

Cancers of the liver and pancreas

Cancers of the liver and pancreas

1. Describe hepatocellular and cholangiocarcinoma.
2. Understand the frequency of metastatic disease to the liver.
3. Recognize the rarity of primary liver neoplasms in children.
4. Recognize all aspects of pancreatic carcinoma.

Malignant tumors of the liver

The liver and lungs are the visceral organs that are most often involved by metastatic tumors.

Primary carcinomas of the liver are relatively uncommon.

Most arise from hepatocytes and are termed *hepatocellular carcinoma* (HCC). Much less common are carcinomas of bile duct origin, *cholangiocarcinomas*.

There are two rare forms of primary liver cancer hepatoblastomas and angiosarcomas.

Hepatocellular Carcinomas

Hepatocellular Carcinomas(HCC)

- Most common primary liver cancer
- Male predominance
- Peaks around fifth and sixth decades
- *More than 85% of cases of HCC occur in countries with high rates of chronic HBV infection.*
 - In these regions, the HBV carrier state begins in infancy following vertical transmission of virus from infected mothers, conferring a 200-fold increased risk for HCC by adulthood

Hepatocellular Carcinomas

In the Western world where HBV is not prevalent, cirrhosis is present in 85% to 90% of cases of HCC, usually in the setting of other chronic liver diseases

Pathogenesis of HCC

The following have been implicated in human hepatocarcinogenesis:

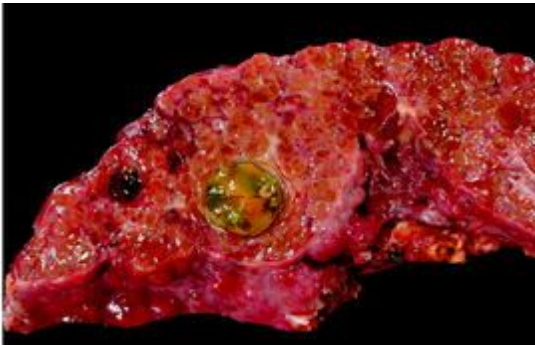
1. Postnecrotic cirrhosis due to chronic HCV (most common cause) and HBV (3rd most common cause)
2. Alcoholic cirrhosis (2nd most common cause of HCC)
3. Food contaminants : Aflatoxins (from *Aspergillus* mold in grains and peanuts) in association with HBV infection.
4. Hereditary hemochromatosis, Wilson disease
5. PBC, AAT deficiency, tyrosinemia
6. *Metabolic syndrome* e.g. obesity, diabetes mellitus, and NAFLD, all of which increase the risk for HCC

Morphology of HCC

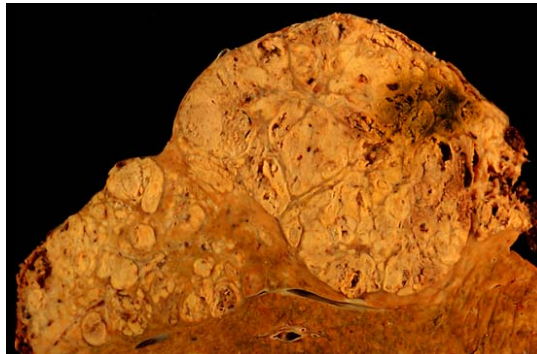
Grossly it may be

- (1) a **unifocal** mass
- (2) **multifocal**, multiple nodules of variable size;
- (3) a **diffusely infiltrative** cancer.

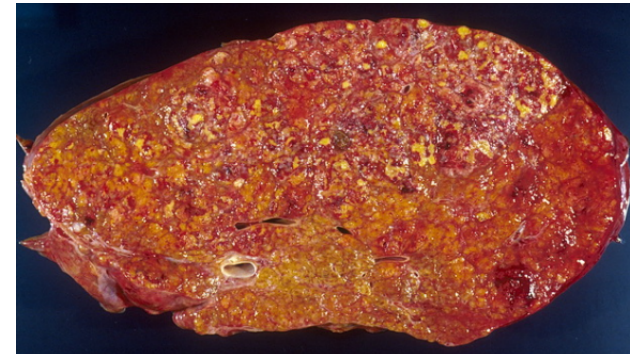
All three patterns may cause liver enlargement. **All patterns of hepatocellular carcinomas have a strong propensity for invasion of vascular channels.**



HCC developed in a cirrhotic liver



multiple nodules of variable size

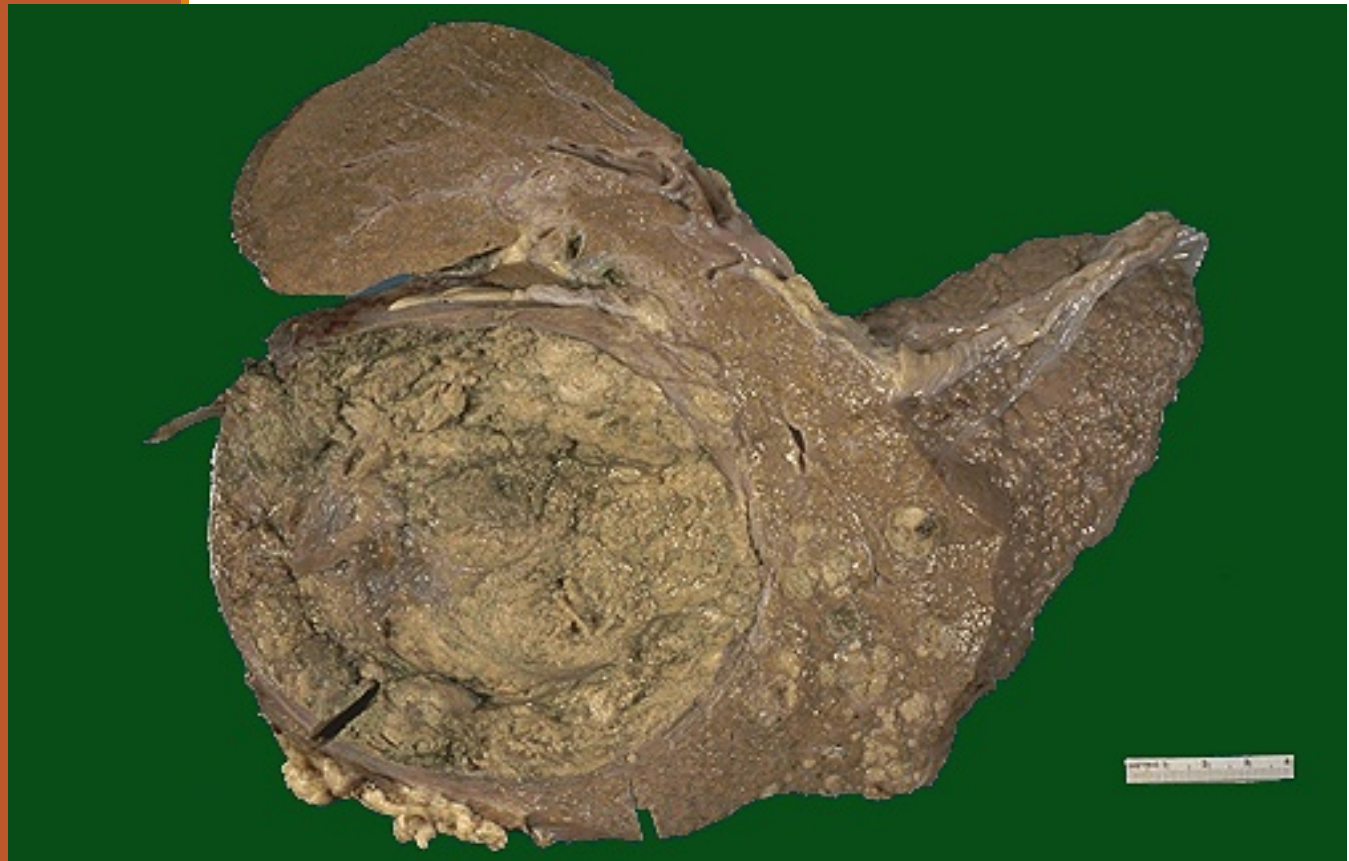


diffusely infiltrative cancer

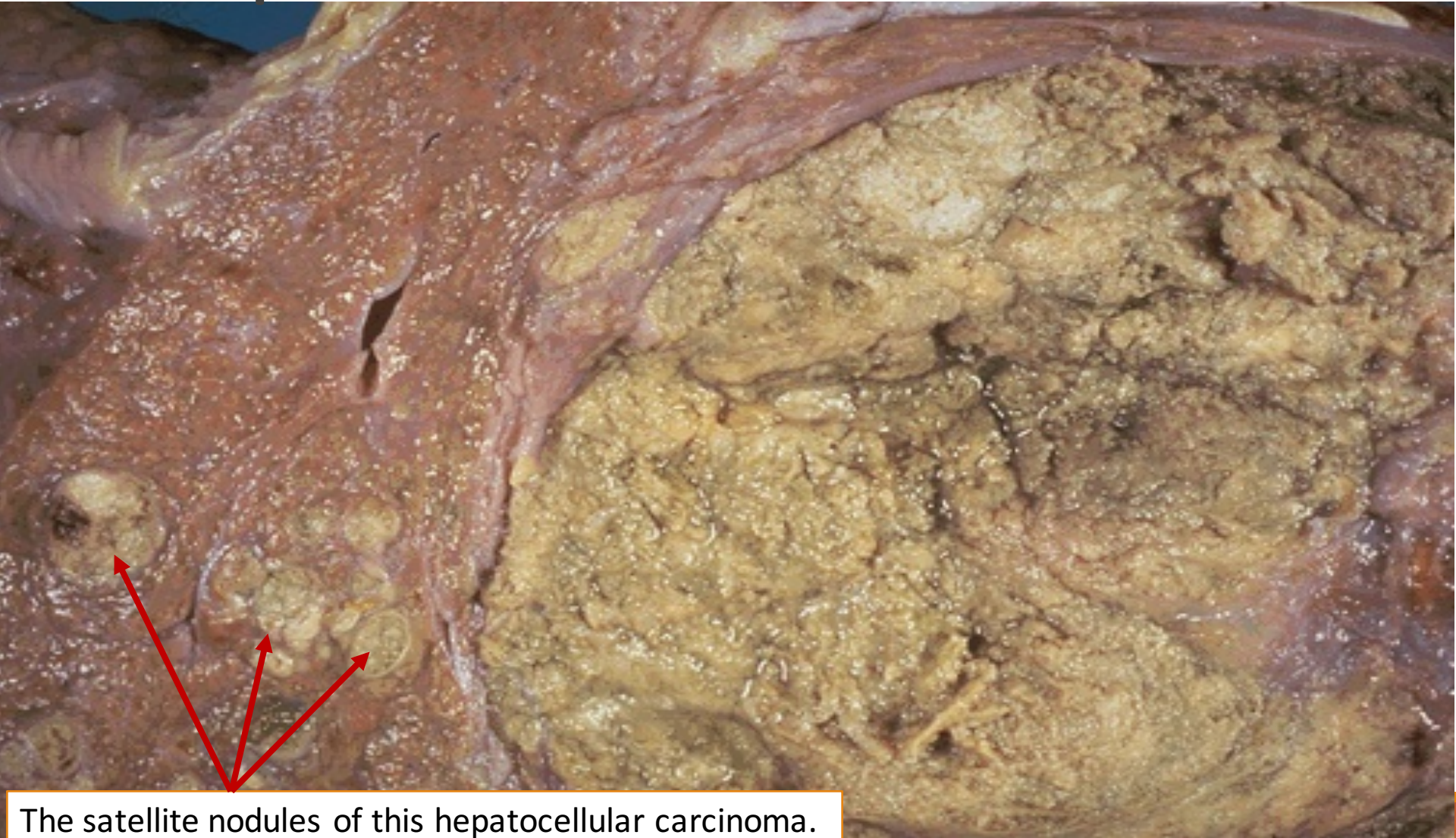
Hepatocellular carcinoma

Such liver cancers usually 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 small satellite nodules.



Hepatocellular carcinoma



The satellite nodules of this hepatocellular carcinoma.

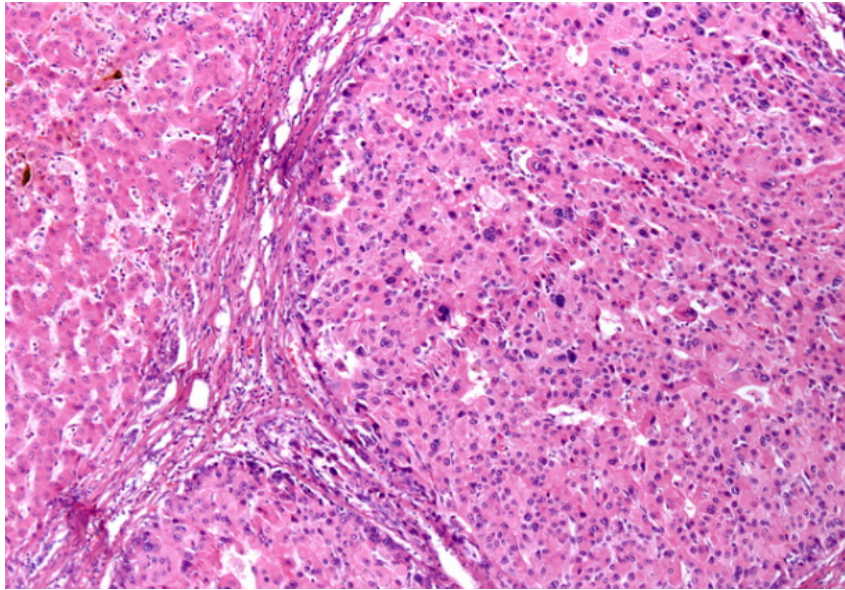
Morphology of HCC

- Extensive intrahepatic metastases may occur
- Tumor may invade the portal vein (with occlusion of the portal circulation) or inferior vena cava, extending even into the right side of the heart.
- Lymph node metastases to the perihilar, peripancreatic, and para-aortic nodes above and below the diaphragm can be present.
- Hepatocellular carcinomas range from well-differentiated to highly anaplastic undifferentiated lesions.

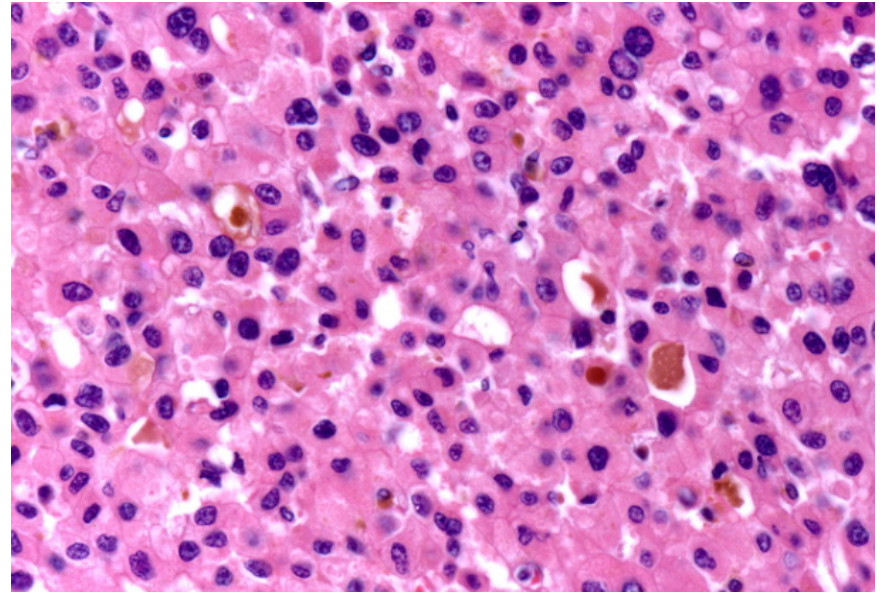
Morphology of HCC

In well-differentiated and moderately well-differentiated tumors, cells that are recognizable as hepatocytic in origin. Bile pigment is usually present. The malignant cells may be positive for alpha-fetoprotein.

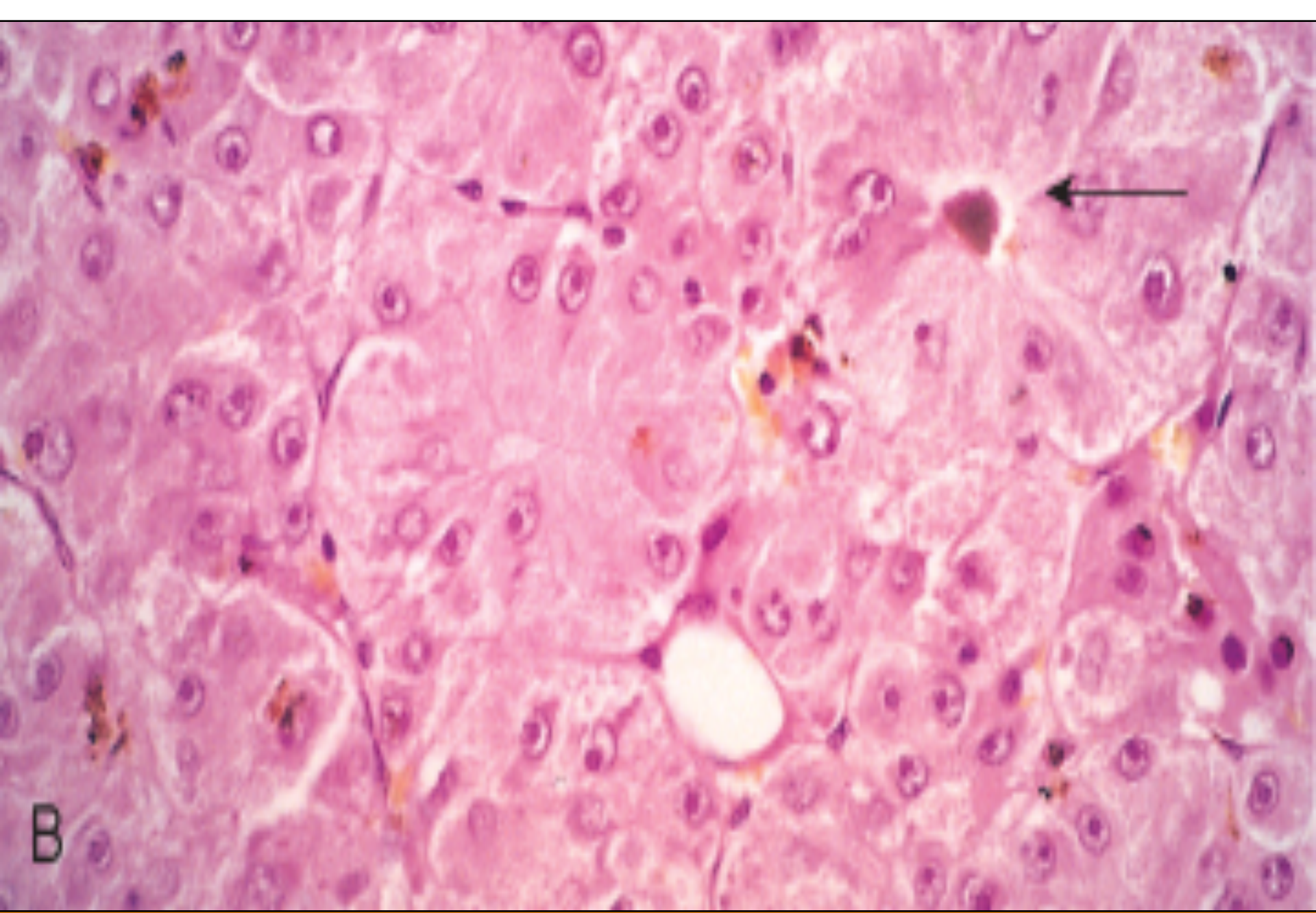
In poorly differentiated forms, tumor cells can take on a pleomorphic appearance with numerous anaplastic giant cells, can become small and completely undifferentiated cells.



well-differentiated tumors

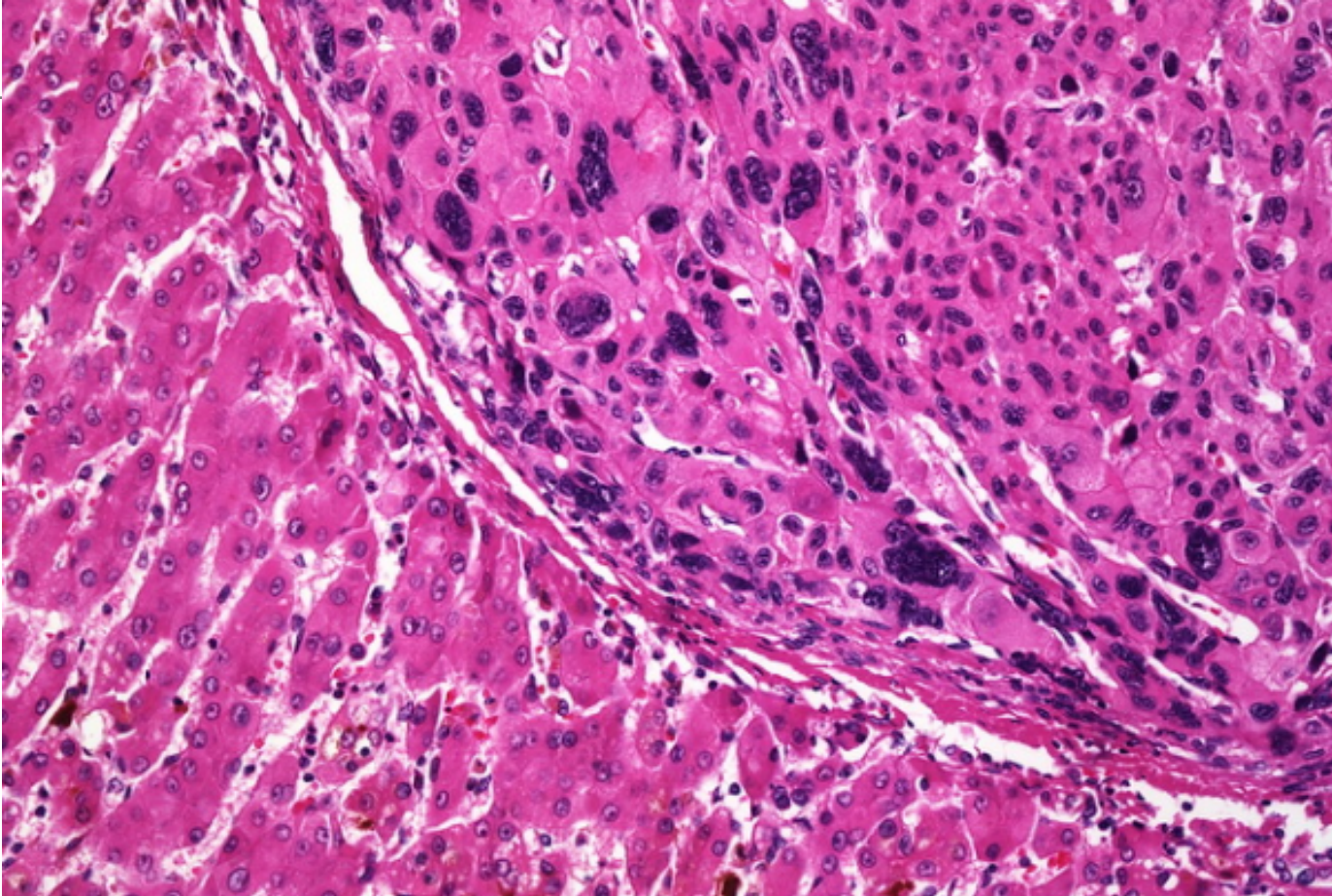


HCC with bile pigment



B

Morphology of HCC



Poorly differentiated HCC (Right)

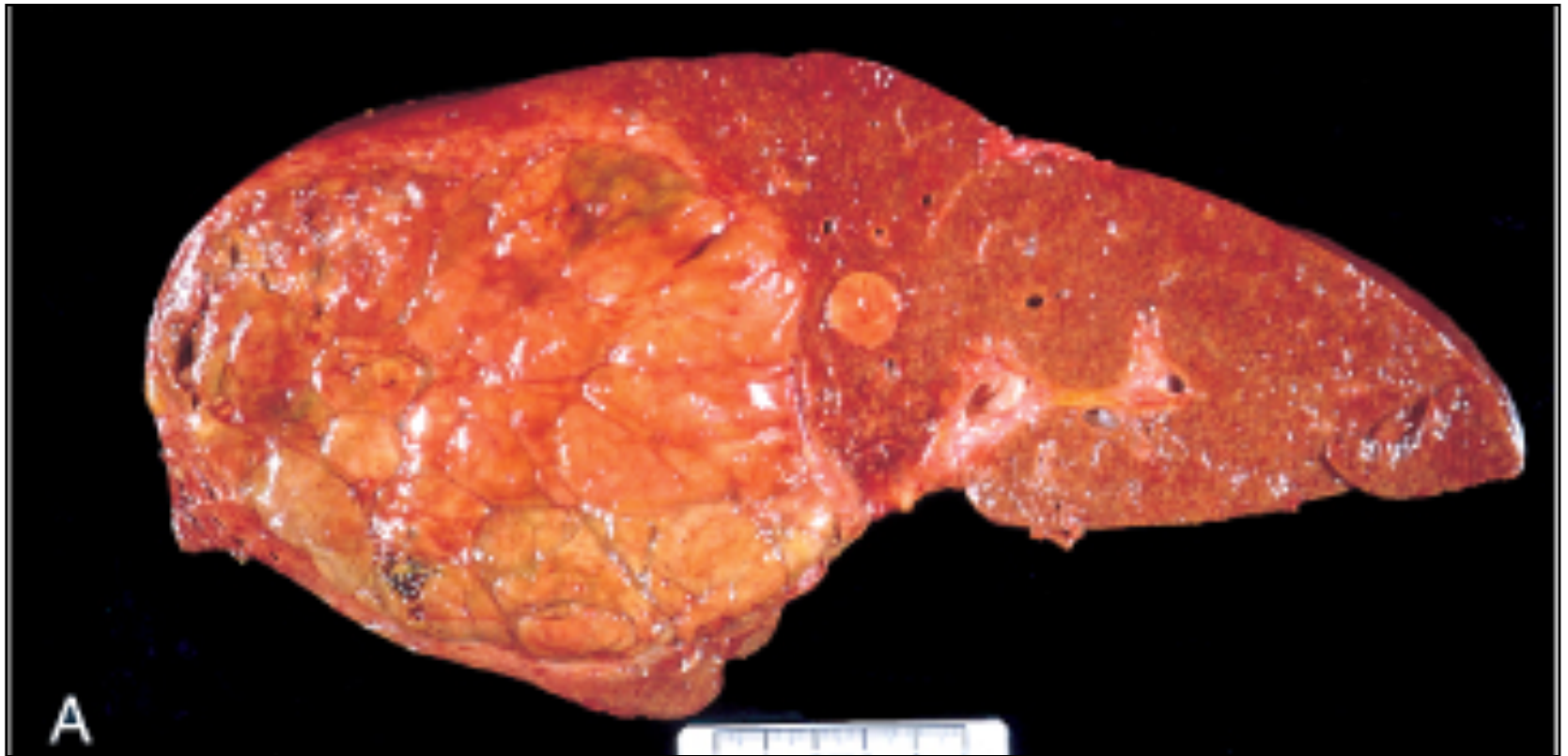
Hepatocellular carcinoma

Variant:

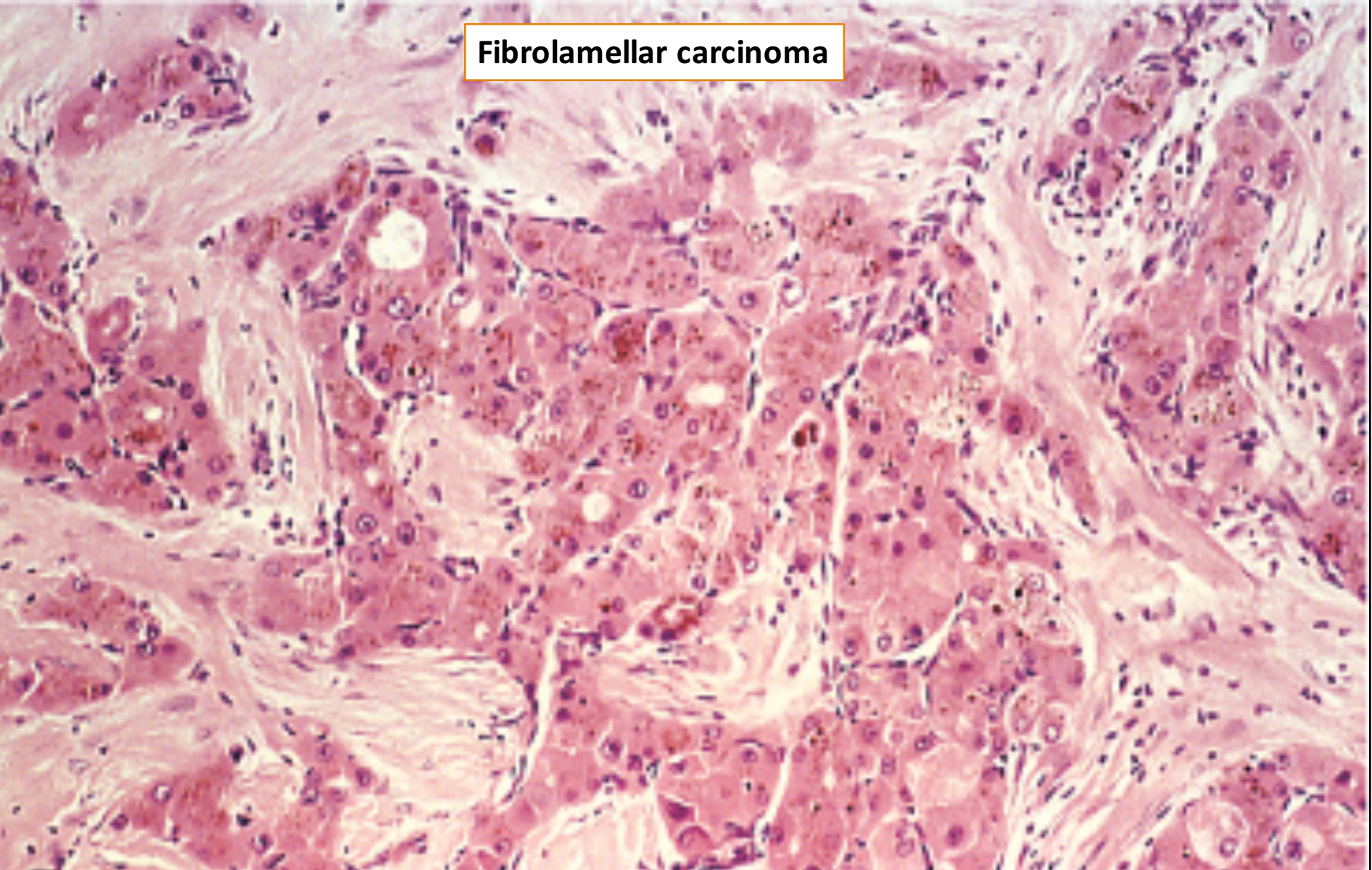
Fibrolamellar carcinoma

- A distinctive variant of hepatocellular carcinoma
- This tumor occurs in young male and female adults (20 to 40 years of age),
- It has no association with HBV or cirrhosis, and often has a better prognosis.
- It usually presents as single large, hard "scirrhous" tumor with fibrous bands coursing through it.

Fibrolamellar carcinoma



Fibrolamellar carcinoma



On microscopic examination, it is composed of well-differentiated polygonal cells growing in nests or cords and separated by parallel lamellae of dense collagen bundles

Clinical Features

- Ill-defined upper abdominal pain, malaise, fatigue, weight loss, and feeling of abdominal fullness.
- In many cases, the enlarged liver can be felt on palpation. Jaundice and fever are uncommon.
- Laboratory studies: Elevated levels of serum α -fetoprotein are found in 50% to 75% of patients with HCC.

Hepatocellular Carcinoma

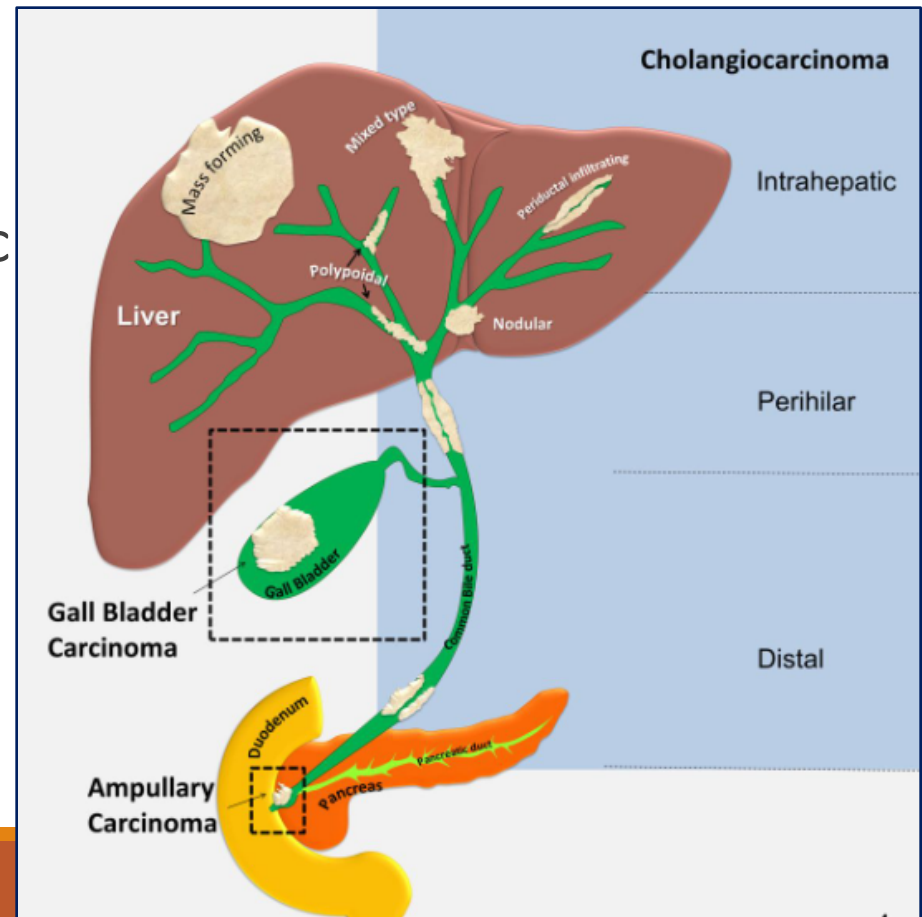
Overall, death usually occurs from

- (1) cachexia
- (2) gastrointestinal or esophageal variceal bleeding
- (3) liver failure with hepatic coma
- (4) rupture of the tumor with fatal hemorrhage.

Cholangiocarcinoma

Cholangiocarcinoma

- liver after HCC Cholangiocarcinoma is a malignancy of the biliary tree, arising from bile ducts within and outside of the liver.
- It is the second most common primary malignant tumor of the liver
- occur in noncirrhotic livers
- may track along the intrahepatic portal tract system or produce a single massive tumor



The risk conditions for development of cholangiocarcinoma include

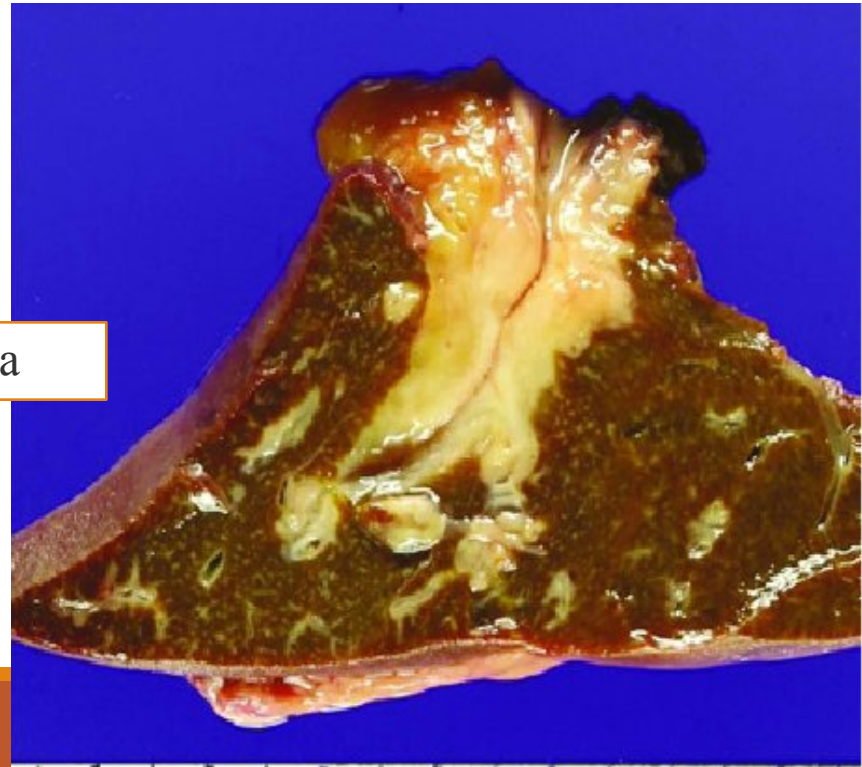
- Primary sclerosing cholangitis.
- Congenital fibropolycystic diseases of the biliary system (particularly Caroli disease and choledochal cysts).
- Previous exposure to Thorotrast (formerly used in radiography of the biliary tract).
- In the Orient, the incidence rates are higher, and it is due to chronic infection of the biliary tract by the liver fluke *Opisthorchis sinensis*.

Cholangiocarcinoma

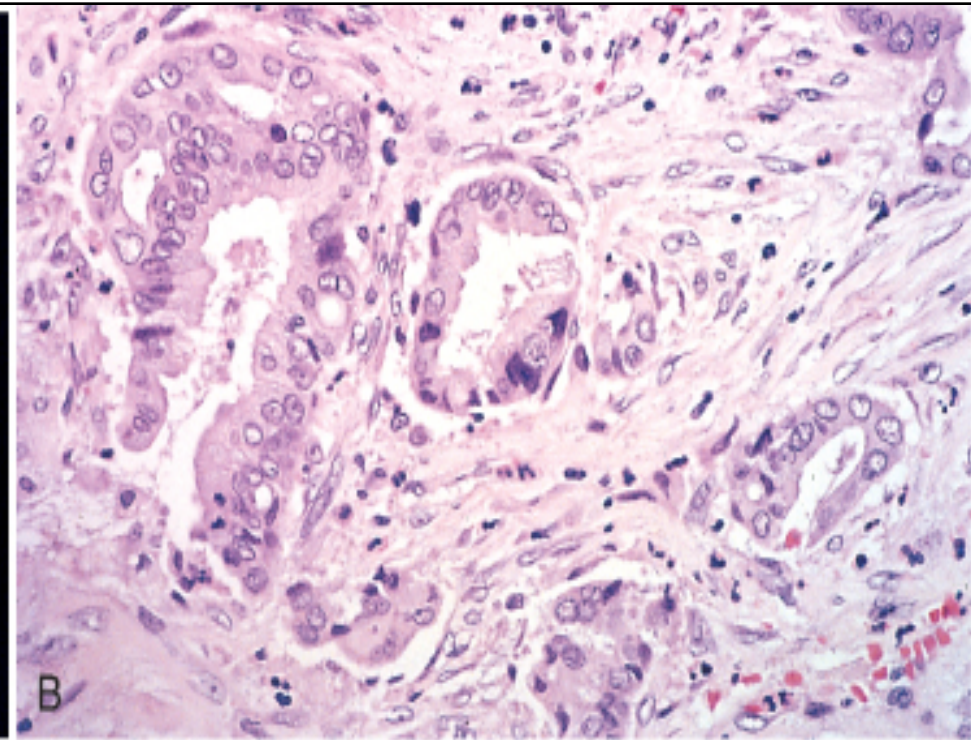
Morphology

Intrahepatic cholangiocarcinomas occur in the non-cirrhotic liver and may track along the intrahepatic portal tract system to create a treelike tumorous mass within the liver or a massive tumor nodule. Lymphatic and vascular invasion are common.

Intrahepatic cholangiocarcinoma

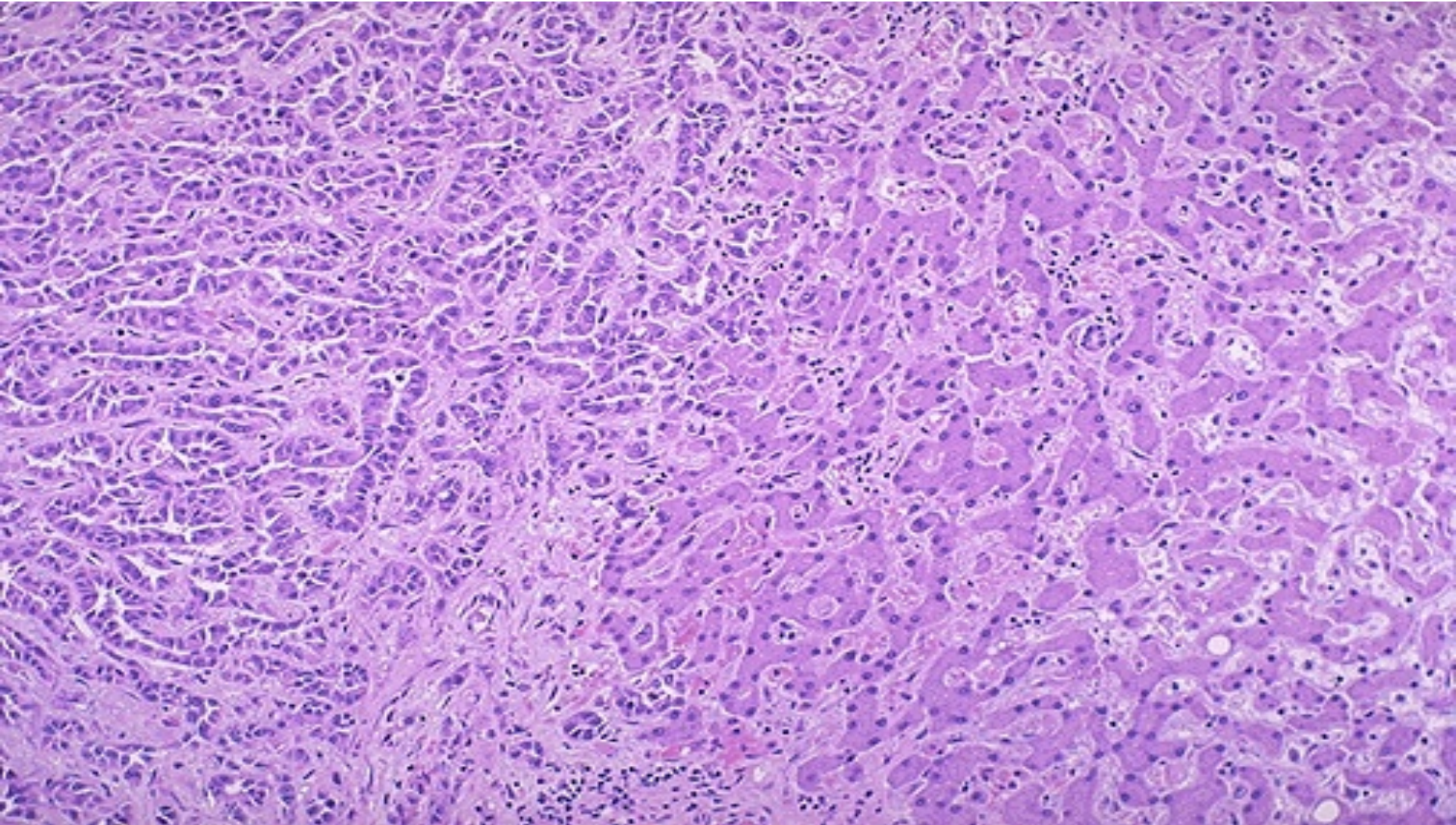


Cholangiocarcinoma



- well to moderately differentiated, growing as glandular/tubular structures lined by malignant epithelial cells surrounded by marked desmoplasia of the stroma.
- mucin-producing adenocarcinomas

The carcinoma at the left has a glandular appearance. Cholangiocarcinomas do not make bile, but the cells do make mucin, and they can be almost impossible to distinguish from metastatic adenocarcinoma on biopsy or fine needle aspirate



Cholangiocarcinoma

Morphology

Mixed variants occur, in which elements of both hepatocellular carcinoma and cholangiocarcinoma are present.

Hematogenous metastases to the lungs, bones (mainly vertebrae), adrenals, brain. Lymph node metastases to the regional lymph nodes are also found

Cholangiocarcinoma

Clinical Features

Intrahepatic cholangiocarcinoma is usually detected late in its course, either as the result of obstruction to bile flow through the hilum of the liver or as a symptomatic liver mass.

Prognosis is poor. The median time from diagnosis to death is 6 months. Aggressive surgery remains the only treatment offering hope for long-term survival.

Alpha-fetoprotein is not elevated.

Metastatic tumors

Metastatic involvement of the liver is far more common than primary neoplasia. (most common sites for metastasis are liver and lung)

Although the most common primaries producing hepatic metastases are those of the breast, lung, and colon, any cancer in any site of the body may spread to the liver, including leukemias and lymphomas.

Typically, multiple nodular metastases are found that often cause striking hepatomegaly and may replace over 80% of existent hepatic parenchyma. The liver weight can exceed several kilograms.



Metastatic tumors

Numerous mass lesions of variable size. Some of the larger ones demonstrate central necrosis. The masses are metastases to the liver.

Metastatic tumors



ANGIOSARCOMA

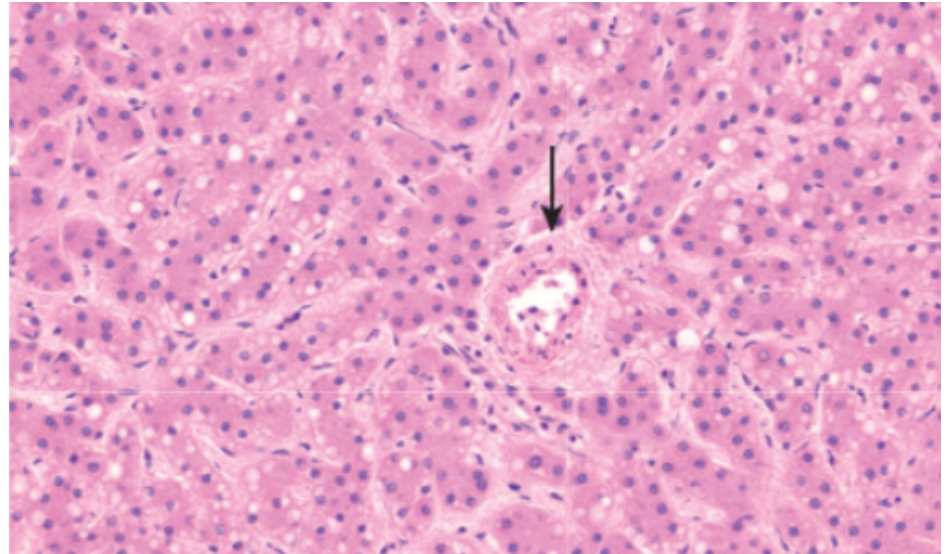
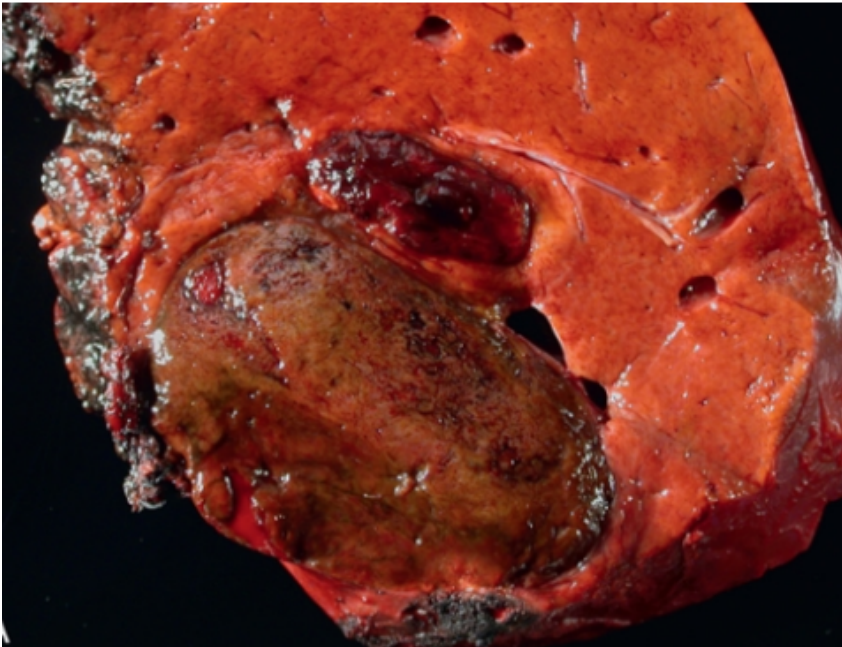
This consists of pleomorphic endothelial cells with large hyperchromatic nuclei, giant cells in frequent mitosis and irregular anastomosing vascular channels. The cells may appear spindle shaped.

Cirrhosis is present in 20% to 40% of the cases.

These have also been linked to vinyl chloride and thorocontrast exposure.

Hepatocellular Adenomas

- Benign neoplasms developing from hepatocytes
- Sex hormone exposure (e.g., oral contraceptive pills, anabolic steroids) markedly increases the frequency of hepatic adenoma
- They may be detected incidentally as a hepatic mass on abdominal imaging or when they cause symptoms.
- The most common symptom is pain, occasionally rupture, an event that may lead to life-threatening intra-abdominal bleeding



Microscopic view showing cords of hepatocytes, with an arterial vascular supply (arrow) and no portal tracts.

PANCREATIC CARCINOMA

PANCREATIC CARCINOMA

Pancreatic cancer has one of the highest mortality rates of any cancer. It is carcinoma of the exocrine pancreas. It arises from ductal epithelial cells.

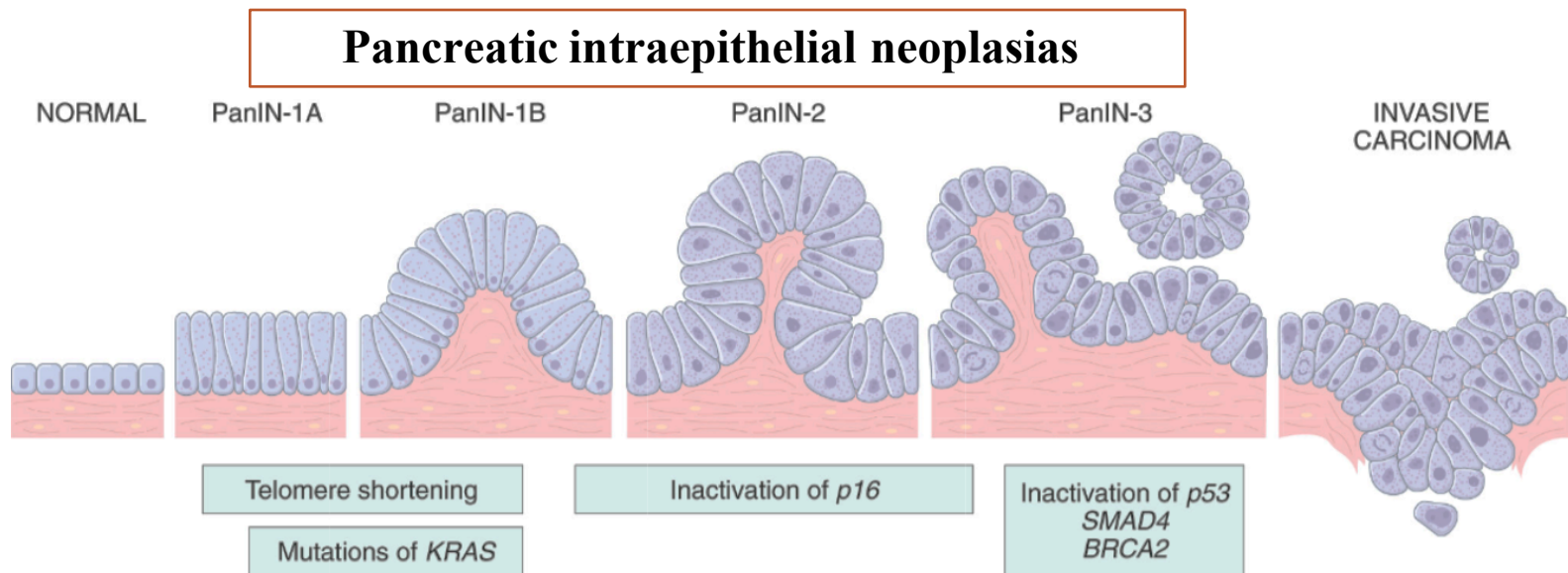
It occurs in the 6th to 8th decade, blacks more than whites, males more than females, diabetics more than non-diabetics.

Risk factors:

1. Smoking, which doubles the risk
2. Long-standing chronic pancreatitis and diabetes mellitus
3. Germ line mutations of the familial breast/ovarian cancer gene *BRCA2* are seen in approximately 10% of cases arising in individuals of Ashkenazi origin

Pathogenesis for the development of pancreatic cancer

Pancreatic cancer arises as a consequence of inherited and acquired mutations in cancer-associated genes



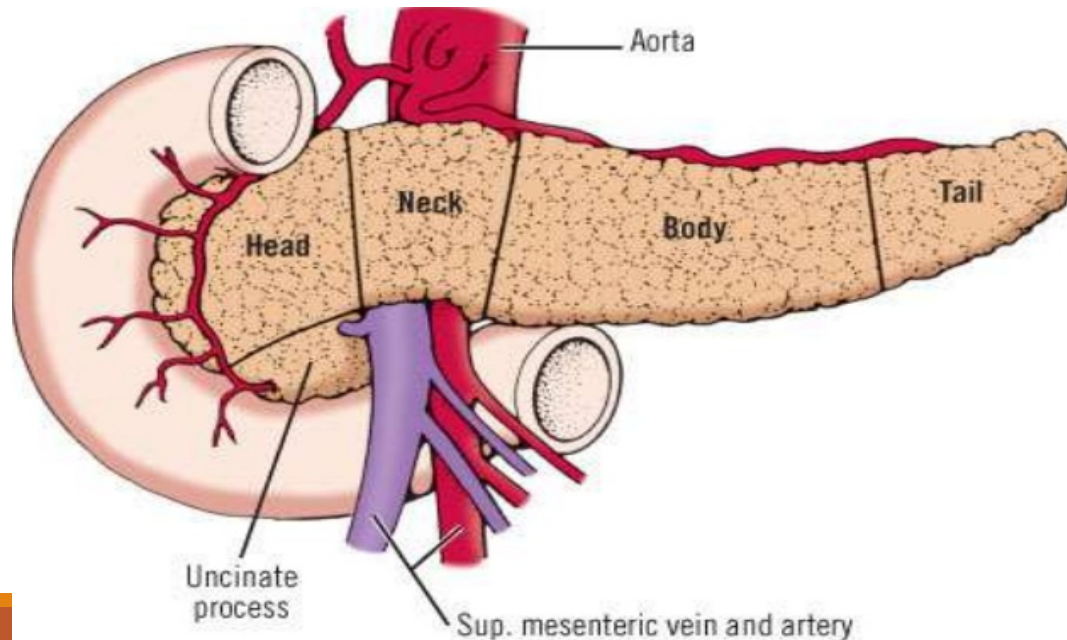
four genes are most commonly affected by somatic mutations in this neoplasm: *KRAS*, *CDKN2A/p16*, *SMAD4*, and *TP53*

PANCREATIC CARCINOMA

Morphology

Location of pancreatic carcinoma:

- Head of the pancreas: 60%
- The body of the pancreas: 15%
- The tail of the pancreas: 5%
- The neoplasm diffusely involves the entire gland: 20%



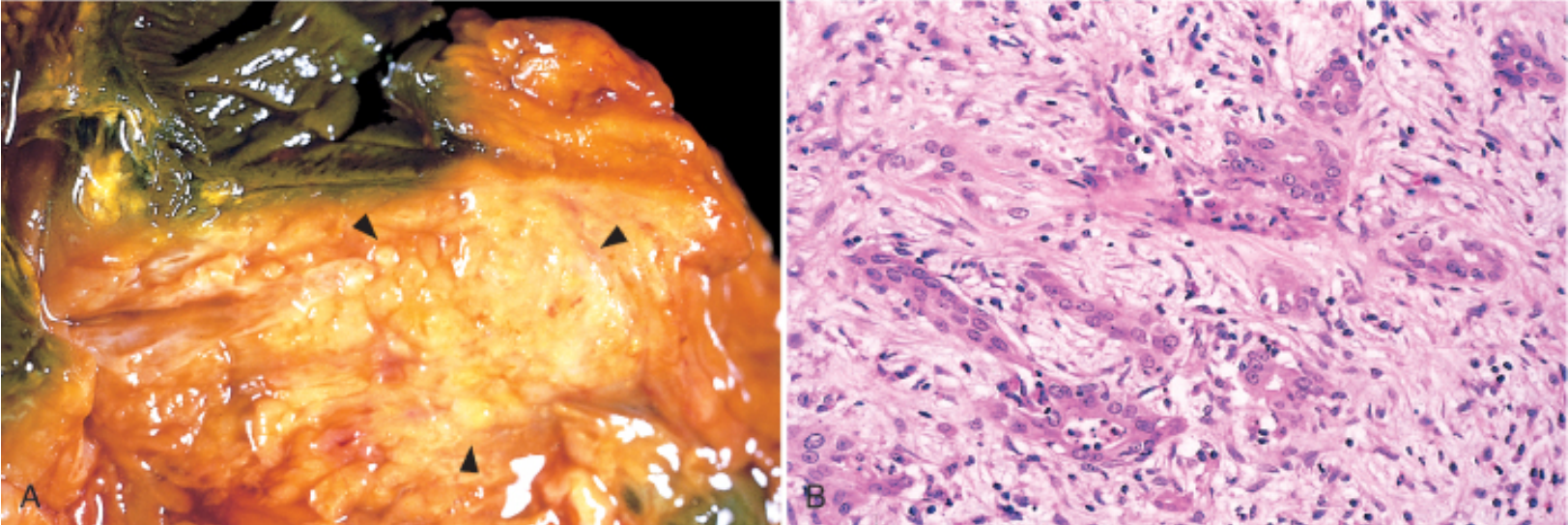
PANCREATIC CARCINOMA

Morphology

Carcinomas of the pancreas are usually hard, stellate, gray-white, poorly defined masses.

PANCREATIC CARCINOMA

Morphology



Majority of carcinomas are ductal adenocarcinomas.

Two features are characteristic:

- 1. It is highly invasive**
- 2. It elicits an intense non-neoplastic host reaction called a "desmoplastic response".**

PANCREATIC CARCINOMA

Morphology

Metastasis to:

Lymph nodes: Peripancreatic, gastric, mesenteric, omental, and portahepatic lymph nodes are frequently involved.

Distant metastases: to the lungs and bones.

Less common variants of pancreatic cancer include **acinar cell carcinomas, adenosquamous carcinomas, and undifferentiated carcinomas with osteoclast-like giant cells.**

PANCREATIC CARCINOMA: CLINICAL FEATURES

Jaundice, weight loss, pain, massive metastasis to liver and migratory thrombophlebitis

Most pancreatic cancers are diagnosed at an advanced stage, accounting for the high mortality rate