The structural organisation of the human body

Glossary of terms

Chemical	- The smallest structure in the body, e.g. oxygen.
Cell	- The smallest structure capable of performing activities essential for life.
Tissue	- Collections of similar cells grouped together to perform a specific function, e.g. muscle tissue.
Connective tissue	- Binds and supports tissues and organs; provides protection and support to organs; stores energy as fat and provides immunity.
Muscle tissue	- Skeletal, cardiac or smooth. Produces motion.
Nervous tissue	- Enables transmission of nerve impulses.
Organs	- Structures that operate to perform a specific function. Consist of two or more types of tissue.
System	- A group of organs that work collaboratively to perform specific functions.
Organism	- A living form, e.g. humans.
Active transport	- The movement of substances across cell membranes.
Diffusion	- Movement of molecules from a place of higher concentration to a place of lower concentration.
Osmosis	- The movement of materials across membranes.
Homeostasis	- The maintenance of a constant internal environment.
Enzyme	- A substance that speeds up the chemical reactions in cells.

Structural organisation of the body

The human body consists of several layers of structural organisation. The levels of structural organisation from the smallest to the largest are:

- **Chemical**
- **Cellular**
- **Tissues**
- **Organs**
- **System**
- **Organisms**

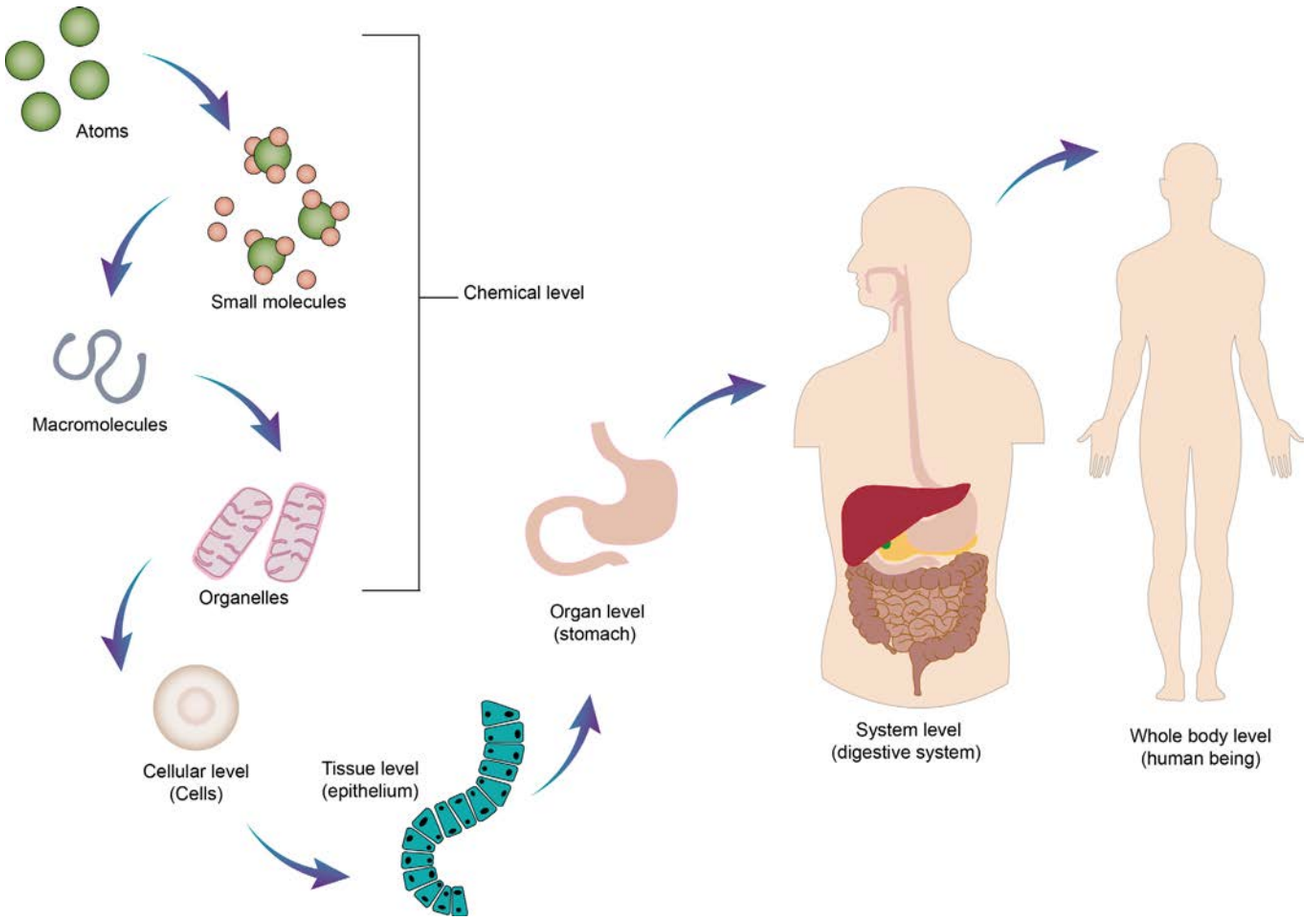


Fig 2: **Structural organisation of the body**

Structures	Examples	Description
Chemical	• Adenosine triphosphate • Oxygen • Carbon dioxide • Hydrogen	• The smallest layer of structural organisation. • The body is made up of various chemicals. Different chemicals combine to form the various molecules found in the human body.
Cells	• Muscle cells • Nerve cells • Blood cells	• The building blocks of the human body. The smallest structures capable of performing activities essential for life.
Tissues	• Nervous tissue • Muscular tissue • Epithelial tissue • Connective tissue	• Tissues are collections of similar cells grouped together to perform a specific function.
Organs	• The heart • The lungs • The liver • The kidneys • The skin	• Structures that operate to perform a specific function. • Consist of two or more types of tissue, which enable them to perform a specific role or function.
Systems	• The integumentary system • The skeletal system • The muscular system • The circulatory system • The respiratory system • The nervous system • The endocrine system • The digestive system • The urinary system • The reproductive system	• A group of organs that work collaboratively to perform specific functions.
Organisms	• Humans • Mammals • Reptiles	• A living form. • All the other body structures function to bring life to the organism.

Chemicals

The lowest level of structural organisation consists of all the chemicals that are essential for maintaining life. Chemicals are made up of atoms that combine together in different ways to form molecules. For example, hydrogen and oxygen atoms combine to from a molecule of water - H20, which is essential for survival of the body. Saliva, tears and many other body fluids are made of water.

Cells

Cells are the basic building blocks of all living things. The human body is composed of trillions of cells. In the human body there are many types of cell which vary in size, structure and function – there is no such thing as a 'typical cell'. However cells do share certain structural characteristics.

They provide structure for the body, take in nutrients from food, convert those nutrients into energy and carry out specialised functions. Cells also contain the body's hereditary material and can make copies of themselves.

Cells have many parts, each with a different function. Some of these parts, called organelles, are specialised structures that perform certain tasks within the cell.

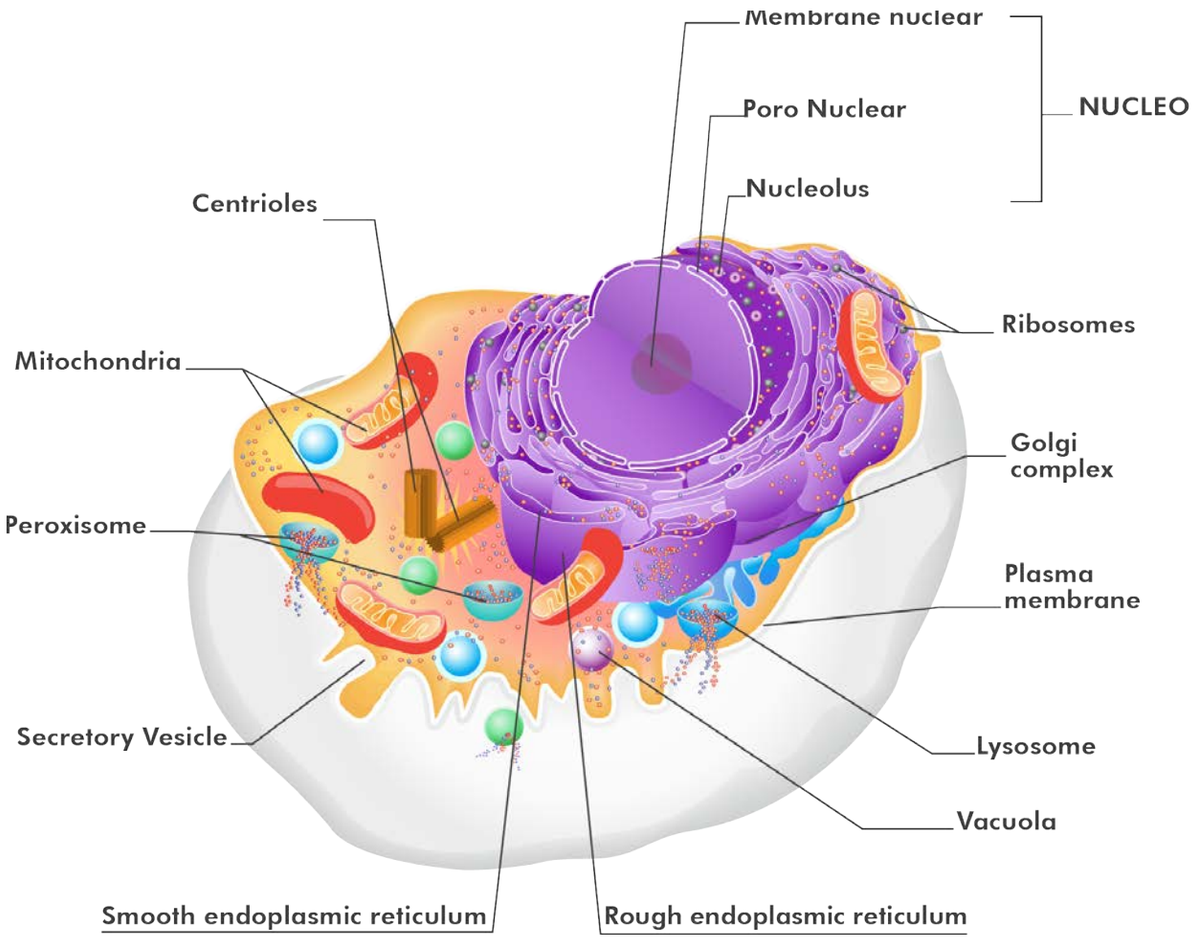
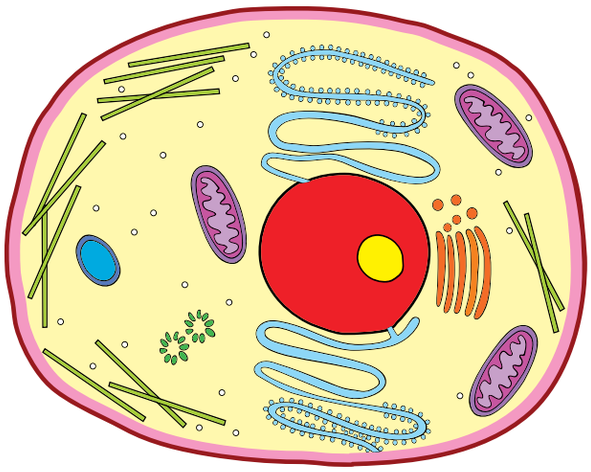


Figure 3: **Structure of a human cell**



Term	Definition	Visuals
Cytoplasm	Within cells, the cytoplasm is made up of a jelly-like fluid (called the cytosol) and other structures that surround the nucleus.	
Cytoskeleton	The cytoskeleton is a network of long fibres that make up the cell's structural framework. The cytoskeleton has several critical functions, including determining cell shape, participating in cell division and allowing cells to move. It also provides a track-like system that directs the movement of organelles and other substances within cells.	
Endoplasmic reticulum	A network of channels running through the cytoplasm. Helps process molecules created by the cell. Transports molecules to their specific destinations either inside or outside the cell.	
Golgi apparatus	The Golgi apparatus packages molecules processed by the endoplasmic reticulum to be transported out of the cell.	
Lysosomes	Contain enzymes that break down molecules and digest bacteria that enter the cell. These organelles are the recycling centre of the cell. They digest foreign bacteria that invade the cell, rid the cell of toxic substances, and recycle worn-out cell components.	
Peroxisomes	Similar structure to lysosomes. Abundant in liver cells. Metabolise hydrogen peroxide, which is toxic to the cells of the body.	
Mitochondria	The powerhouse of the cell, plays a central role in producing adenosine triphosphate (ATP)	
Nucleus	The nucleus serves as the cell's command centre, sending directions to the cell to grow, mature, divide, or die. It also houses DNA (deoxyribonucleic acid), the cell's hereditary material. The nucleus is surrounded by a membrane called the nuclear envelope, which protects the DNA and separates the nucleus from the rest of the cell.	
Plasma membrane	The plasma membrane is the outer lining of the cell. It separates the cell from its environment and allows materials to enter and leave the cell.	
Ribosomes	Ribosomes are organelles that process the cell's genetic instructions to create proteins. These organelles can float freely in the cytoplasm or be connected to the endoplasmic reticulum. The protein factory of the cell.	

Figure 4: Structure of the human cell