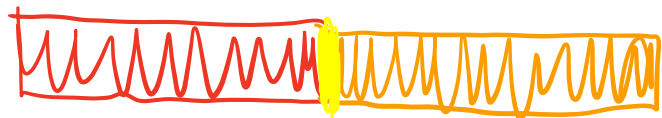


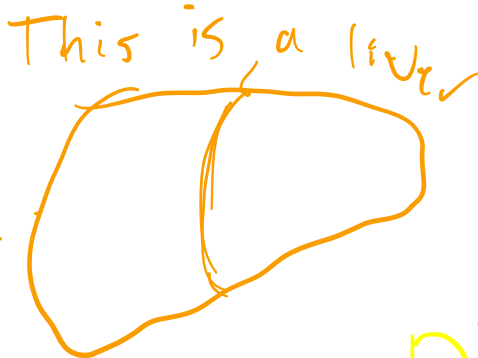
What is Blood?



45%
Hematocrit
Red blood cells

55%
Plasma
92% Water
7% Proteins
Other important stuff

Dehydration
would decrease plasma volume which would also increase hematocrit. Plasma centers want a low hematocrit. Not too low



Where/How is blood made?

Platelets

Bone Marrow (Hematopoietic cords)

Hematopoietic Stem cell (Pluripotent)

↓ The other way this cell could go would be to make cells of adaptive immune system

Common Myeloid Progenitor

EPO ↓ The other way here would be innate immune cells

Megakaryocyte-Erythrocyte progenitor

EPO ↓ Erythrocyte progenitor

↓ Red Blood Cell (Erythrocyte)

TPO made by liver

As RBC matures it goes from a large, clear, blueish cell to a condensed cell w/ no nucleus or any other organelles. The last stage before maturity is called reticulocyte. This is important because this will increase w/ anemias

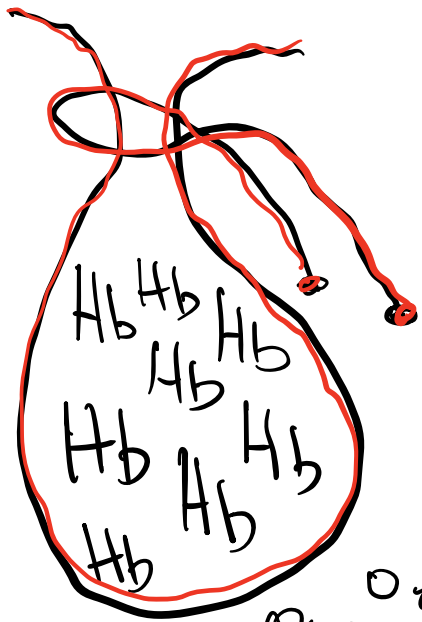


The kidneys make erythropoietin to stimulate further differentiation. Athletes use this to gain advantage in performance but is currently illegal. Blood Doping

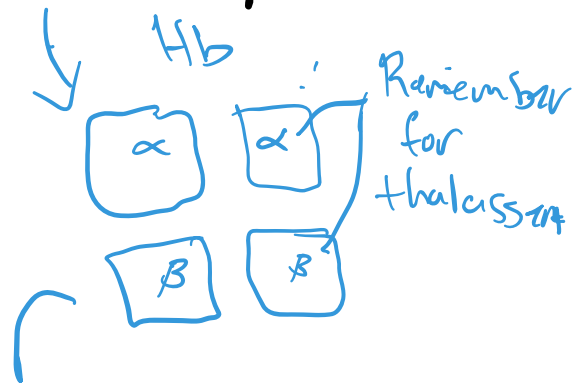
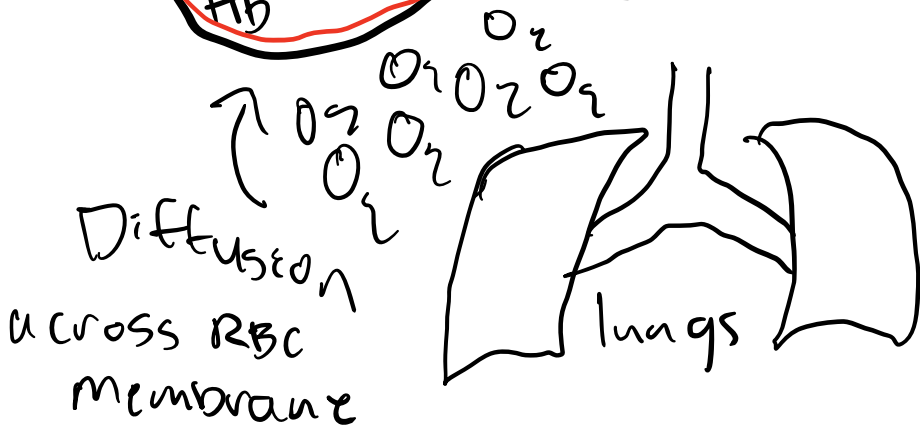


What do red blood cells do?

Red blood cells are bags of hemoglobin
- 45% of your blood is bags of hemoglobin



The real question is what is hemoglobin.



4 subunits

Different Types of Hemoglobin

Hb A 90% Adult

Hb A₂ 3% Adult

Hb A_{1c} 4-6% Sugar on Hb

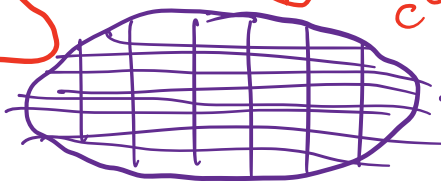
Hb F 1% Fetal

What happens to old RBCs?

When RBCs get old, they aren't as elastic as they used to be. They don't bend & comply

bad  bad

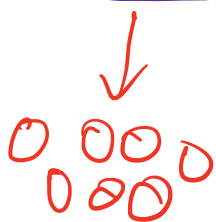
good  good



The spleen

Filters good (pliable)

Cells from bad (rigid) cells. With structures called staves



Recirculated

RBCs usually live 120 days

What is Anemia?

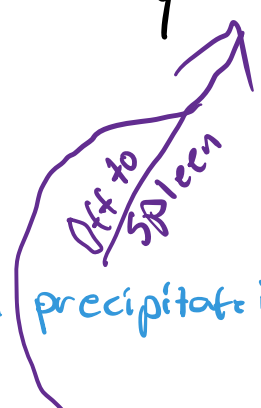
- Reduced ability of RBCs to carry oxygen.

When we say RBCs we really mean Hemoglobin (Hb).

Thalassemia - More rare

- β mRNA mutation - leads to α chain precipitation in RBC

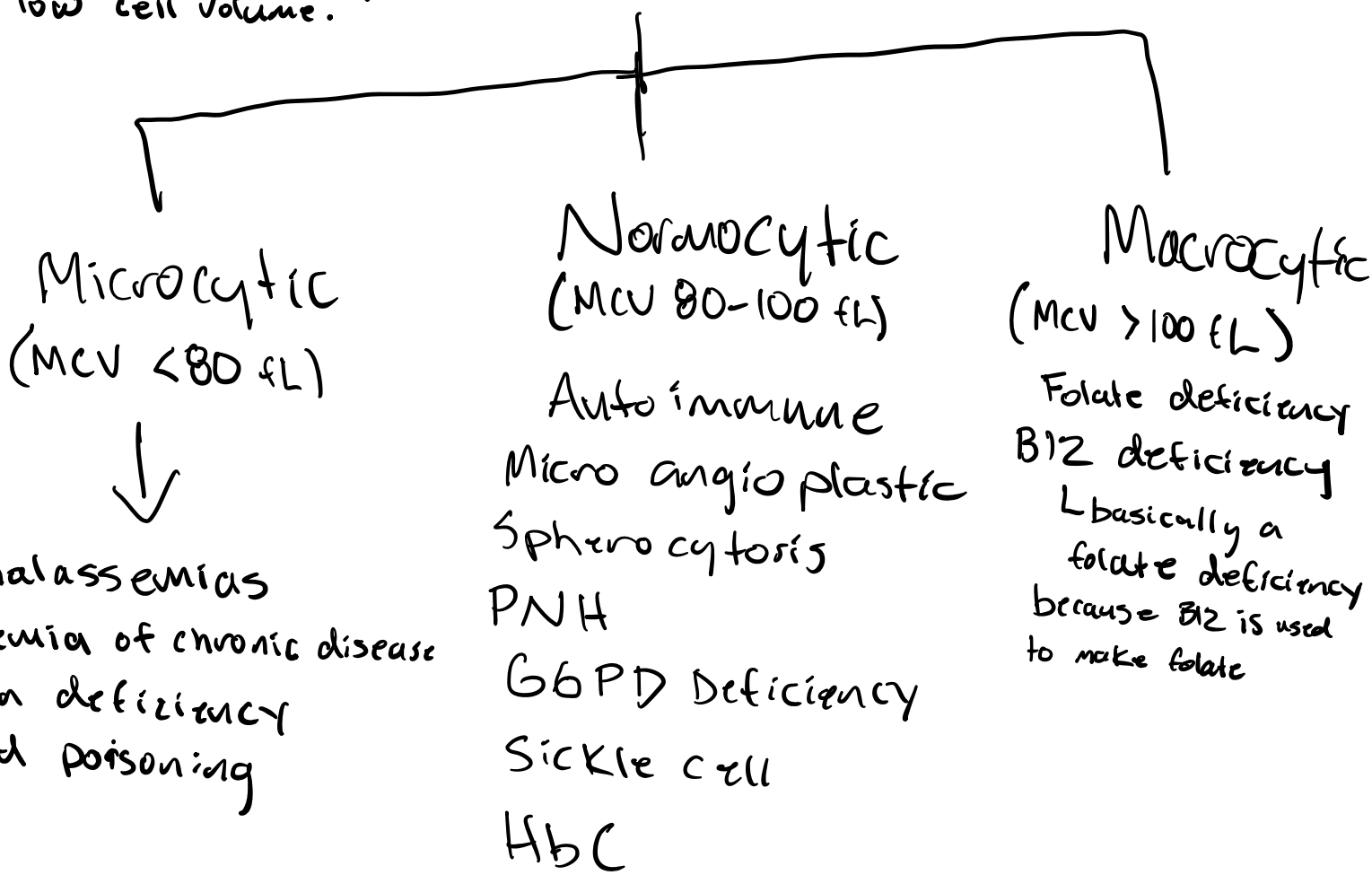
- α mutation of 1 or all 4 of the genes. Leads to β chain precipitation. L3 or 4 mutations are most common for presenting w/ illness



Other diseases associated w/ anemia

The MCV is the mean cell volume which is described the volume of a single RBC. Microcytic would mean you have a low cell volume.

Anemia



If you look any of these up, find the mutation and that will tell you at what point hemoglobin is messed up.