Renal function test

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A renal panel :

may be used to evaluate kidney function, to help diagnose kidney-related disorders, to screen those who may be at risk of developing kidney disease.

Renal panel can depending on performs many testing, include:

- Urinalysis
- Electrolytes: sodium, potassium, chloride, bicarbonate (CO2)
- Phosphorus
- Calcium
- Albumin
- Blood Urea Nitrogen (BUN)
- Creatinine
- Glucose
- Uric acid
- Three calculated values may also be reported with a renal panel:
- **Urine albumin/creatinine ratio (ACR):** This more accurately

determines how much albumin is escaping from the kidneys into the urine. It is used to screen people with chronic conditions, such as diabetes and high blood pressure (hypertension) that put them at an increased risk of developing kidney disease.

Urine protein/creatinine ratio (UP/CR). This may be used to monitor a person with known kidney disease or damage or when they are taking a medication that may affect their kidney function

Urea (BUN)/creatinine ratio : Estimated Glomerular Filtration Rate (eGFR) Anion gap. There are other laboratory tests that can be used to assess kidney function.

Order a renal panel when someone has risk factors for kidney dysfunction like:

1. High blood pressure (hypertension), diabetes, cardiovascular disease, obesity, elevated cholesterol, or a family history of kidney disease.
2. Someone has signs and symptoms of kidney disease, Examples of some signs and symptoms include:

I. Swelling or puffiness, especially around the eyes or in the face, wrists, stomach, thighs or ankles

II. Urine that is foamy, bloody, or coffee-colored , decrease in the amount of urine. Problems or urinating, such as a burning feeling or abnormal discharge during urination, or a change in the frequency of urination, especially at night

III. Mid-back pain, below the ribs, near where the kidneys are located

3. To evaluate kidney function prior to some procedures, such as a CT (computed tomography) scan, that may require the use of drugs that can damage the kidneys.

As part of a routine health checkup

4. Ill person comes to the emergency room and/or is admitted to the hospital

5. At regular intervals to monitor the effectiveness of dialysis

- Not Renal panel test results are not diagnostic but rather indicate that there may be a problem with the kidneys and that further testing is required to make a diagnosis and determine the cause such as performed, such as kidney imaging or a kidney biopsy.

The following table summarizes what results might mean in relation to kidney disease or dysfunction:

Test	Association with kidney disease/dysfunction
Electrolytes: Sodium, Potassium, Chloride, Bicarbonate Phosphorus	kidney dysfunction or disease can cause an imbalance among the electrolytes. When these positively and negatively charged ions are out of balance, it can affect the fluid balance and/or pH of the blood. Caused kidney dysfunction worsens, complications such as metabolic acidosis may result.
Calcium	Low blood level may be seen with kidney failure.
Albumin	**A low blood level may indicate that the kidneys cannot prevent albumin from leaking into the urine and being lost.**
Urea/BUN	High level suggests impaired kidney function caused by acute or chronic kidney disease, damage, or failure, or due to another condition causing decreased blood flow to the kidneys, such as CHF or dehydration, or causing obstruction of urine flow, such as prostate disease or kidney stones.
Creatinine	**High blood level suggests impaired kidney function due to conditions listed above for urea.**
Glucose	High blood level indicates diabetes, a common cause of kidney disease.

Urea (BUN)/Creat-inine ratio	High ratio may be due to a condition such as decreased blood flow to the kidneys while low ratio may be due to other conditions such as liver disease.
eGFR	Calculated from the blood creatinine test result; an eGFR below 60 mL/min suggests that some kidney damage has occurred; an eGFR below 15 indicates kidney failure
Anion gap	A high result can indicate excess acid (acidosis) in the blood that may be related to kidney disease, but the acidosis can also be caused by many other conditions.

The uric acid blood test

is used to detect high levels of this compound in the blood in order to help diagnose recurrent kidney stones and gout which is a common form of arthritis. Monitor uric acid levels in people undergoing chemotherapy or radiation treatment for cancer. Rapid cell turnover from such treatment can result in an increased uric acid level. normal value 3.7 - 8.0 mg/dl.

Gout: Increased concentrations of uric acid can cause crystals to form in the joints, which can lead to the joint inflammation and pain characteristic of gout. Uric acid can also form crystals or kidney stones that can damage the kidneys. patient suffer from joint pain, most often in their toes, but in other joints as well.

hyperuricemia :

Is Higher than normal uric acid levels in the blood and can be caused by producing too much uric acid in the body or the inability of the kidneys to adequately remove enough uric acid from the body. There are many causes for it: There are several genetic inborn errors that affect the break-down of purines.

- Cancer that has spread from its original location (metastatic)"multiple myeloma, leukemias, and cancer chemotherapy " can cause increased production of uric acid.
- Chronic renal disease, acidosis, toxemia of pregnancy, and alcoholism can cause decreased elimination of uric acid.

Hypouricemia:

Low levels of uric acid in the blood are seen much less commonly than high levels.

Although low values can be associated with some kinds of liver or kidney diseases, Fanconi syndrome, exposure to toxic compounds, and rarely as the result of an inherited metabolic defect (e.g., Wilson disease). kidney stones may be given medication to prevent stone formation

Drugs can increase or decrease the level of uric acid.

- diuretic drugs like thiazide drugs can cause uric acid levels to go up.
- Aspirin and other salicylates have varying effects on uric acid. At low aspirin levels can increase blood uric acid. On the other hand, in high doses (as may be used to treat rheumatoid arthritis), aspirin actually lowers the concentration of uric acid.
- For people who have foods that are high in purine content should be avoided. Alcohol also slows down the removal of uric acid from the body. Fasting, rapid weight loss, stress, and strenuous exercise all raise uric acid levels.

The blood urea nitrogen or BUN test :

is primarily used, along with the creatinine test, to evaluate kidney function, to monitor people with acute or chronic kidney dysfunction or failure.

Urea : is a waste product formed in the liver when protein is metabolized. Urea is released by the liver into the blood and is carried to the kidneys, there is usually a small but stable amount of urea nitrogen in the blood. However, when the kidneys cannot filter wastes out of the blood due to disease or damage, then the level of urea in the blood will rise. normal value 7 - 20 mg/dl.

Increased BUN levels suggest

- This may be due to acute or chronic kidney disease, damage, or failure. It may also be due to a condition that results in decreased blood flow to the kidneys, such as congestive heart failure, shock, stress, recent heart attack, or severe burns, to conditions that cause obstruction of urine flow, or to dehydration.
- when there is excessive protein breakdown (catabolism), significantly increased protein in the diet, or gastrointestinal bleeding (because of the proteins present in the blood).

Low BUN levels are not common and are not usually a cause for concern: severe liver disease, malnutrition, and sometimes when a person is overhydrated (too much fluid volume),

- Drugs that can decrease BUN include chloramphenicol and streptomycin.

- Both decreased and increased BUN concentrations may be seen during a normal pregnancy.

The ratio between a person's BUN and blood creatinine:

The ratio of BUN to creatinine is usually between 10:1 - 20:1.

An increased ratio may be due to a condition that causes a decrease in the flow of blood to the kidneys, such as congestive heart failure or dehydration. And increased protein, from gastrointestinal bleeding, or increased protein in the diet.

The ratio may be **decreased** with liver disease (due to decrease in the formation of urea) and malnutrition

The creatinine blood test : It is frequently ordered along with a BUN (blood urea nitrogen) test. Creatinine is a waste product produced by muscles from the breakdown of a compound called creatine. Almost all creatinine is filtered from the blood by the kidneys and released into the urine, so blood levels are usually a good indicator of how well the kidneys are working. normal value 0.7 - 1.4 mg/dl

Blood creatinine measurements: along with age, weight, and sex, are used to calculate the estimated glomerular filtration rate (eGFR).

Blood and urine creatinine : levels may be used to calculate a creatinine clearance. This test measures how effectively the kidneys are filtering small molecules like creatinine out of the blood.

- creatinine is produced and removed at a relatively constant rate, the amount of urine creatinine can be compared to the amount of another substance being measured. Examples include: albumin, urea, protein

Increased creatinine levels in kidney disfunction. These can include:

- Damage to or swelling of blood vessels in the kidneys (glomerulonephritis) caused by, for example, Bacterial infection or autoimmune diseases
- Death of cells in the kidneys' small tubes (acute tubular necrosis) caused by, for example, drugs or toxins
- Prostate disease, kidney stone, or other causes of urinary tract obstruction
- increase temporarily as a result of muscle injury and are generally slightly lower during pregnancy.

- Reduced blood flow to the kidney due to shock, dehydration, congestive heart failure, atherosclerosis, or complications of diabetes
- Creatinine blood levels can also In general, moderate exercise will not affect creatinine levels. continue to exercise and build muscle mass, creatinine levels may increase slightly but not to abnormal levels.

➢ **Low** blood levels of creatinine are not common, can be seen with conditions that result in decreased muscle mass.