

- Fenestrated – Have holes in endothelium but have continuous BM
 - Kidney and gut mucosa
- Sinusoids – Incomplete BM and Large intracellular gaps
- Have a glycocalyx that is -vely charged – has a barrier function
- Endothelial BM
 - Polarised cells with distinct expression of receptors on apical and luminal sides
 - Endothelial luminal membrane resides on a BM and is associated with extracellular matrix – collagen (4,3,1), fibronectin, laminin
- Endothelial intracellular junctions – tighter on arterial side – looser on post capillary venules
 - 3 barriers to paracellular transport (cell to cell connection)
 - Tight junctions
 - Claudins (Cldns) – the more the tighter the junctions
 - Occludins (ocln)
 - Junctional adhesion molecules
 - Adherens junctions
 - Gap junctions – connexions
 - Junctional proteins and integrins (cell to BM) are connected to the actin cytoskeleton of the EC – allows some communication
- Continuous endothelium
 - Paracellular transport - Water & small solutes (<3mm) pass between ECs
 - Transcytosis - Allows passage of larger solutes e.g. albumin (uses transendothelial channel)
 - Caveolae - Smooth membrane invaginations and vesicles = highest density in capillary EC (vesicles move through the membrane and dump on the other side)
 - Transendothelial channels
- Fenestrated continuous endothelium
 - Glomerular endothelium, vessels within endocrine & exocrine glands gastric & intestinal mucosa
 - Fenestrae/pores have a diaphragm – may increase selectivity of the pore – no albumin or peptide hormones (angiotensin)
 - Fenestrations permit greater trans-endothelial transport of fluids and solutes – not macromolecules
- Sinusoidal endothelium
 - Liver sinusoids and bone marrow
 - Small ECs – clear colloids and soluble waste macromolecules from the circulation
 - Large fenestrations
 - BM has gaps
 - High endocytic activity in clathrin-coated pits – (receptor mediated and fluid phase endocytosis)
 - For mass transport – allow bulk flow
- Vesicular-Vacuolar organelles (VVO)
 - A major route for transport of fluids and solutes across the endothelium particularly in inflammatory situations
 - From transcellular channels when they connect
 - Particularly at post capillary venules
 - Vacuoles join together and allow large bulk transport (leukocytes, large molecules)

Endothelium and haemostasis

- Provides a non-thrombogenic surface to maintain blood flow
 - Inhibits the activation of coagulation factors
 - Breaks down clots that start to form
 - Inhibits platelet adhesion/activation
- Anti-coagulant properties of endothelium
 - Tissue factor pathway inhibitor – binds to FXa, FVIIIa, TFA to block activation of the extrinsic pathway
 - Anti-thrombin III – localised with heparan sulphate proteoglycans (glycocalyx) binds and inactivates thrombin
 - Thrombomodulin – converts thrombin into a Protein C activator