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Medical Encyclopedia: Potassium test

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Alternative names

Hypokalemia test; K+

Definition

This test measures the amount of potassium in the blood.

How the test is performed

Blood is drawn from a vein, usually from the inside of the elbow or the back of the hand. The puncture site is cleaned with antiseptic, and an elastic band or blood pressure cuff is placed around the upper arm to apply pressure and restrict blood flow through the vein. This causes veins below the band to swell with blood.

A needle is inserted into the vein, and the blood is collected in an air-tight vial or a syringe. During the procedure, the band is removed to restore circulation. Once the blood has been collected, the needle is removed, and the puncture site is covered to stop any bleeding.

In infants or young children, the area is cleansed with antiseptic and punctured with a sharp needle or a lancet. The blood may be collected in a pipette (small glass tube), on a slide, onto a test strip, or into a small container. Cotton or a bandage may be applied to the puncture site if there is any continued bleeding.

Occasionally, in people experiencing periodic episodes of paralysis, the potassium level may be drawn during an attack of paralysis.

How to prepare for the test

The health care provider may advise you to withhold drugs that may affect the test. (See special considerations.)

Infants and children:

The preparation you can provide for this test depends on your child's age, previous experience, and level of trust. For general information regarding how you can prepare your child, see the following:

- Infant test or procedure preparation (birth to 1 year)
- Toddler test or procedure preparation (1 to 3 years)
- Preschooler test or procedure preparation (3 to 6 years)
- Schoolage test or procedure preparation (6 to 12 years)
- Adolescent test or procedure preparation (12 to 18 years)

How the test will feel

When the needle is inserted to draw blood, some people feel moderate pain, while others feel only a prick or stinging sensation. Afterward, there may be some throbbing.

Why the test is performed

Potassium (K⁺) is the major positive ion within cells and is particularly important for maintaining the electric charge on the cell membrane. This charge allows nerves and muscles to communicate and is necessary for transporting nutrients into cells and waste products out of the cell. The concentration of potassium inside cells is about 30 times that in the blood and other fluids outside of cells.

Potassium levels are mainly controlled by the steroid hormone aldosterone. (For more information see the aldosterone test.) Aldosterone is secreted from the adrenal gland when levels of potassium increase. Aldosterone, in turn, causes the body to rid itself of the excess potassium.

Metabolic acidosis (for example, caused by uncontrolled diabetes) or alkalosis (for example, caused by excess vomiting) can affect blood potassium.

Small changes in the potassium concentration outside cells can have substantial effects on the activity of nerves and muscles. This is particularly true of heart muscle. Low levels of potassium cause increased activity (which can lead to an irregular heartbeat), whereas high levels cause decreased activity. Either situation can lead to cardiac arrest in some circumstances.

In normal people, taking potassium supplements or potassium-containing drugs is of no consequences, because the kidneys efficiently dispose of excess potassium.

Normal Values

The normal range is 3.7 to 5.2 mEq/L.

Note: mEq/L = milliequivalent per liter

What abnormal results mean

Greater-than-normal levels of potassium (hyperkalemia) may indicate:

- Crushed tissue from an injury
- Kidney failure
- Red blood cell destruction
- Metabolic or respiratory acidosis
- Transfusion of hemolyzed blood
- Hyperkalemic periodic paralysis (potassium is elevated during episodes of paralysis)
- Addison's disease (rare)
- Hypoaldosteronism (very rare)

Lower-than-normal levels of potassium (hypokalemia) may indicate:

- The person is not getting enough potassium intake in the diet
- Excessive potassium loss because of a gastrointestinal disorder -- e.g., chronic diarrhea or use of laxatives
- Vomiting
- Diuretic use
- Renal artery stenosis (narrowing of the major blood vessels to the kidney)
- Hyperaldosteronism ("True hyperaldosteronism" as with a tumor of the adrenal gland; "Pseudohyperaldosteronism" as in Liddle's Syndrome)
- Hypokalemic periodic paralysis (low potassium during an episode of paralysis)

- Cushing's syndrome (rare)
- Renal tubular acidosis (rare)

Additional conditions under which the test may be performed:

- Acute adrenal crisis
- Acute bilateral obstructive uropathy
- Acute nephritic syndrome
- Bulimia
- Chronic kidney failure
- Cushing's disease
- Cushing's syndrome caused by adrenal tumor
- Cushing's syndrome - exogenous
- Cushing's syndrome - ectopic
- Diabetic ketoacidosis
- Primary thrombocythemia
- Renal tubular acidosis - distal
- Rhabdomyolysis
- Thyrotoxic periodic paralysis

What the risks are

Risks associated with venipuncture are slight:

- Excessive bleeding
- Fainting or feeling light-headed
- Hematoma (blood accumulating under the skin)
- Infection (a slight risk any time the skin is broken)
- Multiple punctures to locate veins

Special considerations

The following factors can interfere with the test:

- Infusion of potassium-containing fluids
- Infusion of glucose or insulin

Drugs that can increase potassium measurements include aminocaproic acid, antineoplastic drugs, ACE inhibitors (such as captopril or enalapril) epinephrine, heparin, histamine, isoniazid, mannitol, some diuretics, and succinylcholine.

Drugs that can decrease potassium measurements include acetazolamide, aminosalicic acid, amphotericin B, carbenicillin, cisplatin, some diuretics, insulin, laxatives, penicillin G, phenothiazines, salicylates, and sodium polystyrene sulfonate.

Veins and arteries vary in size from one patient to another and from one side of the body to the other. Obtaining a blood sample from some people may be more difficult than from others. If puncturing the vein is difficult, trauma to the red blood cells may cause potassium to be released from them, causing a falsely elevated result.

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