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## Medical Encyclopedia: Hemoglobin

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### Alternative names

Hgb; Hb

### Definition

A hemoglobin test measures the total amount of hemoglobin in the blood. Hemoglobin is almost always ordered as part of a complete blood count (CBC). See also Hemoglobin electrophoresis.

### 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 to fill 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.

### How to prepare for the test

No special preparation is necessary.

In infants and children:

The preparation you can provide for this test depends on your child's age, interests, previous experiences, and level of trust. For more information on how you can prepare children for lab tests, see the following topics:

- 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

Hemoglobin is the protein that carries oxygen in the blood. It is contained in red blood cells. Both high and low hemoglobin counts indicate defects in the balance of red blood cells in the blood, and may indicate disease.

### Normal Values

Hemoglobin (varies with altitude):

- Male: 13.8 to 17.2 gm/dl
- Female: 12.1 to 15.1 gm/dl

Note: gm/dl = grams per deciliter

### What abnormal results mean

Lower-than-normal hemoglobin may indicate:

- Anemia (various types)
- Erythropoietin deficiency (from kidney disease)
- Red blood cell destruction associated with transfusion reaction
- Bleeding
- Lead poisoning
- Malnutrition
- Nutritional deficiencies of iron, folate, vitamin B-12, vitamin B-6
- Overhydration

Higher-than-normal hemoglobin may indicate:

- Congenital heart disease
- Cor pulmonale
- Pulmonary fibrosis
- Polycythemia vera
- Increased RBC formation associated with excess erythropoietin

Additional conditions under which the test may be performed:

- Anemia of chronic disease
- Clinical hemoglobin C
- Diabetes
- Giant cell (temporal, cranial) arteritis
- Hemolytic anemia due to G6PD deficiency
- Type 1 diabetes
- Idiopathic aplastic anemia
- Idiopathic autoimmune hemolytic anemia
- Immune hemolytic anemia
- Iron deficiency anemia
- Paroxysmal cold hemoglobinuria (PCH)
- Paroxysmal nocturnal hemoglobinuria (PNH)

- Pernicious anemia
- Placenta abruptio
- Polymyalgia rheumatica
- Rhabdomyolysis
- Secondary aplastic anemia
- Drug-induced immune hemolytic anemia

This test may be performed under many conditions and in assessment of many diseases.

### What the risks are

- Excessive bleeding
- Finting 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

Hemoglobin (Hb), the main component of red blood cells, is a protein that carries oxygen from the lungs to the body's tissues, and carbon dioxide from the tissues to the lungs to be exhaled.

At a pressure of 100 mmHg in the lung's capillaries, 95-98% of the Hb is combined with oxygen. In the peripheral tissues, where the pressure may be as low as 20 mmHg, less than 30% of the oxygen remains combined with Hb. (See also serum hemoglobin.)

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.

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Updated by: Rita Nanda, M.D., Department of Hematology/Oncology, University of Chicago Medical Center, Chicago, IL. Review provided by VeriMed Healthcare Network.



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