Objectives

2.1 Identify the structure and function of the cell and its organelles

2.2 Describe the structure and capabilities of the cell membrane

General

Cells (-cyte)

Smallest unit of life

The structural units of nearly all living things

Comes in a variety of shapes and sizes - their anatomy 'complements' their physiology
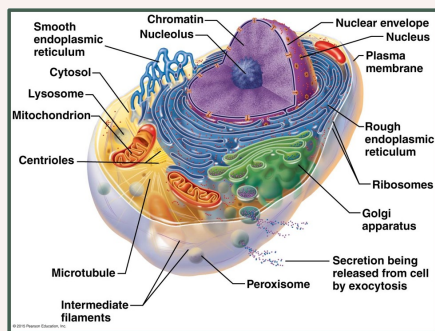
Most cells have 3 main parts: Nucleus, cytoplasm, plasma (cell) membrane

Nucleus - Control centre

Cytoplasm - jelly-like substance that acts as support. Contains H2O (cytosol) & Organelles ('little organs')

Plasma (cell) membrane - Outer 'coat'

Structure of a generalised cell

Organelles - 'little organs'

Found inside the cell

They are structures designed to carry out specific functions

For example:

Ribosomes - float free or attached to rough ER, makes proteins

Mitochondria

Endoplasmic reticulum (ER) - 2 types (rough & smooth)

Golgi apparatus

Lysosomes

Cytoskeleton

The Nucleus

Almost every cell has one

Cytoplasm inside the nucleus is called nucleoplasm

Nucleus contains the genetic material (DNA) seen as strings called chromatin

Nucleus is surrounded by a double membrane containing pores - sometimes called the nuclear envelope

Function

Directs the activity of the cell i.e.:

Cell division

Makes ribosomes required by a cell, most ribosomes migrate into the cytoplasm where protein synthesis occurs

Nuclear envelope regulates substances in and out of the nucleus through pores; without a nucleus, the cell cannot survive very long

Mitochondria

Sausage shaped organelle with a double layered membrane

'Powerhouse of the cell' as it converts food into energy (uses O2 to break down food)

Some power escapes as heat but the rest is used to form ATP molecules

ATP is vital for cell function

All living cells require ATP for its activities

Endoplasmic reticulum (ER)

Network of channels transporting substances around the cell

Two types: Rough and smooth

Rough ER	Smooth ER
Called rough as it has ribosomes on its surface (and inside)	No role in protein synthesis
Proteins made here are dispatched to other ares of the cell in vesicles	Assists with cholesterol & lipd metabolism
	Detoxifies drugs and pesticides

Plasma membrane

Flexible barrier surrounding the cell

Every cell has a plasma membrane

Seperates the intra-cellular environment (inside) from the extra-cellular environment (outside)

Made up of four main components: Bi-layer of phospholipids, Proteins, Cholesterol, Carbohydrates - Glycolipids & Glycoproteins

It's ability to regulate entry & exit of substances makes it 'selectively permeable'

Phospholipids arrange themselves so their hydrophilic end is outwards & their hydrophobic end is inwards, creating an oily film

Plasma (cell) membrane proteins:

Proteins found in the plasma membrane do most of the specialised functions

They act as:

Receptors - for messenger molecules like neurotransmitters & hormones

Channels - act as gates allowing water & other substances through

Carriers - pumping things in and out of the cell

Lysosomes

Membranous bags containing powerful digestive enzymes

Demolition site of the cell

Digests worn out materials for the cell - Focus on bacteria, viruses & toxins

Cytoskeleton

Dense support scaffold of filaments & cylinders for transport & shape

E.g., actin & myosin in muscles

Golgi apparatus

Stack of flattened membrane sacs with many vesicles

Collects proteins from the rough ER

Modifies and repackages proteins

Sorts and redirects proteins

End product is transported around the cell in vesicles to three different destinations:

Become part of the cell

Are secreted from the cell

Ramain inside the cell