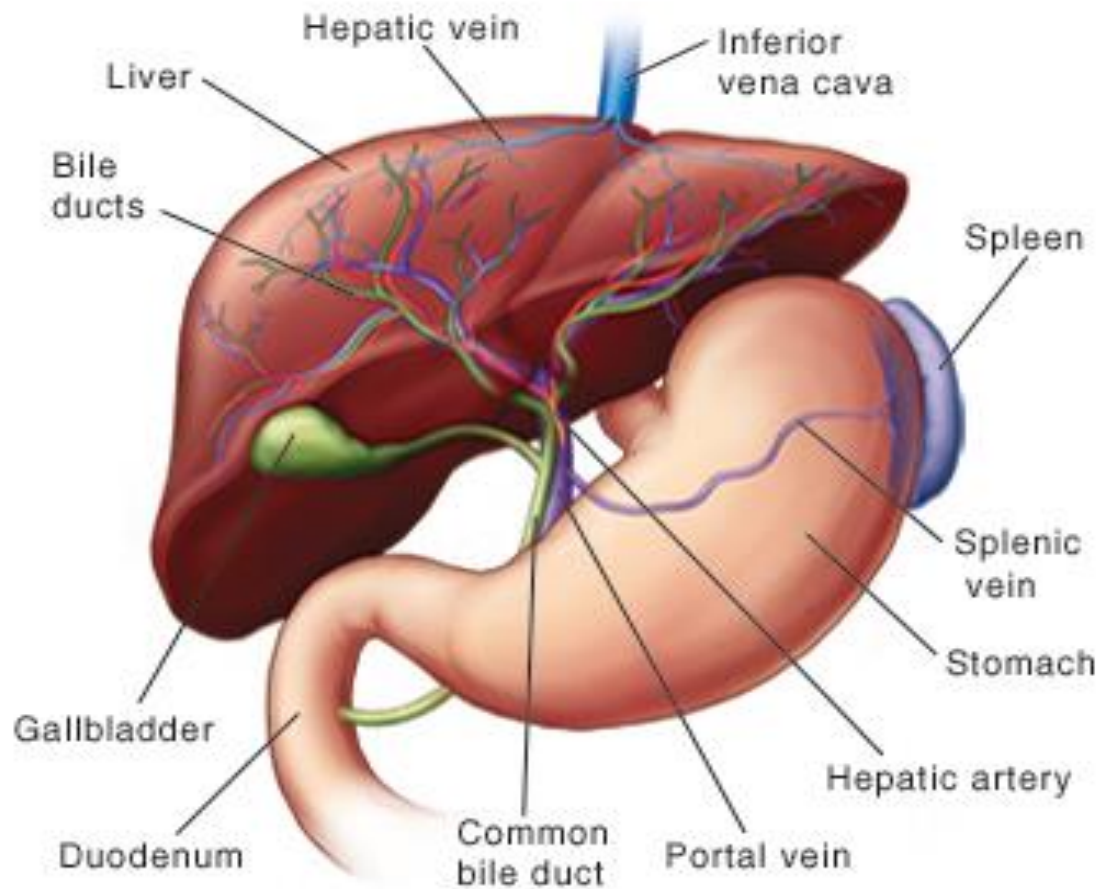


LIVER FUNCTION TESTS

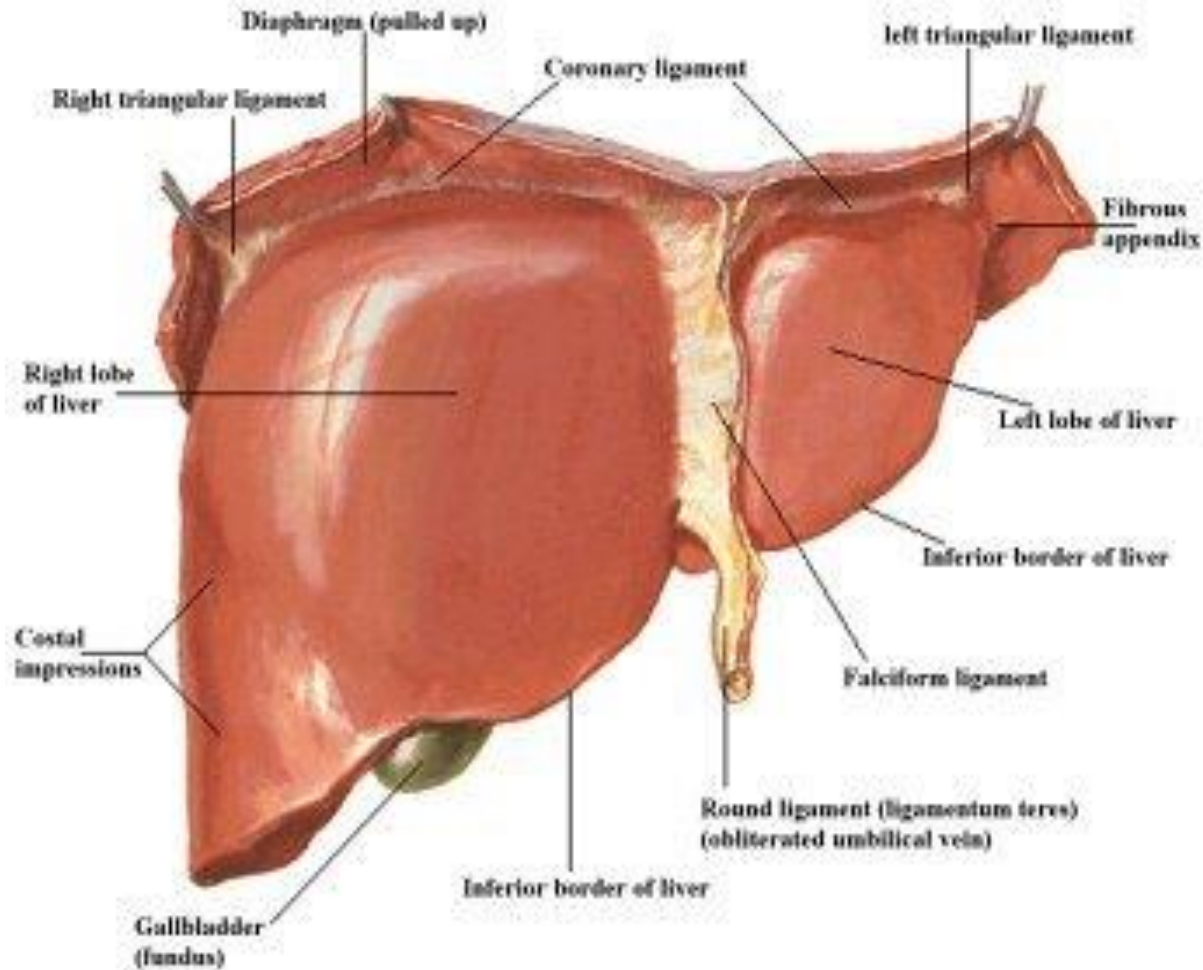
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HEPATOBIILIARY SYSTEM



<https://www.uncnri.org/index.php/dr-karen-corbin-shares-her-work-on-non-alcoholic-fatty-liver-disease/>

LIVER - ANATOMY



<https://kitsuneosteopath.wordpress.com/2011/11/08/visceral-liver/>

LIVER - INTRODUCTION

- Largest gland in the body
- Performs a diverse spectrum of functions.
- ~ 2.5% body weight.
- The two principle lobes (R & L) separated by falciform ligament.
- **Location:**
 1. Right hypochondrium
 2. Epigastrium
- Mostly covered by ribs.

LIVER FUNCTION TESTS (LFTs)

- **AIM:**
- To understand the metabolic functions of the liver.
- To study and diagnosis liver dysfunction and biliary tract diseases.
- To diagnosis the specific liver disorder such as:
 - Liver inflammation
 - Liver injury due to drugs, alcohol, toxins, viruses
 - Liver malfunction due to blockage of bile flow
 - Liver cancer, etc.,
- To distinguish different types of liver diseases.
- To follow the response to treatment.

FUNCTIONS OF LIVER

- The liver performs more than 300 vital functions. Some of the well-known functions are listed below:

Excretory Functions:

Bile pigments, Bile salts are excreted in bile

Secretory

Functions:

Bile formation

Synthetic Functions:

Plasma proteins, Clotting factors like V, VII and Fibrinogen

Metabolic Functions:

Carbohydrate metabolism

Protein metabolism

Fat metabolism etc.

Storage Functions:

Glycogen, Vitamin, Iron, etc.,

Detoxification

Function:

Ammonia to Urea

Drug Metabolism:

CLASSIFICATION OF LFTs

Classified according to the specific functions of the liver:

1. Tests based on abnormalities of bile pigment metabolism (Excretory function):

- Serum bilirubin (Conjugated and Unconjugated)
- Urine bilirubin
- Urine and faecal urobilinogen
- Urine bile salts

2. Tests based on synthetic functions:

- Serum total proteins, albumin concentration and A/G ratio
- Prothrombin time and index

CLASSIFICATION OF LFTs

3. Tests based on metabolic functions:

- **Carbohydrate metabolism:**

- Galactose tolerance test
- Fructose tolerance test

- **Lipid metabolism**

- Serum cholesterol and ester cholesterol and their ratio
- Determination of faecal fats

- **Protein metabolism**

- Serum total protein and aminoaciduria

CLASSIFICATION OF LFTs

4. Determination of serum enzyme activities:

- Serum hepatic markers: AST (SGOT), ALT (SGPT), GGT and ALP

5. Excretion of exogenous substances by the liver (Excretory function):

- Bromsulphthalein test (BSP retention test)
- I_{131} -Rose Bengal test

6. Tests based on detoxification function of the liver:

- Hippuric acid synthesis test

CLASSIFICATION OF LFTs

7. Tests based on amino acid catabolism:

- Determination of blood ammonia level

8. Tests based on drug metabolism:

- MEGX test
- Antipyrine breath test

LFTs - ROUTINE IN CLINICAL PRACTICE

1

- Serum Total Bilirubin [Conjugated (CB) + Unconjugated Bilirubin (UCB)]
Normal level: 0.3 -1.2 mg/dl
- Van den Berg Reaction - **Direct Positive (CB): Normal level < 0.2 mg/dl**
Indirect Positive (UCB): Normal level < 0.9 mg/dl

2

- Serum total Protein, Albumin concentration and A/G ratio
Normal values:
Total Protein: **6.5 to 8.2 g/dl**
Albumin: **3.5 to 5.2 g/dl**
Albumin/Globulin (A/G) ratio : **0.9 to 2.0**

3

- Prothrombin time: **Normal value: 12 to 16 s**

LFTs – SERUM HEPATIC MARKER ENZYMES

4

- Aspartate aminotransferase (AST/SGOT) activity

Normal Value: **Male: 0 – 37 IU/L**
Female: 0 – 31 IU/L

5

- Alanine aminotransferase (ALT/SGPT) activity

Normal Value: **Male: 13 – 40 IU/L**
Female: 10 – 28 IU/L

6

- Gamma Glutamyl transferase (γ -GT) activity

Normal Value: **Male: 0 – 55 IU/L**
Female: 0 – 38 IU/L

7

- Alkaline phosphatase (ALP) activity

Normal Value: **Male: 53 – 128 IU/L**
Female: 42 – 98 IU/L

SERUM HEPATIC MARKERS – LIVER DISEASES

- Measurement of transaminases (ALT & AST) are useful for the diagnosis of liver diseases.

Alanine aminotransferase (ALT) activity:

- Very high values (100 to 1000 IU/L) is specific for acute hepatitis either toxic or viral in origin.
- Moderately increased (25 to 100 IU/L) in chronic liver disease such as cirrhosis, and malignancy in liver.

Aspartate aminotransferase (AST) activity:

- Moderately elevated in liver diseases.
- Normal Ratio (AST/ALT): 1.33 ± 0.42

SERUM HEPATIC MARKERS – LIVER DISEASES

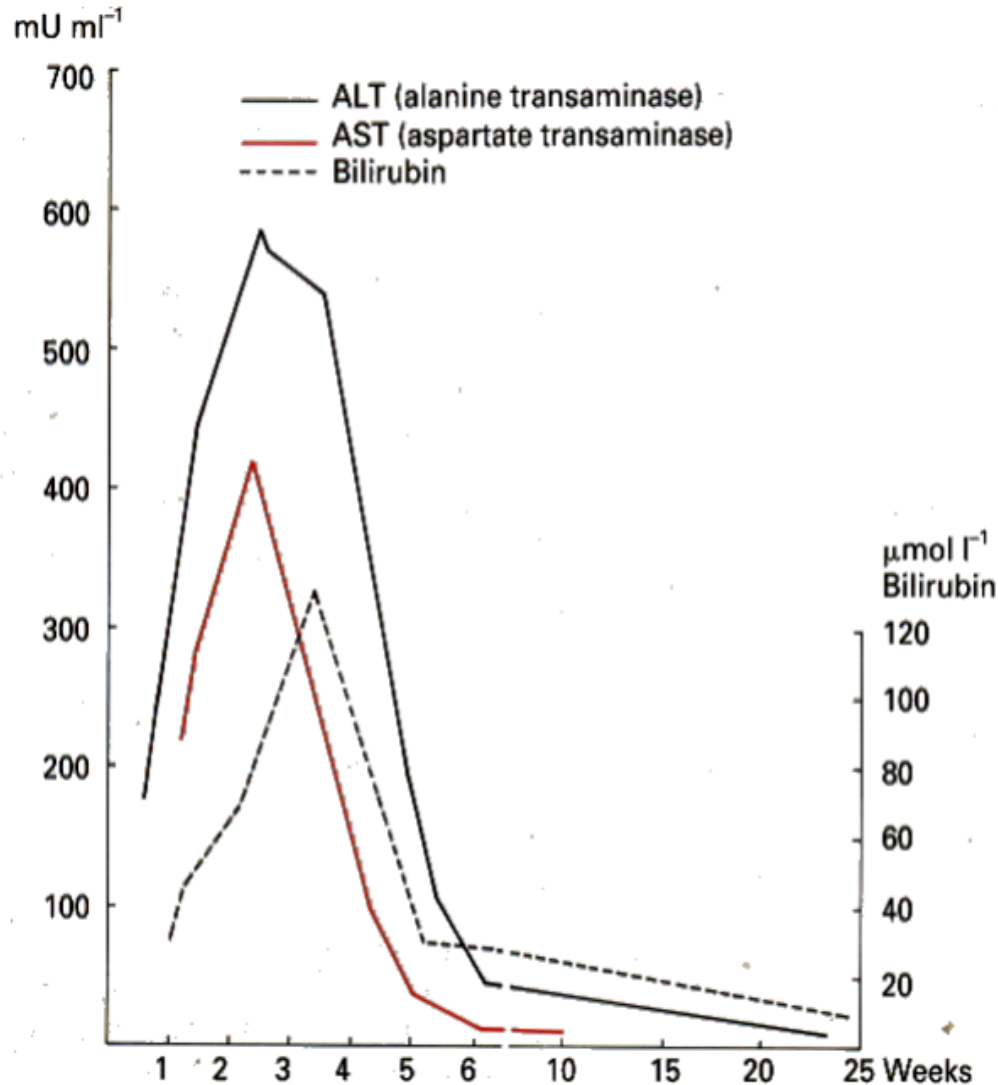
Gamma Glutamyl transferase (γ -GT) activity:

- γ -GT is used as a marker of alcohol induced liver disease and in liver cirrhosis.
- γ -GT increased in liver cirrhosis especially in **obstructive jaundice** and **neoplasm's of liver**.
- Also, moderately increased in **infective hepatitis**.

Alkaline Phosphatase (ALP) activity:

- High levels of ALP is an indicative of extrahepatic obstruction rather than intrahepatic obstruction.
- In hepatobiliary obstruction, hepatocytes lining the biliary ducts induces the ALP synthesis.

LABORATORY DIAGNOSIS OF LIVER DAMAGE



In liver disease:

- Both ALT and AST are increased, but ALT > AST.

In viral hepatitis:

- Rapid rise in serum transaminases (AST & ALT) occurs even before bilirubin raise is seen.