Skeletal System

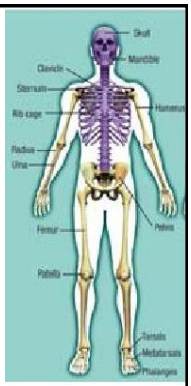
The skeletal system is the name given to the collection of bones in your body

- is made up of
  - : **your bones**
  - : **cartilage**
  - : **connective tissue**
  - = holds your bones together
- an adult human body is composed of **206 bones**
  - : babies ≅ 300 bones at birth as much of its skeleton is made of cartilage for flexibility
- as you grow, most of the **cartilage grows** and is slowly **replaced by bone** with help from **calcium**.
- The bones eventually fuse = by the time you are **25,** growth is complete.

The skeletal system serves many important functions:

1. gives your body **structure, shape and form**
2. **protects** the vital organs such as the brain, heart, & lungs
3. allows for **movement**
4. produces **blood cells**
5. **storage**
   = minerals & energy in the form of fat

The human skeleton is divided into two parts:

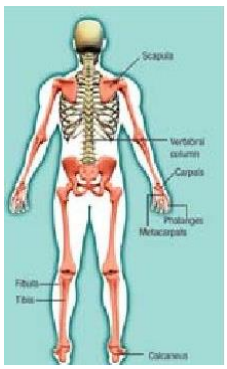


Axial Skeleton

- consists of bones that form **the axis of the body.**
- It supports and protects many organs and includes:
  - **a. Human skull**
    - protects & houses the brain
  - **b. Bony thorax**
    - forms a cage that provides support & protection for the heart, lungs, & major blood vessels
  - **c. Spinal Column**
    - protects the spinal cord
    - made up of 5 regions: cervical, thoracic, lumbar, sacral, coccyx

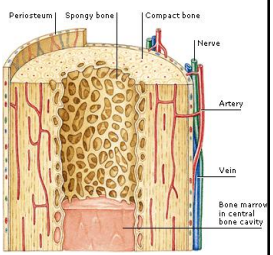
Appendicular Skeleton

- includes the bones of the **limbs and the girdles.**
- The **pectoral girdle** forms your shoulders and anchors your arms.
- The **pelvic girdle** forms your hips and anchors your legs.



Bone Structure

Bones that make up your skeleton are **living organs** and therefore grow and change throughout your lifetime in a process called '**bone modeling**'



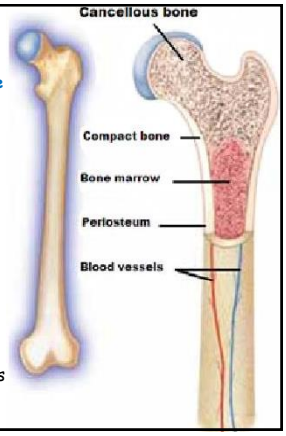
- Done my specialized cells:
  - a) Osteoblasts
    = **build** bone tissue through the process of **ossification**
  - b) Osteoclasts
    = **reabsorb** weakened bone tissue
- Bones are made of many layers of **connective tissue and minerals**
- Almost every bone in your body has a similar structure

a. Periosteum
- the **outer surface** of bone
- is a thin membrane that contains blood vessels to **nourish the bone**

b. Cortical Bone (Compact Bone)
- below the periosteum = smooth, hard part you see when you look at a bone
- provides **strength & support**
- tiny canals within compact bone contain blood vessels.

c. Cancellous Bone (Spongy Bone)
- Found within the compact bone
- Porous = **light weight**

d. Bone Marrow
- is a thick, jelly-like layer that makes blood cells **(red)** or stores fat **(yellow)**



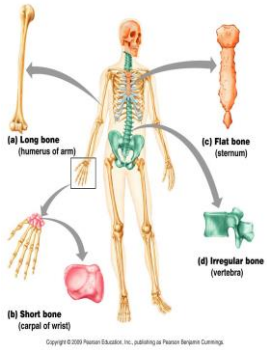
Types of Bones
Bones are classified according to their shape:

a. Long bones
- longer than they are wide
- found in your arms and legs

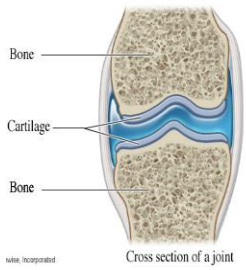
b. Short bones
- equal in width and length
- most are found in wrists & ankles

c. Flat bones:
- thinner bones that can be either flat or curved
- are platelike in nature
- Eg) skull, ribs, and breastbone

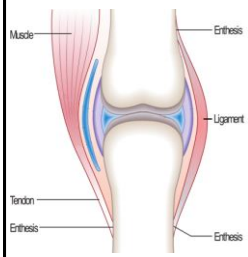
d. Irregular bones
- the odd-shaped bones needed to connect to other bones
- Eg) hip bones & vertebrae



Cartilage
- type of **connective tissue** that can withstand a fair amount of flexing, tension, and pressure
- also makes a **flexible connection** between bones, and acts as a **cushion** between the bones
- Eg) cartilage between the breastbone and the ribs allows your chest to flex so you can breathe



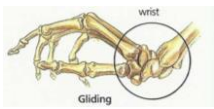
Joints
Joints are formed wherever two or more bones **join together**.
- Some joints are fixed while others move
- Your joints allow your body to move when your muscles contract.



- 2 strong, elastic connective tissues are important in joints:
  - **ligament:** connects **bone to bone**
  - **tendon:** connects **muscle to bone**
- joints have their own lubricating fluid called **synovial fluid** that helps them move freely

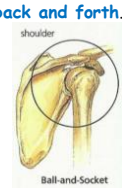
Types of Joints
- Joints are classified by either function or structure

a. Hinge joints
- found in your knees and elbows
- can either open or close **(like a door)**



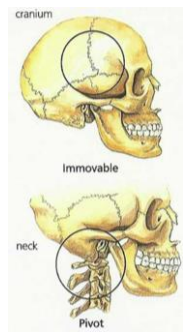
b. Gliding joints
- the flat, plate-like bones found in your wrists or ankles
- these joints **slide back and forth**.

c. Ball-and socket joints
- a sphere with a cup-shaped socket on the other bone
- can perform all types of movement, including **rotation.**



d. Fixed (Immovable) joints
- do not move (bones of the skull)
- have no joint cavity
- are connected by a fibrous connective tissue called **sutures**

e. Pivot joints
- found where the skull meets the spine
- allows **rotation** of one bone around another



Conditions & Disorders of the Skeletal System
As the skeletal system is the framework of the body, many factors play into the health of the skeletal system.

a. Fracture
- is a breakage of a bone caused by excessive force put on it
- Classes of bone fractures:

1. **Closed Fracture**
   = **simple fracture**
   – break does not penetrate the skin
2. **Open Fracture**
   = **compound fracture**
   – broken bone penetrates through the skin

- there are several different types of fractures including **stress, green stick, spiral, and comminuted**

Common Types of Fractures

TABLE 5.2 Common Types of Fractures

Fracture type	Illustration	Description	Comment
Comminuted		Bone breaks into many fragments	Particularly common in older people, whose bones are more brittle
Compression		Bone is crushed	Common in porous bones (i.e., osteoporotic bones of older people)
Depressed		Broken bone portion is pressed inward	Typical of skull fracture
Impacted		Broken bone ends are forced into each other	Commonly occurs when one attempts to break a fall with outstretched arms
Spiral		Ragged break occurs when excessive twisting forces are applied to a bone	Common sports fracture
Greenstick		Bone breaks incompletely, much in the way a green twig breaks	Common in children, whose bones are more flexible than those of adults

Table 5.2

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- Bone fractures are treated by reduction (realignment) & immobilization

Stages in the Healing of a Bone Fracture

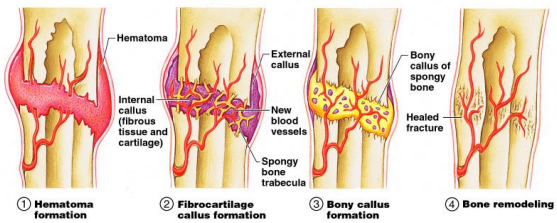

Figure 5.5

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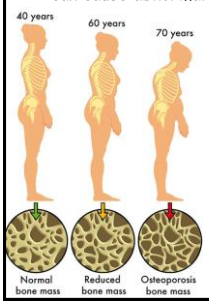
Slide 5.19

b. Posture Deformities
- deformities in posture can be caused by a variety of factors including:

1) Nutrition
- **deficiencies** in specific vitamins and minerals can cause abnormal growth

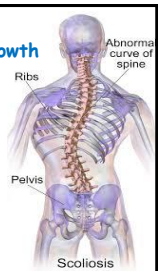


- ie. *Rickets* is a softening of the bones resulting from too little Calcium or Vitamin D

- ie. *Ostioporosis* a disease in which the bone mass is reduced resulting in bones become brittle and fragile

2) Physical
- defects which affect **development & growth**

ie. *Scoliosis*
- is an abnormal lateral curvature of the spine occurring most often during the growth spurt just before puberty



Spina bifita is a birth defect where there is incomplete closing of the backbone around the spinal cord

c. Joint Injuries
- movable joints are subjected to significant wear over a lifetime
- overuse and abnormal motion can cause injuries such as:

1) Sprains and Dislocations
- most common joint injury, caused by **overstretching or tearing of ligaments or tendons**
- can result in a dislocation if bones are displaced from joints

2) Arthritis
- is a joint disorder that involves inflammation in 1 or more joints

3) Bursitis
- **inflammation of the bursa** (fluid-filled sacs) that cushion the joints