

# 1 Lab Results

5-12-06

## 1.1 Hematology

Terminology

Blood count – CBC

Hemogram – anything that says gram, it means they've done a study.

CBC w/ differential – they differentiate between the different types of white blood cells.

Blood Smear – blood dried, dried and and looked at under microscope

Hemoglobin – oxygen carrying part of blood

Hematocrit – capillary tube of blood, spin down, % of packed RBC's in the blood.  
How anemia used to be measured.

Platelet count – the clotting cell fragments. They act as a temporary clot

Why do one? Screen for anemia and infection. Part of a routine screen.

Anemia: not enough RBC's or they aren't carrying enough oxygen.

Sample: used to be venipuncture, now it can be done with finger stick (heel stick with children)

Complete Blood Count: automated count in the blood, WBC, RBC, platelet, etc...

It is normally run in an automated fashion by a machine. In most cases the machine is pretty accurate. If there are significant abnormalities, a blood smear test will be performed and read to evaluate what is going on.

Plasma – the fluid part of blood (blood minus formed elements). The only way to actually measure this is to use an anticoagulant.

Serum – plasma minus the clotting stuff. (No anticoagulant is used) This is the more natural state. (You may only get 20%-40% of the actual fluid as opposed to the 75% of plasma). If it sits for too long your results start to get inaccurate.

At what point to do we stop making red blood cells in our organs? About 5 or 6, after that it's formed in the bones. By late teens and early 20's in the sternum and the tops of the hipbones.

You can do a bone marrow biopsy to determine what's really going on.

WBC: Five types:

Neutrophils: most numerous, first for **acute infections**. Phagocytic. If too elevated it means leukemia.

Lymphocytes: Agranulocytes. Number two in the defense. Specific for antigen with a given antibody. **Chronic infections** If too elevated it can be leukemia.

Basophils: Histamine response. **Allergic reactions**

Eosinophils: parasites, allergic reactions

Monocytes: Chronic infections, phagocytic, and big. These will eat anything, take the active part and present the antigens to the lymphocytes. Tends to be elevated with lymphocytes.

“shift to the left” – archaic term that comes from manual counts. Relates to higher neutrophils.

In leukemia you see more immature WBC’s showing up.

Anemia – used to be determined by hematocrit is % of packed RBC’s.

You look for size and structure of RBC’s.

Cycle Cell anemia: a genetic abnormality with abnormal red blood cells with abnormal amounts of oxygen. It is a cellular adaptation to survive into reproduction where malaria is epidemic. It causes malaria viruses to not survive. People can survive with cycle cell anemia as long as they are not stressed. It can also show up in Mediterranean populations. A crisis can occur when the cells go too far into oxygen debt and they start to tear up the capillaries.

Platelets – looks at size, structure and number

CBC – checks for anemia or infections. A panel of tests that includes:

WBC: 3.8-10.8 thousand/mcl (7.5). Decreased with autoimmune diseases, some medications, or some type of bone marrow disease/failure. Increase with leukemia, infections, inflammations.

- Neutrophil: 60% Acute Infection
  - SEGS – the nucleus is segmented.
  - Bands – a young neutrophil will have a banded appearance.
  - PMN – polymorphic neutrophils
  - GRANS - granulocytic
- Lymphocyte: 30% Chronic Infection
- Monocyte: 5% (macrophage: monocyte outside the bloodstream) Finds the antigens for the lymphocytes.
- Eosinophil: 3% - parasites/allergies
- Basophil: 1% - allergies, histamines

RBC: 5 million per cubic mcl.

- Decreased in anemia.
- Increased can be absolute or relative. Relative mean fluid loss. Absolute means overproduction – Go up with changes in oxygen supply.
- Polysythemia: abnormal overproduction of RBC’s.
- Indices: calculated based on RBC, hematocrit, and hemoglobin. Purpose is to determine type of anemia.
  - MCV – mean corpuscular volume: 90 (size)
  - MCH – mean corpuscular hemoglobin: 30 (amount/weight of hemoglobin)

- MCHC – mean corpuscular hemoglobin concentration 34%

Hemoglobin: 15 g/dl

Hematocrit: 45% (3 \* hemoglobin = hematocrit)

RDW: RBC Distribution Width.

- A large number indicates too many immature RBC's in the blood.
- Young RBC's are much larger than older RBC's
- Under normal circumstances all RBC's are roughly the same size.

Polychromatophilia (sp?) – abnormal RBC shape

Anisocytosis (sp?) – abnormal RBC size

Platelet Count: 250 thousand/mcl

- Decreased: when greater numbers used in bleeding or with genetic disorders.
- Increased: when genetic disorders.
- MPV – size of platelets – Larger platelets are larger than older ones.

## 1.2 Lipid Profile

### Cholesterols:

- HDL – High density lipoprotein
- LDL – Low density lipoprotein

Fats don't travel well in water. Really large lipids don't make it to the liver. They travel through the lymph system and aren't processed by the liver.

Gamma globulin are part of the immune systems.

Other globulins carry the lipids around. These are the cholesterols. The big fluffy carriers are the worst kind. They can get stuck (LDL's). The HDL's are more compact and are healthier. (VLDL are the other forms)

It all starts out as chylomicrons, and then switches to one of the other forms as it is used.

- Cholesterol: 180
- HDL: 85
- LDL: 81

Use to determine medication... ; -P

### Cholesterol:

- A steroid that is essential for life.
- Forms hormones, bile acids, etc...
- Usually measured via venipuncture
- Use to estimate risk of developing a disease, not to measure disease.
- Recommended once every 5 years.
- Should be below 200.
- Moderate risk: 200-250 is borderline.
- High risk: over 250
- Should be measured when healthy
- Usually low during acute illness, immediately following heart attack or stress.

- **Should wait 6 weeks after illness**
- You don't need to fast. It doesn't change in response to a meal.
- It does change in response to changes in eating patterns over a couple of weeks.
- Cholesterol less than 100 can be caused by cancer, liver disease, or malnutrition.
- Cholesterol is high during pregnancy. (Should wait 6 weeks)
- Drugs and Vitamin D can increase it.

**Fats:**

- Triglycerides – common fat

Fat – triglyceride that is solid at room temperature

Oil – triglyceride that is liquid at room temperature

**Triglyceride: 100**

Does change in response to a meal. It will be elevated after a meal.