COURSE NAME: ANATOMY

COURSECODE : 746273

TITLE : Introduction to muscle anatomy

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DESIGNATION : Assistant professor

Macro anatomy of muscle type and skeletal muscle Function

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Learning Objectives

- Definition: muscle and its accessory structures
- Muscle parts
- Function of muscle
- Muscle Fibers arrangement
- Type of muscle (under light microscope)
- Organization level of muscle
- Type of muscle (mitochondria, twitch)
- Extrafusal and intrafusal muscle fibres
- Type of muscle based on contraction

INTRODUCTION

Gross anatomy, Myology, sarcology (Greek)

Muscle = musculus (Latin),

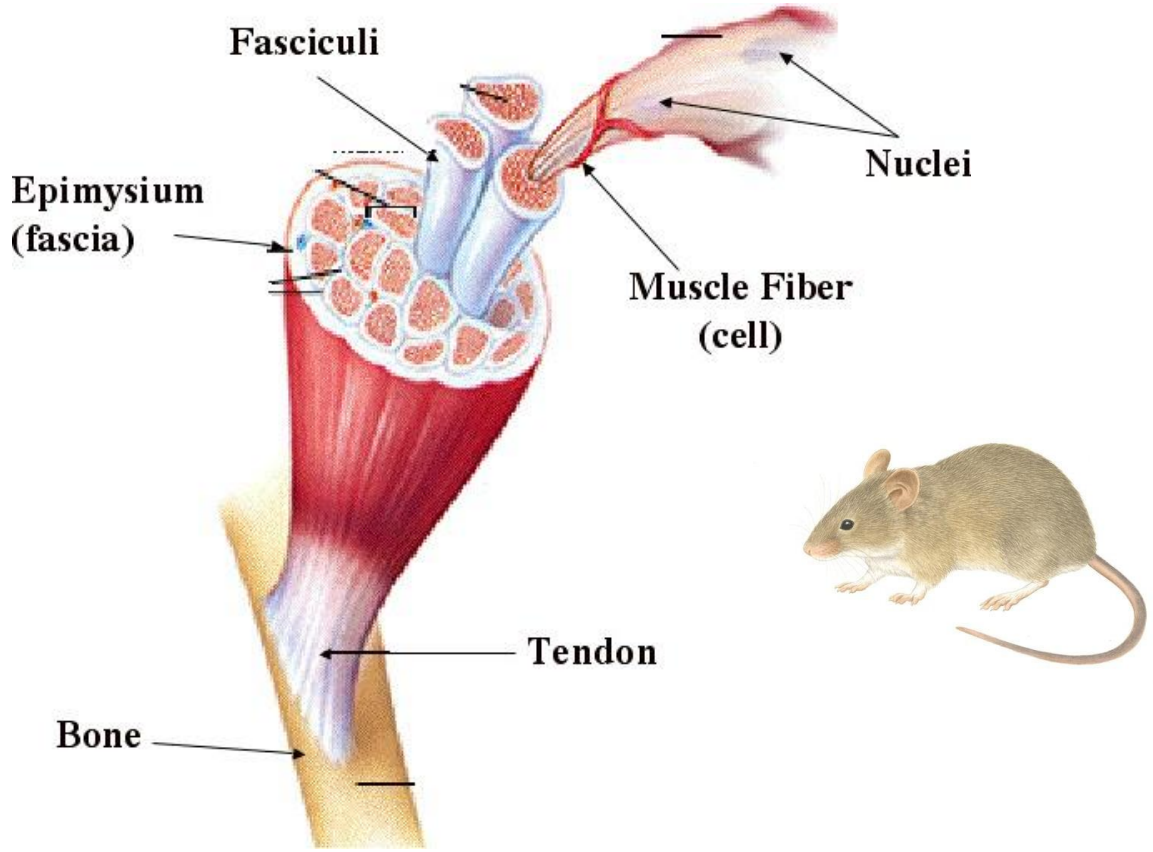
The branch of science concerned with the muscles and their accessory parts: tendons, aponeuroses, bursae,

synovial sheath and fasciae *musculus*= little mouse(L), from Latin *mūs* mouse,

from the imagined resemblance of some muscles to mice

Mus, musculus

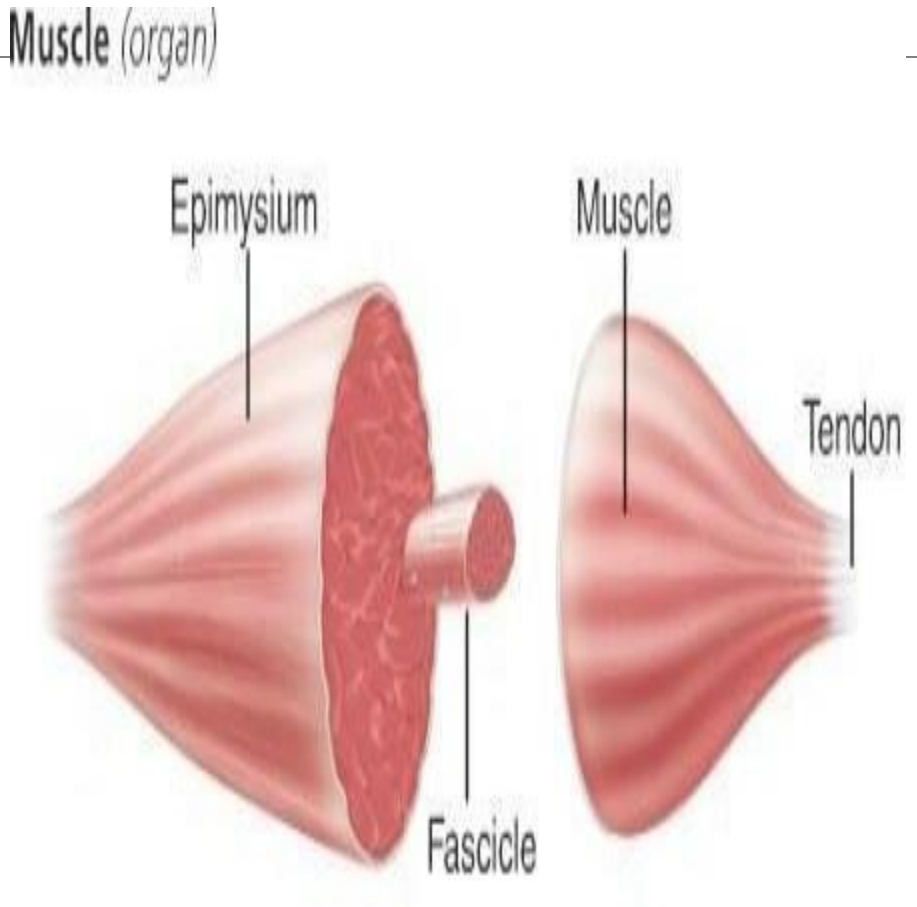
Mus a genus of rodents containing many kinds of mice *Mus* a sub-genus of *Mus* containing the house mouse The house mouse (*Mus musculus*) is a small mammal of the order Rodentia Musculus a bundle of long slender cells (muscle fibers) that have the power to contract and hence to produce movement.



Muscle

A tissue composed of fibers capable of contracting to effect bodily movement • a tissue composed of bundles of elongated cells capable of contraction and relaxation **to produce movement** in an organ or part

A contractile organ consisting of a special bundle of muscle tissue, which moves a particular bone, part, or substance of the body an organ composed of muscle tissue (an **organ** / **viscus = internal organ**) is a collection of tissues joined in a structural unit to serve a common function, the main tissue is that which is unique for the specific organ, such as the myocardium, the main tissue of the heart, while sporadic tissues include the nerves , blood vessels, and connective tissues

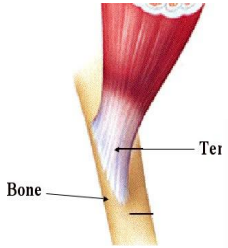


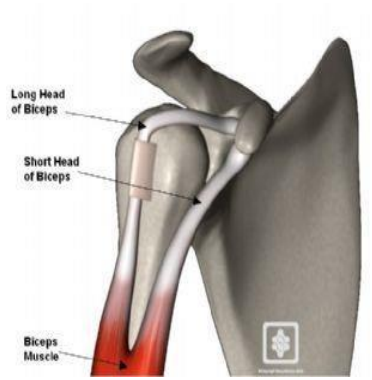
Tendon

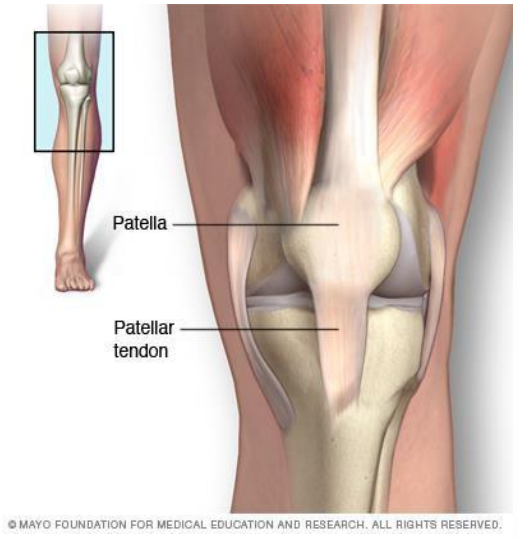
A cord or band of white in elastic collagenous tissue that attaches a muscle to a bone or some other part;

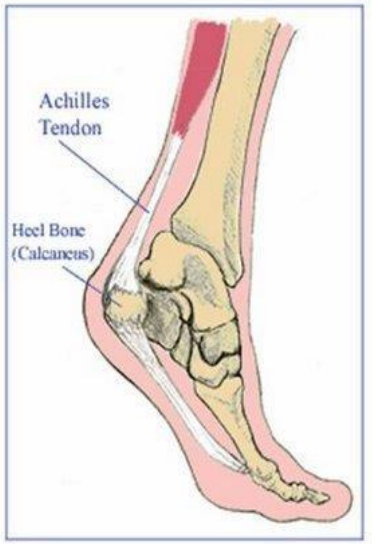
Latin tend, tendon alteration (influenced by Latin tendere, *to stretch*) of Greek tenn;

Example: Patellar tendon, Achilles tendon







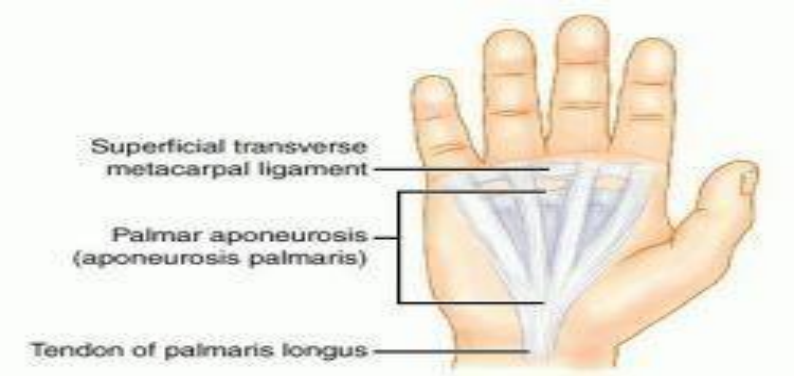


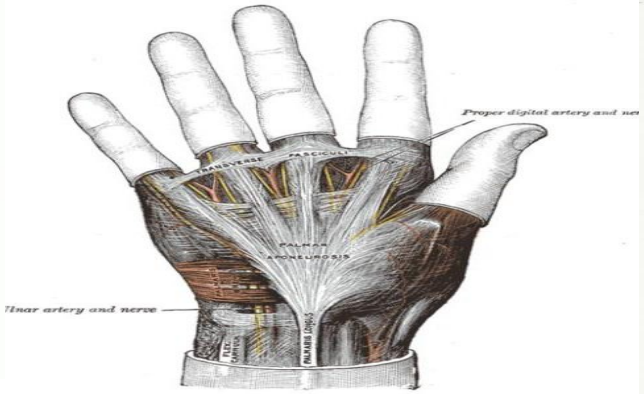
Aponeurosis

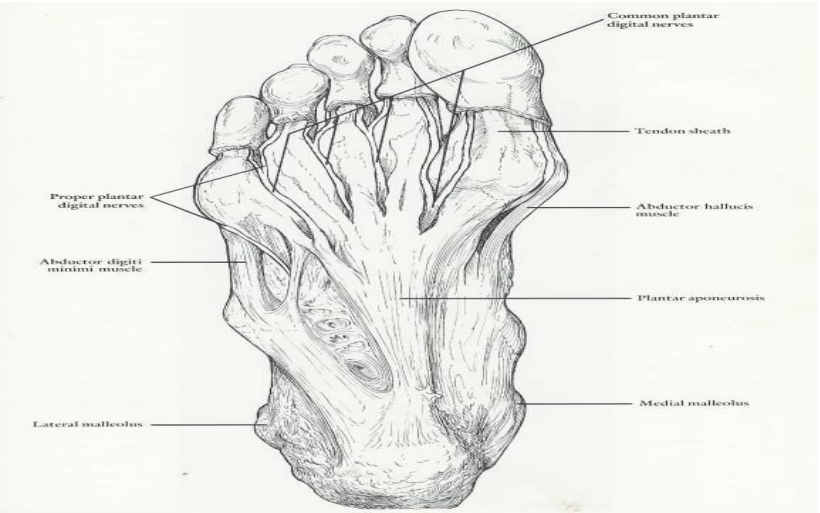
A white fibrous sheet of tissue by which certain muscles are attached to bones

A sheetlike fibrous membrane, resembling a flattened tendon, that serves as a fascia to bind muscles together or as a means of connecting muscle to bone

Example: cranial, palmar, plantaris aponeurosis







Bursae

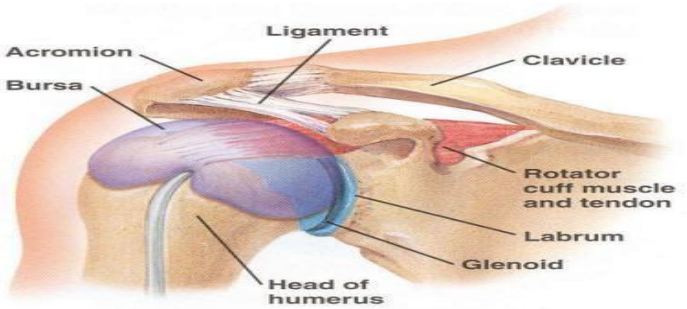
BURSAE

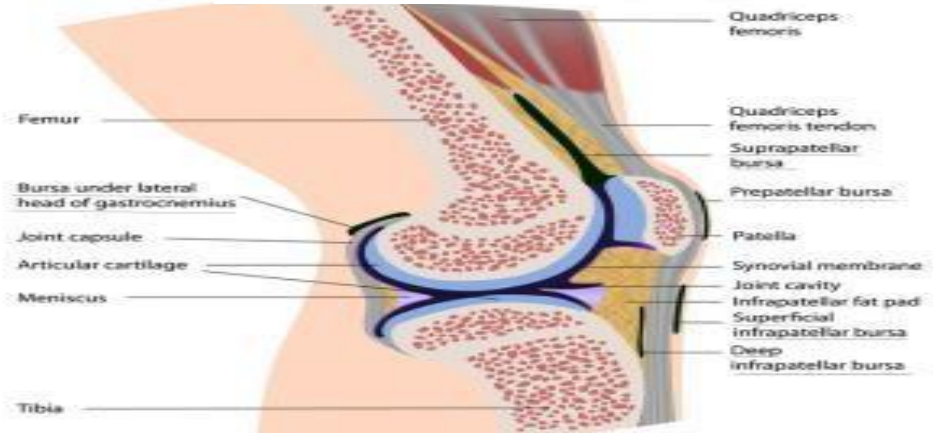
A small fluid - filled sac that reduces friction between movable parts of the body, esp. at joints a pouch, sac, or vesicle, esp. a sac containing synovia, to facilitate motion, as between a tendon and a bone.

A sac or saclike bodily cavity, especially one containing a viscous lubricating fluid and located between a tendon and a bone or at points of friction between moving structures.

Example: supra, pre, infra infrapatellar bursae

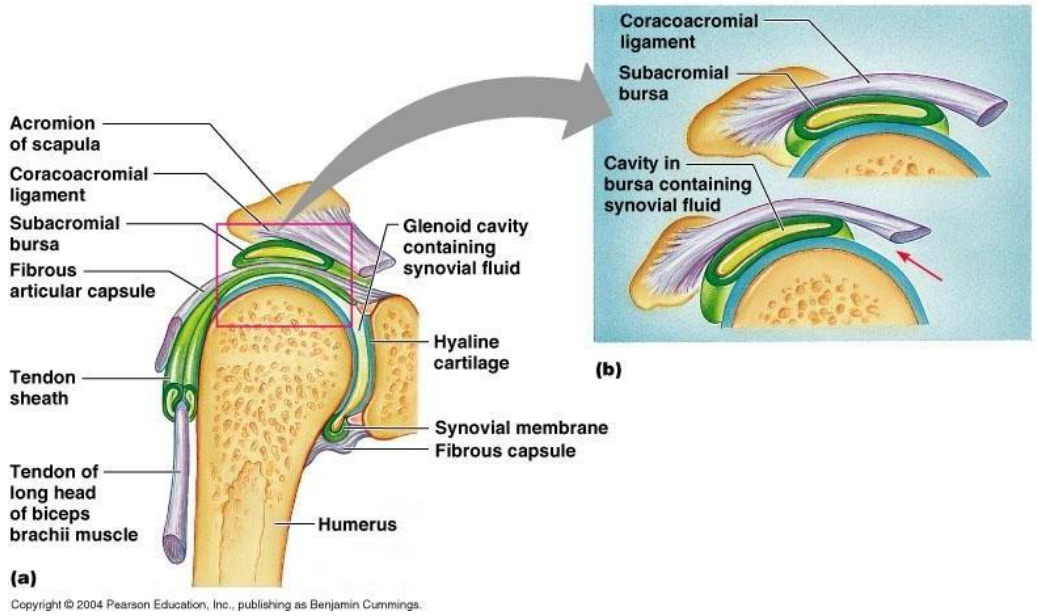
DIAGRAM





Synovia

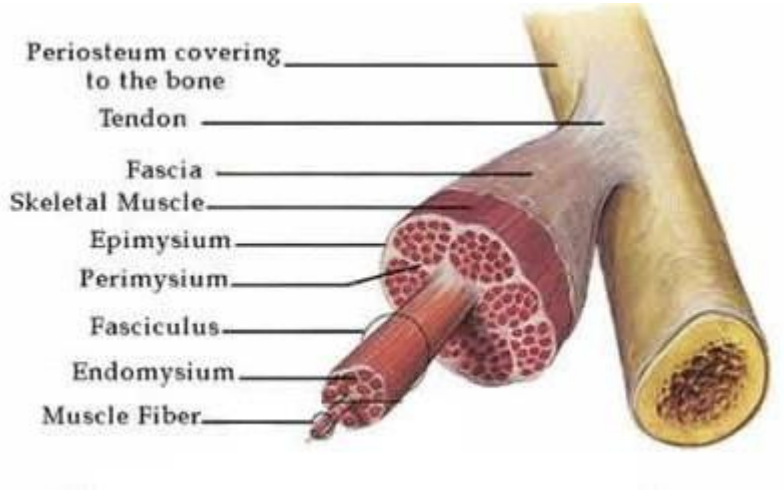
A clear, viscid lubricating fluid secreted by membranes in joint cavities, sheaths of tendons, and bursae.

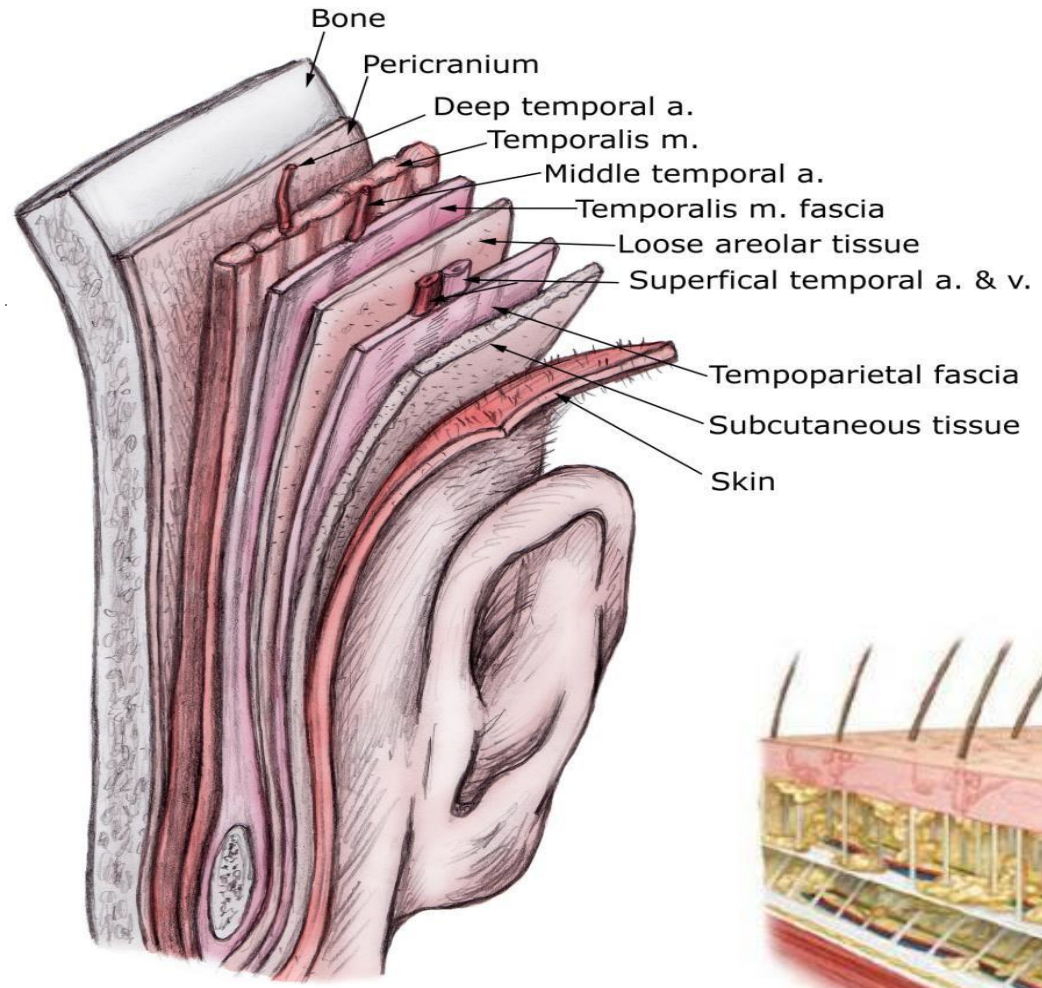


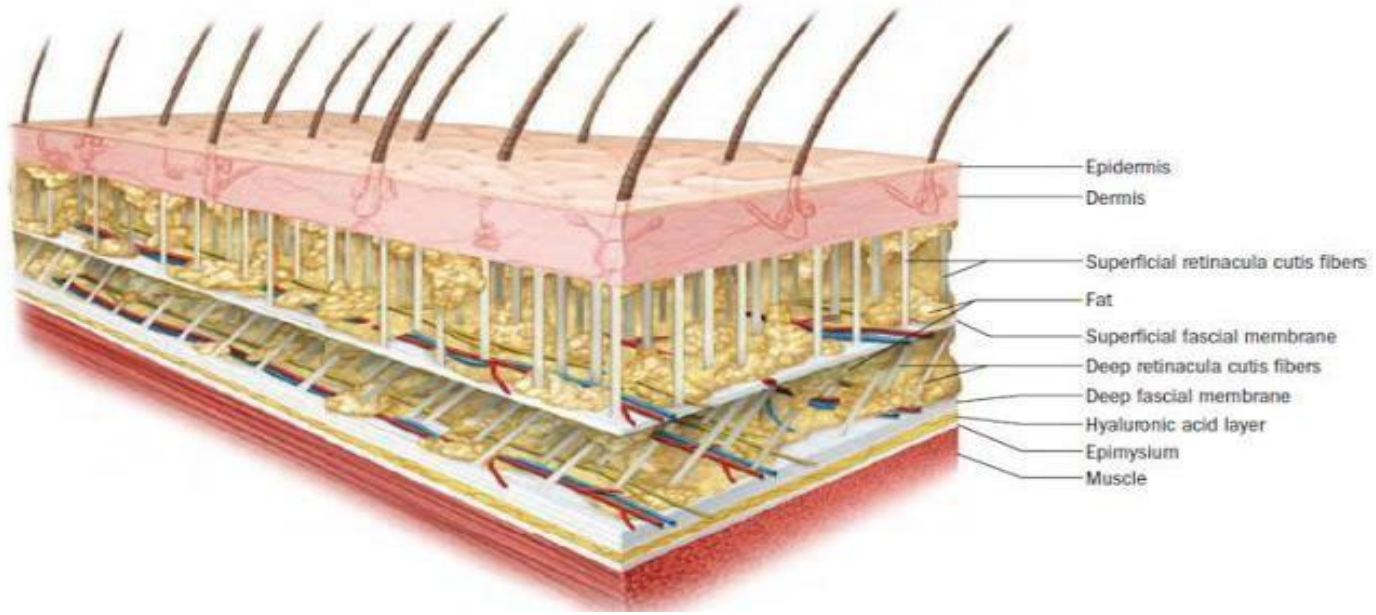
Fascia

A sheet/band of fibrous connective tissue enveloping separating, or binding together muscles, organs, and other soft structures of the body a band/sheath of connective tissue covering, supporting/connecting the muscles/ internal organs of the body

Superficial, deep fascia, visceral, parietal




Bone
Pericranium
Deep temporal a.
Temporalis m.
Middle temporal a.
Temporalis m. fascia
Loose areolar tissue
Superfical temporal a. & v.
Tempoparietal fascia
Subcutaneous tissue
Skin


Epidermis
Dermis
Superficial retinacula cutis fibers
Fat
Superficial fascial membrane
Deep retinacula cutis fibers
Deep fascial membrane
Hyaluronic acid layer
Epimysium
Muscle

Fascia (fasciae)

A "band“(L)is a layer of fibrous tissue A fascia is a structure of connective tissue that surrounds muscles, groups of muscles, blood vessels, and nerves, binding some structures together, while permitting others to slide smoothly over each other.

Various kinds of fascia may be distinguished. They are classified according to their distinct layers, their functions and their anatomical location:

superficial fascia, deep (or muscle) fascia, and visceral (or parietal) fascia (pericardium)

Fascia (fasciae)

Superficial fascia:

This is found in the subcutis in most regions of the body, blending with the reticular layer of the dermis (example: camper and Scarpa fascia)

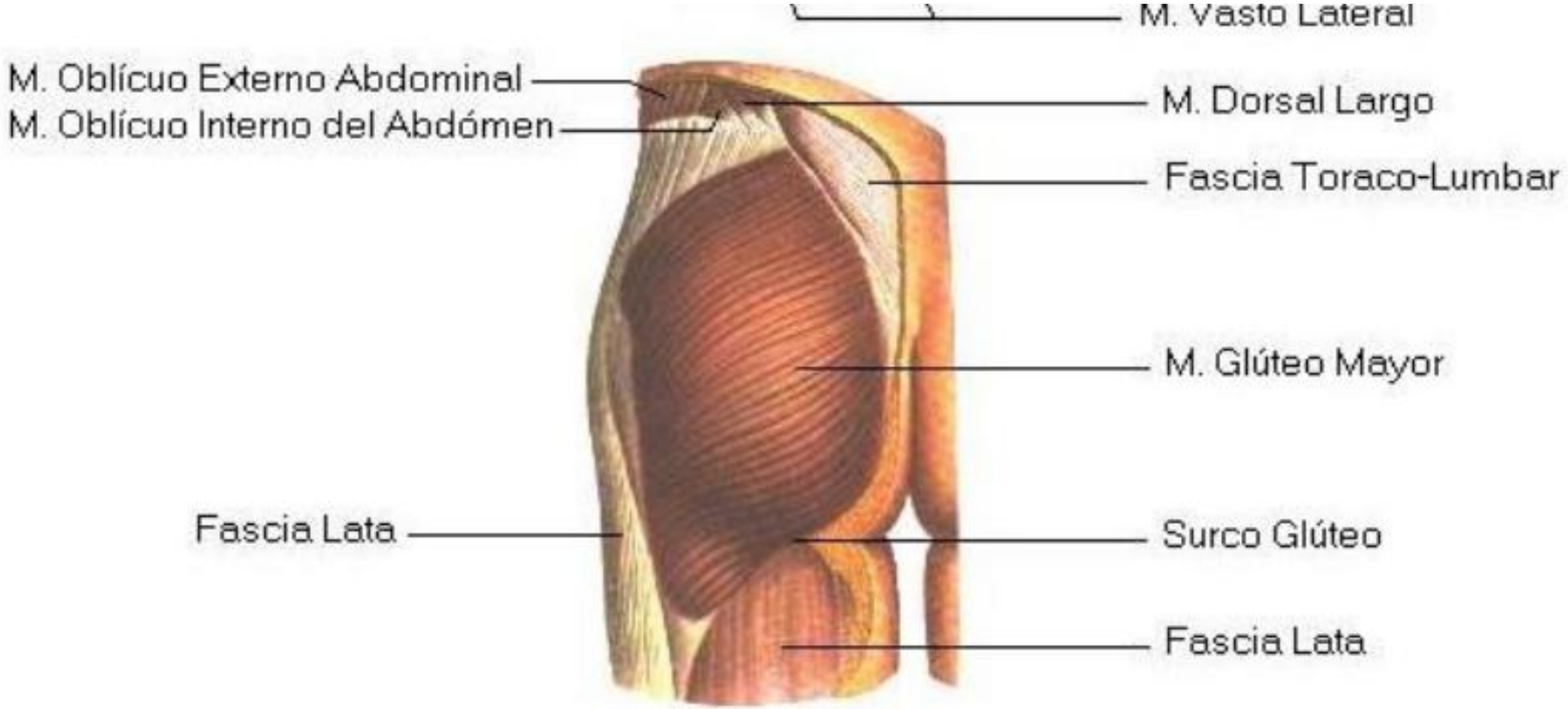
Deep fascia:

Muscle fascia: This is the dense fibrous connective tissue that interpenetrates and surrounds the muscles, bones, nerves and blood vessels of the body (example: fascia latae, fascia glutea, fascia cruris)

Visceral & Parietal fascia:

This suspends the organs within their cavities and wraps them in layers of connective tissue membrane (example: pericardium, peritoneum)

FASCIA


M. Vasto Lateral
M. Oblícuo Externo Abdominal
M. Oblícuo Interno del Abdómen
M. Dorsal Largo
Fascia Toraco-Lumbar
M. Glúteo Mayor
Fascia Lata
Surco Glúteo
Fascia Lata

Function of fascia

Fasciae are normally thought of as passive structures that transmit mechanical tension generated by muscular activities or external forces throughout the body.

The function of muscle fasciae is to reduce friction to minimize the reduction of muscular force.

In doing so, fasciae:

Provide a sliding and gliding environment for muscles. Suspend organs in their proper place.

Transmit movement from muscles to bones.

Provide a supportive and movable wrapping for nerves and blood vessels as they pass through and between muscles

Muscle origin &Insertion

ORIGIN &INSERTION

m.biceps brachii:

Origin: caput longum: tuberositas supraglenoidalis, caput breve: proc. Coracoideus,

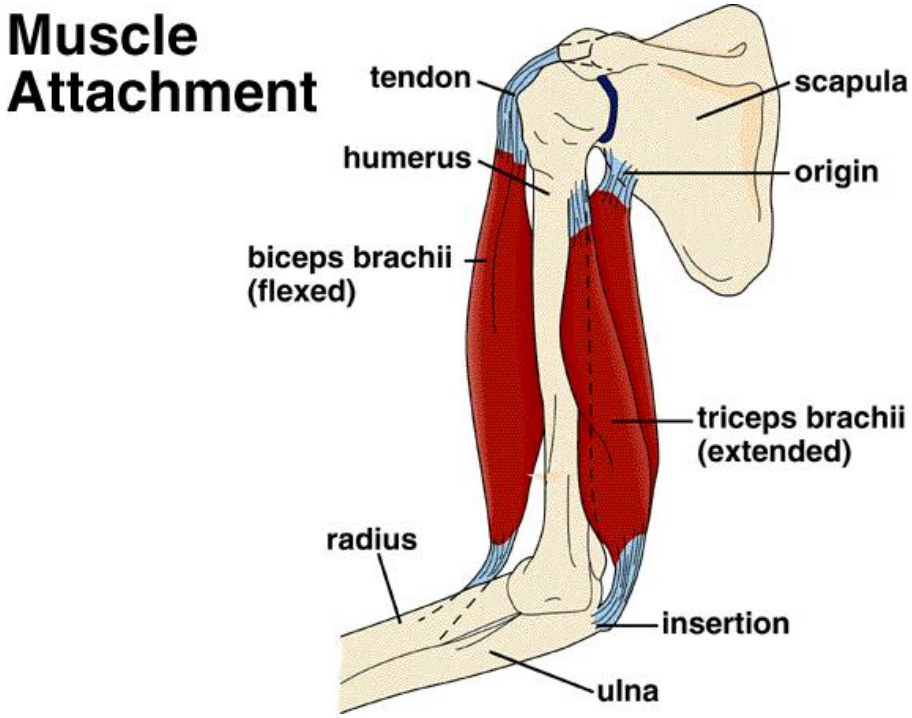
insertion: tuberositas radii

m.triceps brachii:

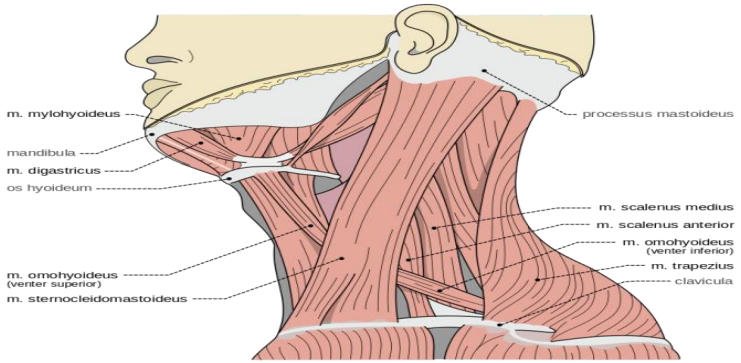
Origin: caput longum: tuberositas infraglenoidalis, caput mediale: facies posterior humeri, distal sulcus nervi radialis, caput laterale: : facies posterior humeri, distal sulcus nervi radialis.

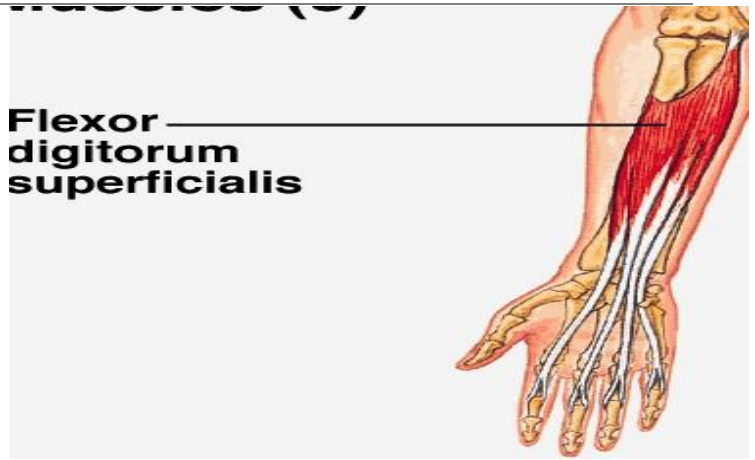
insertion: olecranon ulnae

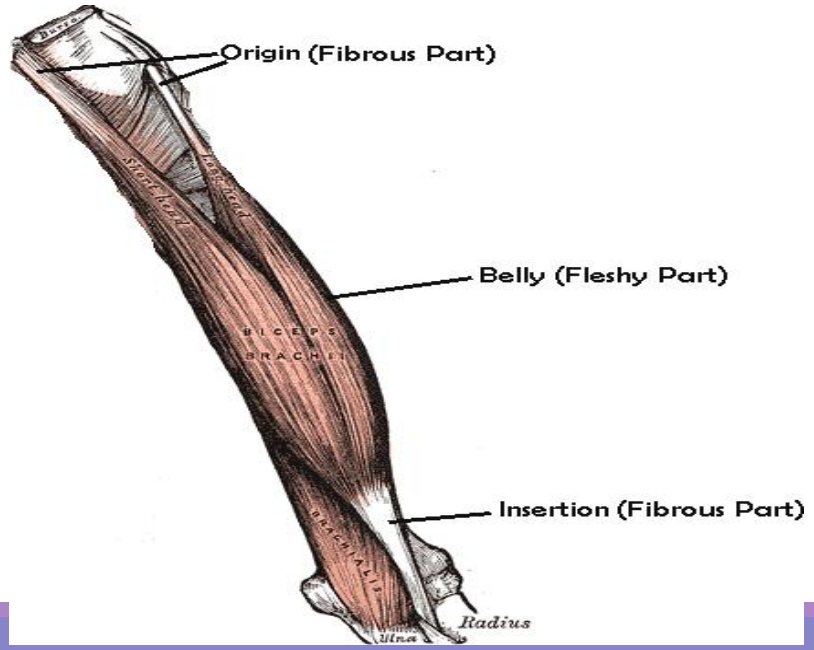
DIAGRAM

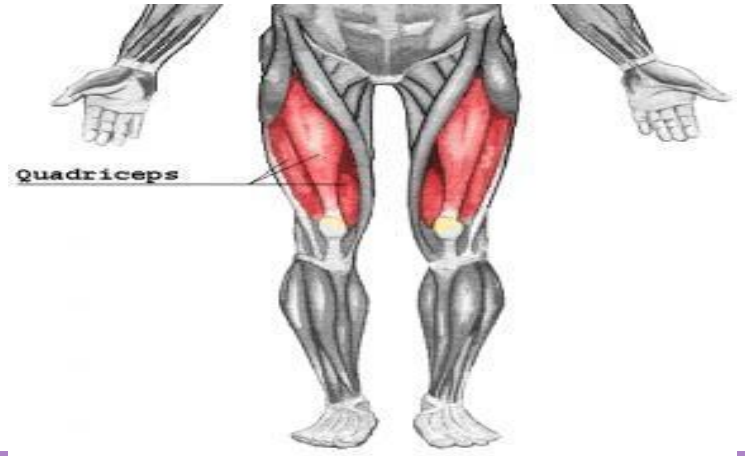


Muscle parts: caput (biceps, triceps, quadriceps &venter (biventer), cauda









Body muscle function

Body movement/motion (skeletal muscle) Muscle spread passthrough the joint, bring the part of body close or far away from other Body heat (skeletal muscle)

When our muscles use that power, an exothermic chemical reaction occurs that "burns" ATP, breaking it into two pieces (ADP and phosphate). That reaction releases energy. Some of that energy is used in the actual movement of the muscle, and remains as a heat

Body shape (skeletal muscle) Bulky muscle such as in the gluteal, brachial, pectoral, shoulder regions

Body muscle function

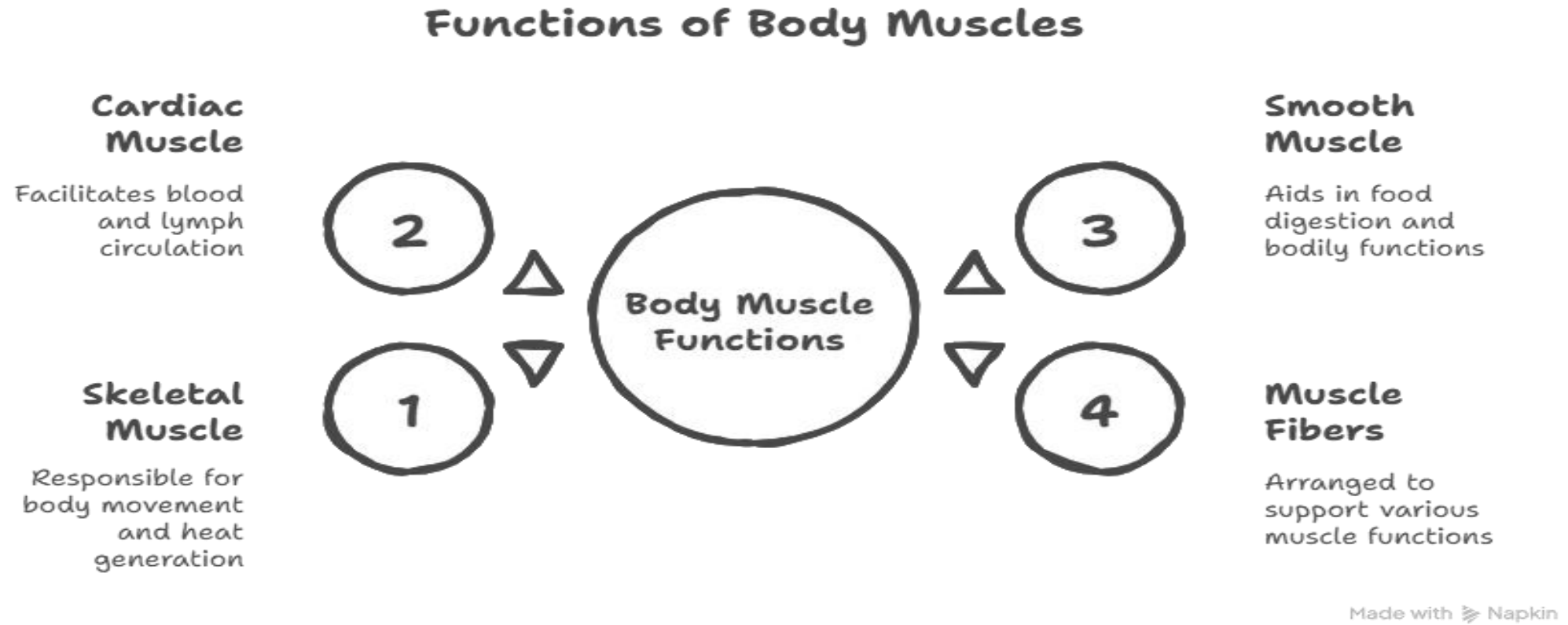
Blood circulation , lymph circulation (cardiac muscle)

Food digestion (smooth muscle)

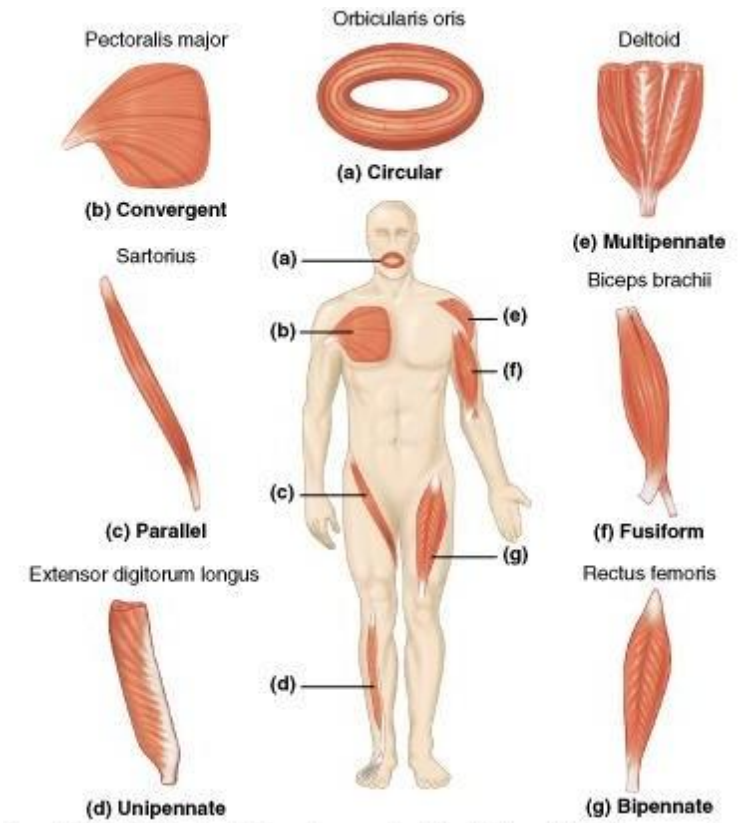
Storage protein (energy)

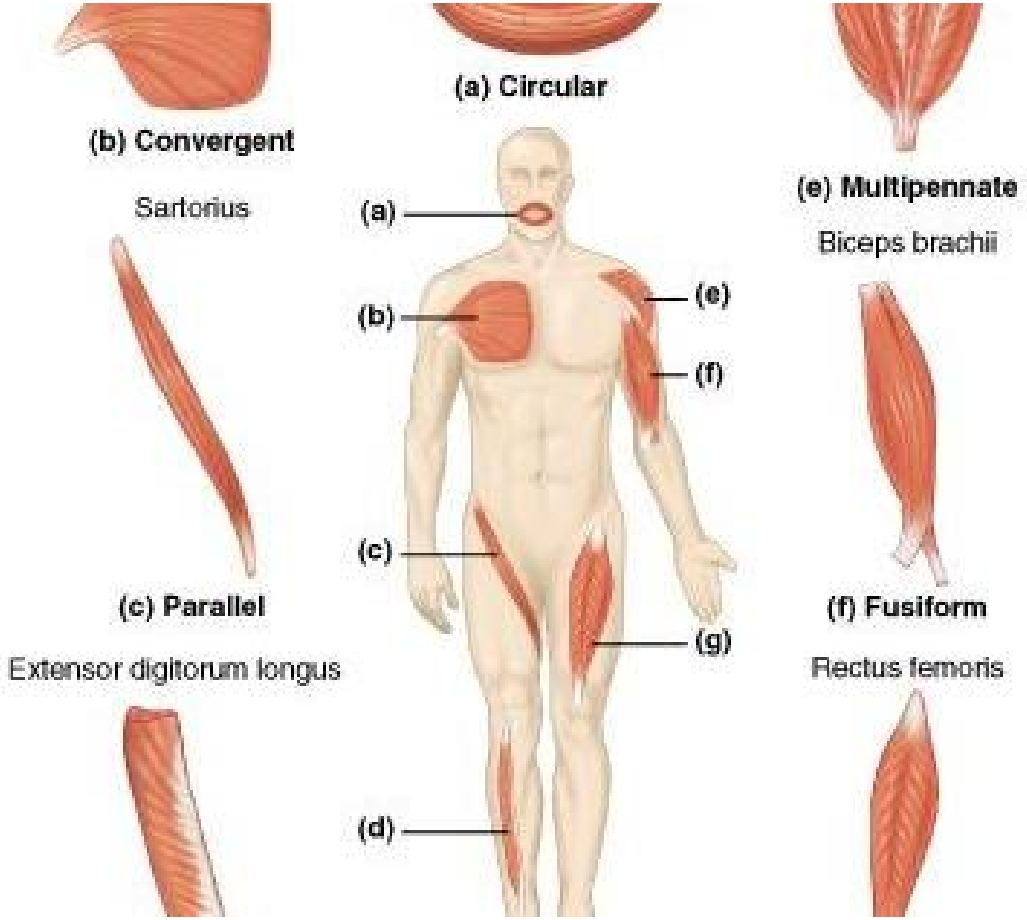
Micturition, defecation, inhalation (smooth and skeletal muscle)

BODY FUNCTIONS



Muscle Fibres arrangement



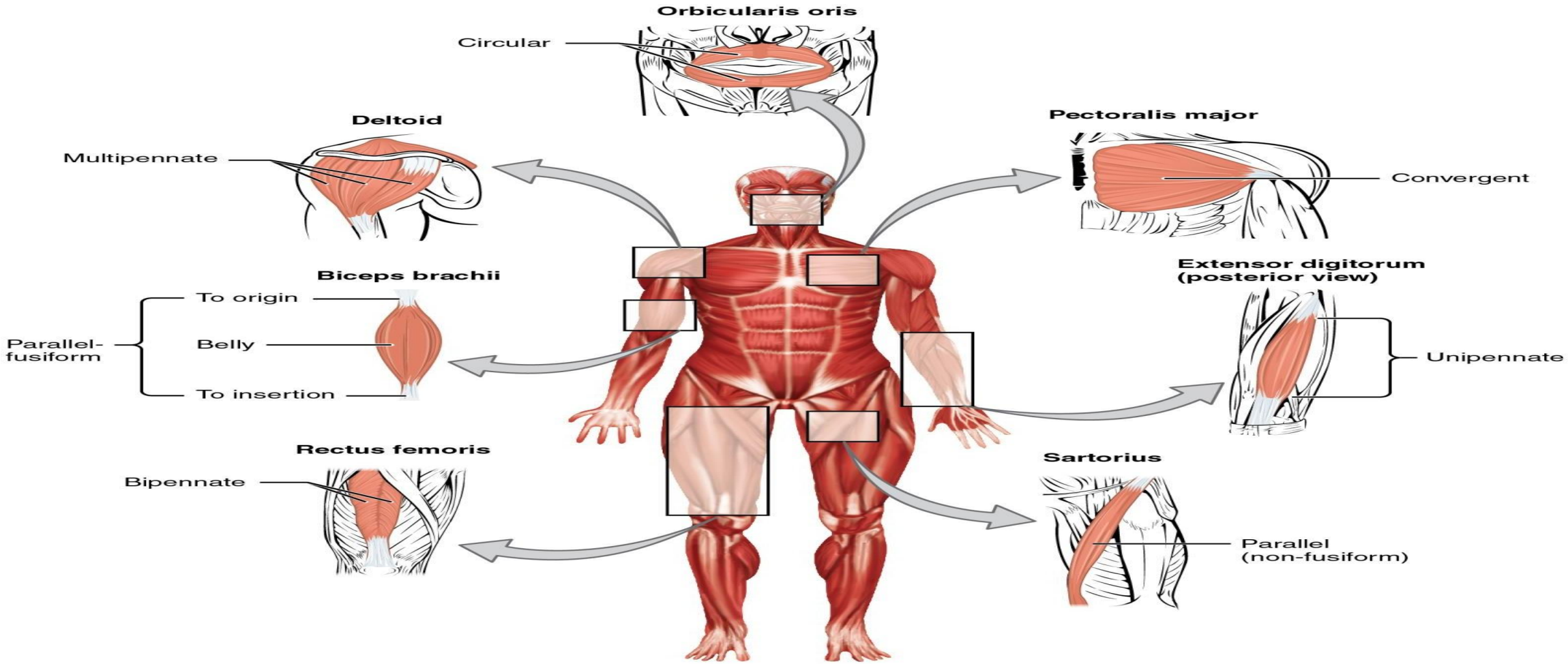


MUSCLE FIBER AND ARRANGEMENT

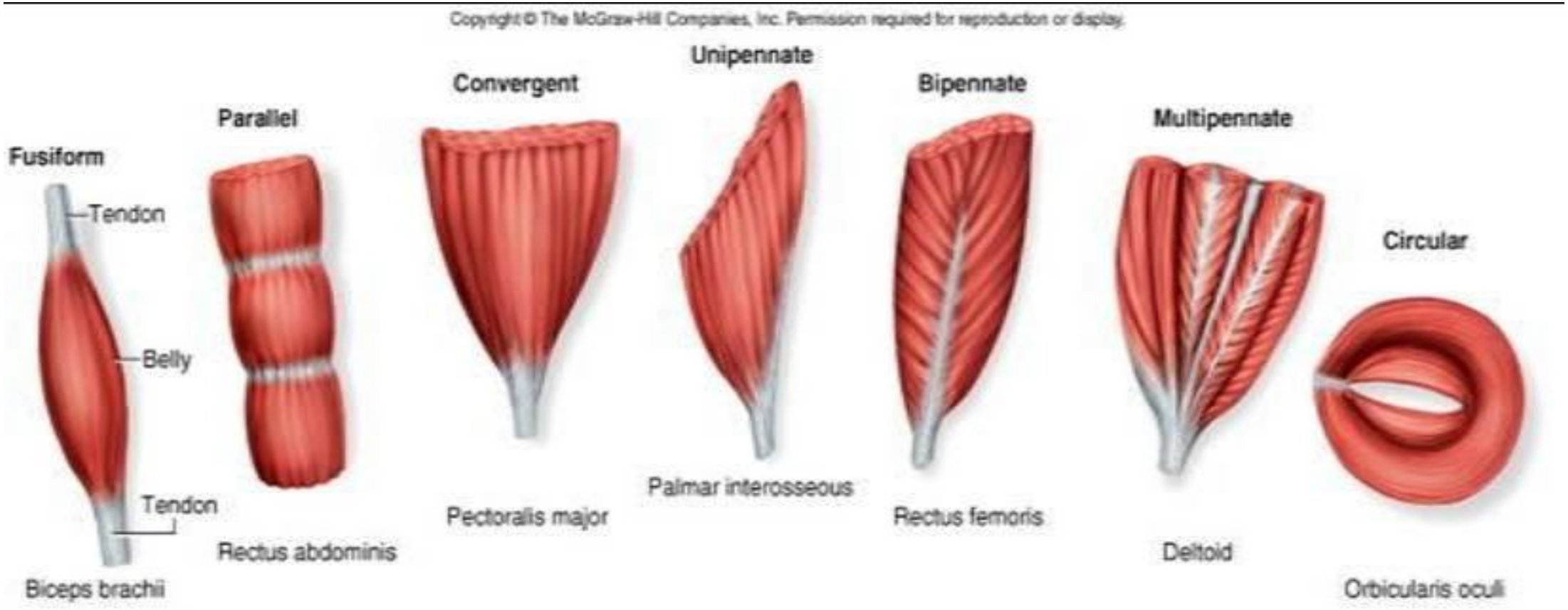
Muscle Shape and Fiber Arrangement

Fiber arrangement	Advantage	Shape	Characteristics / description	Example
Parallel (fibers arranged parallel to the length of the muscle)	Produces greater range of movement than similar-sized pinnate muscles	Flat	Usually thin and broad, fibrous sheetlike aponeurosis that allow them to spread their forces over a broad area.	Rectus abdominus, external oblique
		Fusiform	Spindle-shaped with central belly that tapers to tendons on each end; can focus their power onto small, bony targets.	Brachialis, brachioradialis
		Strap	More uniform in diameter with essentially all of their fibers arranged in a long parallel manner; can focus their power onto small, bony targets	Sartorius
		Radiate (triangular, fan-shaped, or convergent)	Combined arrangement of flat and fusiform muscles, orginate on brad aponeurosis and converge onto a tendon	Pectoralis major, trapezius
		Sphincter (circular)	Technically endless strap muscles, surround openings and function to close them upon contraction	Orbicularis oris, obricularis oculi
Pennate (shorter fibers, arranged obliquely to their tendons)	Produces greater force than similar-sized parallel muscles due to increase cross-sectional area	Unipennate	Run obliquely from a tendon on one side only	Biceps femoris, extensor digitorum longus, tibialis posterior
		Bipennate	Run obliquely on both sides from a central tendon.	Rectus femoris, flexor hallucis longus
		Multipennate	Several tendons with fibers running diagonally between them	Deltoid

Muscle Attachment Diagram



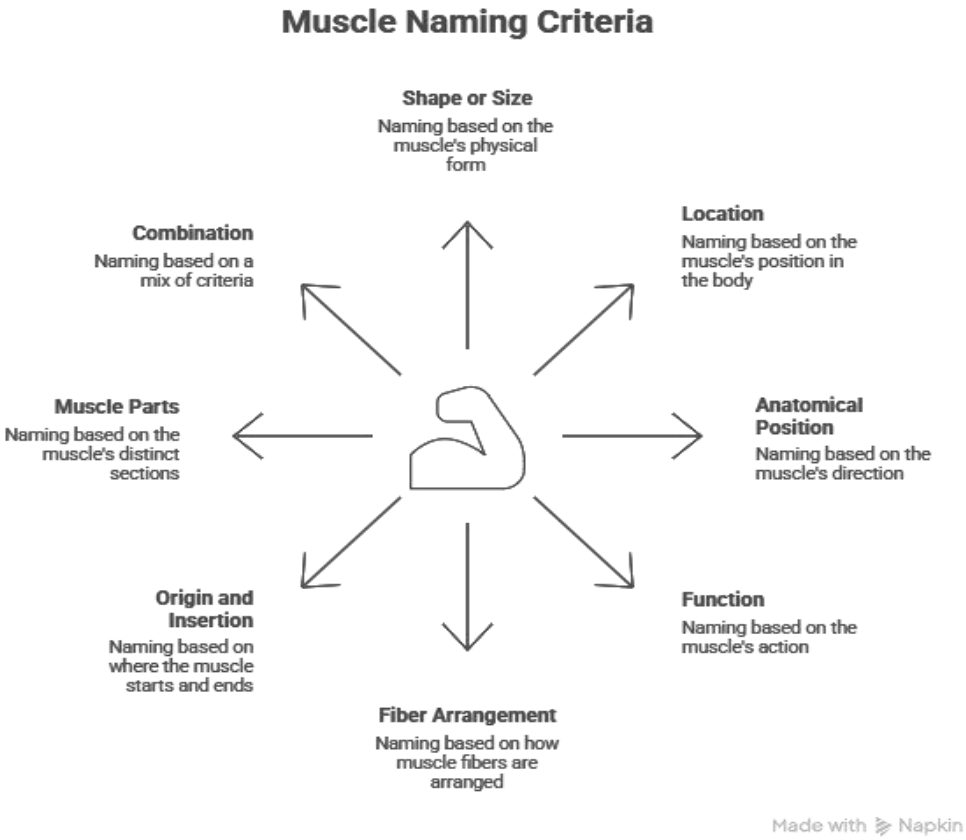
Muscles and its fiber arranggement



Nomenklatur

name of individual muscle based on:

- Indicate muscle in Latin, musculus, m.
- Individual muscle shape or size
- Location (appropriate to the body region)
- Anatomical position/direction
- Function of the muscle
- Fibres arrangement
- Origin and insertion location
- Parts of muscle (caput, venter)
- Combination/mixed



IN CLASS ASSESSMENT

1. MCQs (5 Questions)

Which structure connects muscle to bone?
a) Fascia b) Bursae c) Tendon d) Ligament

Muscle fibres arrangement in which Fibers run parallel to the long axis:
a) Pennate b) Circular c) Parallel d) Convergent

Intrafusal Fibers are present in:
a) Tendon b) Muscle spindle c) Bursae d) Aponeurosis

Which fascia covers individual muscles?
a) Superficial b) Deep c) Visceral d) Parietal

Smooth muscle is responsible for:
a) Body heat b) Posture c) Digestion d) Voluntary movement

IN CLASS ASSESSMENT

Case Scenario (1 Question)

A student presents with pain around the shoulder during lifting. On palpation, tenderness appears near the bicipital groove.

Question:

Which muscle tendon is likely involved? Explain briefly.

IN CLASS ASSESSMENT

Short Answer Tasks (3 Tasks)

Define **muscle origin** and **insertion** with an example.

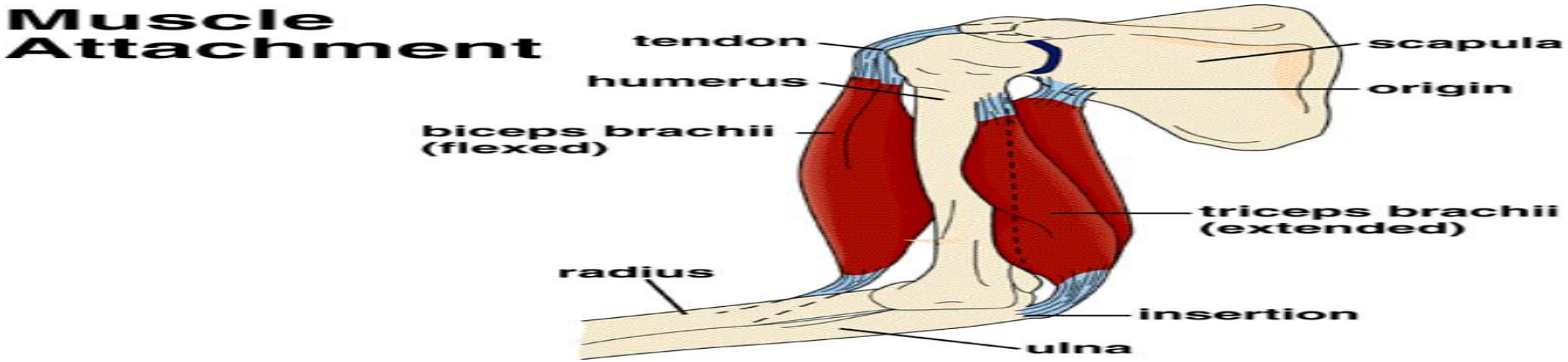
List any **three functions of skeletal muscle**.

Write the **difference between extrafusal and intrafusal fibers**.

IN CLASS ASSESSMENT

OSCE Mini-Task

Station:
Identify the labelled structures on a diagram of the biceps brachii (origin, insertion, tendon, belly).



THANK YOU???