

**URINE FORMATION**

**Slide 1**

- FILTRATION
- REABSORPTION
- SECRETION
- EXCRETION

Urine is made to filter out waste products from the blood.

Nitrogenous wastes like urea and uric acid are removed from the blood in the kidneys.

**The basic unit of filtration in the kidneys is the nephron.**

Each kidney contains a million nephrons.

Capillaries of kidneys filter the blood and the essential substances like glucose, amino acids, salts and the required amount of water are reabsorbed.

Excess water and nitrogenous waste in humans are converted to urine.

The urinary bladder is under the control of the **Central Nervous System**.

**Slide 2**

The urine formation has the following steps:

**1. Glomerular Filtration-** is the primary step in urine formation.

Here the excess fluid and waste products from the kidney are filtered out of the blood into Bowman's capsule to be eliminated out of the body.

The amount of filtrate produced by the kidneys every minute is known as Glomerular Filtration Rate.

**2. Tubular Reabsorption(selective)-**It is the absorption of ions and molecules such as sodium ions, glucose, amino acids, water etc.

This happens as the urine flows through the tube.

The amount of water re-absorbed depends on how much excess water there is in the body, and on how much of dissolved waste there is to be excreted.

**3. Secretion**-Potassium ions, hydrogen ions, and ammonia are secreted out to maintain the equilibrium between the body fluids.

The urine forming in each kidney now enters a long tube, the ureter, which connects the kidneys with the urinary bladder.

Urine is stored here until the pressure of the bladder leads to the urge to pass it out through the urethra.

The bladder is muscular, and its receptors present send signals to the **central nervous system**, thereby, allowing the relaxation of sphincter muscles to release urine. This is known as micturition.

Normally, in a healthy adult, the initial Glomerular filtrate in the kidneys is about 180 L daily.

However, the volume actually excreted is only a 1-2 L/ day, because the remaining 99% filtrate is re-absorbed in the kidney tubules.

## 3 STEPS OF URINE FORMATION

### Step 1: Glomerular Filtration:

- Urine formation starts. Filtering of blood. The filtrate contains essential and nonessential materials. These waste products, helpful products, and water are filtered through the capillary walls of the glomerulus into Bowman's capsule, forming a liquid called FILTRATE.

### Step 2: Tubular Reabsorption:

- Taking back water and essential materials that the body needs. Moves it out of the filtrate and into the blood. 99% is reabsorbed back into the blood.

### Step 3: Tubular Secretion:

- Moves non essential material out of blood and into filtrate for excretion out of the kidneys. The urine, containing wastes, is now passed out of the kidney and into the ureter.

**Osmoregulation is the process by which an organism regulates the water and electrolytic balance in its body.**

The kidney is the main organ responsible for osmoregulation in humans.

Water, amino acids and glucose are reabsorbed by the kidneys.

When the water level in the body is high, it releases a large amount of hypotonic urine.

When the water level is low, it retains water and produces a low amount of hypertonic urine.

Thus, the kidneys maintain the electrolytic balance of the body.

Antidiuretic hormones control the absorption process. Some water and electrolytes are also lost by perspiration.

In **Amoeba** and paramecium, the **osmoregulation** occurs through Contractile vacuole.