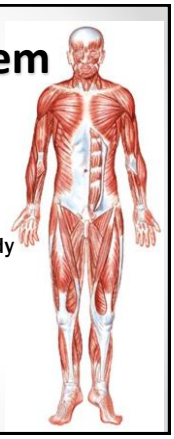
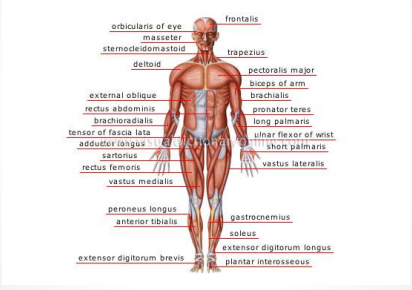
The Muscular System

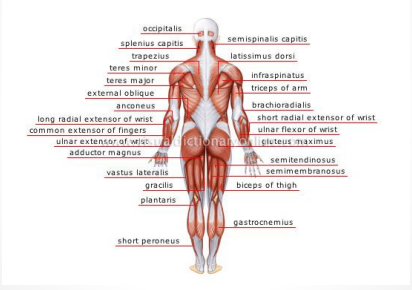


- Specialized tissues that enable the body and its parts to move.

Anterior View



Posterior View



TRIVIA!

- **How many muscles are there in the human body?**
  - Answer: 640 Muscles
  - The muscles make up about 40 % of the body mass.
- **What is the longest muscle in the body?**
  - Answer: *The Sartorius*
  - The **Sartorius** runs from the outside of the hip, down and across to the inside of the knee. It twists and pulls the thigh outwards.
- **What is the smallest muscle in the body?**
  - Answer: *The Stapedius*
  - The **Stapedius** is located deep in the ear. It is only 5mm long and thinner than cotton thread. It is involved in hearing.
- **What is the biggest muscle in the body?**
  - Answer: *The Gluteus Maximus*
  - The **Gluteus Maximus** is located in the buttock. It pulls the leg backwards powerfully for walking and running.

Muscle

- Specialized tissues that enable the body and its parts to move
- comes from the Latin word “mus” which means “Little Mouse”
- Makes up nearly **half** the body’s mass
- The only action of muscle is **contraction** or **shortening**
- Muscles are responsible for essentially all body movement and can be viewed as the **machines** of the body

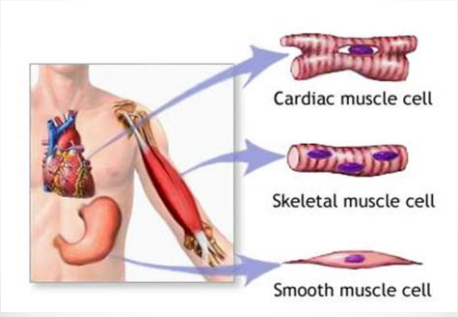
Functions of the Muscles

- **Movement**
- Maintenance of **posture and muscle tone**
- Heat production
- Protects the **bones and internal organs.**

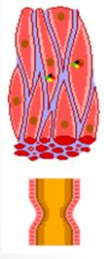
Muscle Classification

- Functionally
  - **Voluntarily** – can be moved at will
  - **Involuntarily** – can't be moved intentionally
- Structurally
  - Striated – have **stripes** across the fiber
  - Smooth – no **striations**

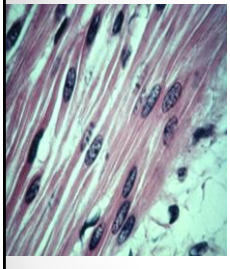
The 3 Types of Muscles



a) Smooth Muscle

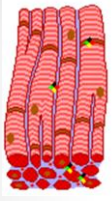


- Fibers are **thin and spindle shaped.**
- No striations
- Single nuclei
- **Involuntary**
- Contracts slowly **(peristalsis)**

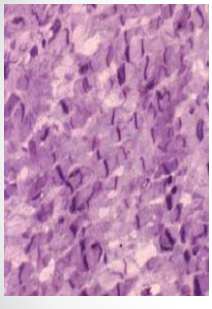


- They fatigue… **but very slowly**
- Found in the circulatory system
  - Lining of the **blood vessels**
  - Helps in the circulation of the blood
- Found in the digestive system
  - **Esophagus, stomach, intestine**
  - Controls digestion
- Found in the respiratory system
  - Controls **breathing**
- Found in the urinary system
  - **Urinary bladder**
  - Controls urination

b) Cardiac Muscle

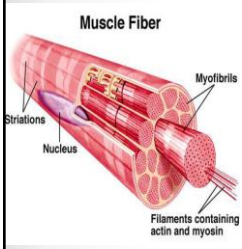


- Cells are **branched and appear fused** with one another
- Has **striations**
  = alternating dark and light bands
- Each cell has a central nuclei
- **Involuntary**



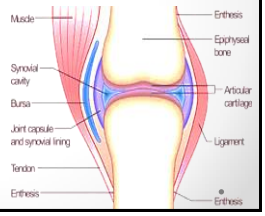
- Found ONLY in the **heart**
- Contractions of the heart muscles pump blood throughout the body and account for the **heartbeat.**
- Healthy cardiac muscle **NEVER fatigues** → or else…

c) Skeletal Muscle



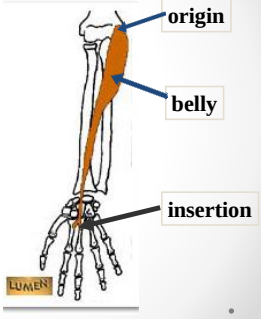
- Fibers are **long & cylindrical**
- Have striations & **many nuclei**
- Cells are surrounded & bundled together by **connective tissue**
  = great force, but tires easily
- **Voluntary**
- And yes… they do fatigue
  = Muscle fatiguing activity like running, etc. forms **Lactic acid** which builds up causing soreness, cramping

- Attached to skeleton by **tendons**
- Most muscles attach to 2 bones that have a movable joint between them
  = Causes movement of bones at the joints.
- small fluid filled sacs called **Bursae** lie between some tendons and the bones beneath them
  = are lined with synovial membrane that secretes **synovial fluid**.



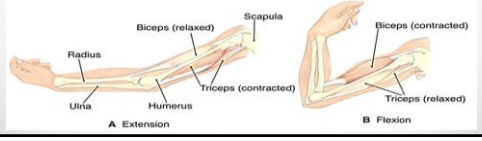
Attachment of Muscles

- **Origin:**
  - the attachment of the muscle to the bone that remains **stationary**
- **Insertion:**
  - the attachment of the muscle to the bone that **moves**
- **Belly:**
  - the **fleshy part** of the muscle between the tendons of origin and/or insertion



Movement of Skeletal Muscle

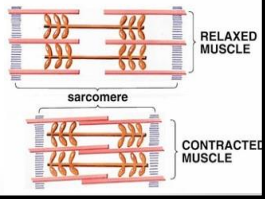
- move when the brain sends messages to the muscle
- muscle move bones by **pulling** **not** pushing.
- Always work in **pairs**
- 2 movements of skeletal muscle: **Contraction (shorten)** **Extension (lengthen)**
- Example:
  - the biceps flex your arm & its partner the triceps extend your arm.
  - the two muscles are **antagonists**, i.e. cause opposite actions.



Muscle Contraction

The Sliding Filament Theory

- Each muscle fibre is made up of smaller fibres called **myofibrils**.
- These contain even smaller structures called **actin** and **myosin** filaments.
- These filaments slide in and out between each other to form a **muscle contraction**
  = the myocin **grabs** and **pulls** the actin

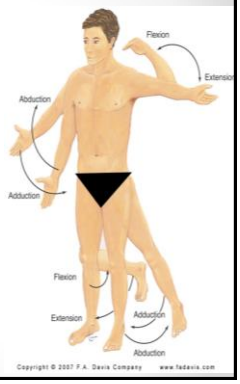


Practice these Movements

1. **Bend arm**
   - biceps → contract
   - triceps → extend
2. **Straighten arm**
   - biceps → extend
   - triceps → contract
3. **Bend knee**
   - quadriceps → extend
   - hamstrings → contract

More Movements

4. **Straighten knee**
   - quadriceps → contract
   - hamstrings → extend
5. **Crunches**
   - abdomen → contract
   - back muscles → extend
6. **Point toes**
   - calf muscle → contract
   - shin muscle → extend



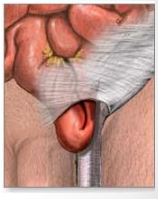
Naming Skeletal Muscles

- **Location** of the muscle
  = epicranius
- **Shape** of the muscle
  = deltoid
- Relative **Size** of the muscle
  = gluteus maximus
- **Direction/Orientation** of the muscle fibers/cells
  = obliques
- Number of **Origins**
  = quadriceps
- **Action** of the muscle
  = extensor digitorum

Muscular System Disorders

- **Atrophy**
  - muscle tissue **shrinks** from disuse
- **Hypertrophy**
  - over exercise, the muscle fiber (cell) **enlarges**
- **Muscle Cramps**
  - **involuntary contractions** of one or more muscle
  - are caused by muscle spasms due to a variety of factors such as **overexertion, poor circulation, dehydration, mineral deficiency**
- **Strain**
  - a **stretch or tear,** this time affecting the muscle itself or a tendon usually resulting from excessive use
  - causes pain, swelling & difficulty in movement
  - treat with **RICE**
    (Rest, Ice, Compression, Elevation)

- **Fibromyalgia**
  - is a **chronic and debilitating muscle disorder** producing pain, fatigue, tenderness stiffness of muscles
  - the exact cause is unknown but generally believed to be a combination of Genetics as well as physical and psychological stressors

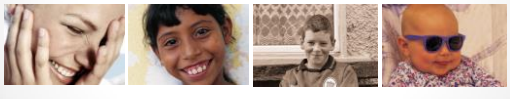


- **Hernia**
  - occurs when an organ **protrudes through a tear in abdominal or pelvic muscle** due to sudden twists, pulls, or muscle strains, lifting heavy objects , weight gain, chronic coughing

- **Myopathies**
  - a group of muscular diseased characterized by the **improper function of muscle fibers** resulting in muscle weakness, fatigue and in some cases paralysis
  - include diseases such as Muscular Dystrophy, Cerebral Palsy, Cardiomyopathy Lou Gehrig's disease

There are about 60 muscles in the face

Smiling is easier than frowning.
It takes 20 muscles to smile and over 40 to frown.



Smile and have a great day!!