

. Kidneys function tests

Many conditions can affect the ability of the kidneys to carry out their vital functions . Some lead to a rapid (acute) failure in kidney function; others lead to a gradual (chronic) failure in function. Both result in a build-up of toxic waste substances in the blood.

Blood test of kidney function

The usual blood test which checks that the kidneys are working properly measures the level of:-

1) Urea

*Is a waste product formed from the breakdown of proteins.

*Urea is usually passed out in the urine.

N.V : 14-44 mg/100ml [3.5 -7 mmol/L]

*Hyper uremia caused by

(chronic nephritis, obstruction of urinary tract)

*Hypo uremia (liver diseases & Starvation)

2) Creatinine

* Is a waste product made by the muscles.

* Creatinine is usually a more accurate marker (specific test) of kidney function than urea.

* Creatinine should be 0.8–1.2 mg/100 ml for males
 And 0.6–0.9 mg/100 ml for females

*Clinical sig. kidney failure, Obstruction of urinary tract.

2) Creatinine Clearance Test:

- ☐ This test evaluates how efficiently the kidneys clear creatinine from the blood.
- ☐ Creatinine a waste product of muscle energy metabolism.
- ☐ the body does not recycle it, all creatinine filtered by the kidneys in a given amount of time is excreted in the urine, making creatinine clearance a very specific measurement of kidney function.

The Function of Liver

- Liver is largest and most complex internal organ
- All blood flow from intestine and pancreas reaches liver via portal venous system
- Liver is a multifunctional organ that is involved in diverse body functions.

1. Metabolic Functions

Liver actively participates in carbohydrate metabolism, lipid, protein, mineral and vitamin metabolisms.

2. Excretory Functions

Bile pigments, bile salts and cholesterol are excreted in bile into intestine.

Test to assess liver function

- Liver function tests (LFT) are helpful to detect the abnormalities and extent of liver damage.
- LFT assays are frequently more sensitive than clinical signs and symptoms.
- Typically the LFT comprises of:
 - Total protein
 - Albumin and globulin
 - (Prothrombin Time)
 - Transaminases – AST & ALT
 - Alkaline phosphatase
 - Bilirubin

Total protein

- Not a very useful measure, non-specific; only provides information on:
 - General nutritional status

Alanine Aminotransferase (ALT)

- The test is primarily used to diagnose liver disease, to monitor the course of treatment for hepatitis, active postnecrotic cirrhosis, and the effect of drug therapy.
- The level of ALT abnormality is increased in conditions where cells of the liver have been inflamed or undergone cell death

- As the cells are damaged, the ALT leaks into the bloodstream leading to a rise in the serum levels
- Any form of hepatic cell damage can result in an elevation in the ALT
- ALT level may or may not correlate with the degree of cell death or inflammation
- ALT is the most sensitive marker for liver cell damage. ALT differentiates between hemolytic jaundice and jaundice due to liver disease.

Increased ALT levels are found in the following conditions:

- Hepatocellular disease
- Active cirrhosis (mild increase)
- Metastatic liver tumor
- Obstructive jaundice or biliary obstruction
- viral, infectious or toxic hepatitis

Aspartate Aminotransferase (AST)

- Also reflects damage to the hepatic cell
- It is less specific for liver disease
- It may be elevated in other conditions such as a myocardial infarct(M.I) and muscle disease
- Although AST is not as specific for liver as the ALT, ratios between ALT and AST are useful to physicians in assessing the aetiology of liver enzyme abnormalities
- Viral hepatitis, mononucleosis, and acute hepatotoxicity typically show elevations in ALT that are equal to or greater than AST elevations (AST/ALT less than or equal to 1.0)
- ALT is elevated to a lesser degree than AST in alcoholic liver disease and cirrhosis, passive congestion, bile duct obstruction, or metastatic tumor to the liver (AST/ALT greater than 1.0)

Alkaline Phosphatase

- Source: liver, bone, placenta and intestine.
- ↑ ALP activity in liver disease are the result of increased synthesis of the enzymes by cells lining the bile canaliculi, usually in response to cholestasis (intra or extra-hepatic).
- ALP ↑ 2x the reference interval in cholestasis.
- Also ↑ in infiltrative diseases of liver, when space occupying lesions (e.g tumours) are present.

- Growing bones need ALP.
- ↑ serum ALP by osteoblast-rapid growth of bone (growth, healing of fracture, bone cancer, Paget's disease, rickets).
- For pregnant women, ALP is produced by the placenta.

ALP from the intestine is increased in a person with inflammatory bowel disease such as ulcerative colitis

Bilirubin (T.S.B)

- Total Serum bilirubin (0.2-1)mg/dl
- Conjugated bilirubin (Direct ; glucuronide) (0.2-0.8)mg/dl
- Unconjugated bilirubin (Indirect; bilirubin - albumin complex)(0.0-0.2)mg/dl
- Increase level of bilirubin causes jaundice, a yellowing of the eyes and skin .

Type of Jaundice :-

1-Hemolytic Jaundice

Cause by hemolysis of R.B.C

2- Hepatic Jaundice

Cause by infection of liver such as hepatitis

3- Obstructive Jaundice

Cause by obstruction of bile duct