

Exercise walk-through

2.5

Membrane Transport

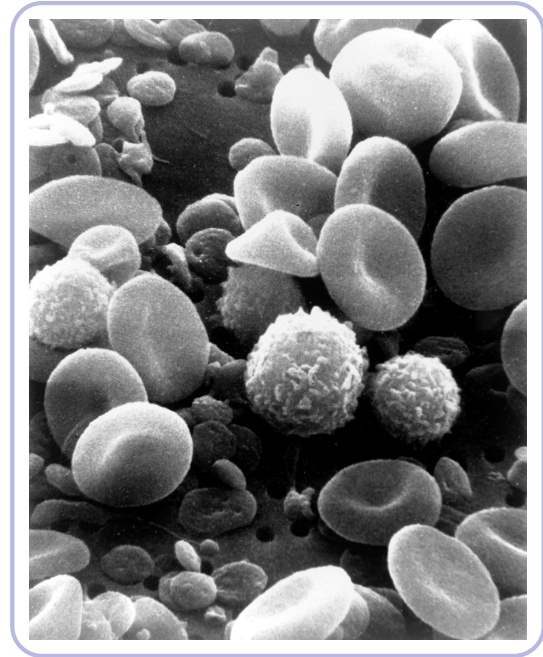
AP Biology

The fluid mosaic membrane

The **fluid mosaic model** : a
phospholipid bilayer
(hydrophilic heads out, hydrophobic tails in)
with drifting proteins.

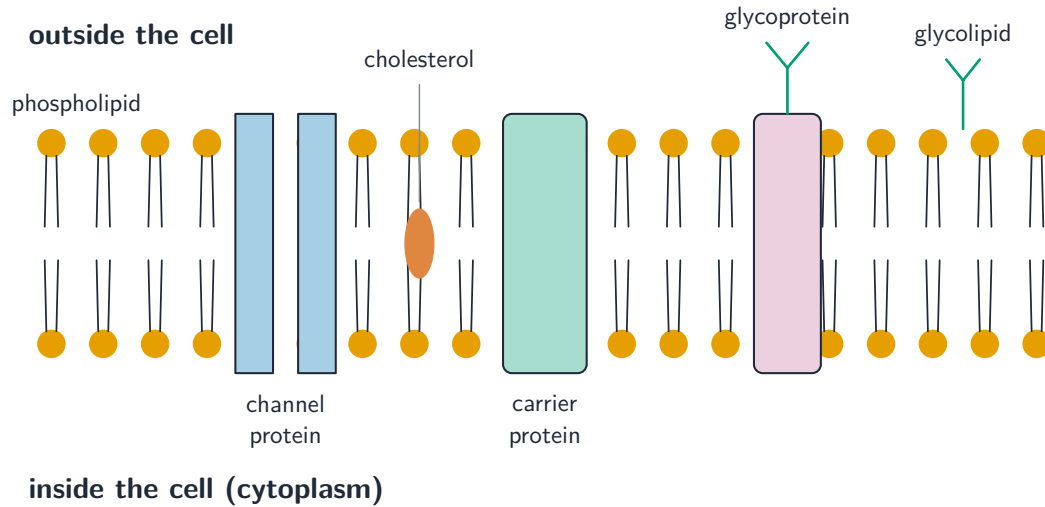
- **membrane proteins** – channels, pumps, receptors
- **cholesterol** – steadies the fluidity

Selectively permeable –
it maintains **homeostasis** .



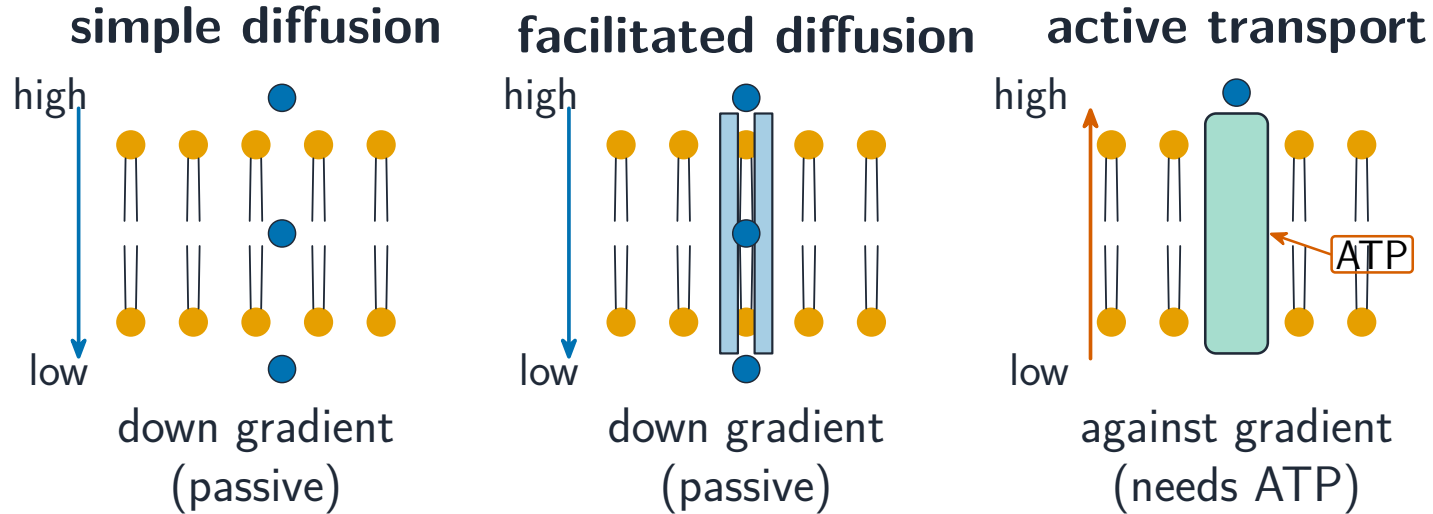
Rbc SEM

The fluid mosaic model of the cell membrane



The fluid mosaic model of the cell membrane

Three ways substances cross the membrane



Three ways substances cross the membrane

Compartmentalization Inside the Cell

Membranes create separate **compartments** so incompatible reactions can run at once and conditions (pH, ion levels) can be tuned locally.

This organization boosts efficiency – the internal membranes also add surface area for reactions.

The Origins of Cell Compartmentalization

The **endosymbiotic theory** explains mitochondria and chloroplasts: they arose when a larger cell engulfed free-living prokaryotes that then lived inside it.

The evidence – their own circular DNA, their own ribosomes, and double membranes – supports this shared evolutionary origin.

Exercises 2.1-2.3

2.1 Does passive transport require ATP?

[1]

2.2 In which direction (relative to the gradient) does active transport move a substance?[1]

2.3 Give one example of active transport.

[1]

Exercises 2.1-2.3

2.1 Does passive transport require ATP?

[1]

2.1

- No

2.2 In which direction (relative to the gradient) does active transport move a substance?[1]

2.2

- Against the gradient (low
- high)

2.3 Give one example of active transport.

[1]

2.3

- The sodium-potassium pump (or any pump moving ions against the gradient)

Exercise 3.1

3.1 Active transport differs from passive transport because it

[1]

☐

A moves substances down the gradient

B requires ATP and moves against the gradient

C never uses proteins

D only moves gases

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3.1 B

- requires ATP and moves against the gradient

Exercise 3.2 (a)

3.2 A cell pumps calcium ions out against their concentration gradient.

(a) State whether this is active or passive transport.

[1]

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[1]

(a)

- Active transport

Exercise 3.2 (b)

3.2 A cell pumps calcium ions out against their concentration gradient.

(b) Explain why ATP is needed.

[2]

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3.2 A cell pumps calcium ions out against their concentration gradient.

(b) Explain why ATP is needed.

[2]

(b)

- Moving ions against their gradient does not happen spontaneously, so energy from ATP is needed to power the pump

Exercise 3.3

3.3 Diffusion of oxygen into a cell needs no energy, but importing glucose against its gradient does. Explain the difference. [2]

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3.3

- Oxygen moves **down** its gradient (passive, spontaneous, no energy); glucose is moved **against** its gradient, which is not spontaneous and requires ATP (active transport)