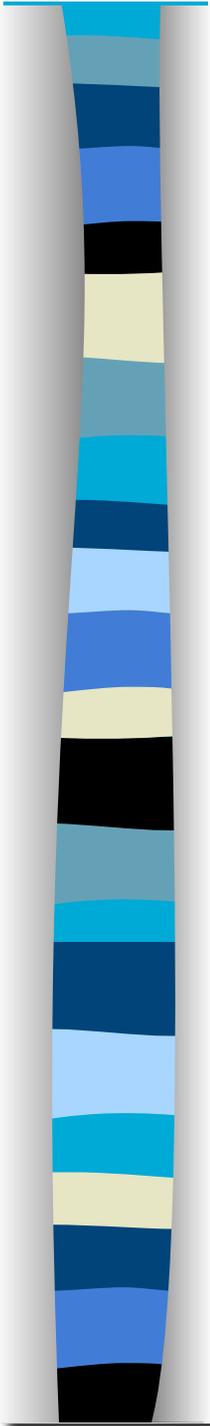


## 26a A&P: Muscular System - Fiber Types, Actions, and Contractions



# 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

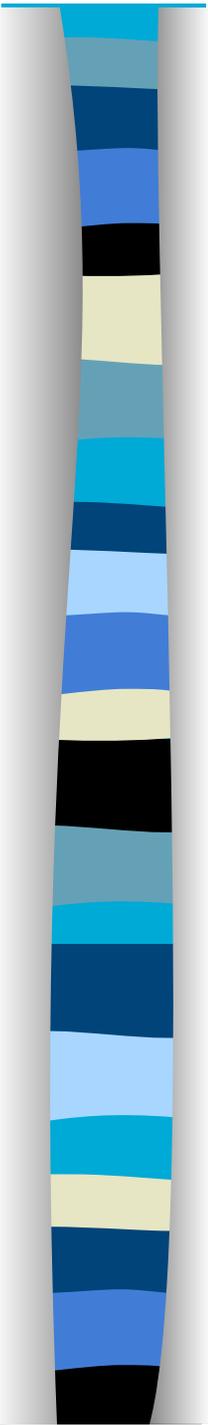
Lecture:

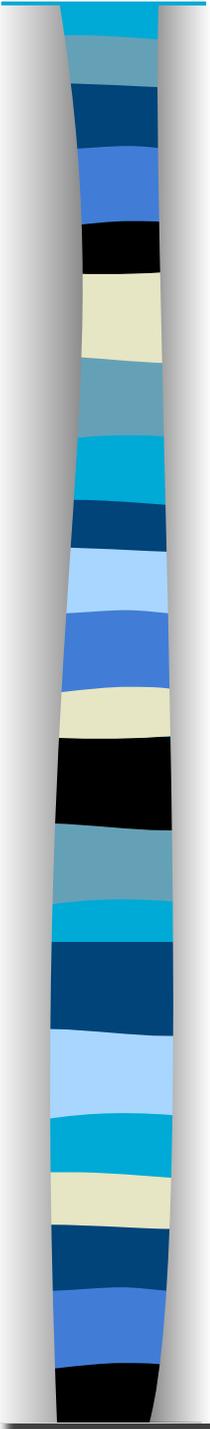
15 minutes

Active study skills:

60 minutes

Total





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

### Quizzes:

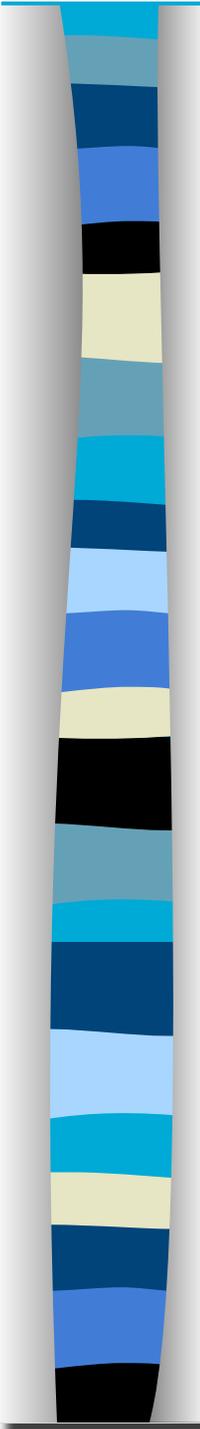
- 29b Kinesiology Quiz
  - Supraspinatus, infraspinatus, teres minor, subscapularis, pec minor, & serratus anterior
- 31a Written Exam Prep Quiz (20a, 20b, 21b, 22a, 23a, 24b, 29b, and 30a)
- 32a Written Exam Prep Quiz (24a, 25a, 26a, 27a, 28a, 29a, 30b, and 31b)

### Assignments:

- 30a Review Questions
  - Packet A: 139-156

### Preparation for upcoming classes:

- 27a Pathology: Musculoskeletal System
  - Packet E: 49-54
  - RQ Packet A-150
- 27b Hydrotherapy: Heat, 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

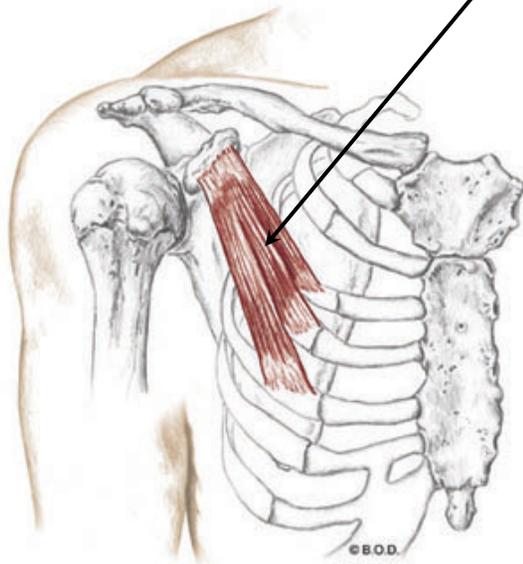
## Trail Guide, Page 92

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

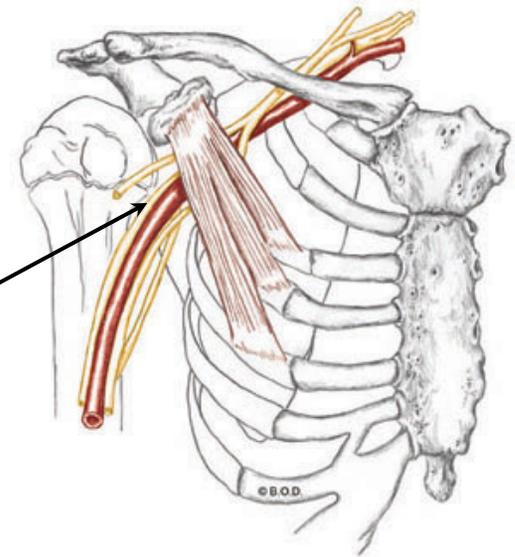
During aerobic activity the pectoralis minor helps to elevate the rib cage for inhalation.

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?



Anterolateral View



Anterior View

# Pectoralis Minor, page 92

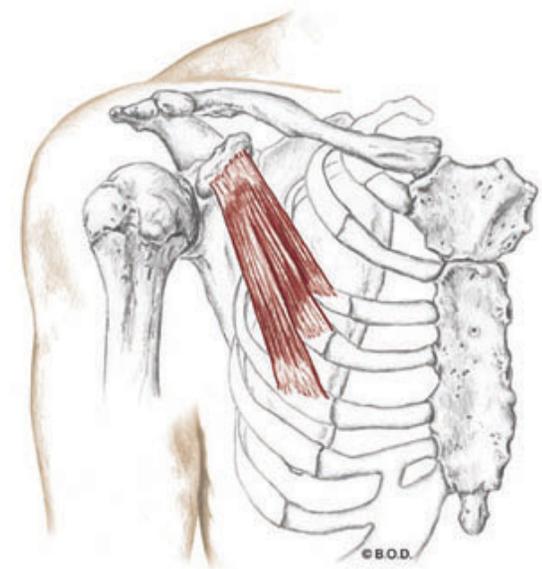
**A** Depress the scapula (scapulothoracic joint)

**Abduct** the scapula (S/T joint)

**Downwardly rotate** the scapula (S/T joint)

With the scapula fixed:

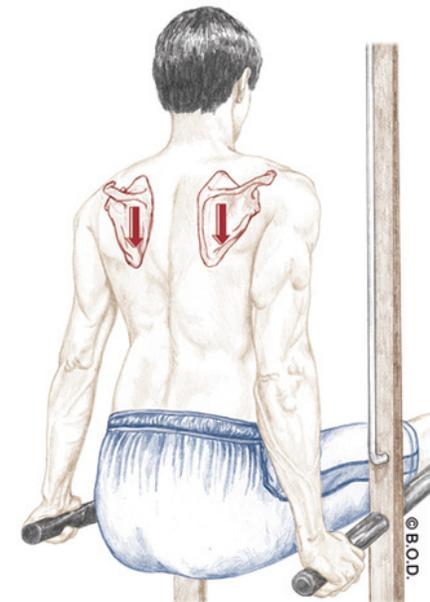
Assist to **elevate** the thorax during forced inhalation



Anterior View

**O** Third, fourth, and fifth ribs

**I** Medial surface of coracoid process of the scapula



# Pectoralis Minor, page 92

**A** Depress the scapula (scapulothoracic joint)

Abduct the scapula (S/T joint)

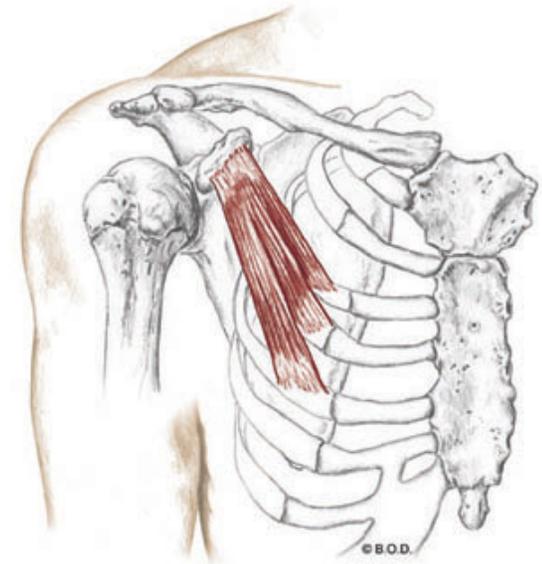
Downwardly rotate the scapula (S/T joint)

With the scapula fixed:

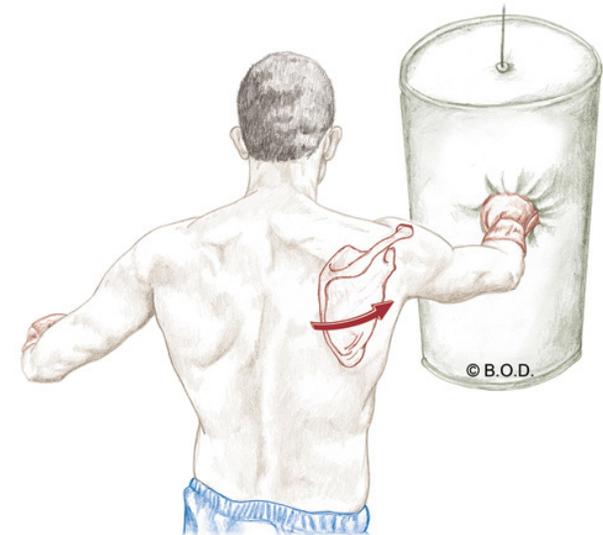
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Anterior View



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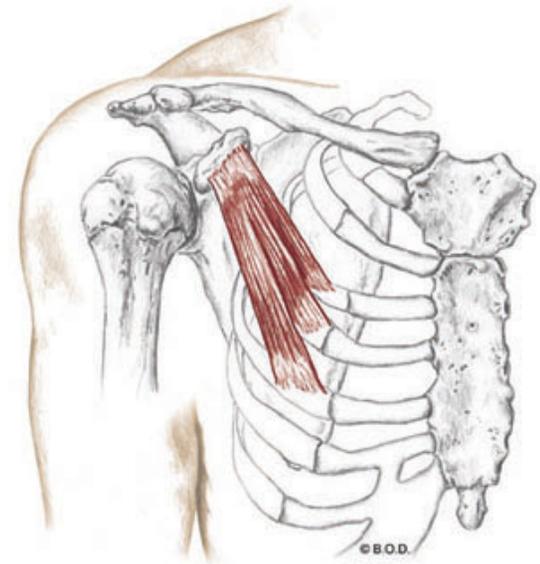
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Anterior View



# Pectoralis Minor, page 92

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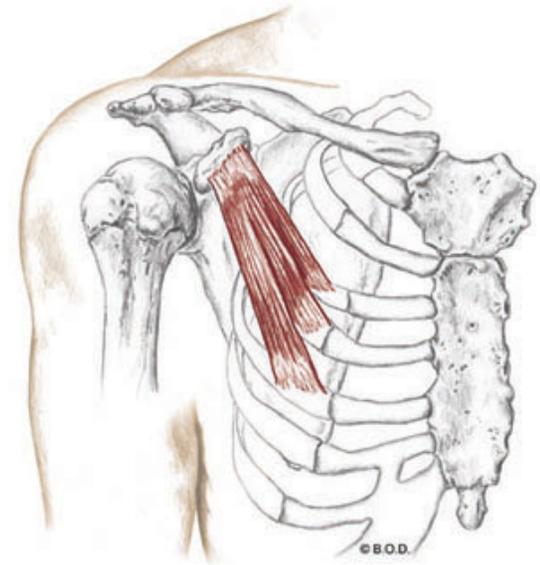
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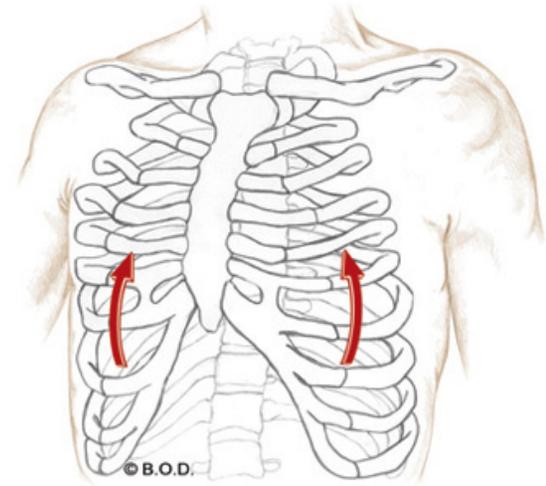
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Anterior View



# Pectoralis Minor, page 92

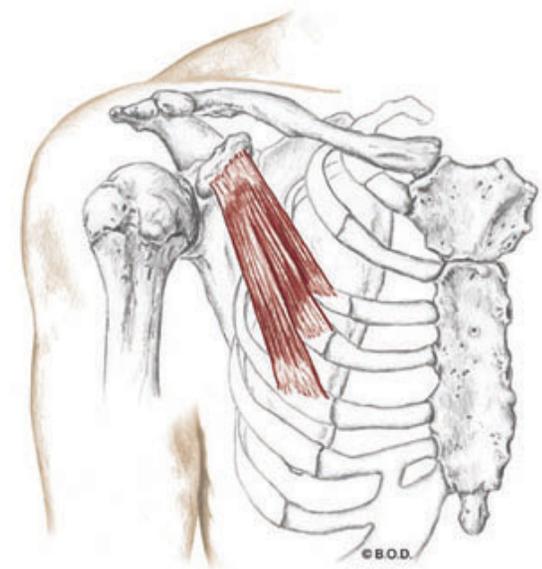
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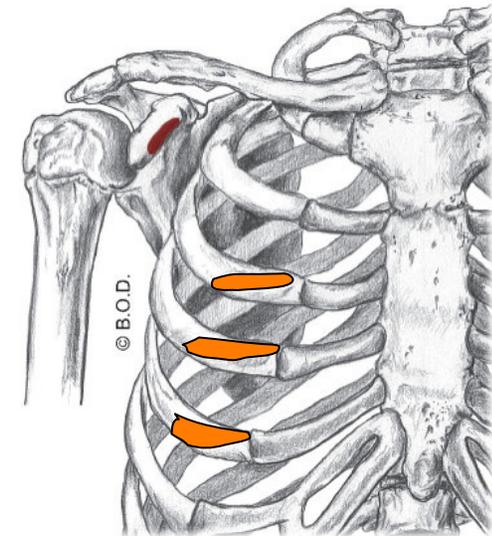
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# Pectoralis Minor, page 92

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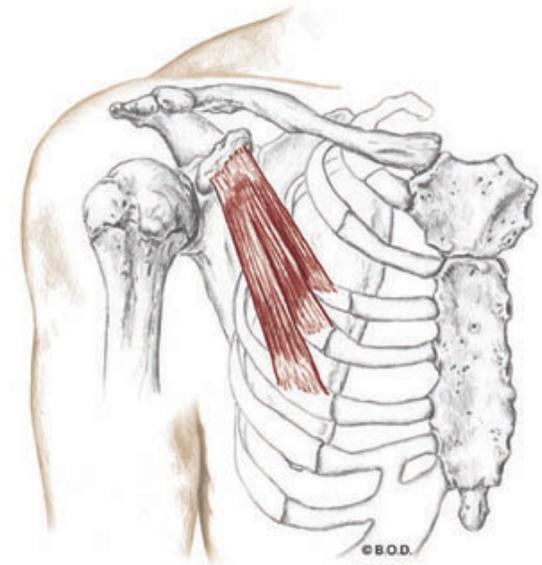
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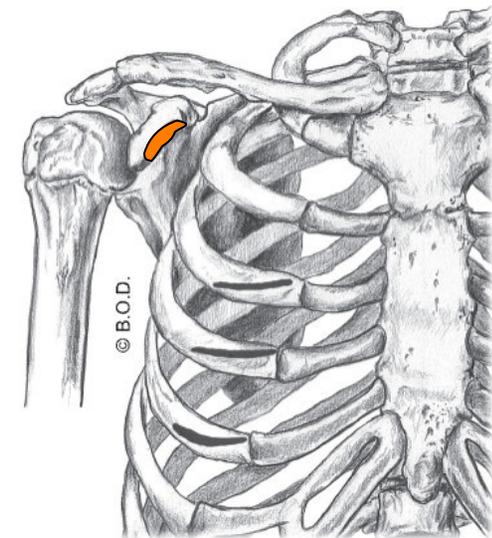
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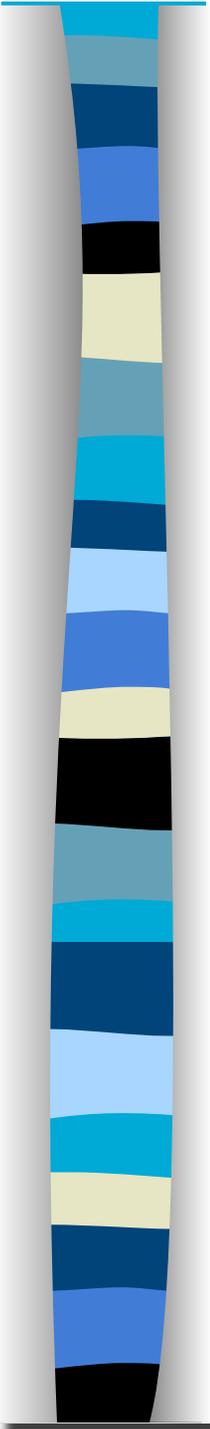
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Anterior View



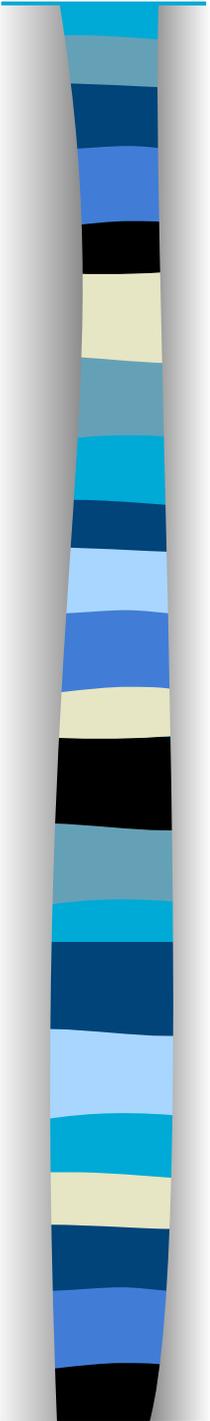


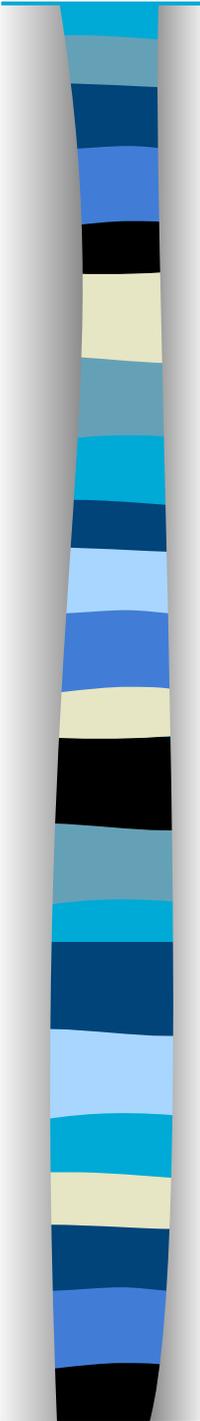
## 26a A&P: Muscular System - Fiber Types, Actions, and Contractions

E - 45

# Energy Sources for Contraction

Adenosine triphosphate  
Fuel  
Oxygen





## Energy Sources for Contraction

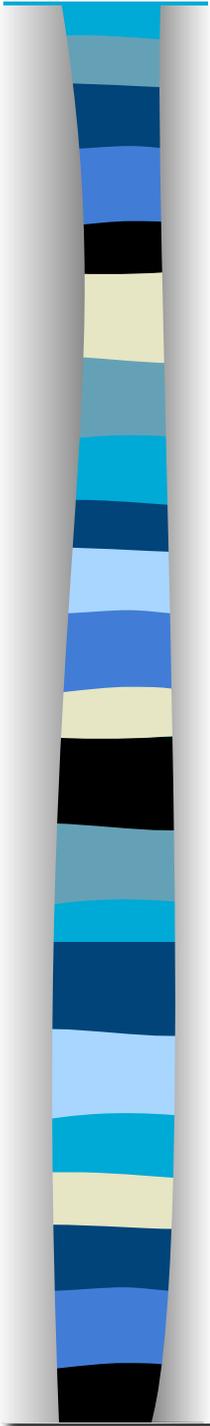
**Adenosine triphosphate (AKA: ATP)** The body's energy storage molecule.

**Fuel** Glucose, fat, or, rarely, protein. Used to form ATP in the mitochondria. By-products are CO<sub>2</sub> and water (from aerobic metabolism), or, from the initial anaerobic process (which only uses carbohydrate, and not O<sub>2</sub>), lactic acid.

**Oxygen** Combined with fuel in the mitochondria during aerobic metabolism, yielding energy (for making ATP) plus CO<sub>2</sub> plus H<sub>2</sub>O.

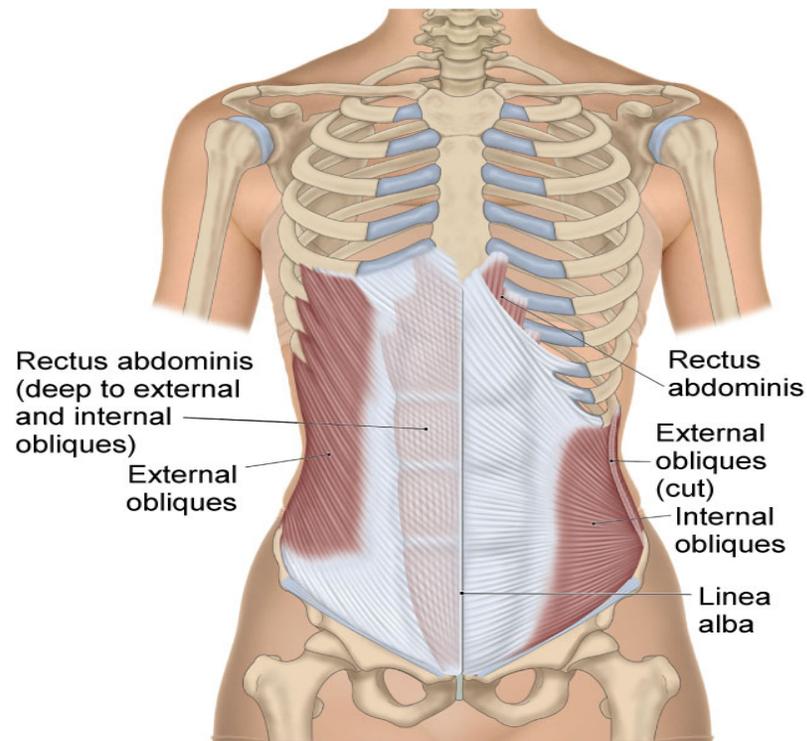
## Types of Skeletal Muscle Fibers

- 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.

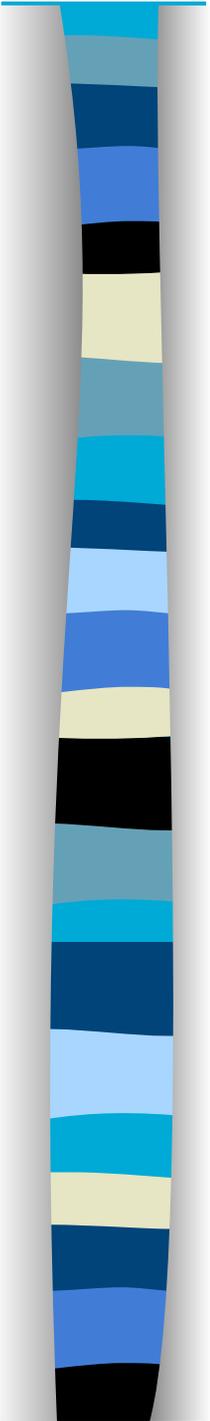


Anterior View



## Types of Skeletal Muscle Fibers

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



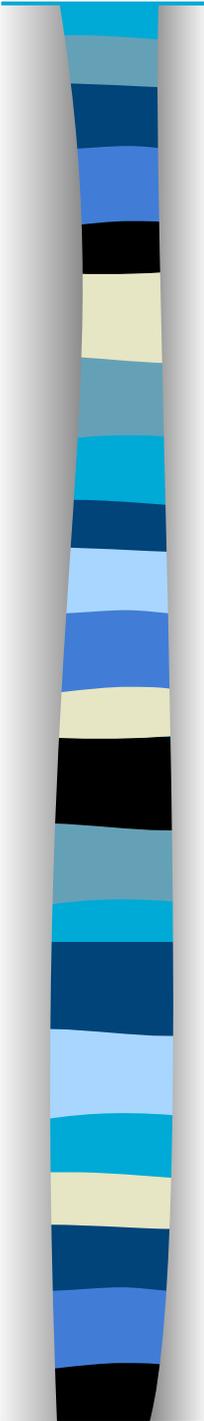
## Types of Skeletal Muscle Fibers

**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.



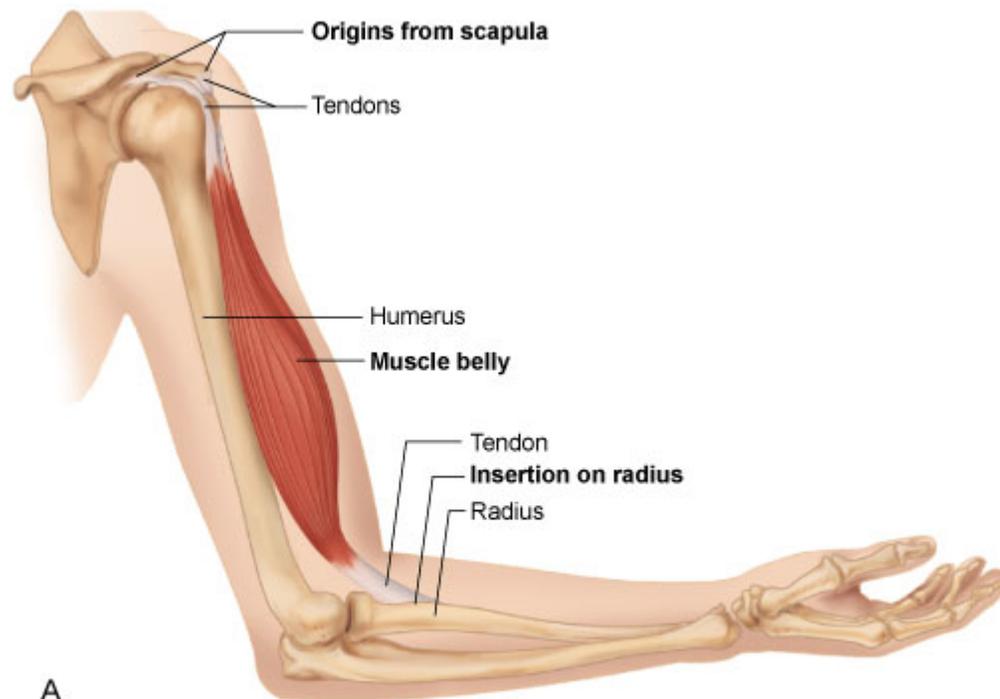
# Parts of Skeletal Muscle

Belly  
Origin  
Insertion



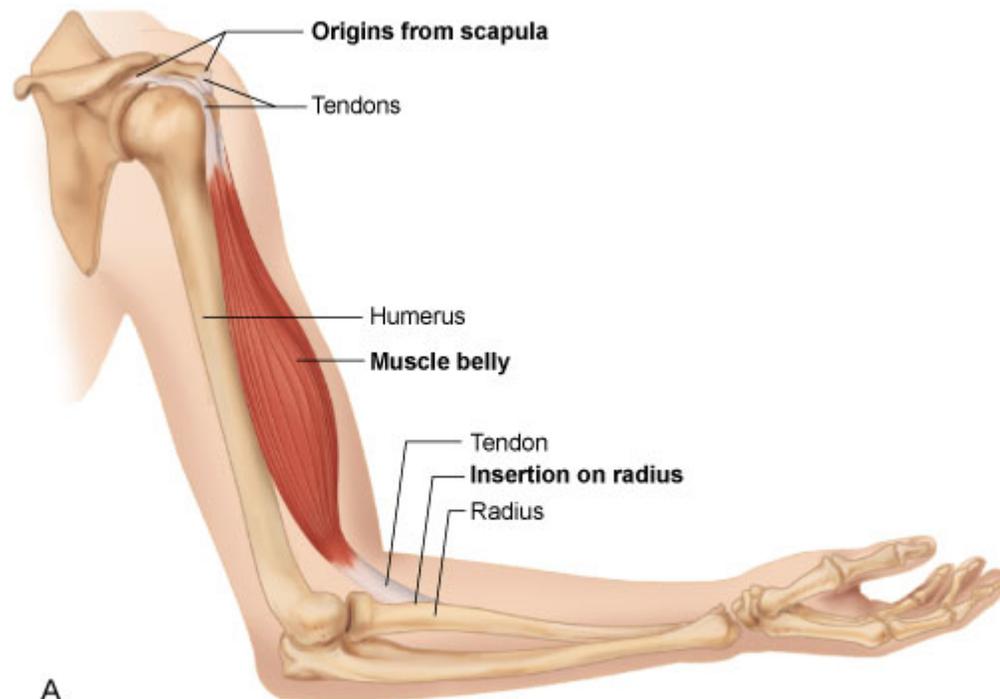
## Parts of Skeletal Muscle

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



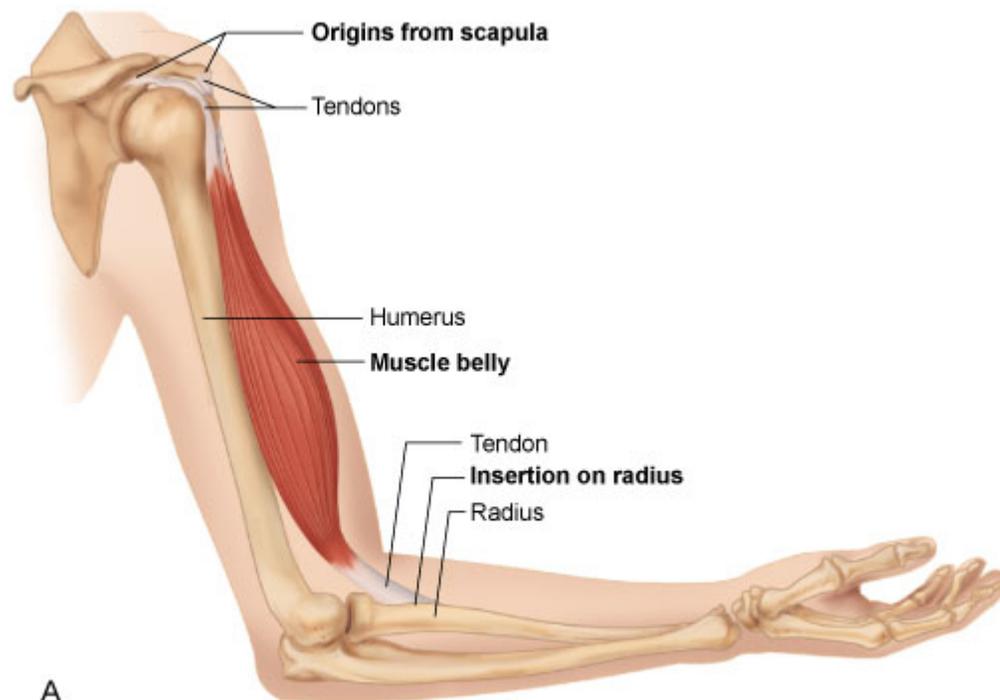
## Parts of Skeletal Muscle

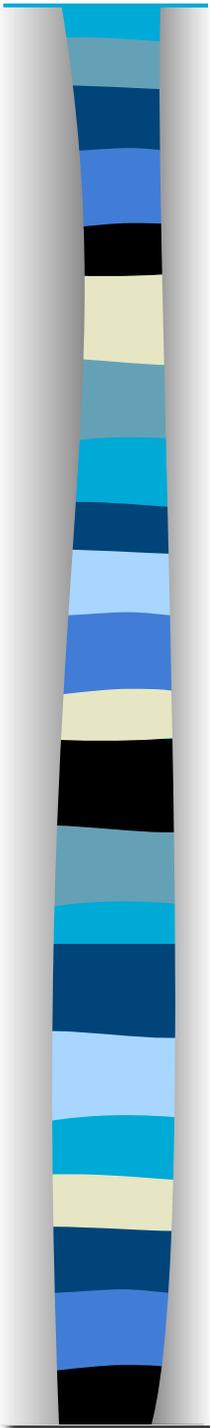
**Origin** Tendinous muscle attachment on the less movable bone or other structure. Typically medial or proximal to the insertion.



## 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

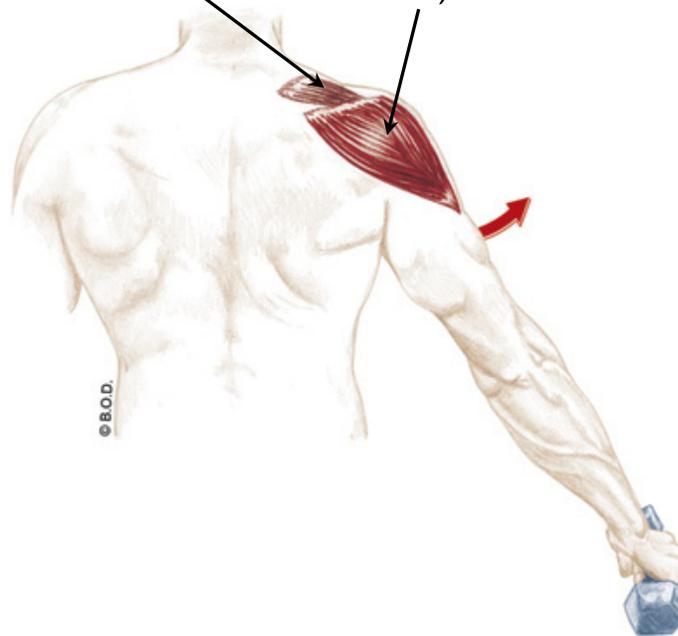
## Muscle Actions

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

### Glenohumeral abduction prime movers:

Supraspinatus

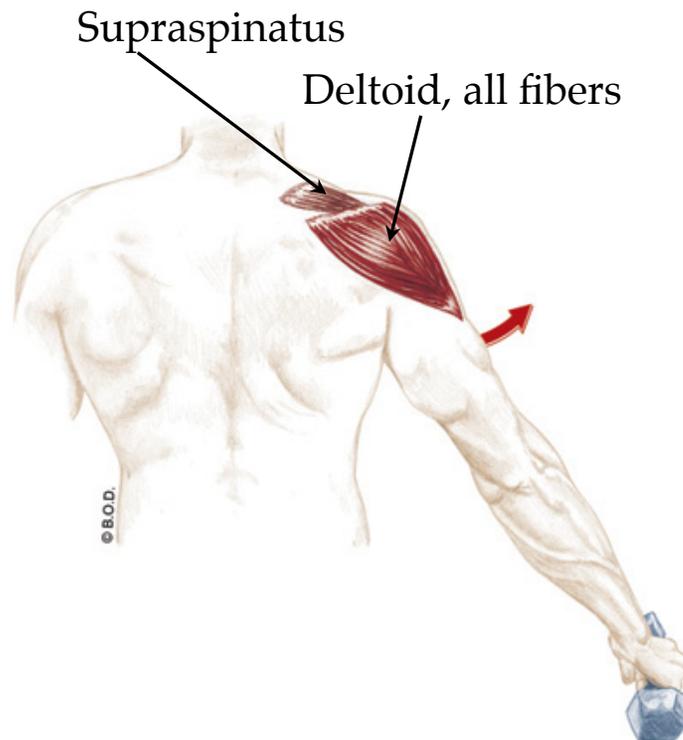
Deltoid, all fibers



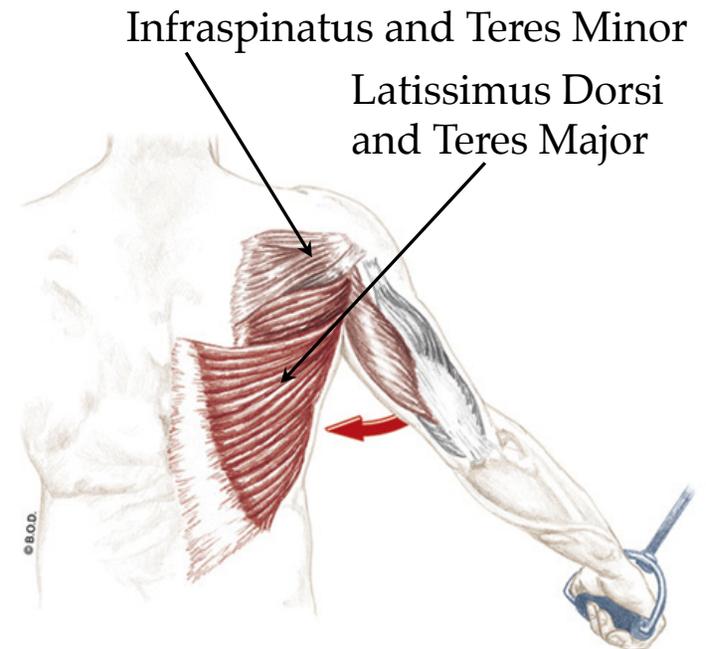
## Muscle Actions

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

Glenohumeral abduction prime movers:



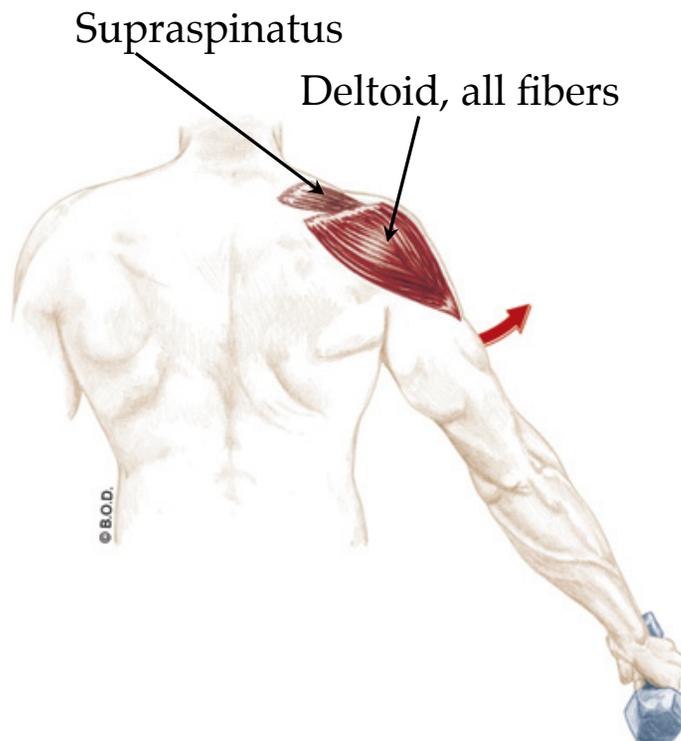
Glenohumeral abduction antagonists:



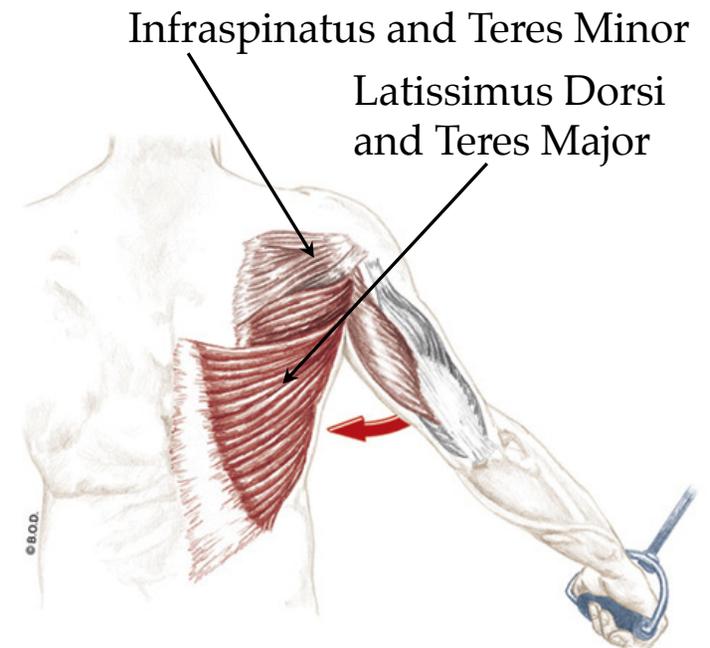
## Muscle Actions

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

### Glenohumeral abduction synergists:



### Glenohumeral adduction synergists:



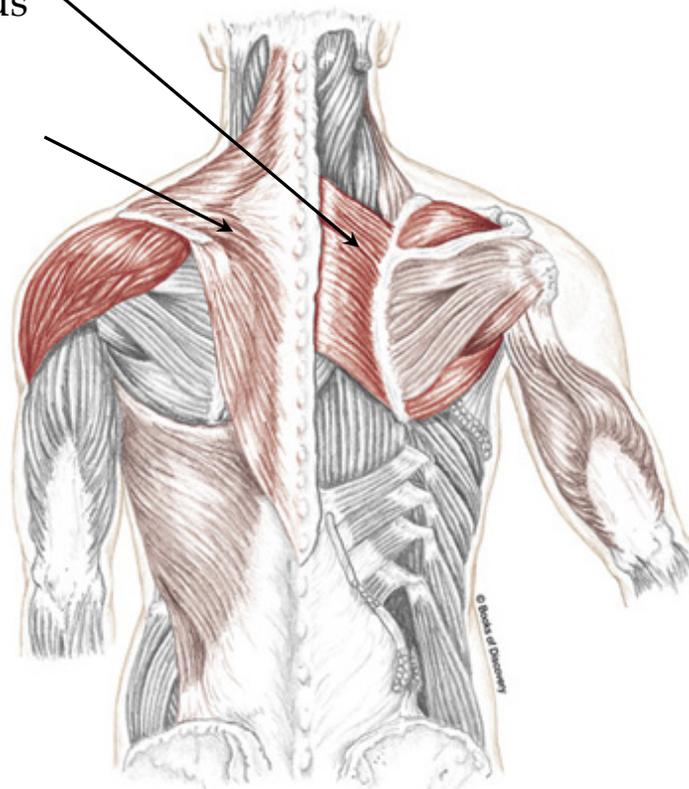
## Muscle Actions

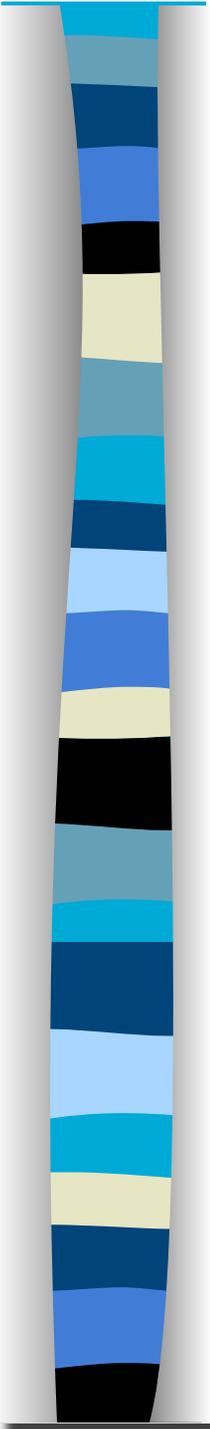
**Fixator** Specialized synergist muscles that act as a stabilizer.

Fixators during glenohumeral abduction:

Rhomboids

Trapezius





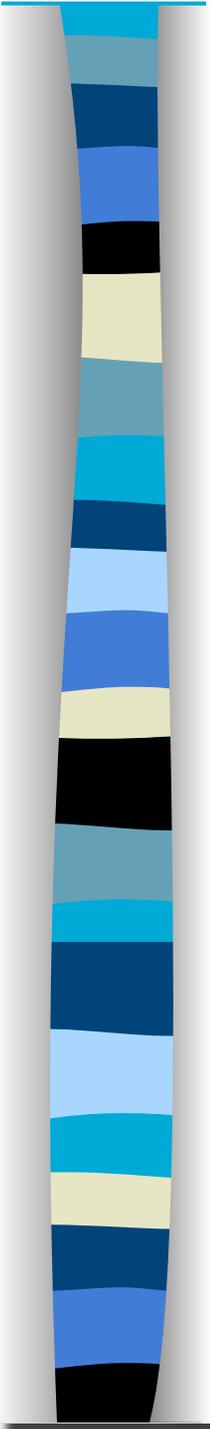
# Types of Contractions

Isotonic contraction

Concentric contraction

Eccentric contraction

Isometric contraction



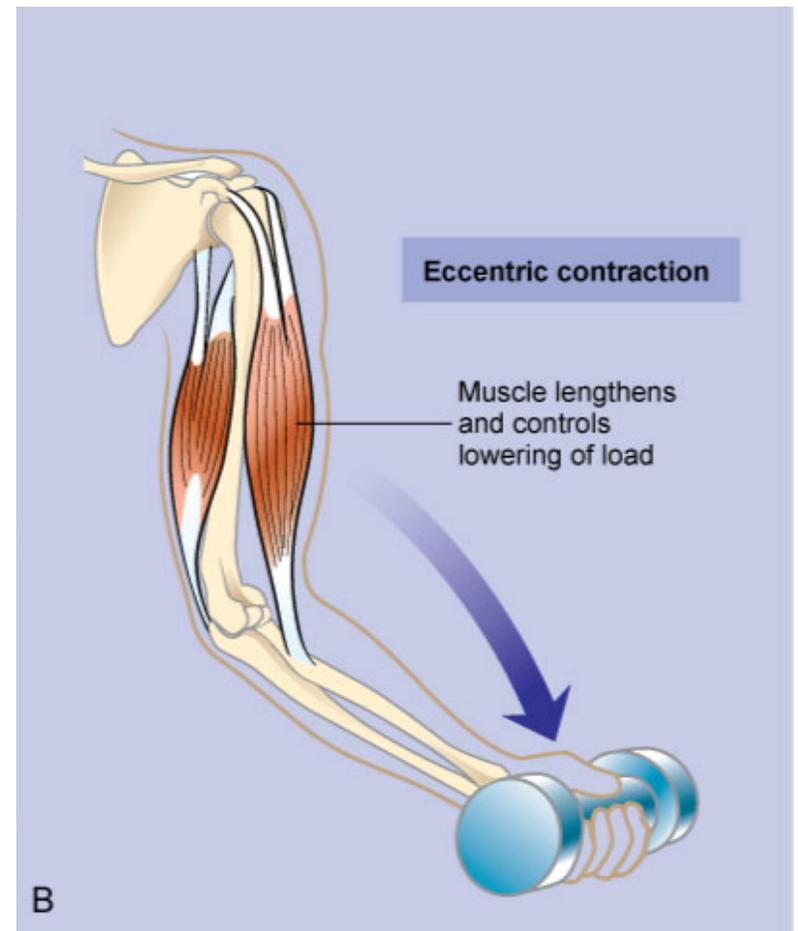
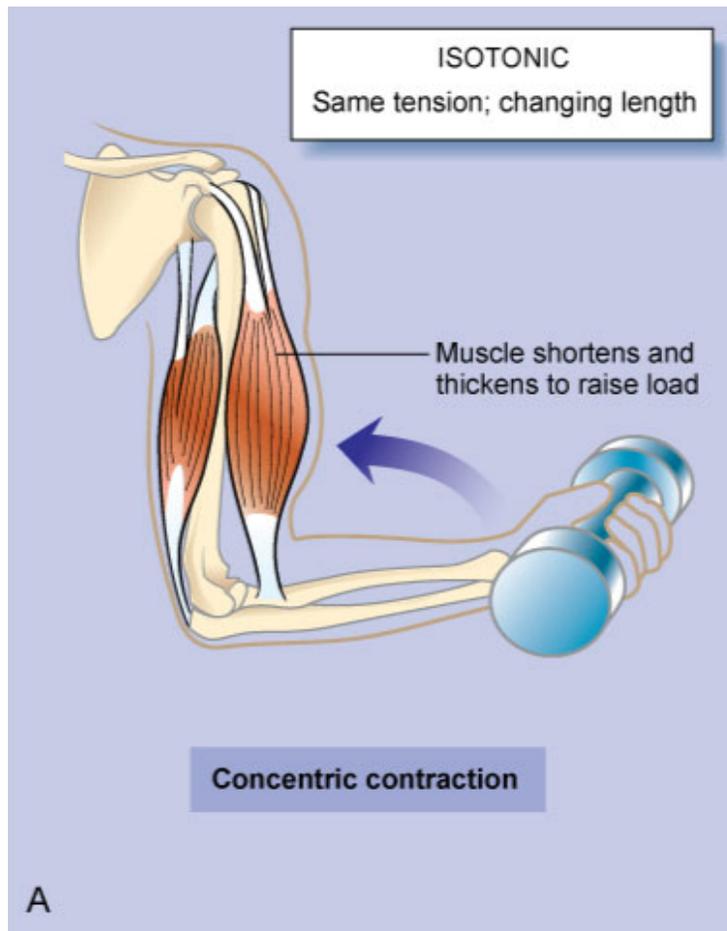
## Types of Contractions

**Isotonic contraction** Contraction in which muscle changes length.

**Concentric contraction** Isotonic contraction. The muscle shortens.

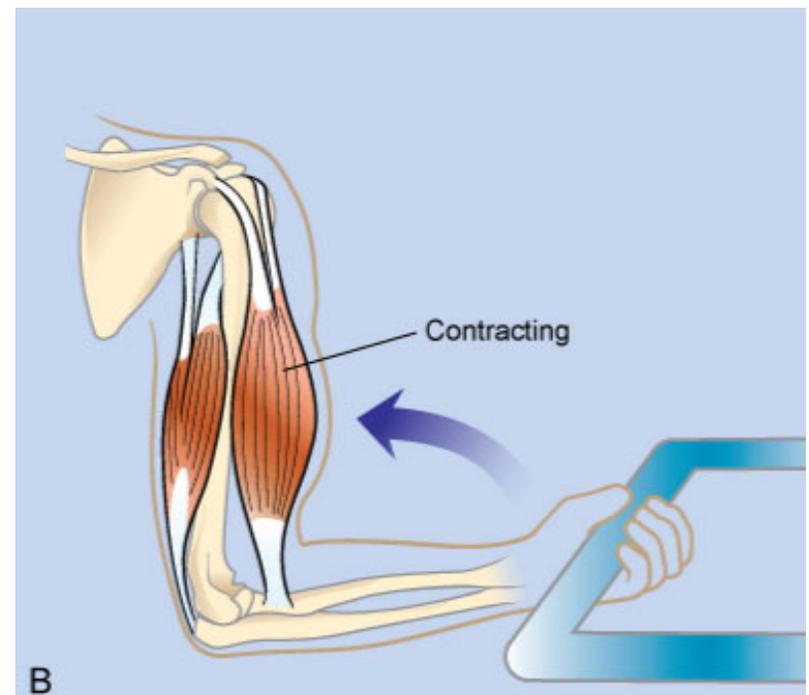
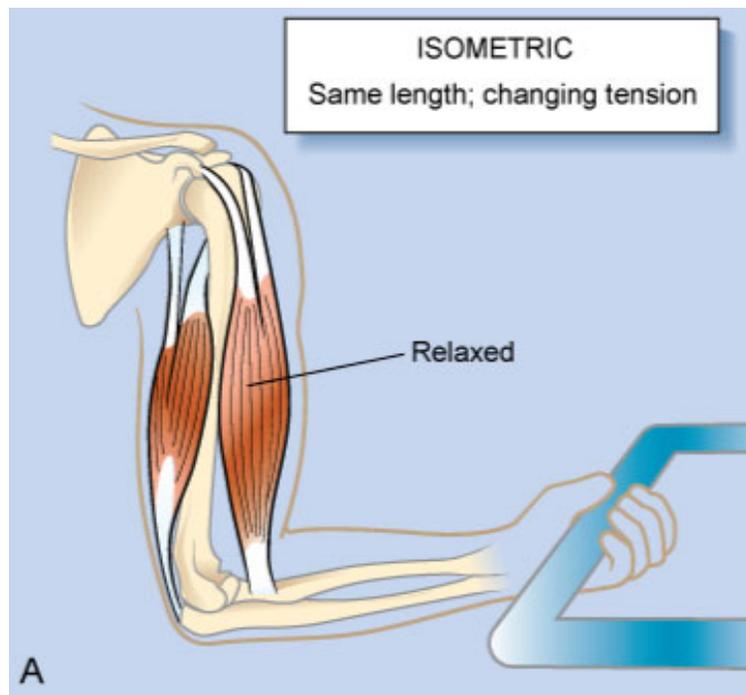
**Eccentric contraction** Isotonic contraction. The muscle lengthens.

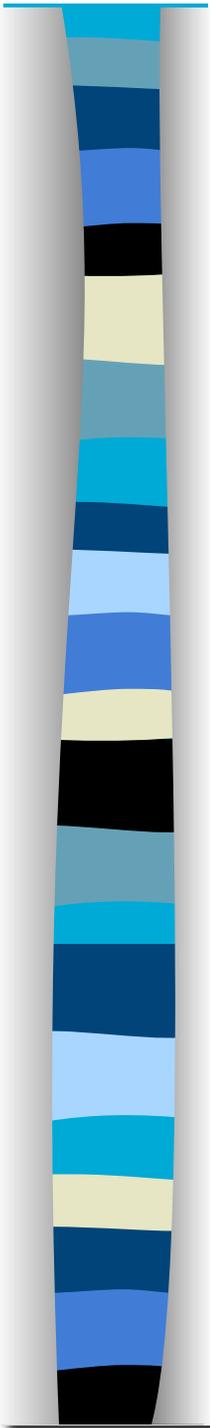
# Types of Contractions



## Types of Contractions

**Isometric contraction** Contraction in which muscle length remains the same.

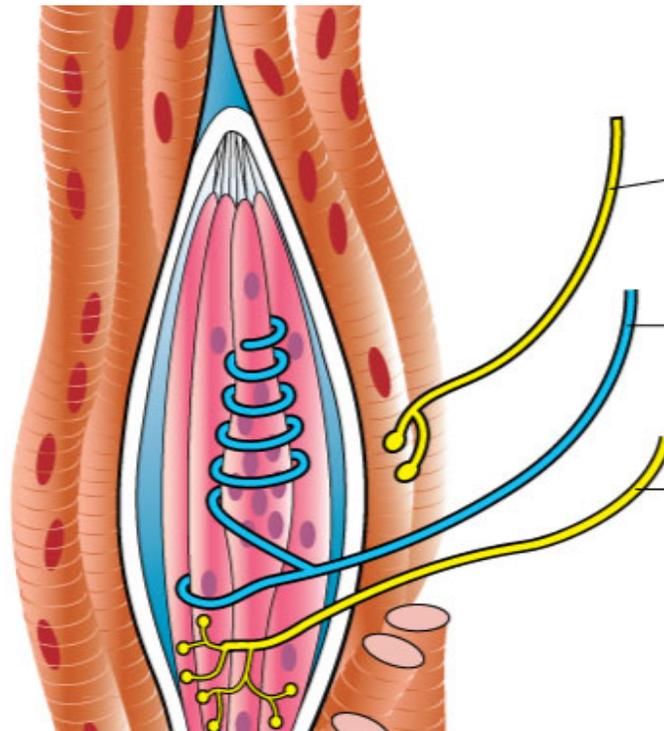




## Stretching and Stretch Receptors

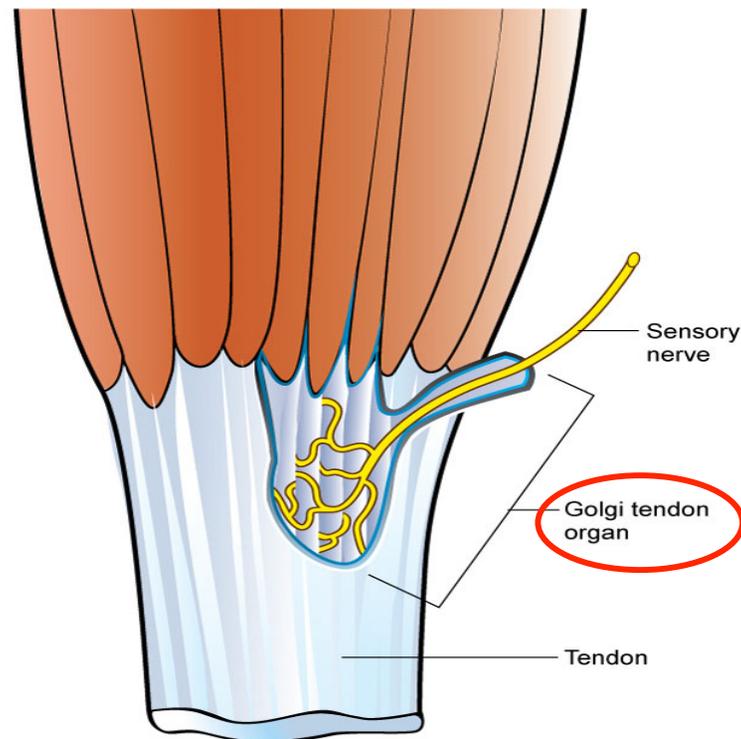
## Stretching and Stretch Receptors

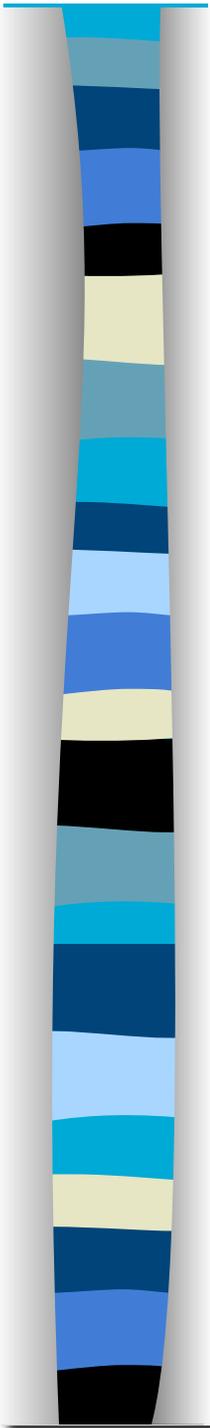
**Muscle spindle** Stretch receptor located within the muscle belly. Detects sudden stretching, causing the nervous system to respond by reflexively contracting the muscle.



## 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.



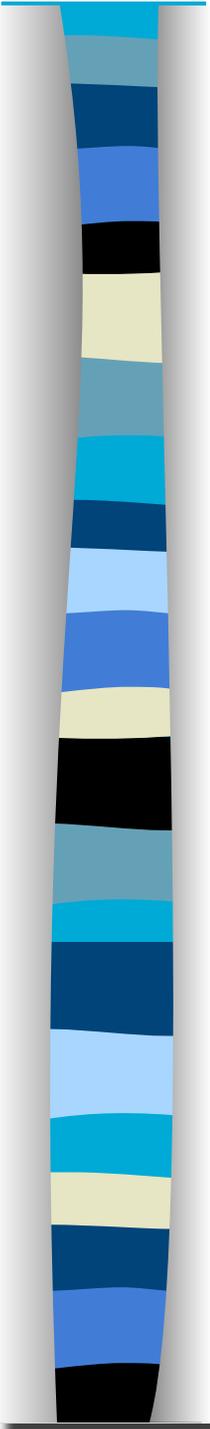


## Posture and Muscle Tone

## Posture and Muscle Tone

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

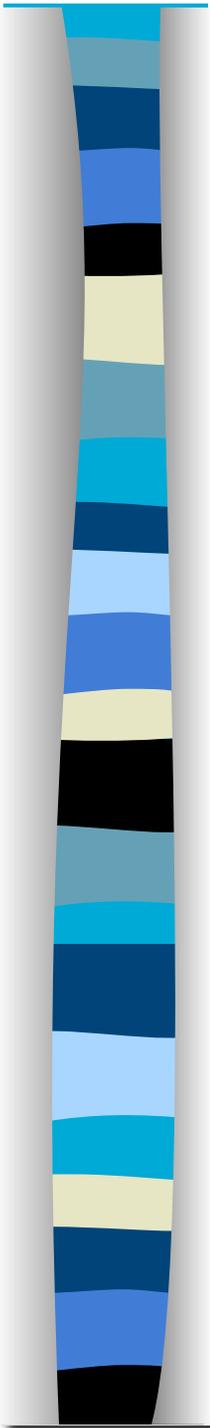




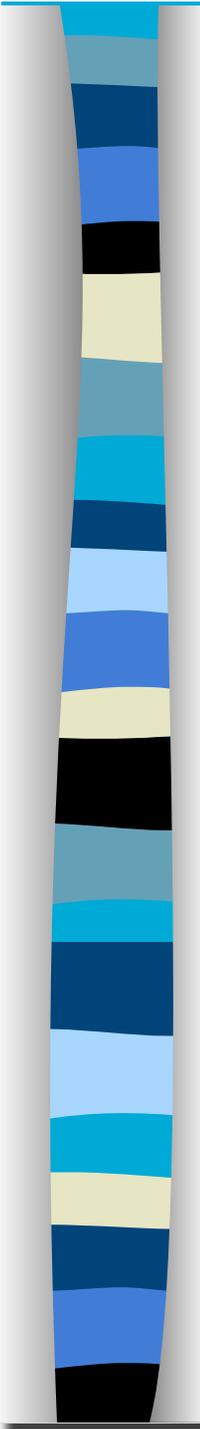
## Posture and Muscle Tone

**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

