Cell transport Cheat Sheet

by Fahrinur via cheatography.com/160968/cs/33786/

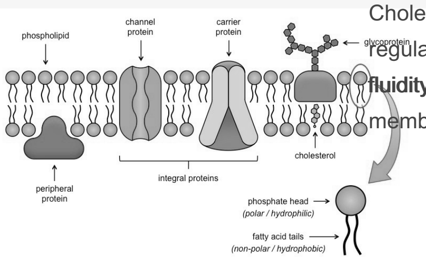
Fluid mosaic membranes

Membranes do not only separate different areas but also **control the exchange of material** across them, as well as acting as an **interface for communication**	**Phospholipid** structurally contain two distinct regions: a **polar head** and **two nonpolar tails**
Membranes are **partially permeable**: substances can cross membranes by *diffusion, osmosis and active transport*	The **phosphate head** of a phospholipid is *polar* (**hydrophilic**) and therefore *soluble* in H_2O. The **lipid tail** is *non-polar* (**hydrophobic**) and *insoluble* in H_2O

Fluid mosaic membranes (cont)

Cellular membranes are formed from a bilayer of phospholipids which is roughly **7nm wide**	**Phospholipid monolayer**: If phospholipids are spread over the surface of H_2O they form a **single layer** with the hydrophilic phosphate heads **in** the H_2O and the hydrophobic fatty acid tails sticking up **away** from the H_2O
The fluid mosaic model describes cell membranes as **mosaics** because: The scattered pattern produced by the proteins within the phospholipid bilayer looks somewhat like a mosaic when viewed from above	**Micelle** - If phospholipids are mixed/shaken with water they form spheres with the hydrophilic phosphate heads facing out towards the water and the hydrophobic fatty acid tails facing in towards each other

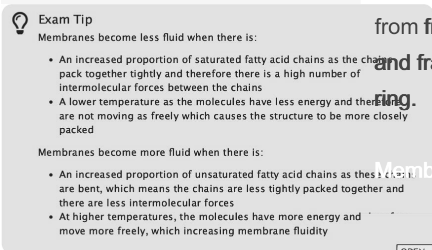
The fluid mosaic model



Phospholipid

- Form the **basic structure** of the **membrane** (phospholipid bilayer)
- Act as a **barrier** to most **water-soluble** substances
- This ensures water-soluble molecules such as **sugars, amino acids and proteins** cannot leak out of the cell
- Can be chemically modified to act as **signalling molecules** by:
- Moving within the bilayer to **activate** other molecules (eg. enzymes)
- Being **hydrolysed** which releases smaller water-soluble molecules that bind to specific receptors in the cytoplasm

Fluidity of membrane


Exam Tip

Membranes become less fluid when there is:

- An increased proportion of saturated fatty acid chains as the chains pack together tightly and therefore there is a high number of intermolecular forces between the chains
- A lower temperature as the molecules have less energy and therefore are not moving as freely which causes the structure to be more closely packed

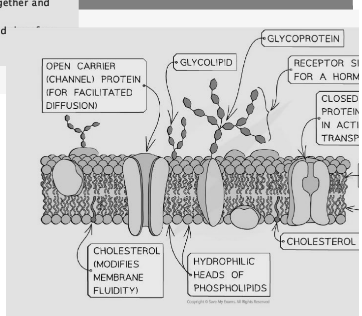
Membranes become more fluid when there is:

- An increased proportion of unsaturated fatty acid chains as these chains are bent, which means the chains are less tightly packed together and there are less intermolecular forces
- At higher temperatures, the molecules have more energy and ... move more freely, which increasing membrane fluidity

Cholesterol

Cholesterol regulates the **fluidity** of the membrane	Cholesterol also contributes to the **impermeabilty** of the membrane to ions and increases **mechanical strength** and **stability** of membranes; without it membranes would break down and cells **burst**
Cholesterol molecules sit in between the phospholipids, preventing them from **packing too closely** together when **temperatures are low**; this prevents membranes from **freezing and fracturing.**	At **higher** temperatures it stops the membrane from becoming **too fluid**: cholesterol molecules bind to the hydrophobic tails of phospholipids, stabilising them and causing phospholipids to pack **more closely** together

Membrane structure



Glycolipids & glycoproteins

Glycolipids and glycoproteins contain *carbohydrate chains* that exist on the surface, which enables them to act as **receptor molecules**

There are three main receptor types:

- signalling receptors for **hormones and neurotransmitters**
- receptors involved in **endocytosis**
- receptors involved in **cell adhesion and stabilisation**

Some act as **cell markers** or **antigens**, for *cell-to-cell recognition*

Proteins

Transport proteins create **hydrophilic channels** to allow **ions and polar molecules** to travel through the membrane.

There are two types: **channel** (pore) proteins & **carrier** proteins

Each transport protein is **specific** to a particular ion or molecule.

Transport proteins