ORGANIZATION OF THE HUMAN BODY

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OUTLINE

• Definition of:
  • Anatomy
  • Physiology
  • Pathophysiology
  • Other subdivisions

• Levels of Organization
• Characteristics of the Living Human Organism
• Homeostasis
• Feedback System
• Basic Mechanism of Disease
• Clinical Application (Palpation, Auscultation and Percussion, Autopsy, Diagnosis of Diseases)
ANATOMY

- Study of the structure of an organism
- Study of body structure, which includes size, shape, composition, and perhaps even coloration.
- Scientific discipline that investigates the body’s structure
  - Developmental anatomy – study of the structural changes that occur between conception and adulthood
  - Embryology – conception to the end of the eighth week of development
  - Gross anatomy – study of structures that can be examined without the aid of a microscope
  - Systemic Anatomy – the body is studied system by system (group of structures that have one or more common functions)
  - Regional Anatomy – the body is studied area by area, by region
- Surface anatomy – study of the external form of the body and its relation to deeper structures
PHYSIOLOGY

• Study of how living organisms work
• Study of how the body functions
• Scientific investigation of the processes or functions of living things
• Always interested in function and integration – how things work together at various levels of organization and, most importantly, in the entire organism
PATHOPHYSIOLOGY

- Study of processes of the in a functioning body and, a knowledge of normal physiology makes such disorders easier to understand.
LEVELS OF ORGANIZATION

1. Chemical level. Atoms (colored balls) combine to form molecules.

2. Cell level. Molecules form organelles, such as the nucleus and mitochondria, which make up cells.

3. Tissue level. Similar cells and surrounding materials make up tissues.

4. Organ level. Different tissues combine to form organs, such as the urinary bladder.

5. Organ system level. Organs such as the urinary bladder and kidneys make up an organ system.

6. Organism level. Organ systems make up an organism.
CHARACTERISTICS OF THE LIVING HUMAN ORGANISM

• **Humans** – living organisms, sharing characteristics with other organisms.
  • **Organization** – condition in which the parts of an organism have specific relationships to each other and the parts interact to perform specific functions
  • **Metabolism** – all of the chemical reactions taking place in an organism
  • **Responsiveness** – an organism’s ability to sense changes in its external or internal environment and adjust to those changes
  • **Growth** – cells increase in size or number, which produces an overall enlargement of all or part of an organism
  • **Development** – includes the changes an organism undergoes through time, begins with fertilization and ends at death
  • **Reproduction** – formation of new cells or new organisms
HOMEOSTASIS

• Existence and maintenance of a relatively constant environment within the body
• Maintenance of a constant environment in the body

MAINTAIN – Keep up
CONSTANT – The same
INTERNAL – Inside the body
ENVIRONMENT – Surroundings of the body
HOMEOSTASIS COMPONENTS

• Variables – body conditions (volume, temperature, and chemical content)
• Set point – ideal normal value of the variables
HOMEOSTASIS

• All organisms must maintain a constant internal environment to function properly
  • Temperature
  • pH of the internal environment
  • Concentration of nutrient and waste products
  • Concentration of salt and other electrolytes
  • Volume and pressure of extracellular fluid
  • Hormonal control
FEEDBACK SYSTEM IN HOMEOSTASIS

NEGATIVE FEEDBACK

POSITIVE FEEDBACK
FEEDBACK SYSTEM IN HOMEOSTASIS

**Homeostatic control systems**

- **Receptor**: Takes in sensory information
- **Variable**: A factor in the body that can be modified by the effector
- **Control center**: Determines the “set point” and regulates the body’s response
- **Effector**: Carries out the body’s response
NEGATIVE FEEDBACK

- Called negative because the information caused by the feedback causes a reverse of the response
- Any deviation from the set point is made smaller or is resisted
- Most common feedback that happens inside the body

Components
- Receptor – which monitors the value of a variable
- Control center – receives information about the variable from the receptor, establishes the set point, and controls the effector
- Effector – produces responses that change the value of the variable
NEGATIVE FEEDBACK

Stimulus: rising blood glucose level

High blood glucose level is detected by insulin-secreting cells of pancreas.

Pancreas secretes the hormone insulin causing liver cells to take up glucose and store it as glycogen.

Return to homeostatic blood glucose level

As body cells take up blood glucose, glucose levels in the blood decline, and insulin release stops (negative feedback).

Most body cells also take up more glucose.
POSITIVE FEEDBACK

• Not homeostatic and are rare in healthy individuals
• When a deviation from a normal value occurs, the system’s response is to make the deviation even greater
POSITIVE FEEDBACK

1. Head of fetus pushes against cervix
2. Nerve impulses from cervix transmitted to brain
3. Brain stimulates pituitary gland to secrete oxytocin
4. Oxytocin carried in bloodstream to uterus
5. Oxytocin stimulates uterine contractions and pushes fetus toward cervix
BASIC MECHANISM OF DISEASE

- Disease – an abnormal alteration of structure or function in any part of the body
- Disease mechanism constitute general pathology
- A logical and orderly way of thinking about diseases and their characteristics must be cultivated
  - Epidemiology (incidence)
  - Etiology (cause)
  - Pathogenesis (evolution/ process of the development of disease)
  - Pathological and clinical features (morphological/structural changes)
  - Complications and Sequelae
  - Prognosis (result prediction)
Define each term:
• Auscultation
• Palpation
• Percussion
• Autopsy
• Diagnosis of diseases
CHEERS