

PROJECT PRAKASH

KEY LEARNING POINTS

Training: Hepatitis Induction Program

Topic: Anatomy & Physiology of Liver

Faculty: Ms. Sarita Ahwal, Lecturer, CON, ILBS

Period: 2021 - 2022

Attendees: In-Service Nurses

✚ **The Liver** is a wedge shaped dark reddish-brown organ and a largest gland in the body. It weighs around ~1.5 Kgs.

✚ **Clinical Examination of Liver**

- The upper border of the liver is defined by percussing down the 2nd ICS in MCL until dullness is encountered.
- Lower border is defined by percussing up at Rt. Iliac Fossa in MCL until dullness is encountered or palpating to feel the lower edge.
- Measure the distance between two identified borders.
- Examination of the liver should note the consistency, contour, tenderness, and presence of any masses or bruits. In normal patients, the edge of the liver may be palpable just below the costal margin. It is **soft and smooth and may be slightly tender**.

✚ **The hepatic lobule** is a building block of the liver tissue, consisting of a portal triad, hepatocytes arranged in linear cords between a capillary network, and a central vein which consists of 1,000 small lobules. Each lobule is made up of numerous liver cells, called hepatocytes, that line up in radiating rows. Between each row are sinusoids. These small blood vessels diffuse oxygen and nutrients through their capillary walls into the liver cells.

Types of Liver Cells

Cell type	Other names	Functions
Hepatocytes (HCs) ~60% to 80%	Liver cells	Major functions: lipid metabolism, drug metabolism, and the secretion of coagulation and complement factors.
Cholangiocytes ~3% to 10%	Biliary epithelial cells	Line the bile duct, secretion.
Kupffer Cells (KCs) ~2% to 5%	Browicz-Kuffer cells	Phagocytosis of pathogens, old RBCs.
Hepatic Stellate Cells (HSCs)	Ito cells, Vitamin A storing cells, lipocytes	Vitamin A and lipid storage, production of myofibroblasts.
Liver Sinusoidal Endothelial Cells (LSECs)	human hepatic sinusoidal endothelial cells (HSECs)	line sinusoids, physiological and immunological functions.
Stem cells	Progenitor cells, oval cells	Liver regeneration.

✚ **Stages of Liver Damage**

Healthy Liver ➡ Fatty Liver ➡ Fibrosis Liver ➡ Liver Cirrhosis ➡ Liver Cancer

✚ Regeneration of Liver

- Liver has a unique property to regenerate.
- A variety of cytokines (such as interleukin-6 and tumor necrosis factor- α), growth factors (like hepatocyte growth factor and transforming growth factor- α) and cells are involved in liver regeneration.

Liver Enzymes

Liver enzymes	Normal range	Present in	Clinical implications
Alanine Aminotransferase (ALT/SGPT)	0-45 IU/l	Liver (hepatocytes)	Increased with liver damage (more liver specific)
Aspartate Aminotransferase (AST/SGOT)	0-35 IU/l	Liver, heart, skeletal muscles, Kidneys, brain etc	Increased in liver or heart diseases
Alkaline Phosphatase (ALP)	30-120 IU/l	Liver (biliary canaliculi surface), bone, placenta	Increased in biliary obstruction, bone injury
Gamma-Glutamyl-Transpeptidase (GGT)	0-30 IU/l	Biliary canaliculi	Increased in biliary obstruction

✚ Impaired Liver Function

- Loss of proteins, clotting factors, impaired clearance of drugs.
- Increased liver enzymes, ammonia, bilirubin.

✚ The liver is a central organ for homeostasis and carries out a wide variety of functions, including metabolism, glycogen storage, drug detoxification, production of various serum proteins, and bile secretion.

✚ Most of those liver functions are carried out by hepatocytes.
