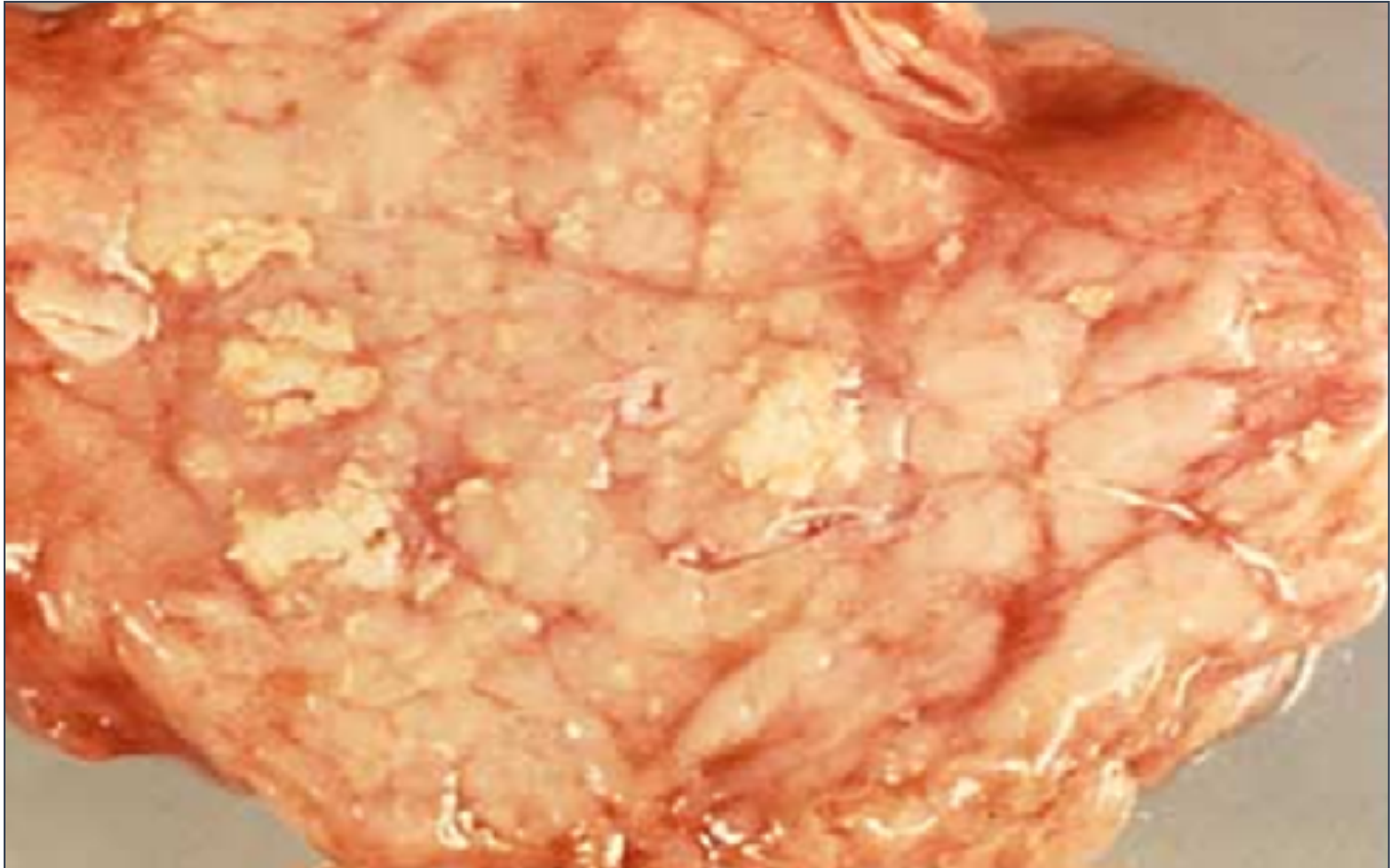
ACUTE PANCREATITIS – LPF



Severe acute pancreatitis shows an area of acute inflammation with necrosis. Within the necrotic area is a blood vessel showing fibrinoid necrosis of the vessel wall leads to severe, hemorrhagic, acute pancreatitis. Common causes of acute pancreatitis are alcoholism , gall stones impaction , traumatic , hereditary and idiopathic .

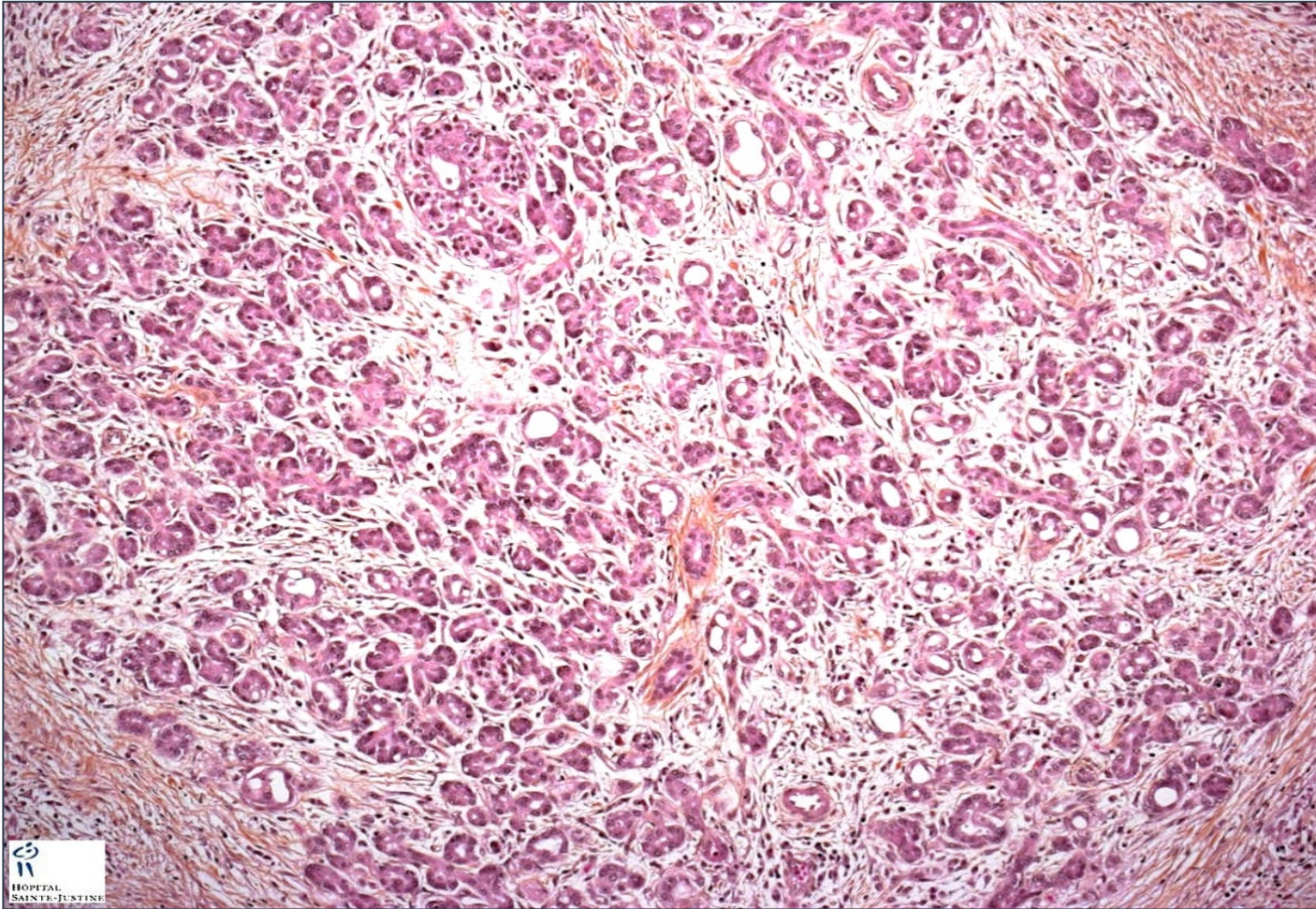
Chronic pancreatitis

CHRONIC PANCREATITIS – GROSS



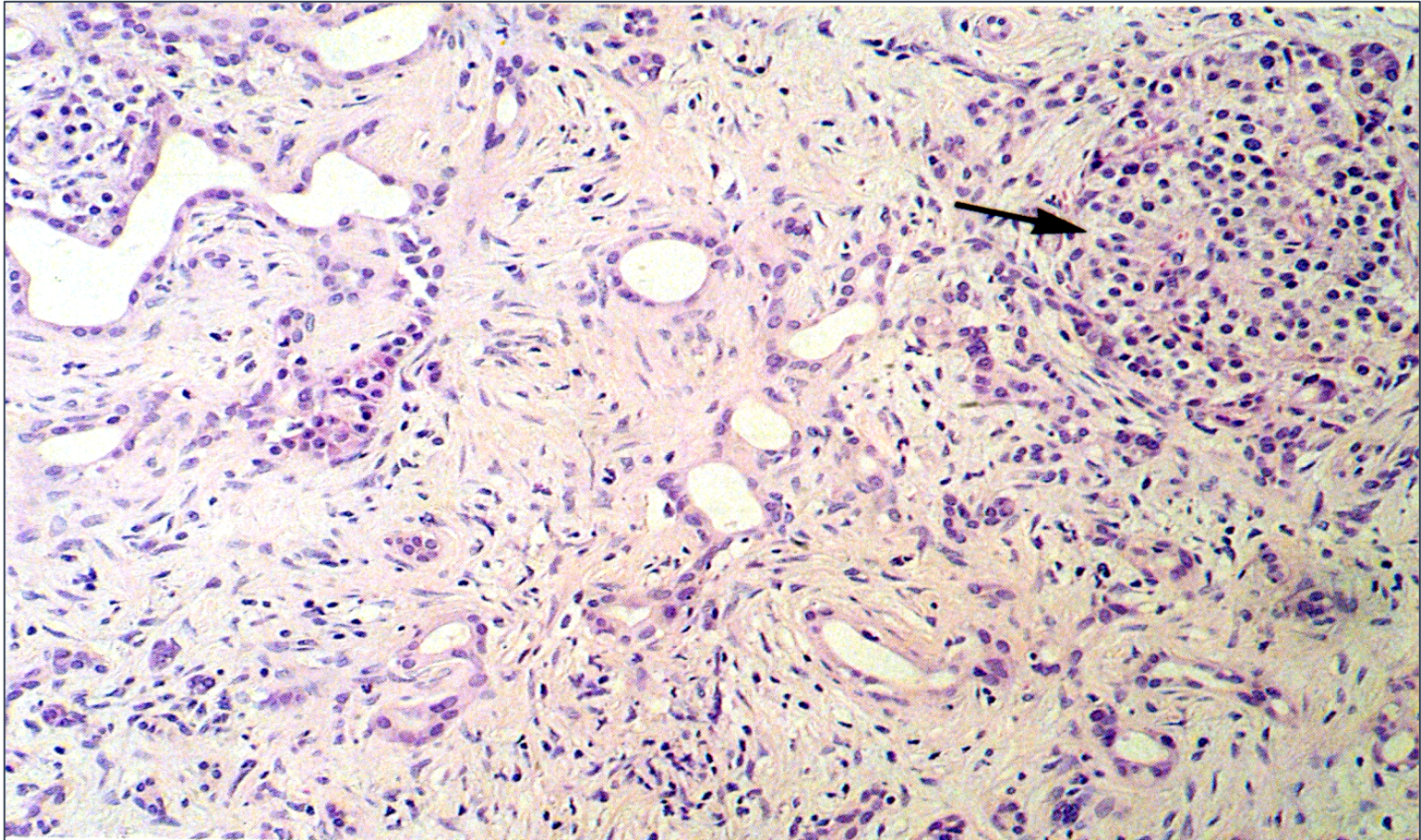
Calcium deposition is secondary to fat necrosis and dystrophic calcification . Possible causes of chronic pancreatitis are gall stones , alcoholism, tropical , hereditary and idiopathic .

CHRONIC PANCREATITIS – LPF



Unfortunately, dense fibrosis is a feature BOTH of chronic pancreatitis as well as adenocarcinoma.

CHRONIC PANCREATITIS – LPF



Chronic Pancreatitis: parenchymal fibrosis, chronic inflammatory infiltrate and reduced number and size of acini with variable dilatation of pancreatic ducts and relative sparing of islets of Langerhans (arrow)

Pancreatic adenocarcinoma

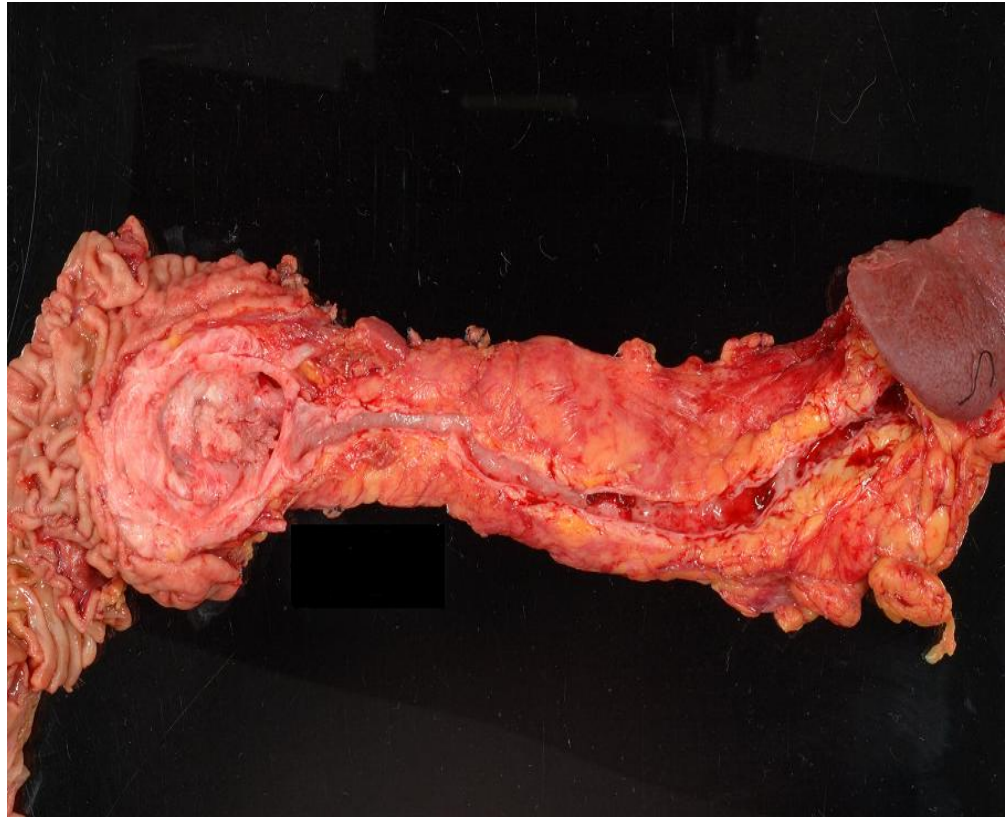
PANCREATIC ADENOCARCINOMA – Gross

predispose to

PANCREATIC ADENOCARCINOMA:

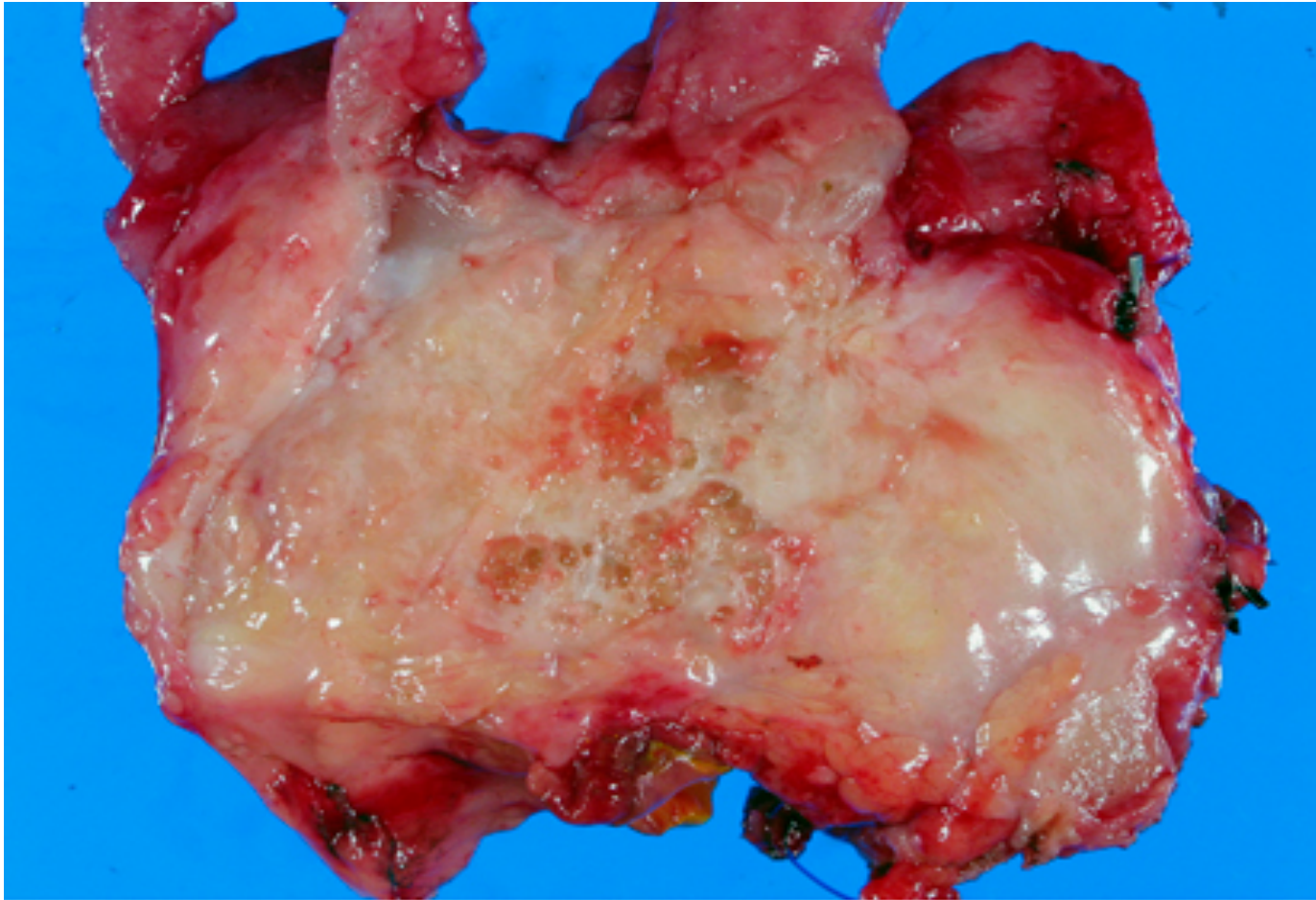
- Chronic pancreatitis
- Diabetic mellitus
- Smoking
- Germline mutation in BRCA2.

The recent sequencing of the pancreatic cancer genome has confirmed that four genes are most affected. by somatic mutations in this neoplasm: **KRAS**, **CDKNA2A/p16**, **SMAD4**, and **TP53**:



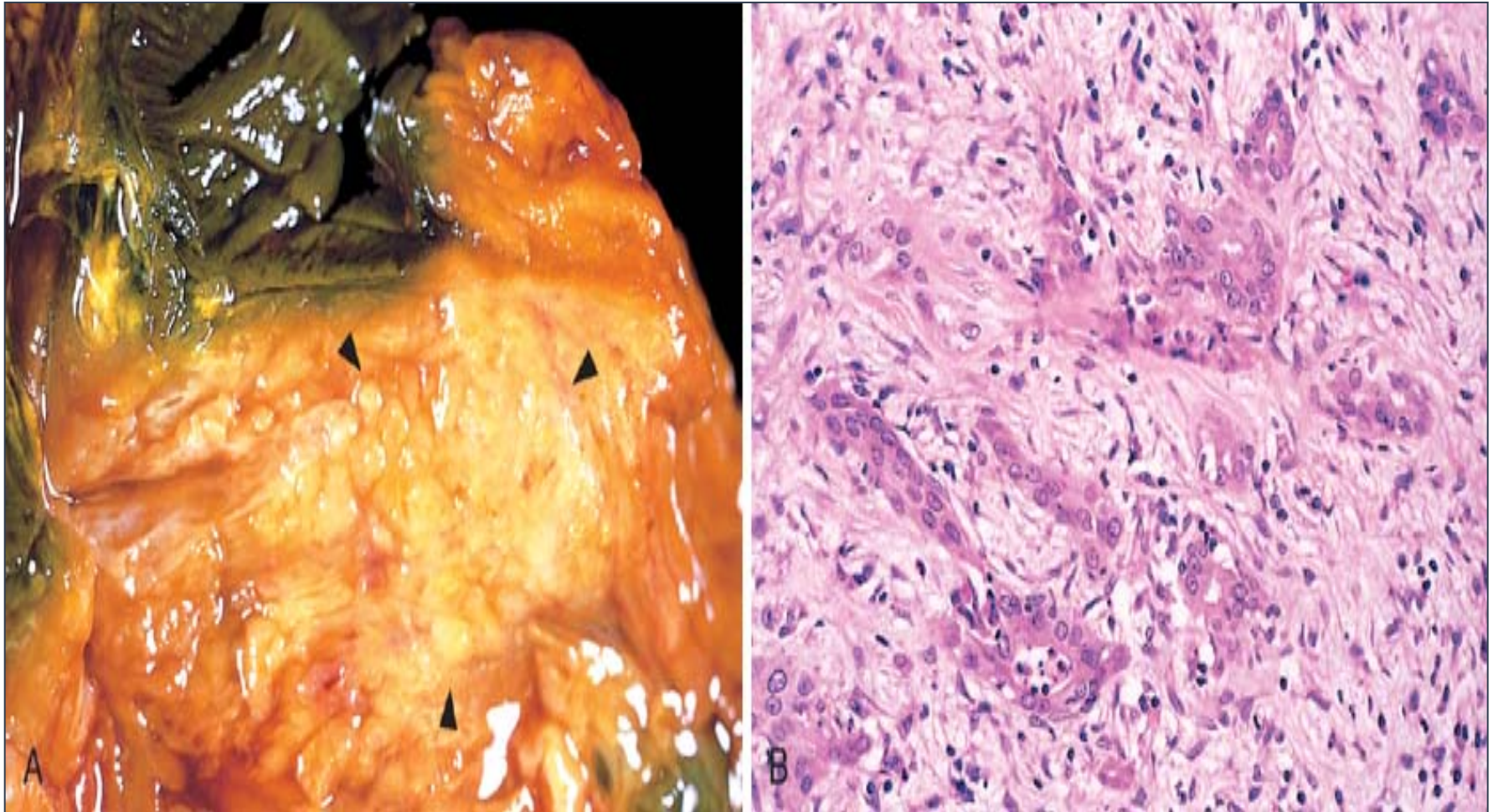
Horizontal section of pancreas showing a well circumscribed tumor nodule at the head of pancreas. Note the presence of a dilated main pancreatic duct. Part of the duodenum is seen on the left and the spleen on the right side.

PANCREATIC ADENOCARCINOMA – Cut surface



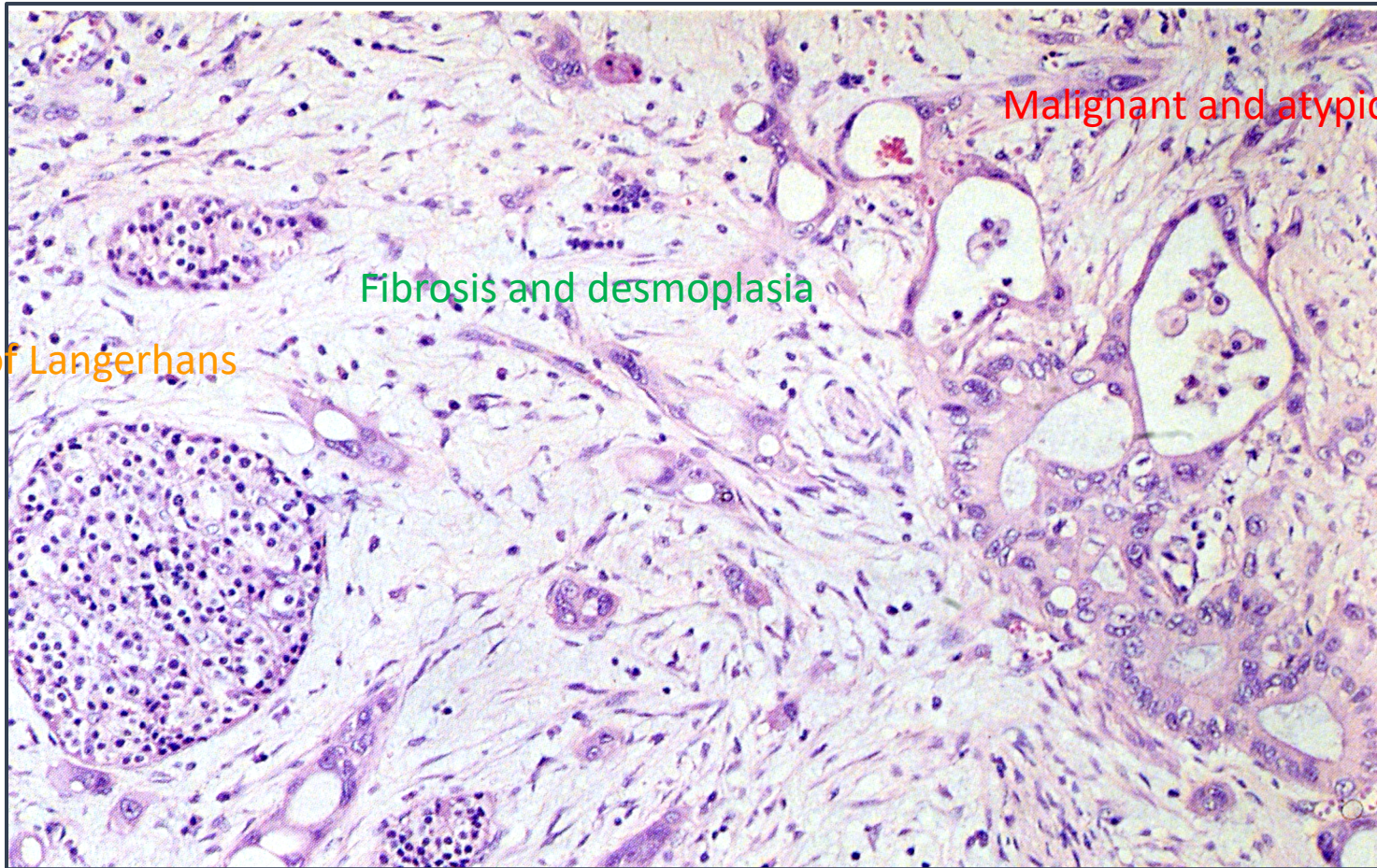
Gross appearance of large duct type ductal adenocarcinoma. A microcystic pattern with cysts measuring from millimeters up to 1 cm.

PANCREATIC ADENOCARCINOMA – Gross & LPF



***Gross picture shows ill defined pale and firm pancreatic mass (left).
Microscopic picture shows malignant glands or acini surrounded by
desmoplastic fibrous stroma (right) .***

PANCREATIC ADENOCARCINOMA – LPF



Malignant and atypical glands

Fibrosis and desmoplasia

Islet of Langerhans

Deeply infiltrative growth pattern with irregular shape and distribution , Desmoplasia , Marked nuclear pleomorphism with nucleoli, Loss of polarity and Mitotic figures

THE END