

Week 1: Introduction to Anatomy & Physiology

Levels of Organisation in the Human Body

- The body's organization is often discussed using six distinct levels that show increasing complexity, starting from the smallest chemical building blocks

- **Chemical level:**

- Atoms bond together to form molecules with specific 3D structures
- The shape of a molecule determines its function; it binds to receptors, enzymes etc like a 'key into a lock'
- Chemical reactions at this level drive metabolism and energy production

- **Cellular level:**

- Cells are the smallest functional biological units, that are capable of carrying out all processes vital for life
- Cells are specialised for specific functions
 - For example, muscle cells contain lots of mitochondria (energy production centres inside the cell) to provide the cell with plenty of energy
- A variety of molecules combine together to form the fluid and organelles that make up a body cell
- Just like at the level of individual molecules, the structure of cells determines their function

- **Tissue level:**

- Tissues are made up of lots of similar cells
- Each tissue is specialised for specific function/s
- In the human body, there are 4 main tissue types:
 1. Epithelial tissue
 2. Connective tissue
 3. Muscle tissue
 4. Nervous tissue

- **Organ level:**

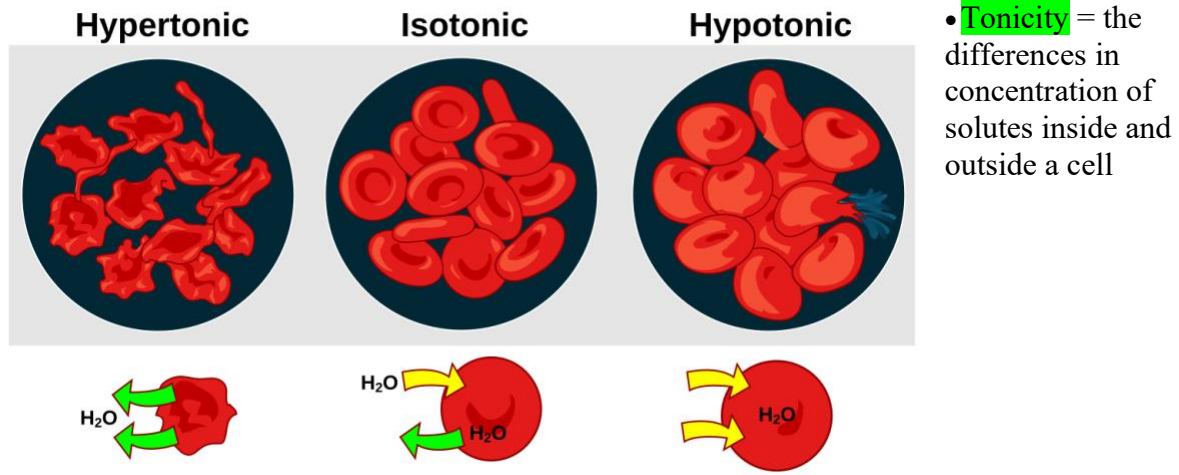
- Two or more different tissues combine to form an organ
- Each tissue within an organ contributes a specific function

- **Organ system level:**

- Two or more different organs work closely together to perform the overall functions of a body system
- Each system has a primary function essential for survival
- Systems are not separate; they are interdependent and often influence one another

Tonicity

Hyper, Iso and Hypotonic



- **Isotonic:**

- Solute concentration is the same inside and outside the cell
- Water will not move into or out of the cell

- **Hypotonic:**

- Solute concentration inside the cell is higher than outside
- Osmosis occurs, causing water to move **into** the cell
- This can cause cells to swell and potentially burst

- **Hypertonic:**

- Solute concentration inside the cell is lower than outside
- Osmosis occurs, causing water to move **out** of the cell
- This causes cells to empty of water and shrink

Tonicity affects water movement via osmotic force diffusion, which significantly impacts cell size

Cellular Metabolism

- **Metabolism** refers to all the millions of individual chemical reactions occurring every second within the body, aiming to keep us alive and healthy
- Metabolism includes both catabolism and anabolism