

# LEC 3 Myology

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# Muscle Tissue

All skeletal muscles are composed of one specific type of muscle tissue.

Other types of muscle tissue form important components of the organs of other systems, including the cardiovascular, alimentary, genitourinary, integumentary, and visual systems.

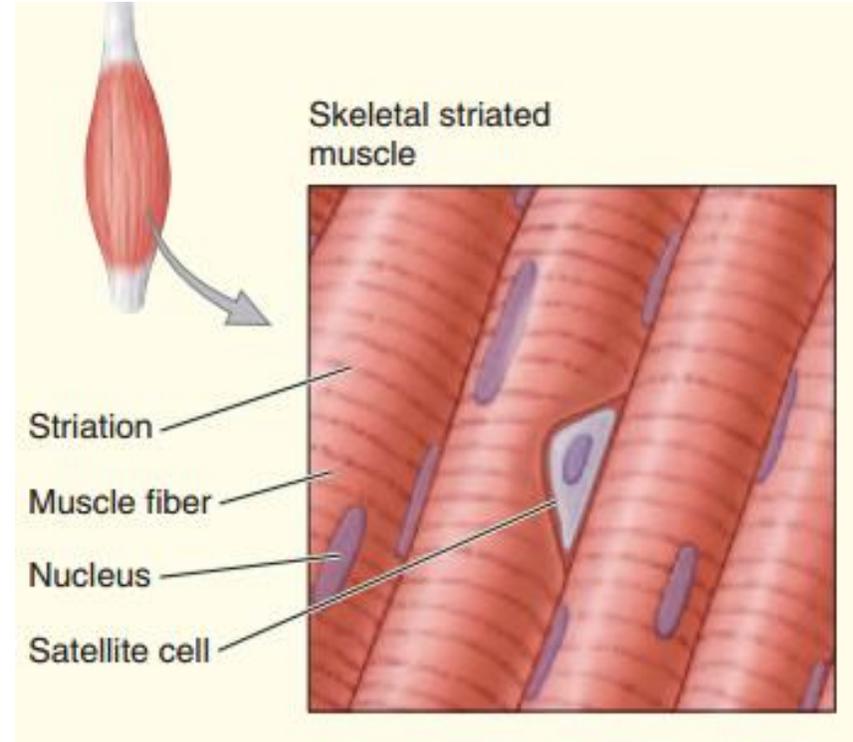
# Muscle types

**There are three muscle types :**

- **Skeletal striated muscle**
- **Cardiac striated muscle**
- **Smooth muscle**

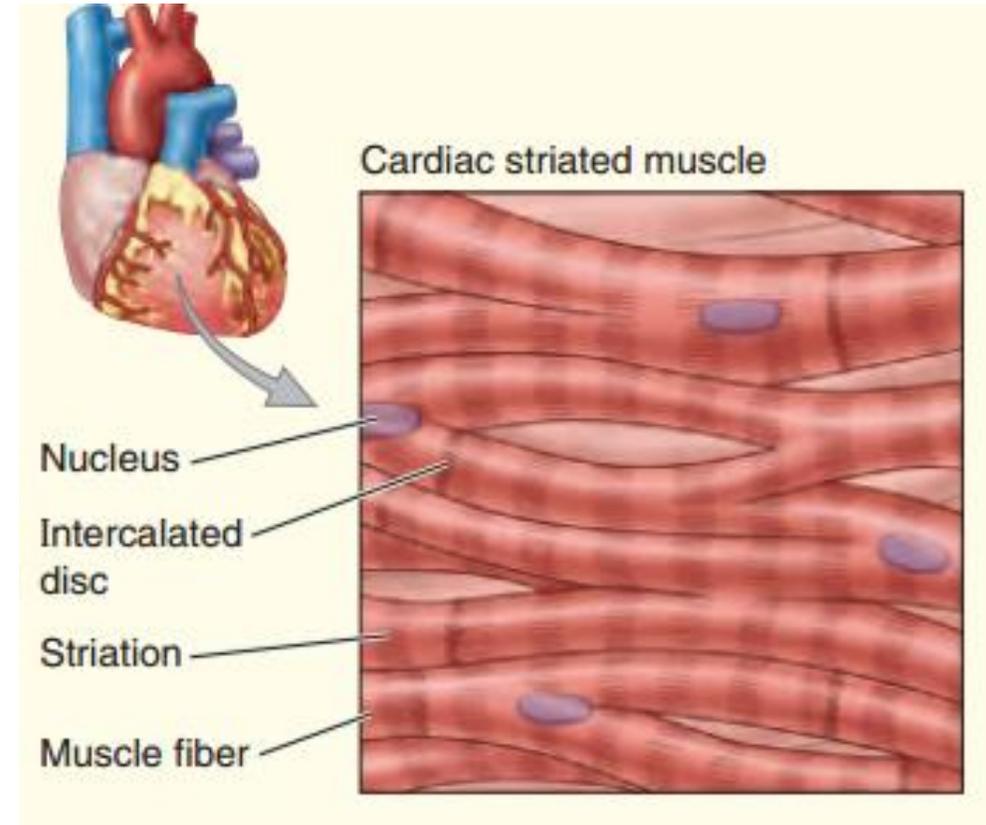
# Skeletal striated muscle

- It is a voluntary somatic muscle
- Make up the gross skeletal muscles
- Moving or stabilizing bones and other structures (e.g., the eyeballs)



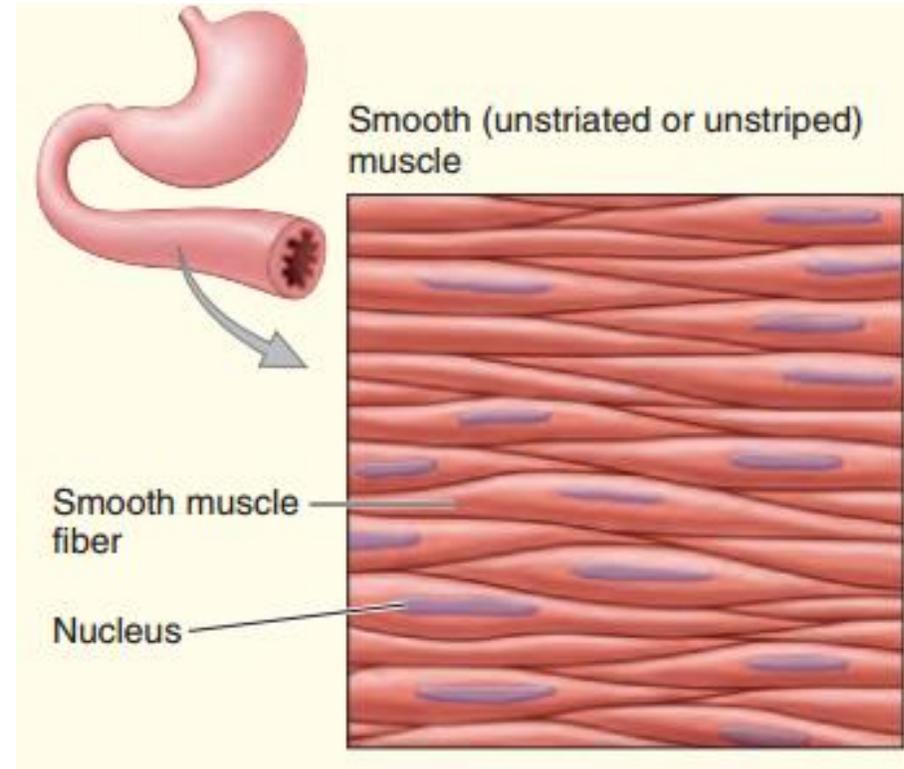
# Cardiac striated muscle

- It is an involuntary visceral muscle
- Forms most of the walls of the heart and adjacent parts of the great vessels, such as the aorta, and pumps blood.



# Smooth muscle (unstriated muscle)

- It is an involuntary visceral muscle
- Forms part of the walls of most vessels and hollow organs (viscera).



# Skeletal Muscles

- All skeletal muscles, commonly referred to simply as “muscles,”
- It has fleshy, reddish, contractile portions (one or more heads or bellies) composed of skeletal striated muscle.
- Some muscles are fleshy throughout, but most also have white non-contractile tissue portions (tendons), composed mainly of organised collagen bundles.
- Most skeletal muscles are attached directly or indirectly to bones, cartilages, ligaments, or fascia or to some combination of these structures.

# The Name of muscles

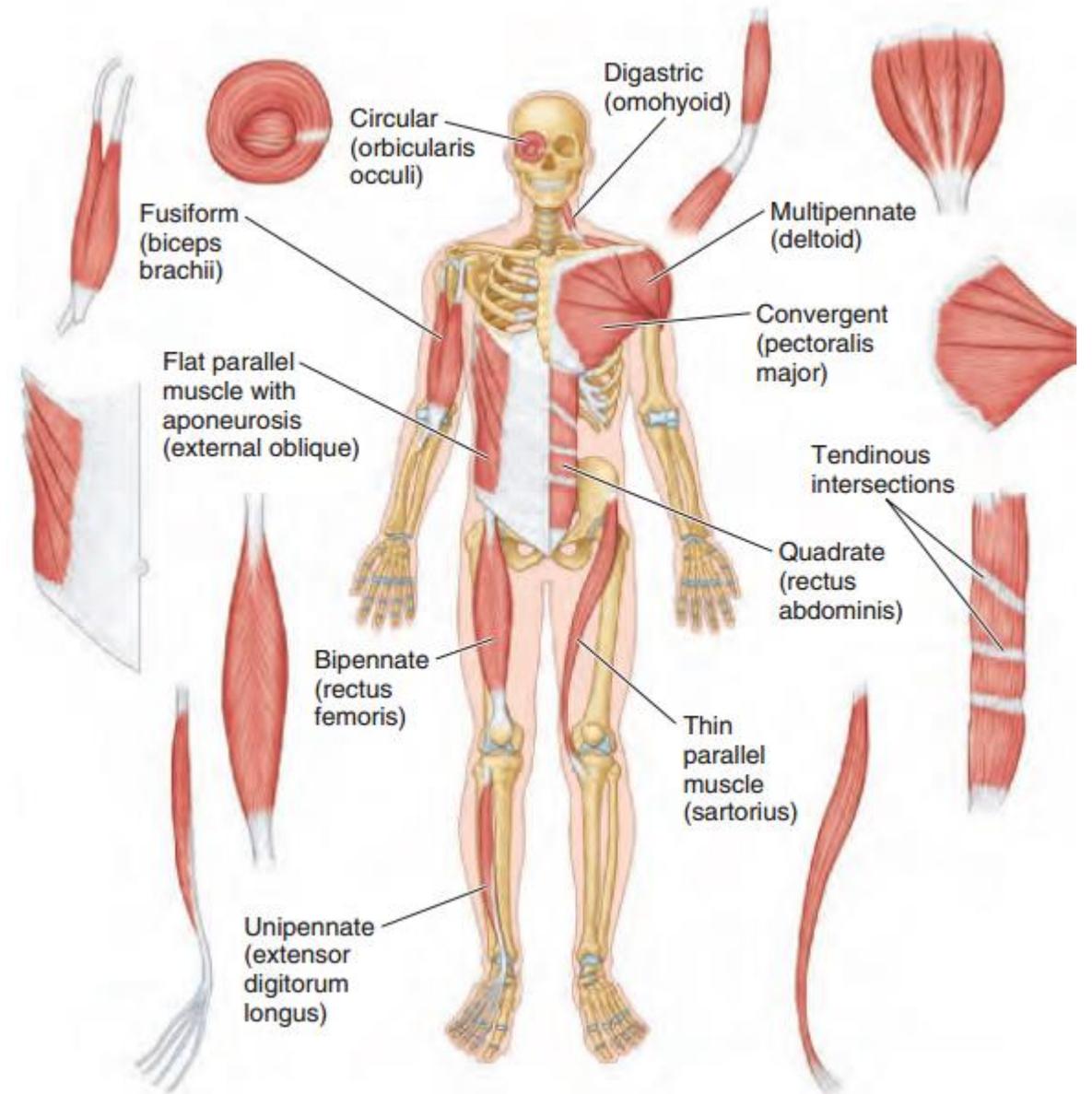
- Most muscles are named based on their function or the bones to which they are attached.
- The **abductor digiti minimi muscle**, for example, abducts the little finger.
- The **sternocleidomastoid muscle** (G. kleidos, bolt or bar, clavicle) attaches inferiorly to the sternum and clavicle and superiorly to the mastoid process of the temporal bone of the cranium.
- Other muscles are named based on their position (medial, lateral, anterior, posterior) or length (brevis, short; longus, long).

# Classification

**Muscles may be described or classified according to their shape, for which a muscle may also be named:**

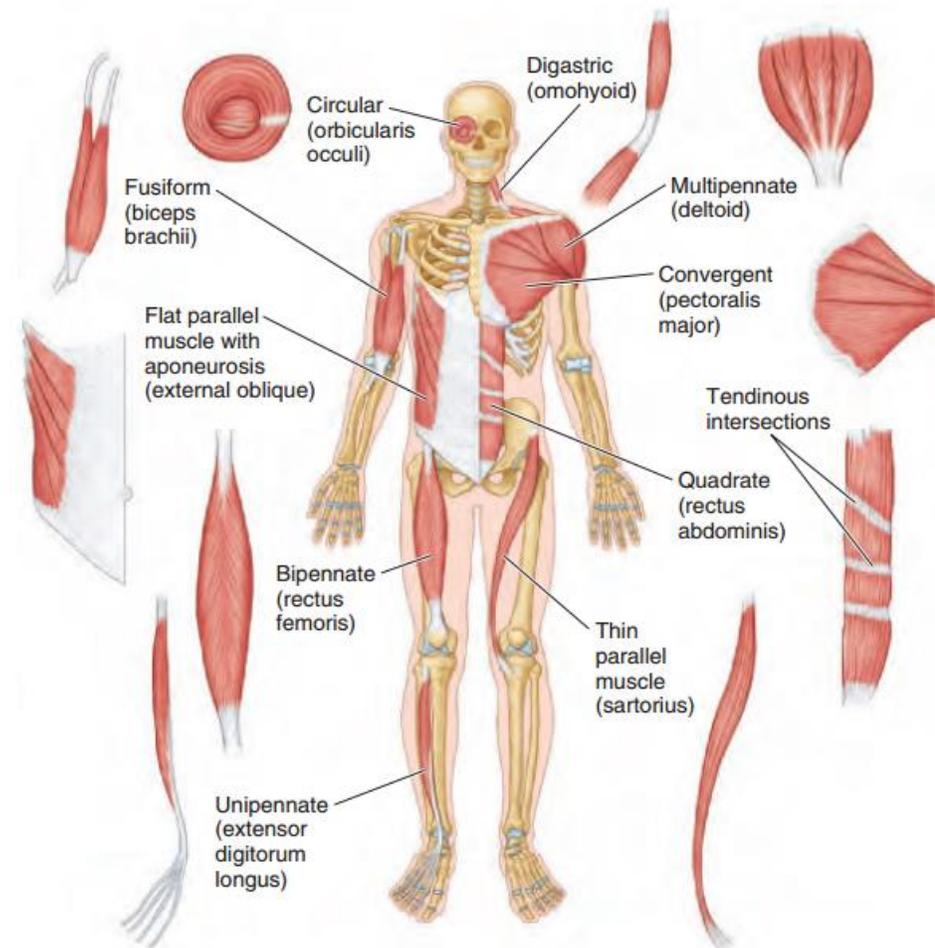
# Flat muscles

**Flat muscles** have parallel fibres, often with an aponeurosis—for example, the external oblique (a broad, flat muscle). The sartorius is a narrow flat muscle with parallel fibres.



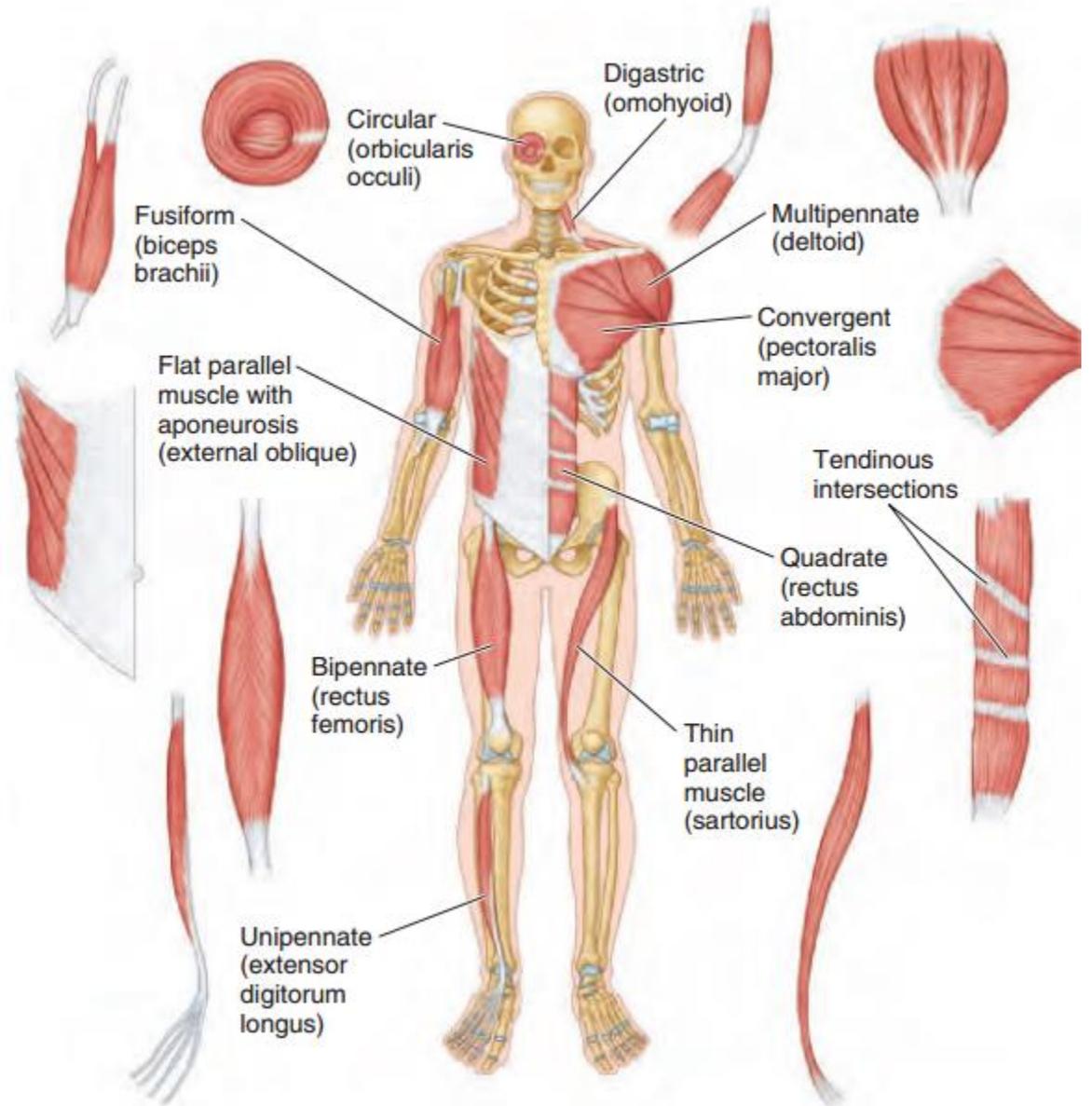
# Pennate muscles

**Pennate muscles** are feather-like (L. pennatus, feather) in the arrangement of their fascicles, and may be **unipennate**, **bipennate**, or **multipennate**—for example, extensor digitorum longus (unipennate), rectus femoris (bipennate), and deltoid (multipennate)



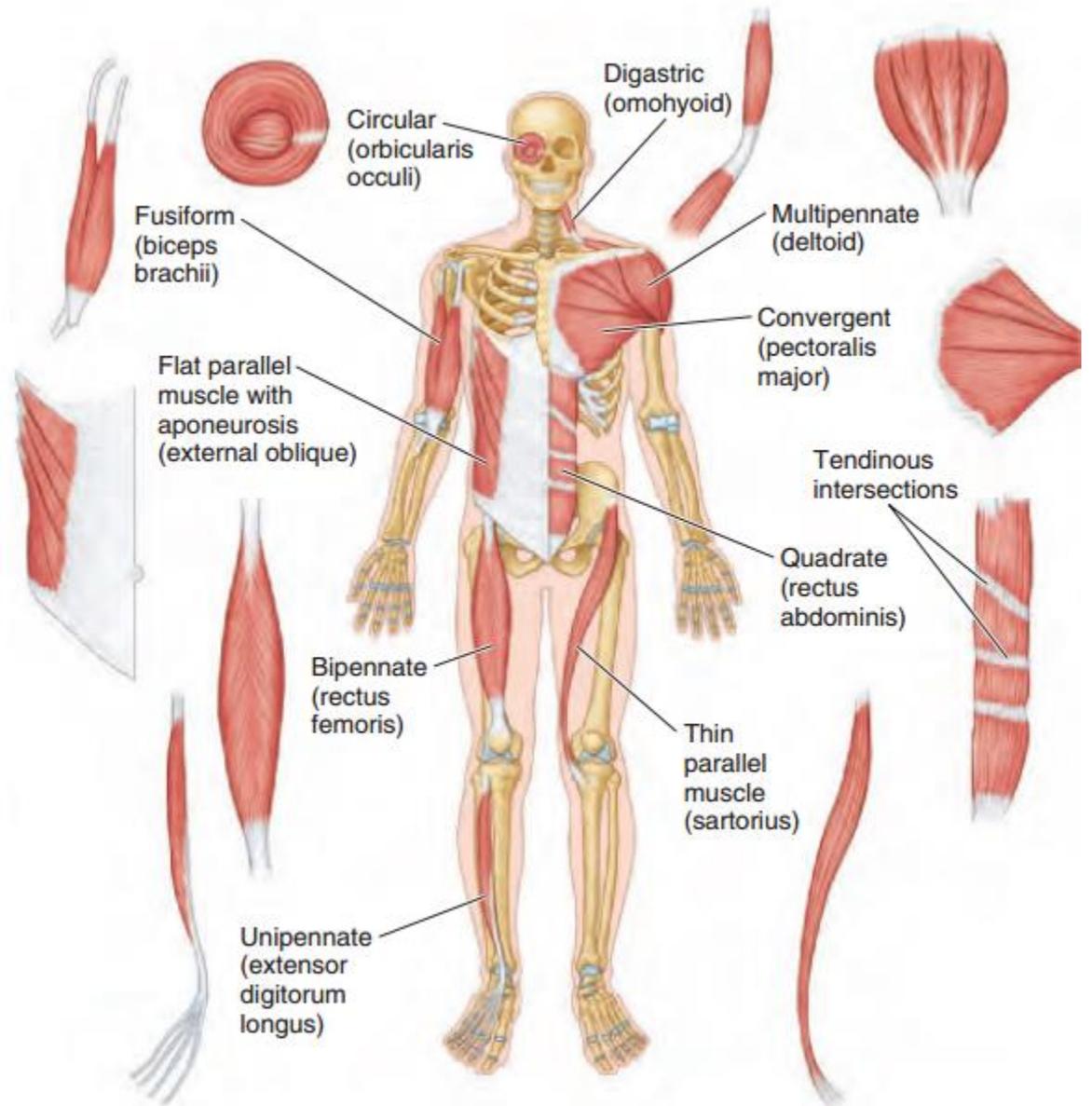
# Fusiform muscles

**Fusiform muscles** are spindle shaped with a round, thick belly (or bellies) and tapered ends—for example, biceps brachii.



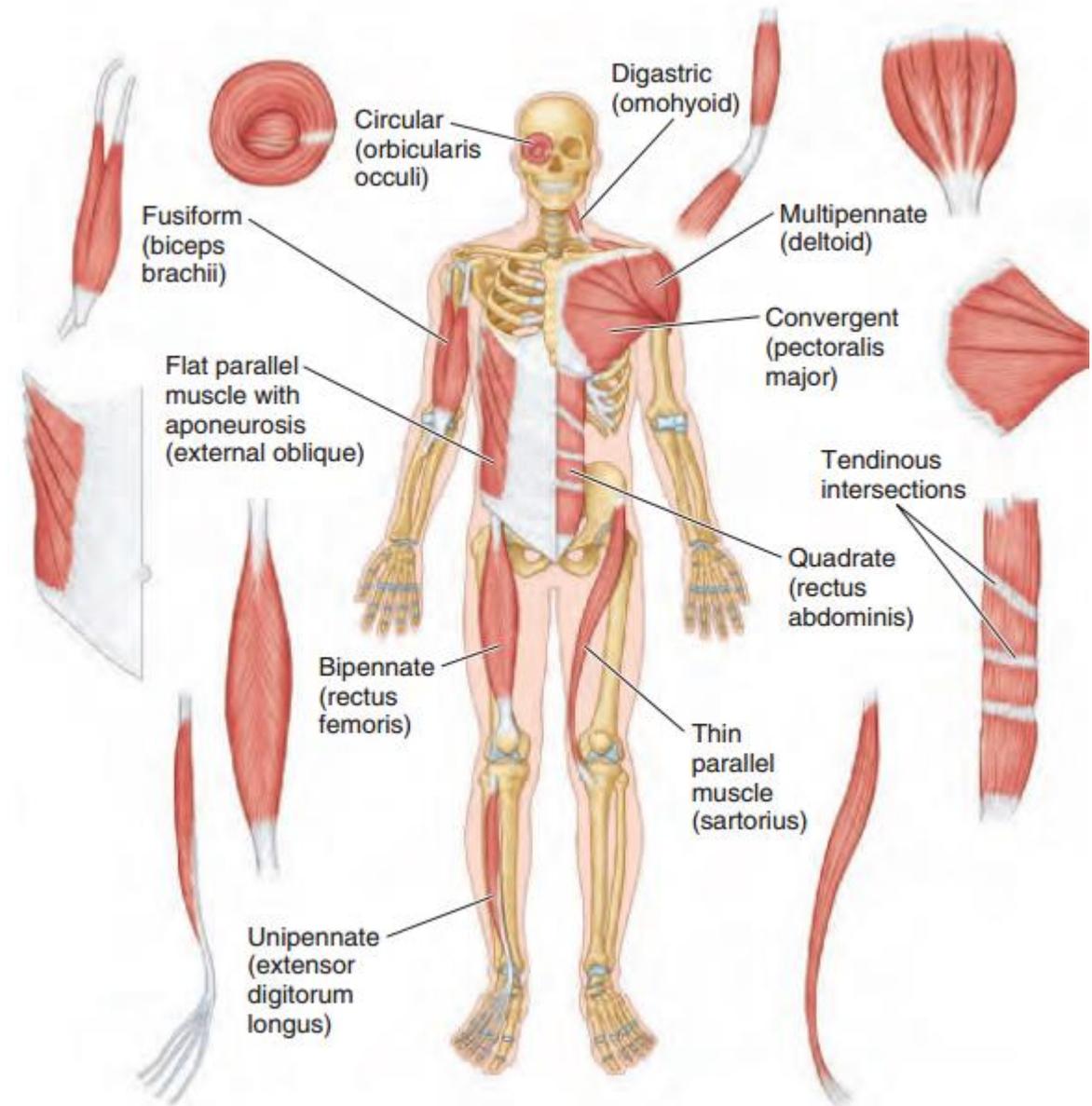
# Convergent muscles

**Convergent muscles** arise from a broad area and converge to form a single tendon—for example, pectoralis major



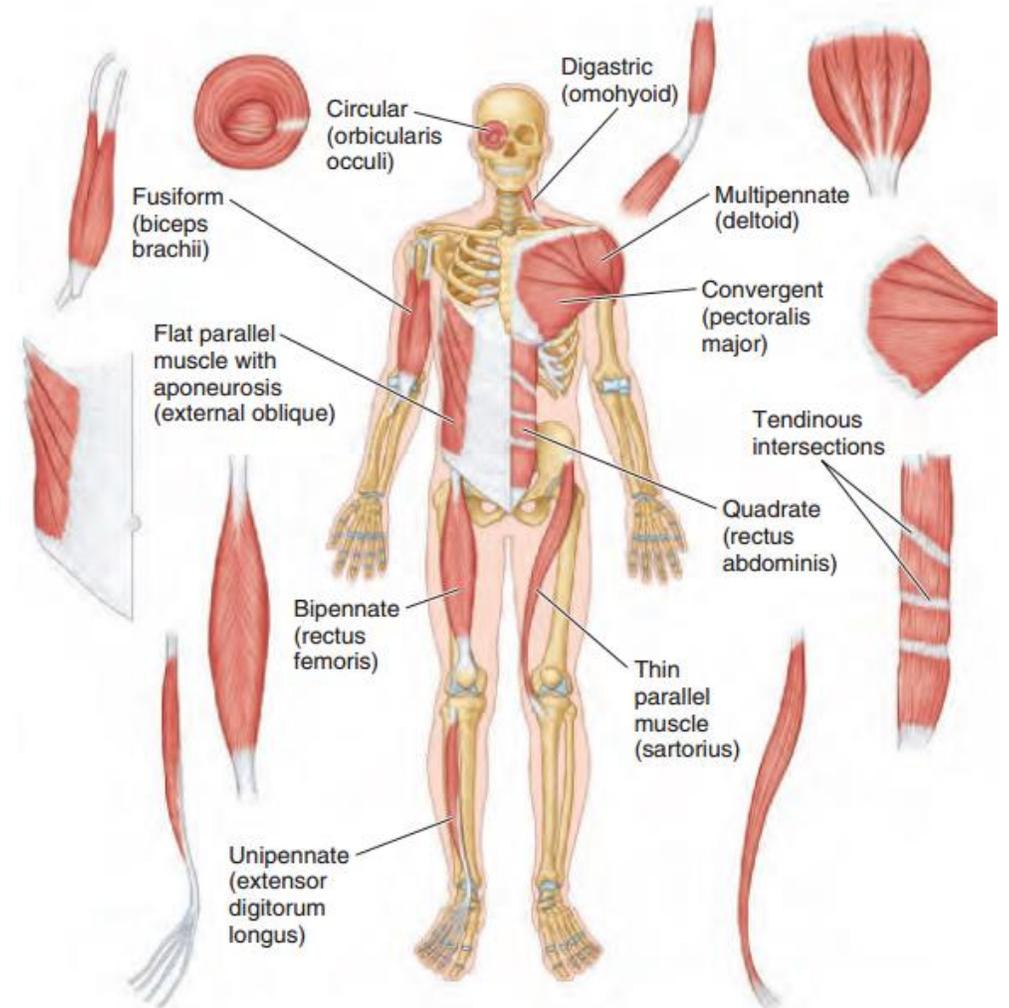
# Quadrate muscles

**Quadrate muscles** have four equal sides (L. quadratus, square)—for example, the rectus abdominis, between its tendinous intersections



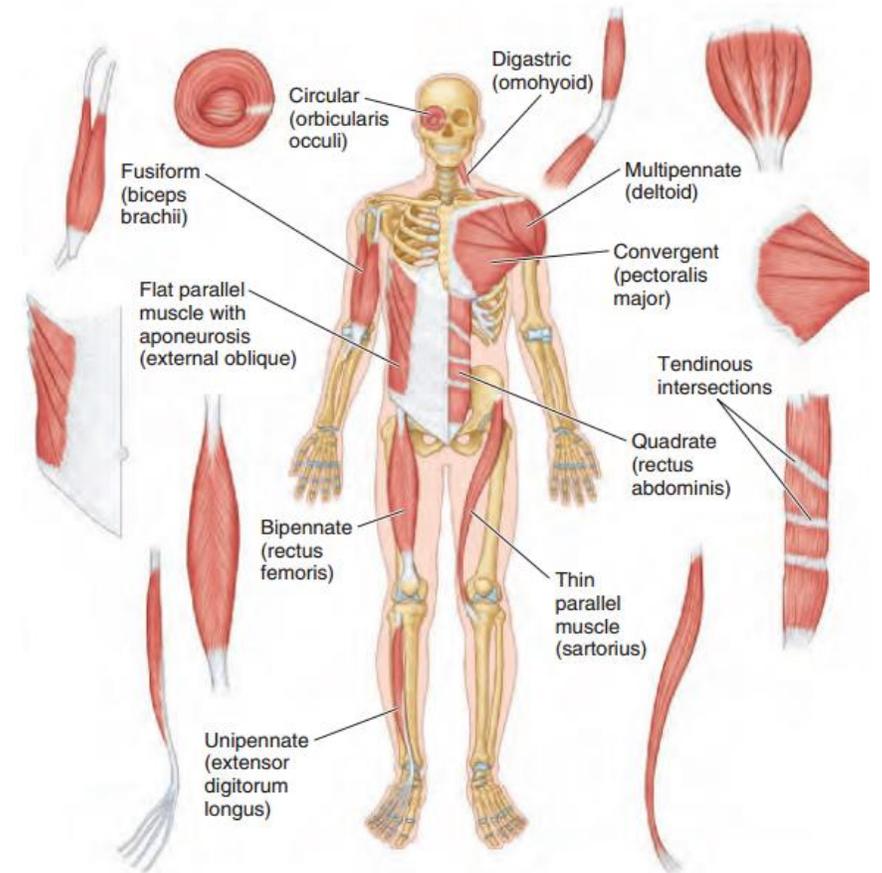
# Circular or sphincter muscles

**Circular or sphincter muscles** surround a body opening or orifice, constricting it when contracted—for example, orbicularis oculi (closes the eyelids).



# Multiheaded or multibellied muscles

**Multiheaded or multibellied muscles** have more than one head of attachment or more than one contractile belly, respectively. Biceps muscles have two heads of attachment (e.g., biceps brachii), triceps muscles have three heads (e.g., triceps brachii).

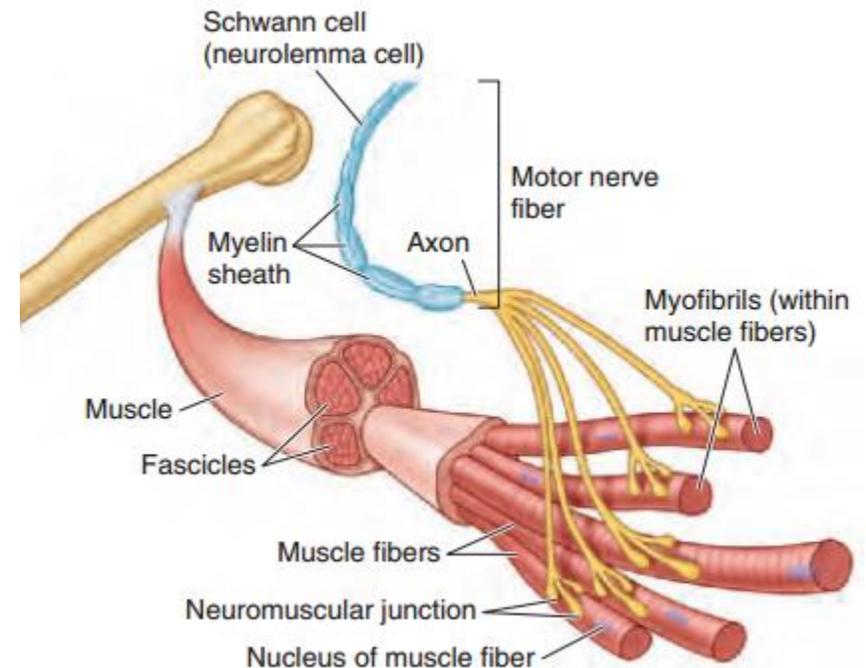


# Contraction of Muscles

- Skeletal muscles function by contracting; **they pull and never push.**
- When a muscle contracts and shortens, one of its attachments usually remains fixed while the other (more mobile) attachment is pulled toward it, often resulting in movement.
- Attachments of muscles are commonly described as the **origin and insertion**; the **origin** is usually the proximal end of the muscle, which remains fixed during muscular contraction, and the **insertion** is usually the distal end of the muscle, which is movable.

# The structural unit of a muscle

- **The structural unit of a muscle** is a skeletal striated muscle fiber, the functional unit of a muscle is a motor unit, consisting of a motor neuron and the muscle fibres it controls.
- When a motor neuron in the spinal cord is stimulated, it initiates an impulse that causes all the muscle fibres supplied by that motor unit to contract simultaneously.



# FUNCTIONS OF MUSCLES

**A prime mover (agonist)** is the main muscle responsible for producing a specific movement of the body.

**A fixator** proximal parts of a limb through isometric contraction while movements are occurring in distal parts.

**A synergist** complements the action of a prime mover. It may directly assist a prime mover, providing a weaker or less mechanically advantaged component of the same movement.

**An antagonist** is a muscle that opposes the action of another muscle.

# NERVES AND ARTERIES TO MUSCLES

Nerves supplying skeletal muscles (motor nerves) usually enter the fleshy portion of the muscle.

The blood supply of muscles is not as constant as the nerve supply and is usually multiple.

# Cardiac Striated Muscle

**Cardiac striated muscle** forms the muscular wall of the heart, the myocardium.

Some cardiac muscle is also present in the walls of the aorta, pulmonary vein, and superior vena cava.

Cardiac striated muscle contractions are not under voluntary control.

Are influenced by the autonomic nervous system (ANS)

# Smooth Muscle

**Smooth muscle**, named for the absence of striations in the appearance of the muscle fibres under microscopy, forms a large part of the middle coat or layer (tunica media) of the walls of blood vessels.

- Smooth muscle is found in skin, forming the arrector muscles of hairs associated with hair follicles.
- In the eyeball, where it controls lens thickness and pupil size.
- Like cardiac striated muscle, smooth muscle is involuntary muscle; however, it is directly innervated by the ANS