

Pathophysiology II

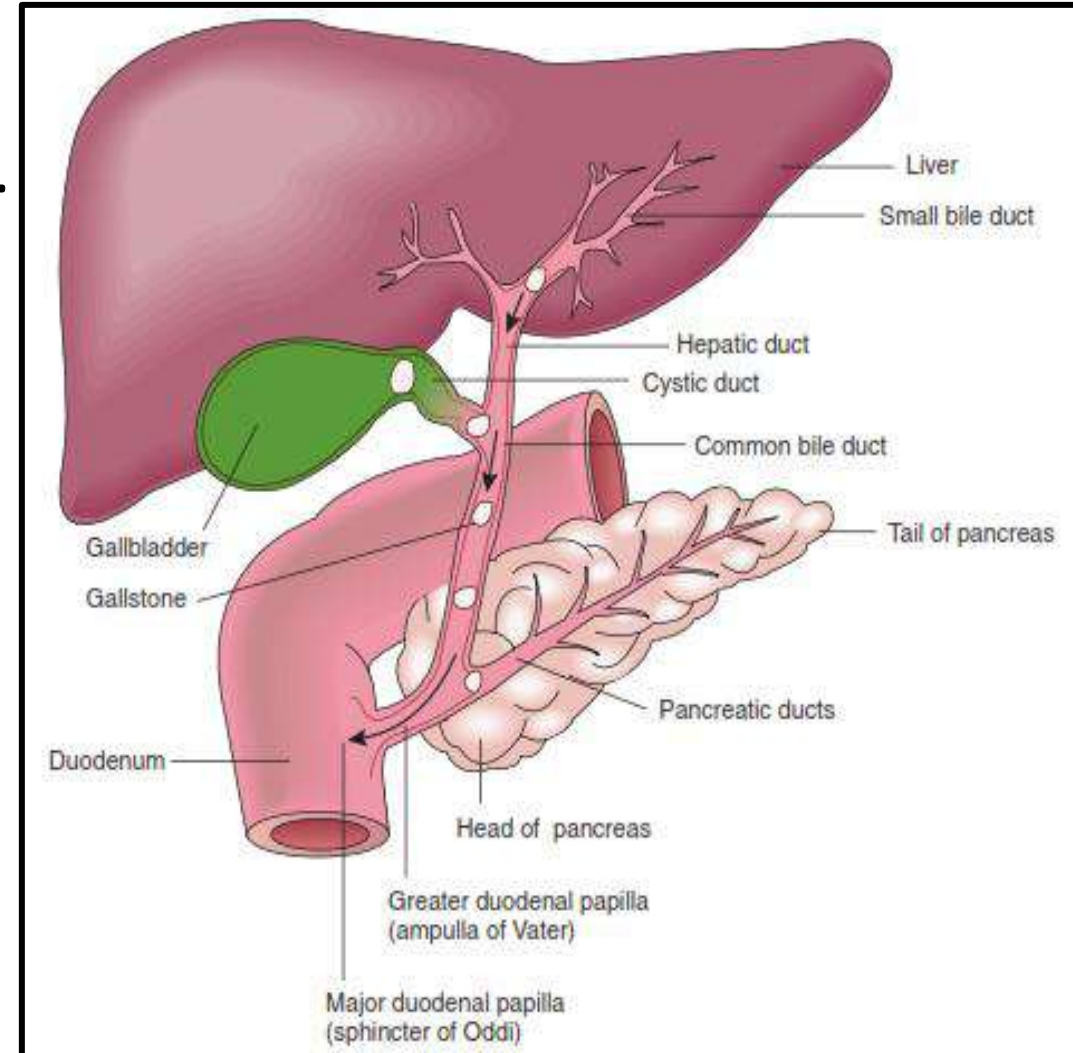
Chapter (1): Liver diseases

- Gallstone formation (cholelithiasis)
- Jaundice
- Hepatitis
- Liver cirrhosis

Liver disorders

Gallbladder disorders

- Group of disorders affecting the gallbladder and biliary tract.
 - **Cholelithiasis (Gallstone formation)**
 - **Cholecystitis**
 - **Cholangitis**
 - **Choledocholithiasis**



Liver disorders

Cholelithiasis

Causes

- High cholesterol level in the bile
- High bilirubin level in the bile
- Increase of mucin (glycoprotein) secretion
- Hypomotility of gallbladder

Risk factors

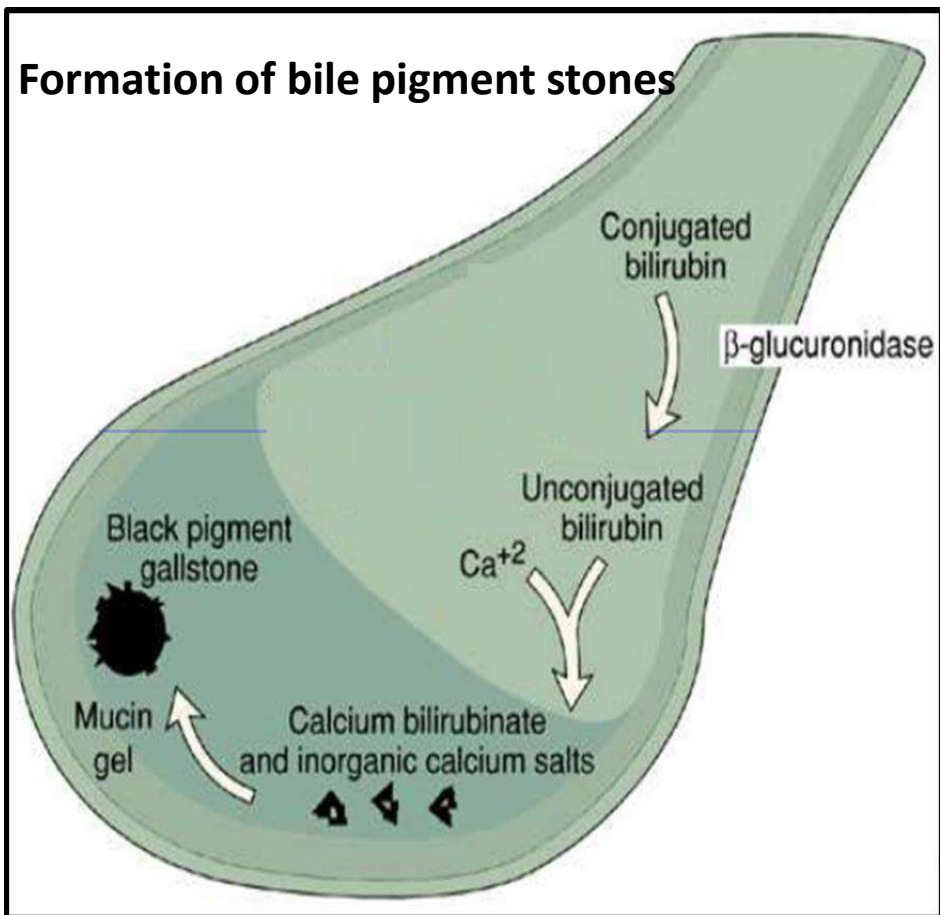
- Gender: Women, multiparity
- Alteration of hepatic cholesterol catabolism
- Obesity, high cholesterol intake, use of oral contraceptives or estrogen supplements
- Hemolytic anemia (Bile pigment stones), cirrhosis, biliary tract infection



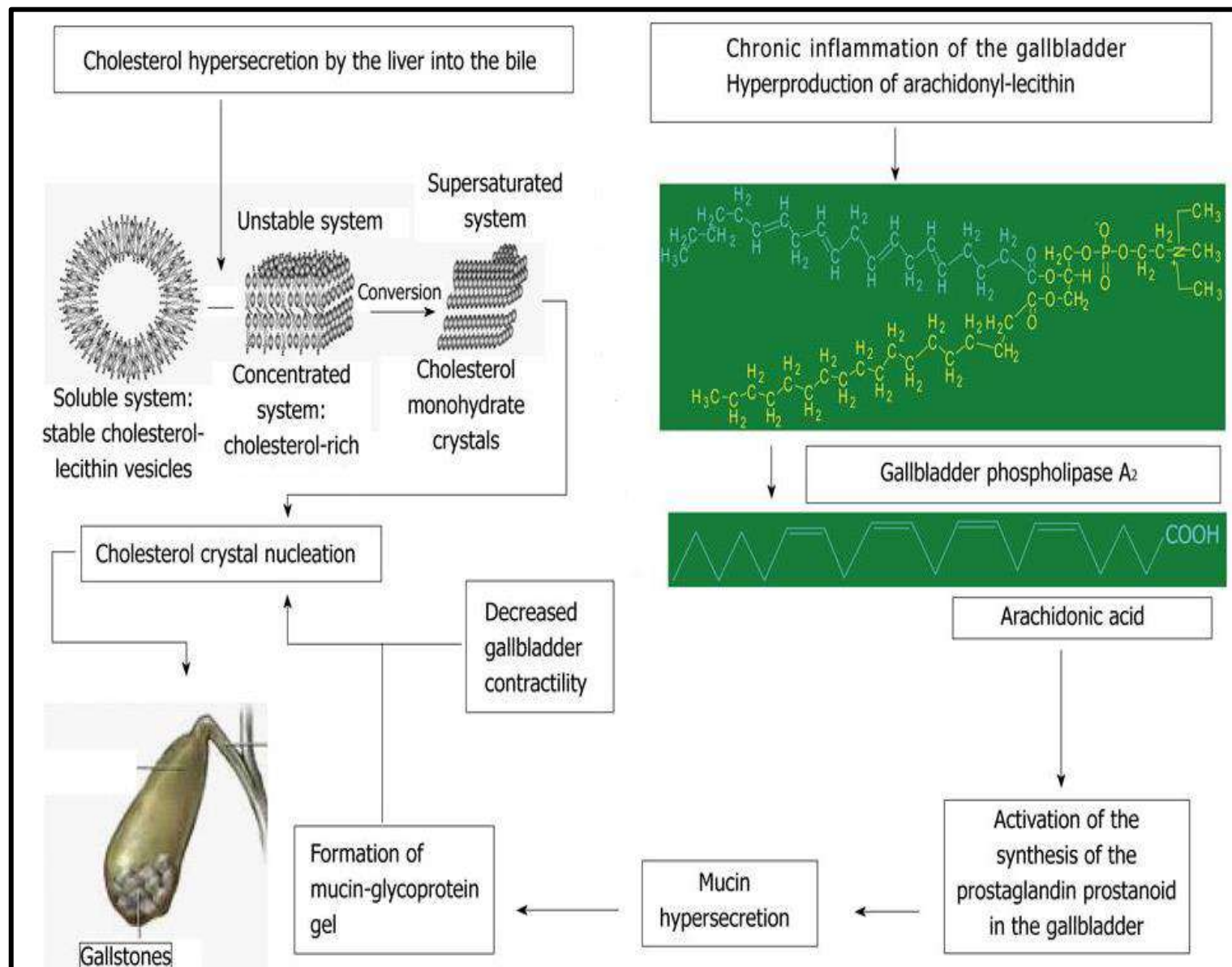
Liver disorders

Cholelithiasis

Pathogenesis



4



Gastrointestinal disorders

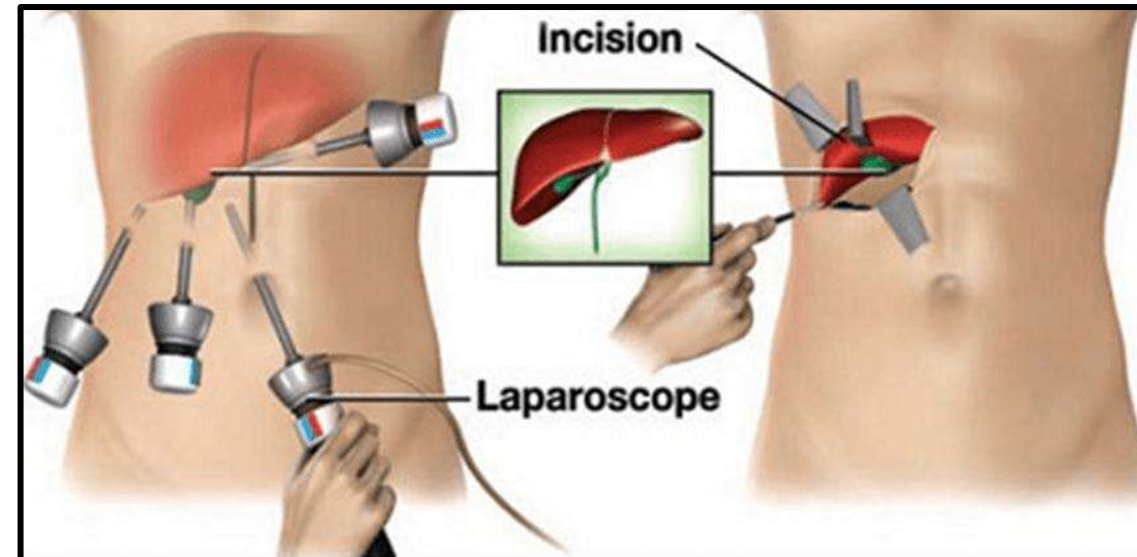
Cholelithiasis

Symptoms

- Frequently asymptomatic
- Severe waves of pain (biliary colic)
- Nausea and vomiting
- Jaundice
- Severe pain with eating a fatty meal

Treatment

- Bile acids to break down the stone
- Shock wave lithotripsy (using high-energy sound waves).
- cholecystectomy
- Laparoscopic cholecystectomy



Laparoscopic cholecystectomy

Open surgery

Gastrointestinal disorders

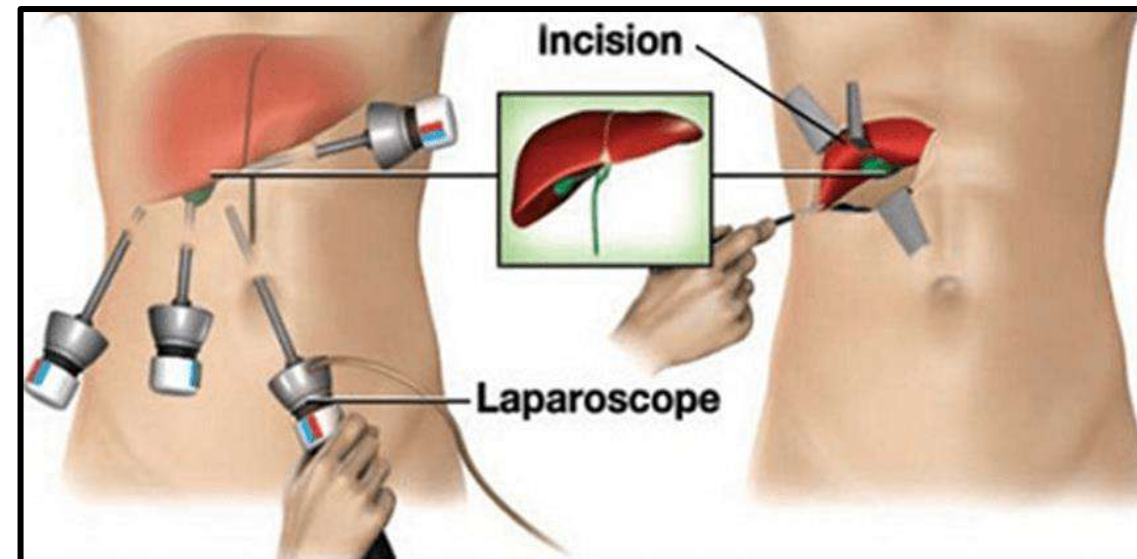
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Laparoscopic cholecystectomy

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Liver disorders

Jaundice (Icterus, hyperbilirubinemia)

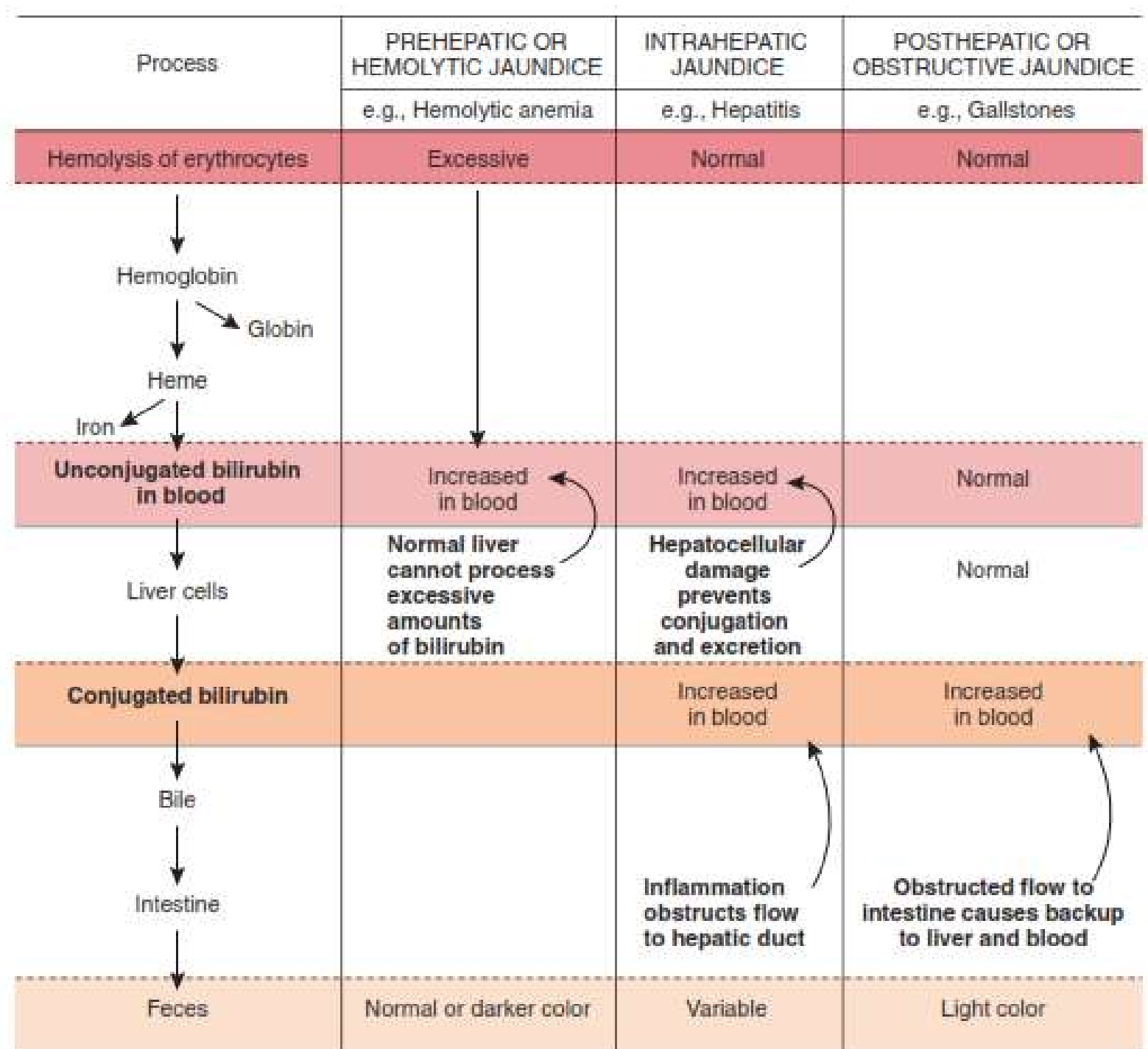
- It refers to the yellowish color of the eyes and skin that results from high levels of bilirubin in the blood.

Causes

- It is not itself a disease but rather is a sign of many types of primary disorders.
 - **Prehepatic jaundice**
 - **Intrahepatic jaundice**
 - **Posthepatic jaundice**



Liver disorders



Liver disorders

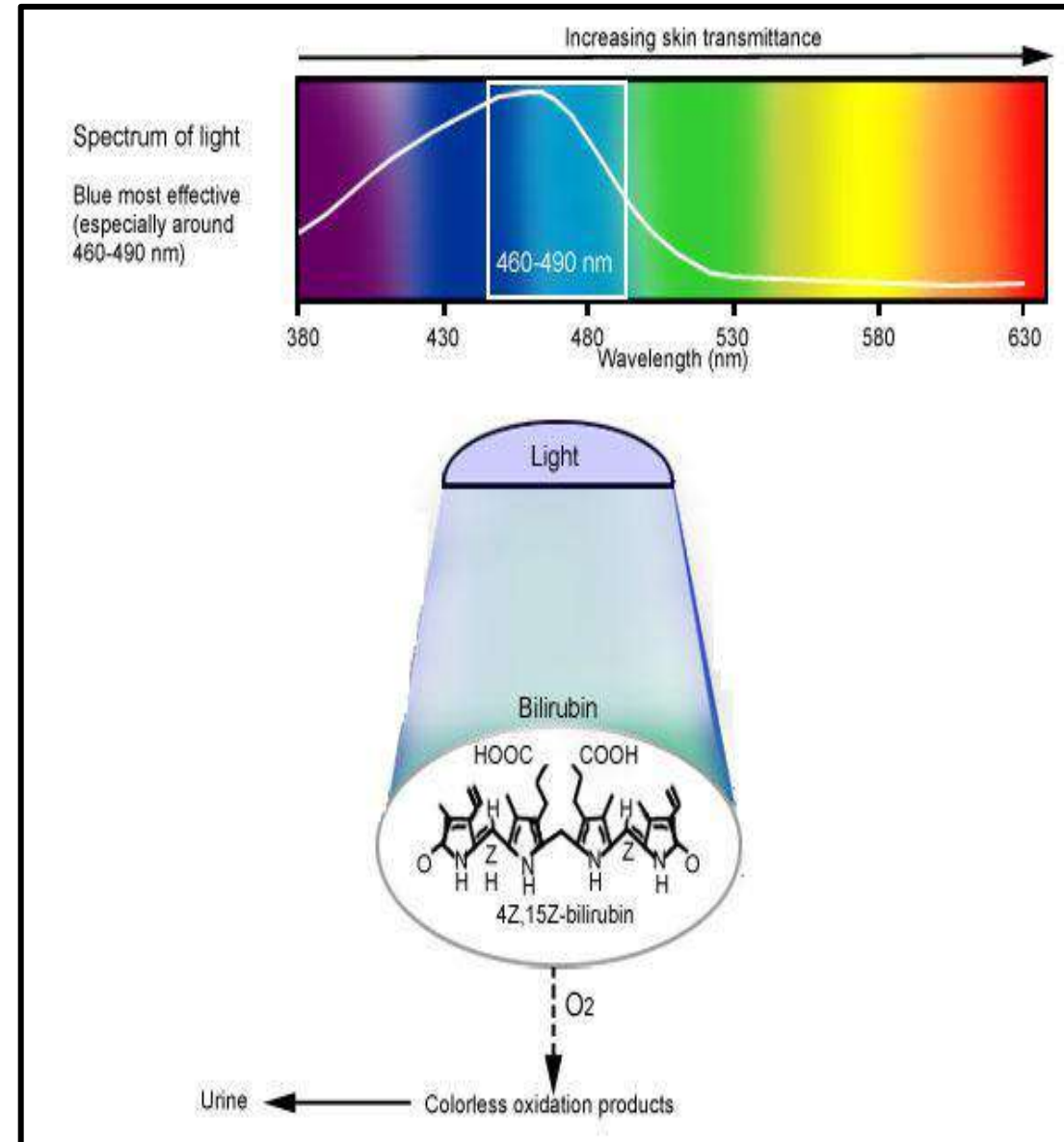
Jaundice (Icterus, hyperbilirubinemia)

Symptoms

- The main sign of jaundice is a yellowish discoloration of the white area of the eye and the skin.
- Urine is dark in color
- Pruritus (itching)????

Treatment

- Phototherapy
- Blood transfusion
- Drugs: Liver enzymes induction



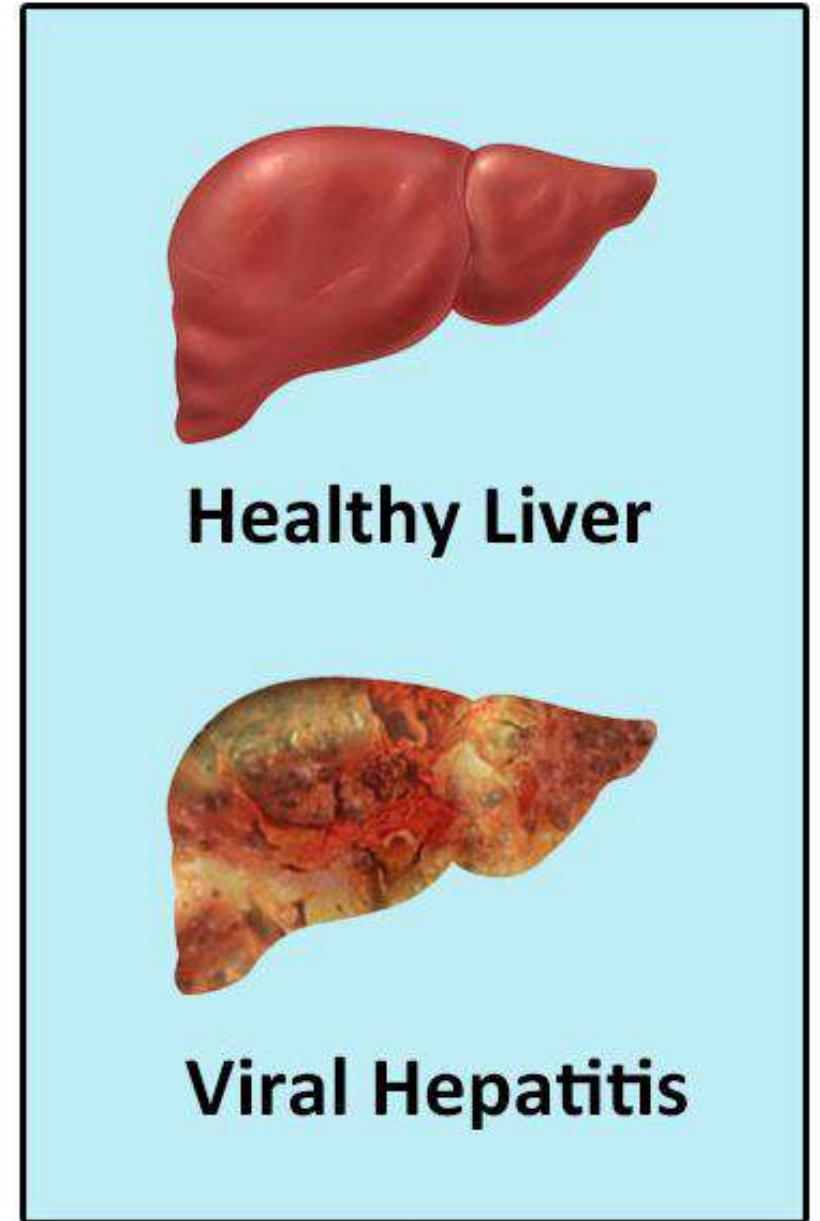
Liver disorders

Hepatitis

- Hepatitis refers to inflammation of the liver.
- Mild inflammation (acute)
- Severe inflammation (chronic)

Causes

- Idiopathic: fatty liver (hepatic steatosis)
- Infection: viruses (**viral hepatitis**), bacteria, protozoa
- Drug toxicity
- Alcohol consumption
- Autoimmunity



Liver disorders

Hepatitis

- **Viral Hepatitis: Hepatitis A virus (HAV), hepatitis B virus (HBV), hepatitis C virus (HCV), hepatitis D virus (HDV), and hepatitis E virus (HEV).**

TABLE 20-5 Types of Hepatitis

Disease	Agent	Transmission	Incubation Period	Serum Markers	Carrier/Chronic
Hepatitis A (infectious)	HAV (RNA virus)	Oral-fecal	2-6 wk	anti-HAV IgM anti-HAV IgG	None
Hepatitis B (serum)	HBV (DNA double-strand virus)	Blood and body fluids	1-6 mo (average, 60-90 days)	HBsAg anti-HBs HBcAb IgM HBcAb IgG HBeAg, HBeAb	Carrier and chronic
Hepatitis C	HCV (RNA virus)	Blood and body fluids	2 wk-6 mo (average, 6-9 wk)	anti-HCV	Carrier and chronic
Hepatitis D, chronic (delta)	HDV (defective RNA virus requires presence of HBV)	Blood and body fluids	2-10 wk	anti-HDV IgM anti-HDV IgG	Chronic
Hepatitis E	HEV (RNA virus)	Oral-fecal	2-9 wk	HE Ag	None

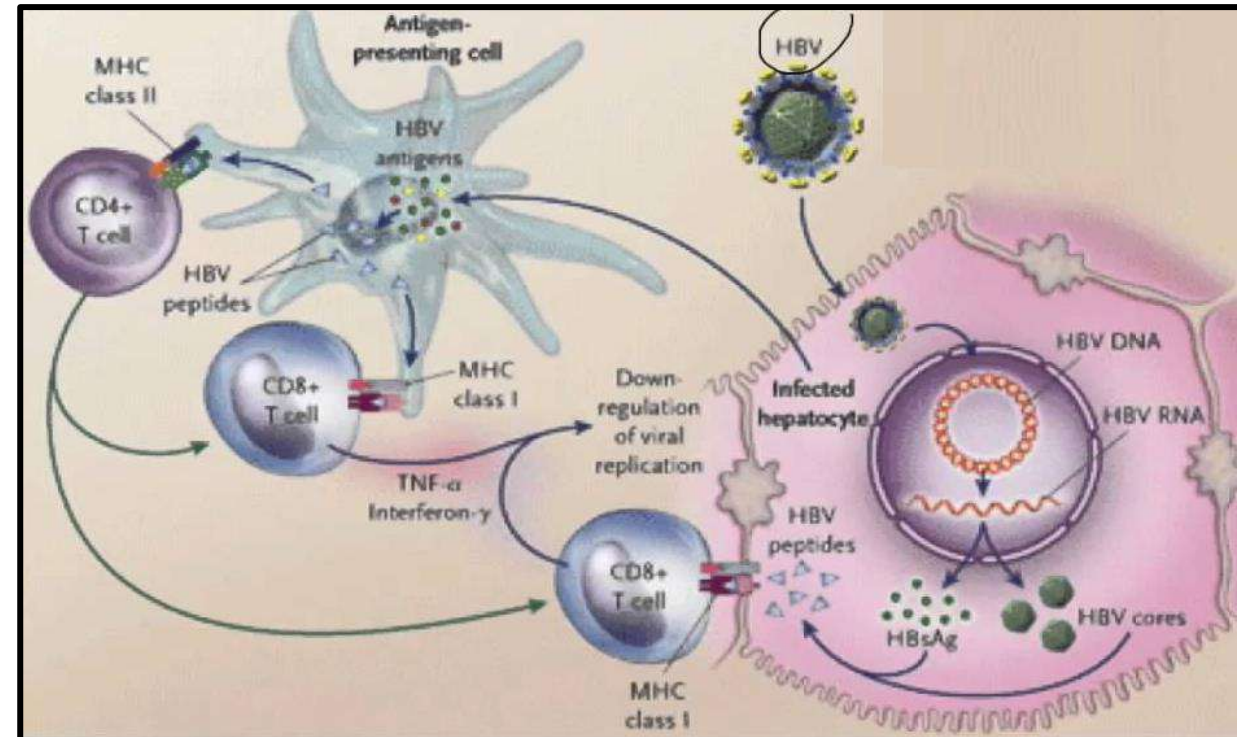
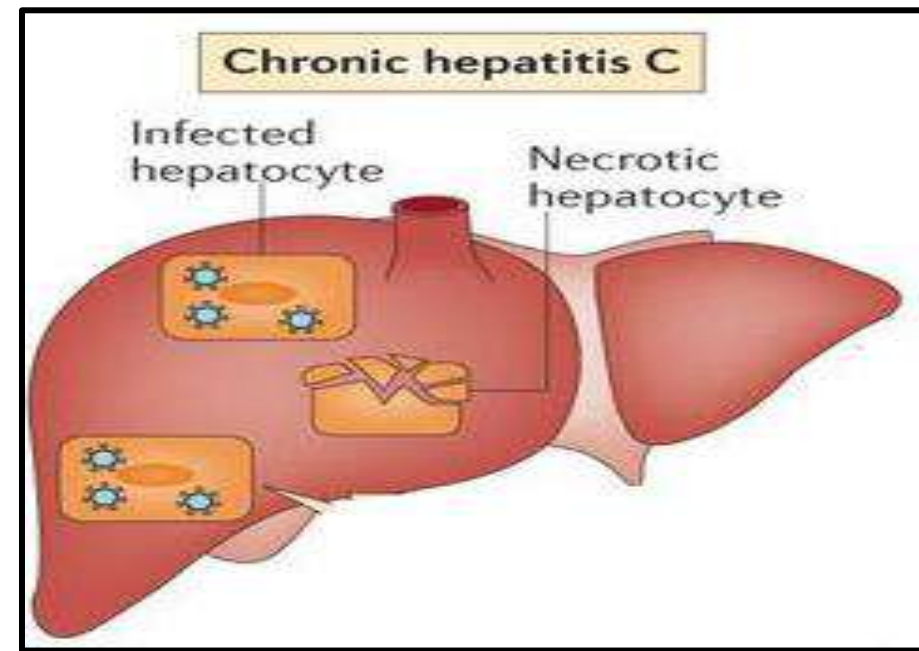
Liver disorders

Hepatitis

➤ Viral Hepatitis

Pathogenesis

- Cell injury
 - Direct action of the virus: **hepatitis C**
 - Cell-mediated immune responses to the virus: **hepatitis B**
- The degree of inflammation and damage varies:
 - Acute inflammation (mild): hepatic cells can regenerate as in hepatitis A, E
 - Chronic inflammation (severe, permanent): Scar tissue (fibrosis), cirrhosis, liver failure or liver cancer as in hepatitis B, C, and D.



Liver disorders

Hepatitis

➤ Viral Hepatitis

▪ Symptoms

- Preicteric or prodromal stage
- Icteric or jaundice stage
- Posticteric or recovery stage

} Acute hepatitis

▪ Treatment

- Vaccination: **except HCV**
- Diet high in protein, carbohydrate, and vitamins: Hepatitis A, E
- Hepatitis B, C and D: interferon α and antiviral drugs as lamivudine and ribavirin

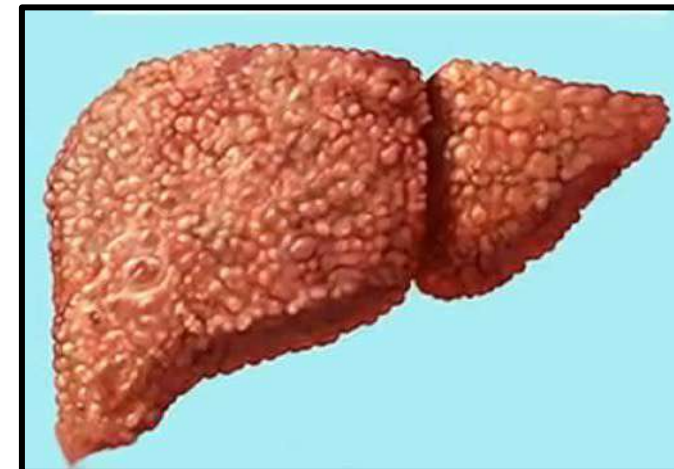
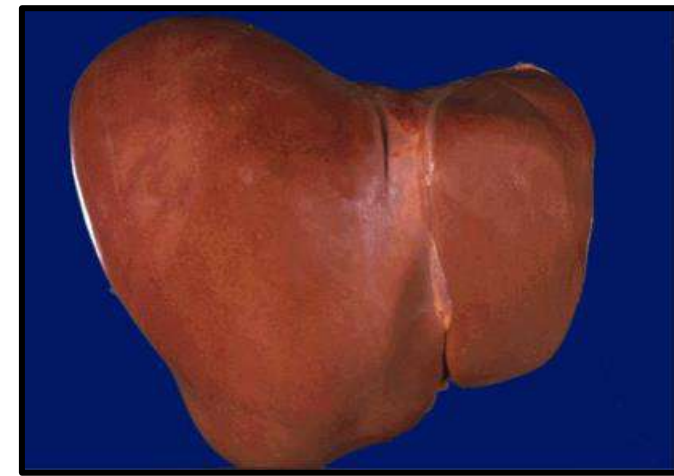
Liver disorders

Liver cirrhosis

- It is a progressive destruction of the liver tissue due to long-term liver disease.

Causes

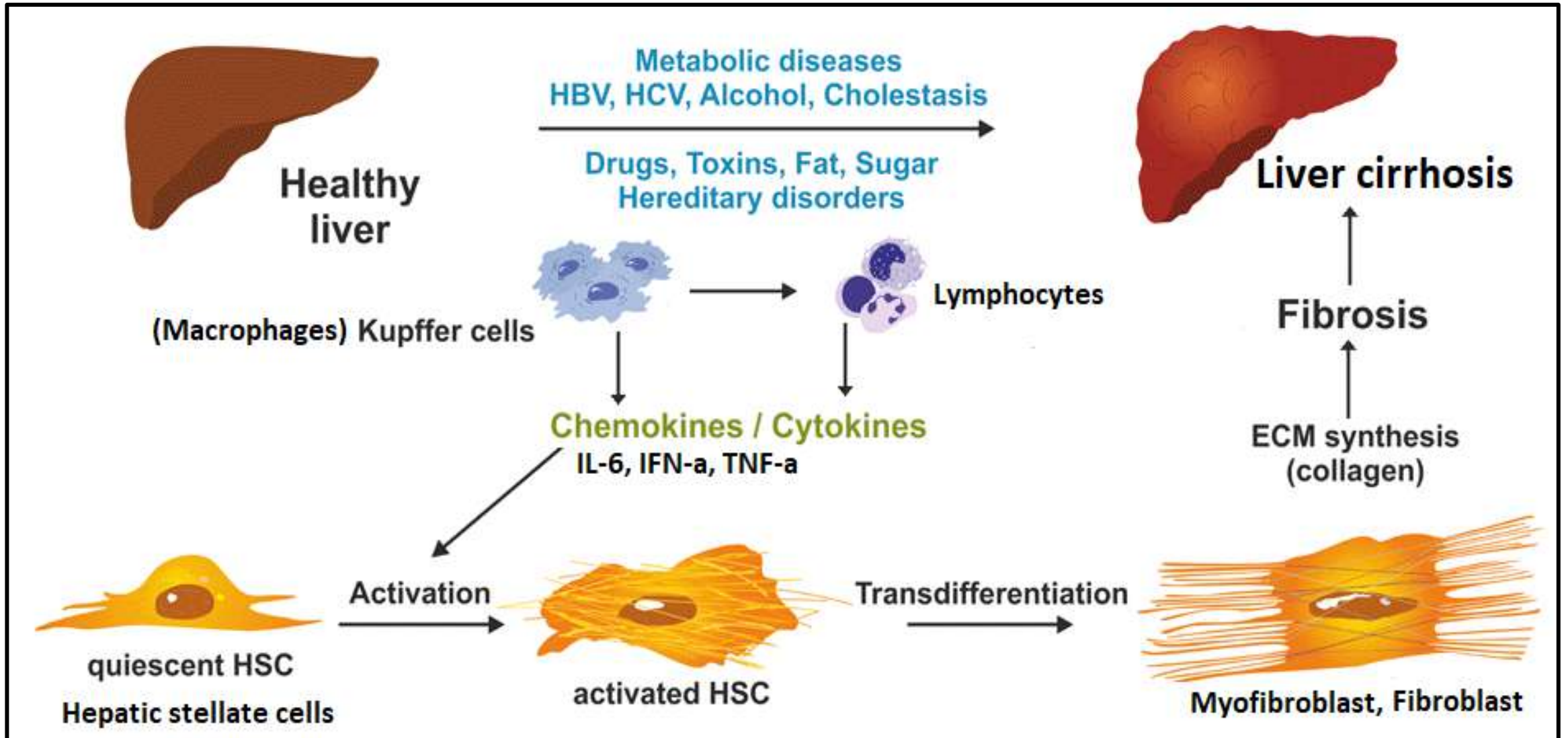
- The four general categories of cirrhosis based on the cause are:
 1. Alcoholic liver disease (portal or Laennec's cirrhosis)
 2. Biliary cirrhosis: stones or cystic fibrosis
 3. Postnecrotic cirrhosis: chronic inflammation, chronic hepatitis or long-term exposure to toxic materials
 4. Metabolic cirrhosis: storage disorders such as hemochromatosis (Ferroportin, transferrin), Wilson's disease



Liver cirrhosis

Liver disorders

Pathogenesis



Liver disorders

Liver cirrhosis

Pathological consequences

- **The pathophysiologic effects of cirrhosis evolve from two factors:**
 - **Loss of liver cell functions**
 - **Obstruction of bile ducts and blood flow by fibrous tissue**

Liver disorders

Liver cirrhosis

■ Symptoms

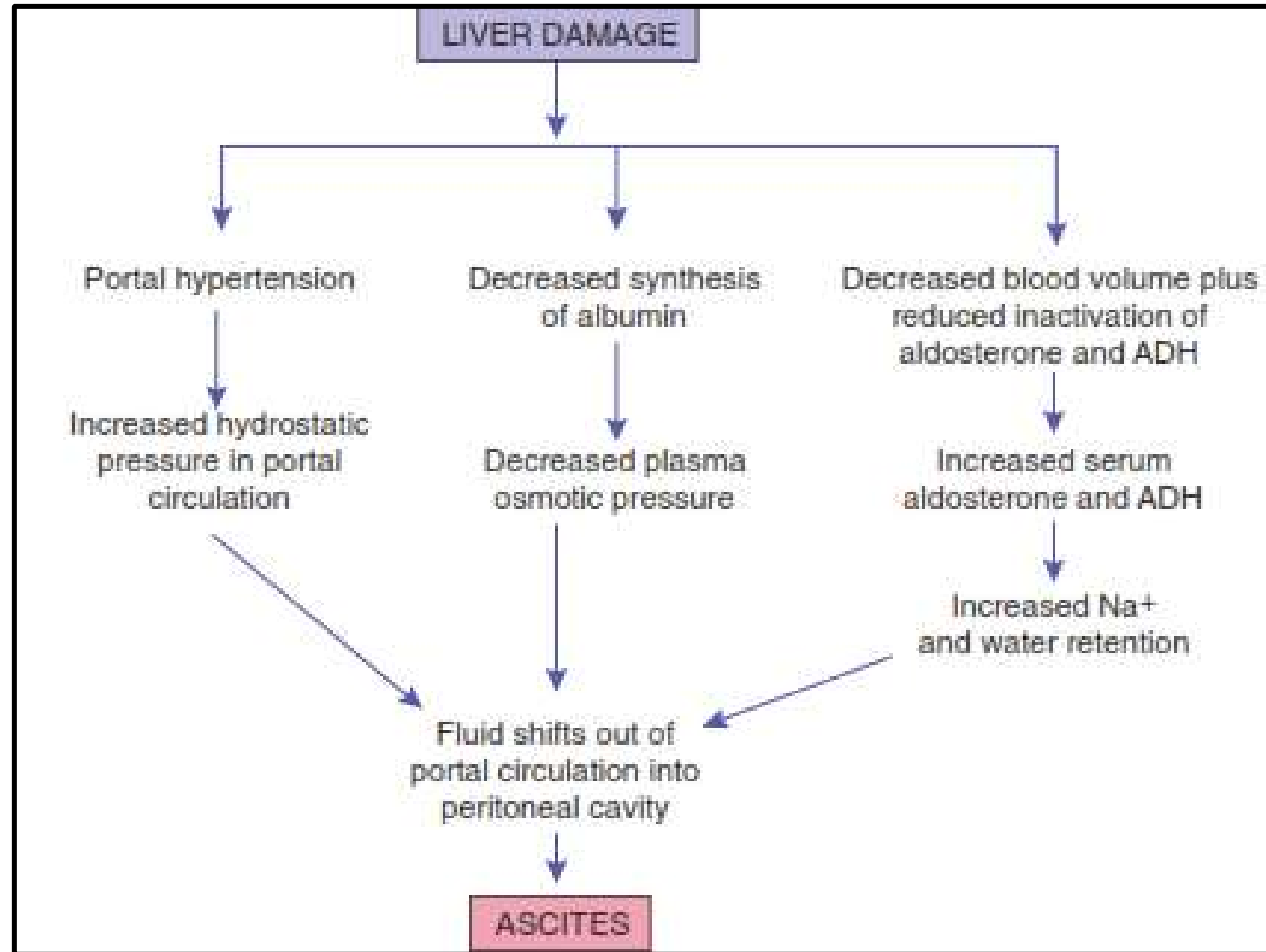
Signs or Symptoms	Pathophysiology
Fatigue, anorexia, indigestion, weight loss	Metabolic dysfunction in the liver, such as decreased gluconeogenesis; decreased bile for digestion and absorption; portal hypertension, leading to edema of intestinal wall and interfering with digestion and absorption
Ascites	Portal hypertension, elevated aldosterone and ADH levels, decreased serum albumin level, lymphatic obstruction in liver
General edema	Elevated aldosterone and ADH levels, decreased serum albumin level
Esophageal varices, hemorrhoids	Portal hypertension and collateral circulation
Splenomegaly	Portal hypertension
Anemia	Decreased absorption and storage of iron and vitamin B ₁₂ , malabsorption, splenomegaly, bleeding
Leukopenia, thrombocytopenia	Splenomegaly, possible bone marrow depression by ammonia and other toxins
Increased bleeding, purpura	Decreased absorption of vitamin K, decreased production of clotting factors by liver, thrombocytopenia
Hepatic encephalopathy, tremors, confusion, coma	Metabolic dysfunction with inability to remove ammonia from protein metabolism and other toxic substances
Gynecomastia, impotence, irregular menses	Impaired inactivation of sex hormones (e.g., estrogen) leads to imbalance
Jaundice	Impaired extraction and conjugation of bilirubin; decreased production of bile and obstruction of bile flow
Pruritus	Bile salts in the tissues resulting from biliary obstruction

Liver disorders

Liver cirrhosis

- Symptoms

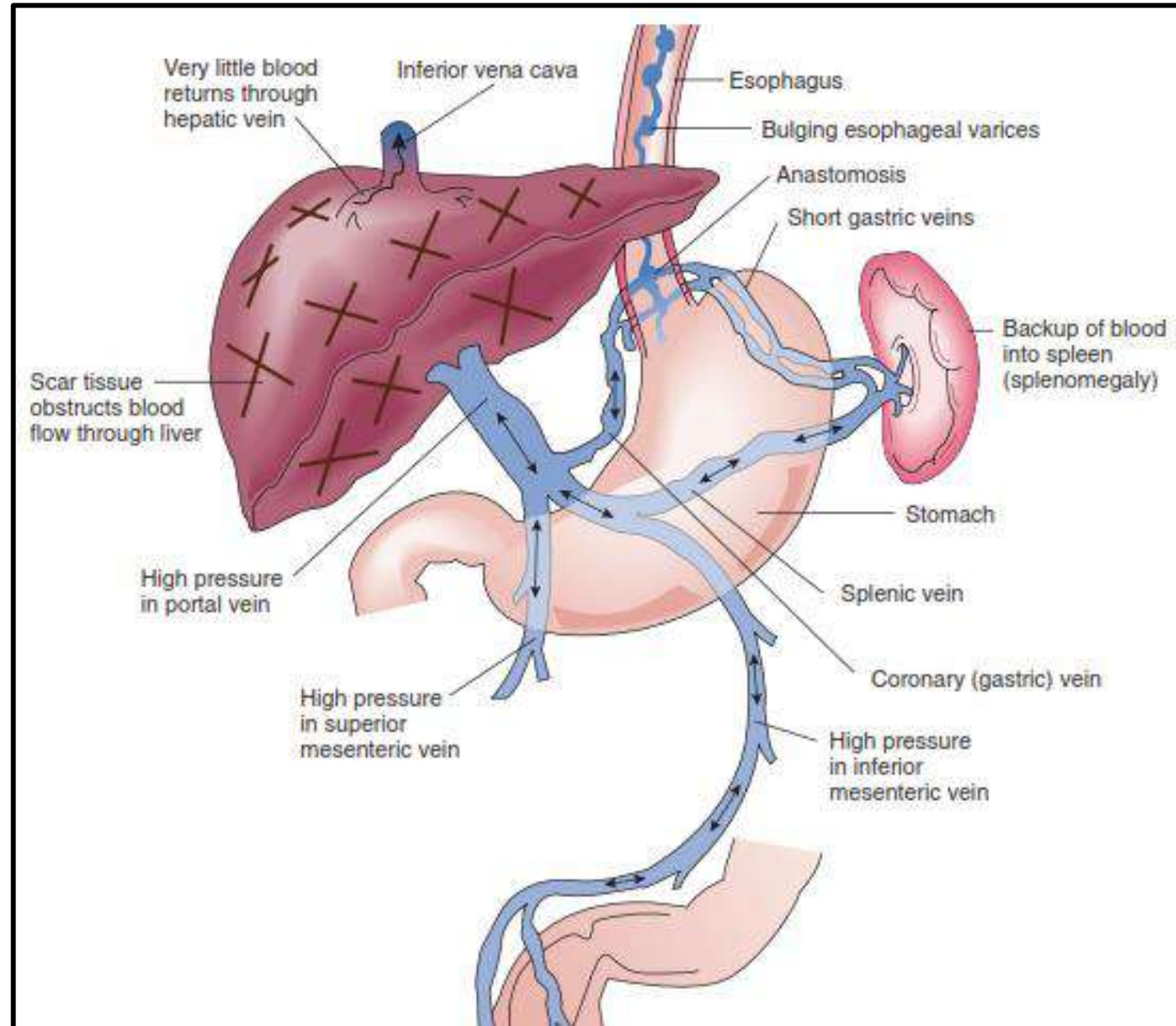
- Ascites



Liver disorders

Liver cirrhosis

- Symptoms
 - Esophageal varices



Liver disorders

Liver cirrhosis

Treatment

- Dietary restrictions include restrictions on protein and sodium intake.
- High carbohydrate intake and vitamins.
- Paracentesis to remove excess fluid.
- Albumin transfusion.
- Neomycin are useful to reduce intestinal flora and control serum ammonia levels.
- Liver transplantation

