

توصیه گایدلاین های پزشکی ورزشی در فعالیت فیزیکی بالغین

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پزشک-متخصص پزشکی ورزشی



PHYSICAL ACTIVITY AND FITNESS TERMINOLOGY

- PHYSICAL ACTIVITY
- Exercise



Physical activity vs **exercise**, what's the difference?

Benefits and Risks Associated with Physical Activity

Box 1.1

Health-Related and Skill-Related Components of Physical Fitness

Health-related Physical Fitness Components

- **Cardiorespiratory endurance:** the ability of the circulatory and respiratory system to supply oxygen

during sustained physical activity

- **Body composition:** the relative amounts of muscle, fat, bone, and other vital parts of the body
- **Muscular strength:** the ability of muscle to exert force
- **Muscular endurance:** the ability of muscle to continue to perform without fatigue
- **Flexibility:** the range of motion available at a joint

Skill-related Physical Fitness Components

- **Agility:** the ability to change the position of the body in space with speed and accuracy
- **Coordination:** the ability to use the senses, such as sight and hearing, together with body parts in performing tasks smoothly and accurately
- **Balance:** the maintenance of equilibrium while stationary or moving
- **Power:** the ability or rate at which one can perform work
- **Reaction time:** the time elapsed between stimulation and the beginning of the reaction to it
- **Speed:** the ability to perform a movement within a short period of time

Decreased Morbidity and Mortality

- Primary prevention (*i.e.*, interventions to prevent the initial occurrence)
 - Higher activity and/or fitness levels are associated with lower death rates from CAD
 - Higher activity and/or fitness levels are associated with lower incidence rates for CVD, CAD, stroke, Type 2 diabetes mellitus, metabolic syndrome, osteoporotic fractures, cancer of the colon and breast, and gallbladder disease
- Secondary prevention (*i.e.*, interventions after a cardiac event to prevent another)
 - Based on meta-analyses (*i.e.*, pooled data across studies), cardiovascular and all-cause mortality are reduced in patients with post-myocardial infarction (MI) who participate in cardiac rehabilitation exercise training, especially as a component of multifactorial risk factor reduction (Note: randomized controlled trials of cardiac rehabilitation exercise training involving patients with post-MI do not support a reduction in the rate of nonfatal reinfarction).

Other Benefits

- Decreased anxiety and depression
- Improved cognitive function
- Enhanced physical function and independent living in older individuals
- Enhanced feelings of well-being
- Enhanced performance of work, recreational, and sport activities
- Reduced risk of falls and injuries from falls in older individuals
- Prevention or mitigation of functional limitations in older adults
- Effective therapy for many chronic diseases in older adults

Box 1.2**The ACSM-AHA Primary Physical Activity (PA) Recommendations (33)**

- All healthy adults aged 18–65 yr should participate in moderate intensity aerobic PA for a minimum of 30 min on 5 d · wk⁻¹ or vigorous intensity aerobic activity for a minimum of 20 min on 3 d · wk⁻¹.
- Combinations of moderate and vigorous intensity exercise can be performed to meet this recommendation.
- Moderate intensity aerobic activity can be accumulated to total the 30 min minimum by performing bouts each lasting ≥10 min.
- Every adult should perform activities that maintain or increase muscular strength and endurance for a minimum of 2 d · wk⁻¹.
- Because of the dose-response relationship between PA and health, individuals who wish to further improve their fitness, reduce their risk for chronic diseases and disabilities, and/or prevent unhealthy weight gain may benefit by exceeding the minimum recommended amounts of PA.

ACSM, American College of Sports Medicine; AHA, American Heart Association.

RISKS ASSOCIATED WITH PHYSICAL ACTIVITY AND EXERCISE

- Exercise-Related Musculoskeletal Injury
- EXERCISE-RELATED CARDIAC EVENTS IN ADULTS

Exercise-Related Musculoskeletal Injury



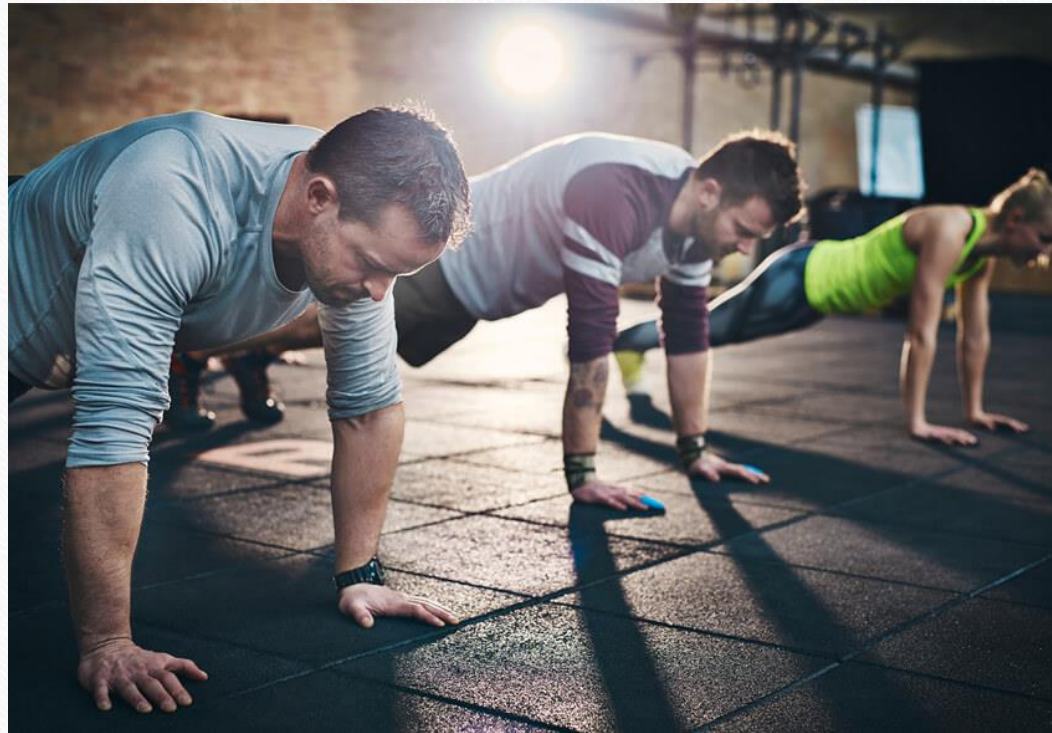
EXERCISE-RELATED CARDIAC EVENTS IN ADULTS



SEDENTARY BEHAVIOR AND HEALTH



HEALTH BENEFITS OF IMPROVING MUSCULAR FITNESS



Box 6.1

Components of the Exercise Training Session

Warm-up: at least 5–10 min of light-to-moderate intensity cardiorespiratory and muscular endurance activities

Conditioning: at least 20–60 min of aerobic, resistance, neuromotor, and/or sports activities (exercise bouts of 10 min are acceptable if the individual accumulates at least $20\text{--}60 \text{ min} \cdot \text{d}^{-1}$ of daily aerobic exercise)

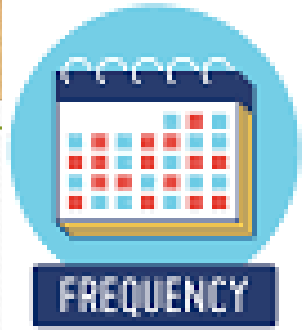
Cool-down: at least 5–10 min of light-to-moderate intensity cardiorespiratory and muscular endurance activities

Stretching: at least 10 min of stretching exercises performed after the warm-up or cool-down phase

Adapted from (37,107).

AEROBIC (CARDIORESPIRATORY ENDURANCE) EXERCISE





■ AEROBIC EXERCISE **FREQUENCY** RECOMMENDATION

FIT

Moderate intensity aerobic exercise done at least $5 \text{ d} \cdot \text{wk}^{-1}$, or vigorous intensity aerobic exercise done at least $3 \text{ d} \cdot \text{wk}^{-1}$, or a weekly combination of $3\text{--}5 \text{ d} \cdot \text{wk}^{-1}$ of moderate and vigorous intensity exercise is recommended for most adults to achieve and maintain health/fitness benefits.



■ AEROBIC EXERCISE **INTENSITY** RECOMMENDATION

FIT

Moderate (*e.g.*, 40%–59% heart rate reserve [HRR] or $\dot{V}O_2R$) to vigorous (*e.g.*, 60%–89% HRR or $\dot{V}O_2R$) intensity aerobic exercise is recommended for most adults, and light (*e.g.*, 30%–39% HRR or $\dot{V}O_2R$) to moderate intensity aerobic exercise can be beneficial in individuals who are deconditioned. Interval training may be an effective way to increase the total volume and/or average exercise intensity performed during an exercise session and may be beneficial for adults.

Methods of Estimating Intensity of Exercise

✓ آزمون صحبت کردن (Talk test)

- اگر شما در حال فعالیت با شدت متوسط هستید، می توانید در طول فعالیت صحبت کنید، اما نمیتوانید آواز بخوانید.
- اگر شما در حال فعالیت با شدت شدید هستید، نمیتوانید بیش از چند کلمه بدون توقف برای نفس بگویید.
- اگر نمی توانید حرف بزنید، یعنی خیلی سخت تمرین می کنید.
- اگر حین فعالیت میتوانید آواز بخوانید، یعنی شدت تمرین شما به اندازه کافی نیست.

6	
7	خیلی خیلی سبک
8	
9	خیلی سبک
10	
11	نسبتاً سبک
12	
13	کمی سخت
14	
15	سخت
16	
17	خیلی سخت
18	
19	خیلی خیلی سخت
20	حداکثر

✓ ضربان قلب هدف (THR)

فعالیت هوازی متوسط 60 تا 70 درصد از ضربان قلب حداکثر و فعالیت هوازی شدید 70 تا 80 درصد از ضربان قلب حداکثر فرد می باشد.



محاسبه ضربان قلب حین تمرین

- پس از تمرین برای حدود 10 دقیقه، توقف کنید.

- دو انگشت خود را روی مچ دست زیر انگشت شست قرار دهید، از انگشت شست برای این کار استفاده نکنید.

- ضربان قلب خود را برای 15 ثانیه بشمارید و در عدد 4 ضرب کنید تا تعداد ضربان در دقیقه را بدست بیاورید.

Box 6.2**Summary of Methods for Prescribing Exercise Intensity Using Heart Rate (HR), Oxygen Uptake ($\dot{V}O_2$), and Metabolic Equivalents (METs)**

- HRR method: Target HR (THR) = $[(HR_{\max/\text{peak}}^a - HR_{\text{rest}}) \times \% \text{ intensity desired}] + HR_{\text{rest}}$
- $\dot{V}O_2R$ method: Target $\dot{V}O_2R^c = [(\dot{V}O_{2\max/\text{peak}}^b - \dot{V}O_{2\text{rest}}) \times \% \text{ intensity desired} + \dot{V}O_{2\text{rest}}$
- HR method: Target HR = $HR_{\max/\text{peak}}^a \times \% \text{ intensity desired}$
- $\dot{V}O_2$ method: Target $\dot{V}O_2^c = \dot{V}O_{2\max/\text{peak}}^b \times \% \text{ intensity desired}$
- MET method: Target MET^c = $[(\dot{V}O_{2\max/\text{peak}}^b) / 3.5 \text{ mL} \cdot \text{kg}^{-1} \cdot \text{min}^{-1}] \times \% \text{ intensity desired}$

^a $HR_{\max/\text{peak}}$ is the highest value obtained during maximal/peak exercise or it can be estimated by $220 - \text{age}$ or some other prediction equation (see [Table 6.2](#)).

^b $\dot{V}O_{2\max/\text{peak}}$ is the highest value obtained during maximal/peak exercise or it can be estimated from a submaximal exercise test. See “The Concept of Maximal Oxygen Uptake” section in [Chapter 4](#) for the distinction between $\dot{V}O_{2\max}$ and $\dot{V}O_{2\text{peak}}$.

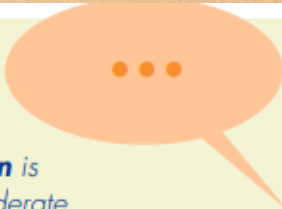
^cActivities at the target $\dot{V}O_2$ and MET can be determined using a compendium of physical activity (1,2) or metabolic calculations (46) (see [Table 6.3](#)).

$HR_{\max/\text{peak}}$, maximal or peak heart rate; HRR, heart rate reserve; HR_{rest} , resting heart rate; $\dot{V}O_{2\max/\text{peak}}$, maximal or peak volume of oxygen consumed per unit of time; $\dot{V}O_2R$, oxygen uptake reserve; $\dot{V}O_{2\text{rest}}$, resting volume of oxygen consumed per unit of time.

Talk test is a way to gauge exercise intensity based on ability to carry on a conversation.



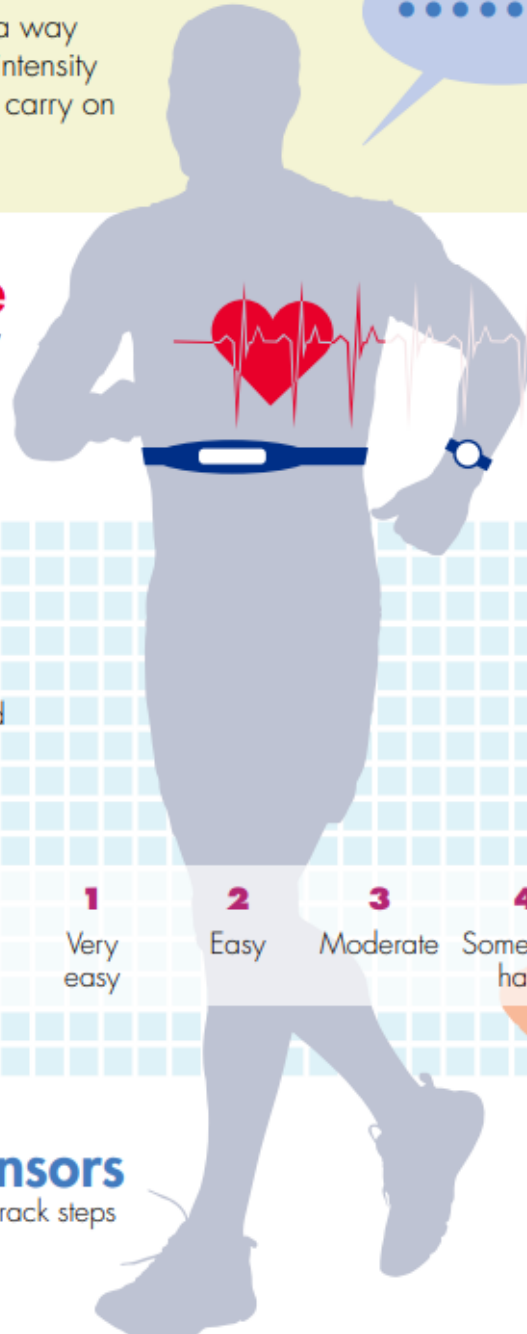
Steady conversation is associated with moderate intensity aerobic exercise.



Vigorous intensity is an exercise intensity where only a few words are sustainable.

Heart rate

can be monitored by using a wrist watch and chest strap or a smart watch.



- A percentage of maximal heart rate indicates intensity (%HRmax)
- Moderate intensity exercise is estimated at 65-75 %HRmax
- Vigorous exercise is 76-96 %HRmax
- Target HR = (220-age) x %HRmax

Perceived effort

is a subjective method to monitor how hard exercise feels.

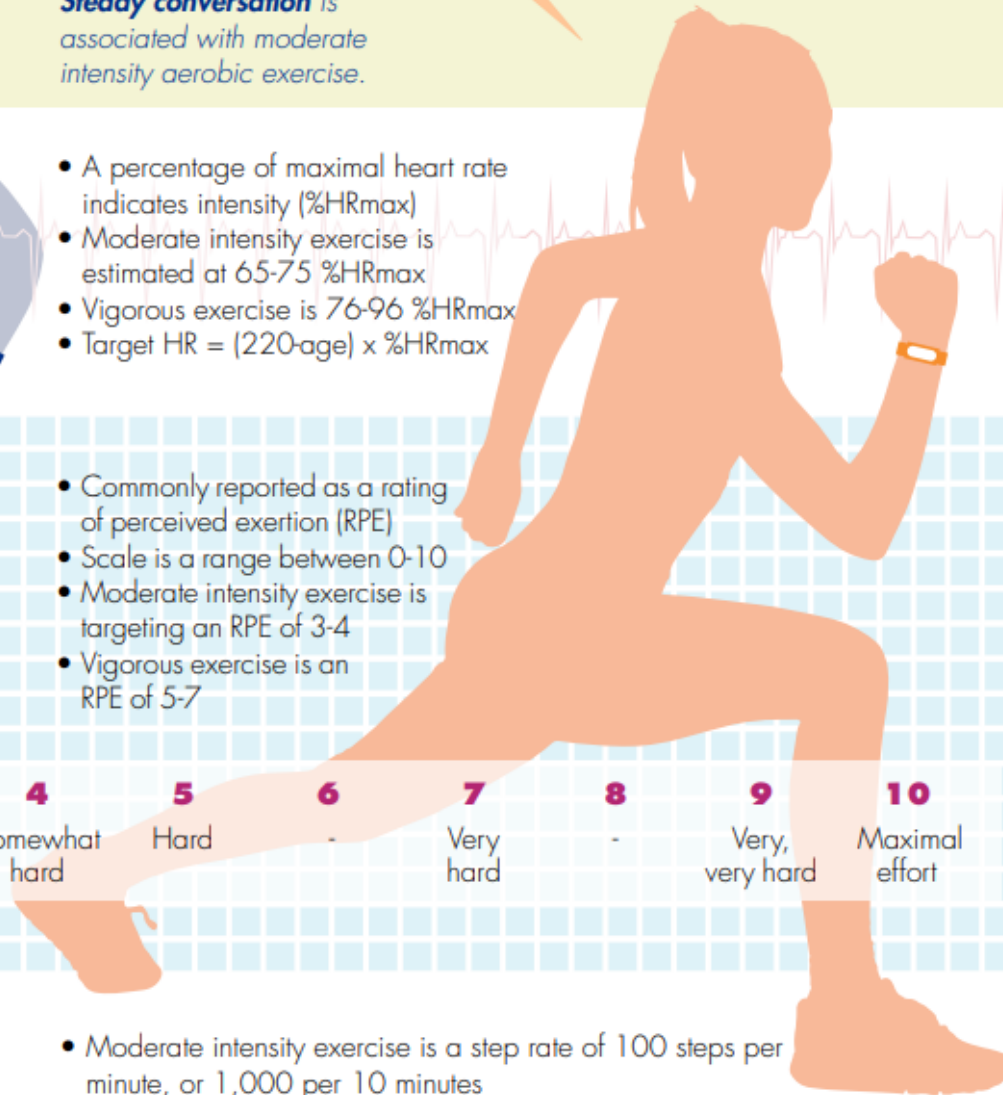
- Commonly reported as a rating of perceived exertion (RPE)
- Scale is a range between 0-10
- Moderate intensity exercise is targeting an RPE of 3-4
- Vigorous exercise is an RPE of 5-7

Rating	0	1	2	3	4	5	6	7	8	9	10
Descriptor	Rest	Very easy	Easy	Moderate	Somewhat hard	Hard	-	Very hard	-	Very, very hard	Maximal effort

Motion sensors

are devices used to track steps and other activities.

- Moderate intensity exercise is a step rate of 100 steps per minute, or 1,000 per 10 minutes
- A common recommendation is to achieve 3,000 steps in 30 minutes
- Vigorous intensity is > 100 steps per minute.





■ AEROBIC EXERCISE **TIME** (DURATION) RECOMMENDATION

FIT

Most adults should accumulate 30–60 min · d⁻¹ (≥150 min · wk⁻¹) of moderate intensity exercise, 20–60 min · d⁻¹ (≥75 min · wk⁻¹) of vigorous intensity exercise or a combination of moderate and vigorous intensity exercise daily to attain the recommended targeted volumes of exercise. This recommended amount of exercise may be accumulated in one continuous exercise session or in bouts of ≥10 min over the course of a day. Durations of exercise less than recommended can be beneficial in some individuals.



■ AEROBIC EXERCISE **TYPE** RECOMMENDATION

FIT

Rhythmic, aerobic exercise of at least moderate intensity that involves large muscle groups and requires little skill to perform is recommended for all adults to improve health and CRF. Other exercise and sports requiring skill to perform or higher levels of fitness are recommended only for individuals possessing adequate skill and fitness to perform the activity.

TABLE 6.4**Modes of Aerobic (Cardiorespiratory Endurance) Exercises to Improve Physical Fitness**

Exercise Group	Exercise Description	Recommended for	Examples
A	Endurance activities requiring minimal skill or physical fitness to perform	All adults	Walking, leisurely cycling, aqua-aerobics, slow dancing
B	Vigorous intensity endurance activities requiring minimal skill	Adults (as per the preparticipation screening guidelines in <i>Chapter 2</i>) who are habitually physically active and/or at least average physical fitness	Jogging, running, rowing, aerobics, spinning, elliptical exercise, stepping exercise, fast dancing
C	Endurance activities requiring skill to perform	Adults with acquired skill and/or at least average physical fitness levels	Swimming, cross-country skiing, skating
D	Recreational sports	Adults with a regular exercise program and at least average physical fitness	Racquet sports, basketball, soccer, downhill skiing, hiking

■ AEROBIC EXERCISE **VOLUME** RECOMMENDATION

A target volume of ≥ 500 – $1,000$ MET-min \cdot wk⁻¹ is recommended for most adults. This volume is approximately equal to $1,000$ kcal \cdot wk⁻¹ of moderate intensity PA, ~ 150 min \cdot wk⁻¹ of moderate intensity exercise, or pedometer counts of $\geq 5,400$ – $7,900$ steps \cdot d⁻¹. Because of the substantial errors in prediction when using pedometer step counts, use steps per day combined with currently recommended time/durations of exercise. Lower exercise volumes can have health/fitness benefits for deconditioned individuals; however, greater volumes may be needed for weight management.

Rate of Progression

- Increase in exercise time/duration per session of 5–10 min every 1–2 wk over the first 4–6 wk of an exercise training program

What about aerobic activity?

- Moderate activity is at a pace where you can talk but cannot “sing.” Examples: *brisk walking, light biking, water exercise and dancing.*
- Vigorous activity is done at a pace where you can't say more than a few words without pausing for a breath. Examples: *jogging, swimming, tennis and fast bicycling.*
- You can exercise for any length of time. For example, you might walk:
 - 30 minutes 5 days/week or
 - 20 minutes daily
 - 5 minutes here, 10 minutes there. Just work your way up to 150 total minutes/week.
- Your ultimate goal is to gradually build up to 7,000-9,000 steps/day.

MUSCULAR FITNESS



■ GOALS FOR A HEALTH-RELATED RESISTANCE TRAINING PROGRAM

FFI

For adults of all ages, the goals of a health-related resistance training program should be to (a) make activities of daily living (ADL) (*e.g.*, stair climbing, carrying bags of groceries) less stressful physiologically and (b) effectively manage, attenuate, and even prevent chronic

diseases and health conditions such as osteoporosis, Type 2 diabetes mellitus, and obesity. For these reasons, although resistance training is important across the age span, its importance becomes even greater with age (5,37,72).

■ **RESISTANCE TRAINING FREQUENCY RECOMMENDATION**

FIT

Resistance training of each major muscle group 2–3 d · wk⁻¹ with at least 48 h separating the exercise training sessions for the same muscle group is recommended for all adults.

■ TYPES OF RESISTANCE EXERCISES

FIT

Many types of resistance training equipment can effectively be used to improve muscular fitness. Both multijoint and single-joint exercises targeting agonist and antagonist muscle groups are recommended for all adults as part of a comprehensive resistance training program.

Volume of Resistance Exercise (Sets and Repetitions)

VOLUME OF RESISTANCE EXERCISE (SETS AND REPETITIONS) RECOMMENDATION

FIT

Ideally, adults should train each muscle group for a total of 2–4 sets with 8–12 repetitions per set with a rest interval of 2–3 min between sets to improve muscular fitness. However, even a single set per muscle group will significantly improve muscular strength, particularly among novices. Older adults or deconditioned individuals should begin a training regimen with ≥ 1 set of 10–15 repetitions of very light-to-light intensity (*i.e.*, 40%–50% 1-RM) resistance exercise for muscular fitness improvements.

-
- Each set should be performed with **proper technique** and to the point of muscle fatigue but not failure because exerting muscles to the point of failure increases the likelihood of injury or debilitating residual muscle soreness, particularly among novices (4,37,79). Maximal strength gains follow a dose-response curve. Among the untrained, significant strength gains are realized with as few as one set per muscle group per session, whereas additional strength gains peak at a volume of four sets per muscle group at 60% of 1-RM, three times a week (84). Individuals interested in maximal strength gains should gradually progress from one to four sets as tolerated. Those who are recreationally or moderately trained achieve the greatest strength improvements with a training intensity of 80% of 1-RM, with four sets for each major muscle group at a training frequency of twice per week

Progression/Maintenance

- **PROGRESSION/MAINTENANCE OF RESISTANCE TRAINING RECOMMENDATION**

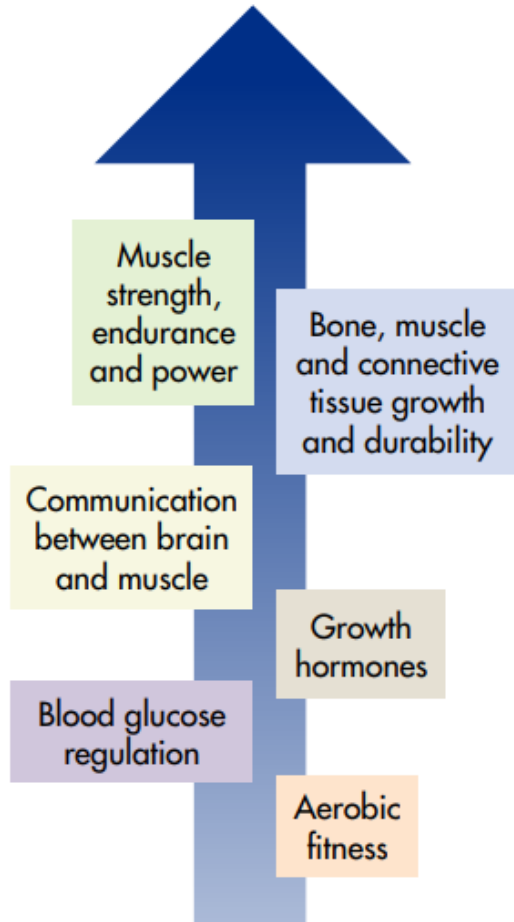
FIT

As muscles adapt to a resistance exercise training program, the participant should continue to subject them to overload to continue to increase muscular strength and mass by gradually increasing resistance, number of sets, or frequency of training.

Resistance Training for Health

People of all ages and abilities who regularly participate in resistance exercise reduce risk of numerous diseases, improve quality of life and reduce mortality.

Key Physiological Benefits of Resistance Exercise



Resistance Exercise Can Help Manage and Treat Many Conditions Including:

- Arthritis
- Cancers
- Cardiovascular disease
- Dementia
- Depression
- Diabetes
- Fall risk
- Frailty
- Hypertension
- Insomnia
- Low back pain
- Mental health
- Movement disorders
- Obesity
- Osteoarthritis
- Osteoporosis
- Pulmonary disorders
- Peripheral vascular disease
- Stroke

Training can be time efficient and effective for health benefits:



For health benefits, muscles need to be challenged with a combination of weight lifted, repetitions and speed of lifting. The addition of resistance training to aerobic programs can also enhance other health gains throughout the life span from childhood to old age.

Exercise Plan:

- Free weights, machines and/or bands can be used
- Perform 8-10 multi-joint exercises that stress the major muscle groups
- Perform 2-3 sets of 8-12 repetitions with good form
- Lift and lower the weight in a controlled manner (2 seconds each up and down)
- The last repetition should be difficult to complete
- Perform exercise 2-3 times per week
- Progress weight lifted over time so that it feels like an 8 out of 10 difficulty (where 0 = no effort, 10 = hardest effort you can give)

What about strength training?

- You don't have to go to a gym. Try elastic bands, do body weight exercises (chair sit-to-stands; floor, wall or kitchen counter push-ups; planks or bridges) or lift dumbbells. Heavy work around your home or yard also builds strength.
- Strengthen your legs, back, chest and arms. To start, try 10-15 repetitions using light effort. Build up to medium or hard effort for 8-12 repetitions. Repeat 2-4 times, 2-3 days/week.
- Give yourself a rest day between each strength training session.

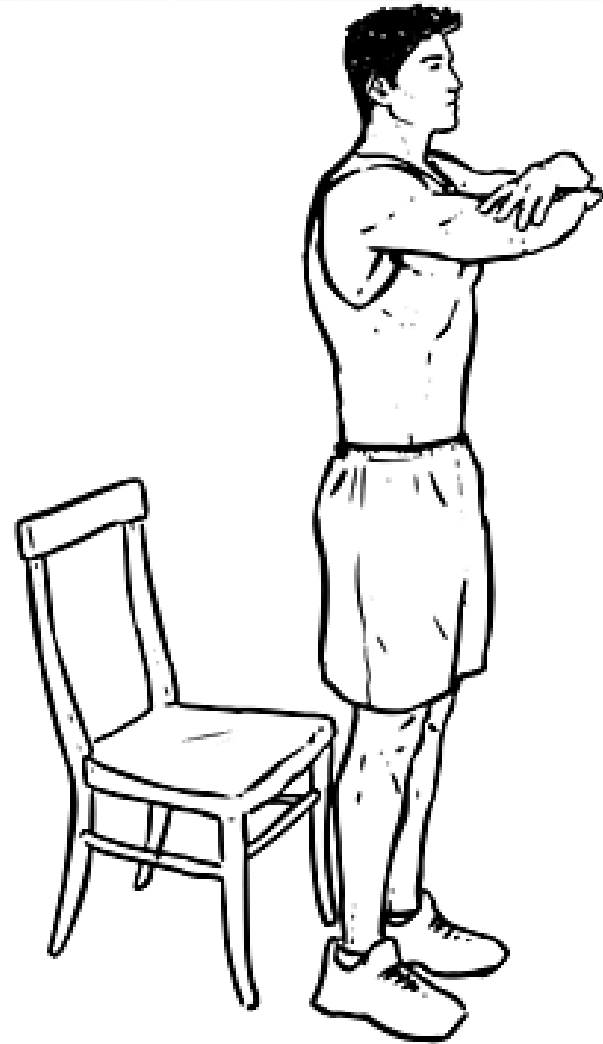
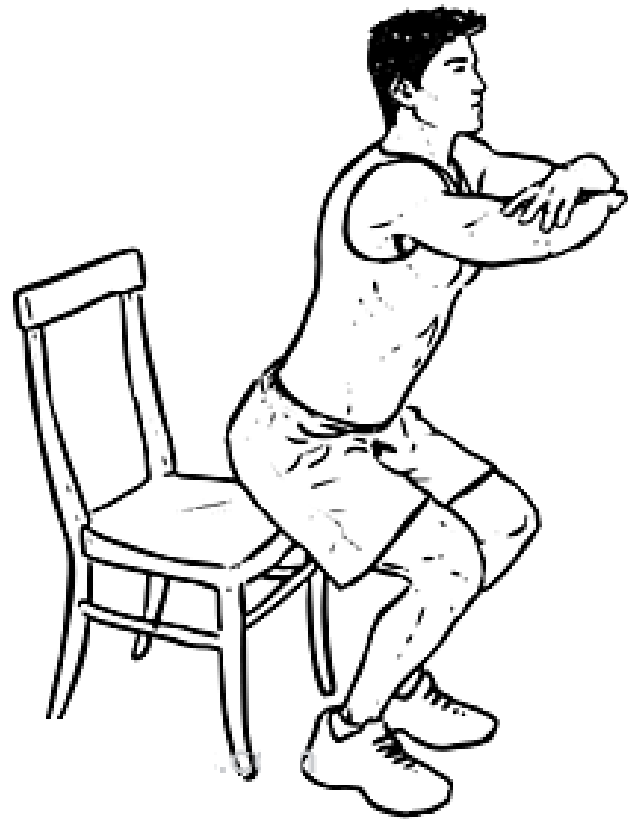
ACSM and CDC Recommendations

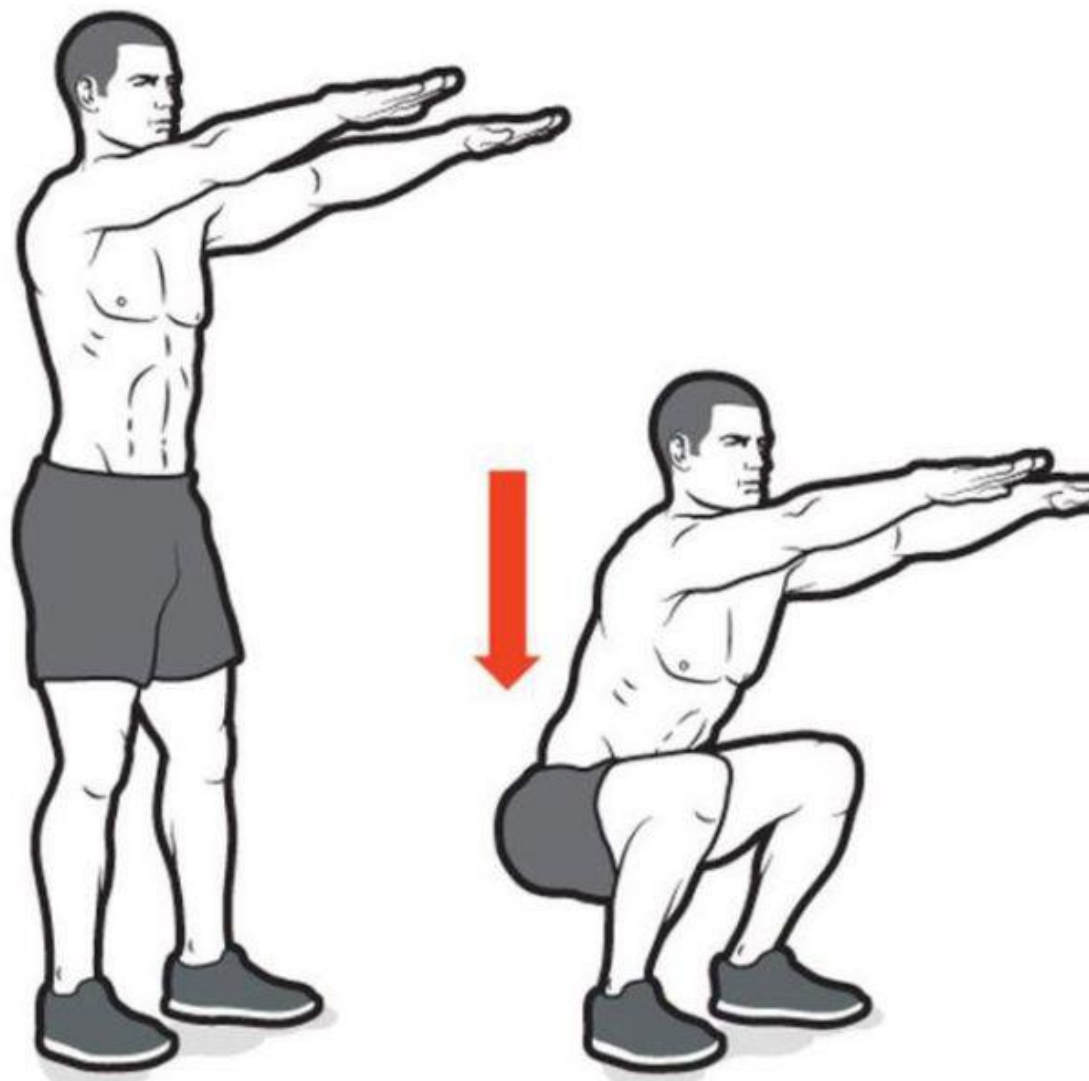


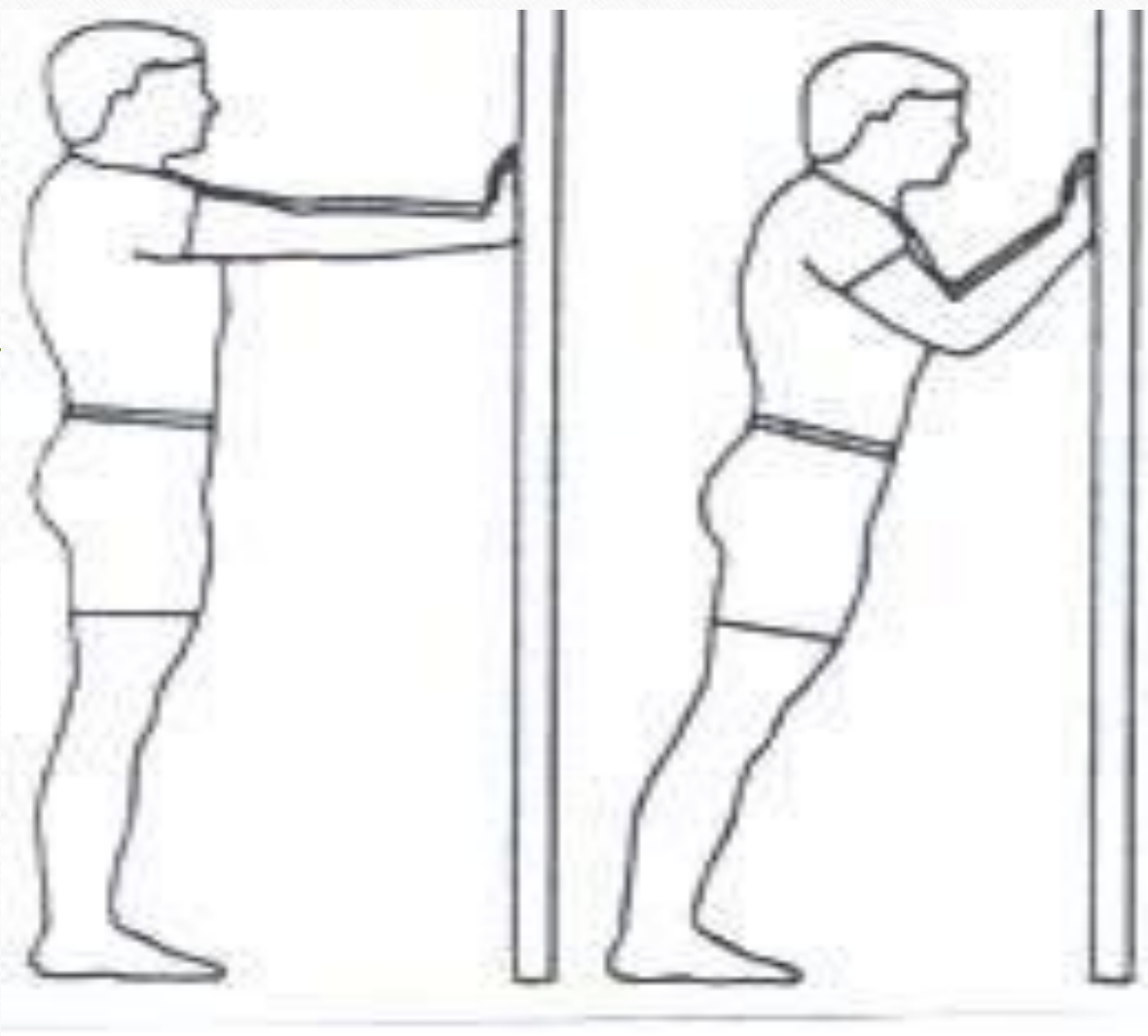
150 minutes
of moderate-intensity aerobic activity every week

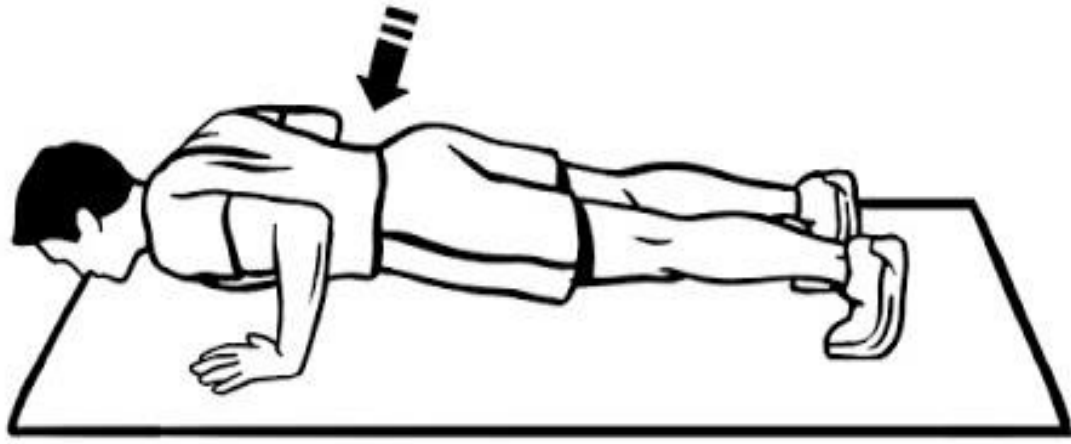
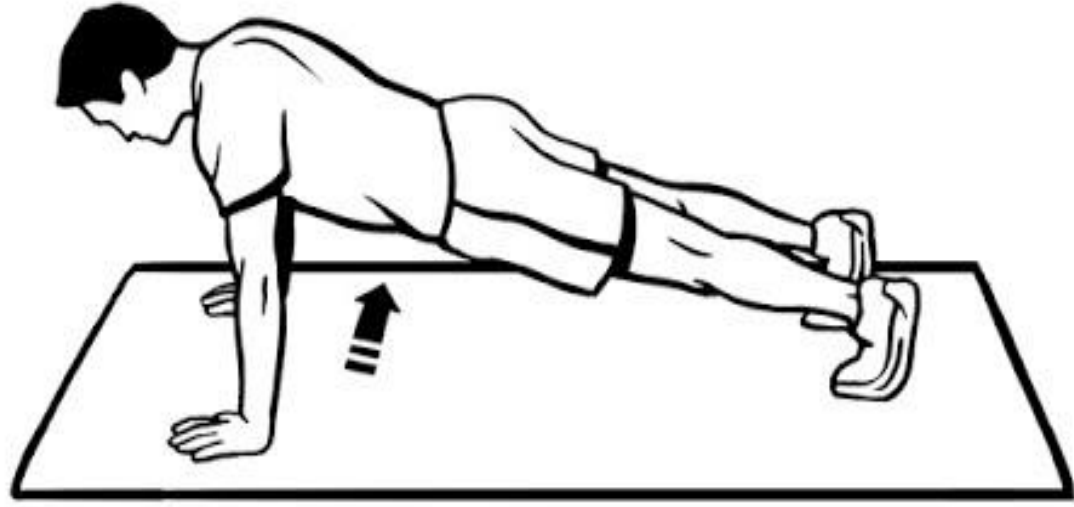
2X per week
Muscle-strengthening activities on 2 or more days a week that work all major muscle groups





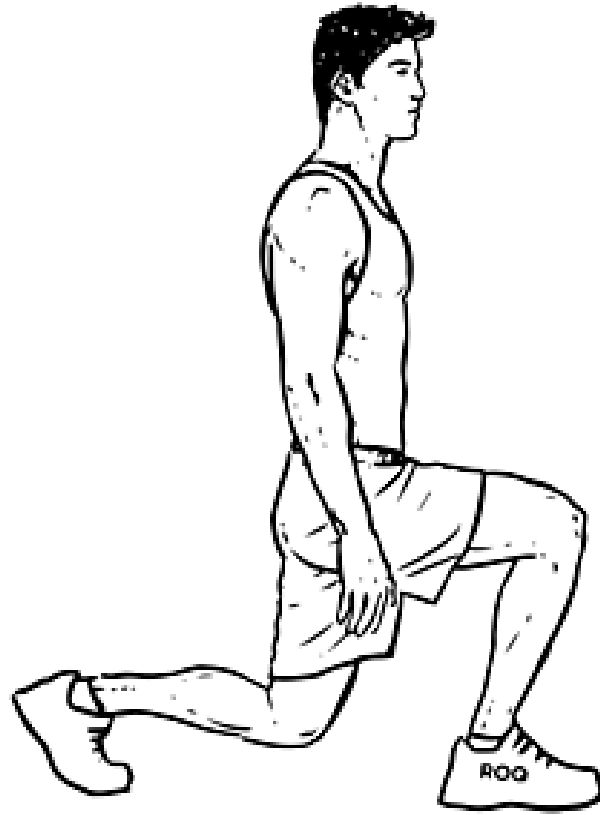






chest press



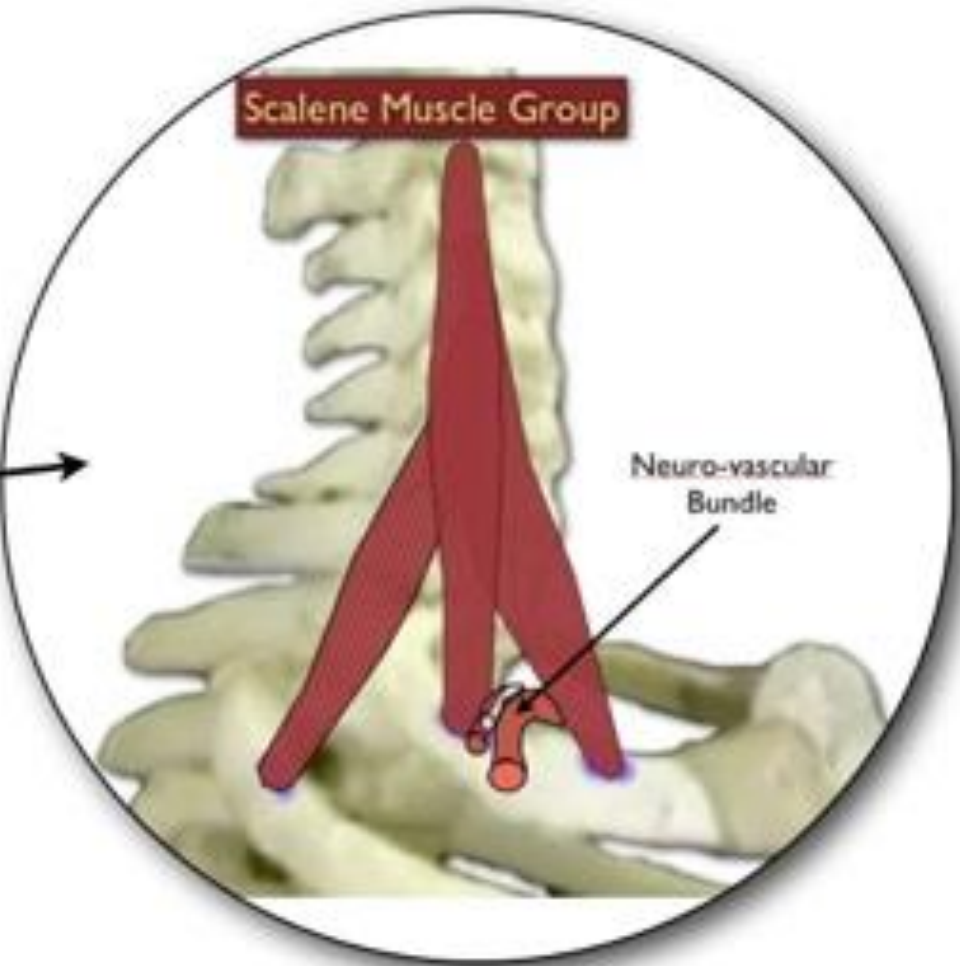
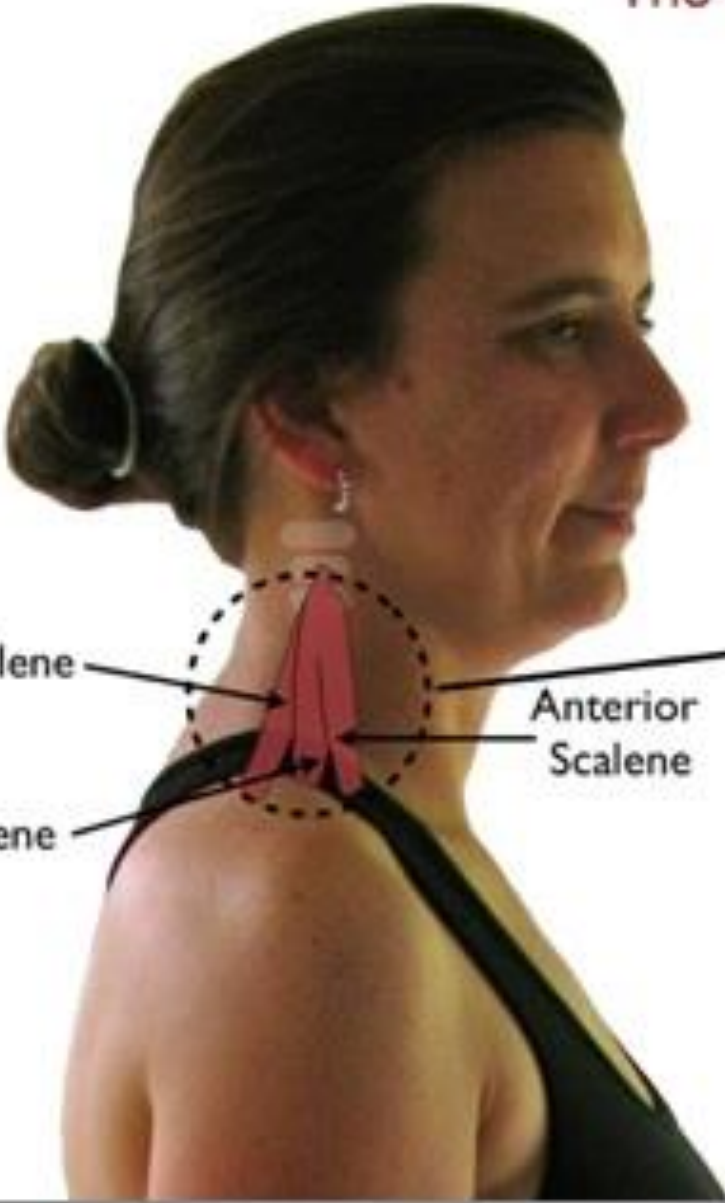


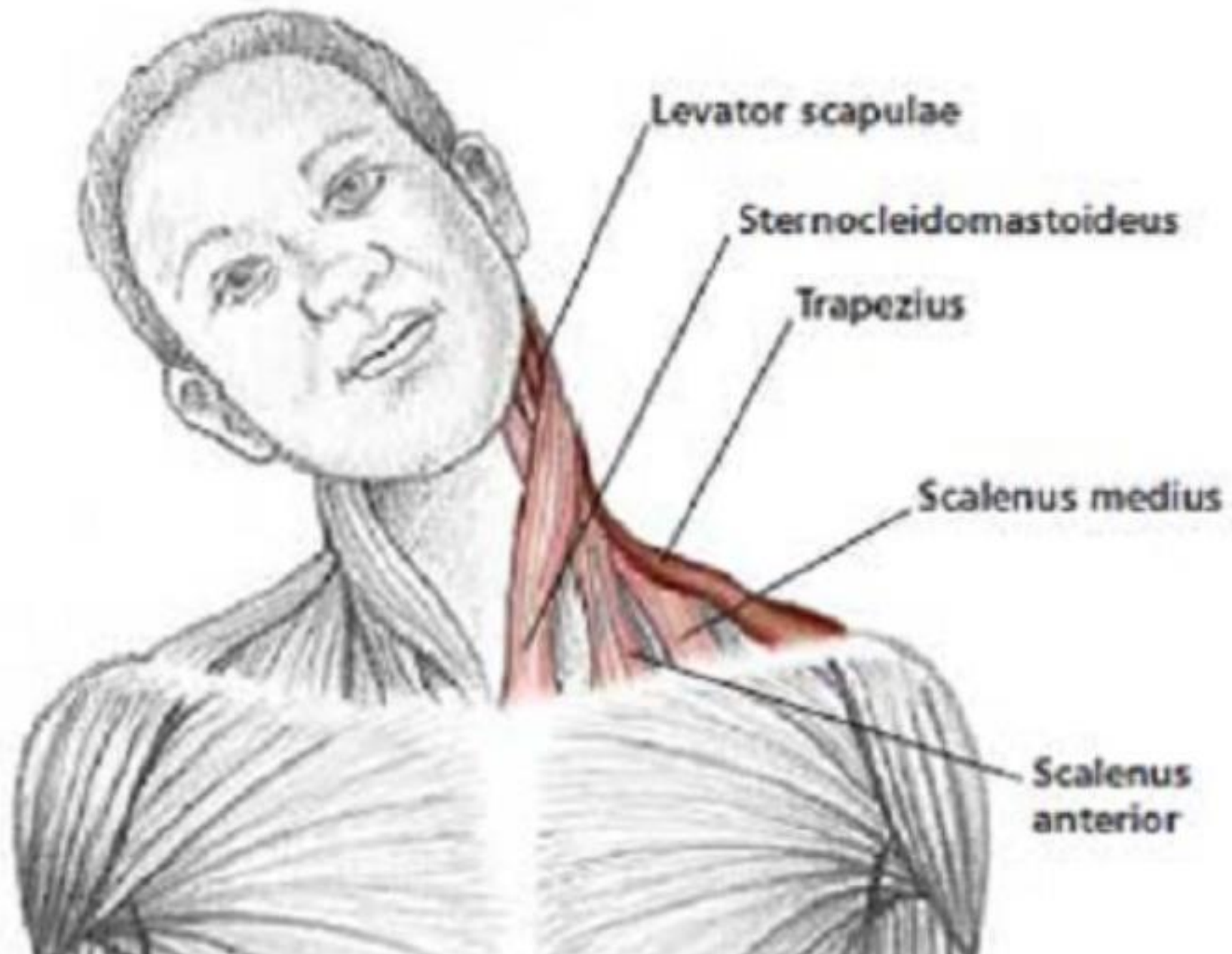
planks



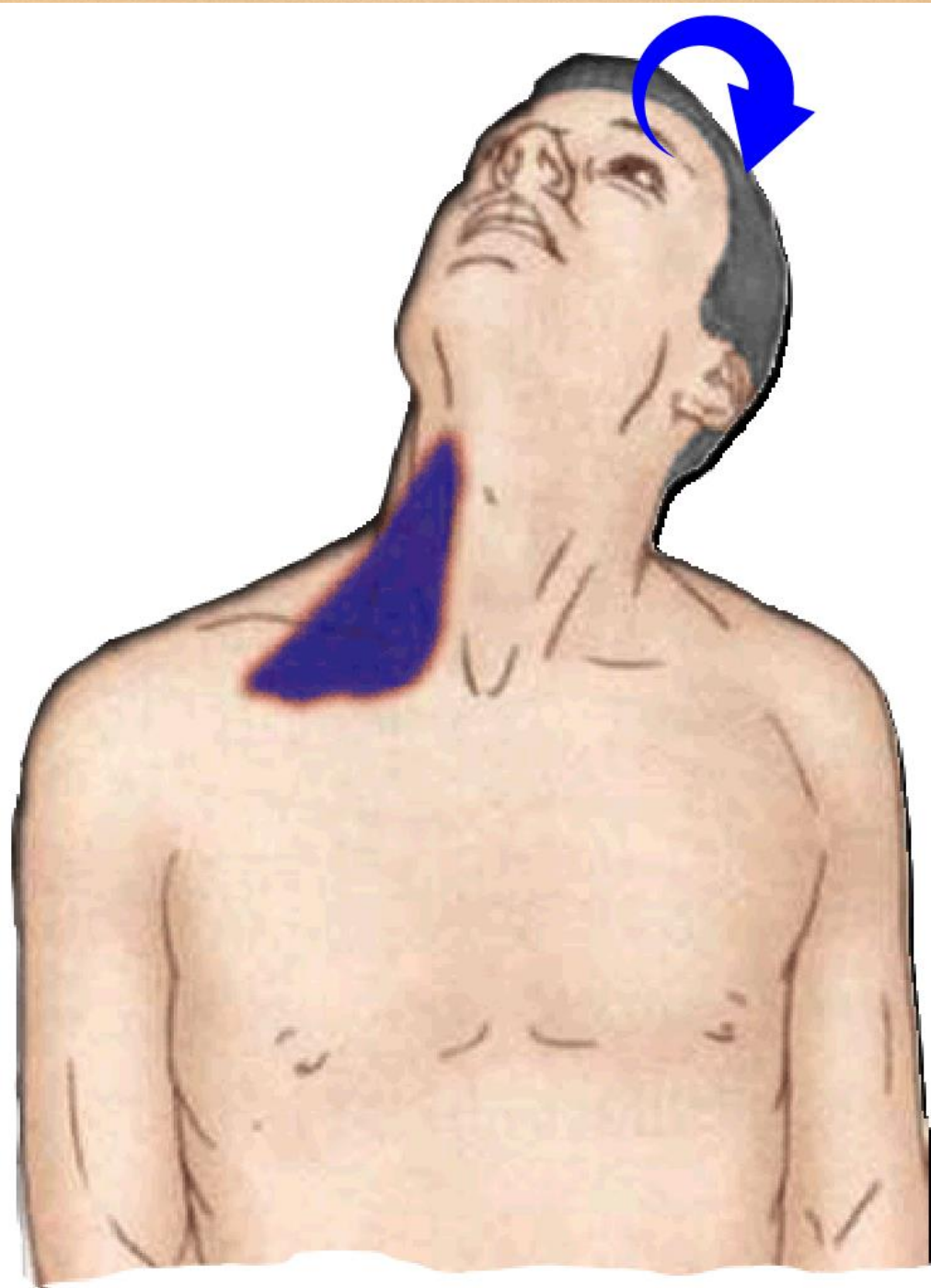
Stretching Exercises

The Scalene Muscle Group

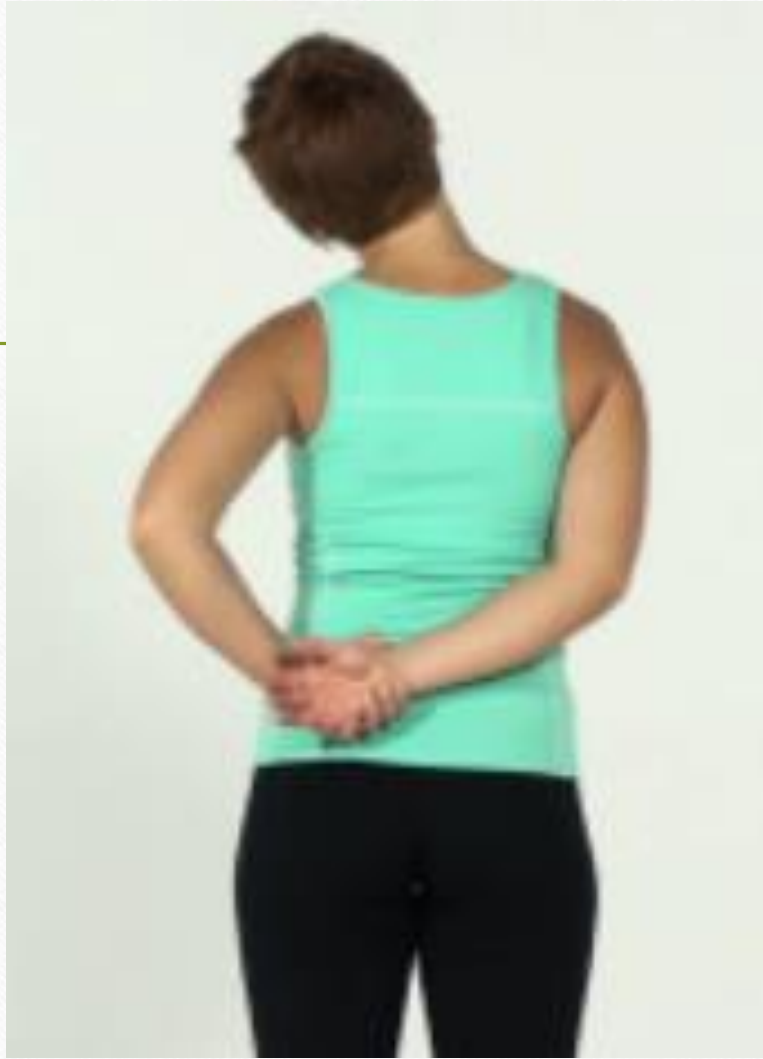




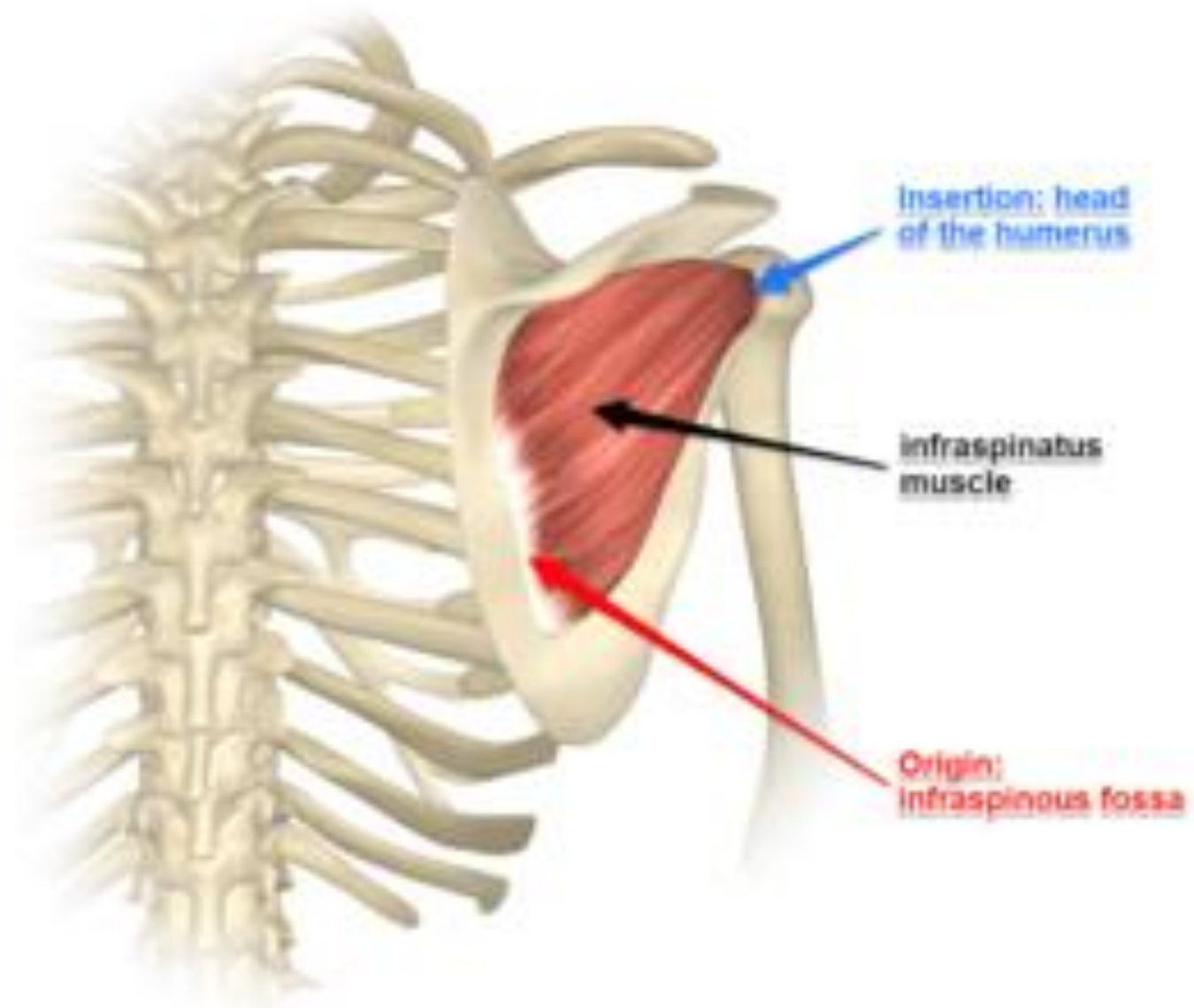


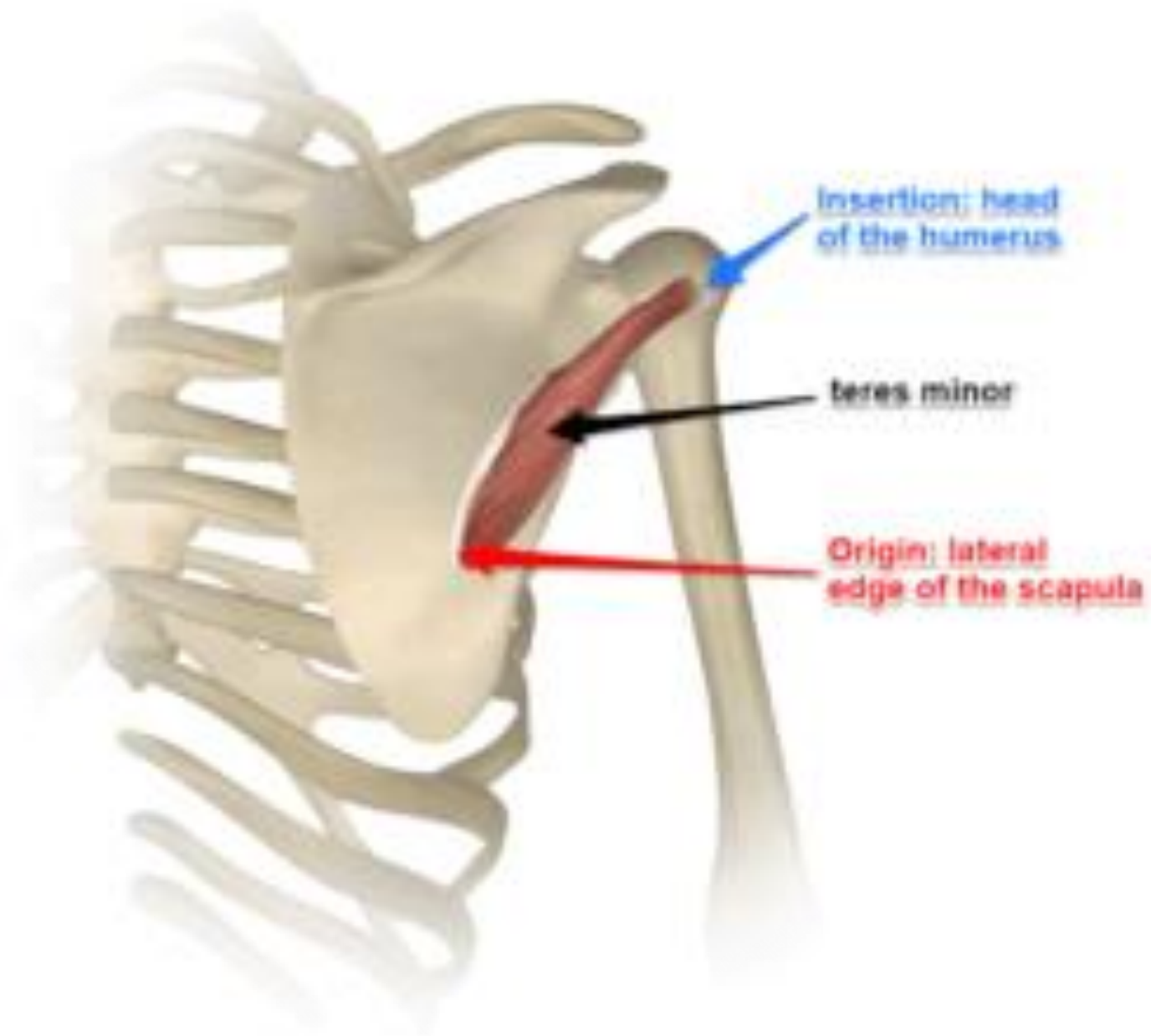


Trapetzius Upper, Scalenus

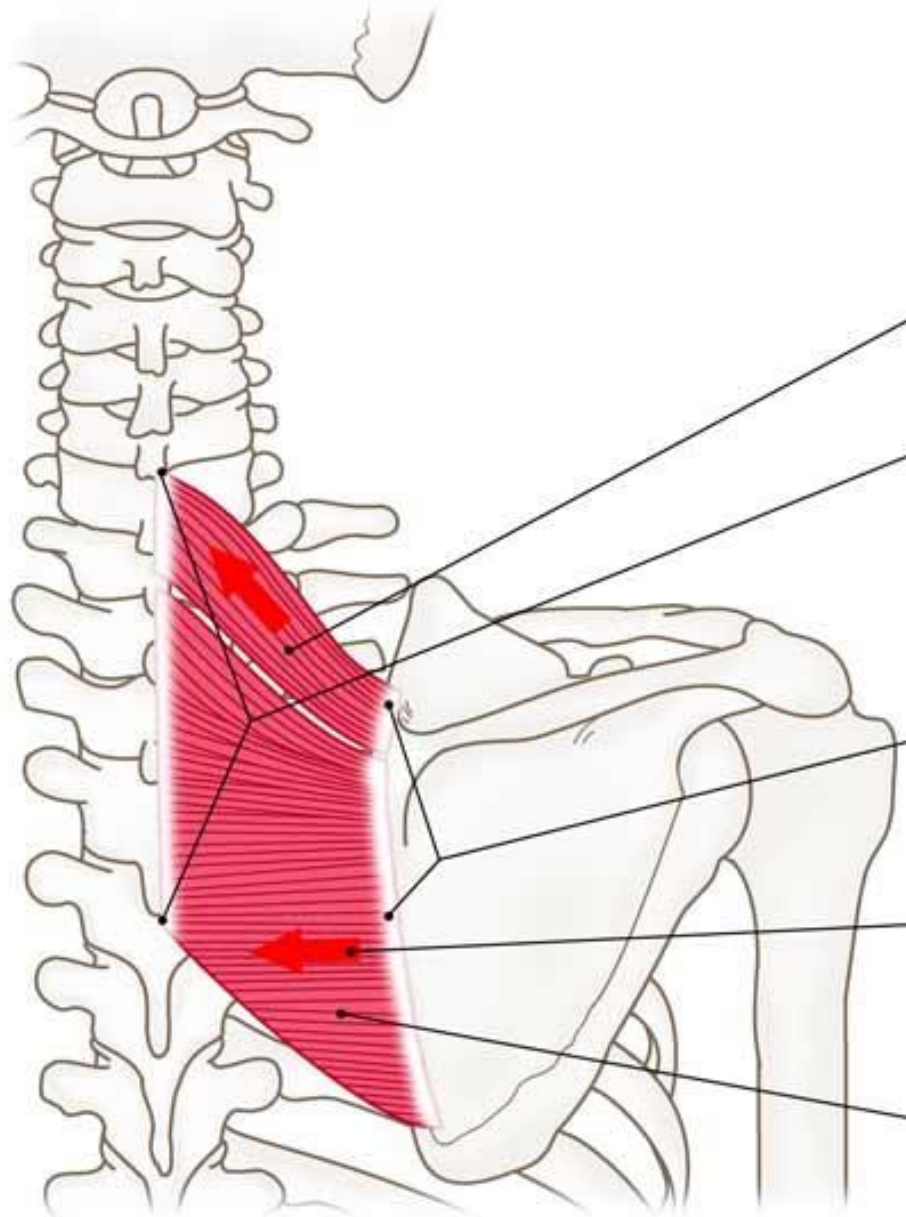


Infraspinatus, Teres Minor, Rhomboids, Middle Trapezius





Rhomboid Major and Minor



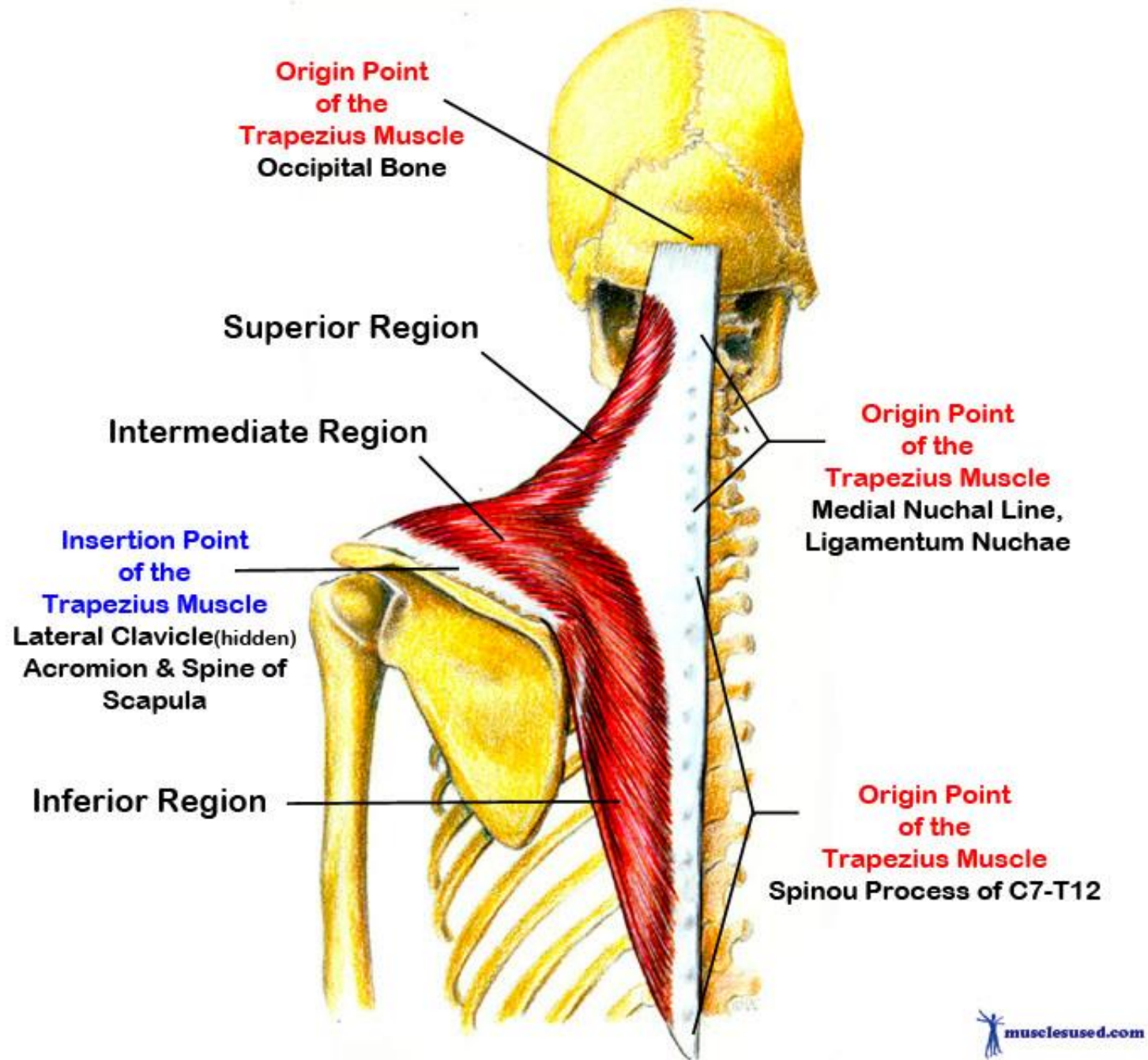
R. minor

Origin: spinous processes of vertebra C7-T1 (R. minor) and T2-T5 (R. major)

Insertion: medial border of scapula

Action: retraction of scapula

R. major

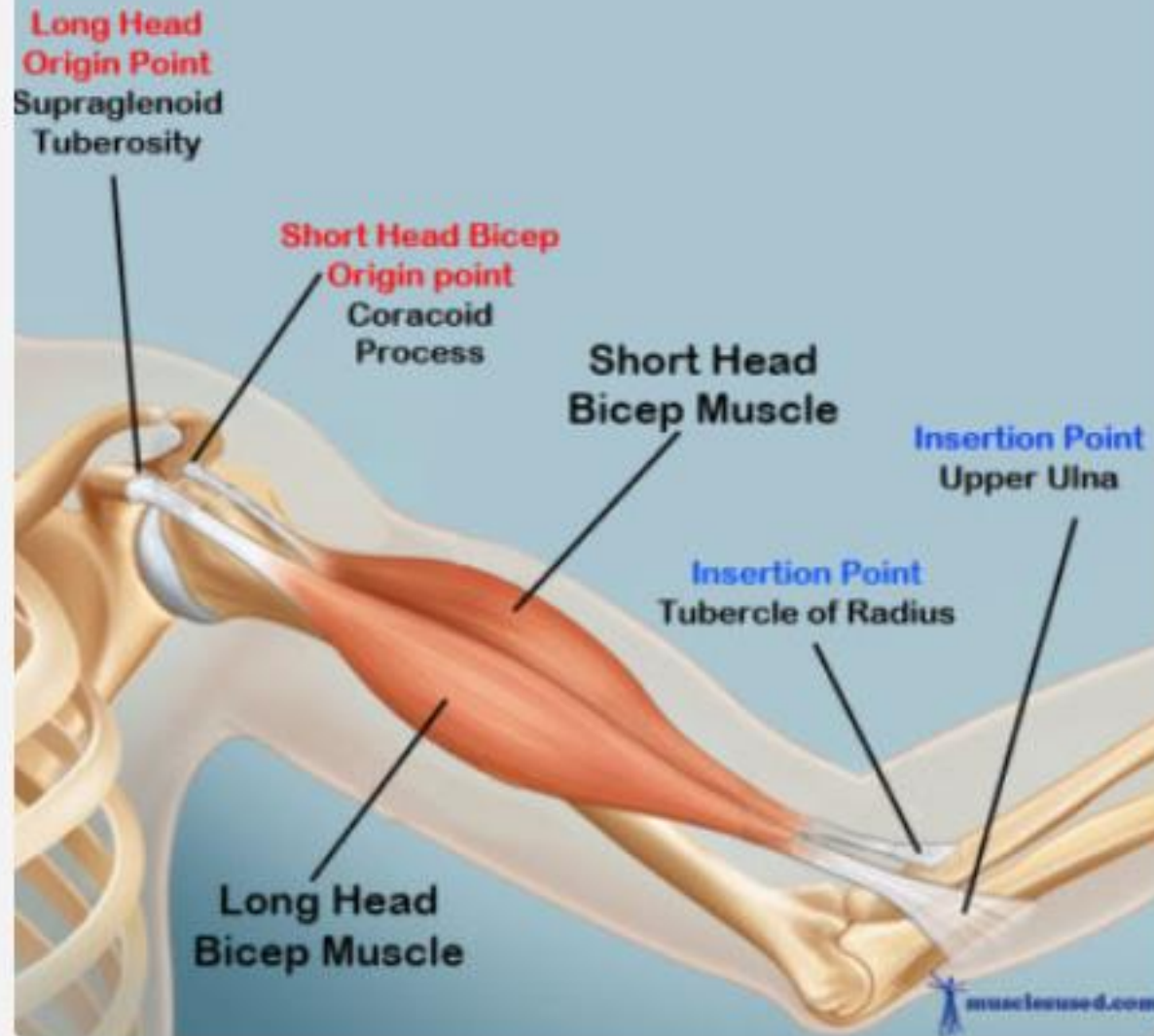






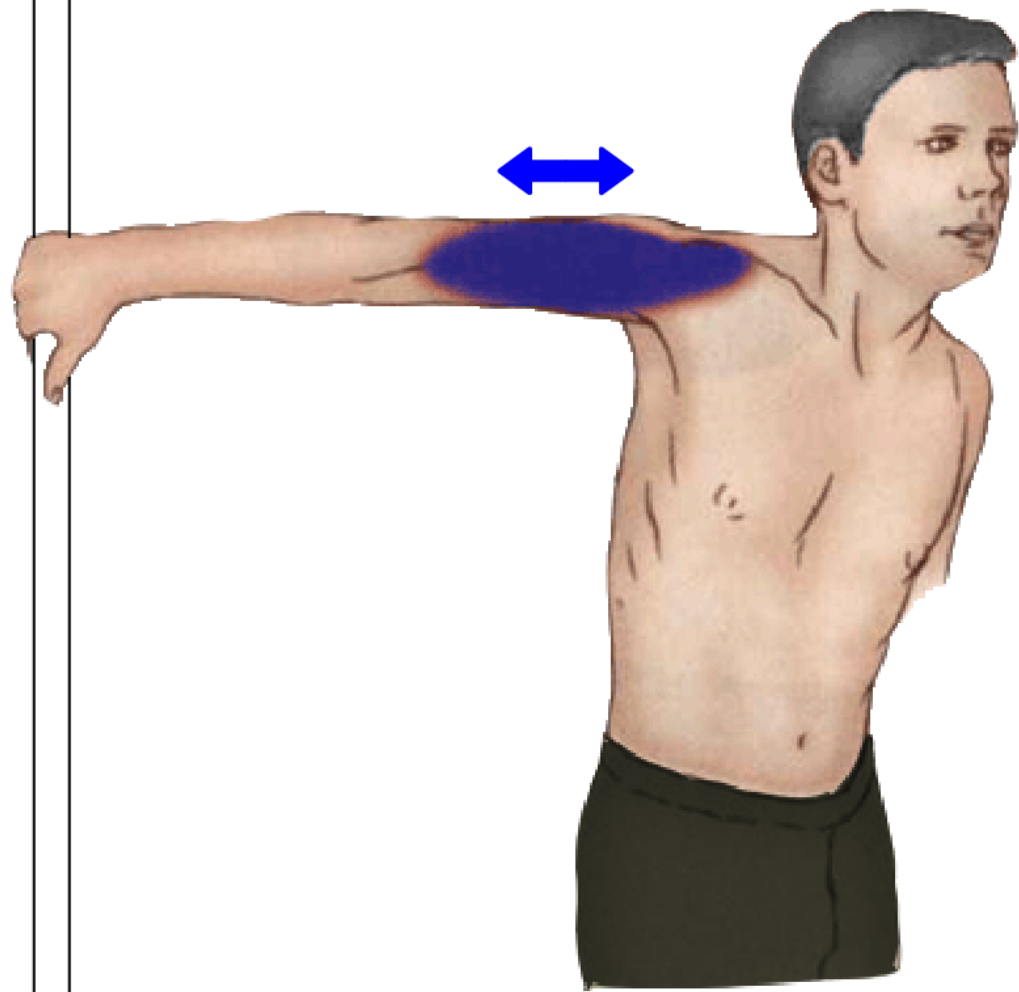


Biceps

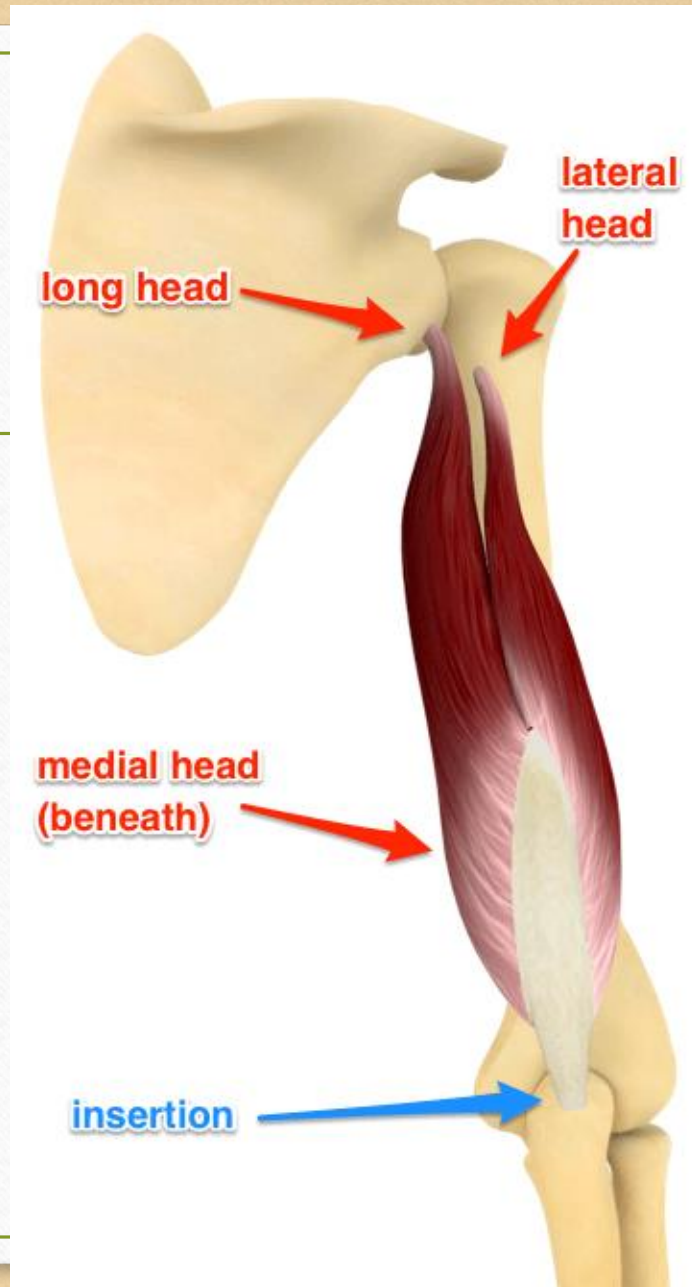


The Biceps Brachii muscle more commonly known as the bicep muscle is found on the **anterior** (front) of the **humerus** (upper arm bone).



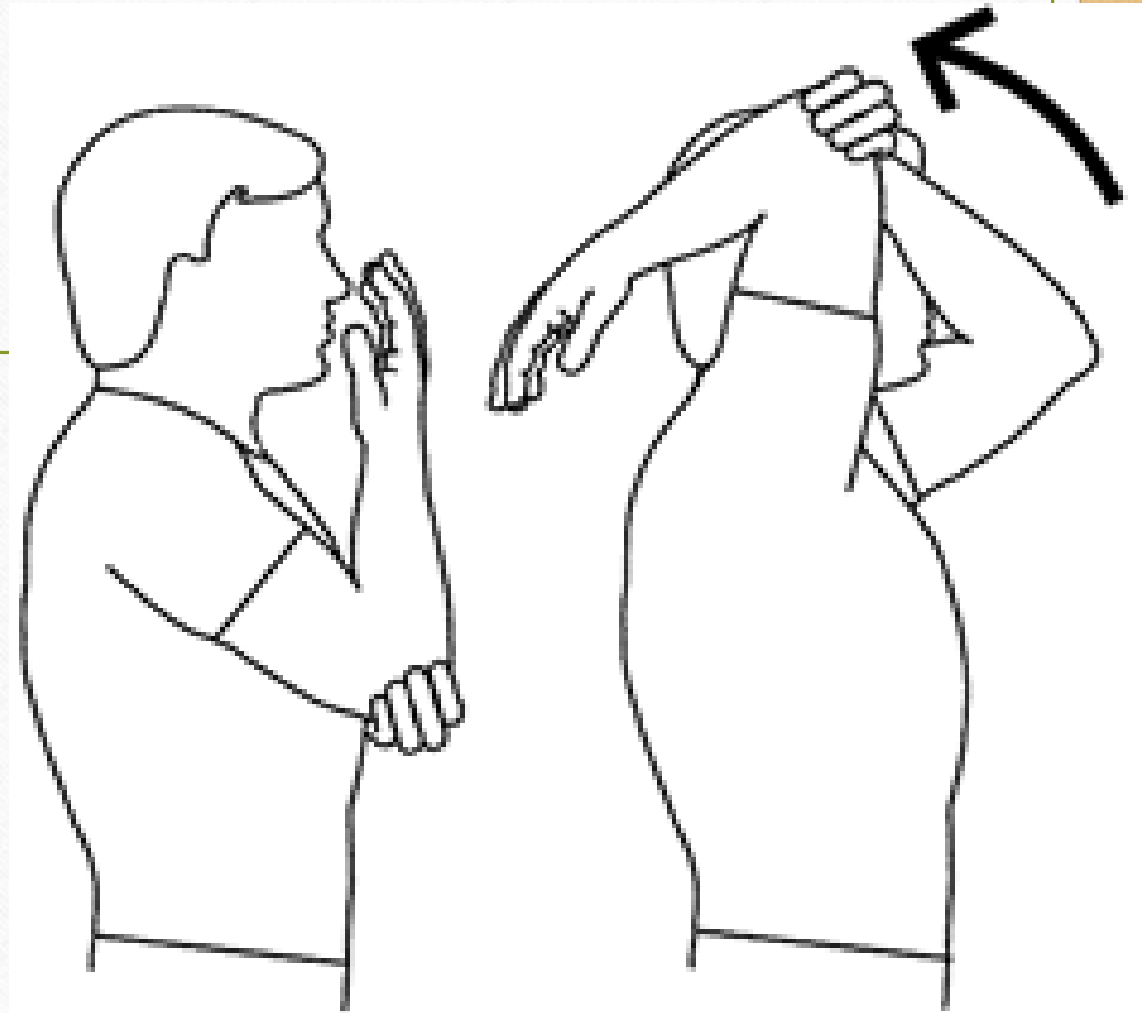


Triceps

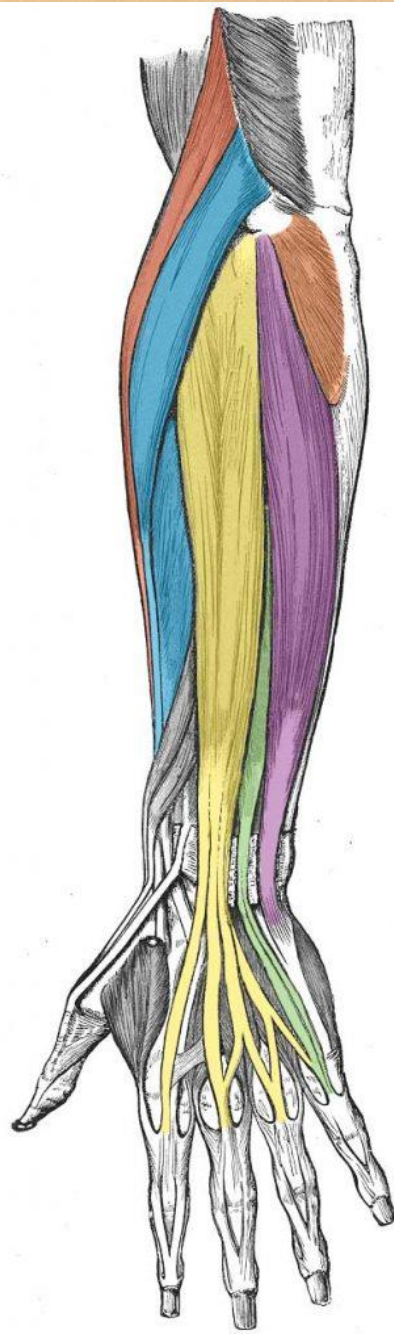










-
- Begin with arm at side.
 - Bend elbow of involved arm.
 - With other arm, slowly lift arm overhead, keeping elbow bent.

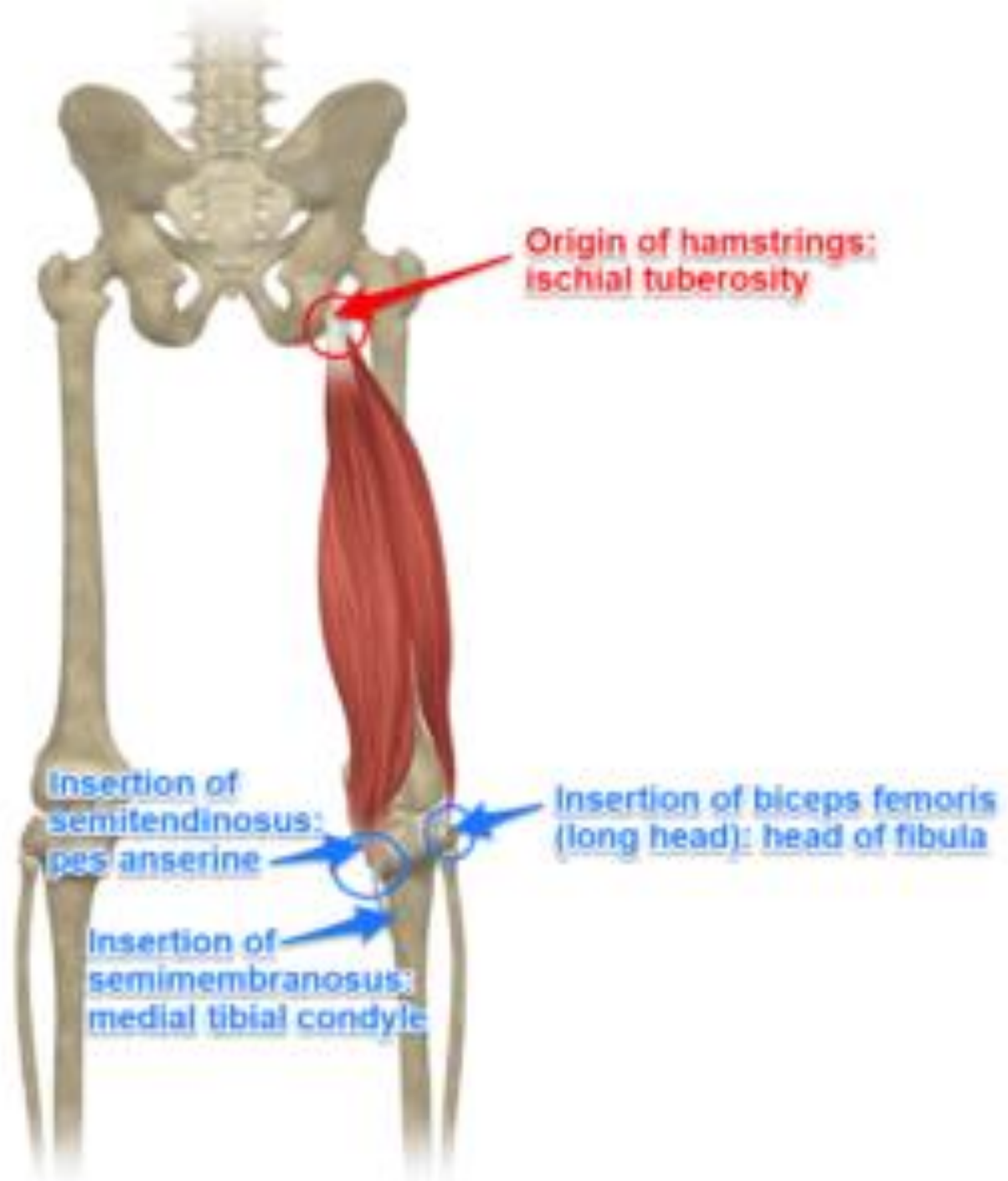


Wrist Extensors



-  **Brachioradialis**
-  **Extensor carpi radialis longus and brevis**
-  **Extensor digitorum**
-  **Extensor digiti minimi**
-  **Extensor carpi ulnaris**
-  **Anconeus**







1)



2)

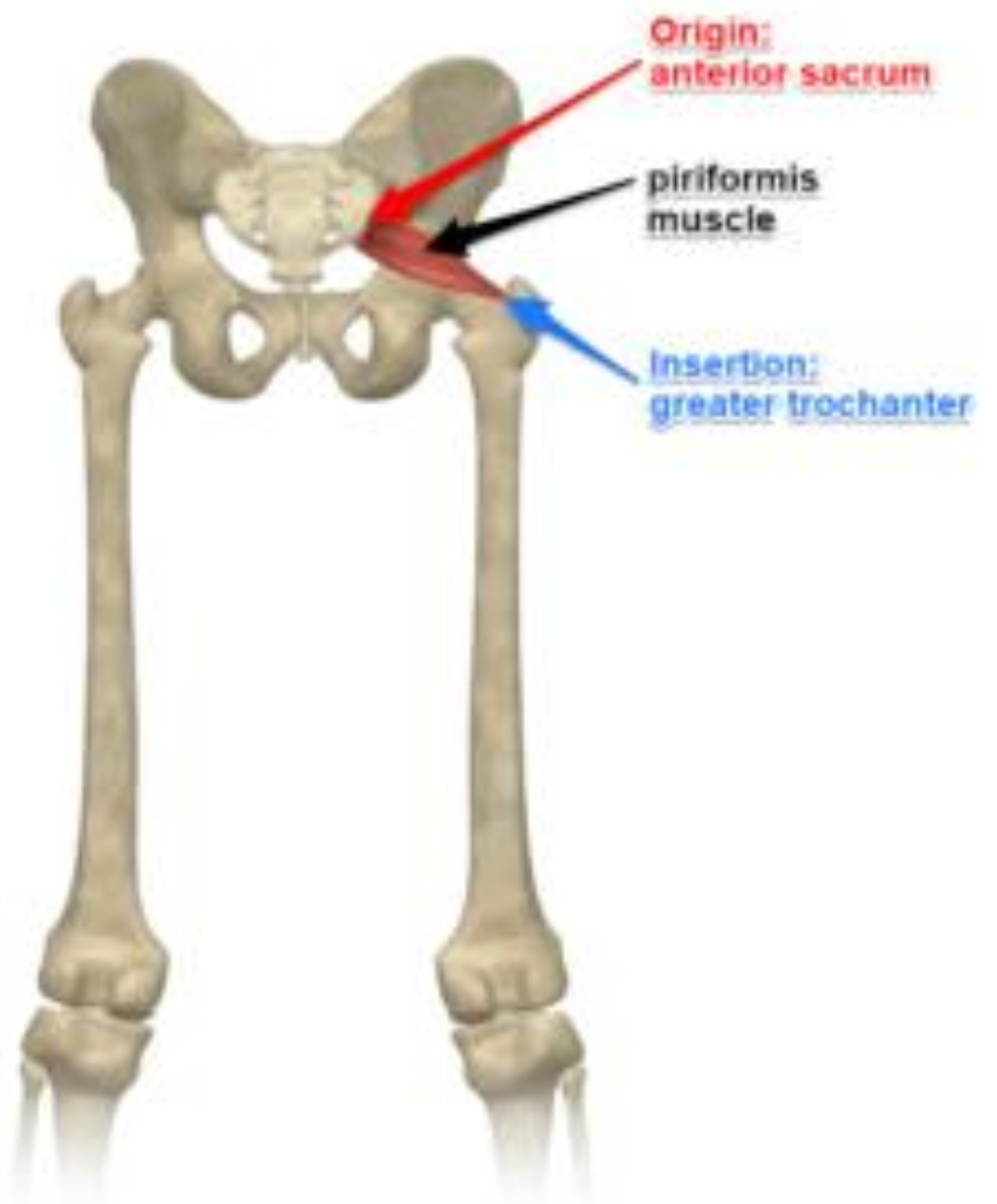


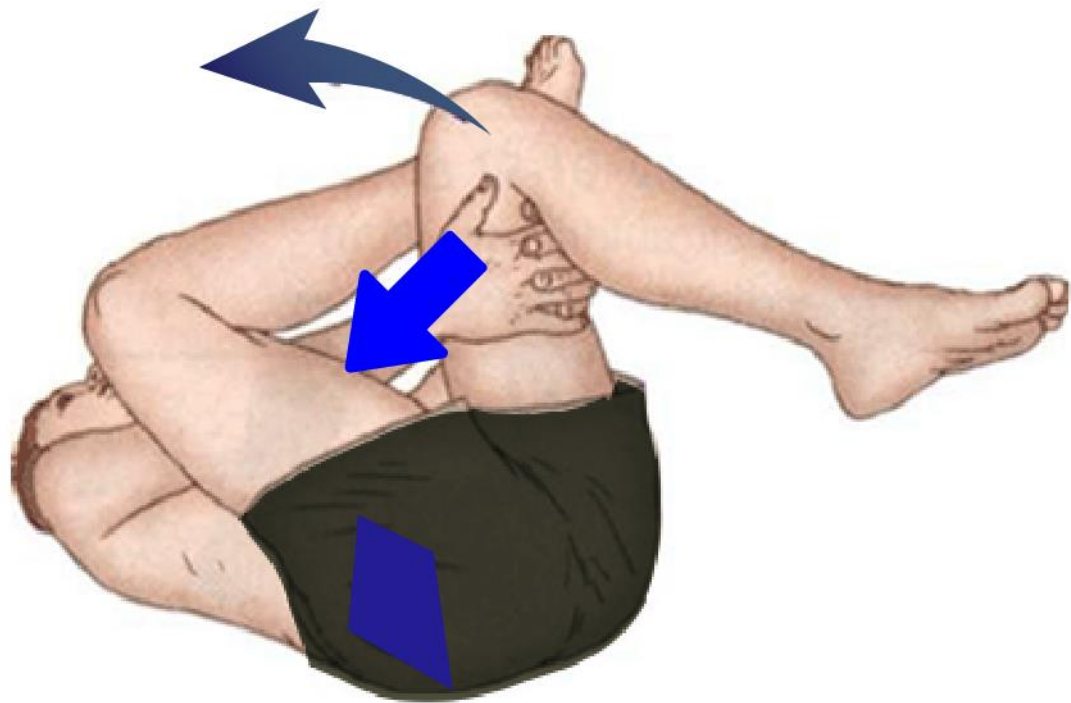
3)





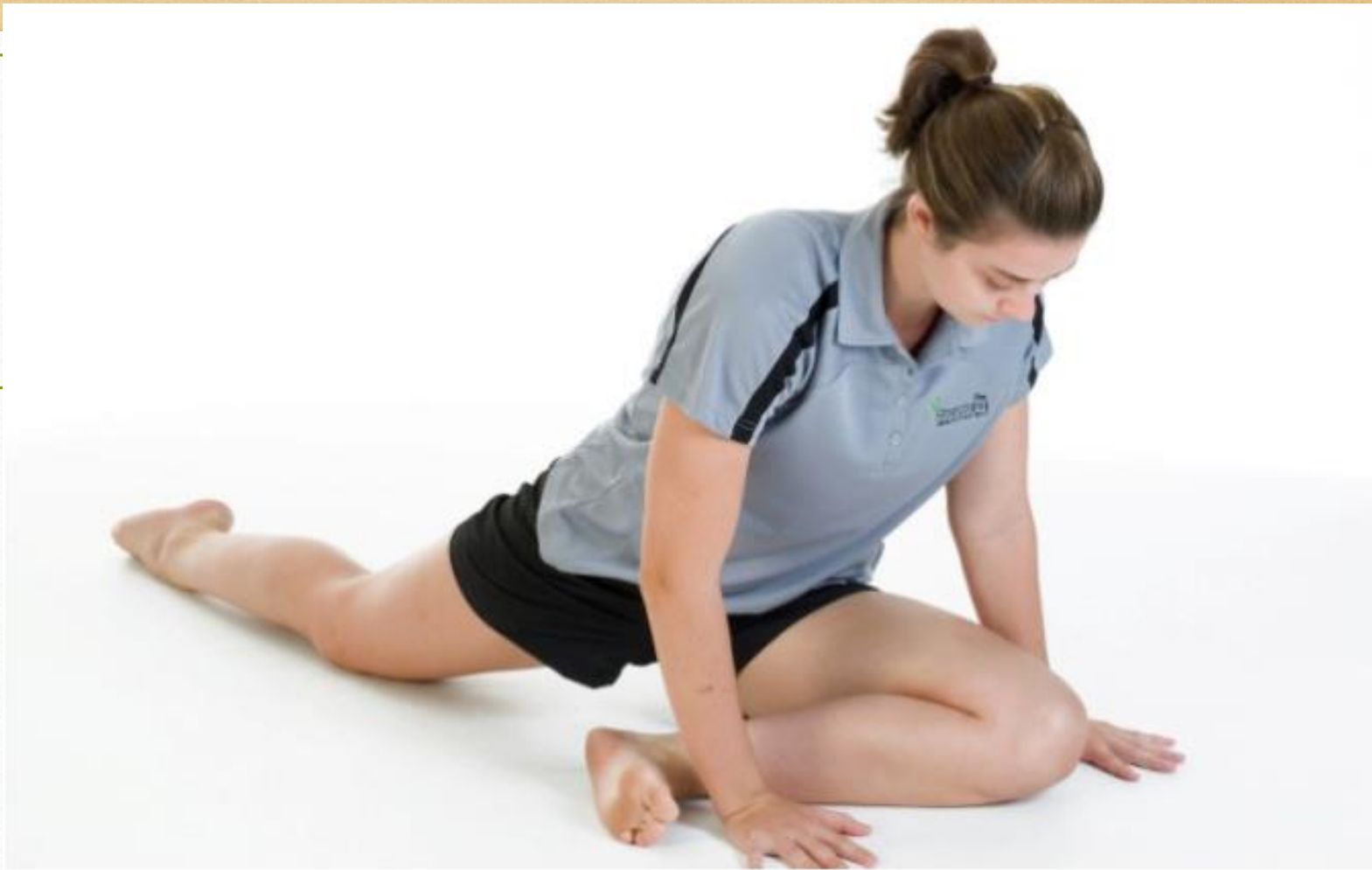








Sit with one leg straight out in front. Hold onto the ankle of your other leg and pull it directly towards your chest.



Lie face down and bend one leg under your stomach, then lean towards the ground.



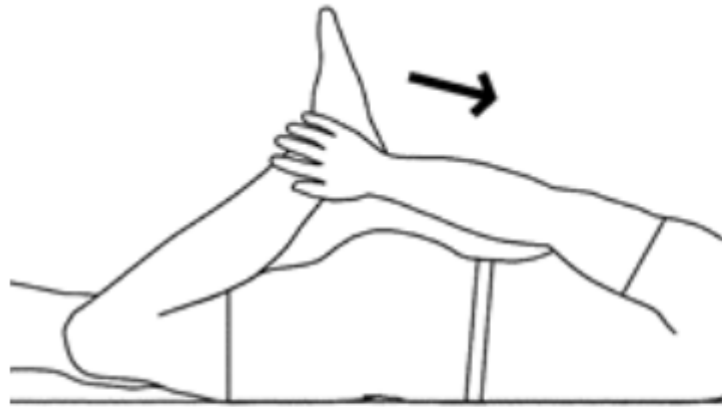
Rectus
Femoris

Vastus
Lateralis

Vastus
Medialis

Vastus Intermedius
is deep to rectus
Femoris





Quadriceps Stretch Prone

Quadriceps Stretch Prone

- + Lie face down.
- + Reach back and grasp ankle.
- + Relax leg and gently pull ankle towards buttocks.
- + Hold end position for 10 -15 seconds
- + Repeat for 5-6 times



Back hero Quadriceps stretch

Yoga pose **Back hero Quadriceps stretch**

- + Sit on your knees.
- + Keep your hips between the feet as shown.
- + Slowly lie back over feet supported on elbows.
- + Hold the stretch for 10 seconds.
- + Repeat for 8 to 10 times.

Origin Point

Medial Condyle
of the
Femur(thigh bone)
and just above
the Condyle
Region

Origin Point

Lateral Condyle
of the
Femur(thigh bone)
and just above
the Condyle
Region

Medial head

**Gastrocnemius
Muscle**

Lateral Head

Gastrocnemius
Aponeurosis

Insertion point
Tendo Calcaneus
(Achilles Tendon)





Thank
you!