

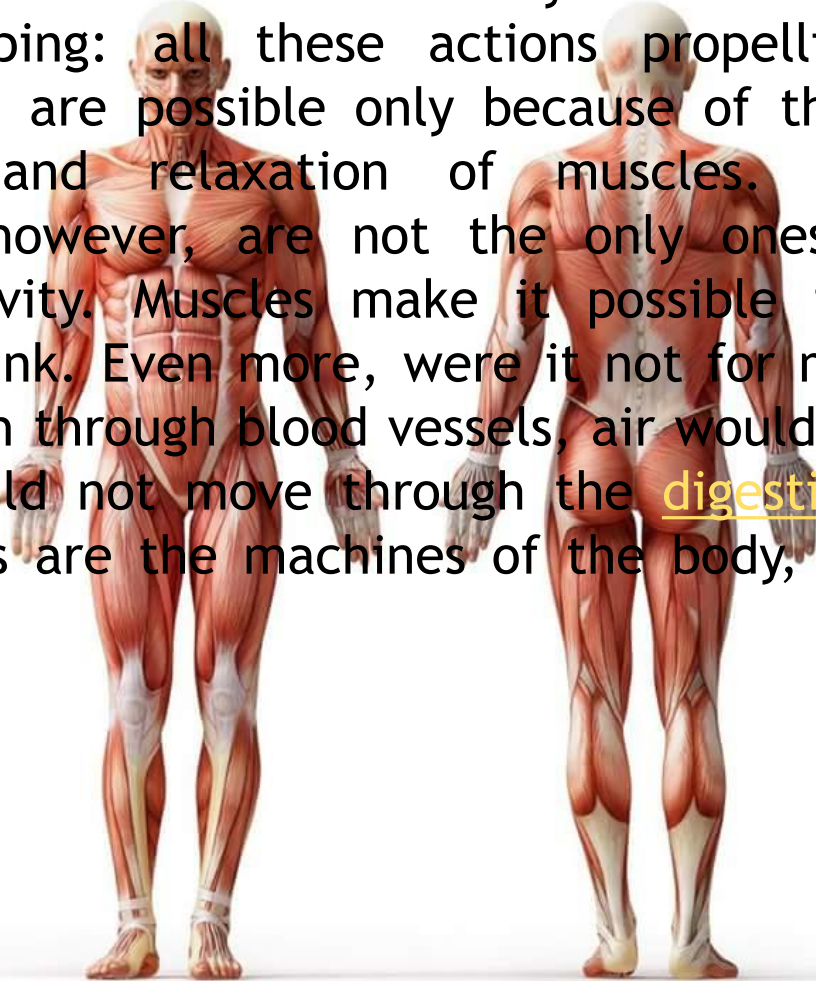
# MUSCULAR SYSTEM IN HUMAN BODY

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# THE MUSCULAR SYSTEM

The muscular system is the body's network of tissues that controls movement both of the body and within it. Walking, running, jumping: all these actions propelling the body through space are possible only because of the contraction (shortening) and relaxation of muscles. These major movements, however, are not the only ones directed by muscular activity. Muscles make it possible to stand, sit, speak, and blink. Even more, were it not for muscles, blood would not rush through blood vessels, air would not fill lungs, and food would not move through the digestive system. In short, muscles are the machines of the body, allowing it to work.

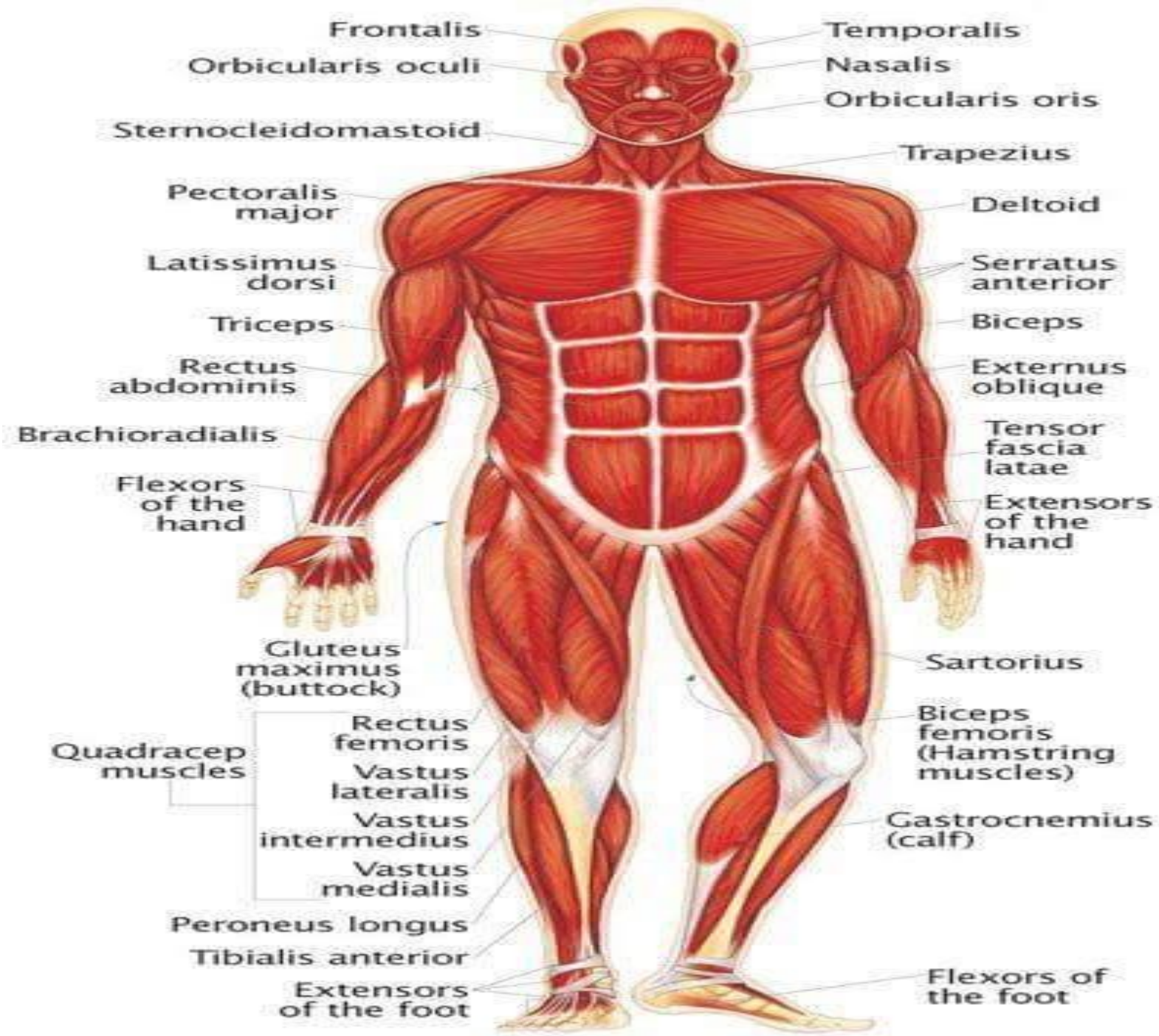


# STRUCTURE OF MUSCLE CELLS

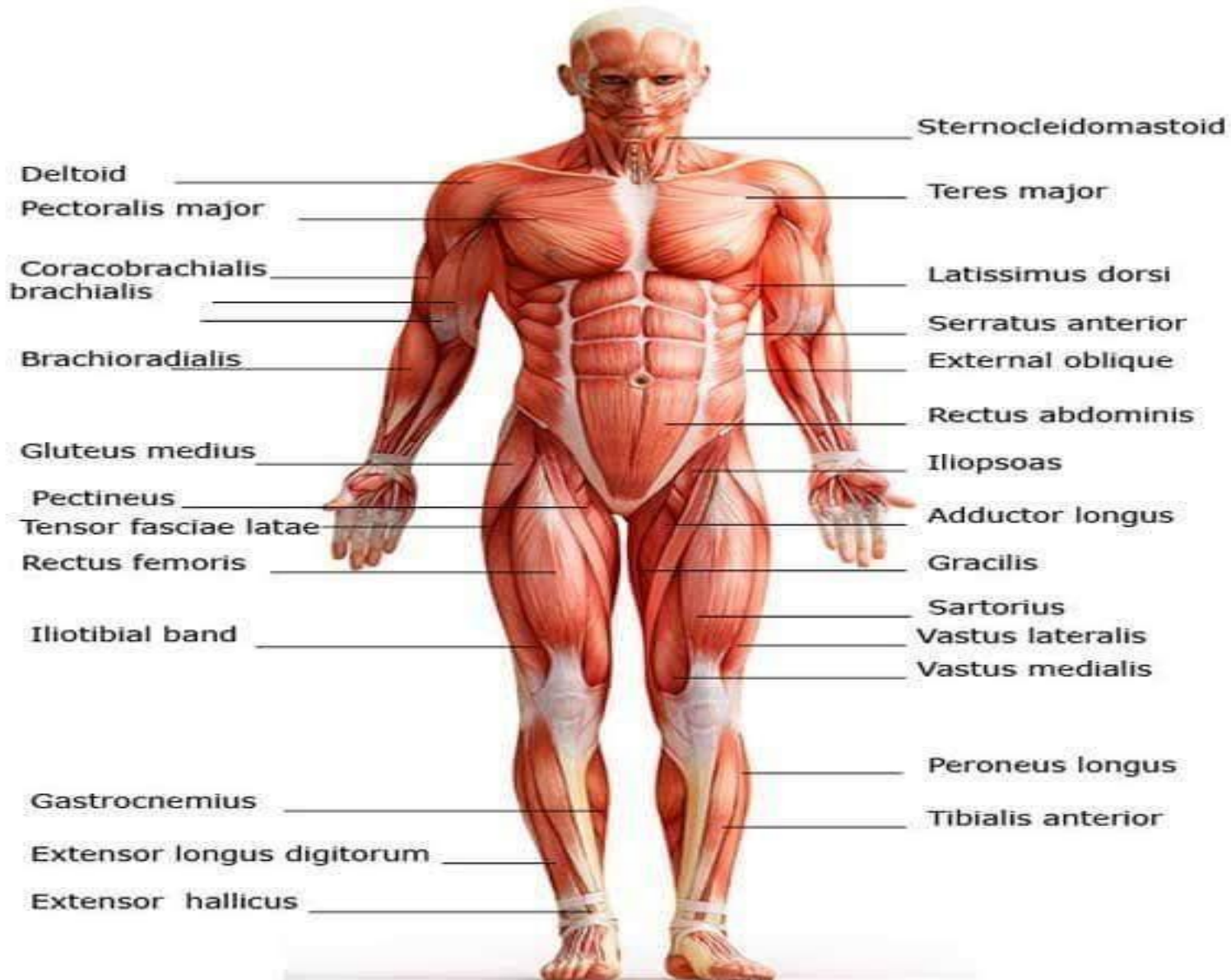
- Each muscle is made of hundreds to thousands of individual muscle cells. Unlike most other cells in the body, these cells are unusually shaped: they are elongated like a cylinder or a long rod. Because of their shape, muscle cells are normally referred to as muscle fibers. Whereas most cells have a single nucleus (the part of the cell that controls its activities), muscle fibers have as many as 100 or more nuclei. The nuclei are located on the surface of the fiber, just under its thin membrane. Another difference between muscle fibers and other body cells is their size. They can extend the entire length of a muscle. For example, a muscle fiber in a thigh muscle could measure 0.0004 inch (0.001 centimeter) in diameter and 12 to 16 inches (30 to 40 centimeters) in length.

# CLASSIFICATION OF MUSCLES

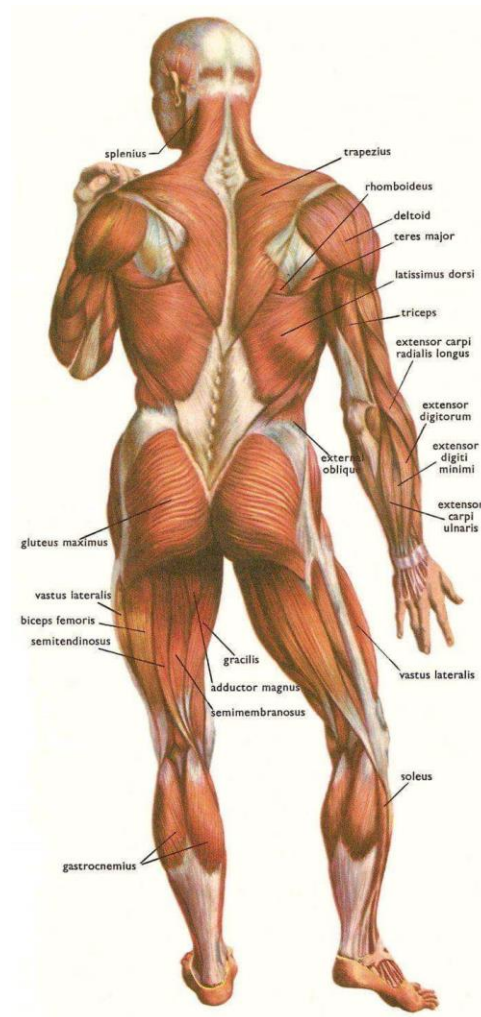
- ◉ POSITIONAL CLASSIFICATION: 1.Skeletal 2. Non-skeletal
- ◉ STRUCTURAL CLASSIFICATION: 1.Striated 2. Non-striated
- ◉ FUNCTIONAL CLASSIFICATION: 1.Voluntary 2. Involuntary
  
- ◉ All striated muscles are voluntary and skeletal but all non striated muscles are involuntary and non skeletal. Only exception the cardiac muscle, it is striated muscles but involuntary and non-skeletal.



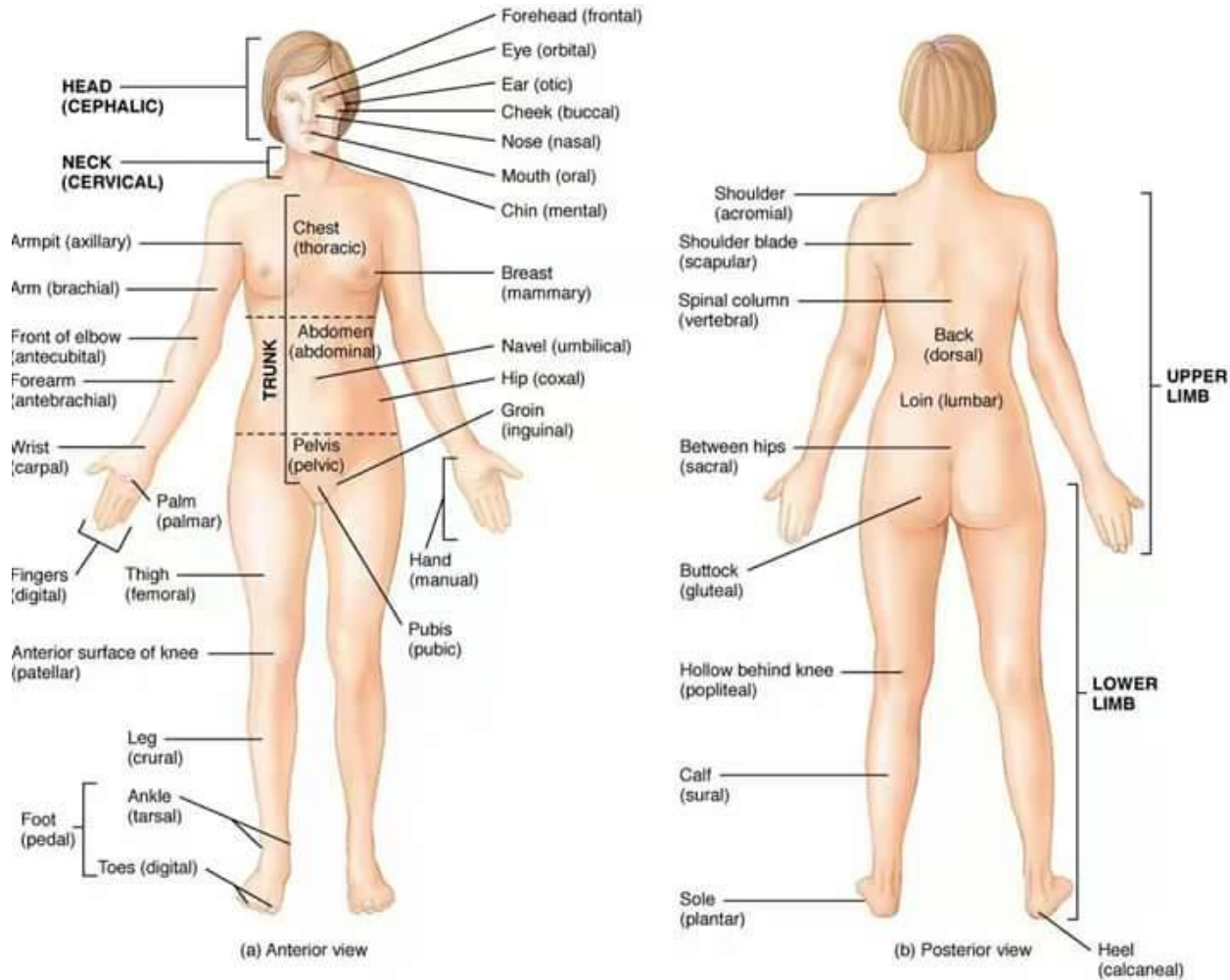
# Major Anterior Muscles



# MAJOR POSTERIOR MUSCLES



# MAJOR ANTERIOR AND POSTERIOR MUSCLES OF WOMAN

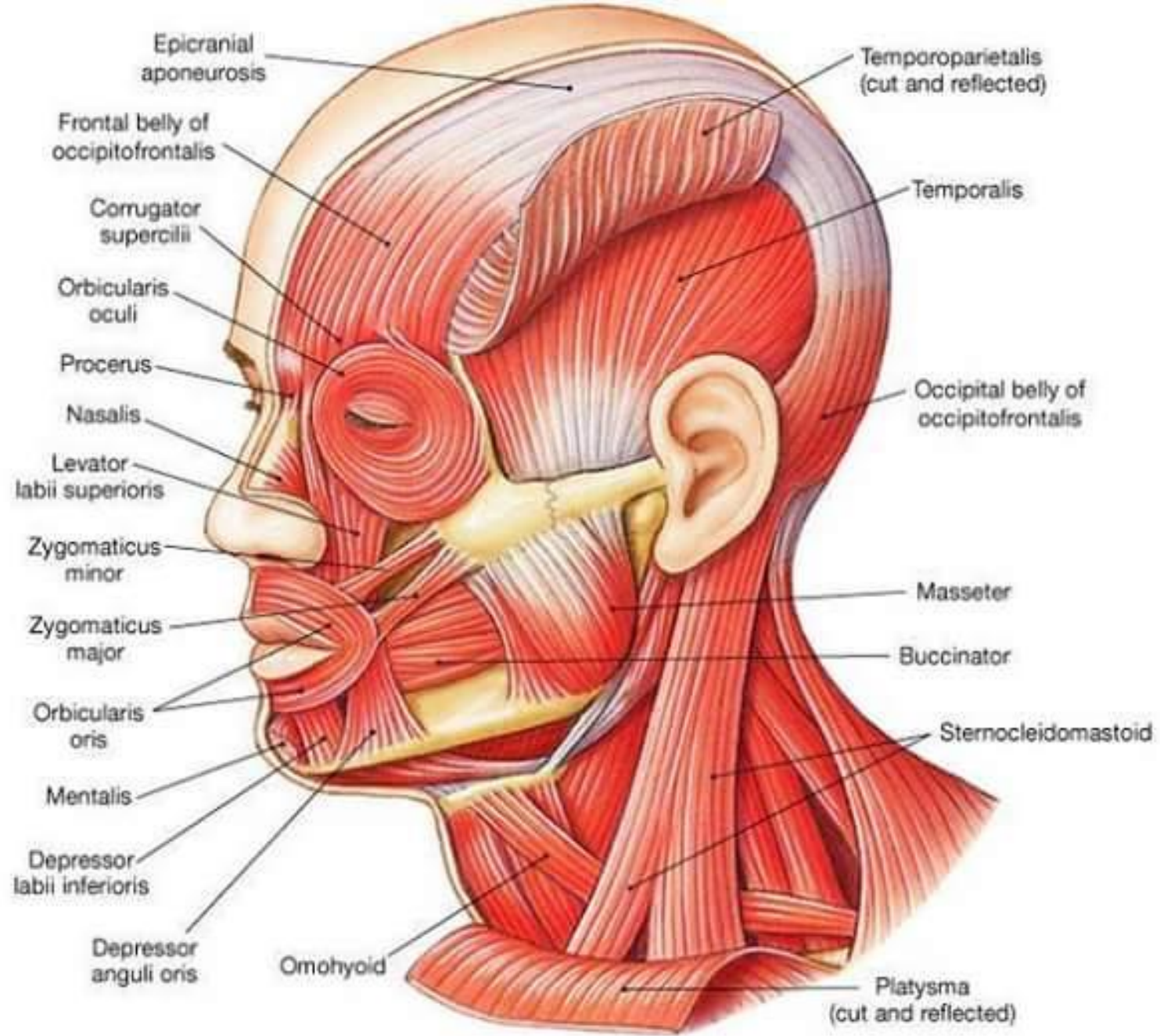




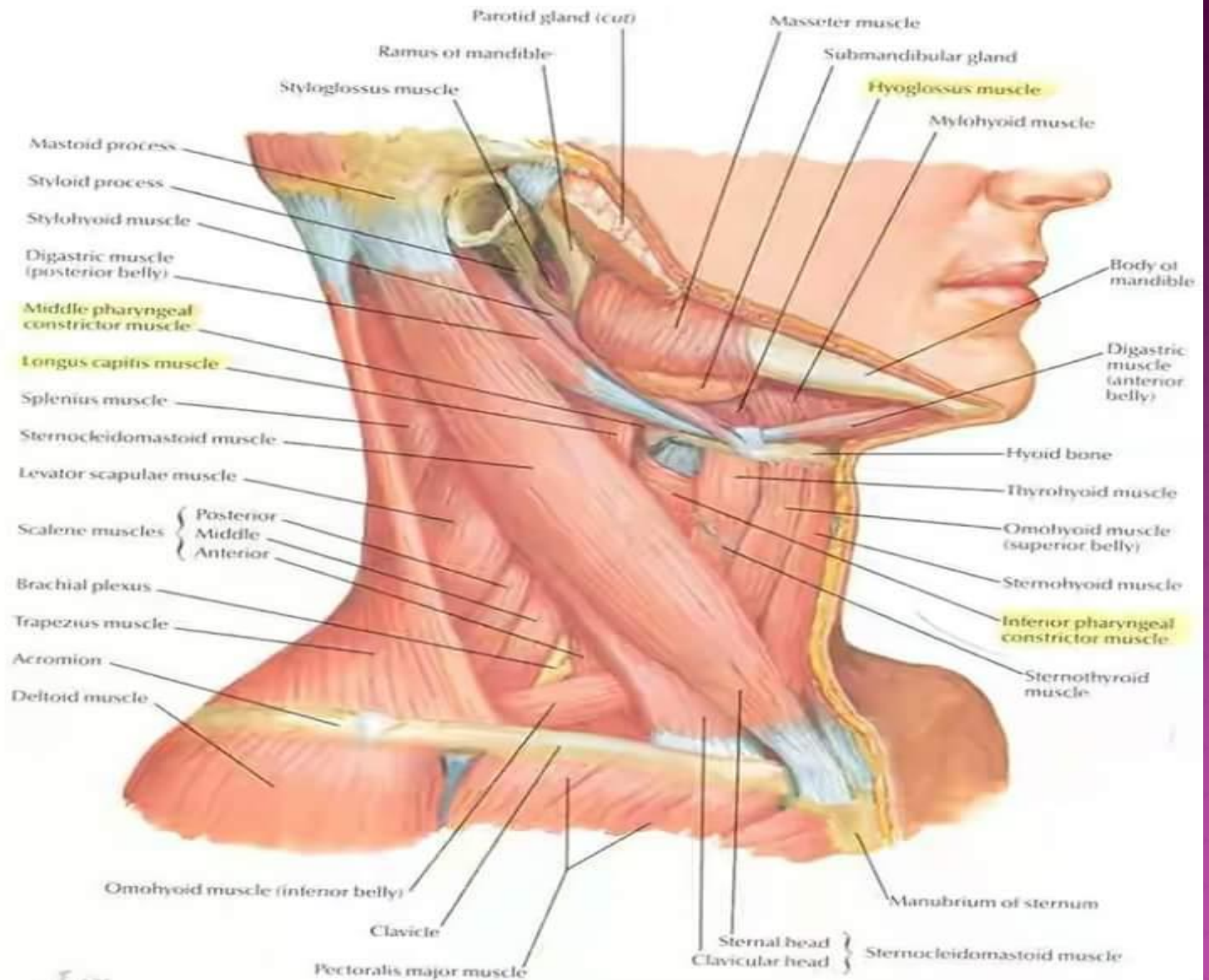


© 2004 Elsevier. All rights reserved. This illustration is a reproduction of the anatomical drawing of the human muscular system from the textbook 'Anatomy and Physiology' by Marieb and Hoar, published by Elsevier. The drawing is a detailed anatomical illustration of the human muscular system, showing the muscles of the head, neck, chest, abdomen, and legs. The muscles are rendered in a realistic red color with detailed fiber structure and shading to show depth and volume. The figure is standing in a slightly flexed, athletic pose with hands on hips. The background is plain white, and there is a vertical purple bar on the right side of the image.





(a) Lateral view



# MOVEMENT AND MUSCLE ARRANGEMENT

- Muscles cannot push; they can only pull. In order to create movement, muscles must act in pairs. Muscles are arranged on the skeleton in such a way that the flexing or contracting of one muscle or group of muscles is usually balanced by the lengthening or relaxation of another muscle or group of muscles. In other words, when a muscle performs an action, another can undo or reverse that action.
- For example, when the biceps (muscle on the front of the upper arm) contracts, the forearm moves in at the elbow toward the biceps; at the same time, the triceps (muscle on the rear of the upper arms) lengthens. When the forearm is moved out in a straight-arm position, the opposite occurs: the triceps contracts and the biceps lengthens.
- A muscle whose contraction is responsible for producing a particular movement is called a prime mover (or an agonist). A muscle that opposes or reverses the movement of a prime mover is called an antagonist. Generally, antagonistic muscles are located on the opposite side of a limb or portion of the body from prime mover or agonist muscles.
- In the previous example, the biceps is the prime mover behind the flexing of the elbow. In this movement, the triceps is the antagonist of the biceps. When the forearm is straightened out (and the elbow is extended), the triceps becomes the prime mover and the biceps is the antagonist.
- Most muscles do not act by themselves to produce a particular movement. Muscles that help prime movers by producing the same movement or by reducing unnecessary movement are called synergists. When the biceps flexes the elbow, smaller muscles in the upper arm also come into play. If the elbow is flexed with the palm of the hand up, the biceps is the prime mover. However, if the elbow is flexed with the palm down or the thumb up (palm in), the other muscles become the prime movers. These particular synergistic muscles allow for greater mobility or movement of the hand when the elbow is flexed.
- Although prime movers are mainly responsible for producing certain body movements, the actions of antagonists and synergists are equally important. Without the combined efforts of all three types of muscles, body movements would not be smooth, coordinated, and precise.



# THE MUSCULAR SYSTEM: WORDS TO KNOW

- ◉ **Acetylcholine** (ah-see-til-KOE-leen): Neurotransmitter chemical released at the neuromuscular junction by motor neurons that translates messages from the brain to muscle fibers.
- ◉ **Adenosine triphosphate** (ah-DEN-o-seen try-FOS-fate): High-energy molecule found in every cell in the body.
- ◉ **Aerobic metabolism** (air-ROH-bic muh-TAB-uhlizm): Chemical reactions that require oxygen in order to create adenosine triphosphate.
- ◉ **Antagonist** (an-TAG-o-nist): Muscle that acts in opposition to a prime mover. **Cramp**: Prolonged muscle spasm.
- ◉ **Fascicle** (FA-si-kul): Bundle of myofibrils wrapped together by connective tissue.
- ◉ **Lactic acid** (LAK-tik ASS-id): Chemical waste product created when muscle fibers break down glucose without the proper amount of oxygen.
- ◉ **Muscle tone**: Sustained partial contraction of certain muscle fibers in all muscles.
- ◉ **Myofibrils** (my-o-FIE-brilz): cylindrical structures lying within skeletal muscle fibers that are composed of repeating structural units called sarcomeres.
- ◉ **Myofilament** (my-o-FILL-ah-ment): Protein filament composing the myofibrils; can be either thick (composed of myosin) or thin (composed of actin).

## THE MUSCULAR SYSTEM: WORDS TO KNOW

- **Neuromuscular junction** (nu-row-MUSS-ku-lar-JUNK-shun):Region where a motor neuron comes into close contact with a muscle fiber.
- **Prime mover (or agonist)**:Muscle whose contractions are chiefly responsible for producing a particular movement.
- **Rigor mortis** (RIG-er MOR-tis):Rigid state of the body after death due to irreversible muscle contractions.
- **Sarcomere** (SAR-koh-meer):Unit of contraction in a skeletal muscle fiber containing a precise arrangement of thick and thin myofilaments.
- **Spasm**:Sudden, involuntary muscle contraction.
- **Strain**:Slight tear in a muscle; also called a pulled muscle.
- **Synergist** (SIN-er-jist):Muscle that cooperates with another to produce a particular movement.
- **Tendon** (TEN-den):Tough, white, cordlike tissue that attaches muscle to bone.



# MUSCULAR SYSTEM FUNCTION

## ◉ MOVEMENT

- ◉ The most obvious function of the muscular system is movement. Organisms have adopted a variety of methods to use the contractile function of the muscular system to move through the environment. The most basic movements of fish include contracting muscles on opposite sides of the body in succession. This action propels them through the water.
- ◉ In organisms with limbs, tendons and other connective tissues are used to secure muscles to the joints and skeleton. Skeletons may be internal like the human skeletons, or they may be external like the exoskeleton of crabs. The nervous system coordinates the contraction of the muscular system to synchronize the movement of the limbs. Animals like the cheetah, swordfish, and bat have obtained speeds above 60 miles per hour or more through the power of their muscles alone.

## ◉ CIRCULATION

- ◉ The second and less obvious function of the muscular system is to assist with circulation. Visceral and cardiac muscle tissues surround the blood vessels and lymph vessels that carry crucial nutrients and oxygen to the cells of the body. Cardiac muscle makes up the heart and supplies the main force for blood traveling through the body.
- ◉ Large arteries and veins have associated muscles which can contract or relax to control blood pressure. The actions of large skeletal muscles also help pump the blood and lymph fluid throughout the body. While you exercise and contract large and small muscles, they push vessels aside, which works like a pump to move fluids around your body.

## ◉ DIGESTION

- ◉ Much like its ability to move fluids through vessels in the circulatory system, the muscular system also aids in moving food through the digestive system. Most digestive organs are surrounded by smooth muscle tissue. Although the tissue cannot be voluntarily contracted like skeletal muscles, it is controlled subconsciously. When food needs to be moved through the gut, the muscles contract in a synchronized fashion in a wave through the digestive system. These wave-like muscular contractions are called peristalsis.

**THANK YOU**