University of Anbar

College of Dentistry


Year: First

Course: Terminology

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# Terminology
# Muscular System

# Main Functions of the Muscular System



- The muscular system is made up of **over 600** muscles.
- The muscular system **enables movement**, **maintains posture**, and **generates heat**.
- It is **controlled** by the **nervous** system and **interacts** with the **skeletal** system.
- The primary purpose for the muscular system is to **provide movement** for the body. The muscles receive their **ability to move** the body through the **nervous system**.
- It is composed of three main types of muscle: **skeletal**, **cardiac**, and **smooth**.

# Major Properties of the Muscular System



- **Excitable or irritable:** This means that they are capable of **receiving** stimulation and **responding** to **stimulation** from the nerves.
- **Contractible:** After receiving stimulation, they are **capable of contracting, or shortening**.
- **Extensible:** A muscle can be **stretched without damage** by the application of force.
- **Elasticity:** A muscle is able to **return** to its original resting shape and length **after** being **extended** or **contracted**.
- **Adaptability:** The muscular system is **adaptable** in that it can be **changed** in response to how it is used. For example, a muscle will enlarge or undergo **hypertrophy** (enlarging the muscle) with increased work; on the other hand, it can go into **atrophy** or waste away if deprived of work.

# Types of Muscles



There are three types of muscle tissue in the body and each of these move either voluntary or involuntary.

**1. Cardiac muscle (myocardium)** is **involuntary** muscle which means it operates without any conscious control. These **muscles** form the **walls** of the **heart** and **contracts** to **circulate** the **blood**.

**2. Smooth (visceral) muscle** makes up the **walls of the hollow organs**, such as the stomach, intestines, and uterus, and the **walls of ducts**, such as the blood vessels and bronchioles. Smooth muscle operates **involuntarily** and is responsible for **peristalsis**, the wave-like movements that propel materials through the systems.

# Types of Muscles



**3. Skeletal muscles:** these are typically what we think of when talking about muscles.

These muscles **attach to the skeleton** and **provide** the skeleton with the **ability to move**.

They are classified as **voluntary;** this is because we have to make a conscious effort or decision to make them move.

It also **maintains posture** and **generates a large proportion of body heat**.

All of these voluntary muscles together make up the muscular system.

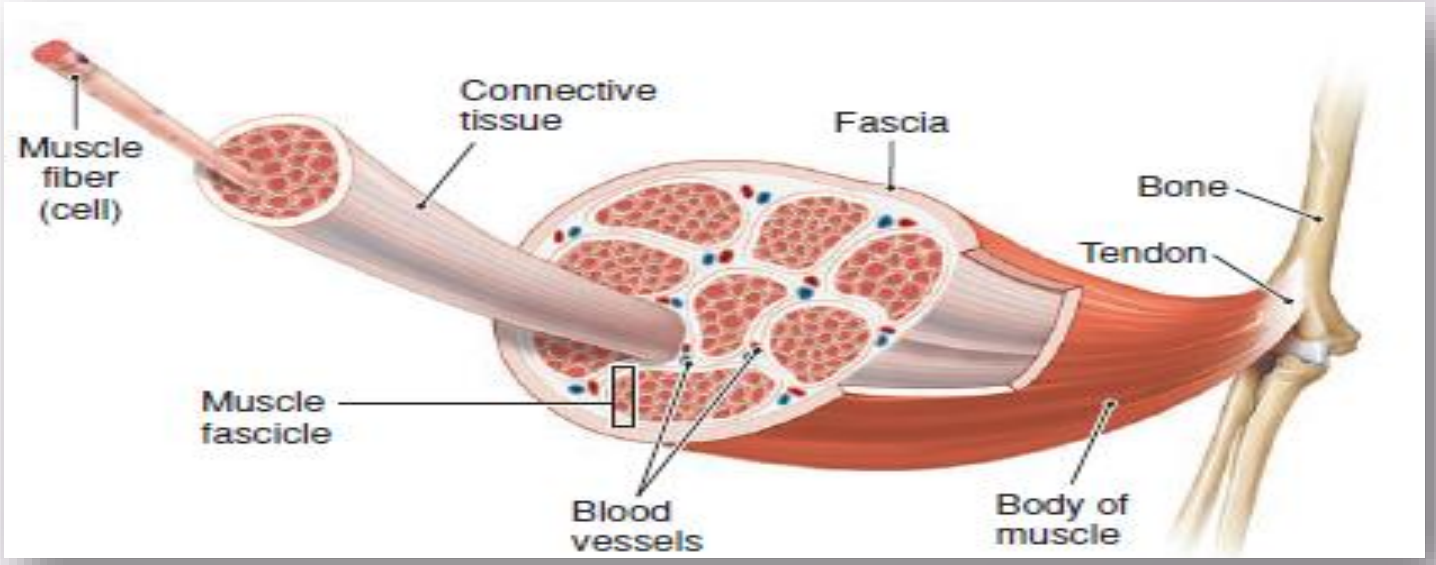
# Structure of Skeletal Muscle

1. **Muscle Fibers = Muscle Cells**
    1. Muscle cells are called **muscle fibers** because they are long, thin, and thread-like.
    2. These fibers are the functional units of muscle tissue. They contract to generate movement
2. **Fascicles = Bundles of Muscle Fibers**
    1. Muscle fibers are grouped together in bundles called **fascicles**.
3. **Fascia = Connective Tissue**
    1. Each fascicle is wrapped in a layer of **connective tissue**, which provides structure and support.
    2. The entire muscle is also covered by a **sheath of connective tissue**, called **fascia**, which helps protect and organize the muscle.
4. **Tendons = Merged Connective Tissues**
    1. The connective tissues surrounding muscle fibers and fascicles eventually come together at the ends of the muscle.
    2. These merged tissues form **tendons**, which attach the muscle to bones and allow movement when the muscle contracts.

# Structure of Skeletal Muscle



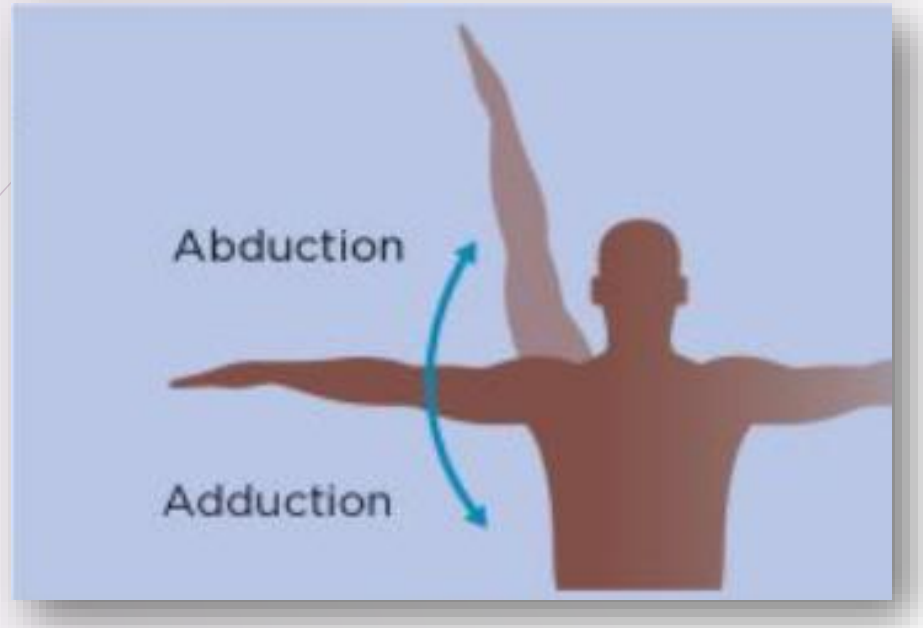
- **Key Takeaways**
  - Muscles are made of **muscle fibers** (cells).
  - **Fascicles**: Bundles of muscle fibers wrapped in **connective tissue**.
  - The **fascia** (a connective tissue layer) covers the entire muscle.
  - The connective tissues merge to form **tendons**, which attach/connect the muscle to bones.
  - **Tendons** and **fascia** work together with the **muscles**, which create the **muscular system** necessary for movement.

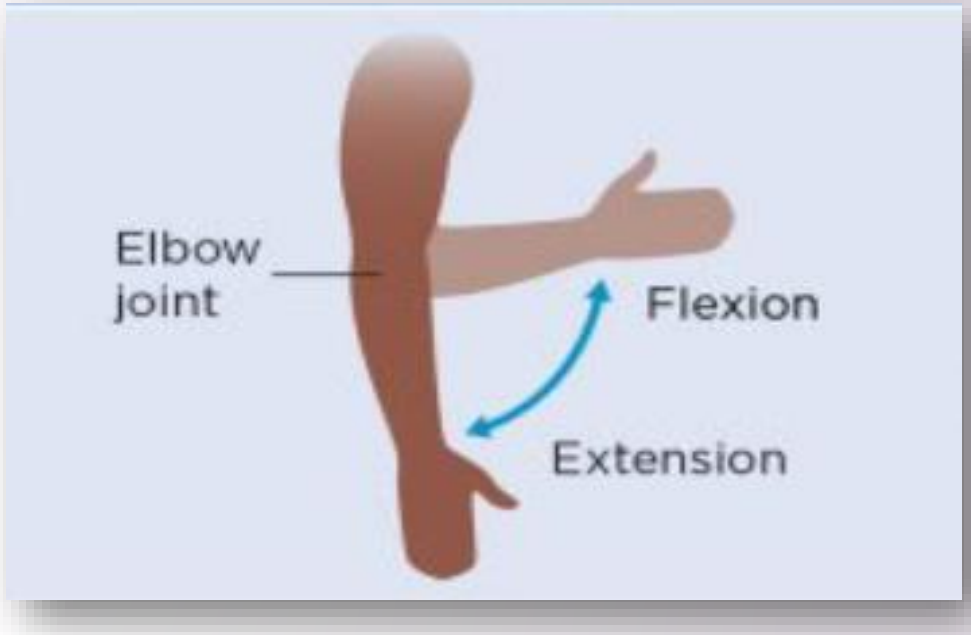


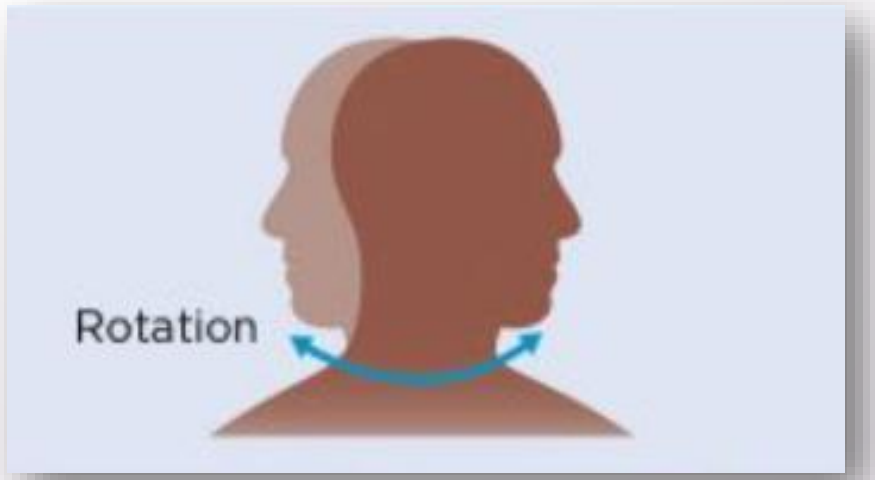
# 5 Types of Muscle Movements



1. **Abduction**: Moving a body part **away from** the **mid-line** of the **body**. (e.g., outward movement of the arm at the shoulder)
2. **Adduction:** Moving a body part **toward** the **mid-line** of the **body**. (e.g., return of lifted arm to the body)
3. **Flexion**: Closing the angle at a joint; **bending** a joint to **decrease** the **angle** between two bones or two body parts. (e.g., bending at the knee or elbow)
4. **Extension**: Opening the angle at a joint; **straightening** and **extending** of the joint to **increase the angle** between two bones or body parts. (e.g., straightening at the knee or elbow)
5. **Rotation**: It involves moving a body part around an **axis**. (e.g., turning the head).


Abduction
Adduction


Elbow joint
Flexion
Extension


Rotation

# Muscle Naming



A muscle can be named by its:

1. **Location**: Near a bone or body region (e.g., temporalis, brachialis).
2. **Direction of Fibers**: Straight, diagonal, or horizontal (e.g., rectus, oblique, transverse).
3. **Size**: Large, small, long, or short (e.g., maximus, minimus, longus, brevis).
4. **Shape**: Triangular, trapezoid, or saw-toothed (e.g., deltoid, trapezius, serratus).
5. **Number of Attachment points (Heads)**: Indicated by the suffix (***-ceps***): biceps, triceps, quadriceps.
6. **Action**: Indicated by adding the suffix (***-or***) to the root for the action: flexor, extensor, abductor, adductor. For example, a muscle that produces flexion at a joint is a *flexor*.

# Roots Pertaining to Muscles



| Root | Meaning | Example | Definition of Example |
|---|---|---|---|
| **my/o** | muscle | myositis [*mi-o-SI-tis*] | inflammation of muscle |
| | | myoglobin [*mi-o-GLO-bin*] | a protein similar to hemoglobin that stores oxygen in muscle cells |
| **muscul/o** | muscle | musculature [*MUS-kyu-lah-chur*] | muscle arrangement in a part or the whole body |
| **in/o** | fiber | inotropic [*in-o-TROP-ik*] | acting on (muscle) fibers |
| **fibr/o** | fiber | fibromyalgia [*fi-bro-mi-AL-je-ah*] | a chronic pain syndrome affecting muscles and soft tissue. |
| **fasci/o** | fascia | fasciodesis [*fash-e-OD-eh-sis*] | binding (suture) of a fascia to a tendon or other fascia |
| **sthen/o** | strength | asthenia [*as-THE-ne-ah*] | weakness (prefix *a-* meaning “without”) |
| **ten/o, tendin/o** | tendon | tenostosis [*ten-os-TO-sis*] | ossification of a tendon |
| **ton/o** | tone | cardiotonic [*kar-de-o-TON-ik*] | having a strengthening action on the heart muscle |
| **erg/o** | work | ergonomics [*er-go-NOM-iks*] | study of the efficient use of energy during work |
| **kin/o-, kine, kinesi/o, kinet/o** | movement | kinesis [*ki-NE-sis*] | movement (adjective: *kinetic*) |

# Common Muscular Disorders, Symptoms and Conditions



- **Asterixis:** Rapid, jerky movements, especially in the hands, caused by intermittent loss of muscle tone.
- **Ataxia:** Lack of muscle coordination (from root ***tax/o*** meaning "*order, arrangement*") (adjective: ***ataxic***).
- **Athetosis:** A condition marked by slow, irregular, twisting movements, especially in the hands and fingers (adjective: ***athetotic***).
- **Atrophy:** A wasting away; a decrease in the size of a tissue or organ, such as muscular wasting from disuse.
- **Dermatomyositis**: A disease of unknown origin involving muscular inflammation as well as dermatitis and skin rashes.
- **Fibromyositis:** A nonspecific term for pain, tenderness, and stiffness in muscles and joints.
- **Fibrositis:** Inflammation of fibrous connective tissue, especially the muscle fasciae; marked by pain and stiffness.
- **Muscular Dystrophy (MD):** A genetic disorder leading to muscle weakness.

# Common Muscular Disorders, Symptoms and Conditions



- **Myasthenia Gravis (MG):** A disease characterized by progressive muscular weakness; an autoimmune disease affecting the neuromuscular junction.
- **Polymyositis**: A disease of unknown cause involving muscular inflammation and weakness.
- **Rheumatism:** A general term for inflammation, soreness, and stiffness of muscles associated with joint pain (adjectives: ***rheumatic***, ***rheumatoid***).
- **Strain:** Overstretching or tearing of a muscle or tendon; injury to a muscle or tendon, often due to overuse or sudden force.
- **Sprain:** Injury to a ligament, typically caused by twisting or impact.
- **Spasm:** Sudden, involuntary muscle contraction, often due to fatigue, dehydration, or nerve issues.
- **Tendinitis:** Inflammation of a tendon, usually caused by injury or overuse; the shoulder, elbow, and hip are common sites; also spelled **tendonitis**.
- **Tenosynovitis:** Inflammation of a tendon and its sheath.

# Diagnostic Procedures

- **Electromyography (EMG):** Study of the electrical activity of muscles during contraction.
- **MRI and CT Scans:** Provide imaging of muscle and soft tissue.
- **Muscle Biopsy:** A sample of muscle tissue is examined for disease.

# Treatments and Therapies

- **Physical Therapy (PT):** Health profession concerned with physical rehabilitation and prevention of disability; exercise, massage, and other therapeutic methods that help to restore movement and strength.
- **Myoplasty**: Surgical repair of a muscle.
- **Anti-inflammatory Medications:** Reduce pain and swelling.
- **Surgery:** Repairs muscle or tendon damage when necessary.