Skin and it's Appendages

It is made up of three layers, the epidermis, dermis, and the hypodermis, all three of which vary significantly in their anatomy and function.

Layers of Epidermis

The layers of the epidermis include the stratum basale (the deepest portion of the epidermis), stratum spinosum, stratum granulosum, stratum lucidum, and stratum corneum (the most superficial portion of the epidermis).

Stratum basale (Stratum germinativum)

- Is the deepest layer, separated from the dermis by the basement membrane.
- The cells found in this layer are cuboidal to columnar mitotically active stem cells that are constantly producing keratinocytes.

Stratum spinosum

- It is 8-10 cell layers
- It contains irregular, polyhedral cells with cytoplasmic processes,
- Dendritic cells and Melanocytes can be found in this layer.

Stratum granulosum

- It is 3-5 cell layers
- It contains diamond shaped cells with keratohyalin granules and lamellar granules.

Stratum lucidum

- It is 2-3 cell layers
- It present in thicker skin found in the palms and soles
- It is a thin clear layer consisting of eleidin which is a transformation product of keratohyalin.

Stratum corneum

- It is 20-30 cell layers
- It is the uppermost layer, made up of keratin and horny scales made up of dead keratinocytes, known as anucleate squamous cells.
- This is the layer which varies most in thickness, especially in callused skin.

Dermis

The dermis is connected to the epidermis at the level of the basement membrane and consists of two layers of connective tissue.

- Papillary and Reticular layers which merge together without clear demarcation.

1. Papillary layer is the upper layer, thinner, composed of loose connective tissue and contacts epidermis.
2. Reticular layer is the deeper layer, thicker, less cellular, and consists of dense connective tissue/ bundles of collagen fibers. The dermis houses the sweat glands, hair, hair follicles, muscles, sensory neurons, and blood vessels.

Contents of Dermis

- Collage and Elastic fibers
- Blood Vessles
- Nerve ending
- Hair Follicles
- Sebaceous glands
- Sweat glands
- Immune cells
- Fibroblasts
- Connective tissue

Skin Appendages

Skin appendages are specialized structures that develop from the epidermal (outermost) layer of the skin and serve various functions. These appendages include:

1. Hair:- Hair is one of the most well-known skin appendages. It consists of a hair follicle, which is a tube-like structure embedded in the skin, and the hair shaft, which extends above the skin's surface. Hair serves various functions, such as providing insulation, protection, and sensory perception.
2. Sebaceous glands:- Sebaceous glands produce sebum, an oily substance that helps keep the skin and hair lubricated and waterproof. These glands are most abundant on the face and scalp.
3. Sweat glands:- Sweat glands also known as sudoriferous glands, produce sweat, which is primarily composed of water and electrolytes. Sweating helps regulate body temperature by cooling the skin through evaporation. There are two types of sweat glands: eccrine and apocrine glands.
    a. Eccrine Sweat Glands: These are the most common sweat glands and are found throughout the body. They play a crucial role in thermoregulation.
    b. Apocrine Sweat Glands: These are found mainly in the armpits and groin area. They produce a thicker sweat that is odorless when secreted but can develop an odor when bacteria on the skin break it down.
4. Sebaceous follicle:- These are hair follicles that are associated with sebaceous glands. They are most abundant on the face and upper trunk. Sebaceous follicles produce sebum, which is released directly onto the skin's surface.

Joints

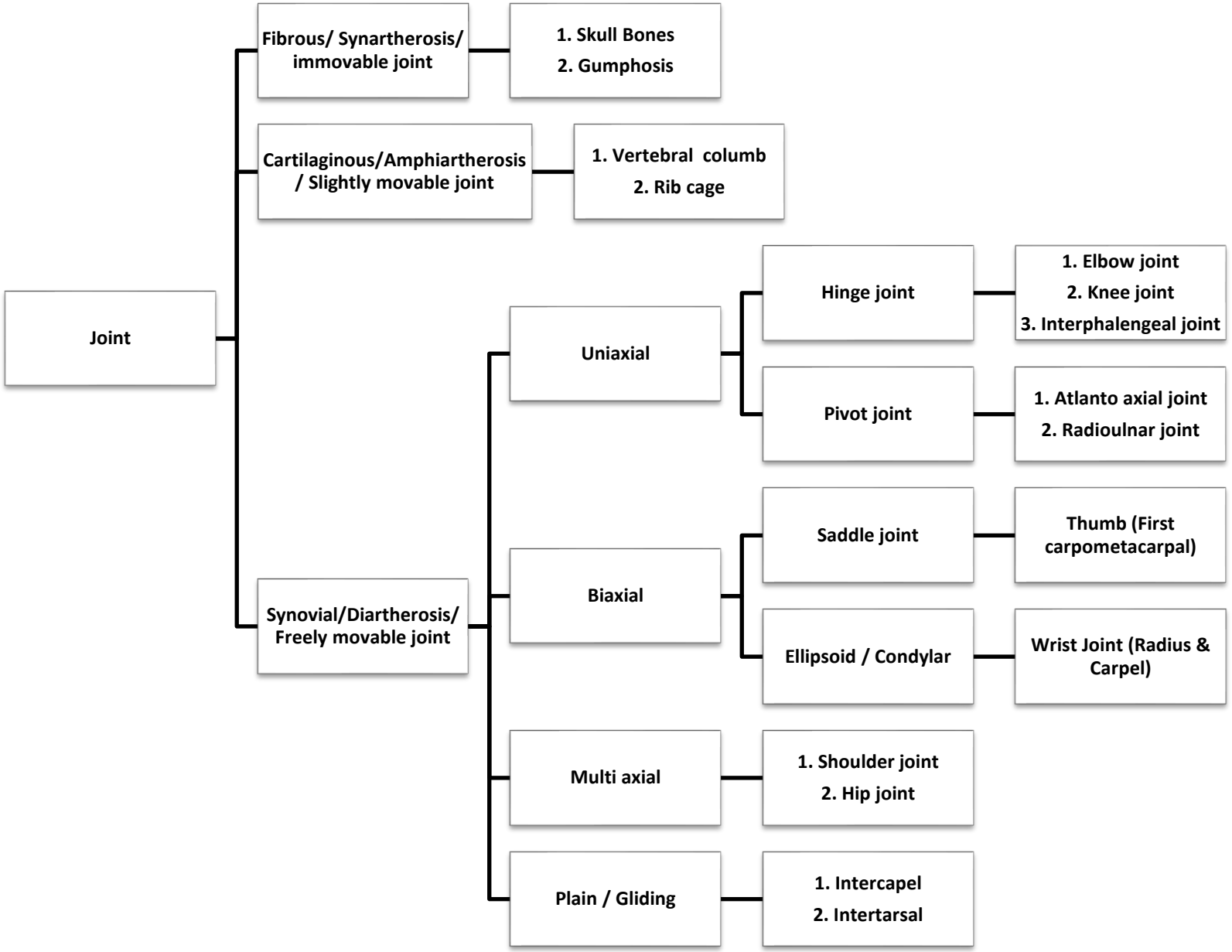
Joints are the points where two or more bones meet/join together is called joint

Types of Joints

1. Fibrous/ Synarthrosis / Immovable
    - It is a type of joint in the skeletal system where two or more bones are connected by fibrous tissue or cartilage.
    - These joints are characterized by their lack of significant movement and provide stability and support rather than allowing for mobility.
    - Synarthrosis joints are the most rigid type of joints in the body.
2. Cartilaginous/Amphiarthroses/ Slightly movable
    - These are the type of joint in the skeletal system where two or more bones are connected by cartilage.
    - These joints allow for limited movement and provide some degree of flexibility and stability. There are two main types of cartilaginous joints:

        A) Synchondroses:- In synchondroses, bones are joined together by hyaline cartilage.

        B) Symphyses:- In symphyses, bones are connected by fibrocartilage
3. Synovial/ Diarthrosis/ Freely movement joint
    - It is a type of joint found in the skeletal system
    - It allows for a wide range of movement between the connected bones.
    - These joints are the most common type of joint in the human body


Joint
Fibrous/ Synartherosis/ immovable joint
1. Skull Bones
2. Gumphosis
Cartilaginous/Amphiartherosis / Slightly movable joint
1. Vertebral columb
2. Rib cage
Synovial/Diartherosis/ Freely movable joint
Uniaxial
Hinge joint
1. Elbow joint
2. Knee joint
3. Interphalengeal joint
Pivot joint
1. Atlanto axial joint
2. Radioulnar joint
Biaxial
Saddle joint
Thumb (First carpometacarpal)
Ellipsoid / Condylar
Wrist Joint (Radius & Carpel)
Multi axial
1. Shoulder joint
2. Hip joint
Plain / Gliding
1. Intercapel
2. Intertarsal

Muscles

- Muscles are contractile tissues in the human body that play a fundamental role in movement, stability, and various physiological functions.
- Muscles are composed of muscle fibers, which are long, slender cells that contain specialized contractile proteins (actin and myosin).
- The process of muscle contraction involves the sliding of these proteins, leading to the shortening of muscle fibers and generating force.
- The nervous system plays a crucial role in initiating and regulating muscle contractions through signals sent by motor neurons.

Types of Muscles

1. Skeletal muscles: -
   - Skeletal muscle constitutes approximately 40% of the total human body weight.
   - Its composition is many individual fibers bundled together into a muscle spindle; this gives the skeletal muscle a striated appearance.
   - Skeletal muscles are the most common type of muscle in the body and are typically attached to bones via tendons.
   - They are responsible for voluntary movements, such as walking, running, lifting, and speaking.
   - Skeletal muscles work in pairs, with one muscle contracting (agonist) while the other relaxes (antagonist) to produce movement.
   - They are straited muscle
2. Smooth muscles / Visceral muscles: -
   - Smooth muscles are found in the walls of internal organs, such as the digestive tract, blood vessels, and the respiratory system.
   - They are not under voluntary control and contract rhythmically to facilitate functions like digestion, blood flow regulation, and breathing.
   - They are non straited muscles
3. Cardiac muscles: -
   - Cardiac muscles are exclusive to the heart and are responsible for pumping blood throughout the circulatory system.
   - They have a unique ability to contract rhythmically without external stimulation, which is essential for the continuous pumping of blood.
   - They are branched straited muscle

Abdominal wall

- The abdominal wall is a complex structure of muscles, fascia (connective tissue), and other tissues that forms the boundary of the abdominal cavity.
- It plays a crucial role in protecting the internal organs of the abdomen, providing support, and facilitating various movements and functions.

The abdominal wall consists of:-

1. Skin: - The outermost layer of the abdominal wall is the skin, which serves as a protective barrier and provides sensory information.
2. Superficial fascia: - Beneath the skin is a layer of subcutaneous tissue (also called the superficial fascia) that contains fat and blood vessels. This layer helps to insulate the body and provides a source of energy storage.
   a. Camper's fascia: - This is the more superficial layer of abdominal fascia that contains fat and is responsible for the rounded appearance of the abdominal wall.
   b. Scarper's fascia: - Scarpa's fascia is a deeper layer of fascia that is more fibrous and less fatty. It is important for support and strength in the lower abdomen.
3. Abdominal muscles: -
   The abdominal muscles may be divided broadly into anterolateral and posterior components.
   a. Anterolateral muscles include five paired muscles:
      i. External oblique,
      ii. Internal oblique,
      iii. Transversus abdominis,
      iv. Rectus abdominis,
      v. Pyramidalis.
   b. Posterior muscles include four muscles
      i. Psoas major
      ii. Quadratus lumborum bilaterally
      iii. Illiacus
      iv. Psoas minor
   The abdominal muscles contribute to movements of the trunk, including flexion, extension, lateral flexion, and rotation.
   Simultaneous contraction of abdominal muscles can facilitate the generation of intraabdominal and intrathoracic pressure critical in sneezing, coughing, vomiting, and defecating.
   This action may also help stabilize the trunk when lifting heavy loads.
   In times of increased physiological or pathological demand for airway ventilation, the anterolateral muscles (except transversus abdominis) act as accessory muscles of respiration by depressing the ribs to cause active expiration.
4. Transversalis fascia
5. Parietal peritoneum