26a A&P: Muscular System - Fiber Types, Actions, and Contractions

26a A&P: Muscular System -
Fiber Types, Actions, and Contractions
Class Outline

5 minutes	Attendance, Breath of Arrival, and Reminders
10 minutes	Lecture:
25 minutes	Lecture:
15 minutes	Active study skills:
60 minutes	Total

26a A&P: Muscular System - Fiber Types, Actions, and Contractions Class Reminders

Quizzes:

- 29b Kinesiology Quiz
  - Supraspinatus, infraspinatus, teres minor, subscapularis, pec minor, & serratus anterior

- 31a Quiz (20a, 20b, 21b, 22a, 23a, 24b, 29b, and 30a)
- 32a Quiz (24a, 25a, 26a, 27a, 28a, 29a, 30b, and 31b)

Assignments:

- 30a Review Questions
  - Packet A: 141-158

Preparation for upcoming classes:

- 27a Pathology: Musculoskeletal System
  - Packet E: 49-54
  - RQ Packet A-153

- 27b Hydrotherapy: Cold and Contrast Treatments
  - Packet G: 25-28

Classroom Rules

Punctuality - everybody's time is precious

- Be ready to learn at the start of class; we'll have you out of here on time
- Tardiness: arriving late, returning late after breaks, leaving during class, leaving early

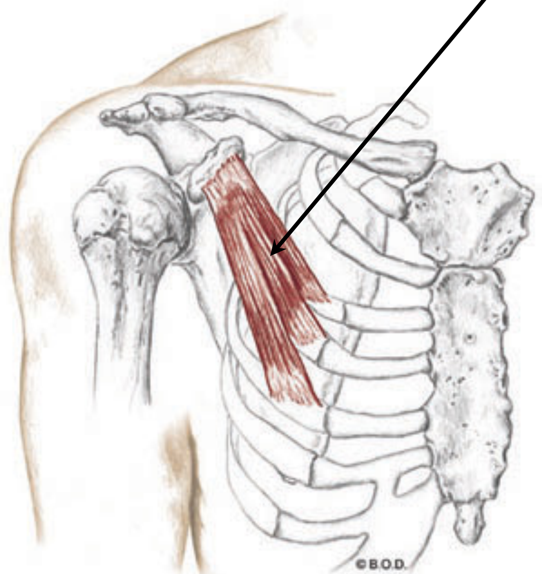
The following are not allowed:

- Bare feet
- Side talking
- Lying down
- Inappropriate clothing
- Food or drink except water
- Phones that are visible in the classroom, bathrooms, or internship

You will receive one verbal warning, then you'll have to leave the room.

Pectoralis Minor

Trail Guide, Page 92



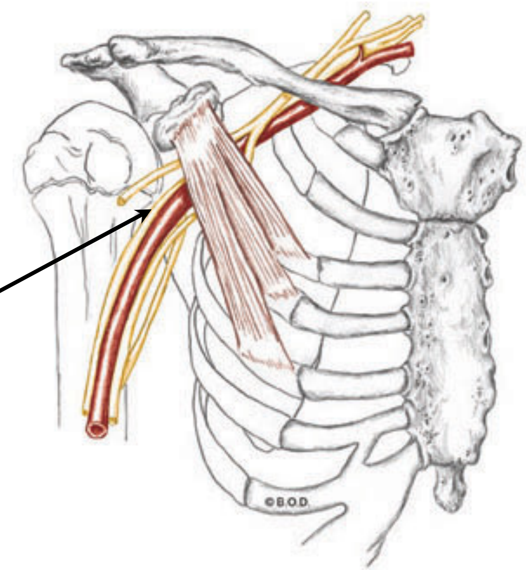
Anterolateral View

Pectoralis minor lies next to the ribcage deep to the pectoralis major.

During aerobic activity the pectoralis minor helps to elevate the rib cage for inhalation.

Major vessels such as the brachial plexus, axillary artery and axillary vein pass underneath the pectoralis minor. This can create the potential for neurovascular compression.

Pectoralis minor, what does it do?



Anterior View

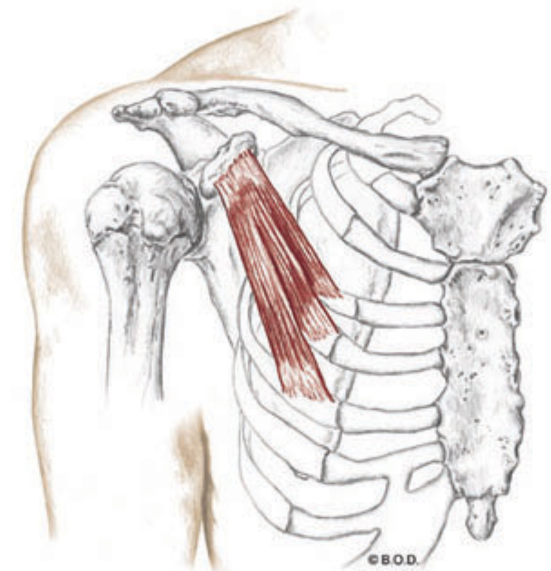
Pectoralis Minor, page 92

A Depress the scapula (scapulothoracic joint)

Abduct the scapula (S/T joint)

Downwardly rotate the scapula (S/T joint)

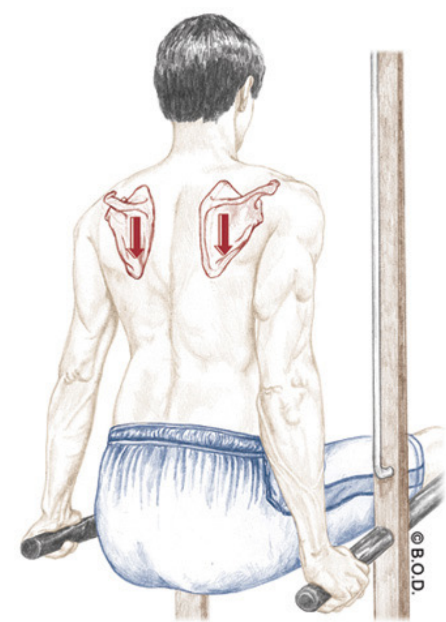
With the scapula fixed:
Assist to elevate the thorax during forced inhalation



Anterior View

O Third, fourth, and fifth ribs

I Medial surface of coracoid process of the scapula



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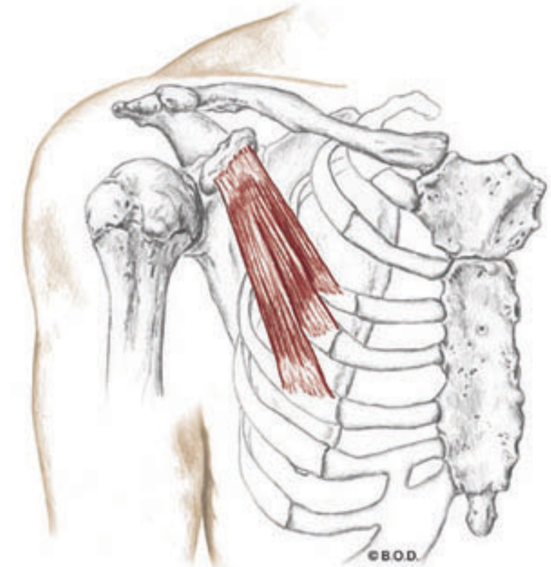

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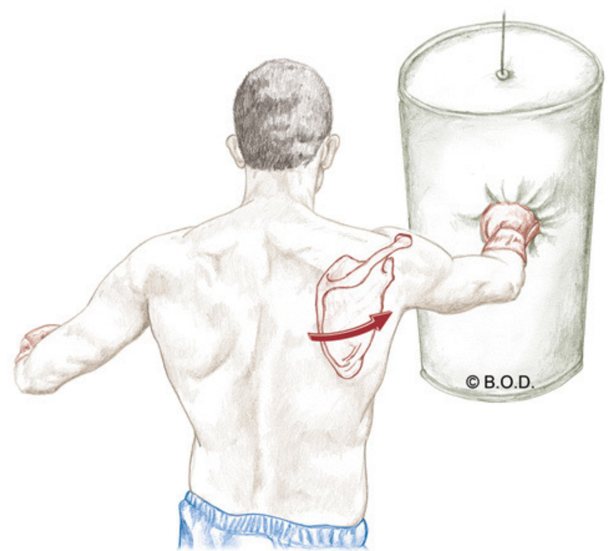

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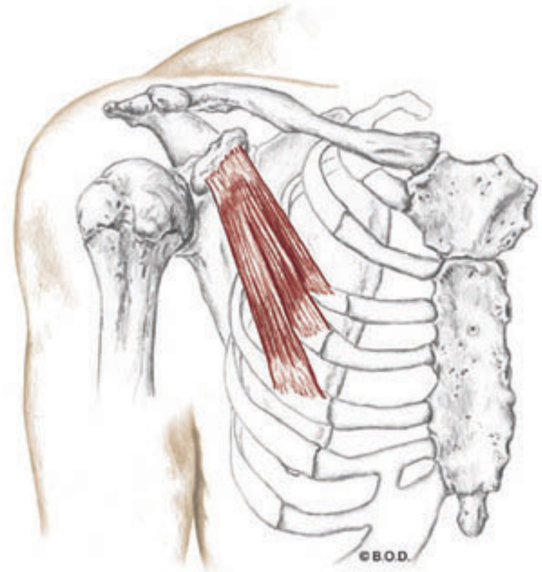

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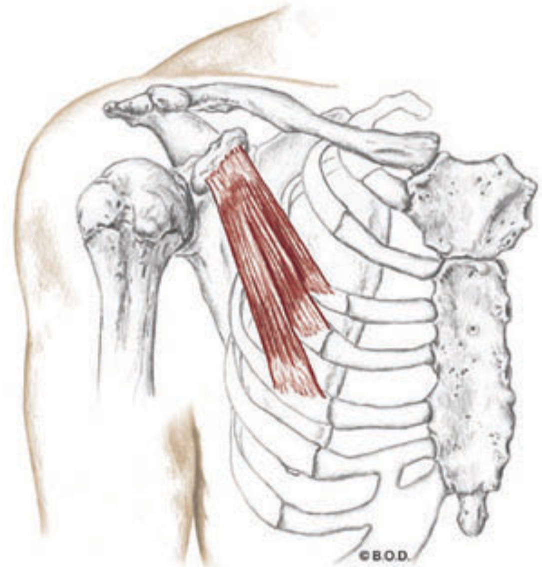

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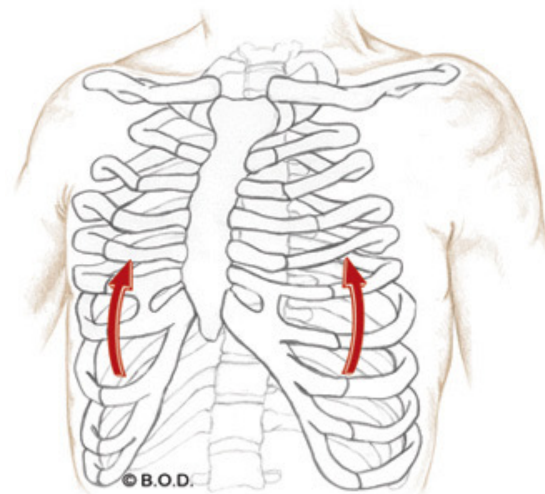

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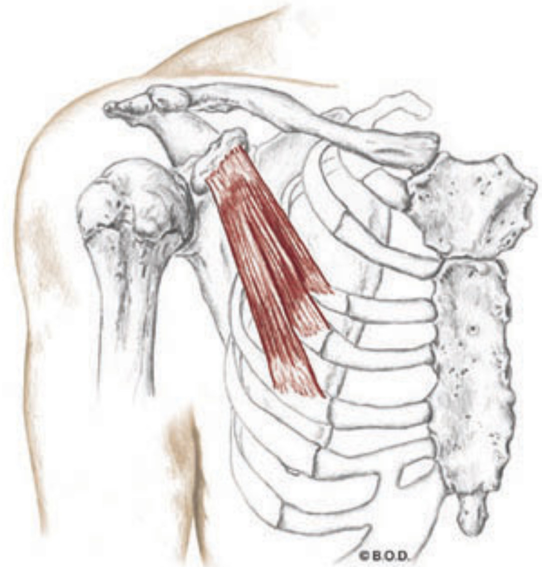

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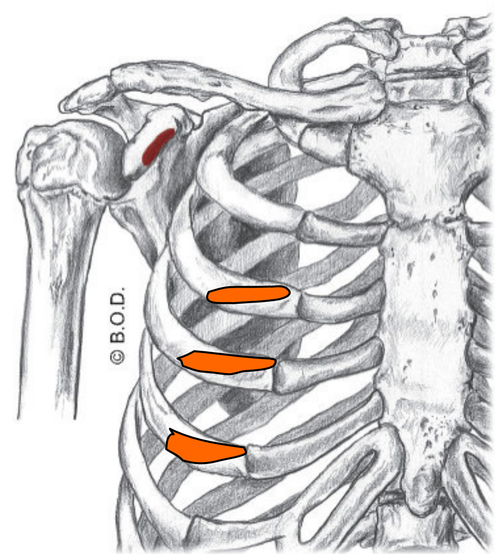

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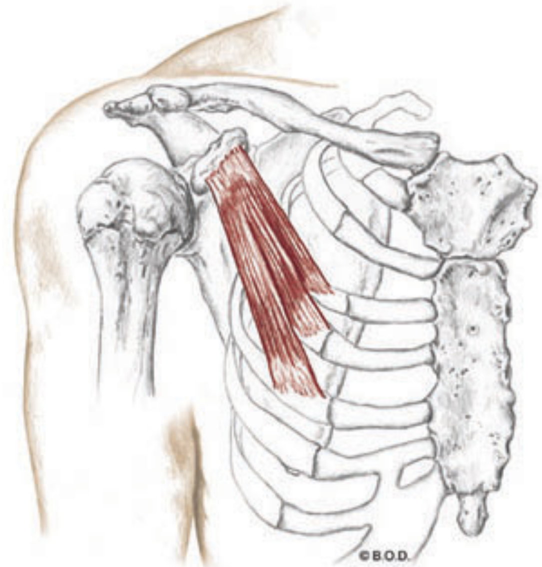

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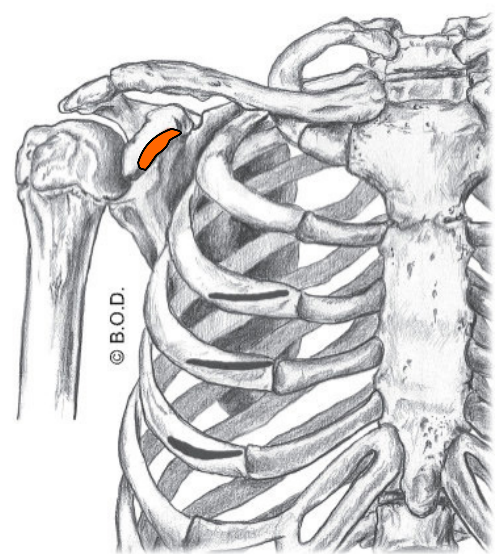


26a A&P: Muscular System - Fiber Types, Actions, and Contractions

E - 45

Energy Sources for Contraction

- Adenosine triphosphate
- Fuel
- Oxygen

Energy Sources for Contraction

Adenosine triphosphate (AKA: ATP) The body's energy storage molecule.

Fuel Glucose, fat, or, rarely, protein. Used to form ATP in the mitochondria. By-products are CO2 and water (from aerobic metabolism), or, from the initial anaerobic process (which only uses carbohydrate, and not O2), lactic acid.

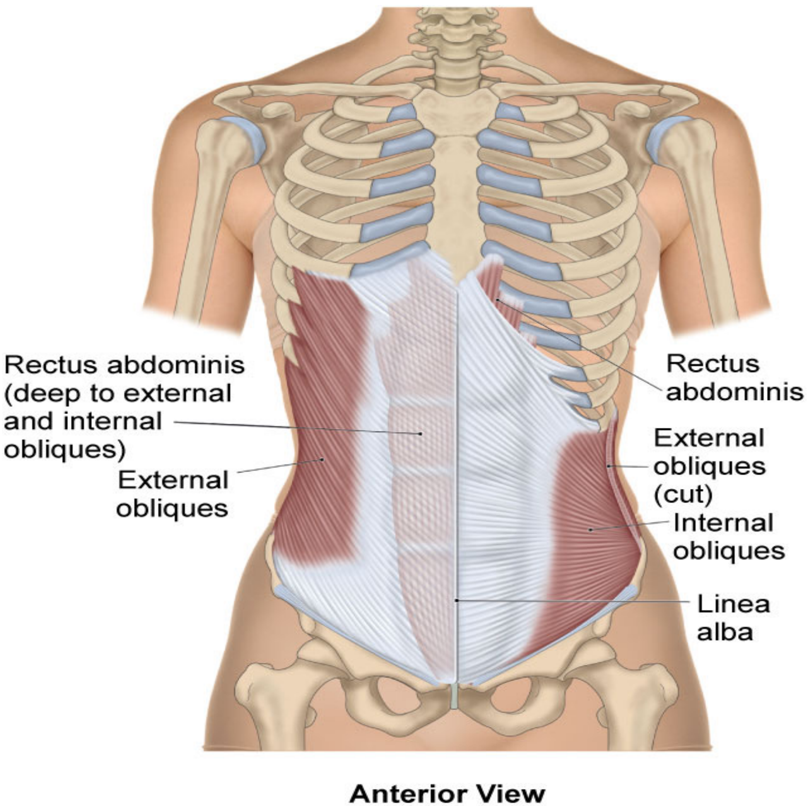
Oxygen Combined with fuel in the mitochondria during aerobic metabolism, yielding energy (for making ATP) plus CO2 plus H2O.

Types of Skeletal Muscle Fibers

Slow twitch (red muscle)
Fast twitch (white muscle)
Intermediate twitch (pink muscle)

Types of Skeletal Muscle Fibers

Slow twitch (AKA: red muscle) Skeletal muscle fibers that contract slowly and are fatigue __resistant__. Examples: postural muscle, core muscle, or legs of long distance runners.



Types of Skeletal Muscle Fibers

Fast twitch (AKA: white muscle) Skeletal muscle fibers that contract forcefully and fatigue rapidly. Examples: arm muscles.

Types of Skeletal Muscle Fibers

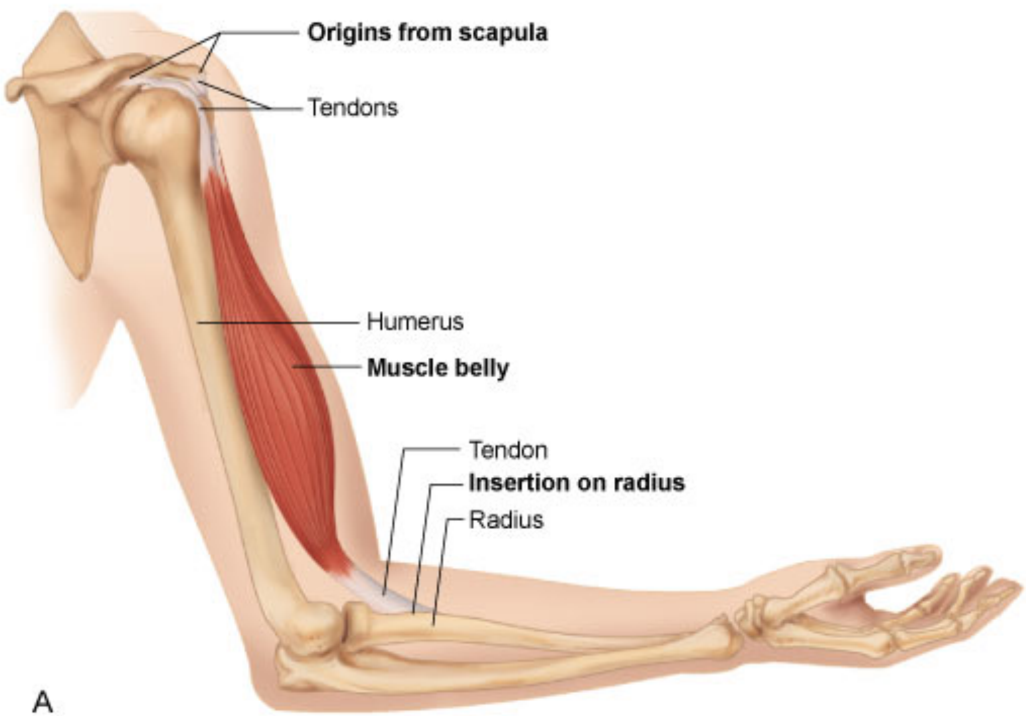
Intermediate twitch (AKA: pink muscle) Skeletal muscle fibers that are more fatigue resistant than fast twitch, and more forceful than slow twitch. Examples: legs of world class sprinters and arms of world class boxers.

Parts of Skeletal Muscle

- Belly
- Origin
- Insertion

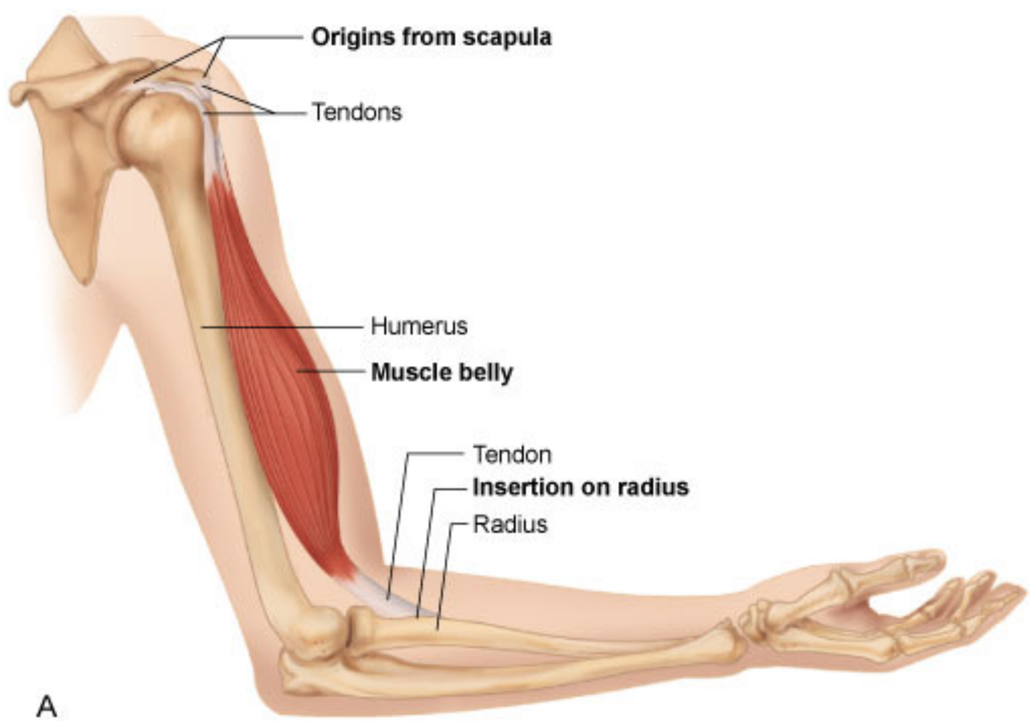
Parts of Skeletal Muscle

Belly The wide central portion of a skeletal muscle that contains the sarcomeres.



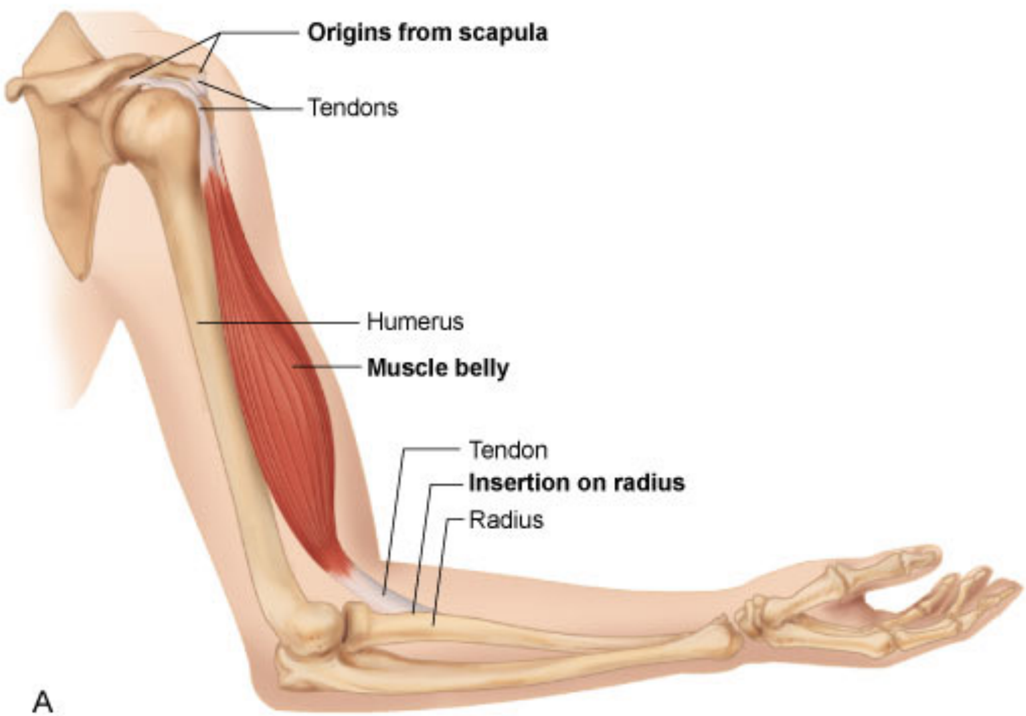
Parts of Skeletal Muscle

Origin Tendinous muscle attachment on the __less__ movable bone or other structure. Typically medial or proximal to the insertion.



Parts of Skeletal Muscle

Insertion Tendinous muscle attachment on the ___more___ movable bone or structure. Typically lateral or distal to the origin.



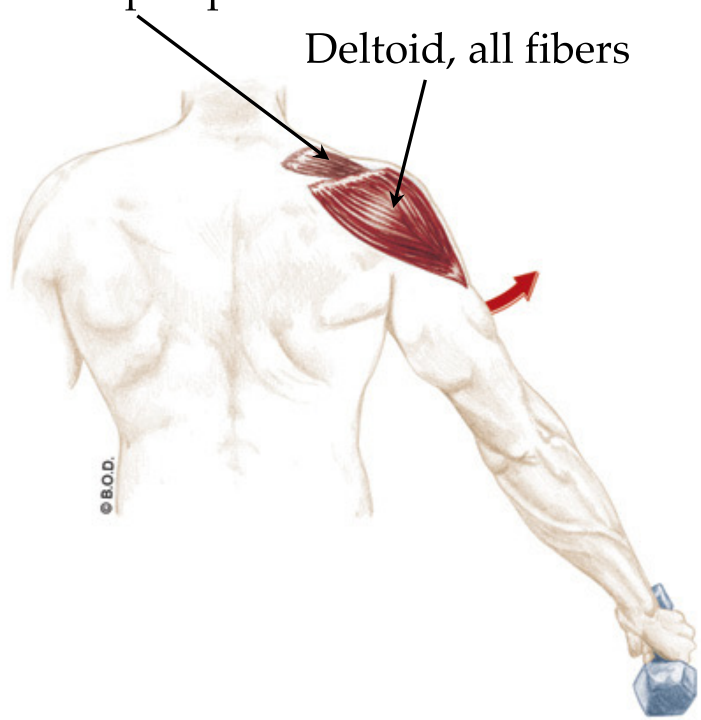
Muscle Actions

- Prime mover (agonist)
- Antagonist
- Synergist
- Fixator

Muscle Actions

Prime mover (AKA: agonist) Muscle responsible for causing a specific or desired action.

<u>Glenohumeral abduction prime movers:</u>



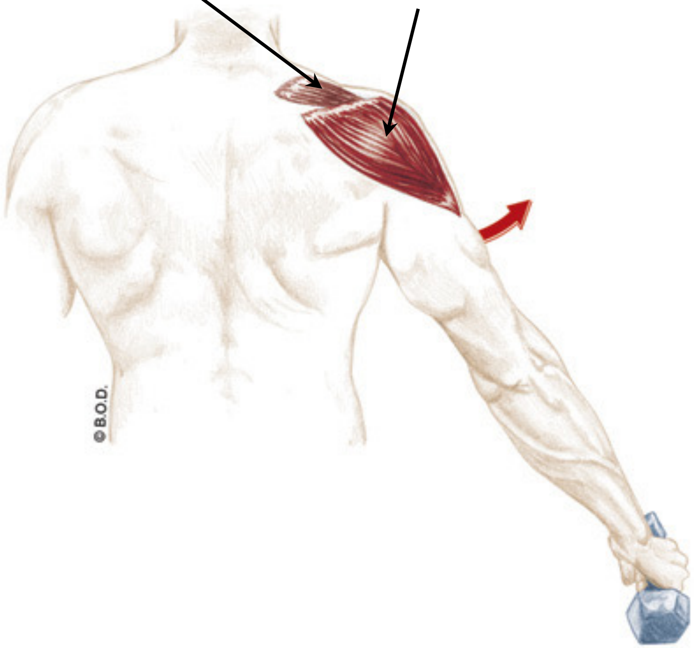
Muscle Actions

Antagonist Muscles that must relax and lengthen or eccentrically contract and lengthen to ___allow___ the actions of the prime mover to occur.

<u>Glenohumeral abduction prime movers:</u>

Supraspinatus

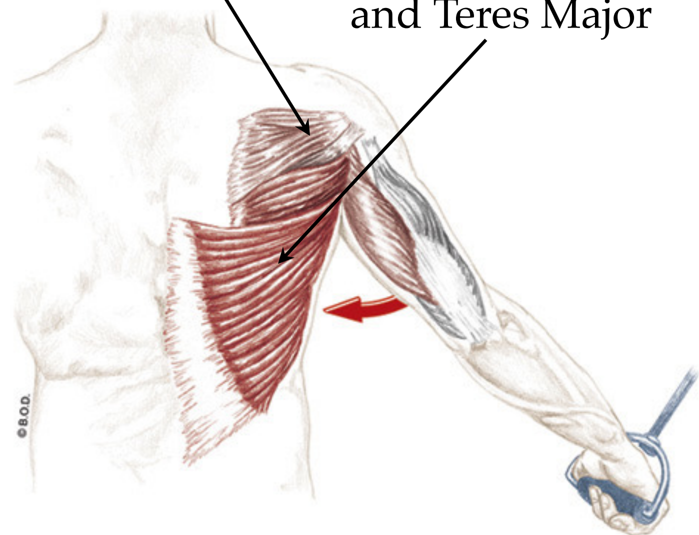
Deltoid, all fibers



<u>Glenohumeral abduction **antagonists**:</u>

Infraspinatus and Teres Minor

Latissimus Dorsi and Teres Major



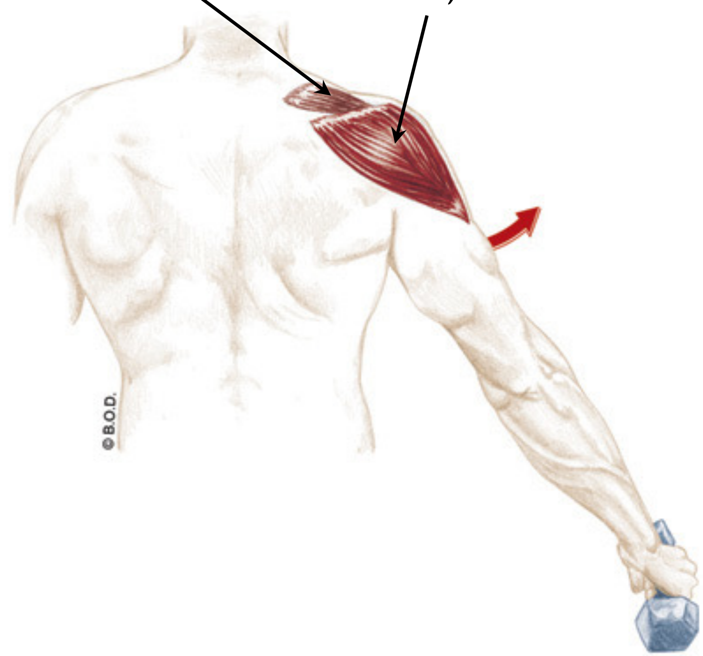
Muscle Actions

Synergist Muscle that aids movement by contracting at the ___same___ time as the prime movers.

Glenohumeral abduction **synergists**:

Supraspinatus

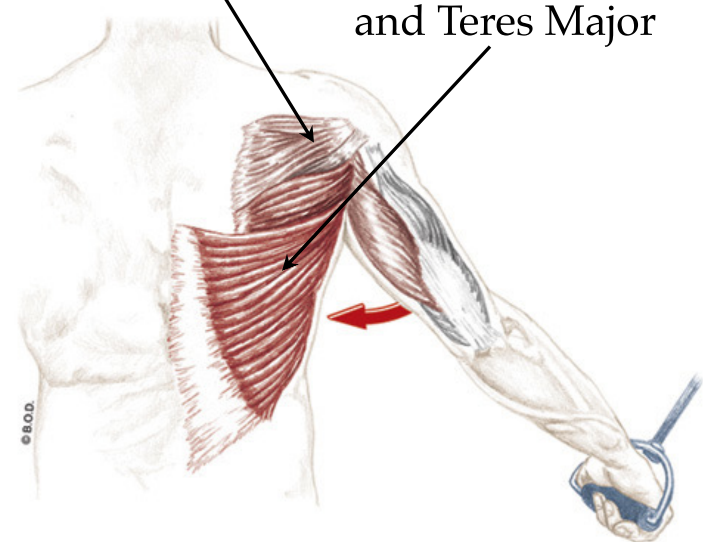
Deltoid, all fibers



Glenohumeral adduction **synergists**:

Infraspinatus and Teres Minor

Latissimus Dorsi and Teres Major



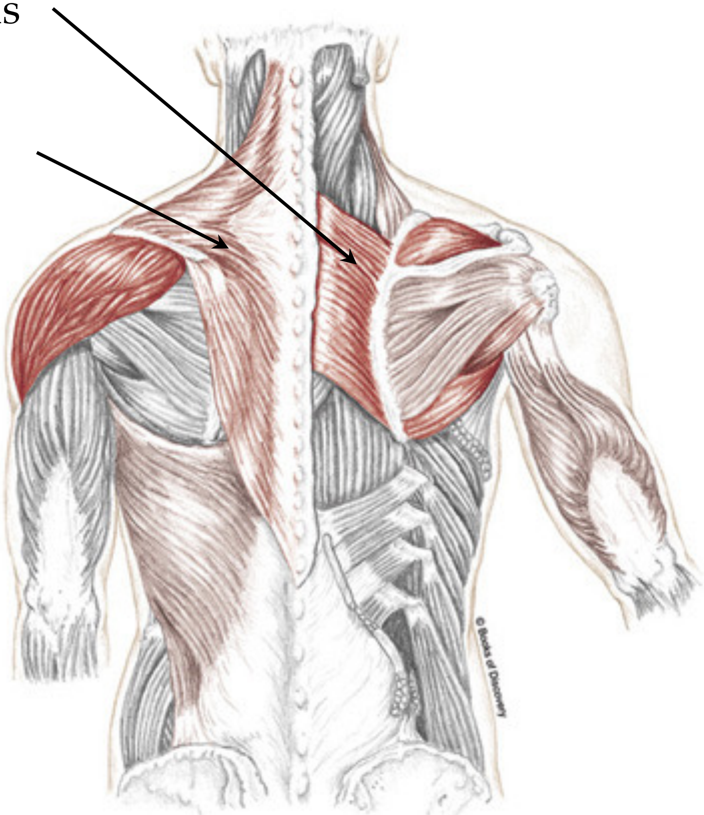
Muscle Actions

Fixator Specialized synergist muscles that act as a ___stabilizer___.

<u>Fixators during glenohumeral abduction:</u>

Rhomboids

Trapezius



Types of Contractions

- Isotonic contraction
  - Concentric contraction
  - Eccentric contraction
- Isometric contraction

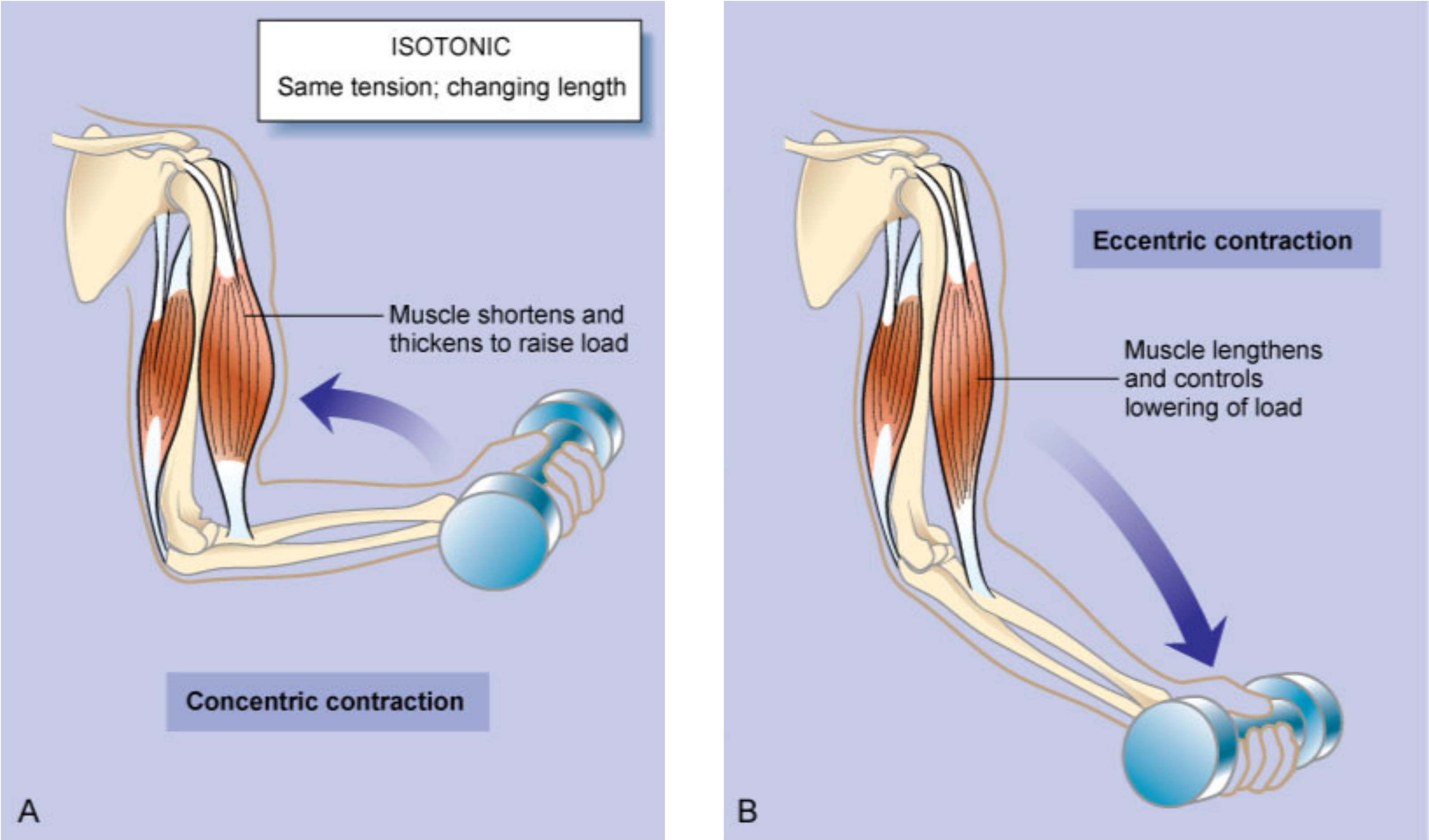
Types of Contractions

Isotonic contraction Contraction in which muscle changes __length__.

Concentric contraction Isotonic contraction. The muscle __shortens__.

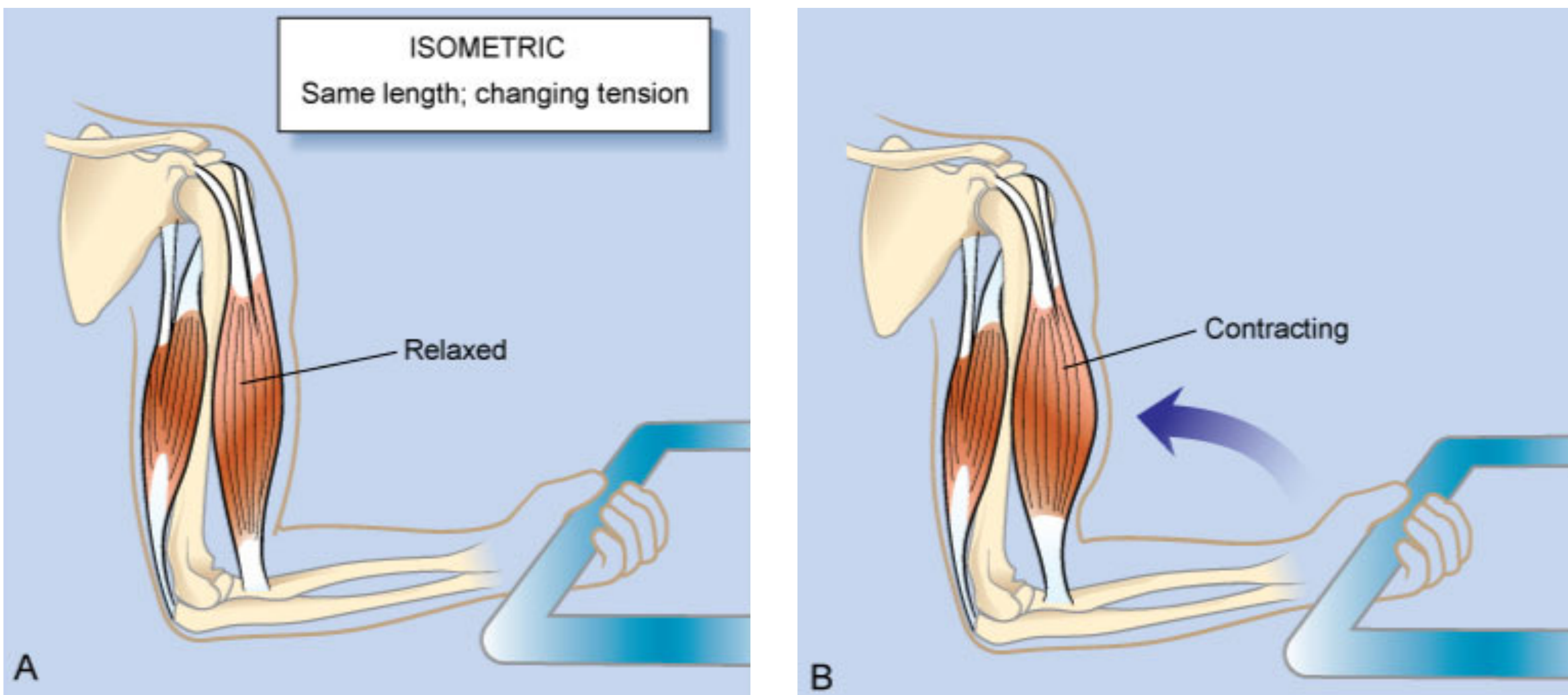
Eccentric contraction Isotonic contraction. The muscle __lenghtens__.

Types of Contractions



Types of Contractions

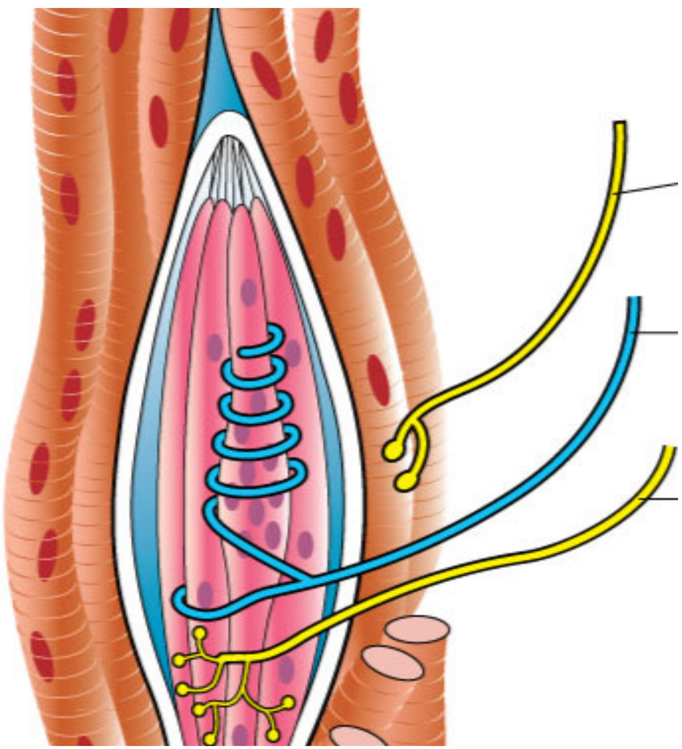
Isometric contraction Contraction in which muscle length remains the same.



Stretching and Stretch Receptors

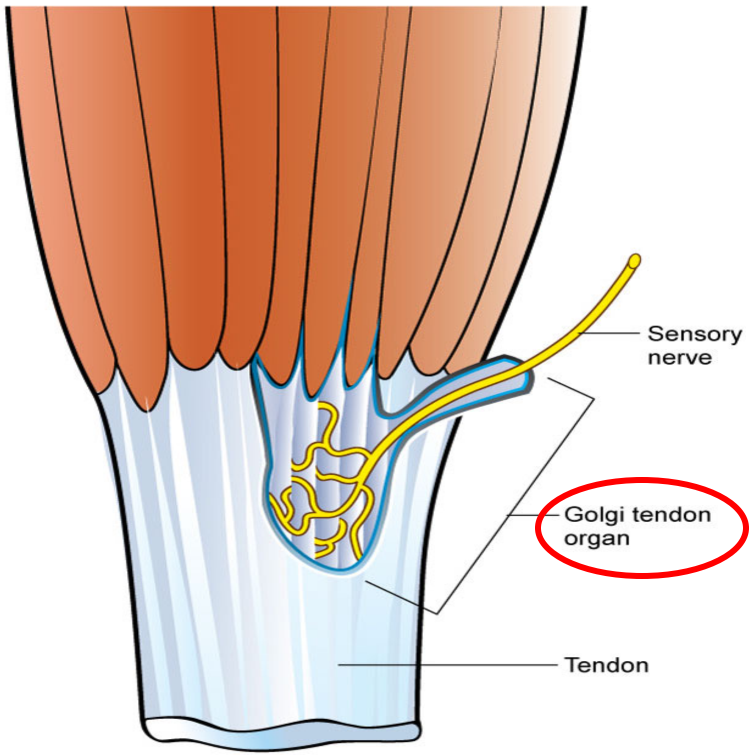
Stretching and Stretch Receptors

Muscle spindle Stretch receptor located within the muscle _____belly______.
Detects sudden stretching, causing the nervous system to respond by reflexively ___contracting___ the muscle.



Stretching and Stretch Receptors

Golgi tendon organ Receptor located at the musculotendinous junction. Detects tension and excessive stretch, causing the nervous system to respond by ___inhibiting___ contraction.



Posture and Muscle Tone

Posture and Muscle Tone

Muscle tone (AKA: tonus) Continued partial contraction of skeletal muscle.

Posture and Muscle Tone

Flaccid Skeletal muscle with ___less___ tone than normal.

Spastic Skeletal muscle with ___more___ than normal tone.

Effects of Massage Therapy on the Muscular System

Effects of Massage Therapy on the Muscular System

Decrease tension within the muscle-tendon unit.

Increase range of motion (ROM)

Decrease delayed onset muscle soreness (DOMS)

Enhance exchange of nutrients and waste to speed recovery from fatigue/soreness

26a A&P: Muscular System -
Fiber Types, Actions, and Contractions