

Chapter-12

Organ function tests

Organ function tests

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Organ function tests:

- Organ function tests are medical tests that are performed to assess the functioning of various organs in the body.
- These tests are usually recommended by doctors when a patient is experiencing symptoms that suggest a problem with a particular organ or when a patient has a condition that can affect the functioning of an organ.

Some common organ function tests include:

- **Liver function tests:** These tests are used to assess the functioning of the liver and to detect liver damage or disease. The tests measure levels of various enzymes, proteins, and other substances in the blood that are produced by the liver.
- **Kidney function tests:** These tests are used to assess the functioning of the kidneys and to detect kidney damage or disease. The tests measure levels of various substances in the blood and urine that are produced or excreted by the kidneys.
- **Lung function tests:** These tests are used to assess the functioning of the lungs and to detect lung diseases such as asthma, chronic obstructive pulmonary disease (COPD), and lung cancer. The tests measure how much air a person can breathe in and out, how quickly they can exhale, and how well their lungs are exchanging oxygen and carbon dioxide.



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- **Cardiovascular function tests:** These tests are used to assess the functioning of the heart and blood vessels and to detect cardiovascular disease. The tests include electrocardiograms (ECGs), stress tests, and imaging tests such as echocardiograms and angiograms.
- **Endocrine function tests:** These tests are used to assess the functioning of the endocrine system, which includes glands such as the thyroid, adrenal glands, and pancreas. The tests measure levels of hormones in the blood or urine that are produced by these glands.
- **Gastrointestinal function tests:** These tests are used to assess the functioning of the digestive system and to detect gastrointestinal diseases such as ulcers, gastritis, and inflammatory bowel disease (IBD). The tests include imaging tests such as endoscopies and colonoscopies, as well as tests that measure the levels of enzymes and other substances in the blood.

Functions of kidney and routinely performed tests to assess the functions of kidney and their clinical significances:

Functions of kidney:

- The kidneys are two bean-shaped organs located in the abdomen that are responsible for filtering waste and excess fluid from the blood and excreting it as urine.
- They also help regulate blood pressure, maintain electrolyte balance, and produce hormones that help regulate red blood cell production and bone health.

The kidneys have several important functions in the body, including:

1. **Regulation of fluid balance:** The kidneys help regulate the balance of fluids in the body by filtering waste and excess fluids from the blood and excreting them as urine.
2. **Regulation of electrolyte balance:** The kidneys help regulate the balance of electrolytes in the body, such as sodium, potassium, and calcium, by filtering and selectively reabsorbing these ions as needed.
3. **Regulation of blood pressure:** The kidneys help regulate blood pressure by producing hormones that control the diameter of blood vessels and the volume of blood circulating in the body.
4. **Production of red blood cells:** The kidneys produce a hormone called erythropoietin, which stimulates the bone marrow to produce red blood cells.
5. **Regulation of acid-base balance:** The kidneys help regulate the pH balance of the body by excreting excess acids or bases in the urine.
6. **Excretion of waste products:** The kidneys filter waste products from the blood, such as urea, creatinine, and uric acid, and excrete them as urine.



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Kidney Function Test:

The following are some commonly performed tests to assess kidney function and their clinical significances:

1. **Blood tests:** Blood tests that measure levels of creatinine and blood urea nitrogen (BUN) are commonly used to assess kidney function. Creatinine is a waste product that is produced by muscle metabolism and excreted by the kidneys, while BUN is a waste product of protein metabolism. Elevated levels of creatinine and BUN in the blood can indicate decreased kidney function or kidney damage.
 2. **Urine tests:** Urine tests that measure levels of protein and albumin are commonly used to assess kidney function. Albumin is a protein that is normally present in the blood, but not in the urine, while proteinuria is the presence of excessive amounts of protein in the urine. Elevated levels of protein and albumin in the urine can indicate decreased kidney function or kidney damage.
 3. **Glomerular filtration rate (GFR):** GFR is a measure of the rate at which blood is filtered by the kidneys. It is calculated based on a person's age, sex, and blood creatinine levels. A GFR of less than 60 mL/min/1.73m² for more than 3 months indicates chronic kidney disease.
 4. **Imaging tests:** Imaging tests such as ultrasounds, CT scans, and MRIs may be used to assess the size, shape, and structure of the kidneys and detect abnormalities such as cysts or tumors.
 5. **Biopsy:** Kidney biopsy may be performed to collect a sample of kidney tissue for microscopic examination to diagnose certain kidney diseases.
- Abnormal results from these tests can indicate kidney disease or dysfunction. Early detection and management of kidney disease can help prevent or delay progression to end-stage kidney disease, which may require dialysis or kidney transplantation.
 - It is important to consult with a healthcare provider to interpret test results and determine the appropriate course of treatment.

Clinical Significances:

You may also need a kidney function test if you have symptoms that indicate possible kidney problems. These symptoms might include:

- Problems with starting to pee: This is a measure of how much urine is produced over a certain period of time. Low urine output can indicate poor kidney function.
- Glomerular Filtration Rate (GFR): This is considered the most accurate measure of kidney function. It is a measure of how well the kidneys are filtering waste from the blood. GFR can be estimated through blood tests that measure levels of creatinine, a waste product produced by muscles.



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- **Blood Urea Nitrogen (BUN):** BUN is a test that measures the amount of nitrogen in your blood that comes from the waste product urea. The kidneys are responsible for removing urea from the blood, so high levels of BUN can indicate poor kidney function.
- **Serum Creatinine:** This is a blood test that measures the level of creatinine in the blood. Creatinine is a waste product that is produced by the muscles and eliminated by the kidneys. High levels of serum creatinine can indicate poor kidney function.
- **Urine Albumin:** This test measures the level of albumin, a protein, in the urine. Albumin should not normally be present in urine, so its presence can indicate kidney damage.
- **Urine Creatinine:** This test measures the level of creatinine in the urine. This measurement can be used to estimate GFR.

Functions of liver and routinely performed tests to assess the functions of liver and their clinical significances:

Functions of liver:

The liver is a vital organ in the body that performs many essential functions. Some of the functions of the liver include:

1. **Bile production:** The liver produces bile, which helps in the digestion of fats.
2. **Protein synthesis:** The liver produces various proteins, such as albumin, that are essential for maintaining proper fluid balance in the body.
3. **Detoxification:** The liver detoxifies harmful substances, such as drugs, alcohol, and toxins, from the blood.
4. **Storage of vitamins and minerals:** The liver stores vitamins A, D, E, and K, as well as iron and copper.
5. **Metabolism:** The liver metabolizes carbohydrates, fats, and proteins to provide energy to the body.

Routine liver function tests are performed to assess the liver's health and function.

These tests include:

1. **Alanine transaminase (ALT) and Aspartate transaminase (AST):** These tests measure the levels of liver enzymes in the blood. High levels of ALT and AST are indicative of liver damage.
2. **Alkaline phosphatase (ALP):** This test measures the levels of ALP in the blood. Elevated levels of ALP may indicate liver or bone disease.
3. **Bilirubin:** This test measures the levels of bilirubin in the blood. High levels of bilirubin may indicate liver disease or hemolytic anemia.



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4. **Albumin:** This test measures the levels of albumin in the blood. Low levels of albumin may indicate liver disease.
5. **Prothrombin time (PT):** This test measures the time it takes for blood to clot. Abnormal PT may indicate liver disease.
6. **Gamma-glutamyl transferase (GGT):** This test measures the levels of GGT in the blood. Elevated levels of GGT may indicate liver disease or alcohol abuse.

Clinical significance of liver function tests include:

1. **Detection of liver disease:** Liver function tests can help detect liver disease in its early stages, before symptoms appear.
2. **Monitoring of liver function:** Liver function tests are used to monitor the progress of liver disease and assess the effectiveness of treatment.
3. **Diagnosis of liver injury:** Liver function tests can help diagnose liver injury caused by drugs, toxins, or infections.
4. **Screening for liver disease:** Liver function tests may be used to screen for liver disease in people who are at risk, such as heavy drinkers or those with a family history of liver disease.

Lipid profile tests and its clinical significances:

A lipid profile test is a blood test that measures the amount of different types of lipids, or fats, in your blood. The lipids measured in a lipid profile test include:

1. **Total cholesterol:** This measures the total amount of cholesterol in your blood, including both high-density lipoprotein (HDL) and low-density lipoprotein (LDL) cholesterol.
2. **HDL cholesterol:** This is often called the "good" cholesterol because it helps remove other types of cholesterol from your blood.
3. **LDL cholesterol:** This is often called the "bad" cholesterol because it can build up in your arteries and lead to heart disease.
4. **Triglycerides:** These are another type of fat that can build up in your blood and contribute to heart disease.

Clinical significances:

The clinical significance of a lipid profile test is that it can help your doctor assess your risk of developing heart disease.

- High levels of LDL cholesterol and triglycerides, and low levels of HDL cholesterol, are all risk factors for heart disease.



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- By measuring these levels, your doctor can determine whether you need to make lifestyle changes, such as changing your diet and increasing your exercise, or whether you need medication to help lower your cholesterol levels.
- In addition to assessing your risk of heart disease, a lipid profile test may also be used to monitor the effectiveness of cholesterol-lowering medications, such as statins.
- If you are taking medication to lower your cholesterol, your doctor may order a lipid profile test periodically to ensure that the medication is working as it should.

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