

Exercise walk-through

4.2

Epithelium and connective tissue

University Medicine

The classification grid

- 1 **Grid** Layer × shape: simple squamous = exchange ($\sim 0.5 \mu\text{m}$); stratified squamous = abrasion; cuboidal = transport; columnar = absorption.
- 2 **Matrix** Connective tissue = cells + **collagen**/elastic/ground substance: areolar → tendon → cartilage → bone → blood.
- 3 **Pseudo** Pseudostratified LOOKS layered but is one layer: all cells touch the basement membrane.

The tissue classification grid

layer × shape

squamous

cuboidal

columnar

simple

exchange

capillary

transport

tubule

absorption

gut

stratified

abrasion

skin

wet barrier

ureter

protection

conj.

connective spectrum

cells + matrix

loose

areolar

dense

regular

cartilage

bone

blood

cell wrap

tendon

joint

scaffold

plasma matrix

Layer × shape classifies every epithelium; fibre density classifies connective tissue.

Exercises 2.1-2.3

2.1 Which epithelium lines the capillary?

[3]

2.2 Name the matrix fibre of tendon and its arrangement.

[3]

2.3 Is pseudostratified epithelium truly multi-layered?

[3]

Exercises 2.1-2.3

2.1 Which epithelium lines the capillary? [3]

2.1

- Simple squamous (minimal diffusion distance).
-

2.2 Name the matrix fibre of tendon and its arrangement. [3]

2.2

- Collagen, densely regular (parallel).
-

2.3 Is pseudostratified epithelium truly multi-layered? [3]

2.3

- No – one layer: all cells touch the basement membrane.

Exercise 3.1

3.1 Predict the epithelium and justify for: alveolus, proximal tubule, oesophagus, small intestine.

For each, state layer + shape and the function it serves ✓.

[8]

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3.1

- Alveolus: simple squamous (exchange).
- Proximal tubule: simple cuboidal with brush border (reabsorption).
- Oesophagus: stratified squamous (abrasion).
- Small intestine: simple columnar (absorption).
- Layer/shape consistently tied to function.

Exercise 3.2

3.2 A duodenal biopsy shows villous flattening (fictional malabsorption case).

Explain why absorption fails architecturally (surface loss). State which epithelium should be present. Explain why diarrhoea follows the same defect. [7]

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3.2

- Flattened villi collapse the absorptive surface area: the machinery is the membrane.
- Simple columnar with a brush border.
- Unabsorbed luminal contents retain water → osmotic diarrhoea.