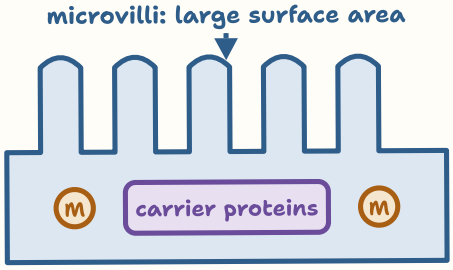
Why Cells Transport Faster: Microvilli

Four adaptations let ileum cells transport glucose quickly, each linked to a faster rate.

Ileum cell: four adaptations for fast absorption



M = mitochondrion; gut lumen above, capillary below

1 Microvilli
large surface area: more glucose absorbed at once

2 Many carrier / channel proteins
more glucose transported per second

3 Blood flow removes glucose
keeps a steep concentration gradient

4 Many mitochondria
ATP for active transport / co-transport

Key terms

microvilli	projections of the cell-surface membrane giving a large surface area for transport.
surface area	more membrane means more transport at once.
carrier / channel proteins	more of them means more glucose transported per second.
concentration gradient	kept steep because blood carries glucose away and the Na+/K+ pump maintains the sodium gradient.
mitochondria	make ATP by respiration for active transport and co-transport.
transport rate	always link the feature to its effect on rate.

I can...

- [ ] Cells adapted for rapid transport by increase in surface area or number of channel and carrier proteins
- [ ] Explain adaptations of specialised cells in relation to transport rate
- [ ] Explain how surface area, number of channel or carrier proteins and differences in concentration or water potential gradient affect rate

EXAM TRAP

Never stop at the feature ("lots of microvilli"). Say what it does to the rate: larger surface area, so more glucose absorbed. Mitochondria supply ATP for active transport, not for diffusion.

4 marks: what earns them

1. Microvilli give a large surface area, so more glucose is absorbed / transported at once (faster rate)
   Not: microvilli with no effect; large cell
2. Many carrier proteins (or channel proteins) in the membrane, so more glucose is transported per second
   Not: a large number of proteins with no effect on rate; enzymes
3. Blood carries glucose away, maintaining a steep concentration gradient, so faster movement in
   Not: high concentration in the cell; gradient with no maintenance and no effect
4. Many mitochondria make ATP for active transport / co-transport, so the rate is maintained
   Not: mitochondria produce energy with no link to transport; make ATP for diffusion

Remember

Area, proteins, gradient, ATP.
Feature, function, effect on rate.
Blood keeps the gradient steep.

Independent revision resource, not endorsed by AQA. Practice question is original.
© 2026 Medservatory, a project of ADMR Solutions Ltd. Free to print and share for personal study.