LIVER FUNCTION TEST

Introduction:

The liver plays several important roles in our body. The two most important functions of the liver are its *synthetic function* and *excretory function*.

Syntetic function of liver: The liver synthesizes two proteins – **Albumin** and **Prothombin** (Clotting factor-II) and also **lipids**.

Excretory functions: The liver excretes **bilirubin** (both unconjugated and conjugated) through urine and faeces.

The liver cells (hepatocytes) have several enzymes –

Transaminases: (also known as aminotransferase**)**

ALT - Alanine transaminase (SGPT) present in the hepatocyte Cytoplasm

AST - Aspartate aminotransferase (SGOT) present in the hepatocyte Cytoplasm and mitochondria

Other enzymes:

AP - Alkaline phosphatase present in the small channels (canaliculi) between adjacent hepatocytes where bile is secreted from the liver.

GGT - Gamma glutamyl transpeptidase present in the canaliculi

LDH - Lactate dehydrogenase present in the hepatocyte mitochondria

Clinical significance of Liver function tests:

- To ascertain the cause of jaundice like Pre hepatic jaundice due to haemolytic disorders, Hepatic jaundice due to liver cell dysfunction, Post hepatic jaundice due to blockage in the bile duct due to stone.
- Screen liver infections, such as viral hepatitis and cirrhosis of liver
- Monitor the progression of a disease, such as viral or alcoholic hepatitis and determine how well a treatment is working.
- Monitor possible side effects of medications
- To monitor liver function in patients who have diabetes, hypertension, anemia, gall bladder disease, before operating for gall bladder stones.

Common tests of Liver function test profile:

1) **Serum Bilirubin**: both conjugated and unconjugated.
2) **Total serum proteins and albumin**.
3) **Liver enzymes**: Transaminases: AST (SGOT), ALT (SGPT). Others: ALP, GGT, LDH.
4) **Prothrombin time** (PT INR) [Prothombin time International normalized ratio]

Preparation for the test: The LFT is a blood test which requires 10-12 hours fasting before the blood is collected from the vein of the patient.

Normal ranges of LFT test profiles:

ALT : 5 to 33 units per liter (U/L)

AST : 15 to 37 U/L

ALP : 46 to 116 U/L

Albumin: 3.5 to 5.0 grams per deciliter (g/dL)

Total protein: 5.0 to 8.5 g/dL

Bilirubin: 0.1 to 1.2 milligrams per deciliter (mg/dL)

Unconjugated Bilirubin: 0.1 to 0.6 mg/dl

Conjugated bilirubin: 0.1 to 0.4 mg/dl

GGT: 8 to 61 U/L

LD: 122 TO 222 U/L

PT: 9.4 to 13.5 seconds (**PT INR**: 0.8 to 1,2)

The following is the method to calculate INR:

$$INR = \left(\frac{\text{PT test sample}}{\text{PT control}}\right)^{ISI}$$

A ratio of 0.8 to 1.2 is considered normal for patients not on warfarin. For individuals on warfarin for any disorder an INR of 2.0 to 3.0 is the target.

The prothrombin time differs in accordance to the analytical method used. Hence to compensate for this International normalized ratio (INR) is used. In this the manufacturers of the kit assign an *International sensitivity index* (ISI) value. This shows the amount of tissue factor present in the kit as against an internationally accepted standard. The ISI value is generally 1 to 2.

INR interpretation:

- INR < 1.1: Healthy range for patients not on anticoagulation medication;

- INR 1.1 - 1.9: Elevated INR level, further investigations required;

- INR 2.0 – 3.0: INR therapeutic level for patients treated with anticoagulation medication;

- INR >3.0: Elevated INR level with increased risk of bleeding.