

Lecture: 1

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Sheet Slides



Physiology



Mrym ghuloom

Physiology- lecture 1

Physiology: A science deals with the functions(abnormal functions) and the mechanisms that are taken by.

Anatomy deals with the structures of the body, **Physiology** deals with functions of these structures.

Human body starts as one cell called Zygote , there is a fluid around of it so this cell can survive by taking the nutrients from the surroundings and at the same time it can get rid of byproducts directly to the fluid.

Human beings are multicellular organisms, that comes from the dividing of the Zygote

1 cell → 2 cells → 4 cells → 8 cells → 16 cells → multicelular

At the 2 cells level it's easy to take nutrients and get rid of byproducts. At the 8 cells level it's also considered easy

At the 16 cells level it's very hard for the center cell to take nutrients an get rid of byproducts.

So there is a need for a system to bring these nutrients and get rid of byproducts through channels, this channel system is called Vascular System. The Vascular System needs a pump(the heart) for its work, when the heart is formed this system is called Cardiovascular System.

When we include the fluid(blood) that is in the vessels we call the system Circulatory System, when we don't include blood we call it Cardiovascular System.

We need another system formed as cells need to take Oxygen and get rid of CO₂, this system is the Respiratory System.

There is a need to get rid of fluid byproducts(Urine) by the Urinary System (Renal System).

There is a need for a system that takes solid nutrients and breaks them to small easily absorbed nutrients, The Digestive System.

The human beings need to move, this movement needs muscles and bones, Musculoskeletal System.

Human body needs protection from external damage and injuries, So it's covered by the Integumentary System (Skin and its appendages such as hair).

Each system performs certain functions, these systems functions are controlled by the Nervous System and Endocrine System, these two systems are complementary to each other and they have their own control way, they are not the same in the control way.

All of these systems work toward one important general function called Homeostasis.

Homeostasis: The ability of the body to maintain almost constant variables such as blood pressure, blood sugar, Oxygen concentration...

Homeostasis is essential for the survival of the cells.

Reproductive System has almost no Homeostasis function, it is the least important in terms of Homeostasis

Its function is to maintain species, it is a very little homeostatic function that any person can live a normal life without the Reproductive System.

The fluid that is surrounding the cells is called Extracellular fluid (ECF), the fluid that is inside the called Intracellular fluid (ICF).

60% of our body weight is composed of fluid,

60% of our body fluid is found inside the cell (ICF), 40% outside the cell (ECF).

The fluid that is outside the cell could be found inside the vessels so it's called Vascular fluid (Plasma), or it can be found between the cells so it's called interstitial fluid.

Fluid in our body

60% ICF

40% ECF
↓ ↓
80% interstitial 20% plasma

Homeostasis: the ability of the body to keep the internal environment almost constant.

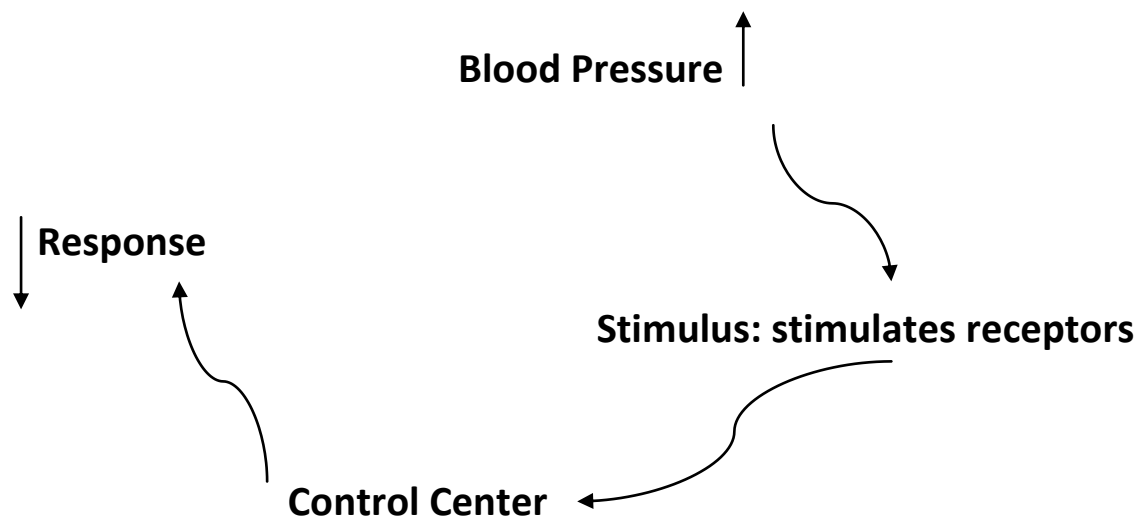
Internal environment is the interstitial fluid.

Any variable has to be almost kept constant, ex: blood pressure, blood glucose, CO2 concentration, PH (Hydrogen concentration)

That's done by many mechanisms, the first mechanism is Feedback mechanism.

Feedback mechanism:

For every change in variable we must have receptors that sense changes:



Blood pressure receptors are called Baroreceptors, the control center is in the brain.

Blood glucose receptors are found in the cells, the control center is the Pancreas.

If the stimulus is an increase the response has to be a decrease, if the stimulus is a decrease the response has to be an increase. (Opposite to each other) the mechanism is negative feedback response.

Negative feedback is a normal mechanism that's compatible with life. Positive Feedback is incompatible with life, but there are some positive feedbacks that are normal and compatible with life such as the action potential (the opening of the first Na^+ Channel is hard, the second is easier, the third is easier,...)

Coagulation of blood is a positive feedback.

The contractions when the baby is born are positive feedback (contraction increase and increase....).

Females have less fluid (water) percentage than males because they have more fats which are hydrophobic.

Our body fluids contains organic substances and electrolytes, electrolytes have certain concentrations measured in millimoles.

If we have a cup of 100% pure water the osmolarity will be zero,

If we have a cup of 120 millimolar of NaCl the osmolarity will be = $120 \text{ Na}^+ + 120 \text{ Cl}^- = 240$ milliosmose,

If we have a cup of 100 millimoles KCl_2 the osmolarity will be = $100 \text{ K}^+ + 200 \text{ Cl}^- = 300$ milliosmose,

If we have a cup of 120 millimoles glucose the osmolarity will be 120 milliosmose.

Done by:

Ala'a Shaban :)