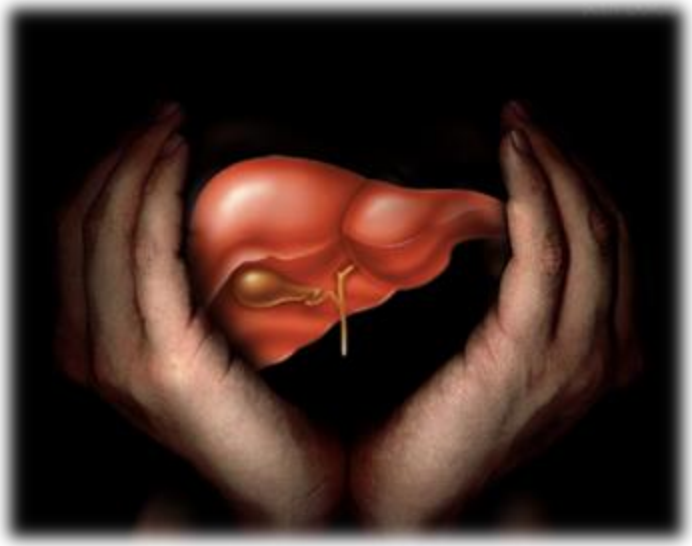
Liver Function Tests

Functions of liver:

Versatile organ involved in metabolism and independently involved in various biochemical functions.



1.Metabolic functions:

1. Key site of metabolism of carbohydrates, proteins and lipids
2. Ammonia is converted to Urea
3. Cholesterol synthesis and catabolised to form bile salts and bile acids
4. Esterification of cholesterol
5. Conversion of monosaccharides to Glucose
6. Catabolism and Anabolism of Nucleic acids

2.Secretory functions

1. Formation and secretion of bile in the intestine
2. Conjugation of free Bilirubin

3. Excretory functions: certain dyes

4. Synthesis of certain Blood coagulation factors

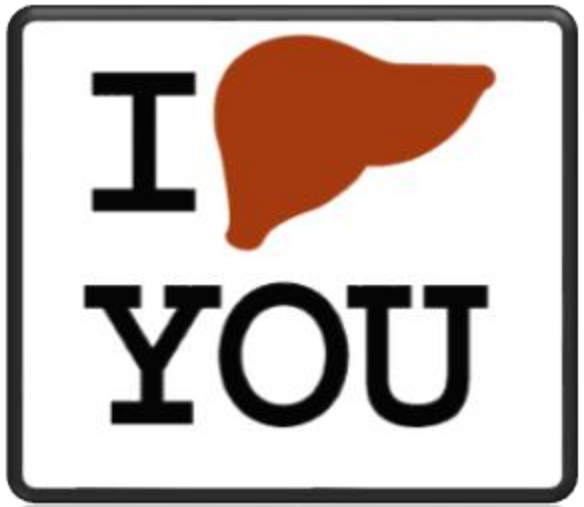
- Preprothrombin to prothrombin
- Factor V, VII , X , fibrinogen

5.Synthesis of specific proteins

- Albumin
- To some extend α and β Globulin

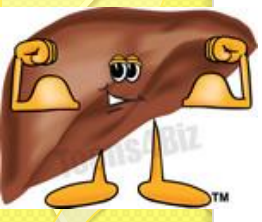
6.Detoxification and protective function:

- Drugs, Hormones



7.Storage :

- Glycogen
- Vitamin B12, vitamin A



Liver function tests:

1. Test based on excretory functions:

- **Serum Bilirubin :**
- Estimated by Van Den Berg test
- Van Den berg Reagent= diazotized Sulphanilic Acid
- When mixed with serum/ plasma reacts with Bilirubin to form a purple colored complex (Azobilirubin)
- This color can be estimated to know the concentration of Bilirubin

- Conjugated Bilirubin is water soluble
- Reacts with VDB reagent immediately to form the purple colour
- Called Direct VDB test

- Conjugated Bilirubin= direct bilirubin

- Unconjugated bilirubin will ans test when alcohol is added. This is called indirect reaction.

- When both present, the reaction is Biphasic
- When serum is mixed with reagent, purple color is formed immediately.
- Color intensifies on adding alcohol

- Total Bilirubin = direct+ indirect

Urine:

1.Bile salts:

- Na or k salts of bile acids
- Absent in hemolytic jaundice, called Acholuric Jaundice
- Detected by Hay's test

- + in urine on obstructive Jaundice and Obstructive phase of hepatic Jaundice

2.Bile pigments(Bilirubin)

- Conjugated Bilirubin if present can be excreted through urine
- Detected by fouchet's test

- Bile pigments are present in urine in obstructive Jaundice and Obstructive phase of hepatic Jaundice

3.Urine Urobilinogen(UBG):

- Normal constituent of urine
- Produced from Bilirubin in the intestine, reabsorbed and excreted through urine
- When there is obstruction to bile flow into the intestine, UBG is not produced

- So, absent in obstructive Jaundice and Obstructive phase of hepatic Jaundice
- Increased in Hemolytic Jaundice

II. Test based on metabolism:

1. Plasma ammonia:

- Conversion of ammonia to urea is decreased in liver function
- Normal level =< 50µg/dl

- Increased in liver Cirrhosis

2. Galactose Tolerance test:

- Galactose selectively metabolized in liver

III. Test based on synthetic functions:

1. Serum Albumin:

- Almost all plasma proteins are synthesized in liver except Globulin
- ½ life of albumin = 20 days

S .Albumin is decreased in chronic liver disease

Normal serum level:

- Total protein= 6-8 g/dl
- Albumin = 3.5-5 g/dl
- Globulin = 2.5-5 g/dl
- A/G ratio = 1.2: 1 to 1.5: 1

- In chronic liver disease, albumin is decreased with compensatory increase in Globulin synthesis

- This causes reversal of A/G ratio

2. Prothrombin time:

- Synthesized in liver
- ½ life =6 hrs
- Level decreased in acute liver disease
- PT prolonged in acute liver failure and also in VIT K deficiency
- Other proteins: Haptoglobulin , Transferrin, have short ½ life
- Decreased in acute liver disease

IV. Test based on liver enzymes:

1. Markers of Hepatocellular Damage:

a.) ALT (SGPT):

- Elevated in all liver diseases
- Normal level= 10-35 IU/L
- Acute Hepatitis >1000 IU/L

b.) AST(SGOT):

- Elevated in all liver diseases
- Not specific for liver
- Normal level= 8-20 IU/L

Moderate elevation 100-300:

- Alcoholic hepatitis
- Auto Immune Hepatitis
- Wilson's Disease

Mild upto 100:

- Fatty liver
- Chronic viral Hepatitis

2.Markers of obstructive liver Disease:

a) ALP:

- Normal level = 40-125 IU/L
- Not specific for liver disease
- Mild elevation in hepatic cell damage

b) GGT:

- Normal level = 10-30 IU/L
- Alcoholic liver disease
- Intra hepatic Cholestasis

c) NTP:

- Normal level = 2- 10 IU/L
- Increased in obstructive liver disease


Thank you!!