**3.1 – From Cells to Tissues to Organs**

Background

* A cell is the simplest level of organization in the body.
* A cell is a system within a system and the health of the organism as a whole depends on the health of its cells.
* A tissue is composed of cells that have the same structure and function.
* An organ is composed of different tissues that work together.
  + Heart (P. 62, Fig 3.3)
* The human body is made up of an estimated 100 trillion cells.
* All of these cells are organized into one of the following four tissue types:
  1. Connective
  2. Muscle
  3. Epithelial
  4. Nervous
* The many specialized cells in a multicellular organism are not scattered randomly throughout the organism.
* Specialized cells that are similar in structure and function are grouped together in tissues.
* Cells, tissues, organs and organ systems should not be thought of separately because they do not work in isolation. Each level is dependent on the level that precedes it.
* Understanding one level of organization of the body, such as the cell, can help us to understand what happens at the next level.
* Similar cells from different organisms will look very similar (ex. Blood cells from humans and animals).
* The way in which the various types of tissue cells perform their basic processes may vary, and those cells may have a special role, but all cells during their existence
  1. Transform and transmit energy
  2. Expel wastes
  3. Reproduce
* The four types of animal tissues are found in different combinations in most of the organs in your body. (P.63, Fig 3.4)
  + Connective tissue – Most diverse of the tissues
    1. Main role is to support and connect different parts of the body
    2. Comes in many different forms
       - Tendons are made up of connective tissue and they connect muscle to bones.
       - Cartilage and blood are also connective tissue
  + Muscle tissue
    1. Cardiac – This forms the heart muscle
    2. Striated – This forms the muscle for movement
    3. Smooth – This lines the digestive tract to move food along
  + Nervous tissue – Most uniform made up entirely of neurons
  + Epithelial tissue –
    1. Forms the outer layer of a structure (ex. The skin)
    2. Lines the digestive tract, nasal passages and the trachea
    3. The cells in these tissues work together to support their own lives as well as the life of the whole organism
* The three types of plant tissues are (P. 64, Fig 3.5):
  1. Protective – Forms a covering on most plants that helps prevent water loss and protects the plant.
  2. Transport – Contain hollow, tube-like cells that move food and water through the plant.
  3. Photosynthetic – Transform the Sun’s energy into sugar.
* All of these types of tissue are found in the three organs of a plant (P. 64, Fig 3.6):
  + - leaves
    - roots
    - stems
  + As in animals the organs of a plant interact and depend on each other.
  + One organ cannot live without the substances and activities provided by the other two organs.
* Plant organs make up two organs systems
  1. The root system – Made up of anything which is below the ground
  2. The shoot system – Made up of anything which is above the ground
* **Can you name the organs in the human body along with its location and function?**
* Which is the largest organ in the human body?
  + *Skin*
    - *It functions in two different organ systems: the integumentary and the excretory systems.*
    - *Often thought of as just an outer covering*
    - *One of the body’s most complex organs*
    - *15% of our body mass*
    - *Provides a layer of protection against bacterial and most viral infections*
    - *Each 6cm2 contains approximately 20 blood vessels, 78 nerves, and 650 sweat glands*
* Healthy organs depend on healthy tissues, which depend on healthy cells.