Overview of Muscle Tissue

• **Skeletal**-Muscle fibers are the longest of muscle types; striations; voluntary; somatic movement; adaptable.
• **Cardiac**- Constitutes bulk of heart walls; striated; involuntary; pacemaker sets contractions.
• **Smooth muscle**- Found in walls of visceral organs, forces fluids/substances through internal body channels; nonstriated; involuntary.

Muscle Functions

• **Producing movement**- Skeletal muscle is responsible for all somatic movements & manipulation; cardiac muscle courses blood through vessels; smooth muscle-peristaltic actions
• **Maintaining posture**- Continuously defying gravity via constant adjustments
• **Stabilizing/strengthen joints**
• **Generation of heat**- Skeletal muscle contractions responsible for heat production.

Skeletal muscle functions

• Produce somatic movements
• Maintain body posture/position
• Reinforce soft tissue-anterior/posterior walls/pelvic floor
• Guard entrances/exits- orifices of alimentary/urinary tracts
• Regulation of body temperature- heat loss by muscle contractions
Gross Anatomy of Skeletal Muscles

- **Epimysium** - dense CT surrounds entire muscle; blends with deep fascia.
- **Perimysium and fascicles** - fibrous CT surrounding bundles of fibers.
- **Endomysium** - sheath of CT surrounding muscle fiber.
- CT coverings contribute to muscle tissue elasticity

Nerve and Blood Supply

- Normal activity of skeletal muscle dependant on nerve/blood supply
- Each muscle is served by one nerve, artery & vein
- Nerves penetrate CT septa; each fiber supplied with nerve ending (myoneural junction)

Nerve and Blood Supply

- Muscle requires large amount of energy

- Extensive blood supply delivers O2 & nutrients for ATP production
Attachments

- Movable *insertion* moves towards immovable *origin*.
- **Direct attachment**-epimysium fused to periosteum/periichondrium.
- **Indirect attachment**-epimysium extends beyond muscles as sheet like aponeurosis; anchors muscle to bone, cartilage or fasciae of other muscles.

Microscopic Anatomy of Skeletal Muscle

- Muscle fiber is long, cylindrical, oval multinuclear myocyte; sarcolemma
- Sarcoplasm contains glycosomes.
- Myoglobin-red pigment
- Myofibril-account for 80% of cellular volume.

Tendons and Aponeuroses

- Tendon-fusion point of collagen fibers of endo-, peri-, and epimysium that attach muscle to bone, skin, or another muscle; resemble thick cords or cables
- Aponeuroses-Formation of thick, flattened sheets.
Naming Skeletal Muscles

• **Location**-temporalis, intercostals
• **Shape**-deltoid, trapezius
• **Relative size**-maximus, minimus, longus, brevis
• **Direction**-rectus, oblique
• **Number of origins**-biceps, triceps
• **Location of attachments**-origin
  - first/sternocleidomastoid
• **Action**-flexor, extensor, adductor.

Arrangement of Skeletal Muscle Fibers

• **Circular**-orbicularis oris
• **Convergent**-pectoralis major
• **Parallel**-sartorius
• **Unipennate**-extensor digitorum longus
• **Multipennate**-deltoid
• **Fusiform**-biceps
• **Bipennate**-rectus femoris

The Axial Musculature

• The axial musculature is involved in moving the head and spinal column.
• Categorized into five groups: (1) muscles of the head; (2) muscles of neck & vertebral column; (3) muscles of the thorax; (4) muscles of the abdominal wall; (5) muscles of the pelvic floor/perineum
Cephalic muscles

- Scalp
  * Epicranius-frontalis/occipitalis
- Facial
  * Orbicularis oculi
  * Zygomaticus
  * Risorius
  * Orbicularis oris
  * Buccinator
  * Platysma

Cephalic Muscles (cont’d)

- Mastication
  * Temporalis
  * Medial/lateral pterygoids
  * Buccinator
- Tongue movements
  * Genioglossus
Neck & Vertebral Column

• Neck
  
  *Sternocleidomastoid*

  *Scalenes*

• Vertebral Column
  
  *Erector Spinae-spinalis,longissimus, Iliocostalis*

  *Semispinalis*

  *Quadratus lumborum*

Muscles of the Thorax

• *External intercostals*

• *Internal intercostals*

• *Diaphragm*
### Muscles of the Abdominal Wall

- *Rectus abdominis*
- *External oblique*
- *Internal oblique*
- *Transversus abdominis*

### Muscles of the Pelvic Floor

- *Levator ani (pubo-, iliococcygeus)*
- *Sphincter urethrae*
- *Ischiocavernosus*
- *Bulbospongiosus*

### Appendicular Skeletal Muscles

- Involved in stabilization of pectoral & pelvic limbs.
- Accounts for 40% of skeletal muscle mass.
Pectoral Girdle Muscles/Upper Limbs

- 4 divisions
  1. Pectoral girdle positioning
  2. Brachium movement
  3. Antebrachium movement
  4. Hand/finger movement

Pectoral Girdle Positioning

- **Anterior Thorax**
  - Pectoralis minor
  - Serratus anterior

- **Posterior thorax**
  - Trapezius

Brachium movement

- Pectoralis major
- Latissimus dorsi
- Deltoid
- Subscapularis
- Supra-, infraspinatus
- Teres major, minor
- Coracobrachialis
Antebrachium Movement

• Posterior aspect: extensors
  Triceps
  Anconeus

• Anterior aspect: flexors
  Biceps brachii
  Brachialis
  Brachioradialis

Hand/Finger Movement

• Anterior aspect
  Pronator quadratus, teres
  Flexor carpi radialis, ulnaris
  Palmaris longus

• Posterior aspect
  Supinator
  Extensor carpi radialis, ulnaris
  Extensor digitorum

Intrinsic hand muscles

• Thenar (ball of thumb)

• Hypothenar (ball of little finger)

• Midpalm (lumbricals, interossei)
Pelvic Girdle Muscles and Lower Limbs

- Larger, stronger than pectoral limb muscles

- 3 groups: (1) Thigh movement; (2) Leg movement; (3) Foot & toe movement.

Thigh Movement

- Anterior compartment
  - *Iliopsoas*
  - *Sartorius*

- Medial compartment
  - *Adductor magnus, longus, brevis*
  - *Pectineus*
  - *Gracilis*

Thigh Movement (cont’d)

- Posterior compartment
  - *Gluteus maximus, medius, minimus*
  - *Piriformis*
  - *Obturator internus*
  - *Gemellus*
  - *Quadratus femoris*
Leg Movement

• Anterior thigh compartment
  
  *Rectus femoris*
  *Vastus lateralis, medialis, intermedius*

• Posterior thigh compartment
  
  *Biceps femoris*
  *Semitendinosus*
  *Semimembranosus*

Foot & Toe Movement

• Anterior compartment
  
  *Tibialis anterior*
  *Extensor digitorum longus*
  *Extensor hallucis*

• Lateral compartment
  
  *Peroneus longus, brevis*
Foot & Toe Movement (cont’d)

- Posterior compartment
  - Gastrocnemius
  - Soleus
  - Flexor digitorum longus
  - Tibialis posterior
  - Flexor hallucis longus