

Locomotor apparatus

It is a complex organ system whose primary function is mechanical.

The **skeleton** and the **muscles** are the major elements comprising this system

Function of this system

1. Forming and maintaining the individual body shape
2. Providing for the locomotion of body parts or the whole organism.

Skeletal system (skeleton) or Osteology

The skeleton is composed of individual elements:

1. **Bones (ossa)**
 2. **Cartilage (cartilagine)**
 3. **Ligaments (ligamenta)**
 4. **Joints (articulationes)**
- These together create the body's framework, the skeletal system.

Osteology is the study of bones (ossa) that combine to form the skeletons of diverse animal species.

Bones are composed of:

- Bone tissue which is sheathed inside by endosteum and outside by the periosteum.
- The bone marrow, blood vessels and nerves supplying these structures

Skeletal design

Connective tissue precursor of bone

- All components of the skeletal system develop from the middle embryonic germ layer (mesoderm).
- The mesoderm differentiates into three types of connective tissue:
- Embryonic
- Reticular
- Fibrous.

These tissues consist of:

1. Cells (e.g. fibrocytes)
 2. Fluid-filled intercellular spaces
 3. Fibrous components (collagen and elastin).
- Both bone and cartilage originate from mesenchymal precursor cells, **the chondroblasts** and **osteoblasts** mature into the chondrocytes and osteocytes.

• **Development and growth of cartilage**

- The formation of cartilage (**chondrogenesis**) originates in the mesenchymal (embryonal) connective tissue, remnants of which still surround the cartilage in later stages of development.
- These remnants are the perichondrium, cells of which the fibroblasts, differentiate into chondroblasts, which produce the cartilage matrix containing water (70%), collagenous or elastic fibres and glycosaminoglycans.
- **Cartilage growth** occurs through proliferation of chondroblasts in the perichondrium. This continual process leads to the appositional expansion of cartilage beneath the surrounding perichondrium
- Conversely, interstitial growth involves the proliferation of differentiated chondroblasts within the cartilage matrix, which continue to divide and form new matrix substance from the inside

- The unique construction provides cartilage strength and flexibility.
 - Glycosaminoglycans are able to bind water, resulting in the increased elasticity of cartilage.
 - Blood vessels and nerves are absent in cartilage.
 - Nutrients must diffuse through the matrix from blood vessels located in surrounding connective tissue
- There are three types of cartilage classified according to the quality of the embedded fibres:

1. Hyaline cartilage
2. Elastic cartilage
3. Fibrous cartilage

Distal limb of a young cat
during chondral ossification

