

Circulatory System

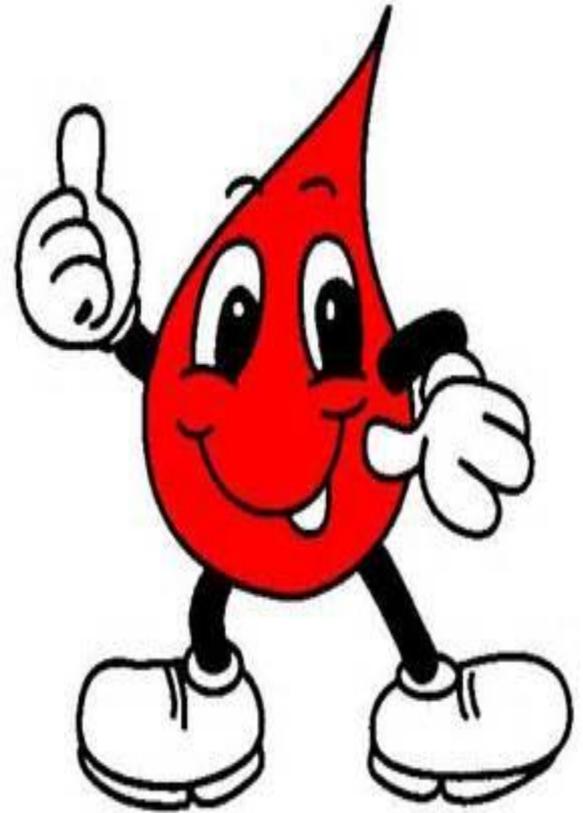
Blood Composition

DHO8 7.8, pg 194

HS1 / 2017-2018

Blood

- ▶ Tissue that flows through the CV system
- ▶ Adults have 4–6 quarts of blood
- ▶ Transports:
 - **O₂** (from lungs)
 - **CO₂** (to the lungs)
 - **Nutrients** (from digestive system)
 - **Metabolic & waste products**
(from cells to organs of excretion)
 - **Heat** (from body parts)
 - **Hormones** (from endocrine glands)

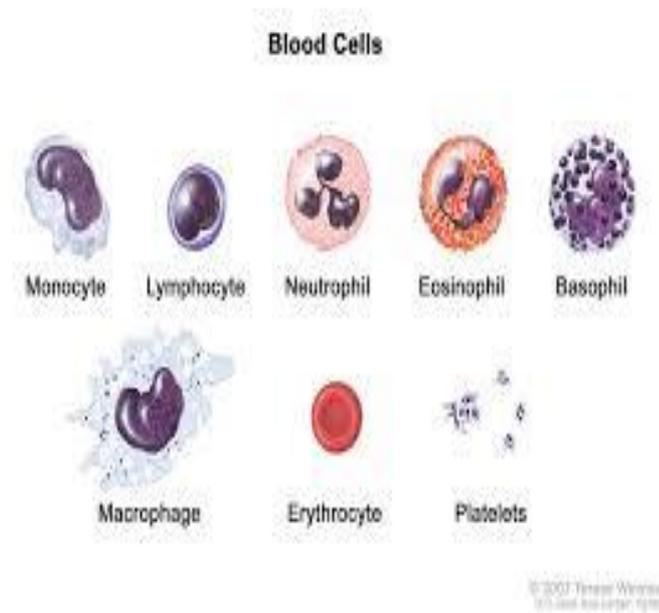


Blood

<https://www.youtube.com/watch?v=R-sKZWqsUpw>

The Components of Blood and Their Importance (52sec)

Made of 2 items:

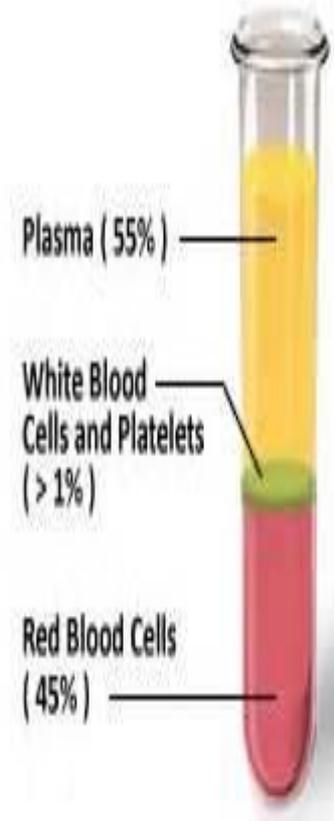


1) Liquid portion called plasma

2) Solid portion called blood cells

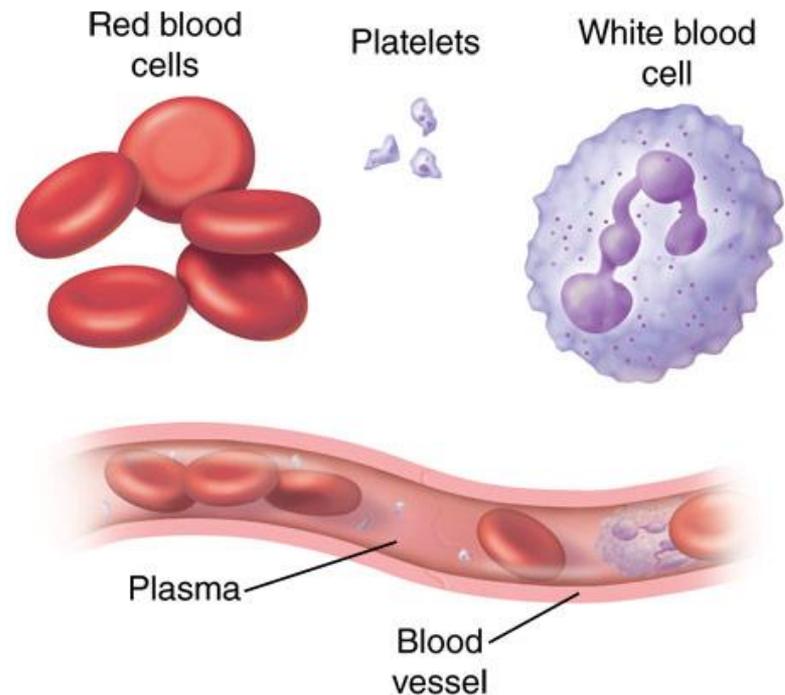
Plasma

- ▶ Fluid portion of blood
- ▶ 90% water (related to dehydration)
- ▶ Contains many dissolved substances such as:
 - Clotting factors
 - Nutrients
 - Minerals and electrolytes
 - Gases
 - Metabolic and waste products
 - Hormones
 - Enzymes



Blood Cells

- ▶ Solid elements in blood
- ▶ 3 types of blood cells
 - 1) Erythrocytes
 - 2) Leukocytes
 - 3) Thrombocytes



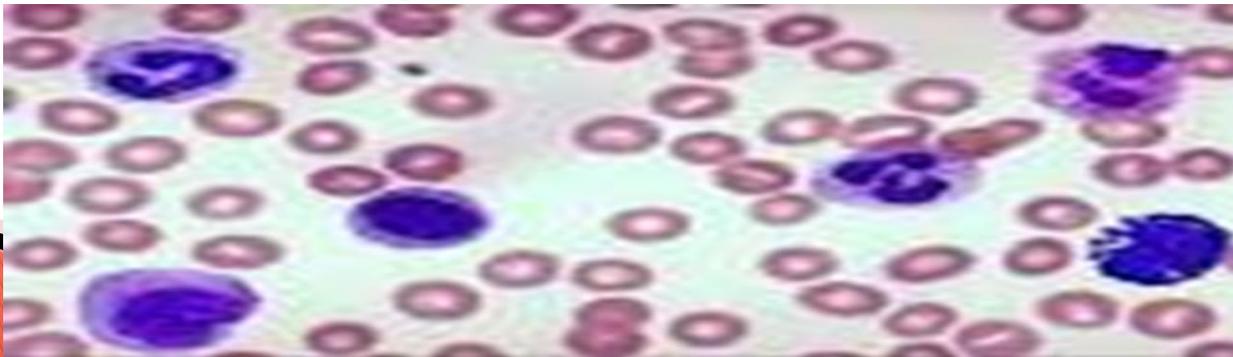
Erythrocytes

- ▶ AKA RBC
- ▶ Made in red bone marrow
- ▶ Live 120 days
- ▶ 4.5–5.5 million per cubic mm (1 drop)
- ▶ Broken down by liver & spleen
- ▶ Disk shape with thinner central area
- ▶ No nucleus
- ▶ Contain hemoglobin–complex protein that carries O₂ & CO₂



Leukocytes

- ▶ AKA WBC
- ▶ Made in bone marrow & lymph tissue
- ▶ Live 3–9 days
- ▶ 5,000–9,000 per cubic mm (1 drop)
- ▶ Can pass through capillary walls & enter body tissue
- ▶ Main function–fight infection
- ▶ Able to engulf, ingest, and destroy pathogens by process=phagocytosis



Leukocytes

- ▶ 5 types of leukocytes:
 1. Neutrophils – phagocytize bacteria by secreting an enzyme called lysozyme
 2. Eosinophils – remove toxins & defend the body from allergic reactions by producing antihistamines
 3. Basophils – play a role in body's inflammatory response; produce histamine (vasodilator) & heparin (anticoagulant)

Leukocytes

4. Monocytes – phagocytize bacteria & foreign materials
5. Lymphocytes – help body's immunity by making antibodies; protect against formation of cancer cells

White blood cells



neutrophil eosinophil basophil monocyte lymphocyte

Thrombocytes

- ▶ AKA platelets
- ▶ fragments or pieces of cells
- ▶ No nucleus
- ▶ Vary in shape & size
- ▶ Made in bone marrow
- ▶ Live 5–9 days
- ▶ 250,000–400,000 per cubic mm (1 drop)
- ▶ Functions in clotting process (stops bleeding)



Do You Know?

- ▶ If a person becomes dehydrated, what would there be less of in the blood?
 - a) Erythrocytes
 - b) Platelets
 - c) Leukocytes
 - d) Plasma

And the answer is...D



Do You Know?

- ▶ If a person does not have enough erythrocytes, he would have difficulty:
 - a) Fighting infection
 - b) Carrying oxygen
 - c) Clotting blood
 - d) Transporting antibodies

And the answer is...B



Do You Know?

- ▶ Neutrophils and lymphocytes are examples of:
 - a) Platelets
 - b) Thrombocytes
 - c) Erythrocytes
 - d) Leukocytes

And the answer is...D

Blood Types

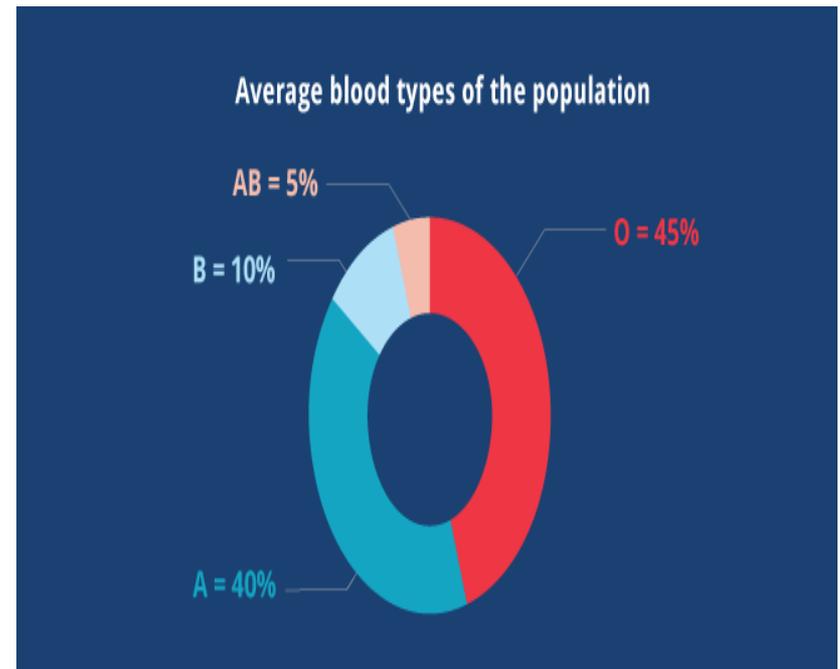
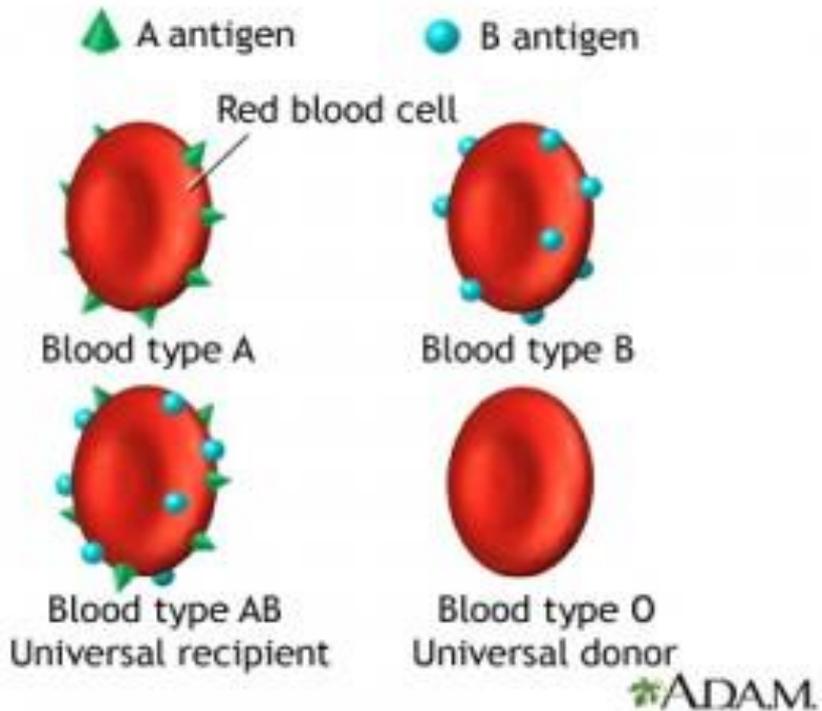
- ▶ Important for blood transfusions and medical–legal issues
 - ▶ Determined by presence or absence of certain proteins (aka antigen)
 - ▶ **Antigen**=substance that can trigger your body's immune system to attack
 - ▶ RBCs have 3 antigens: A, B, and Rh factor
- 

Blood Type

<https://www.youtube.com/watch?v=dCTV2JF0pU0>

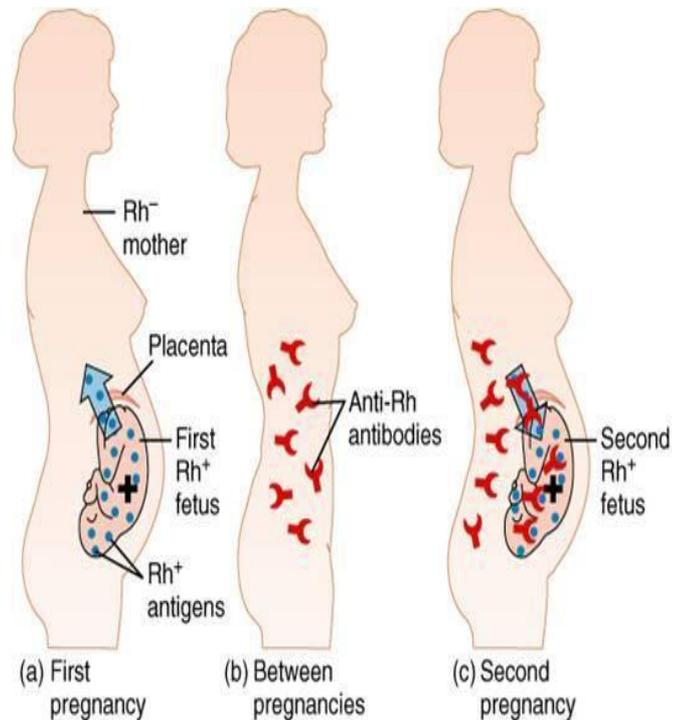
Why Do We Have Different Blood Types? (3:49)

- ▶ Blood types are due to a combination of these 3 antigens



Rh Factor

- ▶ Another protein found on RBC
- ▶ Important to know for pregnancy and transfusions
- ▶ Indicated by a - or + sign (85% US pop +)
- ▶ Rh- has no Rh protein
- ▶ Rh+ has Rh protein
- ▶ Rh- is dangerous



Like accepts Like!

Rh- important!

Do You Know?

- ▶ You are watching Grey's Anatomy and they call for O neg blood in an emergency scene. Why do they call for that type of blood?
- ▶ And the answer is....because O neg does not have any antigens on it that can be perceived as a threat.