



Renal physiology

Physiology Lab- 15

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Lect.7. Physiology Laboratory Wasan abed C 2

Lect.7.

Renal Physiology

The renal system consists of the kidney, ureters, and the urethra.

The overall function of the system filters approximately 200 liters of fluid a day from renal blood flow which allows for toxins, metabolic waste products, and excess ion to be excreted while keeping essential substances in the blood.

Clinical Significance for renal Physiology

The renal system pathologies have a wide range of clinical presentations. Emphysematous urinary tract infections, chronic kidney disease, nephrolithiasis, and urinary incontinence in men and women are topics of discussion below.

Urea

Urea is (also known as carbamide) is an organic compound with chemical formula $\text{CO}(\text{NH}_2)_2$

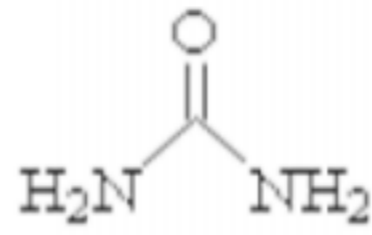
This amide has two $-\text{NH}_2$ groups joined by a carbonyl ($\text{C}=\text{O}$) functional group.

Urea serves an important role in the metabolism of nitrogen-containing compounds by animals and is the main nitrogen-containing substance in the urine of mammals.

It is a colorless, odorless solid, highly soluble in water, and Dissolved in water, it is neither acidic nor alkaline.

a waste product of many living organisms, Urea is major organic component of human urine.

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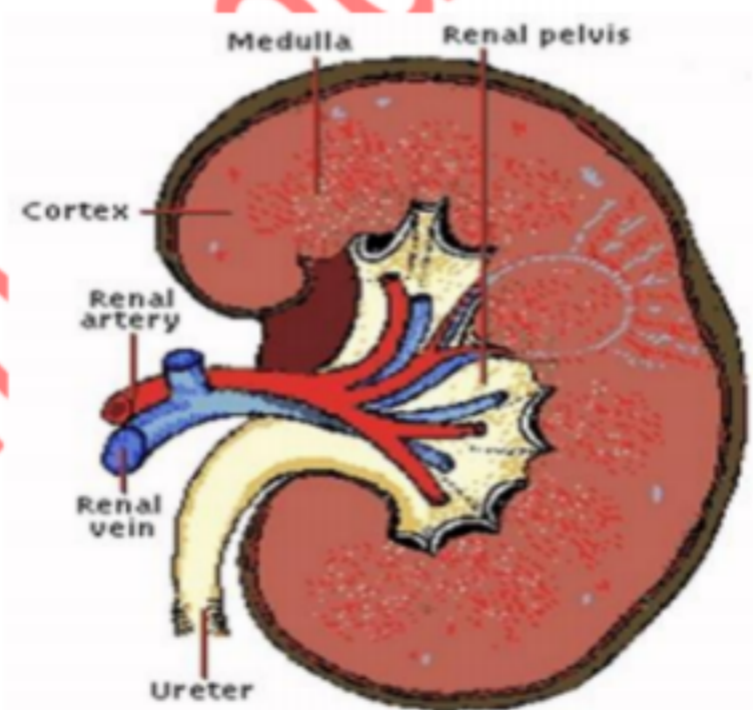


Structure for Urea



color for Urea.

Urea But the ammonia is toxic to cells, and so must be excreted from the body.



Kidney

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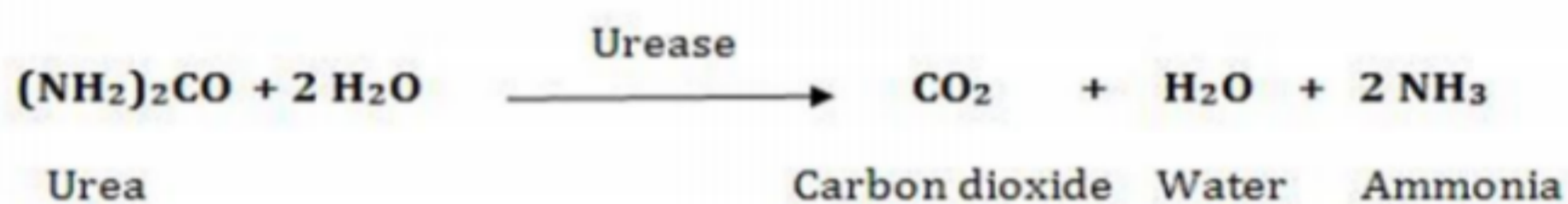
Principle For Urea

Urea is a nitrogen containing compound that is produced during decarboxylation of the amino acid arginine in the urea cycle.

Urea Hydrolysis :

Urea is waste product excreted in urine by animals. Some enteric bacteria produce the enzyme urease, which splits the urea molecule into carbon dioxide and ammonia.

The urease test is useful in identifying the genera Proteus, Providentia, and Morganella, which liberate this enzyme.

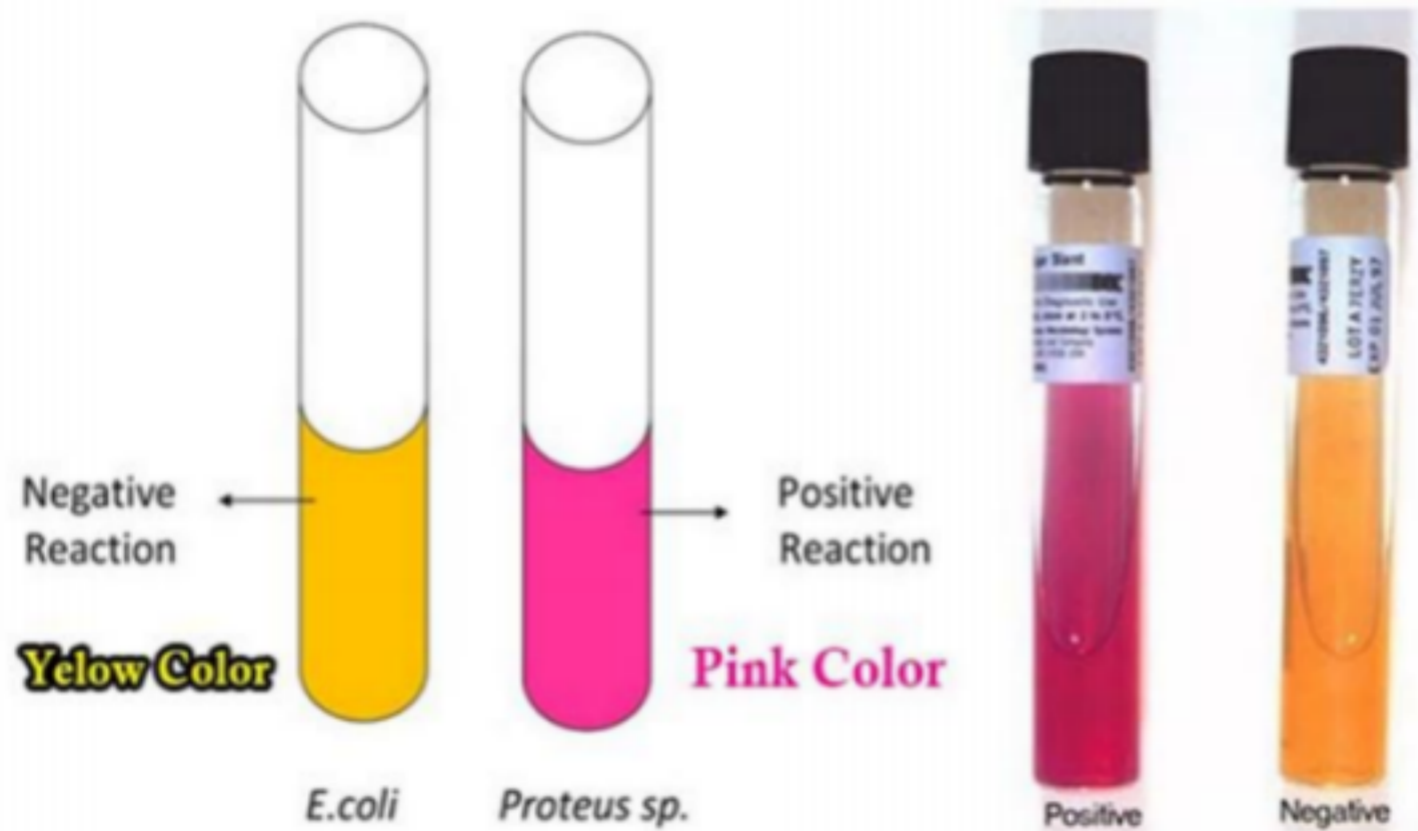
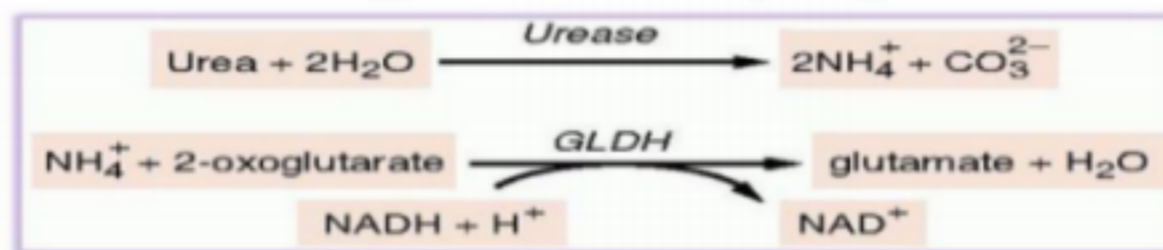


Clinical significance for Urea

Urea is the end product of proteins metabolism, It is synthesized in the Liver from (the ammonia) produced by the catabolism of the amino acid, It is transported by the blood to the kidneys from where it is excreted, increase levels are found in renal diseases, peritonitis, surgical shock and cardiac failure is the pregnancy.

Lect.7.**Analytical methods**

- Urease → hydrolysis of urea to ammonium ion , then detect ammonium ion (NH₄⁺)
- **Enzymatic**
 - The most common method couples the urease reaction with glutamate dehydrogenase



Normal range is 3.0-8.8 m mol/l,

8.0-50 mg\100ml

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Creatinine

Also called: Serum Creatinine, Urine Creatinine.

Creatinine is a waste product in your blood. It comes from protein in your diet and the normal breakdown of muscles of your body. Creatinine is removed from blood by the kidneys and then passes out of the body in your urine.

If you have kidney disease, the level of creatinine in your blood increases.

The normal range is (0.8-1.5)mg\100ml in plasma and (0.8-2.0)g\day in urine.

clinical significance for creatinine

Creatinine is produced as the result of normal muscle metabolism. Phosphocreatine, an energy-storing molecule in muscle, the important clinical significance for Creatinine in muscle diseases.

Serum/plasma creatinine = 0.7 – 1.5 mg/dl in men and 0.6 – 1.1 in women.

Urine = 0.7 – 1.8 gm/day.

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Uric Acid:

Uric acid is the end product of purine metabolism, Purines are obtained from both dietary sources and from the breakdown of body proteins.

Serum Uric Acid

Adult males: 2.0 - 7.5 mg/dl

Adult females: 2.0 - 6.5 mg/dl; in early pregnancy uric acid levels fall by about one-third but rise to non-pregnant levels by term

(Children (ages 10-18).

Males: 3.6 - 5.5 mg/dl; significant rise in males at ages 12-14 coincides with puberty.

Females: 3.6 - 4 mg/dl.

Clinical Significance for Uric Acid

The determination of uric acid in serum is most commonly performed for the diagnosis of gout.

Increased uric acid levels are also found in leukemia, polycythemia, familial idiopathic hyperuricemia, and conditions associated with decreased renal function.

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What is the effect of antibiotics on the kidneys

Antibiotics affect the kidneys in several ways. Taking antibiotics may contribute to the formation of kidney stones. This is done by reducing the bacteria responsible for breaking down oxalates in the intestine, which leads to increased oxalate deposition in the urine, which leads to the formation of kidney stones.

Some antibiotics may cause acute kidney failure, and these antibiotics include the following:

1-Diuretics

Diuretics are used to treat high blood pressure and some cases of swelling, but they may lead to dehydration in the body, which affects the kidneys.

2-2(Non-Steroidal Anti inflammatory drugs)

Nonsteroidal anti-inflammatory drugs, such as: Aspirin, Ibuprofen, and Naproxen, work to relieve pain, but when taken daily or in high doses, they lead to kidney damage, such as: chronic kidney failure.

3-Nutritional supplements

Some herbs or supplements are linked to kidney injury, even among healthy people.

With a wide range of nutritional supplements available, the best way to know if a supplement is safe is to ask your doctor to review all the ingredients.