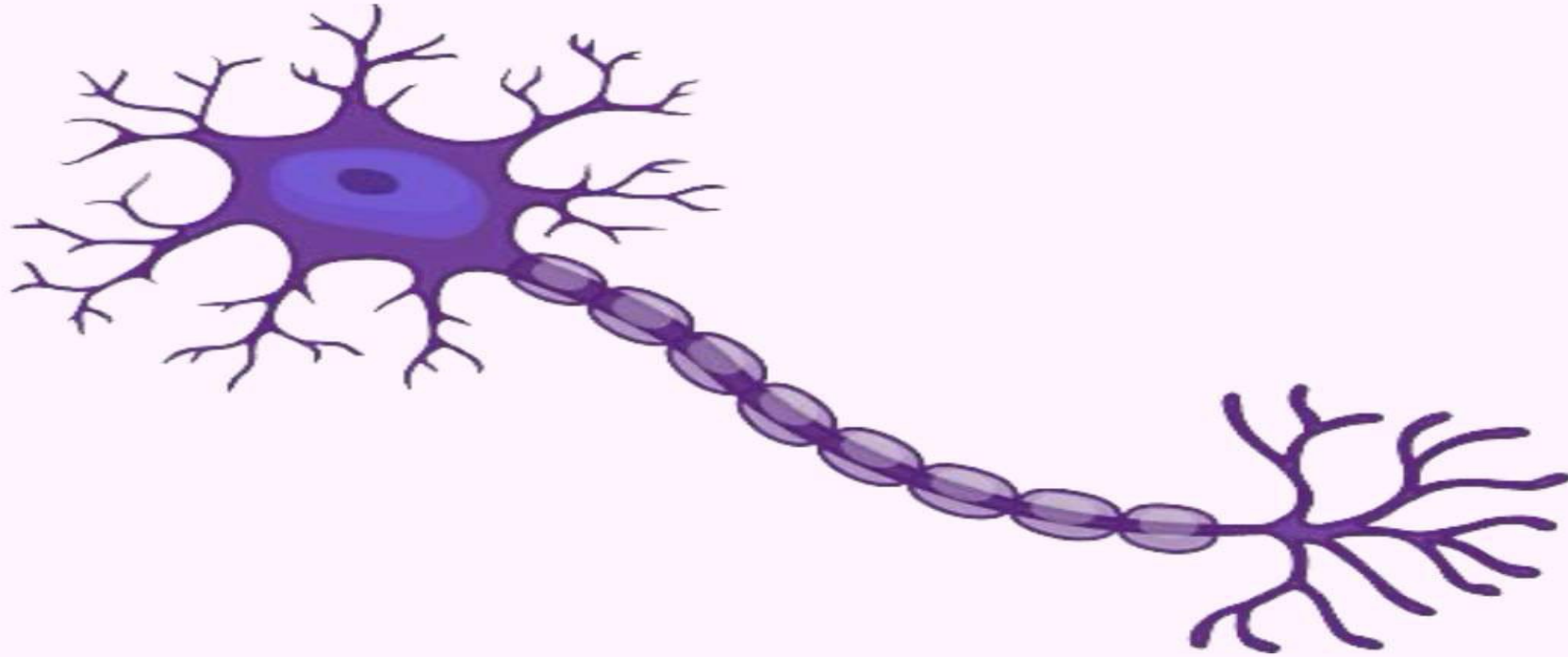




PHYSIOLOGY



LEC NO. :

7

DONE BY :

Nour Al-amoush

وَقُلْ رَبِّ زِدْنِي عِلْمًا

**BLOOD
BY D GEHAN
EL WAKEEL**



تعریف

cells + plasma

RBCs → The most

Definition: It is a complex reddish fluid that

circulates continuously inside the

cardiovascular system. → اگھاز الادو ایئے
(Heart + arteries + Veins + capillaries)

مہر جو

Volume: About 5.6 Liters in a 70 kg man.

Functions of the blood:

1- Major transport medium in the body: It transport: →

وسط ينقل
المواد

من الرئة إلى
الأنسجة * O_2

من الرئة إلى
الخارج * CO_2 →

بعد امتصاصها
من الأمعاء → * Glucose

* End products of metabolism as **urea**.

جاية من الدم

شيز مرغوب بها

من *endocrine glands*
إلى مكان وظيفتها. * Hormones.

2- Haemostatic function: Stoppage of bleeding from injured

blood vessel by clotting.

لما الانسان يصيرله جرح بتتكون جلطة
لتغلق الجرح وتوقف النزيف

3- Homeostatic function: Keep the composition of internal

environment constant

Such as body temperature, blood pressure, heart rate, pH, K/Na concentration.

الدم يحتوي على buffer يعمل على معادلة درجة الحموضة والقاعدية

الدم مثلاً لو تركيز البوتاسيوم زاد رح يقلله عن طريق اخراجه للـ urine
نفس المبدأ لو ارتفعت درجة الحرارة بطلعها عن طريق العرق من الجلد

4- Defensive function: White blood cells provide defense against

عملية البلعمة تعمل على بلع البكتيريا ومن ثم تعمل حويصلة وبعدها تتحطم وتخرج الباقي عن طريق exocytosis

microorganisms by phagocytosis & antibody formation. →

تكوين antibodies تقتل البكتيريا

- **Composition of blood**

1. **Blood Cells:** represents about 45% of the total blood volume.

They include

- A. **Red blood corpuscles (RBCs)**
- B. **White blood cells (WBCs)**
- C. **Platelets**

2. **Plasma:** represents about 55% of the total blood volume.

Extra cellular fluid

Plasma:

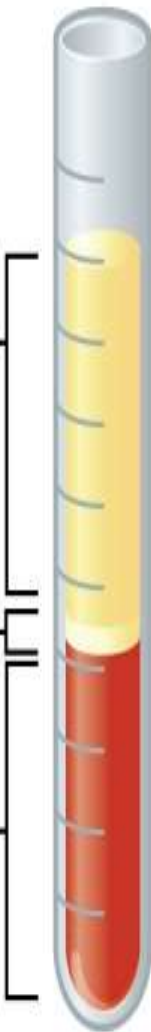
- Water, proteins, nutrients, hormones, etc.

Buffy coat:

- White blood cells, platelets

Hematocrit:

- Red blood cells



Normal Blood:

♀ 37%–47% hematocrit
♂ 42%–52% hematocrit



Anemia:

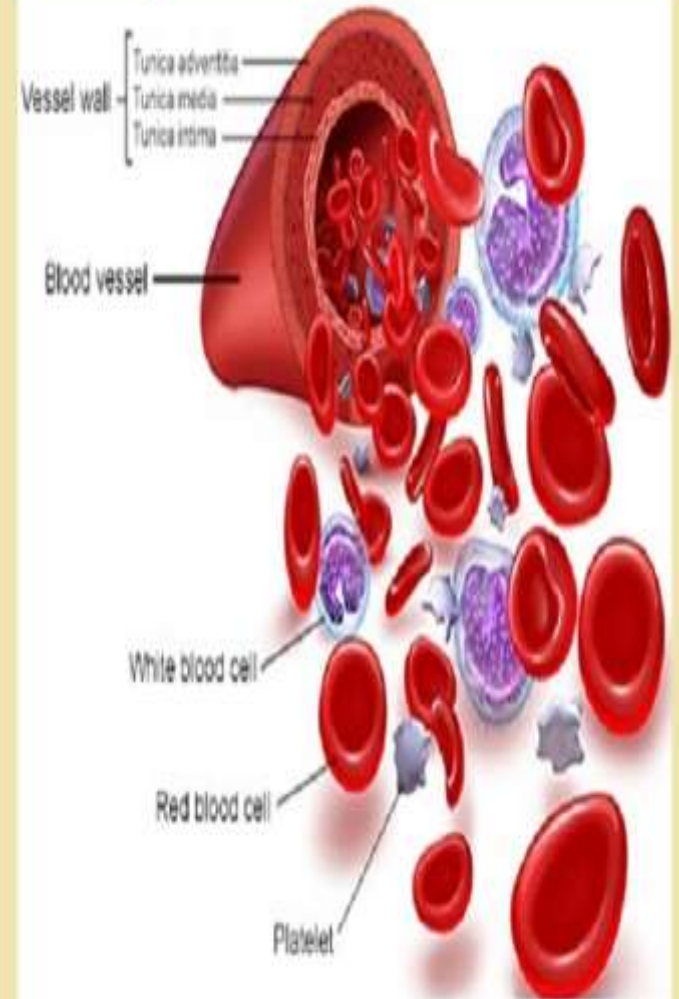
Depressed hematocrit %



Polycythemia:

Elevated hematocrit %

Composition and Functions of Blood



Plasma

- It is a clear fluid in which blood cells are suspended .

Composition:

1- Water 90%

2- Solids:

A. Organic substance 9% → complex and contain C₁₂

- Plasma proteins (7%)
- Other organic substance 2% (metabolic products urea creatinine), nutritive substance(e.g. glucose, amino acids, enzymes, hormones, vitamins).

B. Inorganic substance: 1% e.g. Na, K, Ca, Cl → Ions

Plasma Proteins Types and concentrations of plasma

proteins:

The total plasma protein concentration is about **6-8 gm/dL**.

التركيز الاعلى و هو المسؤول عن osmolarity of plasma و كتلة اقل

الكتلة عالية جدا عشان هيك بيلعب دور في viscosity من عوامل التجلط

	Albumin	Globulin	Fibrinogen	Prothrombin
Concentration (gm/dL)	3.5-5	2.4-2.7	0.4	0.01-0.16
Molecular weight (Dalton) مش مطلوب حفظ	69.000	90.000 - 156.000	340.000	68.700
Subdivisions		$\alpha_1, \alpha_2, \beta_1, \beta_2, \gamma$		
Site of formation	Liver	Liver except γ Antibodies globulin in plasma cells in lymphatic tissues	Liver	liver

عشان هيك يتم انتاجها في الخلايا المناعية

Functions of plasma proteins

1- Osmotic pressure of plasma proteins (mainly

لانه التركيز تاعه اعلى

albumin): which maintains body fluids.

يلى بصير انه عند artiuuler end بتكون الماء
تفلترت و الخلايا اخذت كل يلى بدها اياه بس لسا
ضل ماء، ال osmotic pressure بسحب الماء ف
تحافظ على حجم الدم ثابت لانه لو قل رح يقل ضغطه
و الدم ما رح يروح للدماغ و بصير عنا كثير مشاكل

2- Carrier functions: plasma proteins تنقل substances على

• Pl. prot **transport important substances** as hormones,

②

③

vitamins, **minerals from site of synthesis or**

absorption to site of action or storage.

بتشيل الهرمونات من الغدد اللي انتجتها للمكان
يلى لازم تشتغل فيه
نفس المبدأ لما تاخذ ال amino acids و غيرها
بعد امتصاصها ممكن تخزنها في الكبد او توديها
لمكان شغلها

Examples:

Pl. prot	Carries
Albumin	هرمون الغدة الدرقية Hormones (thyroxine and steroids), amino acids, vitamins, fatty acids الهيمونات اجسية
Globulins	الغاز Iron, Copper, Steroid hormones

• Importance:

- الاهدك من ايها
بتشيلها

a. Prevent rapid loss of substances in urine.

b. Reservoir of the substance → used when needed. → مثل مستودع

3. **Defense action**: antibodies are gamma globulins

4. **Blood coagulation**: by fibrinogen & prothrombin. → عوامل الجلث

5. **Blood viscosity**:
اللزوجة

• Blood viscosity 3 times more than water

• **1.5 times formed by plasma proteins mainly by fibrinogen**
↓ لأنه كتلته كبيرة .

• 1.5 times formed by RBCs

• **Viscosity maintains diastolic blood pressure.** → أهمية اللزوجة
↑ ضغط الدم لما القلب يكون ما بيضخ دم

• **Buffering action**: maintains body PH. → زي شيء يعمل على التكيف
H ions ↑ acidic
H ions ↓ basic
7.35 - 7.45
لازم تبقى ثابتة لأنه كل الوظائف الحيوية و التفاعلات الكيميائية لا تتم الا بدرجة معينة، لو زادت او قلت رح تعمل مشاكل

7. **Carriage of CO₂**. → plasma protein

Plasma protein has positive & negative charge

بتخايبها تدفع H ions لما الحموضة تكون عالية، و تسحبها

O₂ → hemoglobin.

تكرار الدم الحمراء.

Red Blood Corpuscles (R.B.Cs)

male

R.B.C's count: RBCs count is 5.0-5.5 million/mm³ in ♂ and 4.5-5.0 million/mm³ in ♀ Female

Shape and Size:

i) Shape: RBCs are circular, non-nucleated, ^{مقعرة} biconcave discs.
لا تحتوي على نواة عشان
هيكل بحكو corpuscles
not cells

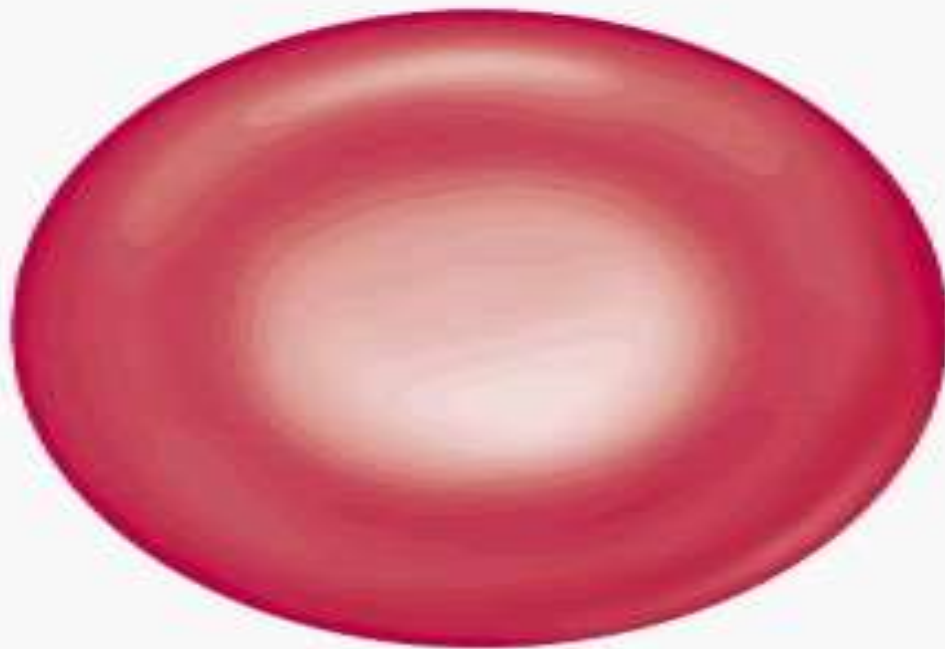
ii) Size:

- Its diameter → 7.5 um.
- Its ^{السمك} thickness → at the thickest point is about 2.5 um.
- Its average volume → 90 to 95 u³ .



Side view

2.0 μm



Top view

7.5 μm

Structure of R.B.C's:

- RBCs are not true cells, because they have no nuclei, so called **corpuscles**.

A. The cell membrane: They are surrounded with **flexible plastic** ^{عشرون تتوسع} **semipermeable membrane**.
نفاذية اختيارية

B. Its contents: They contain;

I. Hb: It is the main constituent of RBCs (34% of their weight).

II. Ions: K⁺ is the chief intracellular cation. *مهم السؤال ده*

III. Enzymes: Carbonic anhydrase enzyme, which is important for CO₂ transport.
لا يحمل كما هو Co2
بل يذوب في الماء وبعدها بروح للرننة على شكل حمض كربونيل h2co3 وبعدين يتحول الى co2 و يخرج عن طريق الزفير

IV. Mitochondria: There are no mitochondria in the RBCs, so *الانزيم الذي يحوله هو Carbonic anhydrases ويرجع يحوله مرة ثانية عند الرنة*

they obtain their energy from anaerobic glycolysis. *اللاهوائي يعني لا يحتاج الى اكسجين*
→ 2 ATP
Per C₆H₁₂O₆

Functions of RBCs:

1) Functions of cell membrane:

تؤهلها لتبادل الغازات في الرئة

a) It has a large surface area than the actual cell volume;

It gives **RBCs its biconcave shape.**

It allows easy diffusion of gases through cell membrane.

b) It is plastic → enhances cell flexibility → allow RBCs to be squeezed in small capillaries without rupture of it.
يعني تنزلق في ال capillaries بشكل سهل

c) It keeps Hb inside RBCs → prevent its loss in urine. 2)
يمنع خسارة الهيموغلوبين لخارج الجسم

2) Functions of carbonic anhydrase enzyme: It helps in transport of CO₂.

3) Blood viscosity: RBCs share in production of blood viscosity, which maintains arterial blood pressure.

Erythropoiesis

Definition It is the process of new RBCs production . عليه تصنع

↓
تعيش لمدة 120 يوم و تتكسر في الطحال

Sites of Erythropoiesis: - **The red bone marrow;**

له نخاع العظم

I. **In infants** → **red bone marrow is present in all bones.**

يبدأ يتحول لـ fatty bone marrow

II. **In adults** (after the age of 20 years) → **red bone marrow is**

present only in the membranous bones such as the

كل ما كبر الشخص كل ما تحولت هاي لـ fatty و (١) vertebrae, (٢) sternum and (٣) ribs + (٤) ilium كريات الدم الحراء تخرج بكميات اقل

بحكيلي هون انه الوظيفة الاساسية لكريات الدم الحمراء هو نقل الاكسجين، نقص الاكسجين هو الذي يحفز انتاج الكريات الحمراء، طيب كيف؟ ينتج هرمون اسمه Erythropoietin يخرج 90% من الكلية و 10% من الكبد

Normal blood oxygen levels

Stimulus: Hypoxia due to decreased RBC count, decreased availability of O_2 to blood, or increased tissue demands for O_2

Reduced O_2 levels in blood

متى الجسم يعاني من نقص الاكسجين؟

كريات الدم الحمراء قليلة او مثلاً لما نطلع لمناطق عالية يكون

الاكسجين اقل او ممكن امراض الرئة تكون سبب، او تمارين عضلية.

الناس يلي عندهم فشل

كلوي غالباً عندهم

anemia لانه الكلية لا

تستطيع انتاج

Erythropoietin

Kidney releases erythropoietin

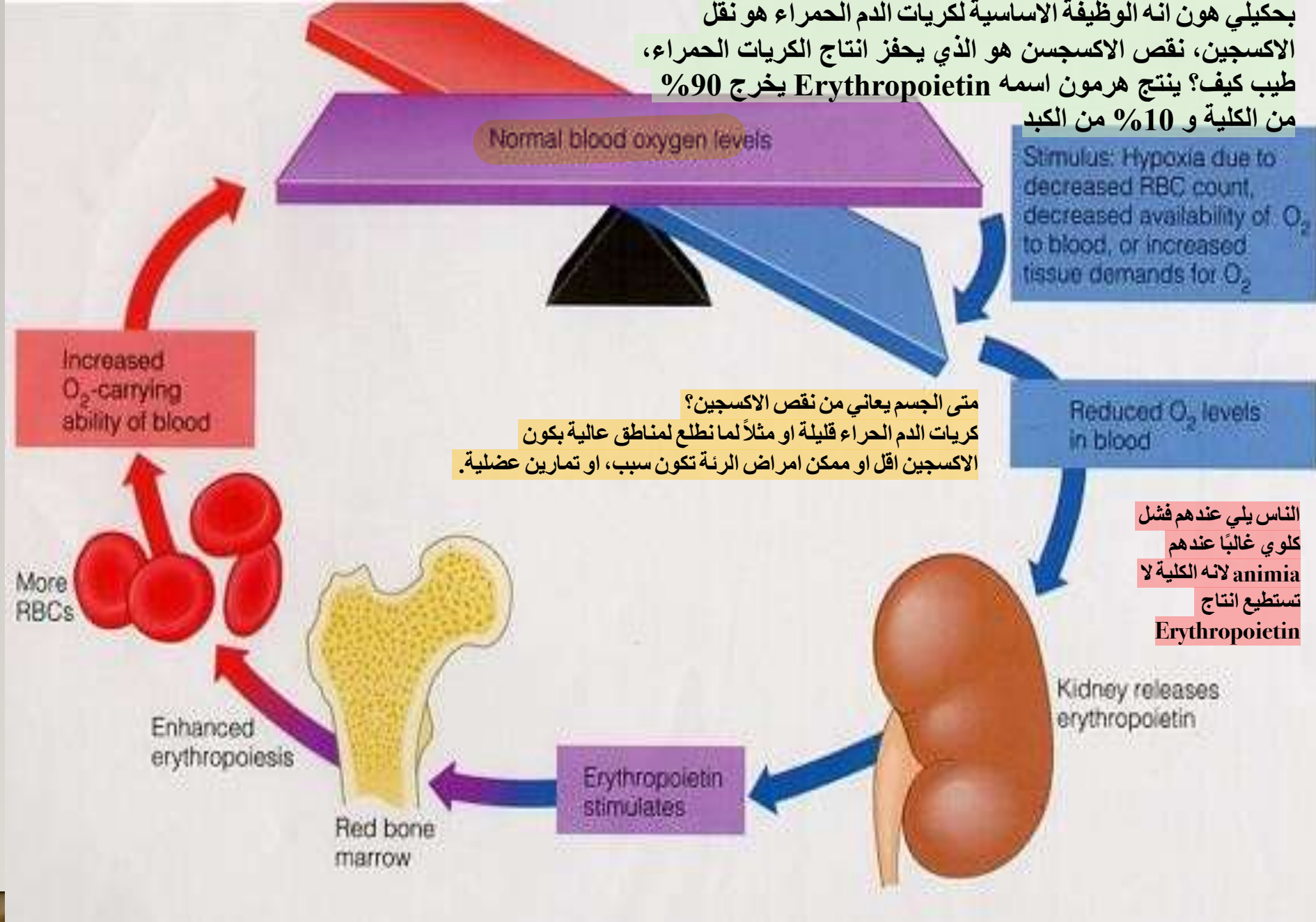
Erythropoietin stimulates

Enhanced erythropoiesis

Red bone marrow

Increased O_2 -carrying ability of blood

More RBCs



Factors affecting Erythropoiesis

I) Tissue oxygenation:

Hypoxia (**↓ of O₂ supply to the tissues**) → increase the rate of RBCs formation.

نقص الأكسجين

Causes of hypoxia:

- High altitudes.
- **↑ed demand for O₂ as in athletes.**
- Loss of RBCs as in haemorrhage.

Mechanism:

Hypoxia stimulates erythropoietin hormone secretion from kidney (90%) and liver (10%) **which in turn stimulates RBCs production in bone marrow.**

2) Healthy Bone Marrow:

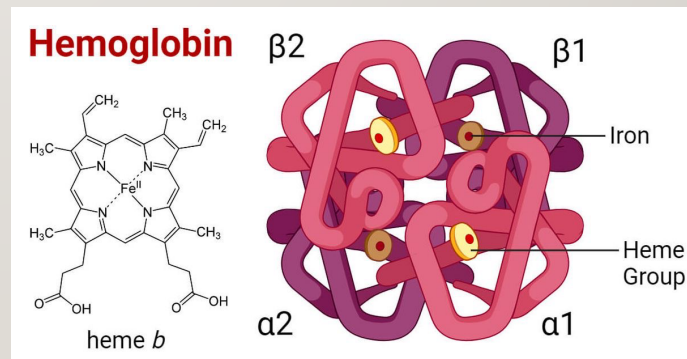
مرض السرطان و العلاج بالاشعاع او الكيميائي تقوم
بتكسير bone marrow

- A healthy bone marrow is essential for the production of RBCs.
- Destruction of bone marrow by irradiation, or drugs will lead to deficiency of all blood cells → **aplastic anaemia**. فقر الدم

3) Healthy Liver:

Healthy liver is essential for normal RBCs formation as it is the site of;

- Formation of globin portion of Hb.
- Formation of 10% of erythropoietin.
مهم لتكوين كريات الدم الحمراء لانه يساعد بتصنيع DNA
و يحصل عليه من الغذاء
- Storage of iron and vitamin B 12.



فقط
للتوضيح.

يحفز الحرق، مثل يلي عندهم زيادة في نشاط الغدة الدرقية

4) Hormones:

- **Thyroid hormones** → stimulate metabolism of bone marrow cells.
- **Glucocorticoids** → stimulate metabolism of bone marrow cells.
- **Androgens** → ↑ **erythropoietin hormone.**

هرمون الذكورة و هذا يفسر سبب انه عدد الكريات الدم الحمراء عند الذكور اكثر من الاناث

5) Nutritional factors:

a) Proteins: of high biological value proteins are essential for erythropoiesis
من خارج الجسم

b) Minerals:

- Iron:** It is important for the formation of Hb
- Copper:** It acts as cofactor in Hb synthesis.
- Cobalt:** It acts as cofactor in Hb synthesis.

c) Vitamins:

- **All vitamins are needed for erythropoiesis, especially vitamin B12 and folic acid**

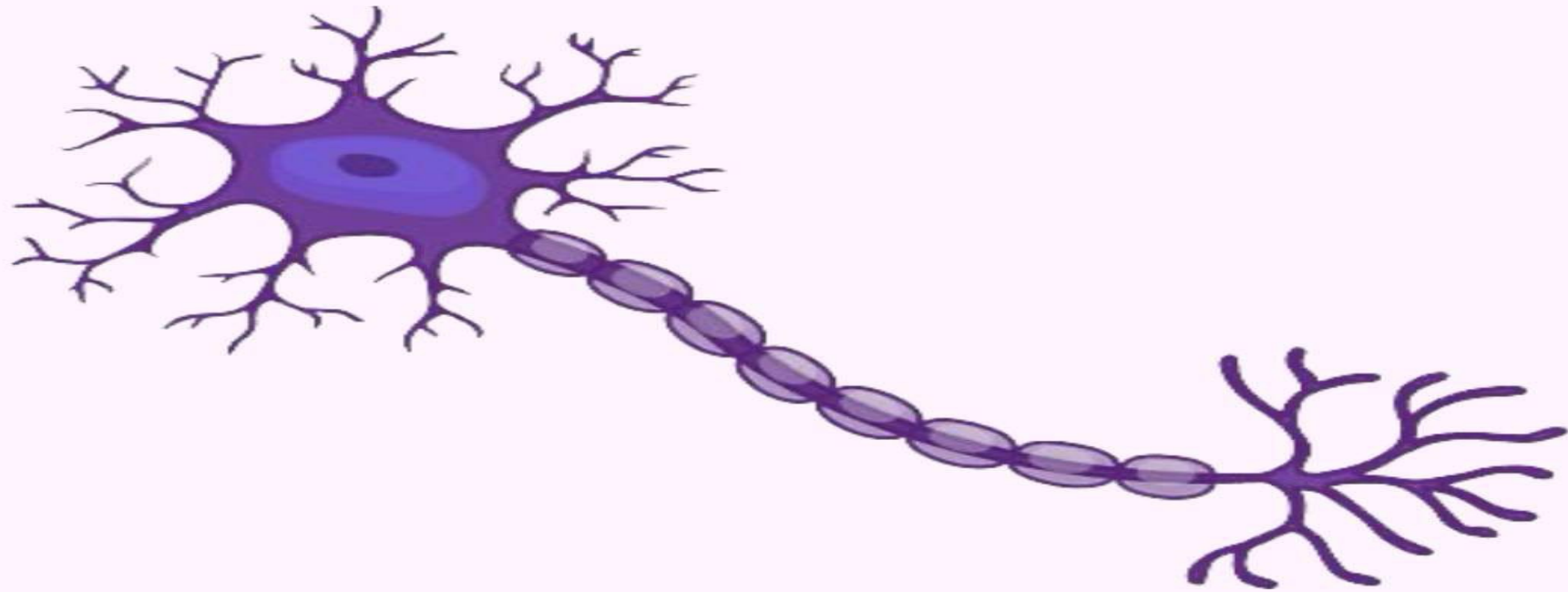
في الخضروات و الفواكه

في اللحم، في البيض، في اللبن

- They are important for final maturation of the RBCs → **so, lack of them causes failure of maturation of blood cells → megaloblastic anemia.**



PHYSIOLOGY



LEC NO. : 8

DONE BY : Nour Al-amoush .

وَبِقَدَرِ رَبِّ زِدْنِي عِلْمًا

Mobile cells (they are moving through blood)
 Lymphatic glands: liver, spleen,
 مناعة ثابتة غير متحركة

White Blood Cells (WBCs)

Line of defence against
 microbes

Total Count of WBCs: Ranges from 4000-11000/mm³.

• **Types:** depending on presence of granules in cytoplasm, leukocytes are divided into

Granular leukocytes ①			A granular leukocytes ② ^{without}	
Neutrophils	Esinophils	Basophils	Lymphocytes	Monocytes
60-70% of total leukocytes	1-5% of total leukocytes	0.5-1% of total leukocytes	20-30% of total leukocytes	3-8% of total leukocytes
Contain granules in cytoplasm			No granules in cytoplasm	
Formed in the bone marrow نخاع العظم			Formed in lymphoid tissues	Formed in bone marrow
Life span About 4-5 days			Life span Months or years	

تحتوي على حويصلات

الاشيع

حويصلات تحتوي على مواد
تستخدمها wbcس في قتل
البكتيريا و الفيروسات و الحماية



Neutrophils



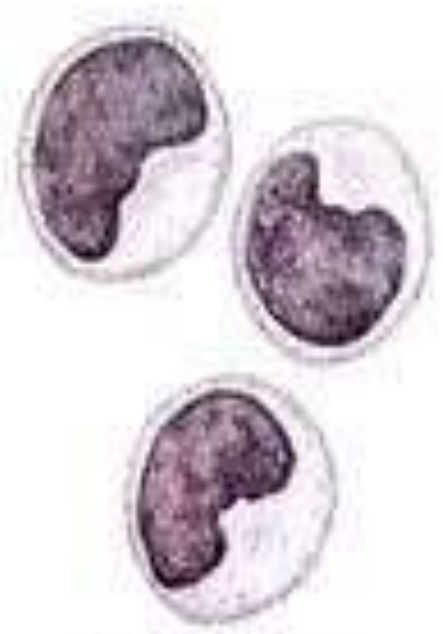
Eosinophils



Basophils



Lymphocytes



Monocytes



Platelets



Erythrocytes

- Functions of leukocytes:

(I) Granular leukocytes

A) Neutrophils:

تشكل

Constitute the first defensive line: against invading micro organisms.

طريقة قتلها للبكتيريا

Main function: phagocytosis and destruction of invading bacteria.

تعمل على بلع البكتيريا للداخل و من ثم تتكون حويصلة بعدها

lysosomes تحطمها وبتطلع برا الخلية

B) Esinophils:

- Weak phagocytosis.

الفرق بينهم:

- **Defense against parasitic infections e.g. schistosomiasis.**

مثل الديدان

- **Decrease allergy.** esinophils ف antigen antibody reaction و بيصير
تلعب دور انه تطلع هوا عشان تمنع antibody reaction ف ما بصير حساسية

C) Basophils: Granules contain histamine & other substances cause allergy

العكس من esinophils

مضاد للتجلط

- Liberation of heparin into blood (prevent blood coagulation).

- **Play a role in allergy.** → يلي بصير انه antigen antibody بيتحد على جدار basophils و يحفز
خروج هذه المواد ف تحصل الحساسية

(II) Non-Granular leukocytes:

تقتل البكتيريا و الفيروسات عن طريق phagocytosis يتكوّنوا في lymphatic tissue مثل spleen&live

(A) Lymphocytes: T lymphocytes for cell mediated immunity

and B lymphocytes secrete antibodies

تعمل عن طريق antibody و تهاجم الخلايا، ممكن تعملها اكثر من عملية مثل المعادلة

(B) Monocytes:

طاقتها اكثر

They phagocytes and kill bacteria but more powerful

than neutrophil

Platelets الصفائح الدموية

Counts: 150000-400000/mm³.

Life span: 8- 12 days

Function of platelets:

- **Has a role in haemostasis:** عن طريق تكوين الجلطات

- تضييق للأوعية
- لما يصير في قطع للجلد ببلش تضييق للأوعية عشان يسكر مكان القطع
- عن طريق الحويصلات الموجودة فيها
- لما بعمل قطع لجزء من الجلد الكولاجين يبدأ يظهر ف تيجي الصفائح الدموية و تتجمع و تلتصق و بصير platelet plug
- الجلطة الأولية
- تقريباً في بالدم factor 13 ، موجودين بصورة inactive اول ما يصير في جرح رح تصير active و تكون الجلطة و في بعض factors بصير لها انتاج من platelets نفسها
- A. **Release of serotonin which produce vasoconstriction.**
- B. **Formation of platelet plug .**
- C. **Release some clotting factors which help clot formation.**

الزوائد تظهر لما يصير
activation of factors

الخلايا
الدمية

Hemostasis Stoppage of bleeding



Definition: It means arrest of bleeding from injured blood vessels.

Steps:

It occurs in the following steps;





- تشنج الاوعية الدموية
- A. Vascular spasm** → بعد ما يصير الجرح بتطلع بعد المواد مثل serotonin بتخلي الجدار ينقبض عن طريق العضلات الملساء الموجودة فيه و يقرب من بعضه و يقلل ال hole يلي تكونت من الجرح
- B. Formation of a platelet plug.** → تيجي ال platelet و تلتصق ببعضها و تكون الجلطة الاولية و بعدين يتكون عليها الجلطة الاساسية
- C. Formation of a blood clot.**
- D. Fibrosis of the blood clot to close the hole in the vessel permanently.** ↓ تبدأ تكون fibers و بعدها تغلق الجرح كامل

Formation of the Blood Clot

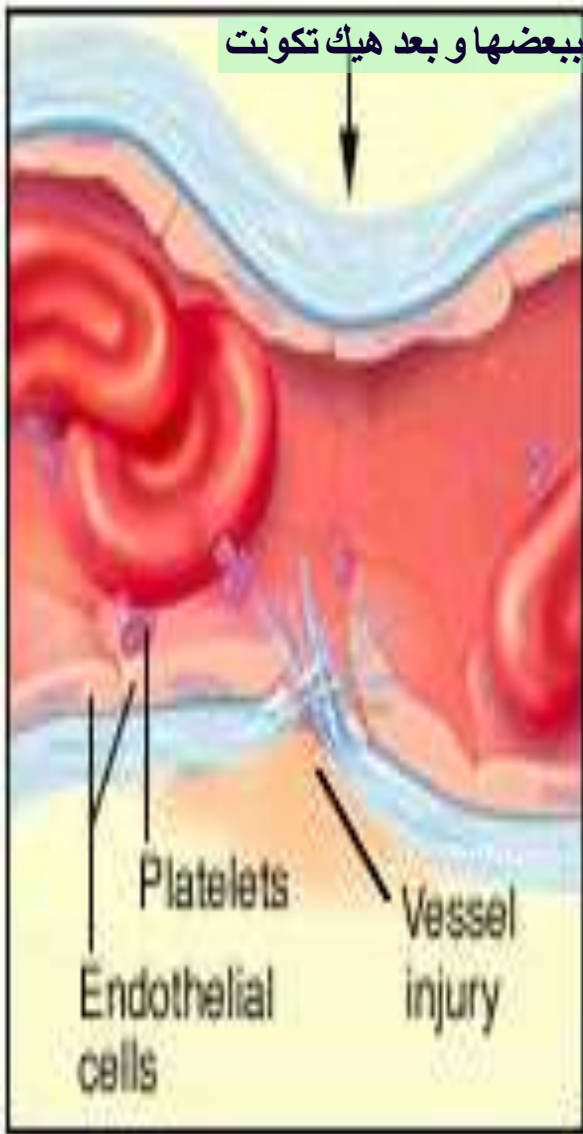
- The clot begins to develop in 15 to 20 sec if the trauma to the vascular wall is severe and in 1 to 2 min if the trauma is minor.  كل ما كان الجرح اكبر كل ما كانت blood clot formation كانت اسرع 

Mechanism of blood clot formation (blood coagulation):

The clotting takes place in 4 steps;

- Formation of a complex substance called prothrombin activators by 2 pathways  extrinsic pathway and  intrinsic pathway.**
- The prothrombin activator catalyzes the conversion of prothrombin into thrombin. 
- The thrombin acts as an enzyme to convert fibrinogen into fibrin threads.**
- Stabilization of clot. 
activators و هو يحول مادة اسمها prothrombin الى thrombin و هو يلي بحول fibrinogen الى fibrin و هو يلي كون blood clot

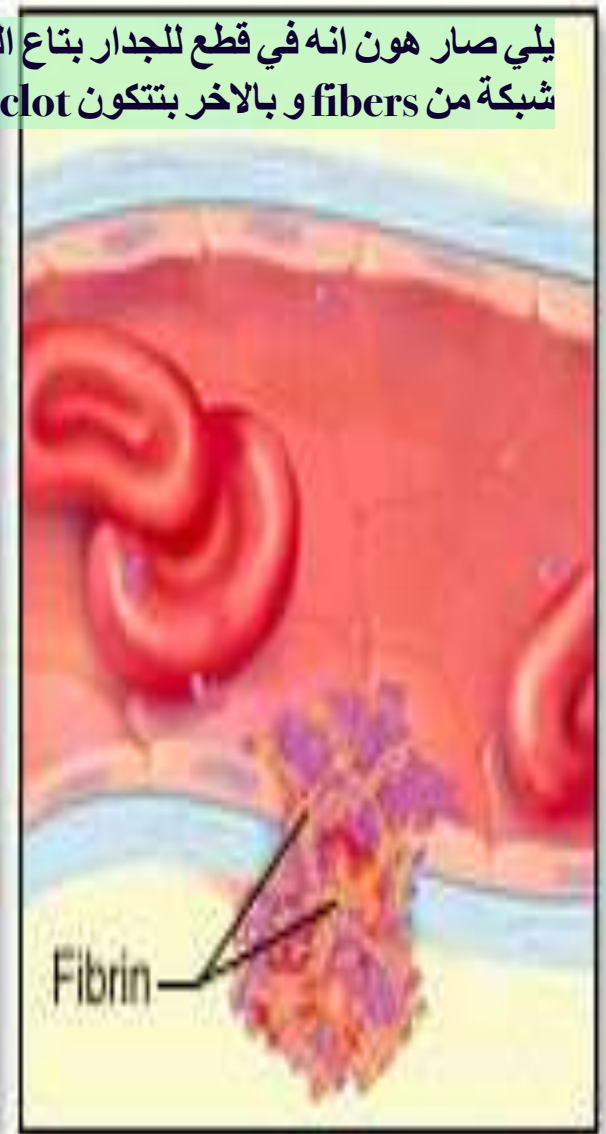
يلي صار هون انه في قطع للجدار بتاع الوعاء الدموي، اجت platelets و التصقت ببعضها و بعد هيك تكونت شبكة من fibers و بالاخر بتكون clot



(a) Vasoconstriction



(b) Platelet aggregation



(c) Clot formation

MECHANISM OF BLOOD CLOTTING

داخلي

Intrinsic system

معامل التجلط 12 موجود بالدم اول ما يصير في جرح يبدأ الكولاجين يلي ظهر بتحفيزه عشان يصير له activation بوجود عامل هو kallikrein

12 > active 12
Then 12 converts 11 > active 11
11 converts 9 > active 9
9 in presence of ca & phospho lipids & factor 8 converts 10 > active 10

لانه يبدأ ب activation of factor outside

و هو tissue

Thromboplastin

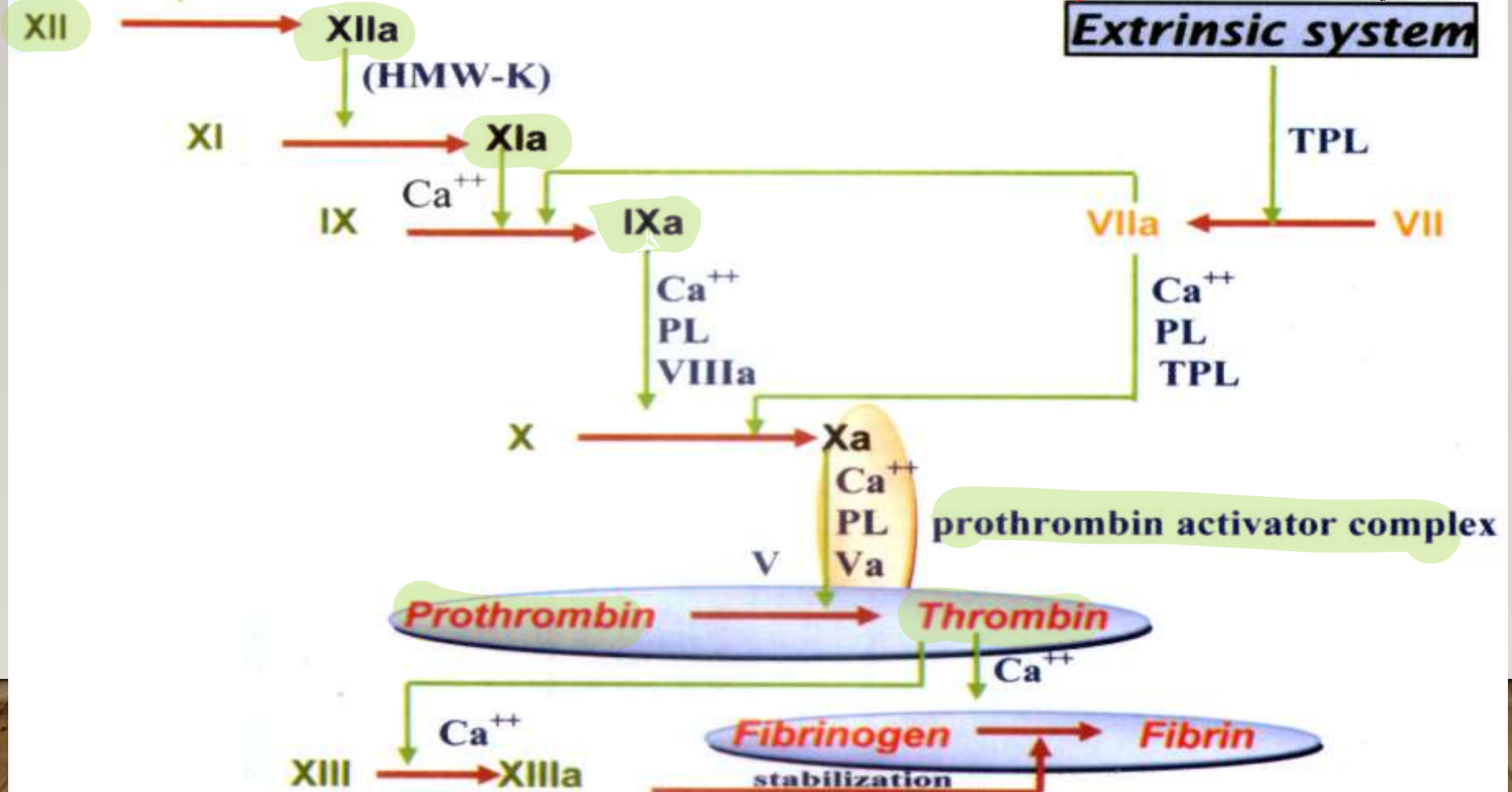
يخرج من النسيج يلي حصل له جرح

بيعمل activation of factor 7

Factor 7 in presence of ca & phospho

خارجي

Extrinsic system



Blood group	Agglutinogen in RBC	Agglutinin in plasma	% frequency
A	A	Anti B	41%
B	B	Anti A	9%
AB	A, B	-	3%
O	-	Anti A and Anti B	47%

Blood Groups

حسب المولدات المضادة الموجودة

- The blood of human is classified into many groups according to certain **antigens present on the surface of RBCs**. They include ABO and Rh systems.

Protein or polysaccharides

antibody مادة قادرة على تحفيز خروج

ABO system

Types of blood groups:

- This system includes 2 related antigens (or agglutinogens) A and B.
- **According to the presence or absence of these 2 antigens, the human blood is normally classified into 4 major groups:**

مولدات الضد

زمرة الدم	RBC	plasma	
A	A	Anti B	41%
B	B	Anti A	9%
AB (مستقبل عام)	A, B	-	3%
O (معطي عام)	-	Anti A and Anti B	47%

لا يمكن انه A تحتوي على anti A لانه رح تتكسر وهكذا بالنسبة للباقي الا o لانه اصلاً ما عندها antigen

بعض الاكالات والمشروبات بتكون anti B لتكون group A لو كنت من

Rh system (Rh factor)

Types of blood groups:

- There are six common types of Rh antigens named C, D, E, c, d, and e.
- The type D-antigen is considerably the most antigenic than the others, so;
 - ❑ Presence of D-antigen → Rh +ve (85 % of peoples).
 - ❑ Absence of D-antigen → Rh -ve (15 % of peoples).

Importance of blood groups

A) Blood transfusion: The transfused blood must be compatible with that of the recipient as regard ABO & Rh systems to avoid transfusion reactions.

B) Pregnancy:

المراة اذا كانت negative و الرجل positive الابن حيكون positive لانه ساند
الدم ممكن ينتقل من الطفل للام و رح تتكون اجسام مضادة
عند الطفل الثاني ممكن دم الام يكسر دم الطفل

- Rh system must be tested during pregnancy to avoid erythroblastosis foetalis. It occurs when Rh -ve mother get pregnant in Rh +ve baby.

C) Medicolegal importance:

بقدر احكي انه هو مو ابوه بس ما بقدر اجزم انه هو ابوه و هو عن طريق

I. Establish parentage: blood groups can prove that a man cannot be the father, although it cannot prove that he is the father.

II. Identify criminals: blood groups help in identifications of criminals in many accidents like rape

ممكن تكون باللعب او بعض secretions زي السائل
المنوي و ممكن اتعرف عليه مثلاً بحالات الاغتصاب

Blood Transfusion

Indications of blood transfusion:

النزيف

1. To restore the whole blood as in haemorrhage.
2. To restore one element of the blood when it is deficient, e.g. RBCs as in cases of anemia, WBCs as in leucopenia, platelets as in purpura, and clotting factors as in hemophilia.

Precautions before blood transfusion:

The transfused blood must be;

1. Compatible with that of the recipient as regard ABO & Rh systems. تحديد فصيلة الدم
2. Its Hb content not less than 90%. ما يينفع واحد مصاب بالانيميا يتبرع بالدم
3. Free from diseases e.g. infective hepatitis, AIDS & malaria. ما يكون عنده امراض تنتقل بالدم مثل الايدز
4. Fresh and not frozen (stored at 4°C for a period not exceeding 21 days). الدم القديم يكون عرضة انه يتكسر
5. Cross matching test should be done to it with recipient blood.

Dangers of blood transfusion:

عدم توافق

مثل يلي بصير لما A يتبرع ل B ف رح يصير

1. **Incompatibility:** antigen antibody reaction بخلي كريات

الدم الحمراء تعمل جلطة تقفل الاوعية الدموية الصغيرة

• It is due to mismatched blood groups.

• This is manifested by;

Because antigen antibody reactions release substances such as histamine which dilate the blood vessels and the blood stops

A. **Circulatory shock:** → drop of ABP.

B. **Hyperkalemia:** → cardiac arrhythmia.

رح يخرج البوتاسيوم نتيجة ال antigen antibody reaction و هيك بيعمل اضطرابات بعضلة القلب

C. **Jaundice:** ↑ serum bilirubin → yellow coloration of the skin and mucous membranes.

الاصفرار

ما بقدر اطلعها عن طريق urine و خطرة جدا لانه ممكن توصل

الاصفرار بصير بالعيون و الجلد و mucous membrane

D. **Acute renal failure.**

يترسب الهيمو غلوبين بانابيب الكلية و هو نازل في البول و بجيقلها و ممكن توذي للوفاة لو ما صار علاج للفشل الكلوي

2. **Allergic reactions:** It is due to presence of leukocytes and platelets in the transfused blood. لانه الدم اللي انتقله يحتوي على مواد غريبة.

3. **Transmission of diseases** e.g. AIDS, hepatitis, and malaria.

QUESTIONS

1-MENTION 3 MAJOR FUNCTIONS OF THE BLOOD

Answer 1- Major transport medium in the body: It transport:

* O₂

* Co₂

* Glucose

* **End products of metabolism as urea.**

* Hormones.

2- Haemostatic function: Stoppage of bleeding from injured blood vessel by clotting.

3- Homeostatic function: Keep the composition of internal environment constant.

2-MENTION 4 FUNCTIONS OF PLASMA PROTEINS

ANSWER;

3. **Defense action:** antibodies **are gamma globulins**

4. **Blood coagulation:** by fibrinogen **& prothrombin.**

5. **Blood viscosity:**

- Blood viscosity 3 times more than water
- **1.5 times formed by plasma proteins mainly by fibrinogen**
- 1.5 times formed by RBCs
- **Viscosity maintains diastolic blood pressure.**

6. **Buffering action:** maintains body PH.

4-WHICH IS THE % OF PLASMA PROTEINS IN PLASMA?

- a) 90gm%
- b) 10gm%
- c) 0.1gm%
- d) **6-9gm%**
- e) 3.5gm%

4-WHICH IS THE SITE OF FORMATION OF MOST OF PLASMA PROTEINS?

- a) Bone marrow
- b) **Liver**
- c) Kidneys
- d) Spleen
- e) Adipose tissues

5-MENTION 3 FUNCTIONS OF RBCS

ANSWER;

1) Functions of cell membrane:

a) *It has a large surface area* than the actual cell volume;

It gives **RBCs its biconcave shape.**

It allows easy diffusion of gases through cell membrane.

b) *It is plastic* → enhances cell flexibility → allow RBCs to be squeezed in small **capillaries without rupture of it.**

c) *It keeps Hb inside RBCs* → prevent its loss in urine. **2)**

2) Functions of carbonic anhydrase enzyme: It helps in transport of CO₂.

3) Blood viscosity: RBCs share **in production of blood viscosity**, which maintains arterial blood pressure.

6-WHAT RBCS ENZYME FACILITATES TRANSPORT OF CO₂?

- a) Myeloperoxidase
- b) **Carbonic anhydrase**
- c) Superoxide dismutase
- d) Globin reductase
- e) Protein kinase

7-WHICH IS THE CHIEF INTRACELLULAR CATION IN RBCS?

- a) **K**
- b) Na
- c) Ca
- d) Mg
- e) Cu

8-HYPOXIA STIMULATES ERYTHROPOIESIS THROUGH STIMULATION OF RELEASE OF WHICH OF THESE HORMONES?

- a) Androgen
- b) Thyroxin
- c) **Erythropoietin**
- d) Insulin
- e) Growth hormone

9- HEALTHY LIVER IS CONSIDERED ESSENTIAL FACTOR FOR ERYTHROPOIESIS BECAUSE:

- a) It is the site of formation of Vit B12
- b) It is the site of storage of iron and vit B12 and formation of globin portion of HB
- c) It is the site of formation of RBCs
- d) It is of storage of RBCs
- e) It is the site of storage of haemoglobin

10- WHICH IS THE WHITE BLOOD CELL CONSTITUTING THE 1ST LINE OF DEFENSE AGAINST INVADING MICROORGANISMS?

- a) Eosinophils
- b) Basophils
- c) **Neutrophils**
- d) Monocytes
- e) Lymphocytes

11- WHICH IS THE WHITE BLOOD CELL CONSIDERED THE FIRST LINE OF DEFENSE AGAINST PARASITES?

- a) **Eosinophil**
- b) Basophil
- c) Monocyte
- d) Lymphocyte
- e) Neutrophil

12- WHICH IS THE 1ST STEP IN HAEMOSTASIAS?

- a) Platelet plug formation
- b) Fibrosis
- c) Clot formation
- d) **Vascular spasm**
- e) Fibrinolysis

13-THE INTRINSIC SYSTEM OF BLOOD CLOT FORMATION BEGINS BY ACTIVATION OF WHICH OF THESE CLOTTING FACTORS?

- a) 7
- b) 9
- c) 11
- d) 10
- e) **12**

14- WHICH IS THE LAST STEP OF BLOOD CLOT FORMATION?

- a) Formation of prothrombin activator
- b) Thrombin formation
- c) Vascular spasm
- d) Platelet plug stabilization
- e) **Conversion of fibrinogen to fibrin**

15- MENTION 3 IMPORTANCE OF BLOOD GROUPS

A) Blood transfusion: The transfused blood must be compatible with that of the recipient as regard ABO & Rh systems to avoid transfusion reactions.

B) Pregnancy:

- Rh system must be tested during pregnancy to avoid erythroblastosis **foetalis. It occurs when Rh -ve mother get pregnant in Rh +ve baby.**

C) Medicolegal importance:

- I. Establish parentage:** blood groups can prove that a man cannot be the father, **although it cannot prove that he is the father.**
- II. Identify criminals:** **blood groups help in identifications of criminals in many accidents like rape.**

16- MENTION 4 PRECAUTIONS BEFORE BLOOD TRANSFUSION

1. **Compatible with that of the recipient as regard ABO & Rh systems.**
2. **Its Hb content not less than 90%.**
3. **Free from diseases e.g. infective hepatitis, AIDS & malaria.**
4. **Fresh and not frozen (stored at 4°C for a period not exceeding 21 days).**

17- MENTION 3 DANGERS OF BLOOD TRANSFUSION

1. Incompatibility:

- **It is due to mismatched blood groups.**

- This is manifested by;

A. Circulatory shock: → drop of ABP.

B. Hyperkalemia: →cardiac arrhythmia.

C. Jaundice: ↑ serum bilirubin → yellow coloration of the skin and mucous membranes.

D. Acute renal failure.

2. Allergic reactions : It is due to presence of leukocytes and platelets in the transfused blood.

3. Transmission of diseases e.g. AIDS, hepatitis, and malaria.

THANK

- **You**