Fibres

Extracellular matrix/AKA Ground Substance

Structure

- The contents of this varies depending on the tissue, for instance bone has a calcium based ECM
- Its typically an amorphous gelatin-like substance
  - Its transparent and colourless
  - Lattice structure with 90% water making it good at resisting compressive forces

Types

- Type I
  - Larger than Type 2
  - Linear organisation with cross-links
  - Seen in the thick rope like structures such as tendons and ligaments. Also used as structure for bone formation
- Type II
  - Smaller fibrils
  - Random orientation – Like a block of dense foam
  - Cross linked to proteoglycans (ground substance)
  - Major collagen of cartilage
- Type III
  - Fibrillar protein which is the important part of arteries

Collagen

Qualities

- Tensile Strength (ability to resist a force): Prevents too much stretching
- Its secreted by **Fibroblasts** in the form of **procollagen.**
- Stronger than steel

Ultrastructure

- Molecules
  - Triple Helix arrangement
  - No branching but develops an aldehyde cross link for strength, binding to neighbouring collagen molecules building these fibrils
- Fibrils
  - Consist of cross-linked collagen molecules as mentioned above with a staggered arrangement
- Fibres
  - Consist of fibrils organised in many different ways such as *fibrillar* or *lattice*

Structures

- Three dimensional
  - 'Block like' - Such as meniscus
- Two dimensional
  - 'Sheet like' - Such as joint capsule or intramuscular septae
- One dimensional
  - 'Rope like' - Such as tendons and ligaments

Elastin

Structure

- **Desmosine** is considered a marker of elastin degradation
- Alanine + Valine + Desmosine/Isodesmosine (latter two are cross links to maintain peptides in register during extension and contraction)
- Collagen, fibrillin, glycoproteins
  - To control elasticity

Ultrastructure

- Longitudinal arrangements
- Can be made into fenestrated sheets (such as in arteries)

Qualities

- Elastic fibres contain **Elastin** and **Microfibrils**
- Formed by **Fibroblasts**
- 5 times more elastic than rubber