

Blood Counts for Patients Receiving Chemotherapy or Radiation Therapy

A blood count is done to look at the blood using very sensitive machines. The number and type of blood cells are counted and recorded. The results help your doctor plan your child's medical treatment.

How a complete blood count is done

A complete blood count (CBC) is done to find out the hemoglobin value and the number and types of blood cells and platelets.

This is how the blood count is done:

- A sample of blood is taken either from a little stick in the finger or from a vein in the arm or other part of the body. If your child has a central line, the blood sample may be taken from it.
- After the blood is collected, a drop is spread thinly on a glass slide in the laboratory.
- The blood on the slide is examined under a microscope. The different cells are counted.
- The rest of the blood collected in the container is run through a very sensitive machine for measurements and counting.

Why blood counts are important

The number and type of cells in your child's blood can tell the doctor a lot about your child's condition. A blood count helps to show the doctor how well the treatment is working. If your child is getting chemotherapy or radiation therapy, the doctor needs to check the blood counts regularly to see what effects the treatments have on normal cells.

The next section lists the different kinds of cells in the blood, the signs and symptoms to look for when blood counts are low, and suggestions for caring for your child at home.

The blood

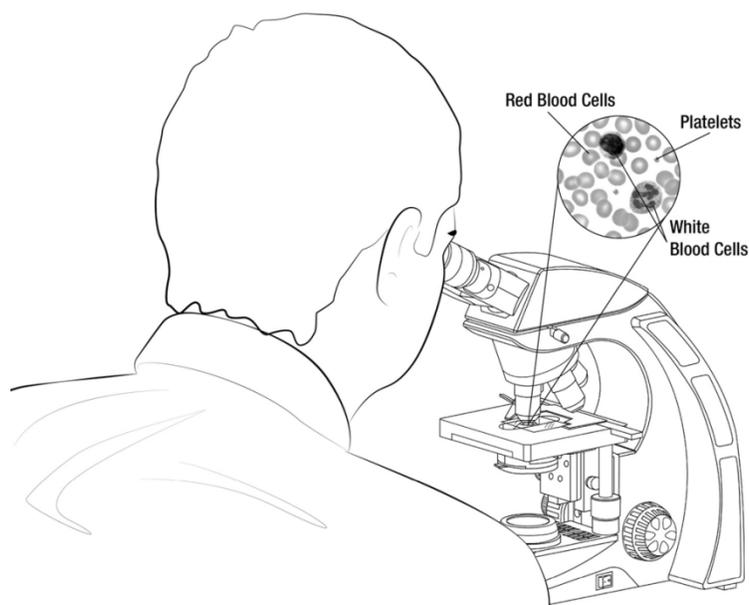
Blood circulates to all parts of the body. The heart pumps the blood to and from the body's organs through the arteries, veins, and capillaries. Oxygen and nourishment are carried by the blood to all body cells. The liver and kidneys filter the blood and remove waste from the blood.

Blood is made up of cells that float in pale yellow liquid called *plasma*. The cells include red blood cells, white blood cells and platelets (Picture 1).

Proteins, salts and blood sugars are also carried in the plasma.

Blood cells are made in the soft, spongy center of the bones called the *bone marrow*. Anything that goes wrong in bone marrow will show up in the blood counts.

Many diseases, including cancers, involve the bone marrow. Often, treatment for cancer or blood disorders also affects the bone marrow.



Picture 1 How blood looks under a microscope.

Red blood cells

In infants less than a year old, the red blood cells are made in the bone marrow of all the bones. In people older than one year, they are made in the marrow of the pelvic bones, breastbone, ribs and backbone only. Red blood cells contain hemoglobin (HE-moe-glow-bin). The oxygen that is breathed into the lungs is carried to all parts of the body by the hemoglobin. A normal hemoglobin value for a child is 12 to 14. The normal hemoglobin value for patients receiving chemotherapy or radiation therapy is 8 to 10.

Signs of low hemoglobin

After chemotherapy or radiation therapy, the bone marrow does not make new red blood cells as fast. With fewer red blood cells, anemia (low hemoglobin) results. If your child's hemoglobin is low, you may see these signs of anemia:

- Paleness
- Dizziness
- Weakness
- Tiredness
- Listlessness (feeling “lazy”, no energy)
- Irritability
- Tendency to feel cold
- Shortness of breath

The blood, continued

Treatment of low hemoglobin

A **packed red blood cell transfusion** may be needed. This increases the red blood cell count until the bone marrow is able to make new red blood cells. Usually, a transfusion is given when the hemoglobin is 7 to 8 or lower. Packed red blood cells are given through an IV. It takes 2 to 4 hours for a transfusion. Transfusions can be given in the Outpatient Clinic or during your child's hospital stay.

See Helping Hand HH-I-78, *Blood Transfusion Aftercare*, for signs of transfusion reactions. Report any signs of low hemoglobin to the hematologist.

Home care

- Your child's body needs more rest than usual. Try to plan activities that allow for rest every couple of hours. Avoid activities that take a lot of energy. Encourage low-key activities such as reading, artwork, TV, video games, board games, cards, music, etc. Plan activities for when the child feels best.
- Your child can avoid dizziness by getting up and moving slowly.

Platelets

Platelets are made in the bone marrow. The platelets help stop bleeding if a blood vessel is cut or injured. A normal platelet count is 150,000. A normal platelet count for a person getting chemotherapy or radiation therapy is 20,000 to 50,000.

Signs and symptoms of low platelets

Thrombocytopenia (throm bo sigh toe PEE nee ya) means a low platelet count. When the platelet count is low, there is more of a chance of bleeding. Also, it may be harder to stop bleeding after an injury. If your child's platelet count is low, you may notice these signs:

- Bruises
- Nosebleeds
- Pink or red urine
- Severe headache
- Trouble waking up
- Petechiae (pe TEE key i) (purple freckles under the skin)
- Oozing blood from the mouth or gums
- "Coffee ground" vomit
- Bright red or black bowel movements

Treatment of low platelets

A platelet transfusion may be given through an IV, if the platelet count is **very** low or if there is constant bleeding. Platelet transfusions reduce the risk of bleeding until the bone marrow starts making new platelets. The transfusion takes about an hour. It can be done in an outpatient clinic or during your child's hospital stay.

Platelets, continued

How to prevent bleeding and injury

- Your child should avoid doing things that may cause injury or bruising. Examples are riding bikes or scooters, climbing trees, roller-blading, four-wheeling, racing go carts, skiing, ice skating and water skiing. He or she should avoid rough sports such as soccer, football, basketball and wrestling, as well as gymnastics, jungle gyms, amusement park rides and trampolines. Protect small children from falls off furniture, down steps, etc.
- Check with your doctor before your child has any dental work done. Use soft toothbrushes; no flossing if it causes oozing from the gums. See Helping Hand HH-II-45, *Mouth Care for Chemotherapy Patients*.
- Do not give ibuprofen or aspirin or any medicine that contains these ingredients. They make platelets less effective.
- Remind your child not to pick his nose or a scab or sore. Your child needs to avoid blowing the nose forcefully.
- If your child shaves, he should use an electric razor (no razor blades).

Home care

- See Helping Hand HH-I-78, *Blood Transfusion Aftercare*, for signs of transfusion reaction.
- Tell the hematologist if you see any signs of low platelets.
- If your child has a small cut while platelets are low, apply pressure to the area with a dry gauze pad for 15 minutes. If bleeding continues, call the hematologist. If your child is seriously injured while the platelet count is low, **immediately** call an emergency squad to take the child to the nearest emergency room.
- Apply a cold pack or ice pack to any bleeding area. For nosebleeds apply a cold cloth on the nose and pinch the nostrils together for 10 to 15 minutes. Tilt the head forward. (See Helping Hand HH-I-84, *Nosebleeds*).

White blood cells

White blood cells fight infection in the body. They are made in the lymph nodes, spleen and bone marrow of certain bones. Thousands of lymph nodes are linked together along the circulatory system all over the body.

A normal white blood cell count is between 4,000 and 10,000. A normal white blood cell count for patients receiving chemotherapy or radiation therapy is 3,000 to 4,000. One way to see if your child can fight infection is to find the Absolute Neutrophil Count (ANC). A neutrophil (NEW tro fil) is one kind of white blood cell. To find the ANC, the total white blood count is multiplied by the percentage of neutrophils.

White blood cells, continued

If the ANC is above 500, the child receiving chemotherapy or radiation therapy has a good chance of fighting infection well. If the ANC is less than 500, the child will have much less ability to fight infection.

Signs and symptoms of low white count

A decrease in the number of white blood cells is called neutropenia (new tro PEE nee ah). If your child's ANC is low, there is an increased risk of an infection. Signs of infection include:

- Sore throat
- Chills
- Rash
- Burning or pain with urination
- Drainage from the ear
- Fever (temperature of 100.5° under the arm or 101°F by mouth or higher)
- Diarrhea
- Cough that does not go away
- Stiff neck
- Any areas of redness, warmth, or pain
- Drainage from central venous catheter site

If your child is exposed to any contagious diseases call the hematologist/oncologist.

Treatment of low white count

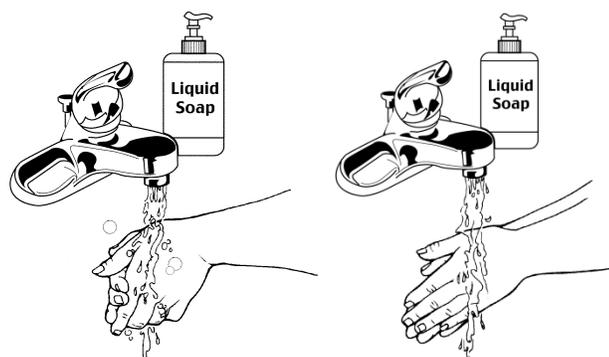
Most infections require 7 to 14 days of antibiotic treatment in the hospital. Antibiotics are given through an IV. If you are told to come to the Emergency Room or Hematology Clinic, tests will be done to look for the source of infection. Tests that may be done are blood cultures, urine culture, chest X-ray and sinus X-ray.

Preventing infection

You cannot avoid all infections when your child's blood counts are low no matter what you do.

You can reduce the chances of your child getting an infection by doing these things:

- Good hand washing is the best way to prevent infections! Wash your hands often, especially after using the bathroom and before eating (Picture 2). See Helping Hand HH-IV-80, *Hand Washing*. Wash skin daily and clean thoroughly after bowel movements.
- No mowing the grass or riding on tractors while others mow or plow. Stay away from dusty areas like fairs and barns.
- No cave exploring (spelunking)



Picture 2 Washing hands often can help to prevent infections.

White blood cells, continued

- Stay away from barns and farm animals. Do not let your child groom pets, empty or clean out litter boxes or clean up pet cages.
- No birds or reptiles (lizards, turtles, etc.)
- No digging in dirt or sand.

Preventing infection, continued

- No swimming in creeks, rivers or lakes. Also stay away from stagnant water. Stale water in vases of cut flower or humidifiers can harbor harmful bacteria.
- Avoid people with chickenpox or shingles and report possible exposures to the hematologist.
- No drinking raw milk. No eating raw or undercooked meat or eggs (no cookie dough or “sunny side up” eggs).

Skin and mouth care

- No sharing of toothbrushes, cups, washcloths or thermometers. Practice good oral hygiene (brush the teeth four times per day). Toothbrushes hold bacteria, so replace them every 3 months. Use a new toothbrush after treating a mouth infection (thrush).
- Your child should wear shoes to prevent cuts on feet.
- Wash cuts right away with soap and water.
- Avoid sunburn; apply a sunscreen lotion whenever your child goes outside.

Home care

- Your child’s doctor or nurse will help you understand the results of the blood test. Be sure to ask if you have any questions.
- Stay away from people who have chickenpox. Chickenpox can cause serious infection in a child getting chemotherapy. Tell the hematologist if your child has been around someone who develops chickenpox.
- It is important to call the hematologist/oncologist as soon as you notice a sign of infection. Do not just give acetaminophen (such as Tylenol®). This may reduce the fever but will not treat the infection that is causing the fever.
- Call the hematologist/oncologist for instructions before bringing your child to the Emergency Room or office. This way, the doctors will be expecting you and will be more prepared for what your child may need.
- If you come to the Emergency Room, tell the person at the desk your child has been getting chemotherapy or radiation therapy and may need an isolation room. Have your child wear a mask.

When to wear a mask

Have your child wear a mask if:

- Your child is coming to or leaving the hospital or walking around in the hospital
- Your child is around an area where there is construction being done
- Your child has to be outside around an area where grass is being mowed or fields are being plowed.

ANC Precautions

ANC less than 100	ANC 100 to 500	ANC more than 500
<ul style="list-style-type: none">▪ Stay home.▪ Friends may come to visit as long as they are healthy and have no ill family members.	<ul style="list-style-type: none">▪ Try to go to places during less busy times (go out to dinner early, go to a weekday matinee).▪ Avoid crowds (church, school, shopping mall, restaurant, movie theaters, grocery store, and parties with lots of other children).	<ul style="list-style-type: none">▪ Avoid contact with people who are ill.▪ Continue to try to avoid big crowds (but you can be a little less strict).

For directions to the nearest Laboratory Service Center, please call Laboratory Services at (800) 934-6575 or visit NationwideChildrens.org/Lab.