

Blood

Science 30

Unit A

Sample Diploma Questions

Use the following information to answer question 5.

The resting heart rate and blood pressure readings of a patient are shown below.

60-100bpm is average →	Resting Heart Rate (beats/min)	Blood Pressure (mmHg)	90 to 135 systolic (top #) 50 to 90 diastolic (bottom #) ←
	72	145/95	

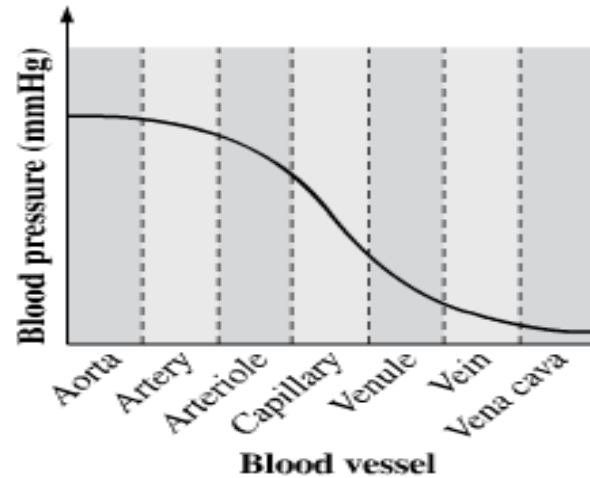
5. Which of the following rows compares the patient's resting heart rate and diastolic blood pressure with the average ranges for healthy adults?

Row	Resting Heart Rate	Diastolic Blood Pressure
A.	Within average range	Higher than average
B.	Within average range	Lower than average
C.	Above average	Higher than average
D.	Above average	Lower than average

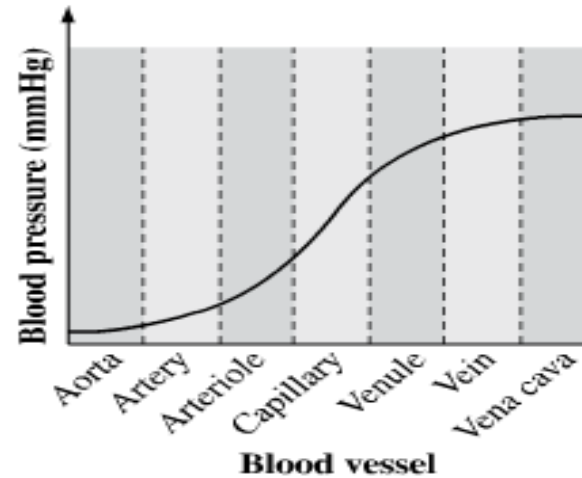
Sample Diploma Questions

6. Which of the following graphs represents the relative blood pressures in different blood vessels?

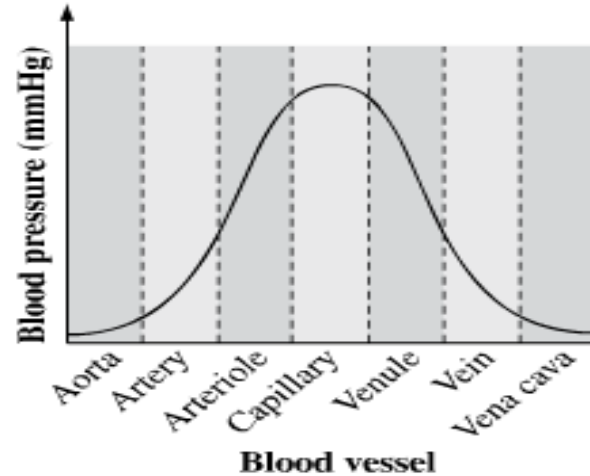
A.



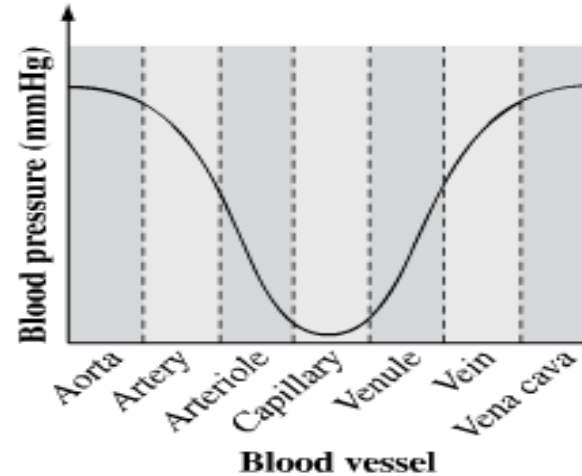
B.



C.



D.



Use the following information to answer numerical-response question 2.

Steps for Measuring Blood Pressure

First Step—Options

- 1 Place the cuff on the upper arm, above the elbow.
- 2 Place the cuff on the lower arm, below the elbow.

Second Step—Options

- 3 Increase the pressure in the cuff to 72 mmHg.
- 4 Increase the pressure in the cuff to 160 mmHg.

Third Step—Options

- 5 Open the valve until blood starts to flow in the brachial artery and record the pressure. An average value is 80 mmHg.
- 6 Open the valve until blood starts to flow in the brachial artery and record the pressure. An average value is 120 mmHg.

Fourth Step—Options

- 7 Continue to release air in the blood pressure cuff until the artery is fully dilated and record the blood pressure. An average value is 80 mmHg.
- 8 Continue to release air in the blood pressure cuff until the artery is fully dilated and record the blood pressure. An average value is 120 mmHg.

Systolic 90-135

Diastolic 50-90

Numerical Response

2. From the steps above, choose the number of each **correct option** that is used when measuring blood pressure.

First Step 1 (Record in the **first** box)

Second Step 4 (Record in the **second** box)

Third Step 6 (Record in the **third** box)

Fourth Step 7 (Record in the **fourth** box)

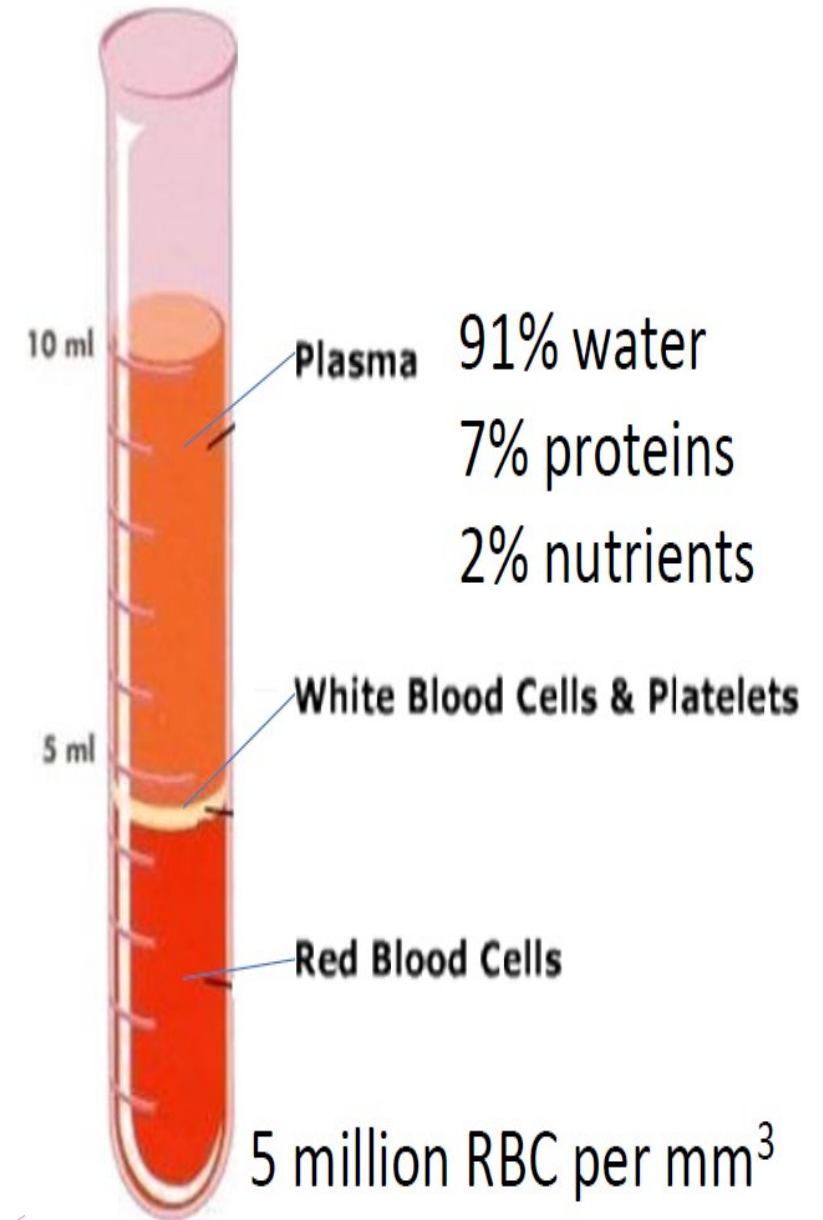
(Record your answer in the response boxes at the bottom of the screen.)

Curriculum

- ▶ describe the main components of blood (i.e., plasma, red blood cells, white blood cells, platelets, blood proteins that include antibodies, hemoglobin and hormones) and their role in the transportation of substances (e.g., nutrients, wastes, gases, hormones), blood clotting, the defence against pathogens and the distribution of thermal energy.

Blood Composition

- ▶ The blood is a tissue (made of cells) and fluid called plasma
- ▶ Plasma is mainly water, with dissolved solutes (ie: glucose, amino acids)
- ▶ Blood consist of: plasma, white blood cells & platelets and red blood cells

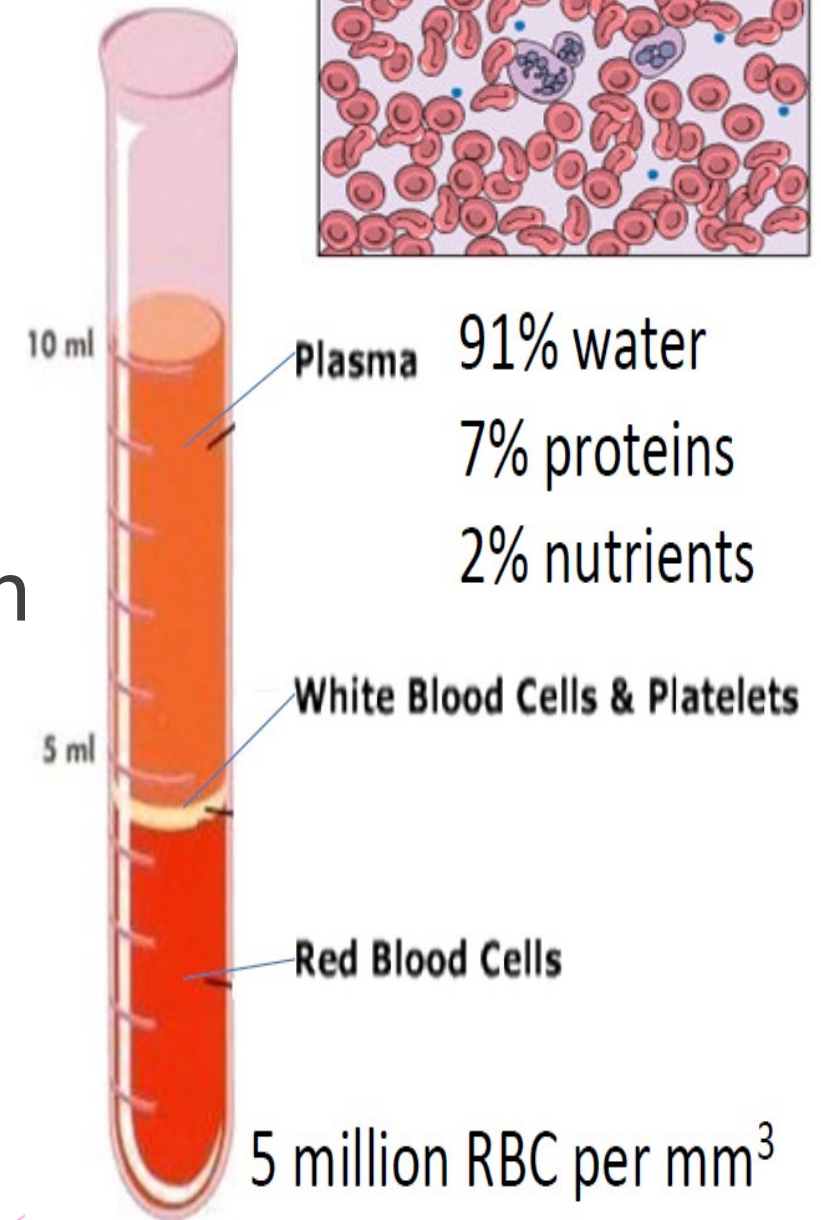


Blood

Average 70kg person has 5L of blood

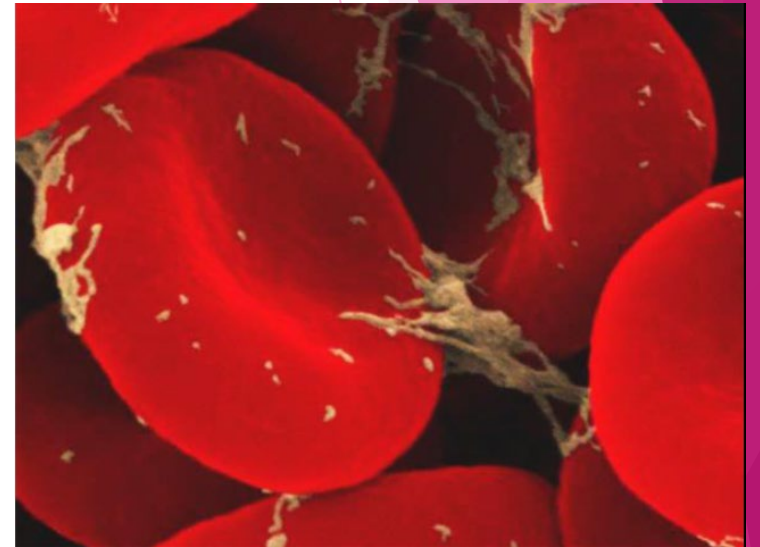
□ 55% of blood is fluid 45% is blood cells

- ▶ **Plasma (fluid)** - pale yellow fluid portion of blood where cells suspended
- ▶ **Blood Cells**- white and red which have distinct functions
- ▶ **Platelets** - found in plasma and responsible for scab production



Red Blood Cells (also called Erythrocytes)

- ▶ ***Carry oxygen using hemoglobin***
 - ▶ Each red blood cell can transport 4 oxygen molecules
- ▶ Bi-concave shape, that allows them to move through blood vessels more easily
- ▶ make up 99% of blood cells



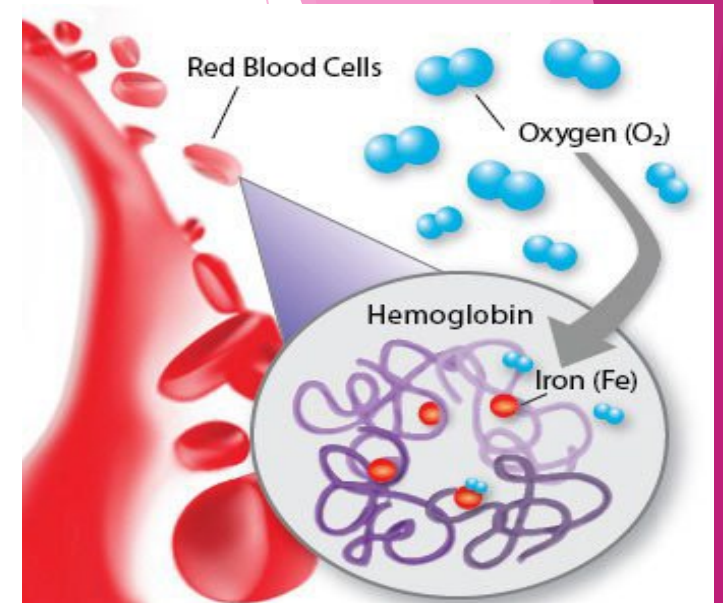
Red blood cells

- ▶ Do not have a nucleus
- ▶ Has a life span of 120 days
 - ▶ When they die that are absorbed by the liver and new red blood cells are produced in bone marrow called erythropoiesis
(ur-i-throw-pow-ai-uh-suhs)

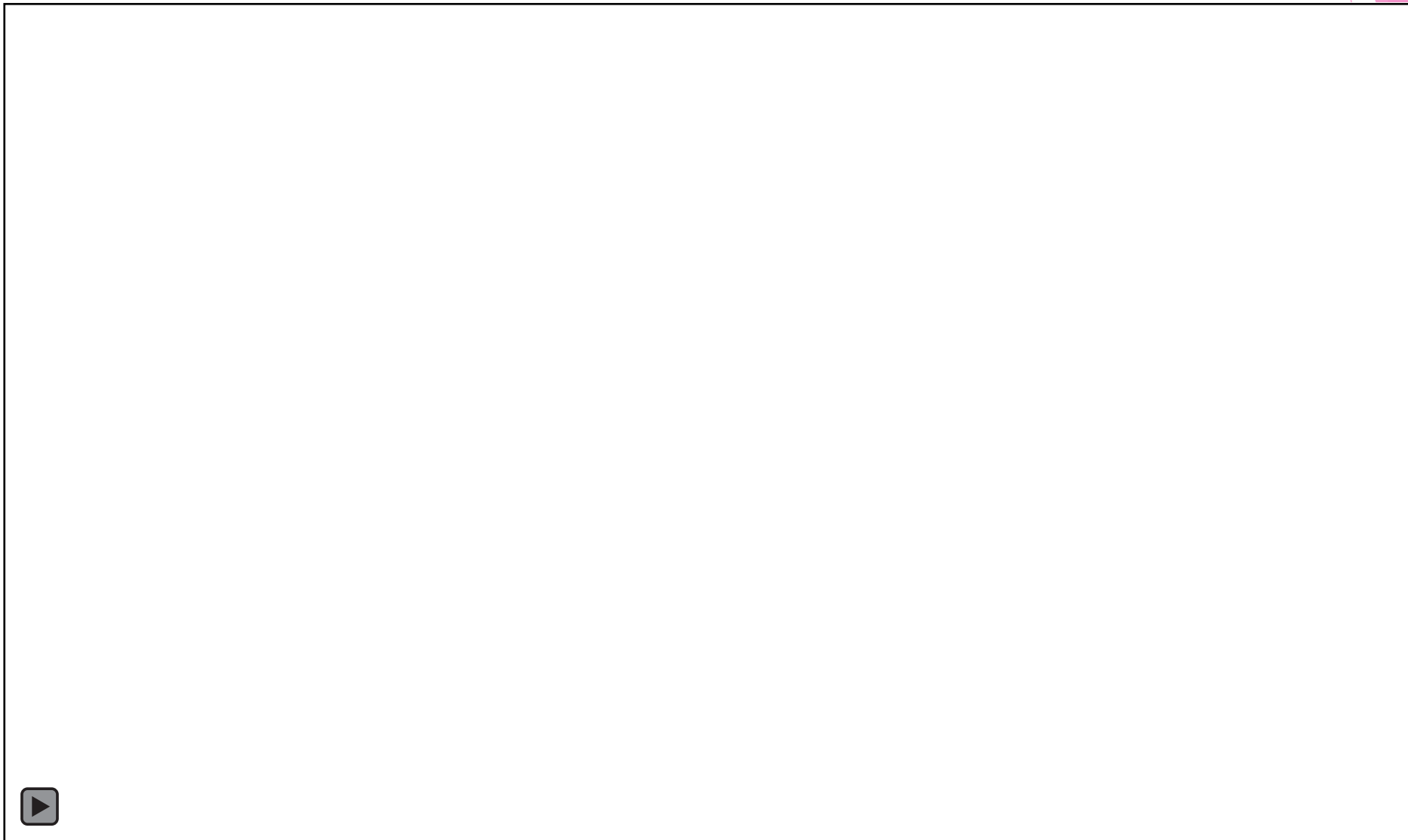


Hemoglobin (Hb)

- ▶ As red blood cells mature, they lose their nucleus (enucleated) which gives them extra room for the hemoglobin molecule
- ▶ Hemoglobin gives blood its red color, & allow them to carry 70 times more *oxygen* than a blood cell with no hemoglobin
 - Each red blood cell contain 280 million Hb molecules
 - Hb contains iron (about 2 grams in the entire body)
 - Each Hb molecule can temporarily bind 4 O₂ molecules



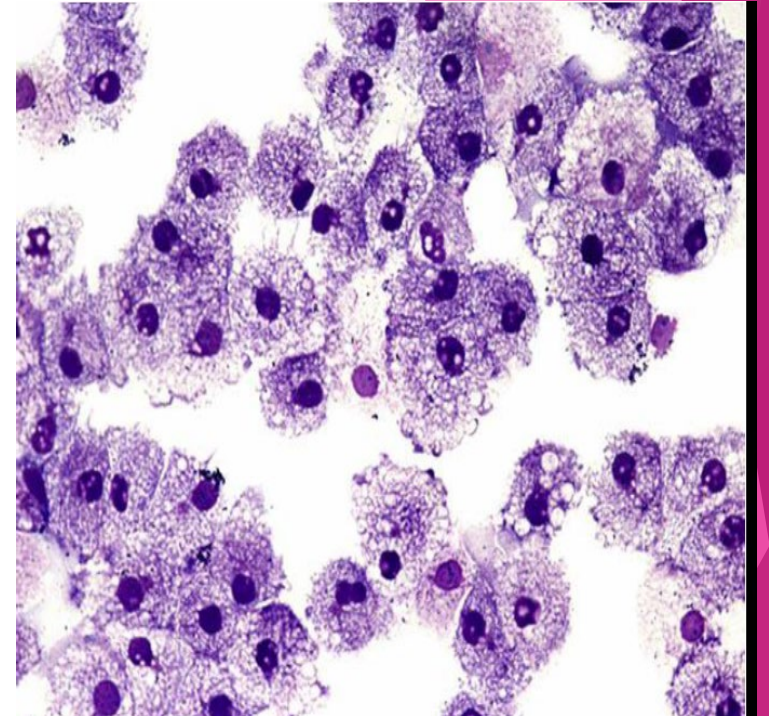
Blood and Oxygen (5 min)



white blood cells (or leukocytes)

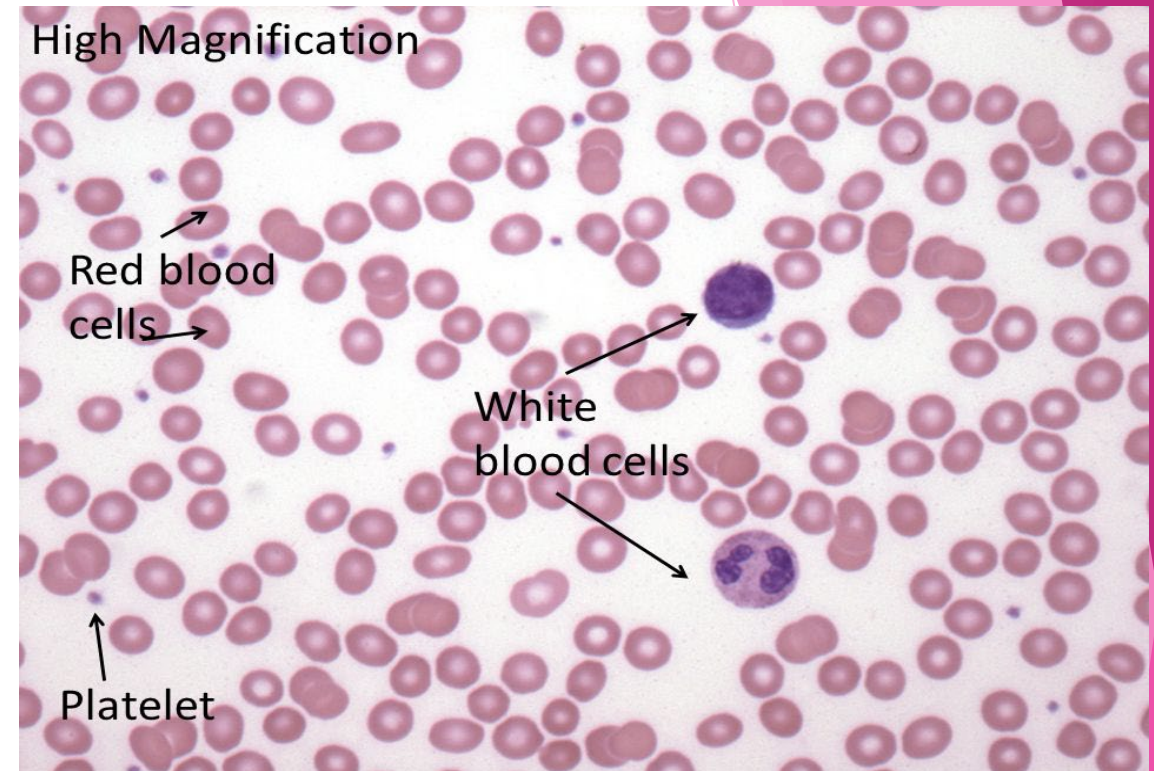
Make up for 1% of blood

- ▶ Part of the immune system (fight disease)
- ▶ Have a nucleus, bigger than RBC
- ▶ Produced from specialized cells on bone marrow.



White blood cells

- ▶ Last for 13-20 days
- ▶ When a disease carrying organism enters the body, your body process more white blood cells to combat them
- ▶ When killing foreign invaders they engulf them in a process called macrophage



White Blood Cells (2 min)

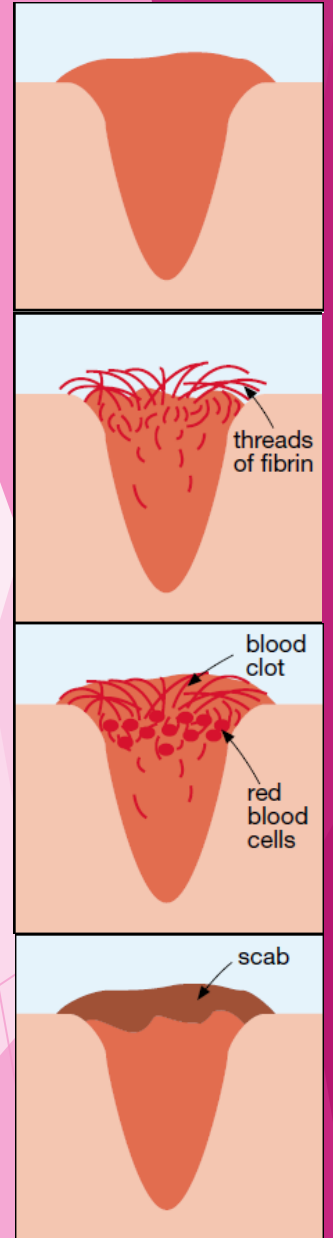


Platelets



When you have a cut, there are proteins in your blood to stop the bleeding called **fibrinogen**

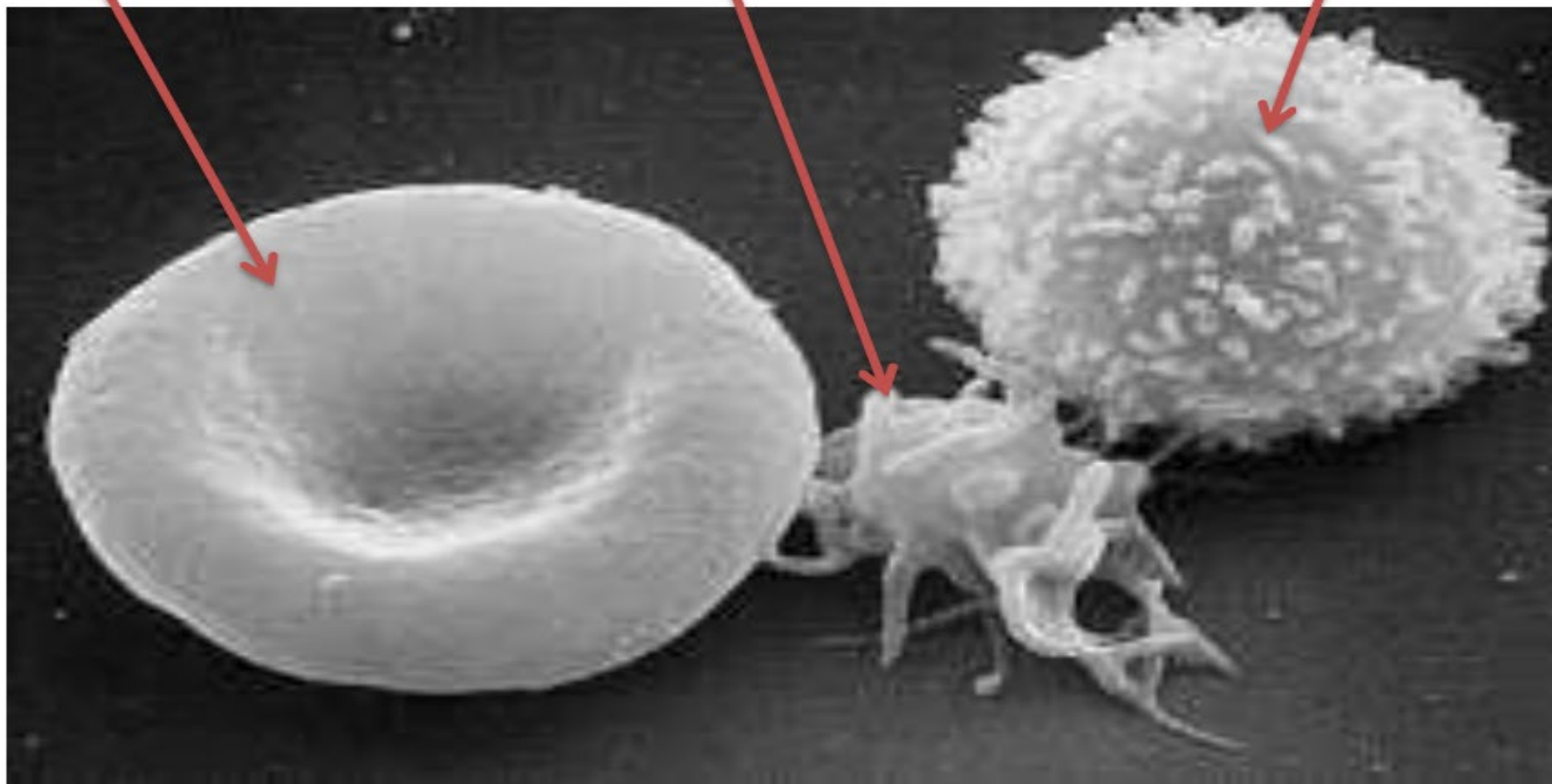
- ▶ Platelets rupture when they come into contact with a rough surface which triggers a series of chemical reactions
- ▶ It causes inactive fibrinogen to become active and make a mesh that traps red blood cells, as more blood gets caught it produces a **blood clot**
- ▶ It eventually hardens and becomes a scab
- ▶ Small (1/5th the size of RBC)



RBC

platelet

WBC



How do we heal? (4 min)



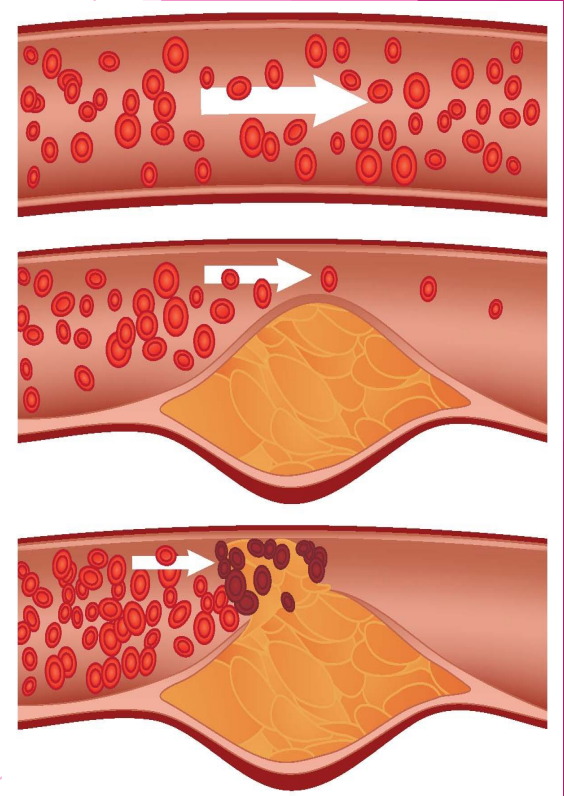
Plasma

- ▶ Mostly made of water containing suspended or dissolved substances
- ▶ Transports/holds the following:
 - ▶ Blood cells
 - ▶ Dissolved waste
 - ▶ Urea
 - ▶ Hormones from glands
 - ▶ *Digested nutrients*
 - ▶ Proteins (ie. fibrinogen)
 - ▶ Heat
- ▶ Used to replace lost fluid in the body when there is an accident or injury



Cholesterol

- ▶ **Cholesterol** is a waxy, fat-like substance present in the cell membrane of every body cell and in food from animal sources
- ▶ Cholesterol is vital to all cell membranes and key to producing vitamin D and some hormone production
- ▶ When there is too much cholesterol the walls of arteries are used as their deposits
- ▶ Buildup of cholesterol in arteries is called **plaque**



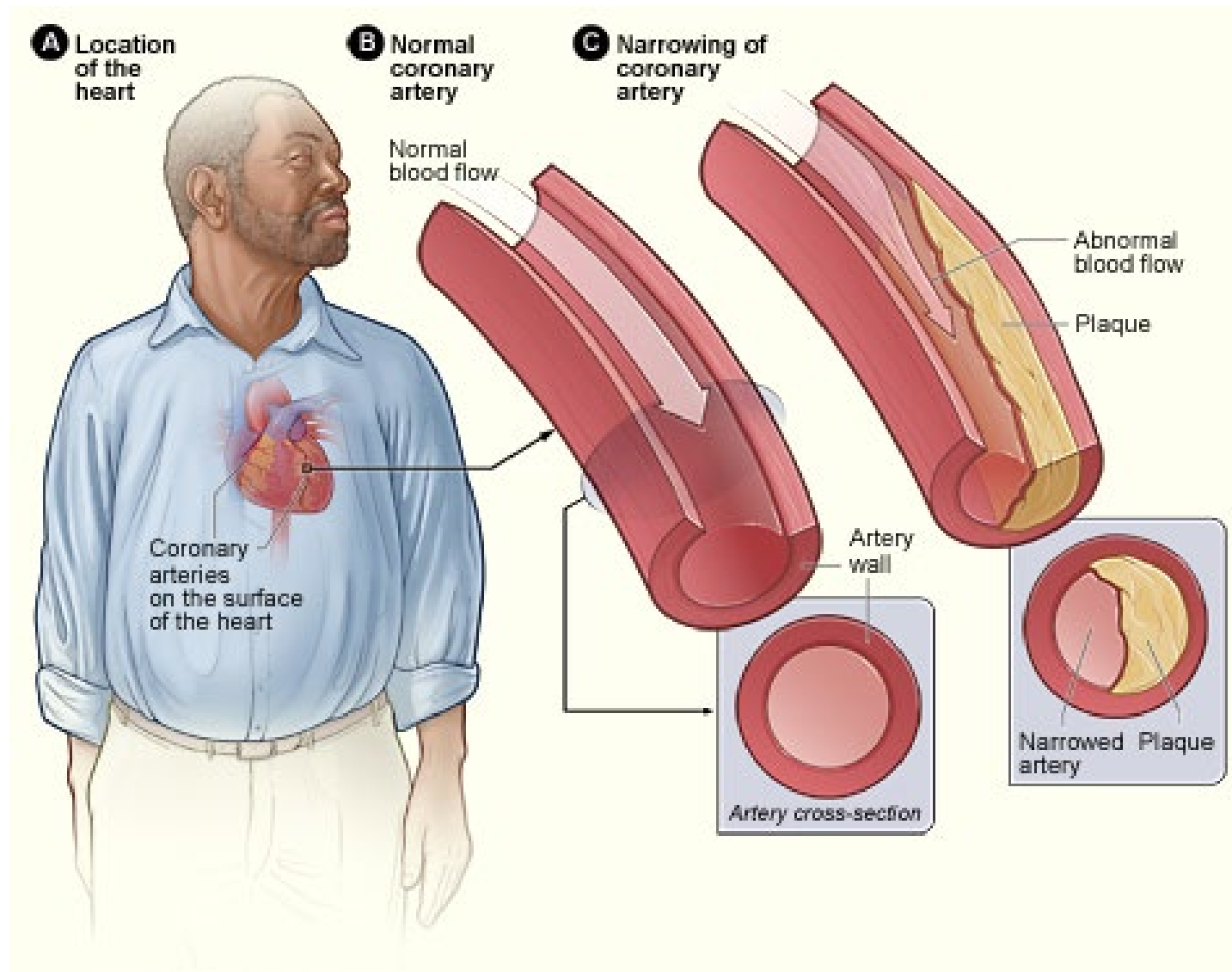
Cholesterol

- ▶ **Low-density Lipoproteins (LDLs):** blood protein that carries cholesterol in bloodstream from liver to rest of the body
- ▶ **High-density Lipoproteins (HDLs):** blood protein that carries cholesterol in blood stream from body cells to the liver
- ▶ Too much LDL = deposits in arteries (“bad” cholesterol)
- ▶ Too much HDL = less likely to deposit in arteries (“good” cholesterol)

Atherosclerosis and Coronary Heart Disease

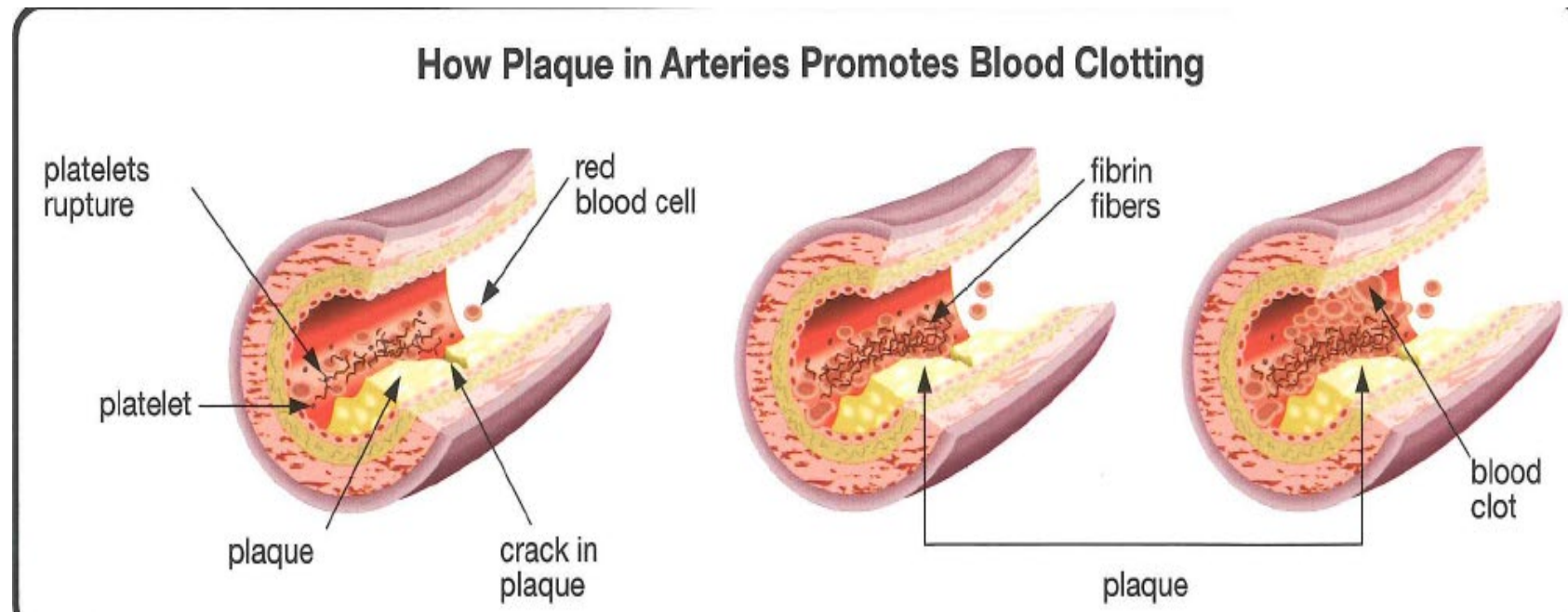
- ▶ **Atherosclerosis:** hardening of the arteries due to accumulation of fatty deposits
 - ▶ fatty buildup leads to loss in elasticity of the heart which causes stiffness
 - ▶ Can occur to any major artery bodies
- ▶ **Coronary Heart Disease:** disease in which blood flow through coronary arteries restricted, resulting in possible chest pain and/or heart attack
 - ▶ Cause inability of oxygen to be supplied to heart and builds up toxic wastes
- ▶ **Angina:** chest pain caused by narrowing of vessels that supply blood to heart tissue

Atherosclerosis (a.thr.ow.skr.ow.suhs)



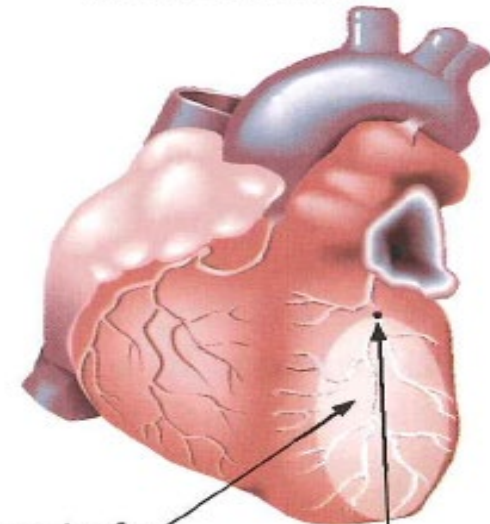
Clots

- ▶ If the plaque artery becomes rough or cracked, platelets can rupture and release chemicals that start the clotting process
- ▶ This clot can block the flow of blood in the artery

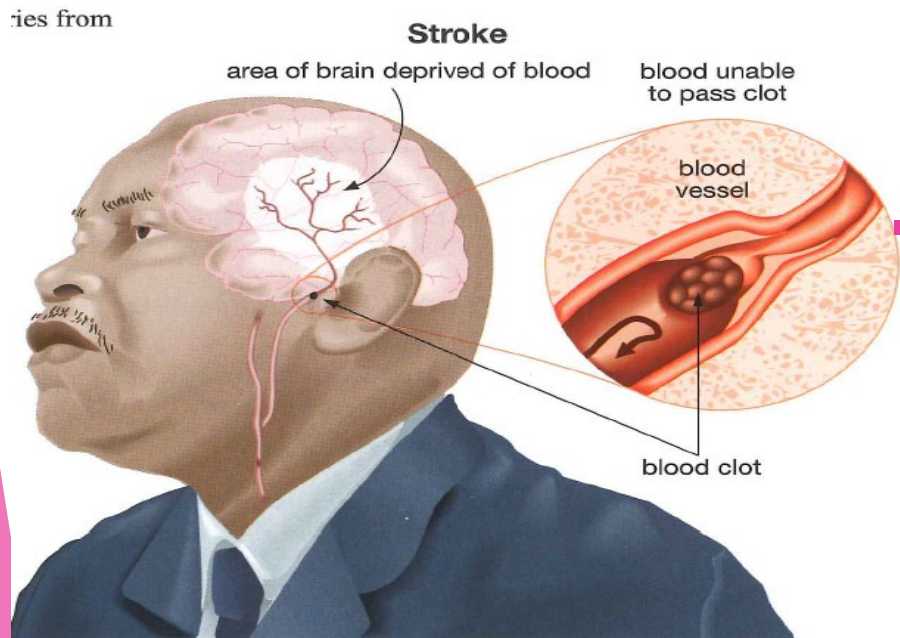


Strokes and Heart Attacks

- ▶ If this happens in the **coronary arteries** (*supplies blood to the heart*) the heart cells start to die. This is a **heart attack**



part of heart muscle tissue dies
clot in coronary artery



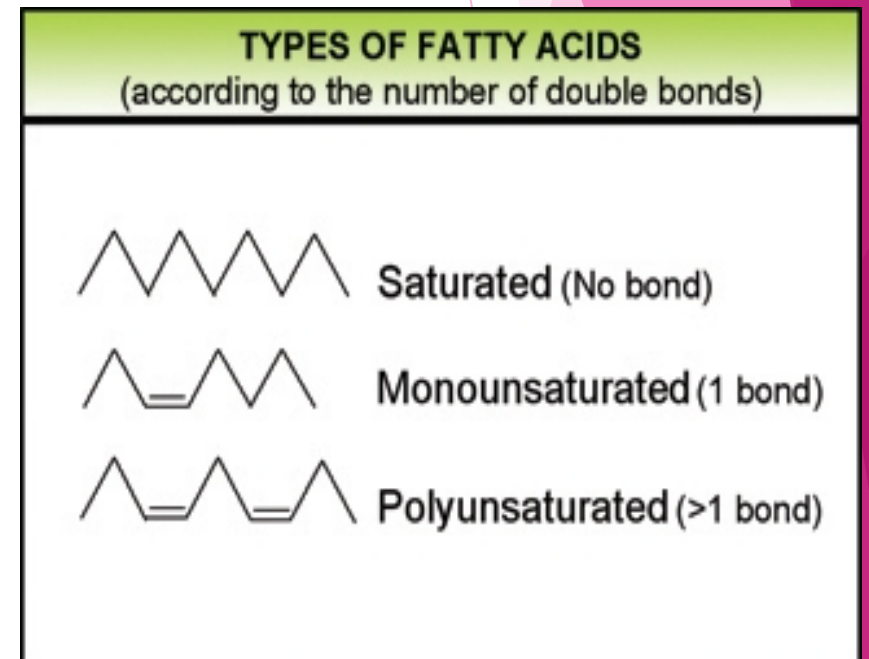
- ▶ If this happens in the **brain**, brain cells start to die. This is a **stroke**

Heart Attacks (5 min)



How do I not die?

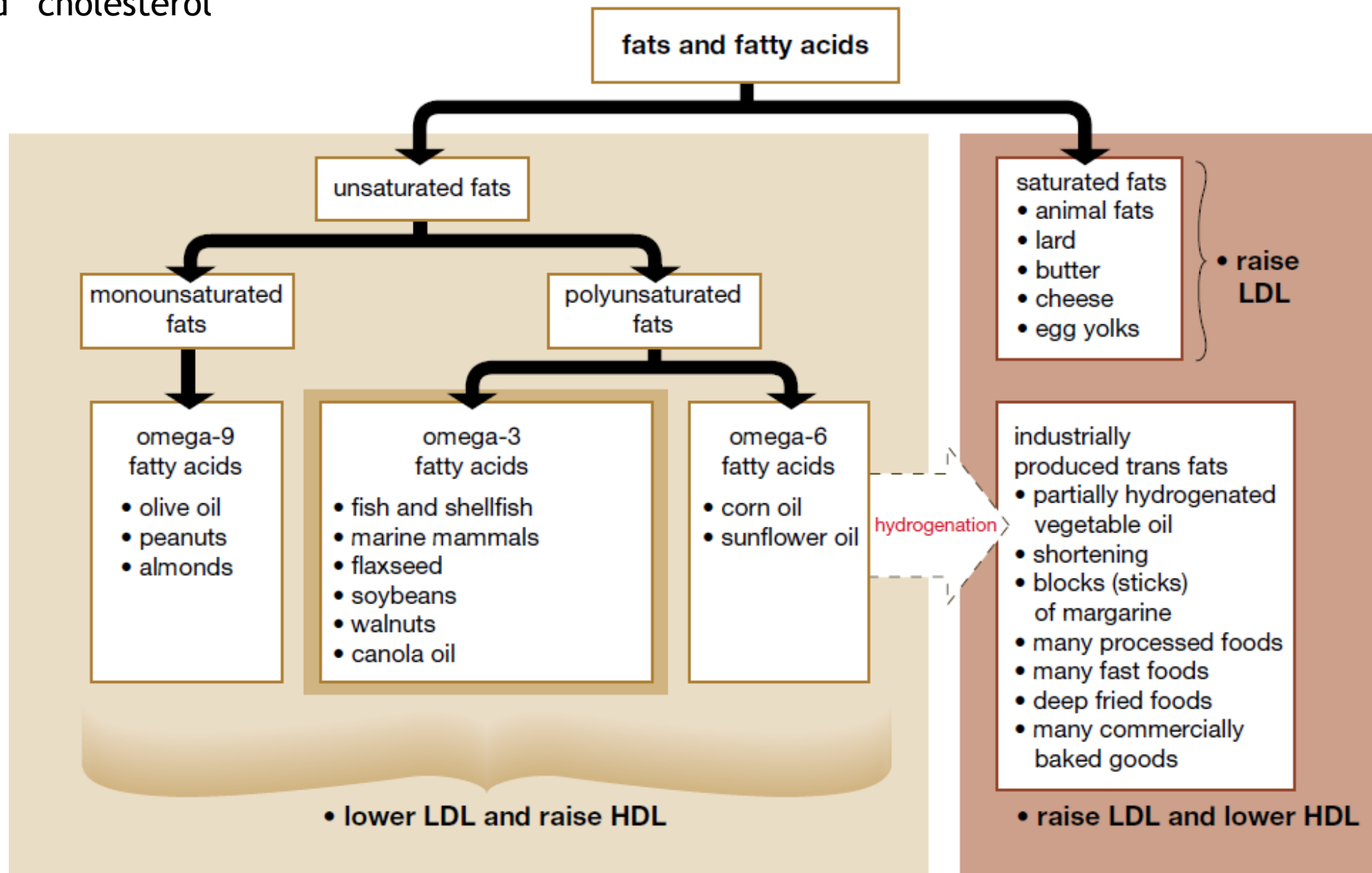
- ▶ People make approximately 75% of their cholesterol in blood from the liver and only 25% is taken from food
- ▶ This means eating foods with lower cholesterol may not do anything at all
- ▶ It has more to do with fats in our diet



Video (5 min)








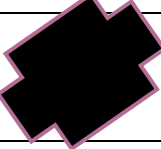




HDL = “good” cholesterol
LDL = “bad” cholesterol



textbook

- ▶ P. 38 #25,
- ▶ P. 41 #1, 3, 4, 5

- ▶ List the four components of blood in decreasing order of their relative volume in whole blood (from most abundant to least abundant).
- ▶ **Plasma, RBC, WBC, Platelets**

Feature	Red Blood Cells	White Blood Cells	Platelets	Plasma
Name	erythrocytes	leukocytes		
Color	red	white		yellow
Where its formed	Bone marrow	Bone marrow		
Relative size	medium	big	small	
Shape	Bi concave	round		
Nucleus?	no	yes		
Life span	120 days	13-20 days		
function	Carry O ₂	Combat disease (foreign pathogens)	Clot blood	Transports and holds nutrients

