

Electrolytes

are electrically charged minerals that help control the amount of fluids and the balance of acids and bases in your body. They also help control muscle and nerve activity, heart rhythm, and other important functions. An electrolyte panel, also known as a serum electrolyte test, is a blood test that measures levels of the body's main electrolytes.

1 – Sodium (Na^{+1}): which helps control the amount of fluid in the body. It also helps your nerves and muscles work properly.

Symptoms of high sodium levels (hypernatremia) include:

- Thirst
- Urinating (peeing) very little
- Vomiting
- Diarrhea
- Confusion
- Muscle twitching
- Seizures

Symptoms of low sodium levels (hyponatremia) include:

- Weakness
- Fatigue
- Confusion
- Muscle twitching
- Seizures

Normal Results

Sodium: 136 to 144 mmol/L.

2 – Chloride (Cl^{-1}): which also helps control the amount of fluid in the body. In addition, it helps maintain healthy blood volume and blood pressure.

High levels of chloride may be a sign of:

Dehydration

Kidney disease

Metabolic acidosis

Low levels of chloride may be a sign of:

- Heart failure

- Lung disease
- Addison disease
- including weakness
- dizziness
- weight loss
- dehydration.
- Metabolic alkalosis
- Irritability
- muscle twitching
- tingling in the fingers and toes

Normal Results

Chloride: 97 to 105 mmol/L.

3 – Potassium : which helps your heart and muscles work properly

If your potassium levels are too high (hyperkalemia), your symptoms may include:

- Arrhythmia (a problem with the rate or rhythm of your heartbeat)
- Fatigue
- Muscle weakness
- Nausea
- Numbness or tingling

If your potassium levels are too low (hypokalemia), your symptoms may include:

- Irregular heartbeat
- Muscle cramps
- Weak or twitching muscles
- Fatigue
- Nausea
- Constipation

Normal Results

Potassium: 3.7 to 5.1 mmol/L.

4 – Calcium (Ca^{+2}) : is a key element in your body, but it does more than just build strong bones and teeth. It's also used to control your muscles, transmit signals in your nerves, manage your heart rhythm and more.

Having too much or too little calcium in your blood can cause a wide range of symptoms across different systems in your body.

- Hypercalcemia (too much calcium)
- Brain: Headache, fatigue, apathy and confusion.
- Digestive tract: Constipation, abdominal pain and vomiting.
- Kidneys: Frequent need to pee, kidney stones and kidney failure.
- Heart: Arrhythmias, some of which can be severe.
- Skeletal: Pain in the bones and joints.

Hypocalcemia (not enough calcium)

- Brain: Confusion and behavior changes.
- Muscles: Unusually strong reflexes and loss of muscle control, muscle twitching, spasms in the throat muscles making it hard to speak or breathe.

Normal Results

8.5 to 10.2 mg/dL.

5 - Magnesium (Mg) : helps your cells as they turn nutrients into energy. Your brain and muscles rely heavily on magnesium to do their job.

Hypermagnesemia (too much magnesium):

Heart rhythm changes and arrhythmias, weakened reflexes, decreased ability to breathe and cardiac arrest (your heart stops).

Hypomagnesemia (not enough magnesium):

- Muscle weakness
- twitching and loss of control
- heart arrhythmias

Normal Results

1.7 to 2.2 mg/dL.

6 – Phosphorus (P) : it is a key part of transporting chemical compounds and molecules outside your cells. It helps your cells metabolize nutrients, and it's also a key part of molecules called nucleotides, which are the building blocks that make up your DNA.

Hyperphosphatemia (too much phosphorous):

This typically causes you to experience hypocalcemia because your body tries to use calcium as a substitute for phosphorus. It usually doesn't cause symptoms

until it becomes severe, and symptoms of hypocalcemia also often happen with this. It can also be associated with excessive itching.

Hypophosphatemia (not enough phosphate):

- The early symptom of this condition is usually muscle weakness.
- As it gets worse, more severe symptoms occur. They include rhabdomyolysis (breakdown of muscle tissue, which can cause severe kidney damage), seizures, reduced heart function and trouble breathing (caused by muscle weakness).

Normal Results

2.5 to 4.8 mg/dL.

Creatine phosphokinase (CPK)

is an enzyme in the body. It is found mainly in the heart, brain, and skeletal muscle.

Normal Results

10 - 120 ($\mu\text{g/L}$)

High CPK levels may be seen in people who have:

- Brain injury or stroke
- Convulsions
- Delirium tremens
- Dermatomyositis or polymyositis
- Electric shock
- Heart attack
- Inflammation of the heart muscle (myocarditis)
- Lung tissue death (pulmonary infarction)
- Muscular dystrophies
- Myopathy
- Rhabdomyolysis
- Trauma
- Hypothyroidism
- Hyperthyroidism
- Pericarditis following a heart attack