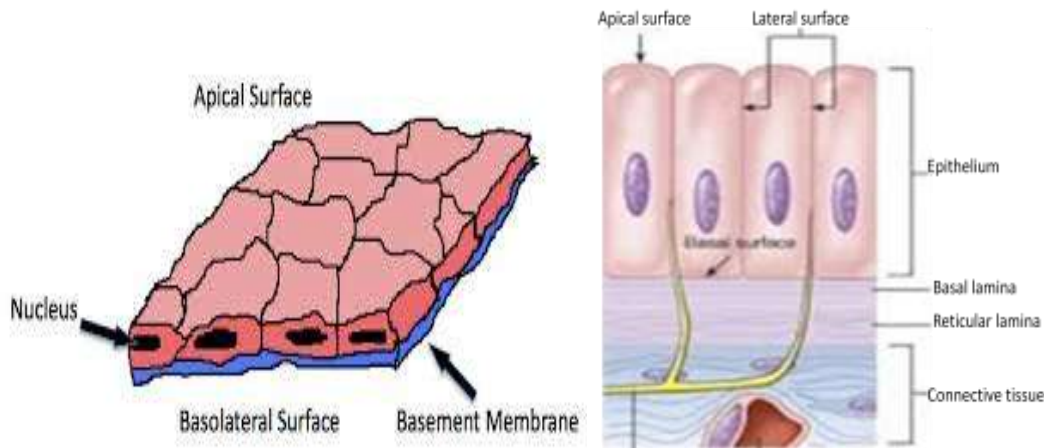




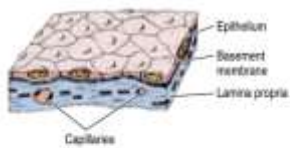
Basement Membrane

- The **basement membrane** is a thin sheet of fibers that underlies the epithelium
- The basement membrane is the fusion of two lamina, the basal lamina and the reticular lamina (or lamina reticularis)
- **lamina lucida** - electron lucent (very little staining in the EM).
- **lamina densa** - electron dense.
- **lamina reticularis** - can be associated with reticular fibres of the underlying connective tissue.

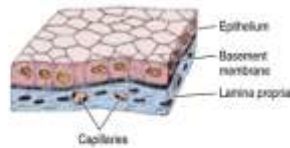


Epithelial Tissue

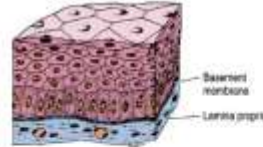
A Simple squamous epithelium



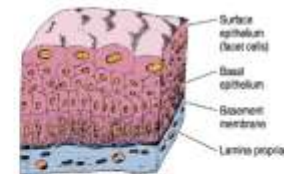
B Simple cuboidal epithelium



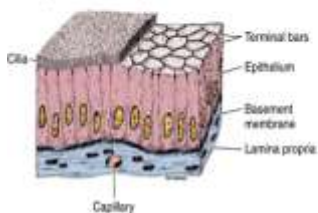
A Stratified squamous epithelium



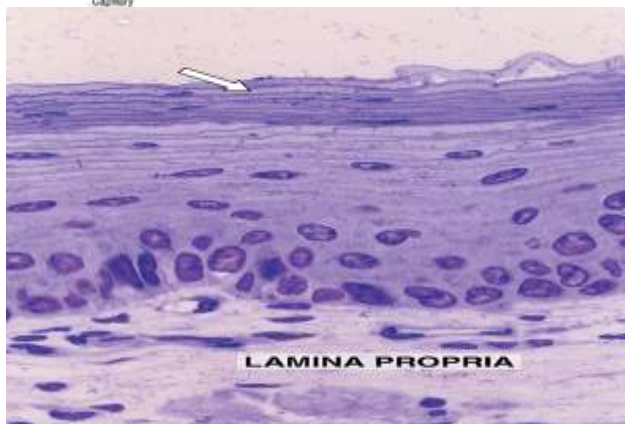
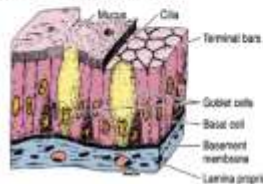
B Transitional epithelium



C Simple ciliated columnar epithelium



C Ciliated pseudostratified epithelium



Basal lamina

- laminin, integrins, entactins, and dystroglycans) together make up the basal lamina
- intrinsic macromolecular components



lamina lucida & lamina densa

- Lamina Densa
 - dense layer closer to the connective tissue
 - 30–70 nm in thickness
 - consists of an underlying network of reticular **collagen** (type IV) fibrils
- Lamina Lucida
 - clear layer close to epithelium

Functions of basement membrane

- anchor down the **epithelium** to its loose **connective tissue** (the **dermis**) underneath
 - provide structural support to the tissue
 - Determines & maintains polarity of cell (basal & apical sides determined as BM is basally placed)
- offer functional input to modulate cellular function.

(fine tune cellular function)

- a mechanical barrier, preventing **malignant** cells from invading the deeper tissues
- accelerate **differentiation** of **endothelial** cells (specially in embryonic period & repair)
- essential for **angiogenesis**

Basal Lamina affecting cell function

- Limits contact between different types of cells in the tissue
 - At the **neuromuscular junction**, the basal lamina that surrounds the muscle cells, separates the nerve cell from the muscle cell at the synapse, and helps to regenerate the synapse after injury, and helps to localize acetylcholine receptors
- acts as a filter allowing only water and small molecules to pass through permeability barrier or sieve
 - In the **kidney**, the basal lamina acts as a molecular filter

Fusion of basal laminae

- **Glomerular filtration** of the **kidney**
 - by the fusion of the basal lamina from the **endothelium** of glomerular capillaries and the basal lamina of the epithelium of the **Bowman's capsule**
- Gaseous exchange between **lung alveoli** and pulmonary **capillaries**
 - by the fusion of the basal lamina of the lung alveoli and of the basal lamina of the lung capillaries

basal lamina

- (lamina – layers)
- can be organised in three ways:
 1. Can surround cells (muscle fibres)
 2. Lies underneath sheets of epithelial cells
 3. Separates two sheets of cells,
- endothelial cells of blood vessels and epithelial cells of another tissue. This type of arrangement is found in the kidney glomerulus, lungs (basal lamina acts as a permeability barrier or sieve).

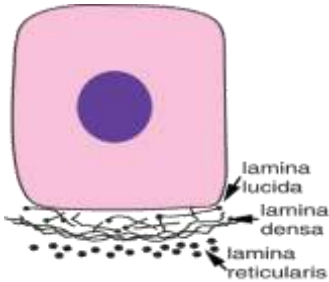
Structure of Basement membrane

- Basement Membrane
 - Basal Lamina
 - Lamina Lucida



- Laminin, integrins, entactins, dystroglycans
- Lamina Densa consists of a network of fine filaments.
 - Type IV collagen. forms felt-like network of fibers that gives the basement membrane its tensile strength
- Lamina Reticularis
 - Type III collagen (as reticular fibers)
- Attaching proteins (between Basal and Reticular Laminae)
 - Type VII collagen (anchoring fibrils)
 - fibrillin (microfibrils)

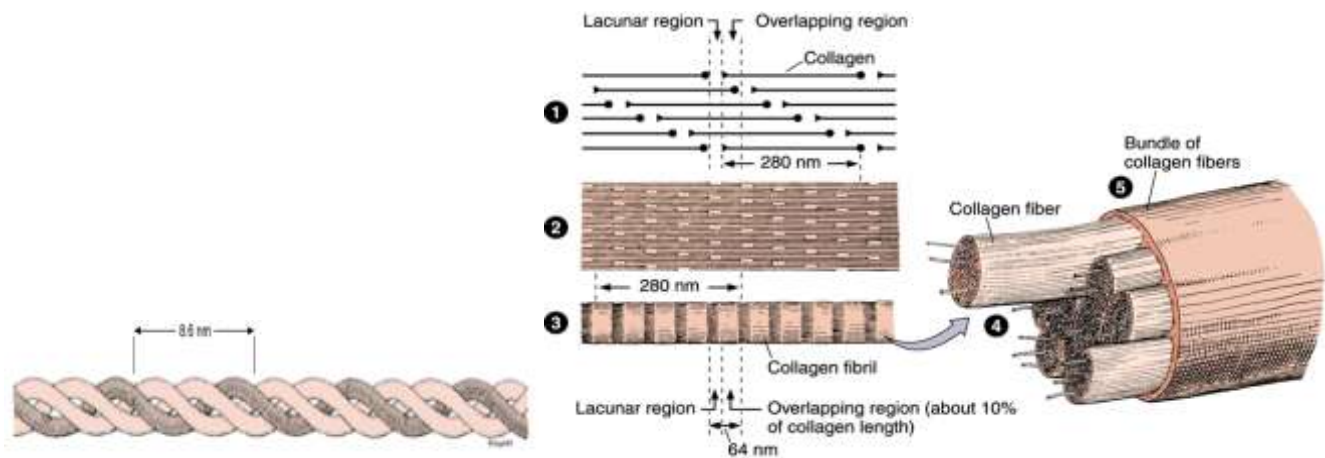
Basement Membrane



Collagen

- Collagen I is the most abundant protein in the human body
- Type IV collagen is the most abundant protein in BMs.

Connective Tissue Collagen



Collagen Networks (Forming anchoring fibrils)

Type	Tissue	Function
VII	Epithelia	Anchors skin epidermis to dermis
IV	Basement membrane	Support, filtration



Collagen Types (Fibril Forming)

Type	Tissue	Function
I	Skin, tendon, bone, dentine	Resistance to tension
II	Cartilage, vitreous	Resistance to pressure
III	Skin, muscle, BV, +type I	Structure maintenance in expansile organs
V	Fetus, skin, bone, placenta, interstitium	Like type I
XI	cartilage	Like type II

Collagen Networks (Forming anchoring fibrils)

Type	Tissue	Function
VII	Epithelia	Anchors skin epidermis to dermis
IV	Basement membrane	Support, filtration

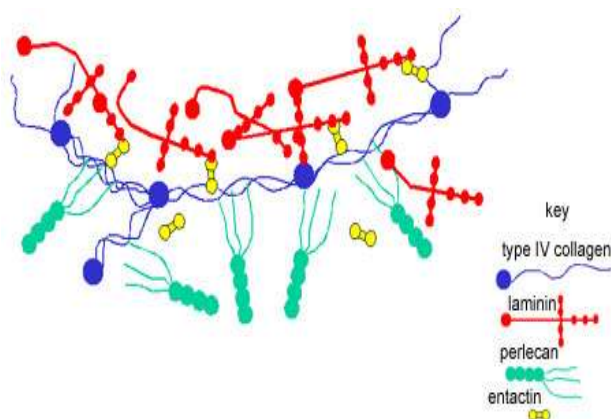
Collagen Types (Fibril Binding)

Type	Tissue	Function
IX	Cartilage, vitreous	Binds gly-a-gly
XI	Embryo(tendon, skin)	As type II
III	Fetus(tendon, skin)	Interacts with type I

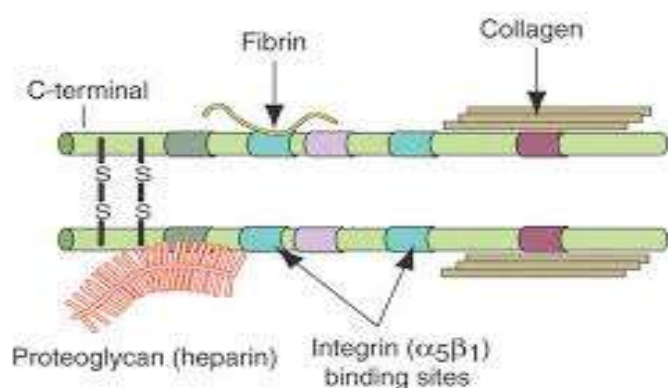
Links between basal and reticular laminae

- The lamina reticularis is attached to the basal lamina with **anchoring fibrils** (type VII collagen fibers) and **microfibrils** (fibrillin).
- supportive matrix

Basement membrane



Structure of Basement Membrane





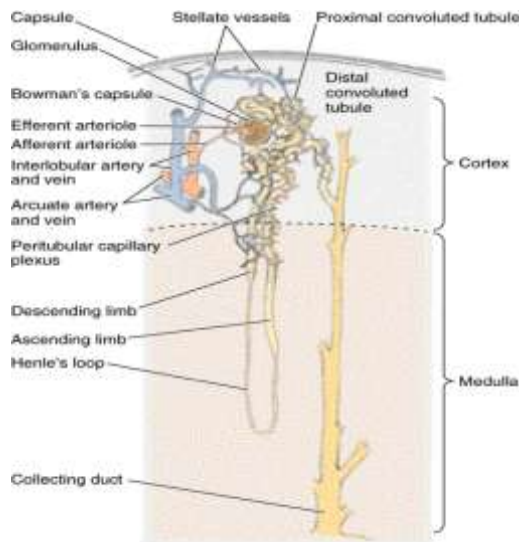
Cancer cells (Malignant)

- If the epithelial cells become transformed (cancerous) and become 'malignant', they are able to break through the basement membrane and invade the tissues beneath. This characteristic is used in the diagnosis of malignant epithelial tumors

a poorly functioning basement membrane

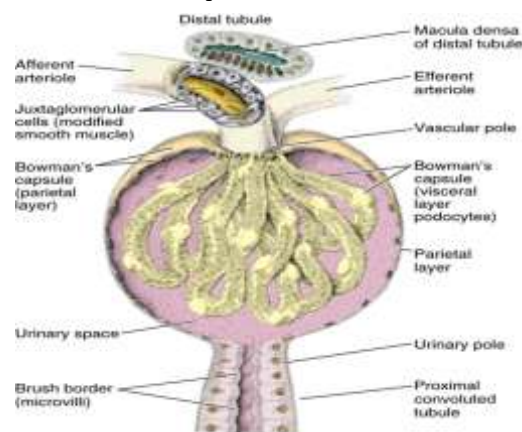
Diseases

- Genetic defects
- Injuries by the body's own immune system
- Other mechanisms
- [Alport syndrome](#)
 - Genetic defects
- [Goodpasture's syndrome](#)
 - Collagen type IV is autoantigen (target antigen) of autoantibodies in the autoimmune disease
- [Epidermolysis bullosa](#)
 - Skin
- Muscular dystrophy
 - Dystrophin . a glycoprotein in the plasma membrane of muscle cells re In muscular dystrophy, this protein is defective or missing



KIDNEY

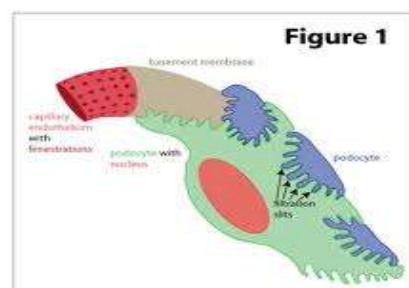
Renal Corpuscle



Renal Corpuscle



Basement Membrane in Kidney



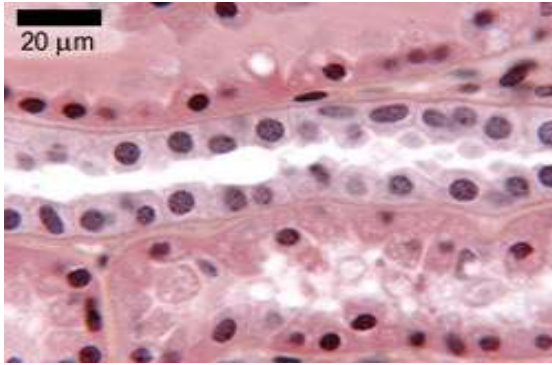


Special stains

- periodic acid-Schiff (PAS) staining
 - reacts with the sugar moieties of its proteoglycans
 - Alcian blue

Alport's Syndrome

Electron Micrograph



Skin

