



# AL-MUSTAQBAL UNIVERSITY

Department of Medical laboratory Techniques Department

## *Clinical Biochemistry*

(Electrolytes)

(Determination of Potassium (



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## Electrolytes:

are minerals in your body that have an electric charge. They are in your blood, urine, tissues, and other body fluids. Electrolytes are important because they help

- Balance the amount of water in your body
- Balance your body's acid/base (pH) level
- Move nutrients into your cells
- Move wastes out of your cells
- Make sure that your nerves, muscles, the heart, and the brain work the way they should

In the Table (1) the electrolyte in the body

**Table (1):The electrolyte in the body**

<i>Solutes</i>	<i>Plasma mEq / L</i>	<i>Interstitial fluid (mEq/L)</i>	<i>Intracellular fluid (mEq/L)</i>
<b>Cations:</b>			
Sodium	140	146	12
Potassium	4	5	160
Calcium	5	3	–
Magnesium	1.5	1	34
<b>Anions:</b>			
Chloride	105	117	2
Bicarbonate	24	27	10
Sulfate	1	1	–
Phosphate	2	2	140
Protein	15	7	54
Other anions	13	1	–

Note -  $\text{mEq/L} = \text{mmol/L} \times \text{valency}$

Electrolytes can be obtained from foods and liquids and the levels of electrolytes in your body become too low or too high. This is called an electrolyte imbalance, and it can happen when the amount of water in the body changes.

Therefore, the amount of water a person takes must equal what he loses.

### **POTASSIUM (K<sup>+</sup>):**

Total body potassium is about 3500 mEq, out of which 75% is in skeletal muscle. Potassium is the major intracellular cation, and maintains intracellular osmotic pressure. The depolarization and contraction of heart require potassium. During transmission of nerve impulses, there is sodium influx and potassium efflux; with depolarization. After the nerve transmission, these changes are reversed. The intracellular concentration gradient is maintained by the Na<sup>+</sup> K<sup>+</sup> ATPase pump.

### **Requirement**

Potassium requirement is 3–4 g per day

### **Sources**

Sources rich in potassium, but low in sodium are banana, orange, apple, pineapple, almond, dates, beans, yam and potato. Tender coconut water is a very good source of potassium.

### **Normal Level:**

Plasma potassium level is 3.5–5.2 mmol/L. The cells contain 160 mEq/L; so precautions should be taken to prevent hemolysis when taking blood for potassium estimation. The K<sup>+</sup> in serum is estimated directly by using an ion selective electrode.

## Hypokalemia

Normally, your blood potassium level is 3.6 to 5.2 millimoles per liter (mmol/L). A very low potassium level (less than 2.5 mmol/L) can be life-threatening and requires urgent medical attention.

The most common cause is excessive potassium loss in urine due to prescription medications that increase urination. Also known as water pills or diuretics, these types of medications are often prescribed for people who have high blood pressure or heart disease.

Vomiting, diarrhea or both also can result in excessive potassium loss from the digestive tract. Occasionally, low potassium is caused by not getting enough potassium in your diet.

## Hyperkalemia

Plasma potassium level above 5.5 mmol/L is known as hyperkalemia. Since the normal level of K<sup>+</sup> is kept at a very narrow margin, even minor increase is life threatening.

- Kidney Disease. Hyperkalemia can happen if your kidneys do not work well. It is the job of the kidneys to balance the amount of potassium taken in with the amount lost in urine.
- A diet high in potassium. Eating too much food that is high in potassium can also cause hyperkalemia, especially in people with advanced kidney disease. Foods such as honeydew melon, orange juice, and bananas are high in potassium.
- Taking extra potassium, such as salt substitutes or supplements.