Estimation of urea ,creatinine and creatinine clearance

Dep. Medical laboratories techniques,
University of Al Maarif

Lab -5- Metabolic Disorders

Msc. Sumaya Nadhim

Functions of Kidney:

-Excretion of various materials via urine like urea, creatinine and uric acid.

-Maintain blood volume, pressure and sodium levels.

-Erythropoietin: role in RBC production.

-Vitamin D activation and calcium regulation.

-Acid–base balance.

1- Urea/BUN

Urea is a waste product formed in the liver when protein is metabolized into amino acids. This process produces ammonia, which is then converted into the less toxic waste product urea. The kidney is the only significant route of excretion for urea. It is filtered by the glomerulus. However, not all elevated BUN tests are due to kidney damage. Blood urea is increased due to:

-Renal causes: impaired glomerular filtration in glomerulonephritis, nephrosis.

-Pre-renal causes: dehydration, heart failure, leukemia, Common medications, including large doses of aspirin and some types of antibiotics.

-Post renal causes: carcinoma of bladder, obstruction of urinary tract by kidney stones, Blockage of the urethra by cancer or prostatic hyperplasia.

Normal levels of blood urea are between 20 and 45 mg/dL

Sample collection:

Serum, plasma ,urine.

$$\frac{A\ sample}{A\ standard} \text{ x C standard} = \text{mg/dl}$$

2-Creatinine

Creatinine is a waste product produced by muscles from the breakdown of a compound called creatinine. Creatinine is removed from the body by the kidneys from the blood and release it into the urine.

The amount of creatinine you produce depends on your body size and your muscle mass. For this reason, creatinine levels are usually slightly higher in men than in women and children.

Tiny blood filtering units called nephrons. In each nephron, blood is continually filtered through glomerulus. The glomerulus allows the passage of water and small molecules but retains blood cells and larger molecules. Attached to each glomerulus is a tiny tube (tubule) that collects the fluid and molecules that pass through the glomerulus and then reabsorbs what still can be used by the body.

**Creatinine is more specific indicator of the safety of the kidney function.

Normal values:

* Male (0.7-1.4 mg/dl)

* Female (0.7-1 mg/dl)

Sample collection: serum, plasma, urine.

Creatinine Clearance:

-A creatinine clearance test measures creatinine levels in both a sample of blood and a sample of urine from a 24-hour urine collection.

-This calculation allows for a general evaluation of the amount of blood that is being filtered by the kidneys in a 24-hour time period.

-The amount of blood filtered per minute by the kidneys is known as the glomerular filtration rate (GFR).

$$C = \frac{Uc\ x\ Tv}{24\ x\ 60\ xSc}$$

Uc: level of creatinine in urine.

Tv: urine volume collected during 24 hrs.

Sc: creatinine level in serum.

24: number of hours per day

60: number of minutes per 1 hr

Thank you for listening