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COURSE TITLE: GROSS ANATOMY OF THE THORAX AND ABDOMEN

1. Why do we have the portal vein or the liver receiving more blood from the vein than it receives from the artery?

2. Discuss five (5) disease conditions of the liver

In the hepatic portal system, the liver receives a dual blood supply from the hepatic portal vein and hepatic arteries. The hepatic portal vein carries venous blood drained from the spleen, gastrointestinal tract and its associated organs; it supplies approximately 75% of the liver’s blood. The hepatic arteries supply arterial blood to the liver and account for the remainder of its blood flow.

Oxygen is provided from both sources; approximately half of the liver’s oxygen demand is met by the hepatic portal vein, and half is met by the hepatic arteries. Blood flows through the liver tissue and empties into the central vein of each lobule. The central veins coalesce into hepatic veins that collect the blood leaving the liver and bring it to the heart.

A portal system is a venous structure that enables blood from one set of capillary beds to drain into another set of capillary beds, without first returning this blood to the heart. The majority of capillaries in the body drain directly into the heart, so portal systems are unusual.

The hepatic portal system connects the capillaries of the gastrointestinal tract with the capillaries in the liver. Nutrient-rich blood leaves the gastrointestinal tract and is first brought to the liver for processing before being sent to the heart. Here, carbohydrates and amino acids can be stored or used to make new proteins and carbohydrates.

DISEASE CONDITIONS OF THE LIVER

1. CIRRHOSIS

This is a condition in which the [liver](https://en.wikipedia.org/wiki/Liver) does not function properly due to long-term damage. It is also known as liver cirrhosis or hepatic cirrhosis. The damage is characterized by the replacement of normal liver [tissue](https://en.wikipedia.org/wiki/Tissue_%28biology%29) by [scar tissue](https://en.wikipedia.org/wiki/Fibrosis). Typically, the disease develops slowly over months or years. Early on, there are often no symptoms. As the disease worsens, a person may become [tired](https://en.wikipedia.org/wiki/Fatigue), [weak](https://en.wikipedia.org/wiki/Asthenia), [itchy](https://en.wikipedia.org/wiki/Pruritus), have [swelling in the lower legs](https://en.wikipedia.org/wiki/Pedal_edema), develop [yellow skin](https://en.wikipedia.org/wiki/Jaundice), bruise easily, have [fluid buildup in the abdomen](https://en.wikipedia.org/wiki/Ascites), or develop [spider-like blood vessels on the skin](https://en.wikipedia.org/wiki/Spider_angioma). The fluid build-up in the abdomen may become [spontaneously infected](https://en.wikipedia.org/wiki/Spontaneous_bacterial_peritonitis). Other serious complications include [hepatic encephalopathy](https://en.wikipedia.org/wiki/Hepatic_encephalopathy), bleeding from [dilated veins in the esophagus](https://en.wikipedia.org/wiki/Esophageal_varices) or [dilated stomach veins](https://en.wikipedia.org/wiki/Gastric_varices), and [liver cancer](https://en.wikipedia.org/wiki/Liver_cancer). Hepatic encephalopathy results in confusion and may lead to [unconsciousness](https://en.wikipedia.org/wiki/Unconsciousness). Cirrhosis is most commonly caused by [alcohol](https://en.wikipedia.org/wiki/Alcoholism), [hepatitis B](https://en.wikipedia.org/wiki/Hepatitis_B), [hepatitis C](https://en.wikipedia.org/wiki/Hepatitis_C), and [non-alcoholic fatty liver disease](https://en.wikipedia.org/wiki/Non-alcoholic_fatty_liver_disease).

Typically, more than two or three alcoholic drinks per day over a number of years is required for alcoholic cirrhosis to occur. Non-alcoholic fatty liver disease has a number of causes, including being [overweight](https://en.wikipedia.org/wiki/Overweight), [diabetes](https://en.wikipedia.org/wiki/Diabetes_mellitus), [high blood fats](https://en.wikipedia.org/wiki/Hyperlipidemia), and [high blood pressure](https://en.wikipedia.org/wiki/Hypertension). A number of less common causes of cirrhosis include [autoimmune hepatitis](https://en.wikipedia.org/wiki/Autoimmune_hepatitis), [primary biliary cholangitis](https://en.wikipedia.org/wiki/Primary_biliary_cholangitis), [hemochromatosis](https://en.wikipedia.org/wiki/Hemochromatosis), certain medications, and [gallstones](https://en.wikipedia.org/wiki/Gallstones). Diagnosis is based on blood testing, [medical imaging](https://en.wikipedia.org/wiki/Medical_imaging), and [liver biopsy](https://en.wikipedia.org/wiki/Liver_biopsy).

Some causes of cirrhosis, such as [hepatitis B](https://en.wikipedia.org/wiki/Hepatitis_B), can be prevented by [vaccination](https://en.wikipedia.org/wiki/Vaccination). Treatment partly depends on the underlying cause, but the goal is often to prevent worsening and complications. Avoiding alcohol is recommended in all cases of cirrhosis. Hepatitis B and C may be treatable with [antiviral medications](https://en.wikipedia.org/wiki/Antiviral_medication). Autoimmune hepatitis may be treated with [steroid medications](https://en.wikipedia.org/wiki/Corticosteroids). [Ursodiol](https://en.wikipedia.org/wiki/Ursodiol) may be useful if the disease is due to blockage of the [bile ducts](https://en.wikipedia.org/wiki/Bile_duct). Other medications may be useful for complications such as abdominal or leg swelling, [hepatic encephalopathy](https://en.wikipedia.org/wiki/Hepatic_encephalopathy), and dilated esophageal veins. In severe cirrhosis, a [liver transplant](https://en.wikipedia.org/wiki/Liver_transplant) may be an option.

1. HEPATITIS

Hepatitis is [inflammation](https://en.wikipedia.org/wiki/Inflammation) of the [liver tissue](https://en.wikipedia.org/wiki/Liver_parenchyma). Some people with hepatitis have no symptoms, whereas others develop yellow discoloration of the skin and whites of the eyes ([jaundice](https://en.wikipedia.org/wiki/Jaundice)), [poor appetite](https://en.wikipedia.org/wiki/Anorexia_%28symptom%29), [vomiting](https://en.wikipedia.org/wiki/Vomiting), [tiredness](https://en.wikipedia.org/wiki/Fatigue_%28medicine%29), [abdominal pain](https://en.wikipedia.org/wiki/Abdominal_pain), and [diarrhea](https://en.wikipedia.org/wiki/Diarrhea). Hepatitis is [acute](https://en.wikipedia.org/wiki/Acute_%28medicine%29) if it resolves within six months, and [chronic](https://en.wikipedia.org/wiki/Chronic_condition) if it lasts longer than six months. Acute hepatitis can [resolve on its own](https://en.wikipedia.org/wiki/Self-limiting_%28biology%29), progress to chronic hepatitis, or (rarely) result in [acute liver failure](https://en.wikipedia.org/wiki/Acute_liver_failure). Chronic hepatitis may progress to scarring of the liver ([cirrhosis](https://en.wikipedia.org/wiki/Cirrhosis)), [liver failure](https://en.wikipedia.org/wiki/Liver_failure), and [liver cancer](https://en.wikipedia.org/wiki/Liver_cancer).

Hepatitis is most commonly caused by the viruses [hepatitis A](https://en.wikipedia.org/wiki/Hepatitis_A), [B](https://en.wikipedia.org/wiki/Hepatitis_B), [C](https://en.wikipedia.org/wiki/Hepatitis_C), [D](https://en.wikipedia.org/wiki/Hepatitis_D), and [E](https://en.wikipedia.org/wiki/Hepatitis_E). Other causes include [heavy alcohol use](https://en.wikipedia.org/wiki/Alcoholism), certain medications, toxins, other infections, [autoimmune diseases](https://en.wikipedia.org/wiki/Autoimmune_diseases), and [non-alcoholic steatohepatitis](https://en.wikipedia.org/wiki/Non-alcoholic_steatohepatitis). Hepatitis A and E are mainly spread by contaminated food and water. Hepatitis B is mainly [sexually transmitted](https://en.wikipedia.org/wiki/Sexually_transmitted_infection), but may also be [passed from mother to baby](https://en.wikipedia.org/wiki/Vertically_transmitted_infection) during [pregnancy](https://en.wikipedia.org/wiki/Pregnancy) or [childbirth](https://en.wikipedia.org/wiki/Childbirth) and spread through infected [blood](https://en.wikipedia.org/wiki/Blood). Hepatitis C is commonly spread through infected blood such as may occur during [needle sharing](https://en.wikipedia.org/wiki/Needle_sharing) by [intravenous drug users](https://en.wikipedia.org/wiki/Drug_injection). Hepatitis D can only infect people already infected with hepatitis B.

 Hepatitis A, B, and D are [preventable](https://en.wikipedia.org/wiki/Vaccine-preventable_diseases) with [immunization](https://en.wikipedia.org/wiki/Immunization). Medications may be used to treat chronic viral hepatitis. Antiviral medications are recommended in all with chronic hepatitis C, except those with conditions that limit their life expectancy. There is no specific treatment for NASH; however, physical activity, a [healthy diet](https://en.wikipedia.org/wiki/Healthy_diet), and [weight loss](https://en.wikipedia.org/wiki/Weight_loss) are recommended. [Autoimmune hepatitis](https://en.wikipedia.org/wiki/Autoimmune_hepatitis) may be treated with [medications to suppress the immune system](https://en.wikipedia.org/wiki/Immunosuppressants). A [liver transplant](https://en.wikipedia.org/wiki/Liver_transplant) may be an option in both acute and chronic liver failure.

1. FATTY LIVER DISEASE

 Fatty liver disease (FLD), also known as hepatic steatosis, is a condition where excess [fat](https://en.wikipedia.org/wiki/Fat) builds up in the [liver](https://en.wikipedia.org/wiki/Liver). Often there are no or few symptoms. Occasionally there may be tiredness or pain in the upper right side of the [abdomen](https://en.wikipedia.org/wiki/Abdomen). Complications may include [cirrhosis](https://en.wikipedia.org/wiki/Cirrhosis), [liver cancer](https://en.wikipedia.org/wiki/Liver_cancer), and [esophageal varices](https://en.wikipedia.org/wiki/Esophageal_varices). There are two types of fatty liver disease: [non-alcoholic fatty liver disease](https://en.wikipedia.org/wiki/Non-alcoholic_fatty_liver_disease) (NAFLD) and [alcoholic liver disease](https://en.wikipedia.org/wiki/Alcoholic_liver_disease). NAFLD is made up of [simple fatty liver](https://en.wikipedia.org/wiki/Simple_fatty_liver) and [non-alcoholic steatohepatitis](https://en.wikipedia.org/wiki/Non-alcoholic_steatohepatitis) (NASH). The primary risks include [alcohol](https://en.wikipedia.org/wiki/Ethanol), [type 2 diabetes](https://en.wikipedia.org/wiki/Type_2_diabetes), and [obesity](https://en.wikipedia.org/wiki/Obesity). Other risk factors include certain medications such as [glucocorticoids](https://en.wikipedia.org/wiki/Glucocorticoid), and [hepatitis C](https://en.wikipedia.org/wiki/Hepatitis_C). It is unclear why some people with NAFLD develop simple fatty liver and others develop NASH. Diagnosis is based on the [medical history](https://en.wikipedia.org/wiki/Medical_history) supported by blood tests, [medical imaging](https://en.wikipedia.org/wiki/Medical_imaging), and occasionally [liver biopsy](https://en.wikipedia.org/wiki/Liver_biopsy). It is recommended that people with fatty liver disease do not drink alcohol. Treatment of NAFLD is generally otherwise by dietary changes and exercise to bring about [weight loss](https://en.wikipedia.org/wiki/Weight_loss). In those who are severely affected, [liver transplantation](https://en.wikipedia.org/wiki/Liver_transplantation) may be an option.

1. FIBROSIS

 Pulmonary fibrosis is a condition in which the [lungs](https://en.wikipedia.org/wiki/Lungs) become [scarred](https://en.wikipedia.org/wiki/Scar) over time. Symptoms include [shortness of breath](https://en.wikipedia.org/wiki/Shortness_of_breath), a dry cough, feeling tired, weight loss, and [nail clubbing](https://en.wikipedia.org/wiki/Nail_clubbing). Complications may include [pulmonary hypertension](https://en.wikipedia.org/wiki/Pulmonary_hypertension), [respiratory failure](https://en.wikipedia.org/wiki/Respiratory_failure), [pneumothorax](https://en.wikipedia.org/wiki/Pneumothorax), and [lung cancer](https://en.wikipedia.org/wiki/Lung_cancer). Causes include environmental pollution, certain medications, [connective tissue diseases](https://en.wikipedia.org/wiki/Connective_tissue_disease), infections, and [interstitial lung diseases](https://en.wikipedia.org/wiki/Interstitial_lung_disease). [Idiopathic pulmonary fibrosis](https://en.wikipedia.org/wiki/Idiopathic_pulmonary_fibrosis) (IPF), an interstitial lung disease of unknown cause, is most common. Diagnosis may be based on symptoms, [medical imaging](https://en.wikipedia.org/wiki/Medical_imaging), [lung biopsy](https://en.wikipedia.org/wiki/Lung_biopsy), and [lung function tests](https://en.wikipedia.org/wiki/Lung_function_tests). There is no known cure.

 Treatment is directed towards efforts to improve symptoms and may include [oxygen therapy](https://en.wikipedia.org/wiki/Oxygen_therapy) and [pulmonary rehabilitation](https://en.wikipedia.org/wiki/Pulmonary_rehabilitation). Certain medications may be used to try to slow the worsening of scarring. [Lung transplantation](https://en.wikipedia.org/wiki/Lung_transplantation) may occasionally be an option. At least 5 million people are affected globally. Life expectancy is generally less than five years. Pulmonary fibrosis may be a secondary effect of other diseases. Most of these are classified as [interstitial lung diseases](https://en.wikipedia.org/wiki/Interstitial_lung_disease). Examples include [autoimmune disorders](https://en.wikipedia.org/wiki/Autoimmune_disorders), viral infections and bacterial infection like [tuberculosis](https://en.wikipedia.org/wiki/Tuberculosis) which may cause fibrotic changes in both lung's upper or lower lobes and other microscopic injuries to the lung. However, pulmonary fibrosis can also appear without any known cause.

1. CHOLANGITIS

Ascending cholangitis, also known as acute cholangitis or simply cholangitis, is [inflammation](https://en.wikipedia.org/wiki/Inflammation) of the [bile duct](https://en.wikipedia.org/wiki/Bile_duct) (cholangitis), usually caused by [bacteria](https://en.wikipedia.org/wiki/Bacteria) ascending from [its junction](https://en.wikipedia.org/wiki/Ampulla_of_Vater) with the [duodenum](https://en.wikipedia.org/wiki/Duodenum) (first part of the [small intestine](https://en.wikipedia.org/wiki/Small_intestine)). It tends to occur if the bile duct is already partially obstructed by [gallstones](https://en.wikipedia.org/wiki/Gallstone).Cholangitis can be life-threatening, and is regarded as a [medical emergency](https://en.wikipedia.org/wiki/Medical_emergency). Characteristic symptoms include [yellow discoloration of the skin or whites of the eyes](https://en.wikipedia.org/wiki/Jaundice), [fever](https://en.wikipedia.org/wiki/Fever), [abdominal pain](https://en.wikipedia.org/wiki/Abdominal_pain), and in severe cases, [low blood pressure](https://en.wikipedia.org/wiki/Hypotension) and [confusion](https://en.wikipedia.org/wiki/Mental_confusion). Initial treatment is with [intravenous fluids](https://en.wikipedia.org/wiki/Intravenous_fluid) and [antibiotics](https://en.wikipedia.org/wiki/Antibiotic), but there is often an underlying problem (such as gallstones or [narrowing](https://en.wikipedia.org/wiki/Stenosis) in the bile duct) for which further tests and treatments may be necessary, usually in the form of [endoscopy](https://en.wikipedia.org/wiki/Endoscopy) to relieve obstruction of the bile duct.

A person with cholangitis may complain of [abdominal pain](https://en.wikipedia.org/wiki/Abdominal_pain) (particularly in the [right upper quadrant](https://en.wikipedia.org/wiki/Right_upper_quadrant_%28abdomen%29) of the [abdomen](https://en.wikipedia.org/wiki/Human_abdomen)), [fever](https://en.wikipedia.org/wiki/Fever), [rigors](https://en.wikipedia.org/wiki/Rigor_%28medicine%29) (uncontrollable shaking) and a feeling of uneasiness ([malaise](https://en.wikipedia.org/wiki/Malaise)). Some may report [jaundice](https://en.wikipedia.org/wiki/Jaundice) (yellow discoloration of the skin and the whites of the eyes). [Physical examination](https://en.wikipedia.org/wiki/Physical_examination) findings typically include jaundice and right upper quadrant tenderness. [Charcot's triad](https://en.wikipedia.org/wiki/Charcot%27s_cholangitis_triad) is a set of three common findings in cholangitis: abdominal pain, jaundice, and fever.

Bile duct obstruction, which is usually present in acute cholangitis, is generally due to [gallstones](https://en.wikipedia.org/wiki/Gallstone). 10–30% of cases, however, are due to other causes such as [benign](https://en.wikipedia.org/wiki/Benign) stricturing (narrowing of the bile duct without an underlying tumor), postoperative damage or an altered structure of the bile ducts such as narrowing at the site of an [anastomosis](https://en.wikipedia.org/wiki/Anastomosis) (surgical connection), various tumors ([cancer of the bile duct](https://en.wikipedia.org/wiki/Cholangiocarcinoma), [gallbladder cancer](https://en.wikipedia.org/wiki/Gallbladder_cancer), cancer of the [ampulla of Vater](https://en.wikipedia.org/wiki/Ampulla_of_Vater), [pancreatic cancer](https://en.wikipedia.org/wiki/Pancreatic_cancer), [cancer of the duodenum](https://en.wikipedia.org/wiki/Small_intestine_cancer)), [anaerobic organisms](https://en.wikipedia.org/wiki/Anaerobic_organism) such as [Clostridium](https://en.wikipedia.org/wiki/Clostridium) and [Bacteroides](https://en.wikipedia.org/wiki/Bacteroides)