SLE211 Study Notes - Table of Contents

Topic 1: Body Fluids and Homeostasis

- Physiology: Study of the function of living things
- Focuses on how, not why something occurs

    eg. Shivering occurs because nerve cells detecting decrease in body temperature, signalling area of brain responsible for temperature regulation, brain activates nerve pathways that cause involuntary occulting contractions NOT to help body warm up because shivering generates heat.

- Physiology is closely related to anatomy

Levels of Organisation in Body

- **Chemical level:**
    - Atoms of oxygen, carbon, hydrogen and nitrogen make up approximately 96% of body chemistry, which make up the molecules of life such as carbohydrates, fates and nucleic acids.
- **Cellular level:**
    - Chemical components arranged to form cells, the fundamental units of structure and function.
    - Basic cell functions are:
        1. Obtaining nutrients and oxygen from environment
        2. Performing chemical reactions to provide energy for cells
        3. Eliminating waste and by-products to the cell's environment
        4. Synthesising proteins and other components needed for cell structures
        5. Controlling exchange of materials between cell and environment
        6. Moving materials from one part of the cell to another
        7. Respond to changes in surrounding environment
        8. For most cells, reproducing (exceptions are nerve and muscle cells)

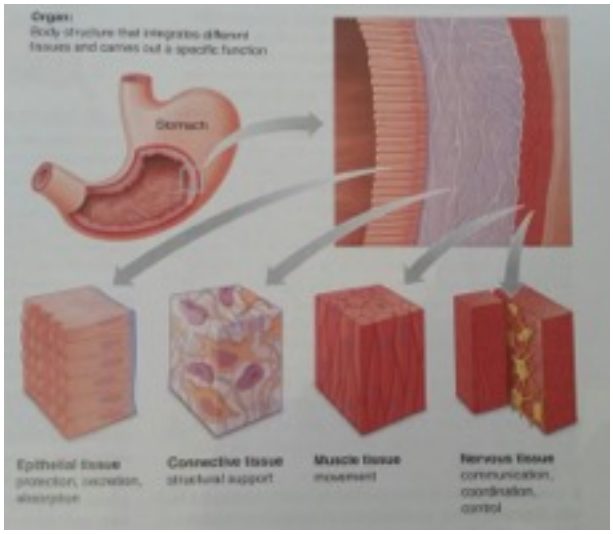
- Specialised cell functions occur in multi-cellular organisms. Usually a modification or elaboration of a basic cell function. Specialised function occurs in addition to fundamental cell activity.

  eg. Digestive enzyme secretions in gland cells of digestive system or muscle contraction.

- **Tissue level:**

  - Cells of similar structure and specialised function combine to form tissues.

    1. Muscle tissue: Cells specialised for contracting which generates tension and produces movement. Types of muscle tissue are skeletal, cardiac and smooth muscle.
    2. Nervous tissue: Cells specialised for initiating and transmitting electrical impulses. These impulses are involved in communication, co-ordination and control.



    3. Epithelial tissue: Cells specialised for exchanging material between the cell and its environment. Organised into epithelial sheets and secretory glands.

Layers of cells that line parts of the body. Only selective material transfer is possible through epithelial barrier.

Exocrine glands: Secrete though ducts to outside of the body, or to a cavity that opens to the outside. eg. Sweat glands, digestive glands

Endocrine glands: Lack ducts and release secretory products (hormones) internally into blood. eg. Pancreas secretes insulin

    4. Connective tissue: Relatively few cells dispersed in an abundance of extracellular material. Connects, supports, and anchors. Cells in connective tissue (except blood) produce specific structures molecules which are released into extracellular spaces between cells.

       eg. Elastin - stretching and recoiling

- **Organ level:**
  - Organs consist of two or more types of primary tissue organised to perform particular functions.

    eg. The stomach consists of all types of primary tissue (see above diagram)
- **Body system level:**
  - Groups of organs are organised into body systems.
  - A system is a collection of organs that perform related functions and interact to accomplish a common activity essential for survival of whole body.
  - The human body has 11 systems:
    1. Circulatory
    2. Respiratory
    3. Digestive
    4. Urinary
    5. Skeletal
    6. Muscular
    7. Integumentary
    8. Immune
    9. Nervous
    10. Endocrine
    11. Reproductive

    eg. Digestive system consists of mouth, pharynx, oesophagus, stomach, small intestine, large intestine, salivary glands, exocrine pancreas, liver and gall bladder
- **Organism level:**
  - Each body system counts on proper functioning of all other systems to carry out its specific responsibilities.
  - A multicellular organism consists of various body systems structurally and functionally linked, separate from surrounding environment.

    eg. Blood pressure regulation depends on co-ordinated responses among circulatory, urinary, nervous and endocrine system