

Understanding Your Complete Blood Count

This information was developed to help you understand your complete blood count and describe neutropenia, anemia, and thrombocytopenia.

Part 1: **The measurements in a complete blood count**

What is a complete blood count?

A complete blood count, often referred to as a CBC, is a common blood test. A CBC provides detailed information about three types of cells in your blood: red blood cells, white blood cells, and platelets. These blood cells are made in the bone marrow, the spongy tissue filling the center of your bones. Bone marrow in the skull, sternum (breast bone), ribs, vertebral column (backbone), and pelvis produces these blood cells.

Each type of blood cell plays an important role in your body's normal function.

What does a complete blood count measure?

A complete blood count includes five major measurements:

▶ **White blood cell (WBC) count**

White blood cells fight infections. They are measured in thousands per cubic milliliter (K/uL) of blood. A WBC of 4.8 K/uL is 4,800 cells.

▶ **Red blood cell (RBC) count**

Red blood cells carry oxygen to and remove waste products from the body's tissues. These cells also contain hemoglobin. Red blood cells are measured in millions per cubic millimeter (mil/uL) of blood.

▶ **Hemoglobin (HGB) value**

Hemoglobin gives red blood cells their color. Hemoglobin carries oxygen from the lungs to the tissues and takes carbon dioxide (the waste products) from the tissues to the lungs. From the lungs, carbon dioxide is exhaled. Hemoglobin is measured in grams per deciliter (g/dL) of blood.

▶ **Hematocrit (HCT) value**

The hematocrit is the percentage of red blood cells in relation to your total blood volume.

▶ **Platelet count**

Platelets help to stop bleeding by forming blood clots. They are measured in thousands per cubic millimeter (m/uL) of blood. A platelet count of 200 K/uL is 200,000 cells.

What are the normal ranges of these measurements?

Each measurement in a complete blood count has a normal range that will be noted on your complete blood count:

- ▶ WBC: 3.3-8.7 K/uL
- ▶ RBC: 3.93-5.69 M/uL
- ▶ HGB: 12.6-16.1 g/dL
- ▶ HCT: 38-47.7%
- ▶ Platelets: 147-347 K/uL

Part 2: A more detailed look at what the complete blood count measures

White blood cells

These cells are the mobile units of the body's infection-fighting system. White blood cells travel in the bloodstream to areas of infection and destroy the responsible bacteria. However, the WBC lab value is not meaningful unless the "differential" is also known.

The differential measures each of the five types of white blood cells:

- ▶ neutrophils (polys and bands)
- ▶ basophils
- ▶ eosinophils
- ▶ lymphocytes
- ▶ monocytes

The differential is usually based on 100 cells counted in a laboratory sample.

What are neutrophils?

Neutrophils are the most numerous white blood cells. They make up about 56 percent of white blood cells. Neutrophils are

the "soldiers" that fight infections. They eat or gobble up the infectious particles (bacteria) in your body.

On your lab sheet, you will see the words "polys" and "bands." Polys are mature neutrophils. Bands are young polys, which also fight infections.

What is the ANC or AGC?

The absolute neutrophil count (ANC), also called absolute granulocyte count (AGC), is the measure of the number of infection-fighting white blood cells in your blood.

How is the ANC calculated?

To calculate the ANC, the number of white blood cells (WBC) and the percentage of polys and bands must be known. Then, the number of white blood cells is multiplied by the percentage of polys and bands.

For example, let the number of white blood cells be 300. (This number would be 0.3 K/mm³ on the lab sheet. To get this number, move the decimal three places to the right.) Let the number of polys be 10 percent (0.10), and bands 5 percent (0.05). The ANC is found by doing the following:

$$\begin{aligned} &300 \times (0.10 + 0.05) \\ &= 300 \times 0.15 \\ &= 45 \end{aligned}$$

The ANC is 45.

Part 3: **Low blood counts—neutropenia**

What does it mean to have a low ANC or an ANC lower than 500?

The normal neutrophil count is 2,500-6,000. When you have 1,000 or fewer neutrophils, your risk of infection is increased. When your ANC is lower than 500, you are at risk for getting a serious infection. This condition is called “neutropenia.”

If you are neutropenic and develop a fever or signs of infection, contact your doctor immediately.

You may be given antibiotics to fight the infection.

If I am neutropenic, should I take special care of myself?

If your ANC is low, be alert for the following signs and symptoms of infection:

- ▶ fever (temperature of 100.4 degrees F (38.0 degrees C) or higher)
- ▶ shaking chills
- ▶ flushed skin
- ▶ sweating
- ▶ frequent urination or burning when urinating
- ▶ redness, tenderness, or pain anywhere on the body
- ▶ general feeling of tiredness or flu-like symptoms (sore throat, sneezing, runny nose, coughing, nausea, vomiting, diarrhea, shortness of breath, chest discomfort)

If you are neutropenic and have any of these signs or symptoms, contact your doctor immediately.

If I am neutropenic, how can I prevent myself from getting infections?

The following list contains information to help you care for yourself while you are neutropenic.

General precautions

- ▶ Wash your hands before eating and after using the toilet, blowing your nose, coughing, or sneezing. Washing your hands frequently is very important.
- ▶ Check your temperature once a day when you are neutropenic. If your temperature is between 100.4 and 100.9 degrees F two times in 24 hours, or if your temperature 101.0 degrees F or higher once, notify your nurse or doctor immediately. Take Tylenol only on your doctor’s advice. Do not take aspirin.
- ▶ Check for signs of infection in such areas as the site of a central venous catheter or port, or any tube or catheter site. Also check the mouth, groin, and perineum (the area between the penis and the rectum in men, and between the vagina and rectum in women).
- ▶ Signs of infection include redness, swelling, tenderness, drainage, or odor. If you have any signs of infection, notify your nurse or doctor.
- ▶ Shower or bathe daily. If your skin becomes dry, use unscented lotion or oils to soften it and prevent cracking. Use an electric shaver rather than a razor.

Mouth care checklist

- ▶ Rinse teeth and gums with plain water after meals and at bedtime.
- ▶ Use a soft toothbrush. Floss only if your ANC is greater than 500 and platelet count is greater than 50,000.
- ▶ Use a lubricant (such as A & D ointment) on the lips to prevent chapping.
- ▶ Wear well-fitting dentures.
- ▶ Have dental work done only if you first consult your doctor.

Precautions to take during daily activities

- ▶ Avoid having contact with crowds, and people with illness / infections.
- ▶ Avoid working with dirt/soil
- ▶ Avoid cleaning bird cages, cat litter boxes, and fish tanks.
- ▶ Wear shoes in the hospital and at home.
- ▶ Do not have manicures or pedicures, and do not have nail tips or false nails applied.
- ▶ To promote hygiene during sexual activity, avoid excessive friction during intercourse by using a water-based lubricant. Avoid rectal intercourse. Use a birth control method recommended by your nurse or doctor.
- ▶ Avoid hot tubs and Jacuzzis. Swim only in chlorinated swimming pools.
- ▶ Avoid immunizations unless directed by your doctor.

- ▶ Limit your exposure to pet excrement, fresh flowers, house plant, and stagnant water. Wash your hands after touching any of these items.
- ▶ If you cut or scrape your skin, clean the area immediately with soap and warm water. Then apply a bandage.
- ▶ Avoid using enemas, rectal thermometers, and suppositories. Women should not douche or use tampons or vaginal suppositories.

Anemia

What happens when I don't have enough red blood cells?

When you do not have enough red blood cells, you develop a condition called "anemia." When you are anemic, your hematocrit and hemoglobin levels will be below normal. You may feel weak and tired, and you may also have these symptoms:

- ▶ dizziness
- ▶ shortness of breath
- ▶ heart palpitations (racing heartbeat)
- ▶ pounding in your head
- ▶ ringing in your ears

Anemia precautions list

By following these suggestions, you can lessen or prevent some of the symptoms of anemia.

- ▶ Rest often during the day and sleep enough at night.
- ▶ Rest between activities.

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- ▶ Get up slowly from a sitting or reclining position. This will lessen dizziness. You may need blood transfusions if your hematocrit or hemoglobin is too low.

Thrombocytopenia

What happens when I don't have enough platelets?

When you do not have enough platelets, you have a condition called “thrombocytopenia.” You may bruise easily, and you may also have some of the following signs:

- ▶ tiny, pinpoint-sized red or purple spots on your skin (petechiae)
- ▶ nose bleeds
- ▶ bleeding gums
- ▶ prolonged bleeding from a cut
- ▶ black or bloody stool
- ▶ brown or red urine
- ▶ increased vaginal bleeding

Thrombocytopenia precautions list

Many over-the-counter drugs contain aspirin, and aspirin prevents platelets from working as they should. Avoid taking any drug that contains aspirin. (The table included in this information lists common aspirin-containing products.) Other over-the-counter drugs for pain or fever may also affect platelet function. Examples include ibuprofen (Motrin, Advil, Midol, Pediacare Fever) and naproxen (Naprosyn, Naprelan, Aleve, Anaprox). Speak with your doctor before taking medication.

You can also observe the following precautions to prevent bleeding when your platelets are low:

Personal hygiene

- ▶ Use a soft toothbrush. If your gums bleed during brushing, use Toothettes instead of a toothbrush. Do not floss if platelets are less than 50,000.
- ▶ Use an electric shaver rather than a razor, especially if your platelet count is lower than 20,000.
- ▶ Wear shoes in the hospital and at home.
- ▶ When you blow your nose, do it gently.
- ▶ Avoid using enemas, rectal thermometers, and suppositories. Women should not douche or use tampons or vaginal suppositories.
- ▶ Eat properly so that you do not become constipated.
- ▶ Avoid eating irritating foods such as popcorn or apple peels.

Precautions to take during daily activities

- ▶ **Avoid wearing tight-fitting clothing.** For example, do not wear shirts with elastic wristbands, or skirts or slacks with tight waist-bands.
- ▶ **Avoid cutting with sharp knives or working with sharp blades.** Wear gloves when gardening.
- ▶ **Avoid contact sports such as football and hockey.**

► **Speak with your doctor about sexual intercourse.**

If your platelet count is too low, sexual intercourse may not be advisable.

If you have sexual intercourse, use water-based lubricants as needed.

Other ways to prevent bleeding

- Notify your nurse or doctor if you notice new petechiae or bruises.
- Notify your nurse or doctor immediately if you have a nosebleed, bleeding gums, bleeding from a procedure or incision site, or blood in your urine or stool.
- Notify your nurse or doctor if you have headaches, extreme drowsiness (unrelated to medication), confusion, or falls.

Common Aspirin-Containing Products

Acetylsalicylic acid

ASA

Adprin-B

Adult Analgesic Pain Reliever

Aggrenox

Alka Seltzer products

Alor 5/500

Anacin products

Arthritis Foundation Pain Reliever

Arthritis Pain Formula

Ascomp with codeine

Ascriptin products

Aspercin

Aspergum

aspirin

Aspirin

Aspirin-mox

Back-Quell

Bayer products

BC Powder

BC products

Buffasal

Bufferin products

Butalbital compound

Carisoprodol compound Combiflex

Cope

Durabac

Easprin

Ecotrin

Emagrin Forte

Emagrin

Empirin

Empirin with codeine

Equagesic

Excedrin products

Fiorinal tablets and capsules

Goody's Extra Strength

Goody's Headache Powder

Goody's Body Pain Powder

Halfprin

Heartline

Levacet
Lortab ASA
Momentum
Orphengesic products
Norgesic
Norgesic Forte
Norwich products
PAC Analgesic
PAC tablets and capsules
Painaid products
Pain Reliever
Pamprin products
Panasal 5/500
Pepto-Bismol
Percodan
Robaxisal
Saleto
Sodol compound
Soma Compound
Soma Compound with codeine
St. Joseph Low Dose Adult Aspirin
Stanback powder and tablets
Synalgos-DC
Talwin compound
Vanquish
Zee-Seltzer
Zorprin

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