

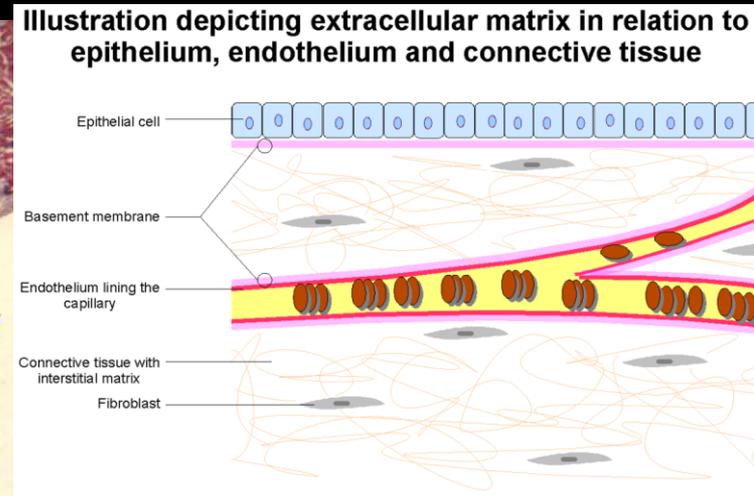
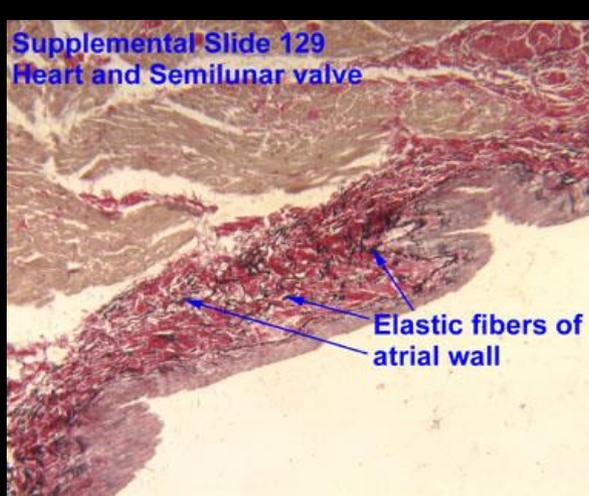
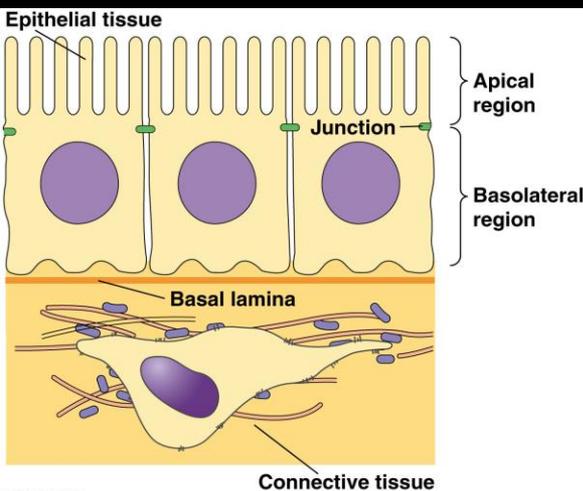
The Extracellular Matrix

The Extracellular Matrix (ECM)

- An organized network of extracellular materials present beyond the immediate vicinity of the plasma membrane
- Rather than being inert filler material, ECM is a dynamic, physiologically active component of all living tissues.
- In addition to providing structural support for the cells embedded within a tissue, provides both physical and biochemical signals
 - These signals guide their division, growth & development.
 - In other words, ECM largely determines how a tissue looks and functions.
- Many type of animal cells are surrounded by an ECM

Types of ECMs

- Basement membrane (basal lamina)
 - Epithelia, endothelia, muscle, fat, nerves
- Elastic fibers
 - Skin, lung, large blood vessels
- Stromal or interstitial matrix



Basement Membrane (basal lamina)

- One of the best defined extracellular matrices
- A continuous sheet; 50-200 nm thick
 - Surrounds muscle and fat cells
 - Underlies the basal surface of epithelial tissues such as the epidermis of the skin or the lining of the digestive & respiratory tracts
 - Underlies the inner endothelial lining of blood vessels

Basement Membrane (basal lamina)

Functions:

- Provides mechanical support for the attached cells
- Generates signals that maintain cell survival
- Serves as a substratum for cell migration
- Separates adjacent tissues within an organ
- Acts as barrier to the passage of macromolecules
 - Prevents the passage of proteins out of the blood as it flows through porous-walled capillaries and the capillaries of the glomerulus

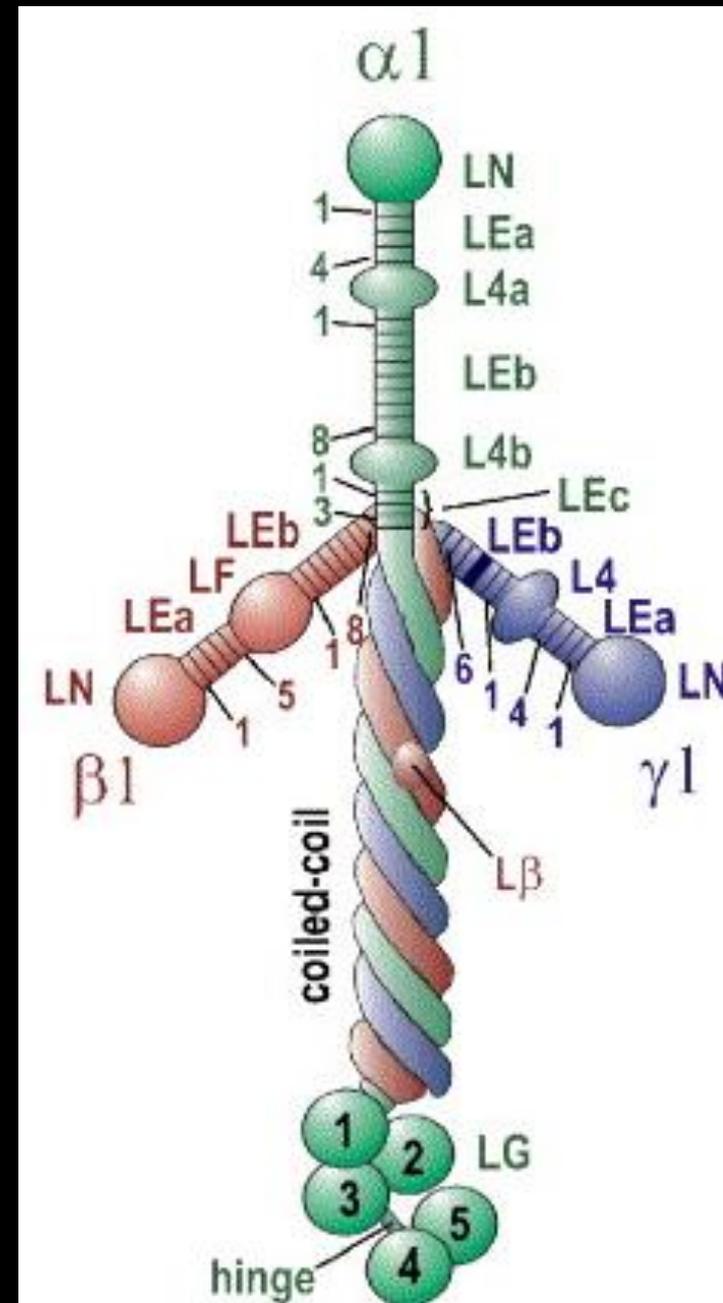
Macromolecular organization of ECM

Components include fibrous proteins & Polysaccharides

- Laminin
- Collagen
- Proteoglycan
- Fibronectin

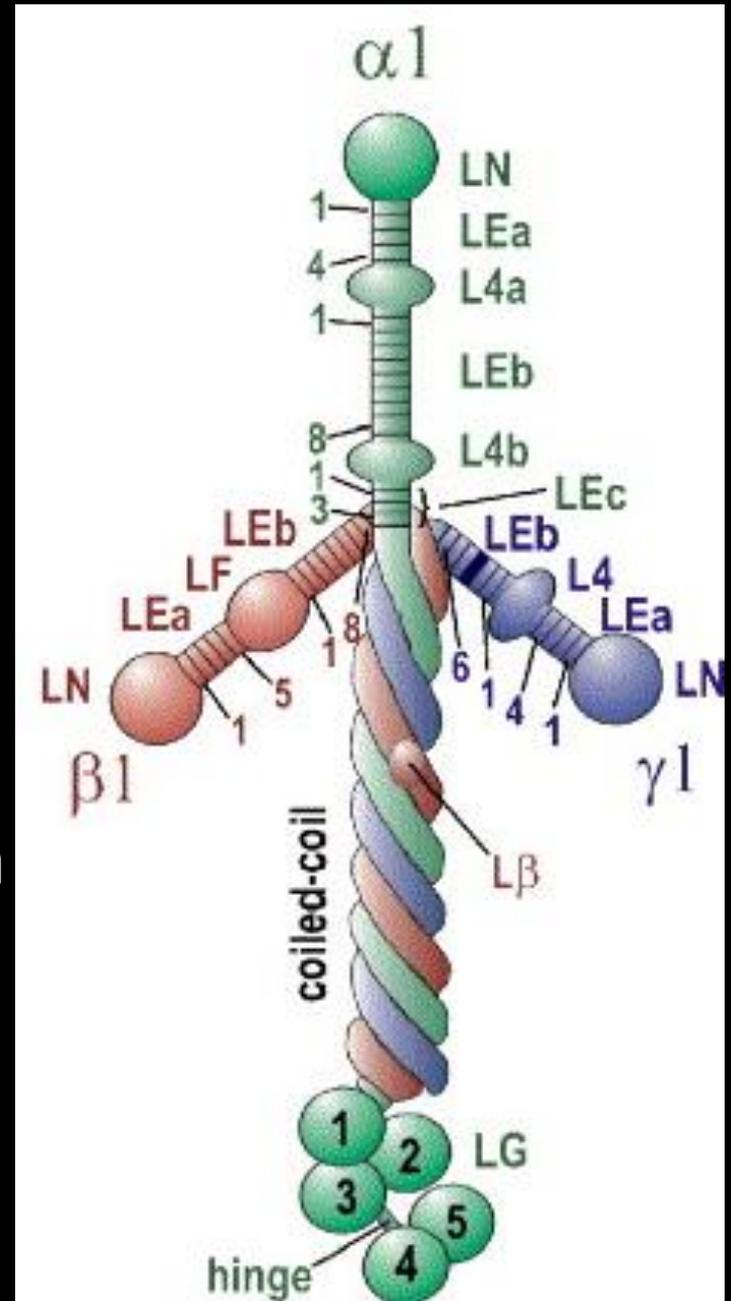
Laminin

- Laminins – a family of extracellular glycoproteins
- Consist of 3 different polypeptide chains linked by disulfide bonds
- Organized into a molecule resembling a cross with 3 short arms and a long arm - Trimeric proteins
- Contain globular, rod, and coiled-coil domains
- Contain an α -chain, a β -chain, and a γ -chain, found in 5, 4, & 3 genetic variants, respectively



Laminin

- The 3 shorter arms bind to other laminin molecules - allows them to form sheets.
- The long arm binds to cells - helps anchor organized tissue cells to the membrane
- At least 15 laminins have been identified



Laminin: Functions

- An integral part of the structural scaffolding in almost every tissue of an organism
- Extracellular laminins greatly influence the cell's potential for migration, growth & differentiation
 - Play a critical role in the migration of primordial germ cells
 - During their migration, the primordial germ cells traverse surfaces particularly rich in laminin
 - Primordial germ cells possess a cell-surface protein that adheres strongly to one of the subunits of the laminin molecule