2025

PHYSIOLOGY SUMMARIZE

FIRST SIX LECTURE

SUMMARIZE

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LECTURE 1

Homeostasis (same state)

* It is the keeping of internal environment of the body constant despite large changes in the external environment.

* Homeostasis is essential for the survival of cells.

*Body functions are regulated by 3 systems:

1) Auto-Regulation

2) Nervous system(short term)

3) Endocrine system(long term)

*Homeostasis is maintained by mechanisms that act through negative feedback loops.

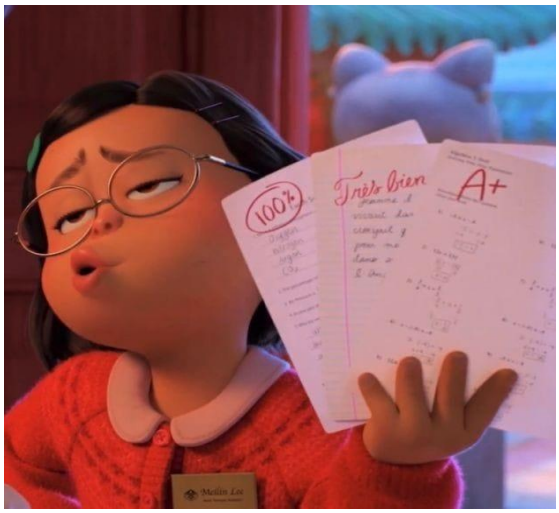
a. A negative feedback loop requires

(1) a sensor that can detect a change in the internal environment and

(2) an effector that can be activated by the sensor.

b. In a negative feedback loop, the effector acts to cause changes in the internal environment that compensate for the initial deviations that were detected by the sensor.

*Positive feedback loops serve to amplify changes and may be part of the action of an overall negative feedback mechanism.



PHYSIOLOGY

LECTURE 2&3

transport across cell membrane

Passive

- **Down hill**
- **Movement from high (concentration / pressure / electrical) to low**
- **With gradient**
- **No need of energy**

Active

Diffusion

B-Facilitated

- Large
- No energy
- With carrier
- To saturation

A-Simple

- Small
- No energy
- No carrier
- To equilibrium

1

Osmosis

Special to H2O Transport

Through semipermeable membrane (permeable to H2o not to the Salts)

-Osmotic pressure needs to prevent Osmosis.

It depends on number of molecules disadved in a Solution.

Mechanism :

2

1.lipid soluble (e.g O2 ,Co2) through lipid layer

2. Ions charged ,water soluble through channels

transport across cell membrane

Factors affecting in simple diffusion

1.Direct proportion with Concentration, pressure and electrical gradients

2.Temperature, surface area

3.lipid solubility أهم عنصر

4.Number of channels and Inverse proportion with Thickness & Molecular weight

3

Active

- Movement from low (concentration / pressure / electrical) to high
- Against gradient
- With energy carrier

1 ry

2 ry

Indirect

Energy from A.T.P

e.g (Na+ , K+ , pump)

CO :

2 Substances move in the same direction .

COUNTER ;

2 Substances move in opposite direction .

Vesicular

Very large

Exocytosis

From Inside to outside

Endocytosis

From outside to Inside

Phagocytosis

FOR:

Solid particles

Pinocytosis:

FOR:

Liquid particles

CELL MEMBRANE

LIPID 42%

Phospholipid

(2 layers)

Lipid bilayer .

Head :

. Peripheral

. Polar

. Hydrophilic

Tail :

. Central part

. non polar

. hydrophobic

FUNCTION:

Selective, permeability

(more permeable to lipid Soluble Uncharged Substances)

CARBOHYDRATE 3%

GLYCOLIPID

GLYCOPROTEIN

GLYCOCALYX

Function of carbohydrate:

Receptor , Adhesion ,Identification ,Recognition

PROTEIN 55%

INTEGRAL

Transmembrane

CHANNELS

Open

- Leak
- Simple

Gated

- Voltage gated
- Ligand gated

CARRIER

1.Uniport

2.Symport

3.antiport

PERIPHERAL

Receptors or enzyme

PHYSIOLOGY

LECTURE 4

BLOOD

- **Plasma**
  - **Water** — أكثر شي موجود بالبلازما
  - Nutration matirial
  - Ions & waste materials
  - **Plasma protein (PP)**
    - **Albumin** — أكثرPP
      - - Colloid Osmotic pressure of plasma proteins (OPPP)
        - It is important in the regulation of tissue fluid
    - **Globulin**
      - Defense (immunity) Mechanism
    - **Fibrinogen**
      - 3-Blood Viscosity:
        - prevention of the rapid outflow of blood through the vessels, thus maintaining normal arterial blood pressure.
        - Blood viscosity 5 than water
        - 2 from fibrinogen / 3 from RBC's
    - **Prothrombin** — أقلPP
      - Blood Coagulation
- **Cells**
  - **Platelets** — Thrombocytes
  - **WBC'S** — Leucocyte
  - **RBC 'S** — Erythrocyte

THIS IS SPECIFIC FUNCTION ☹

NON SPECIFIC FUNCTION 😊 (for all PP)

Buffering Action:

Capillary Permeability:

It decrease the capillary permeability (closes the capillary pores)

Absorption and Transport:

For several substances e.g. vitamins & hormon.

Important:

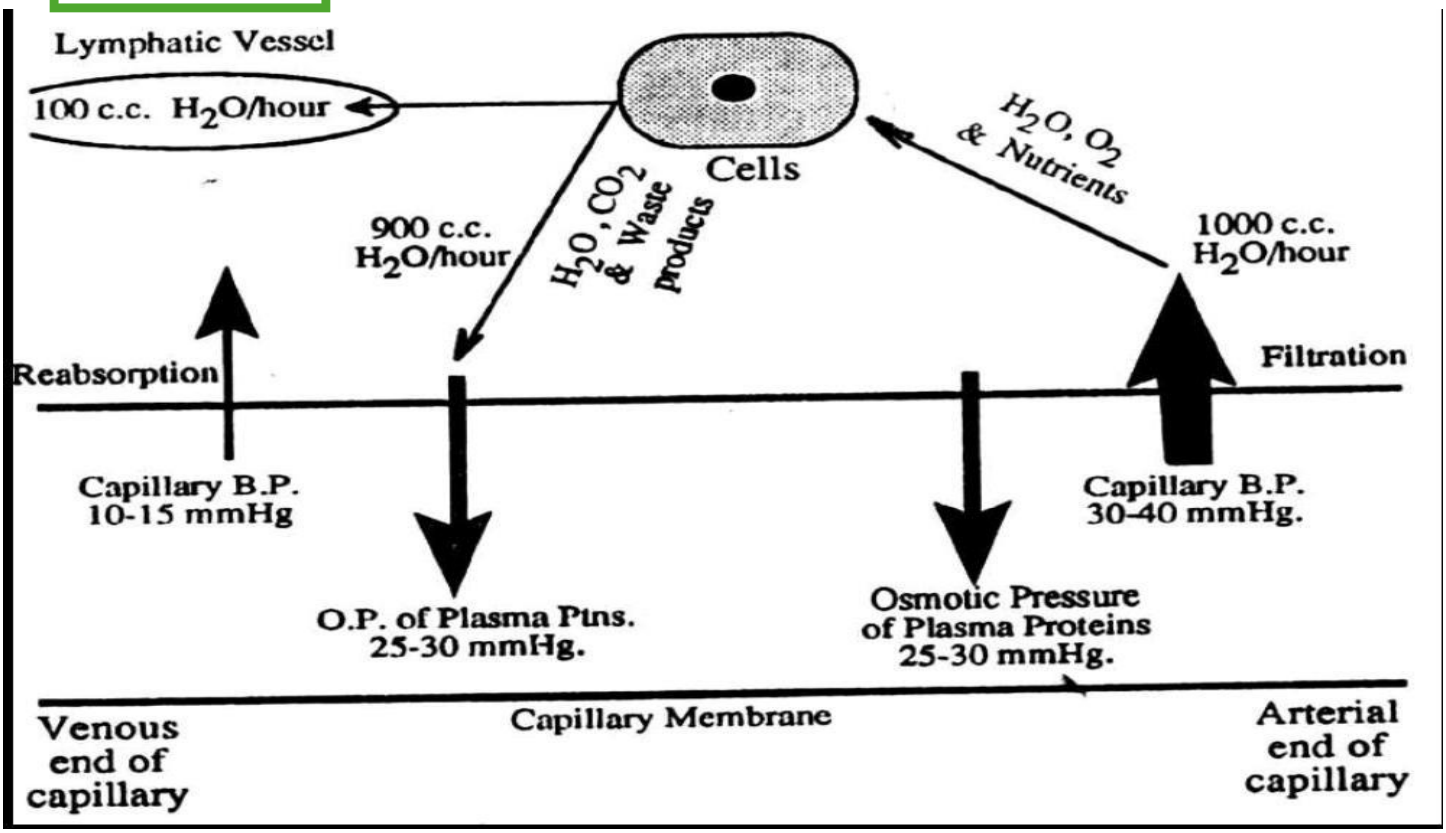
a- Prevent loss of these substances in urine (plasma proteins are large MW so not filtered by the kidney) .

b- Serve as a reservoir.

Diet Reserve:

Plasma proteins are used in starvation as a diet.

(OPPP)



LECTURE 5

RBC'S

ERYTHROCYTE

Avareg value : 5 million/mm3

** MALE : (5-5.5) due to testosterone hormone

**FEMALE: (4.5-5) due to menstruation & estrogen

**NEW BORN : (7) due to intrauterine O2 lack

Shape :

Circular , biconcave , no nucleated discs

Characters:

- Flexible (not elastic)
- Biconcave

Hemoglobin :

35% OF RBC'S weight

Normal value 15gm%

**MALE (12-16) due to testosterone & hormone

** FEMALE (14-18)) due to menstruation & estrogen

** NEW BORN (19) due to intrauterine O2 lack "Hypoxie"

FORMS

TYPES 👀

- oxyhemoglobin
- Deoxyhemoglobin
- Carbaminohemoglobin
- Caeboxyhemoglobin

When oxygen is bound to Hb. It gives blood its red color.

When no oxygen is bound to Hb.

When carbon dioxide is bound to Hb.

When carbon monoxide is bound to Hb.

TYPES OF HEMOGLOBIN 👀

ADULT (HBA):

contains 2 α chain cand 2B chain

أكثر نوع موجود بال adultes

HBA2:

contains 2α chains and 2 delta.

FETAL HB (HBF):

contains 2α and 2 ɤ gamma

أقل نوع موجود بال adultes

GLYCOSYLATED HB: (HB. A1C)

glucose is attached to terminal valine amino acid in B-chain. It is indicator of control diabetes in last 3 months. It is increased in poorly controlled diabetes

-HBS :

It is abnormal type of Hb due to congenital abnormality of B-globin → hemoglobin-S which

causes sickle cell anaemia

FACTOR AFFECTING ERYTHROPOIESIES

Hypoxia

(decrease in O2 supply to tissue)

Most important

Healthy Bone

Marrow: It is the site of formation in adult

Hormones:

Androgen, thyroxin (general metabolic stimulant),adrenal ine, noradrenaline, cortisol

Healthy Kidney:

secretes 85 % of erythropoietin hormone in response to hypoxia, anemia and androgen hormone

Healthy Liver:

1) Secretes 15 % of erythropoietin hormone.

2) Storage for globulin, iron, vitamin B12, folic acid and copper

Healthy Diet:

-Iron, Proteins and vitamins:

*Vitamin B12 & folic acid = RBCs maturation factors and Vitamin C (for synthesis of Hb).

↓Vitamin B12 & folic acid→ Megaloblastic Anemia

-Others: Copper & cobalt are cofactors in synthesis of Hb (needs small amount).

ANEMIA ☹

Microcytic hypochromic anemia

e.g. iron deficiency anemia.

Normocytic normochromic anemia

e.g. a plastic, hemorrhagic and hemolytic anemias

Macrocytic anemia (megalablastic)

e.g. vitamin B12 folic acid deficiency

LECTURE 6

WBC'S

Neutrophils

1. Migration: Movement of Neutrophils toward infection sites in response to chemical signals.
2. Margination: Neutrophils move to vessel walls, preparing to exit into tissues
3. Diapedesis: Neutrophils squeeze through vessel walls into affected tissues .
4. Amoeboid movement: Neutrophils move by extending pseudopodia.

Esinophils

- Antiallergic
- Antiparasite

Basophils

- Release of heparin (anticoagulant)
- Release of histamine (production of allergy

Lymphocytes

- T-lymphocytes: Responsible for cellular immunity
- B-lymphocytes: Responsible for humoral immunity

Monocyte Macrophages

1- Highly phagocytic cell.

2- Tissue repair after damage.

HEMOSTASIS

Stoppage of bleeding

Vasoconstriction of the injured vessel .

Formation of platelet plug

Blood coagulation

Clot retraction

*Occure immediately after injury .

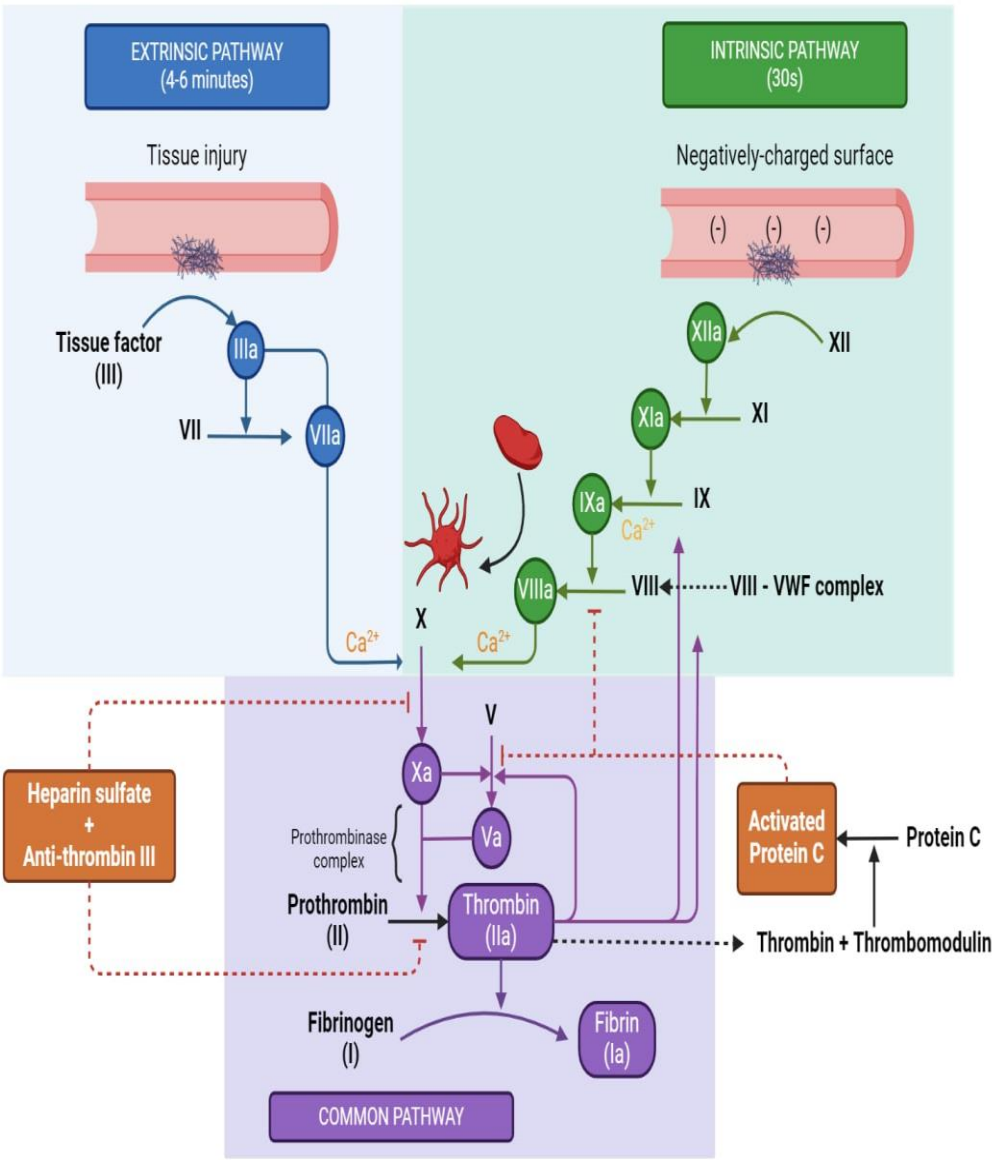
*Occure locally

Due to:

-Nervous reflexes sympathetic

-Myogenic contraction

-Release of serotonin, thromboxane A2



Thank you for listening!