Muscles

Skeletal muscle fibers

- 600 skeletal muscles
- Long, cylindrical, multinucleated cells
- 10-100m in diameter
- Muscle fiber length 25mm

- A **sarcomere** (sarco "flesh", mere "part") is the basic unit of striated muscle tissue. It is the repeating unit between two Z lines.
- **Sarcolemma**: fine transparent tubular sheath which envelops the fibers of skeletal muscles
- **Sarcoplasm**: Sarcoplasm is the cytoplasm of a myocyte (muscle fiber). It contains unusually large amounts of *glycosomes* (granules of stored glycogen) and significant amounts of myoglobin, an oxygen-binding protein.

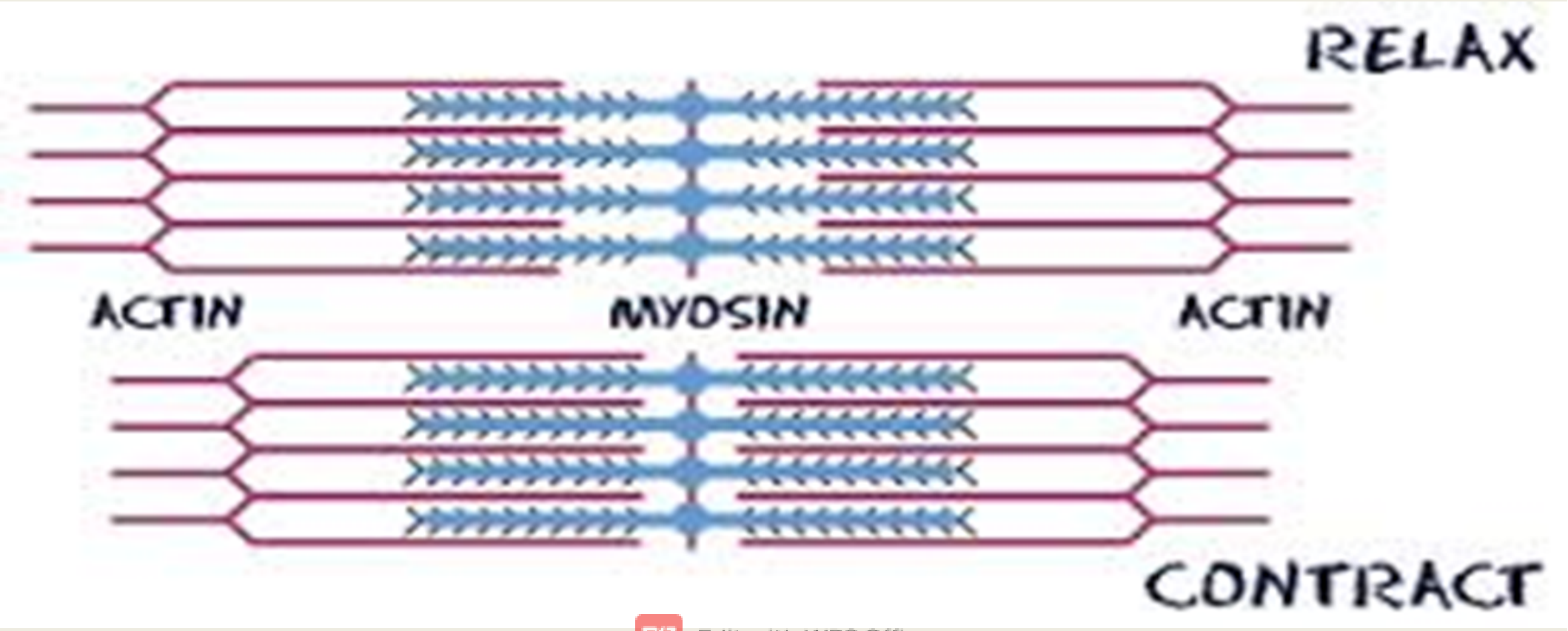
- Myofibrils (thick actin and thin myosin)
- Actin and myosin filaments (myofilaments)

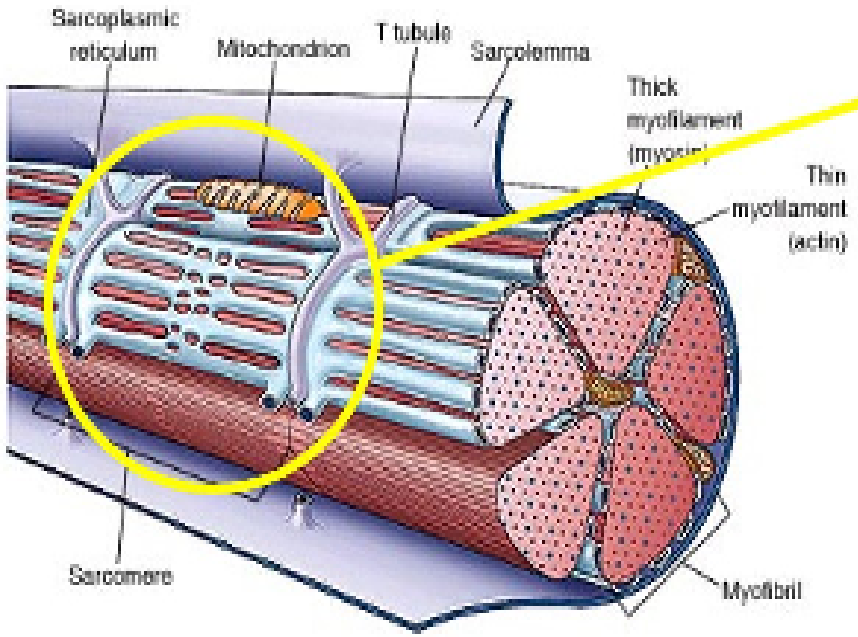
- **Dark band:**

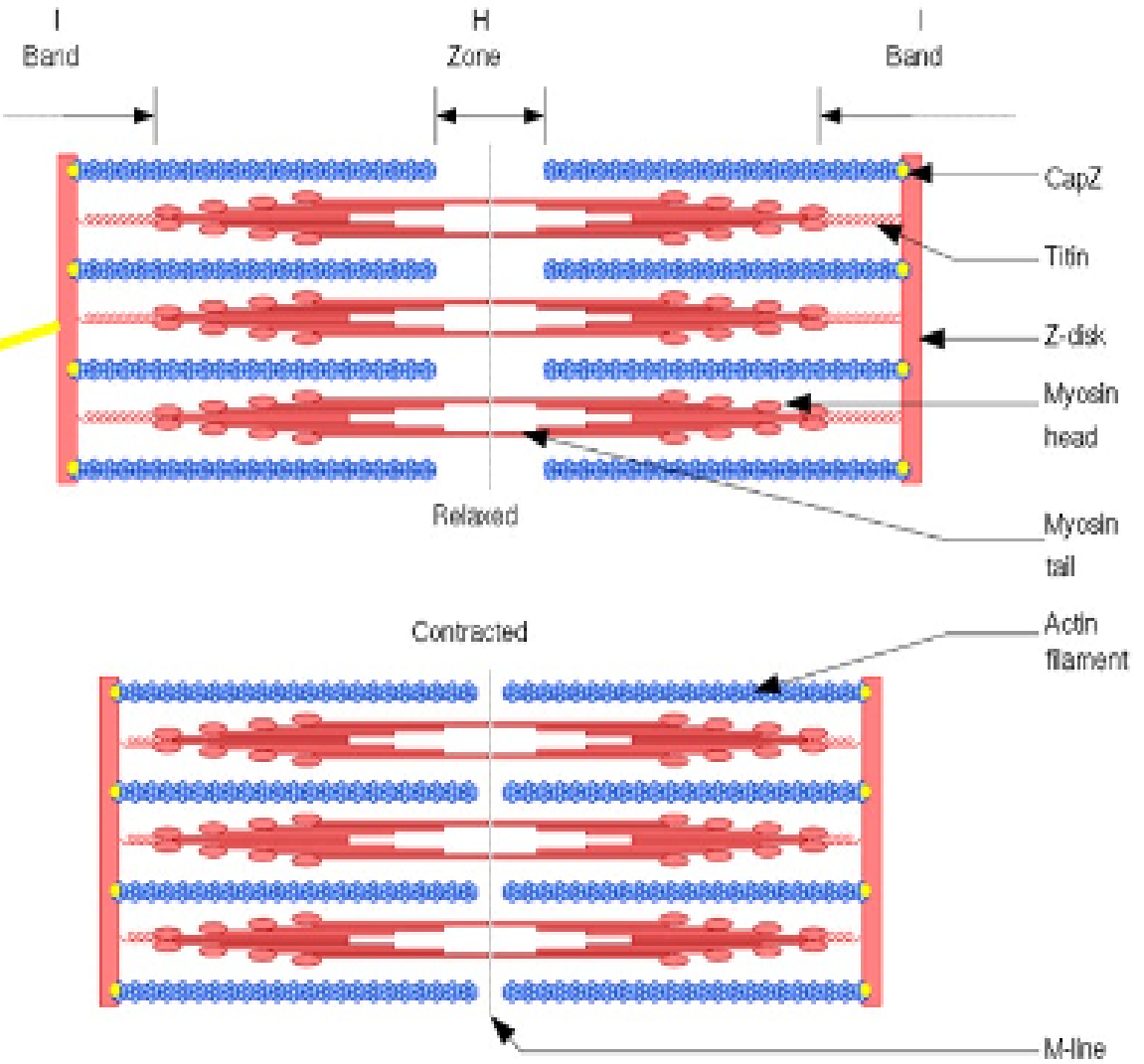
Thick myosin and thin actin overlapped

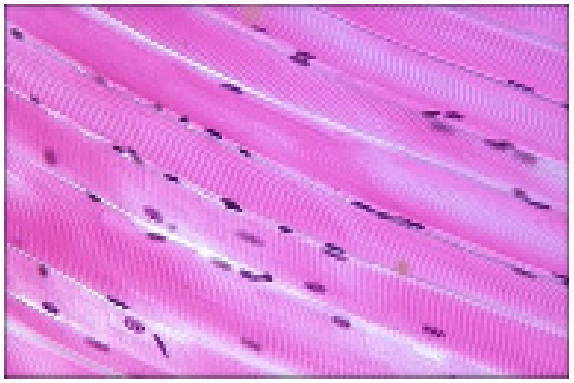
- **Light band:**

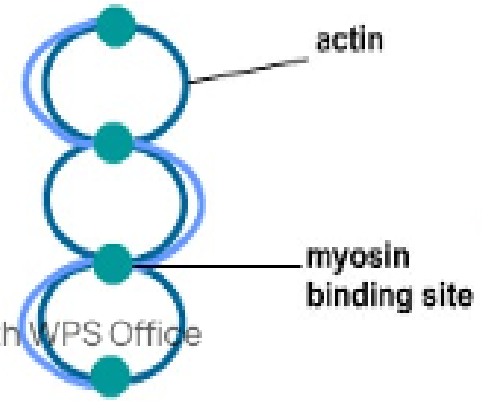
Thin action

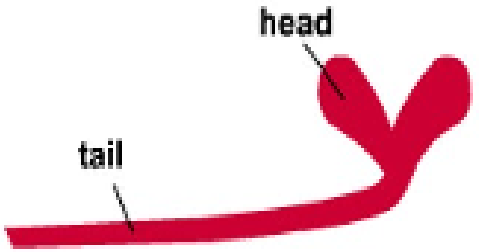


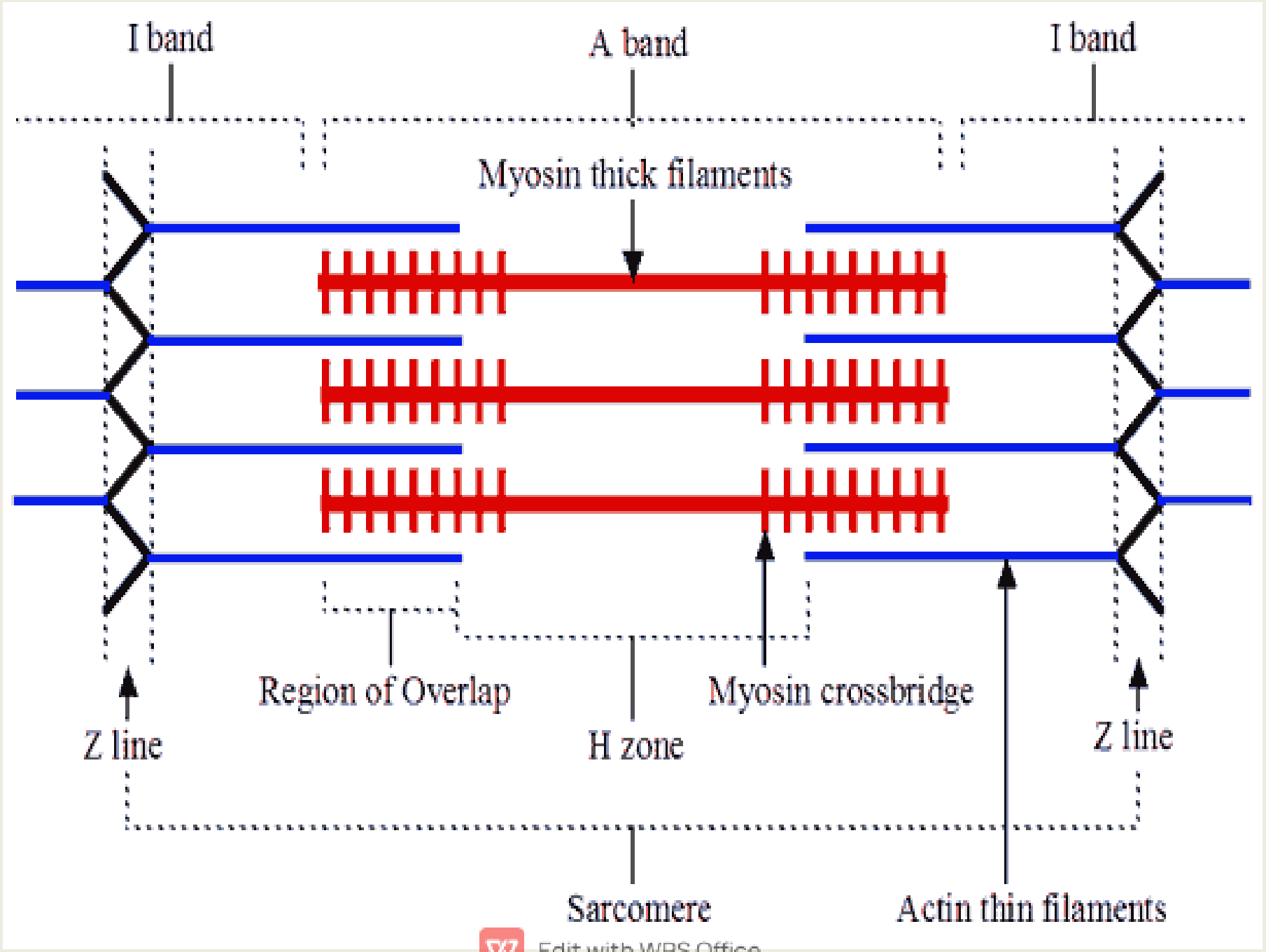


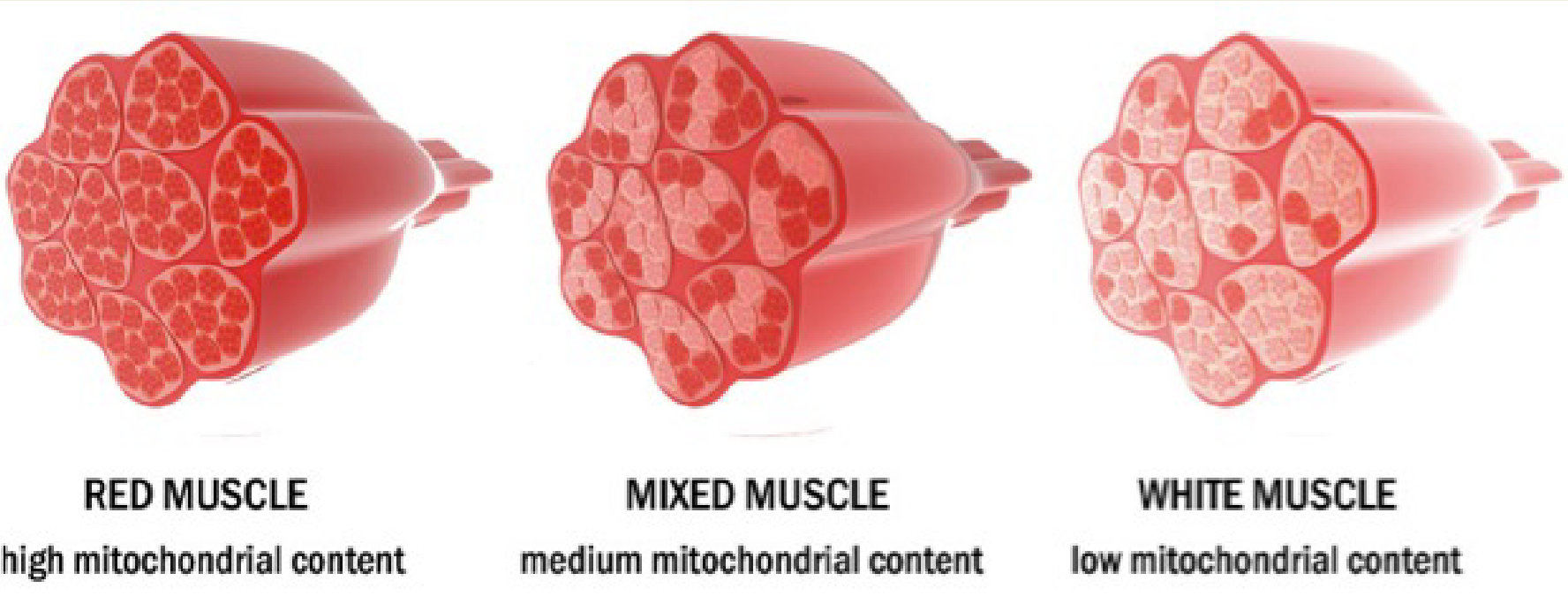












- **Red:**
- Smaller diameter, abundant myoglobin, mitochondria, slow twitch fibers
- **White:**
- Larger diameter, less myoglobin, fast twitch fibers
- **Intermediate**:
- Intermediate characteristics
- Resistant to fatigue

Classification of skeletal muscles

- Classification criteria:
- Shape and fiber architecture
- Group action

Classification of muscles on the basis of shape and fiber architecture

- General shape
- Orientation of the muscle fibers

1. Muscles with fibers parallel to the line of pull
2. Muscles with fibers which are oblique to the line of pull
3. Spiral muscles
4. Cruciate muscles
5. Circular muscles

Muscles with fibers parallel to the line of pull

- Great range of movement
- Less power

I. Strap like muscles

II. Quadrilateral muscles

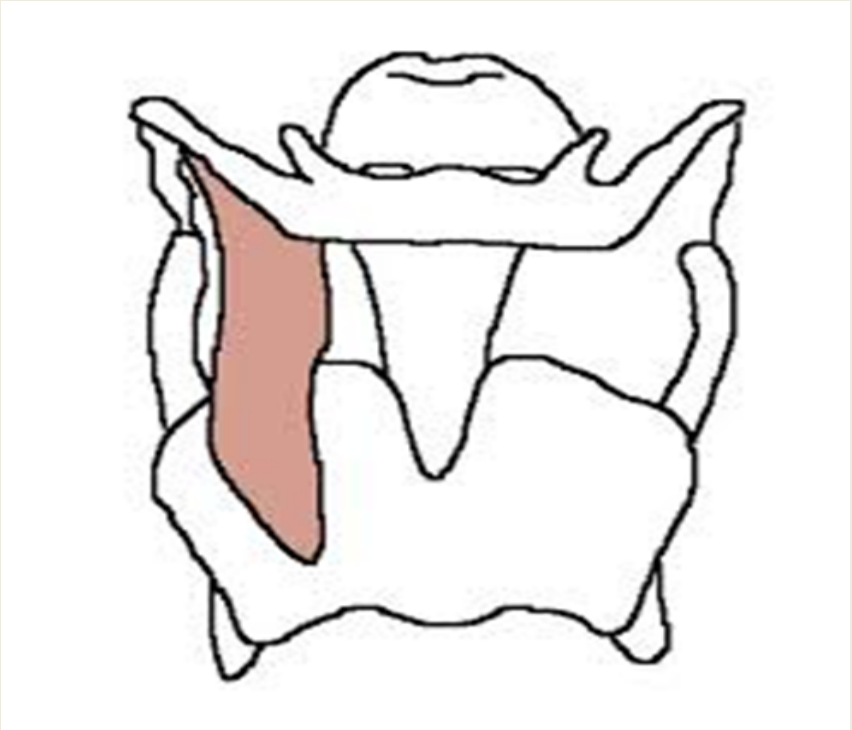
III. Fusiform muscles

Strap like muscles

- Length is greater than width
- Strap like appearance
- Fibers run for the entire length
- Fiber may run over shorter segments
- Transverse tendinous intersections
- Sartorius

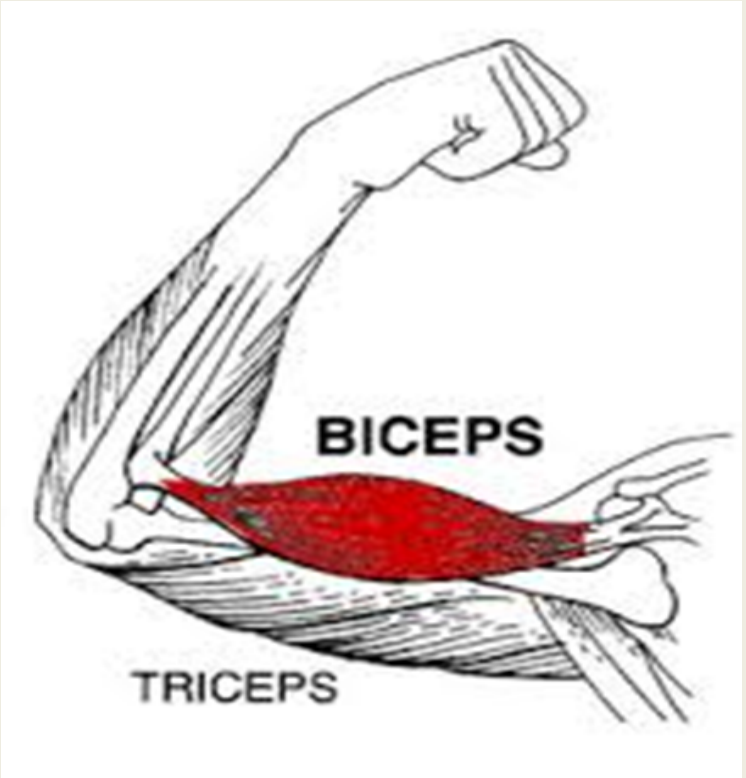
Quadrilateral muscles

- Length is short
- Flat
- Quadrilateral appearance
- Thyrohyoid muscle



Fusiform muscles

- Fibers are parallel in the belly
- Converge toward the proximal and distal attachments
- Biceps brachii muscle



Muscles with fibers which are oblique to the line of pull

- Greater power
- Lesser range

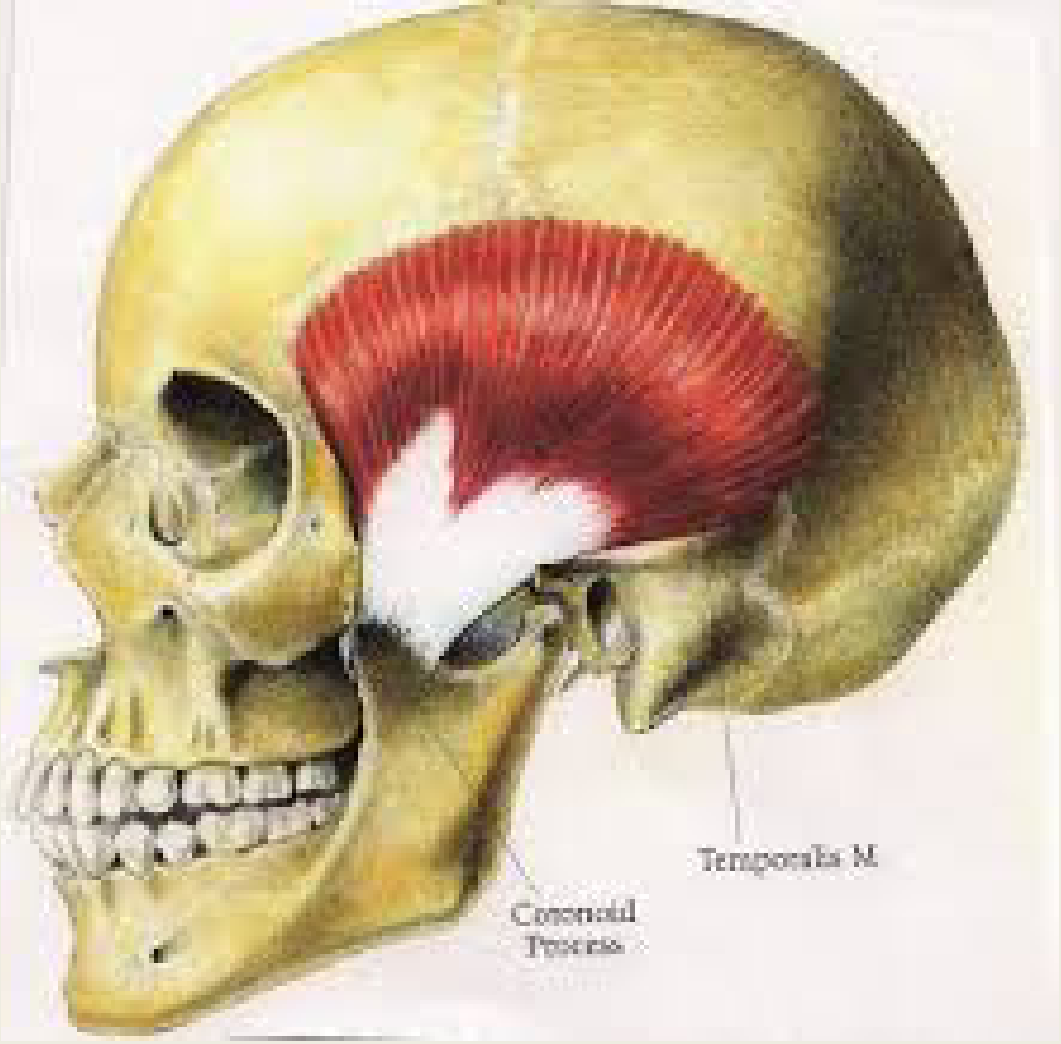
I. Triangular muscles

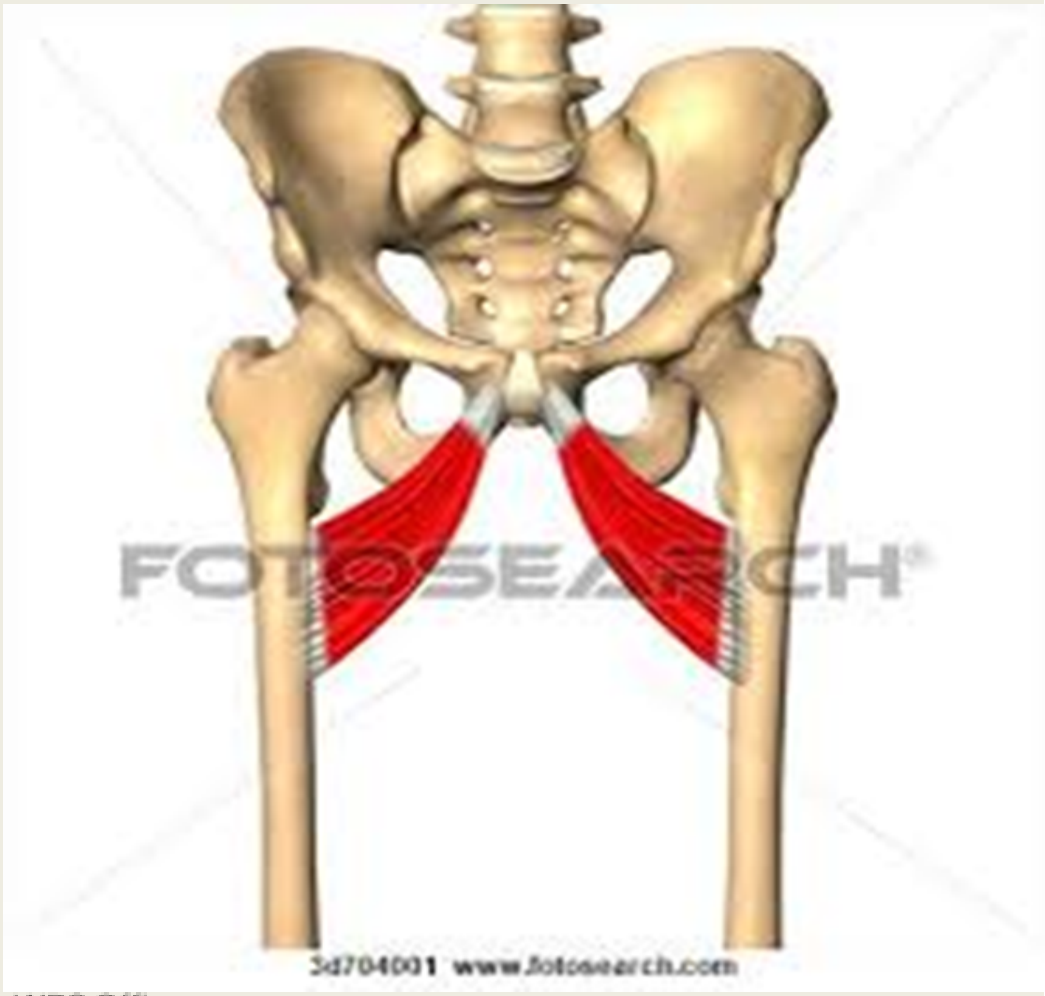
II. Pennate mucles

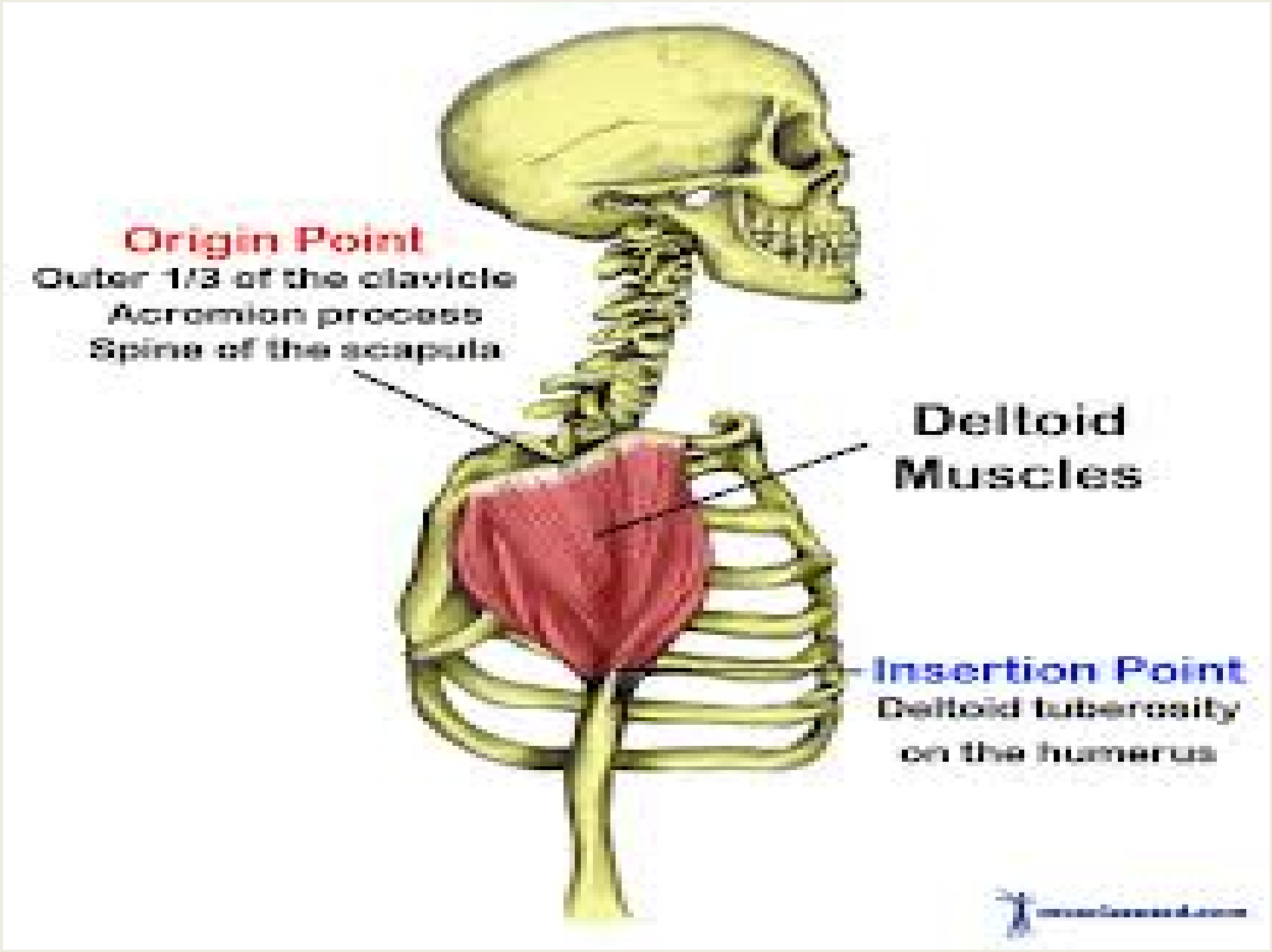
III. Radial muscles

Triangular muscles

- Broad origin
- Restricted insertion
- Temporalis
- Adductor longus
- Deltoid



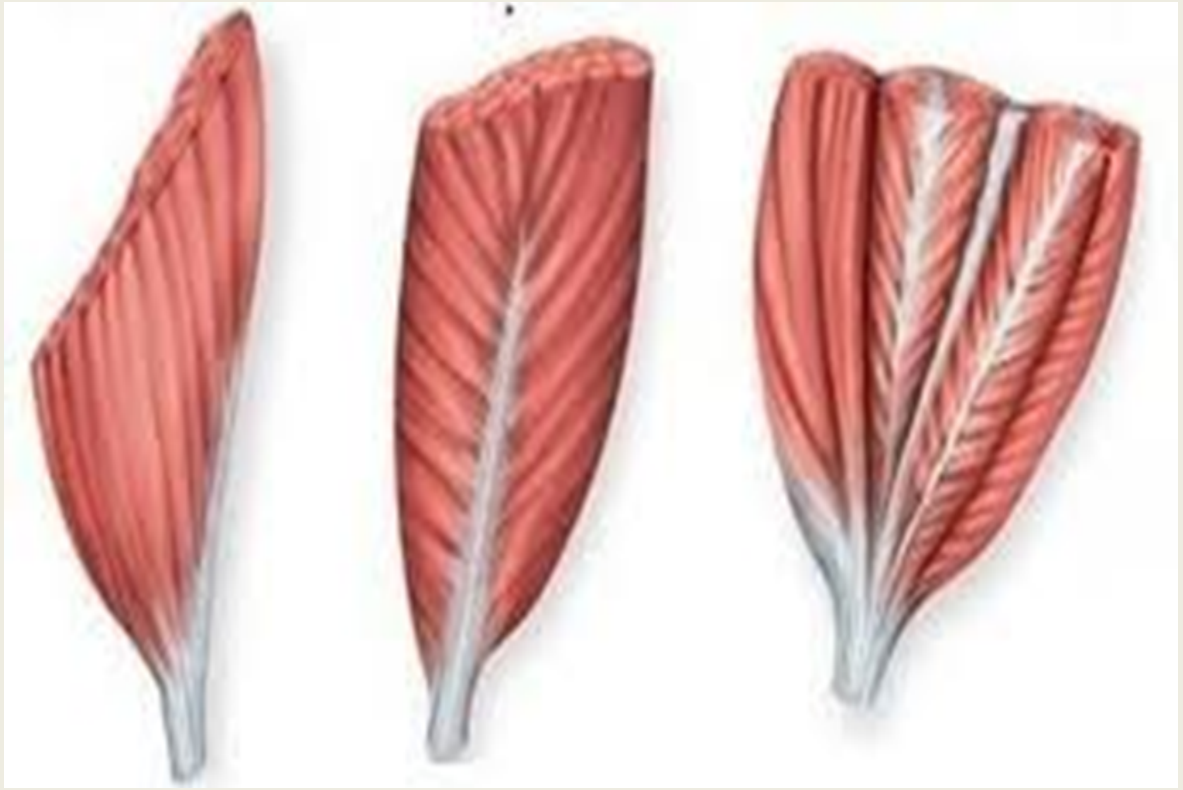




Pennate mucles

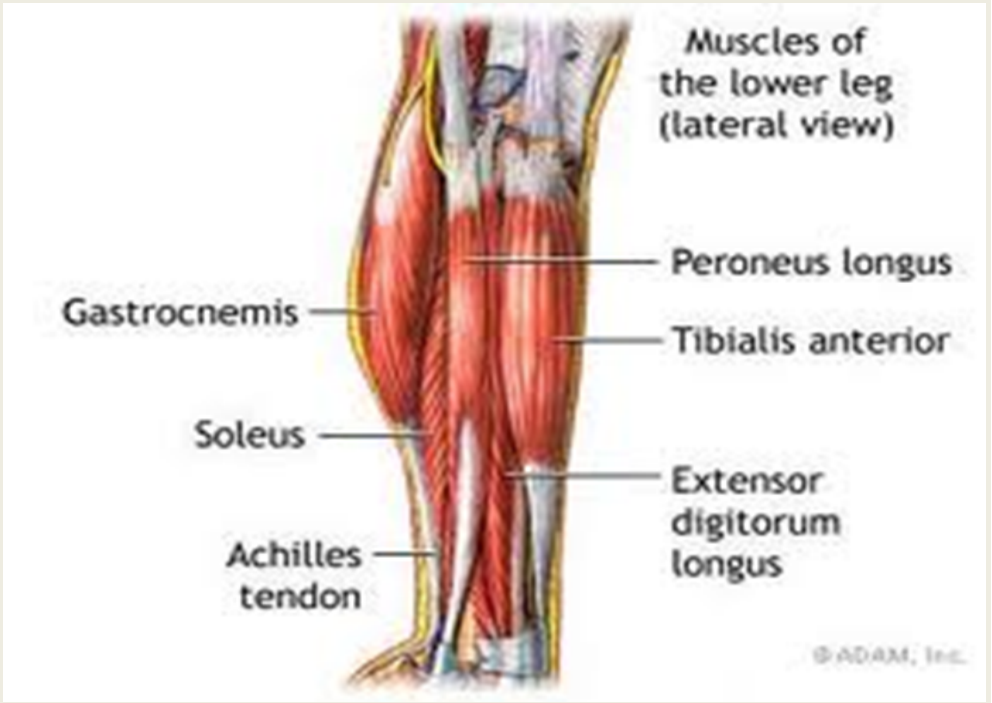
- Feather like
- Fibers are obliquely attached to tendon

Unipennated	Peroneus tertius
	Flexor pollicis longus
Bipennate	Rectus femoris
	Dorsal interossei
Multipennate	Subscapularis
	Deltoid



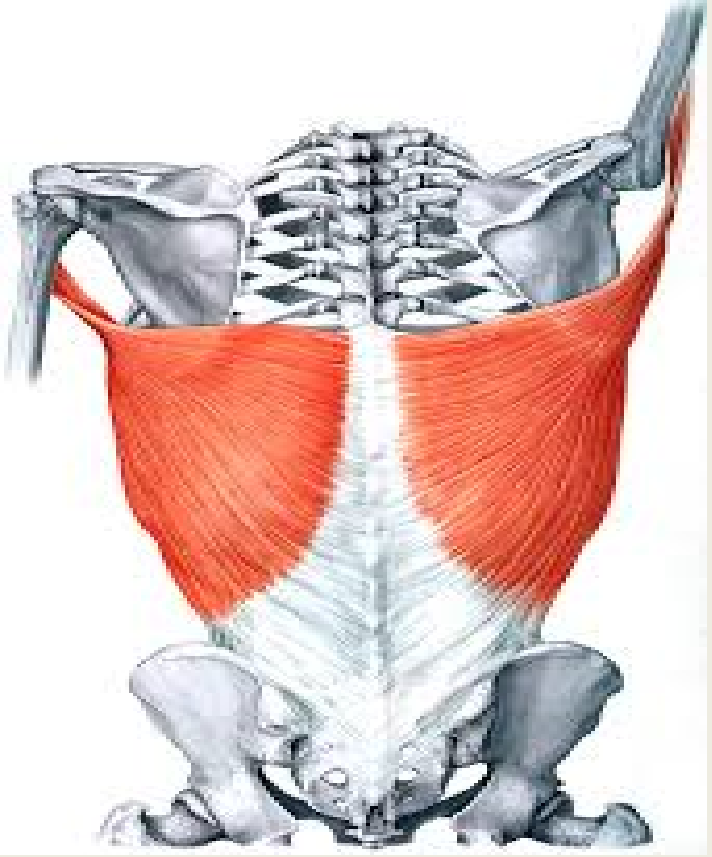
Radial muscles

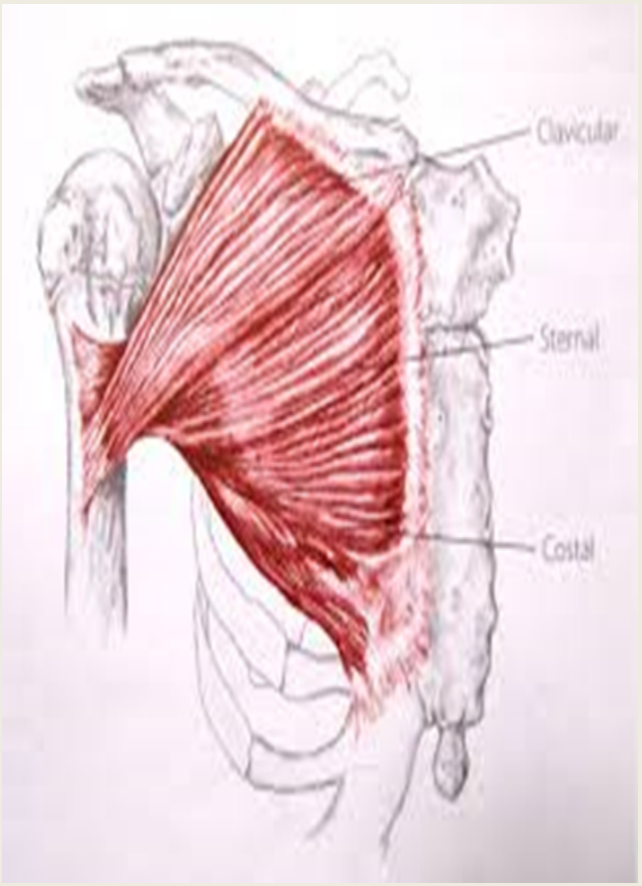
- Fibers originate from the the walls of a cylindrical osteofacial compartment
- Converge obliquely on a central tendon
- Circumpennated
- Tibialis anterior

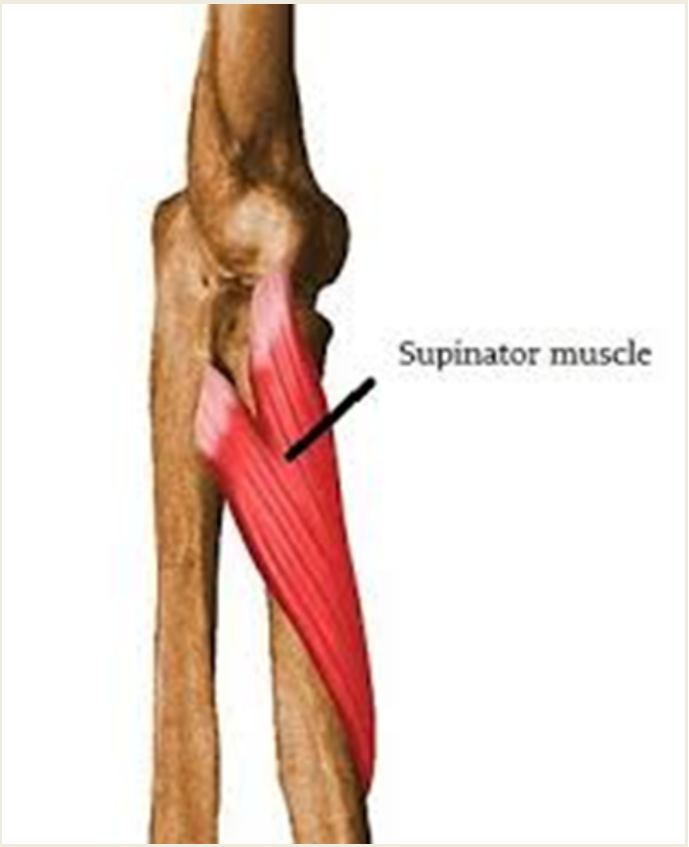


Spiral muscles

- Twist
- Broad origin
- Narrow insertion
- Latissimus dorsi
- Sternocostal part of pectoralis major
- Muscle belly spirals around a long bone
- Supinator muscle







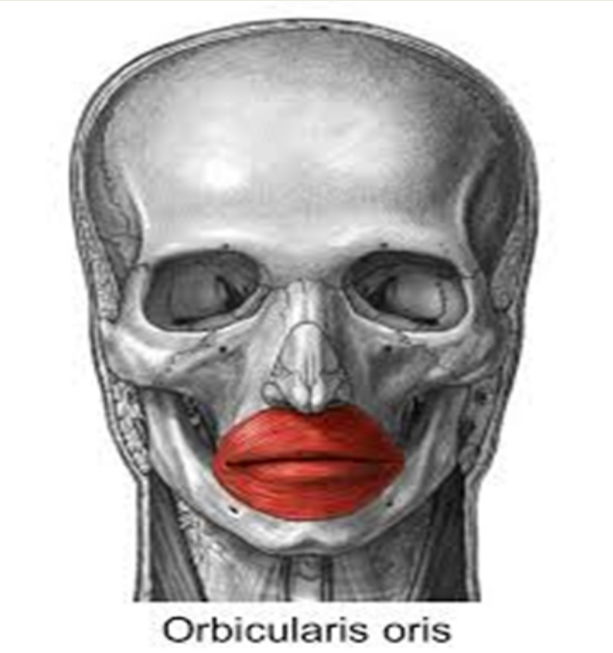
Cruciate muscles

- Muscle consist of two plane of fibers arranged in different directions`
- Fibers of 2 planes cross each other
- Partially spiral each other
- Masseter
- Sternocleidomastoid

Circular muscles

- Fibers are arranged in a circular pattern
- Sphincteral muscles
- Orbicularis occuli
- Orbicularis oris


Orbicularis oculi


Orbicularis oris

Classification of muscles on the basis of group action

- **Agonist:**
- Prime mover
- Constantly active in the initiation and maintenance of a particular movement
- **Antagonists:**
- Act in opposition to agonist
- When prime mover initiates a movement antagonist contracts
- Slowly relax

synergists

- **Synergists**
- Prevent unwanted movement
- Partial antagonists

- **Fixators**
- Provide a stable base