

# **Back To Chiropractic CE Seminars**

## **Technique: The Shoulder ~ 4 Hours**

**Welcome to Back To Chiropractic Online CE exams:**

**This course counts toward your California Board of Chiropractic Examiners CE. (also accepted in other states, check our website or with your Chiropractic State Board)**

**The California Board requires that you complete all of your CE hours BEFORE the end of your Birthday month. We recommend that you send your chiropractic license renewal form and fee in early to avoid any issues.**

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## **Exam Process: Please read all instructions before starting!**

- 1. You must register/pay first. If you haven't, please return to: [backtochiropractic.net](http://backtochiropractic.net)**
- 2. Open a new window or a new internet tab & drag it so it's side-by-side next to this page.**
- 3. On the new window or new tab you just opened, go to: [backtochiropractic.net](http://backtochiropractic.net) website.**
- 4. Go directly to the Online section. DON'T register again.**
- 5. Click on the Exam for the course you want to take. No passwords needed.**
- 6. Follow the Exam instructions.**
- 7. Upon passing the exam you'll be able to immediately download your certificate, and it'll also be emailed to you. If you don't pass, you can repeat the exam at no charge.**

**Please retain the certificate for 4 years.**

**If you get audited and lose your records, I'll have a copy.**

**I'm always a phone call away... 707.972.0047 or email: [marcusstrutzdc@gmail.com](mailto:marcusstrutzdc@gmail.com)**

**Marcus Strutz, DC**

**Back To Chiropractic CE Seminars**



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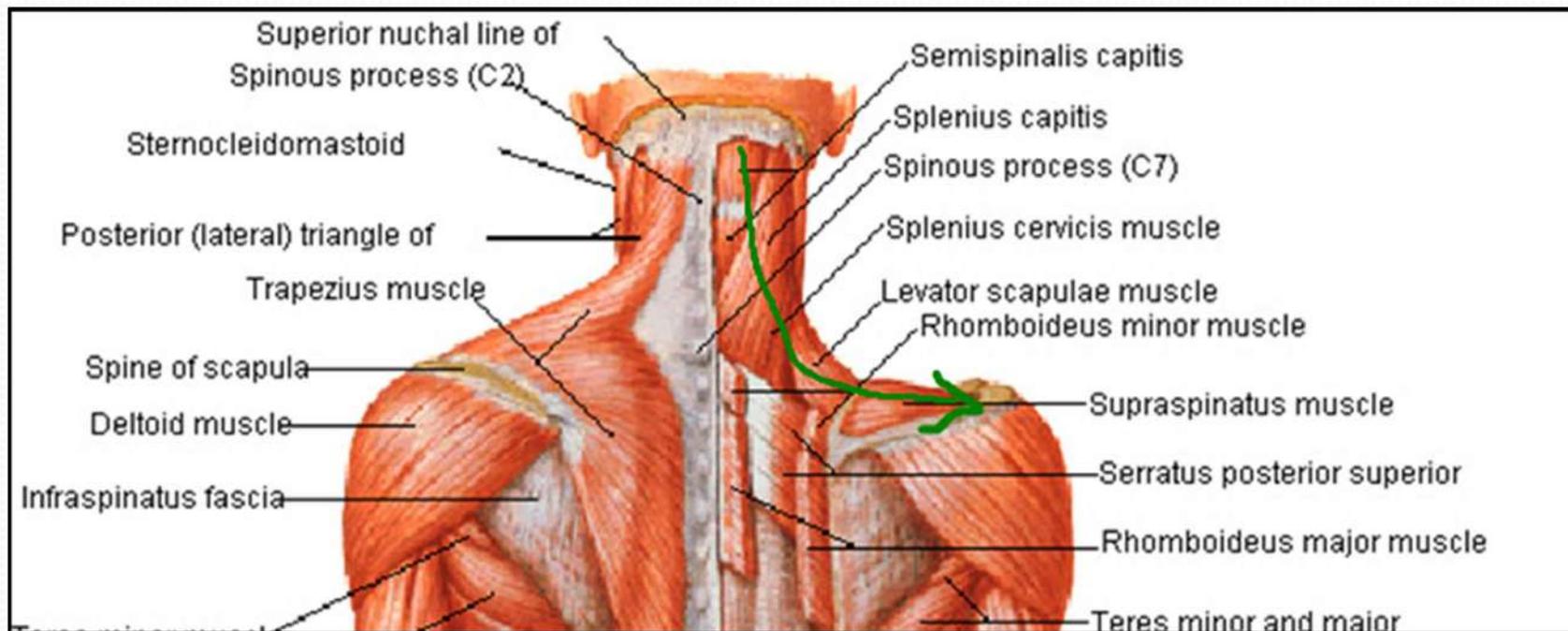
**Life Chiropractic College West Graduate  
June 1996, Summa Cum Laude**

**Professor Life Chiropractic College West, 1997-2002**

- **Physiotherapy Rehab** (authored course manual)
- **Physiotherapy Modalities** (authored course manual)
- **X-Ray Physics** (authored course manual)
- **Philosophy I**
- **Philosophy V - Practice Management**
- **Microbiology Lab**
- **Spinal Biomechanics**
- **Systemic Physiology Lab**

- **Private Practice, 2000-2013 Mendocino/Ft Bragg, CA**
- **CE Seminars, 2002-present:  
Technique, Wellness (Pt Ed), Physiotherapy,  
History Taking & Physical Examination Procedures**
- **Ghost Writer Practice Management, 2007-present**
- **National Board Review Instructor, 1999-2000  
Dr. Irene Gold & Dr. John Donofrio**
- **Middle School Teacher Math & Science, 1989-1993**
- **Racquetball Club Pro & Weight Trainer  
Walnut Creek, 1982-1987**
- **Father: Amuel Strutz DC Palmer Grad 1961**

# Chiropractic Adjustive Technique ~ The Shoulder 4 hours of CE

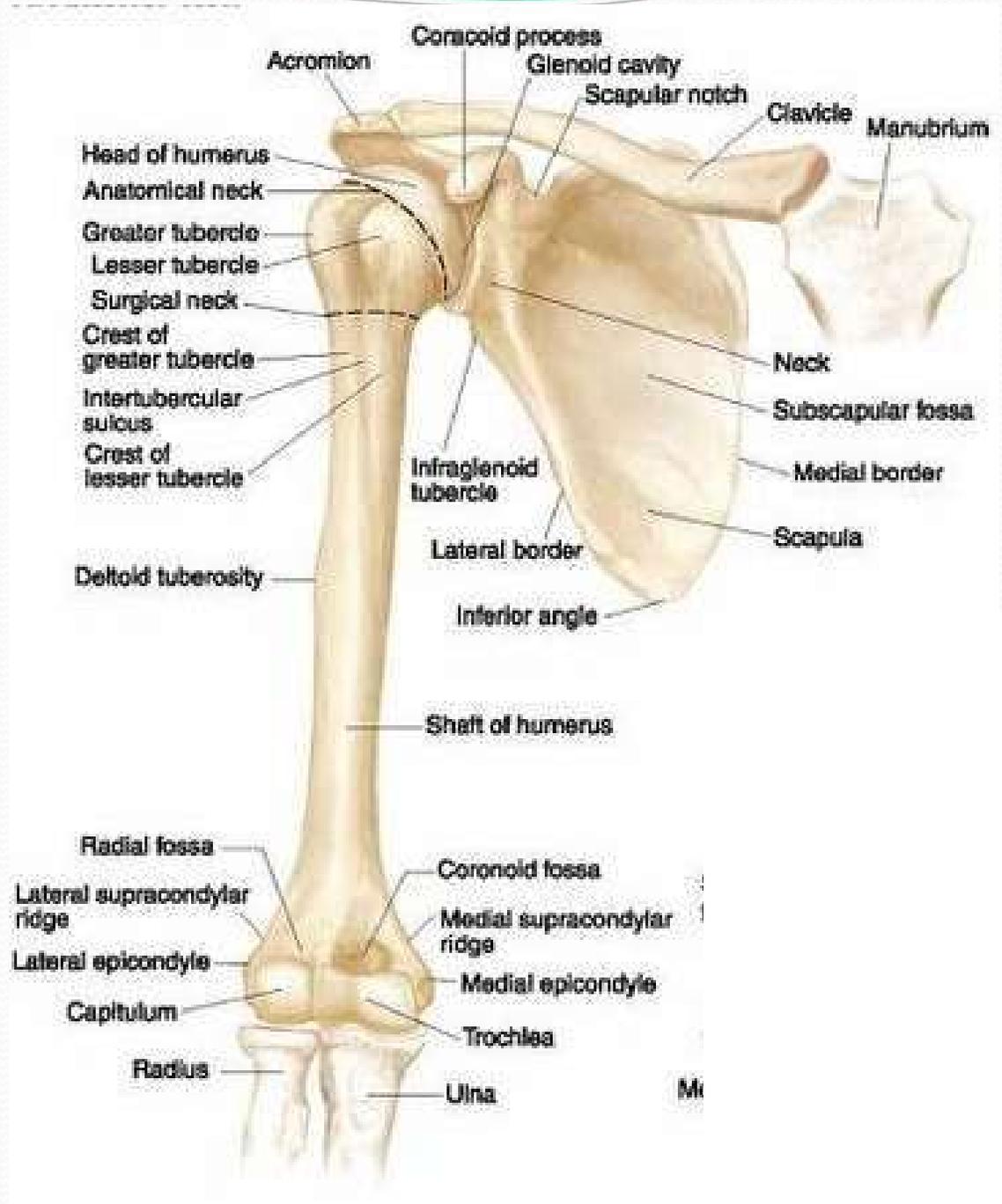


# The Shoulder

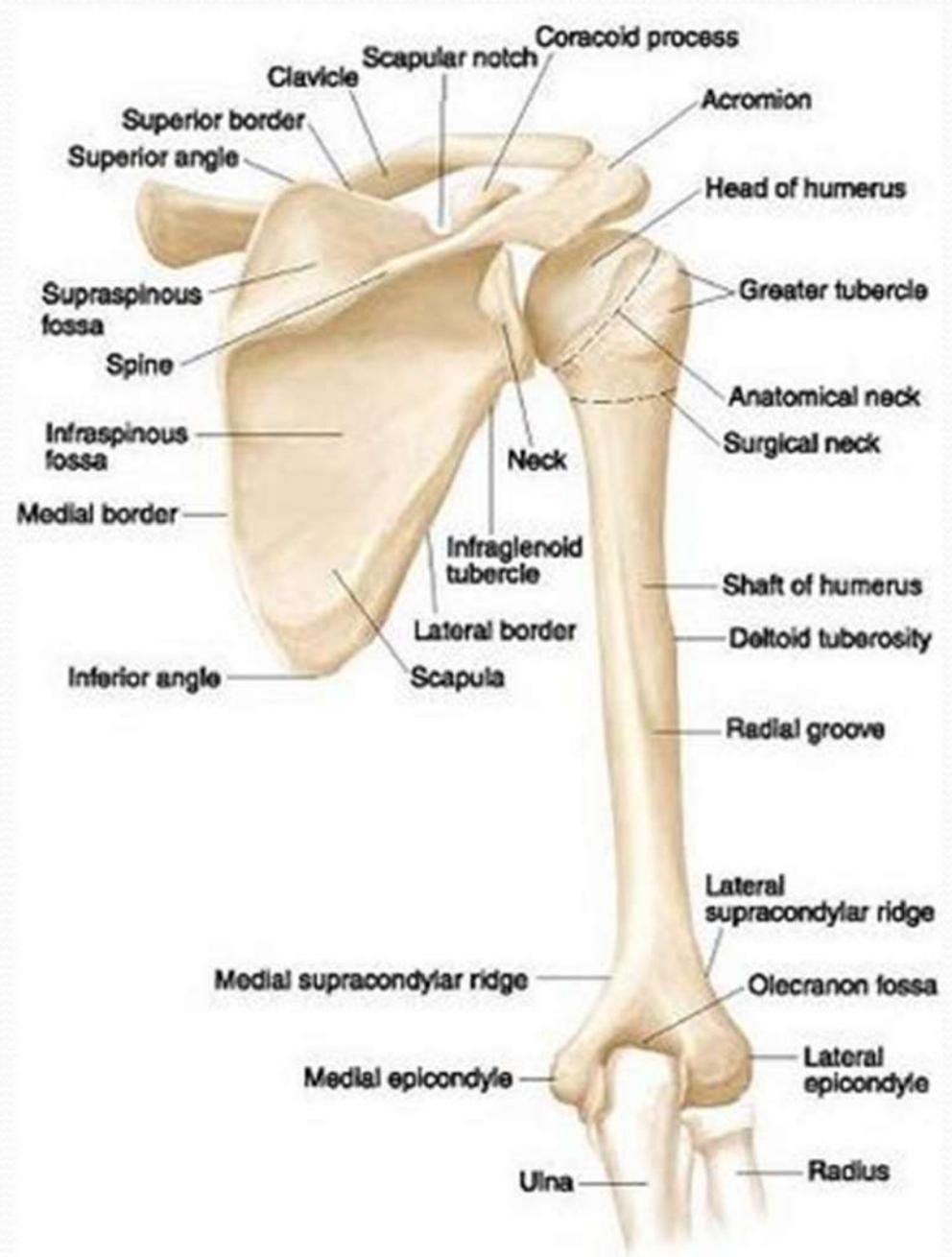
## Anatomy

### The Bones

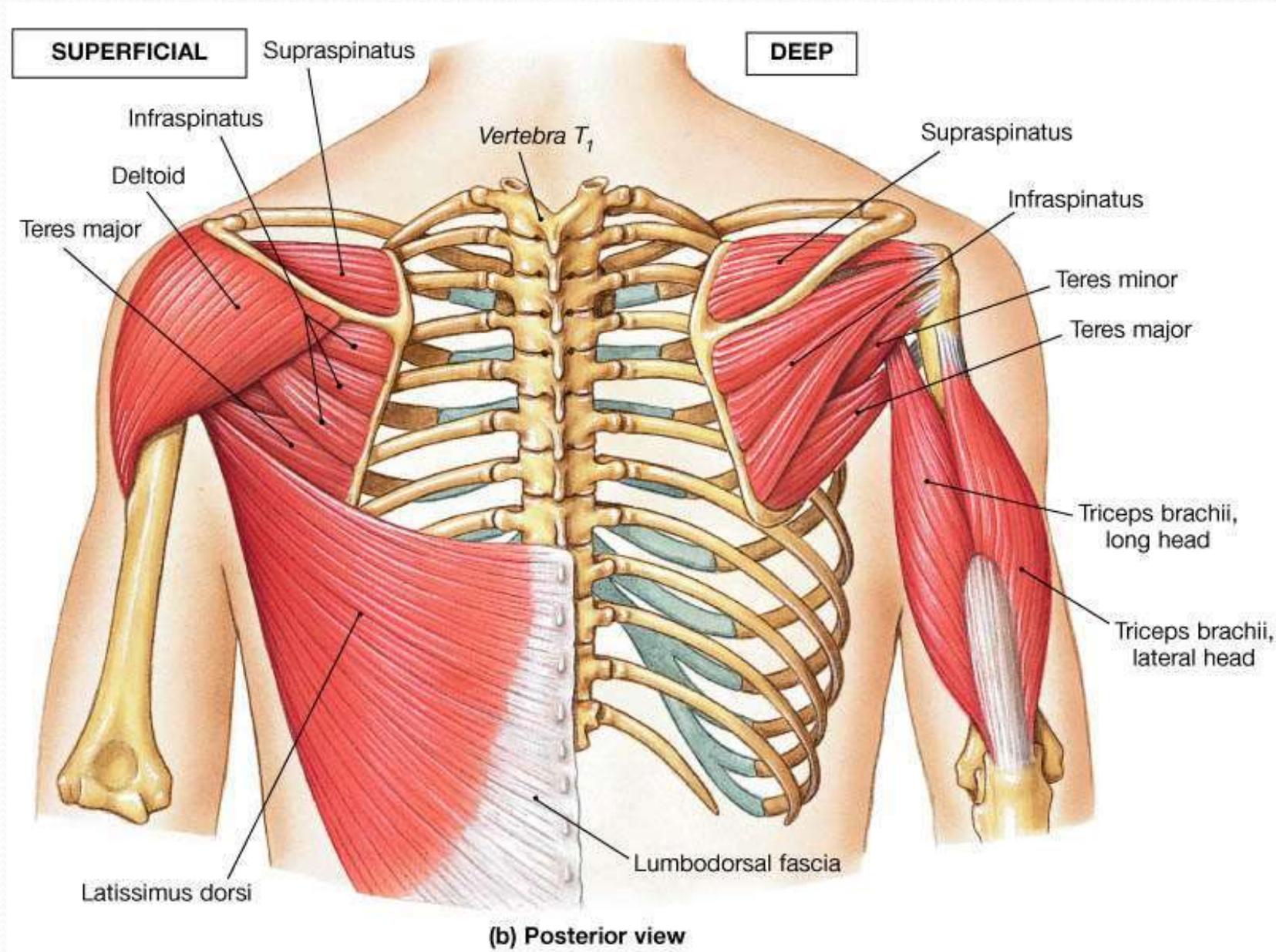
### Anterior View



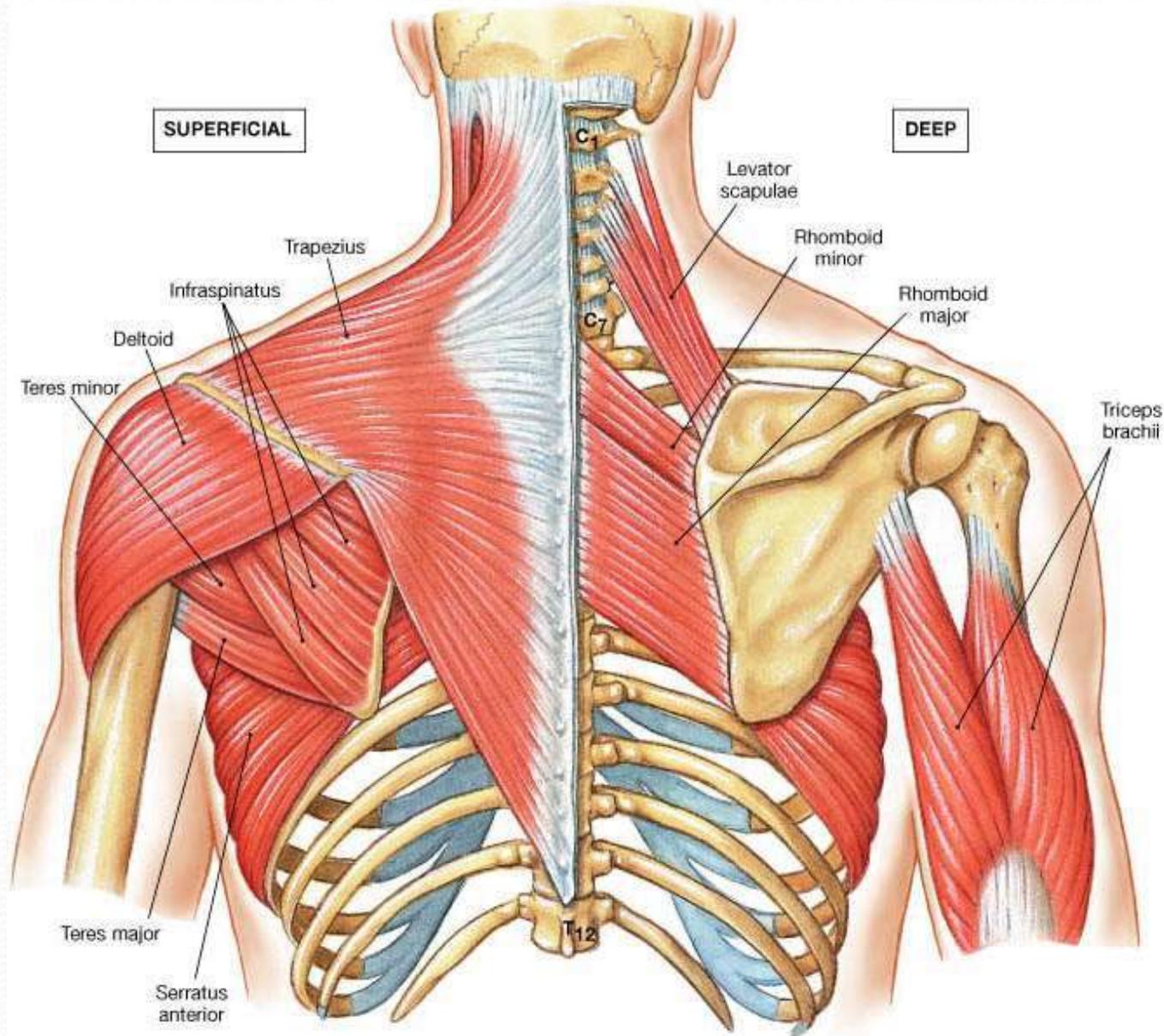
# The Shoulder Anatomy The Bones Posterior View



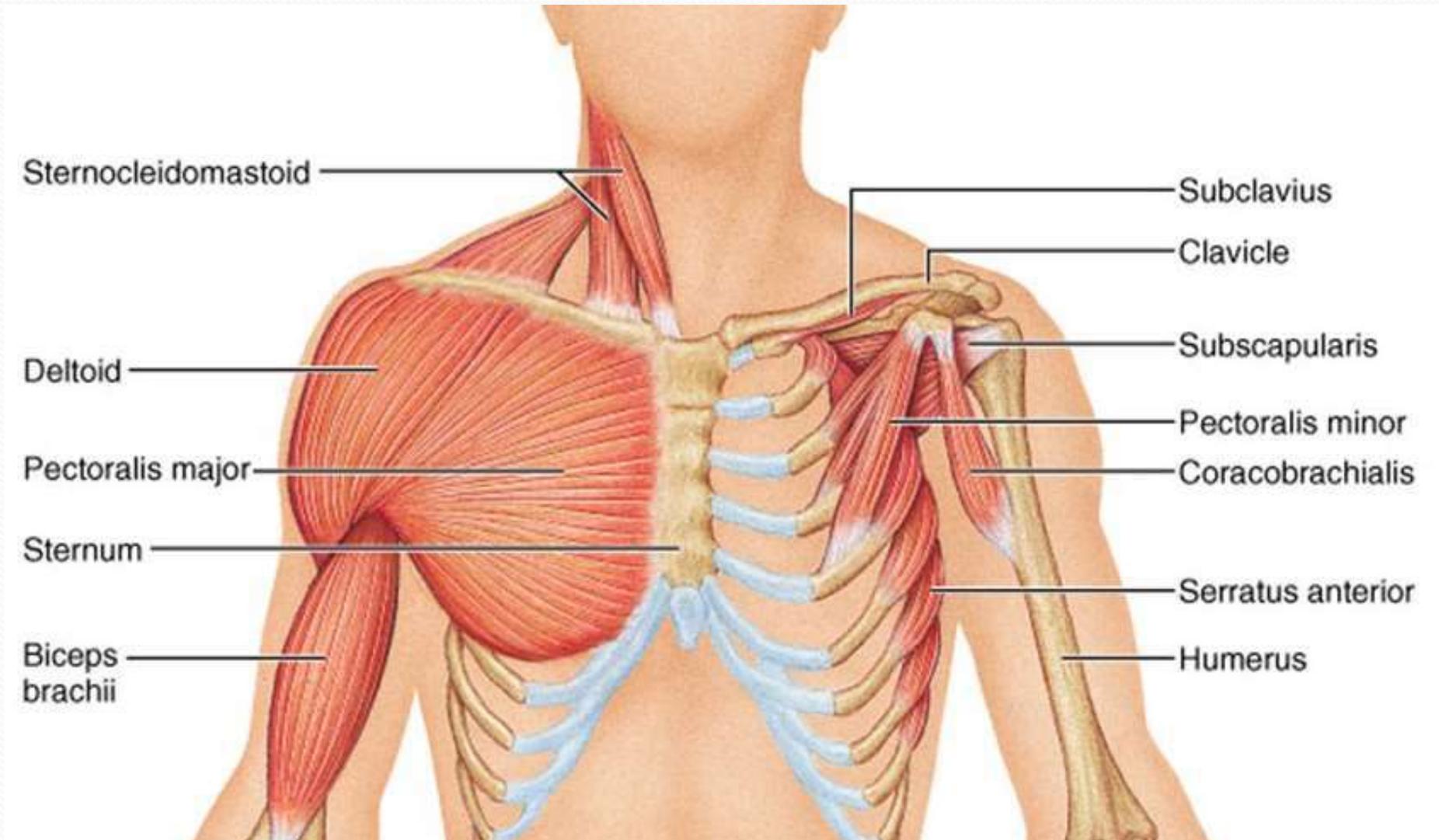
# The Posterior Shoulder Muscles



# The Posterior Shoulder Muscles



# The Anterior Shoulder Muscles



# Deltoid

Origin: the anterior border and upper surface of the lateral third of the clavicle, acromion, spine of the scapula

Insertion: deltoid tuberosity of humerus

Action: shoulder abduction, flexion and extension

Innervation: axillary nerve



# Supraspinatus

Origin: supraspinous fossa of scapula

Insertion: anterior aspect of greater tubercle of humerus

Action: abduction of arm initial  $15^{\circ}$  and stabilizes humerus

Innervation: suprascapular nerve



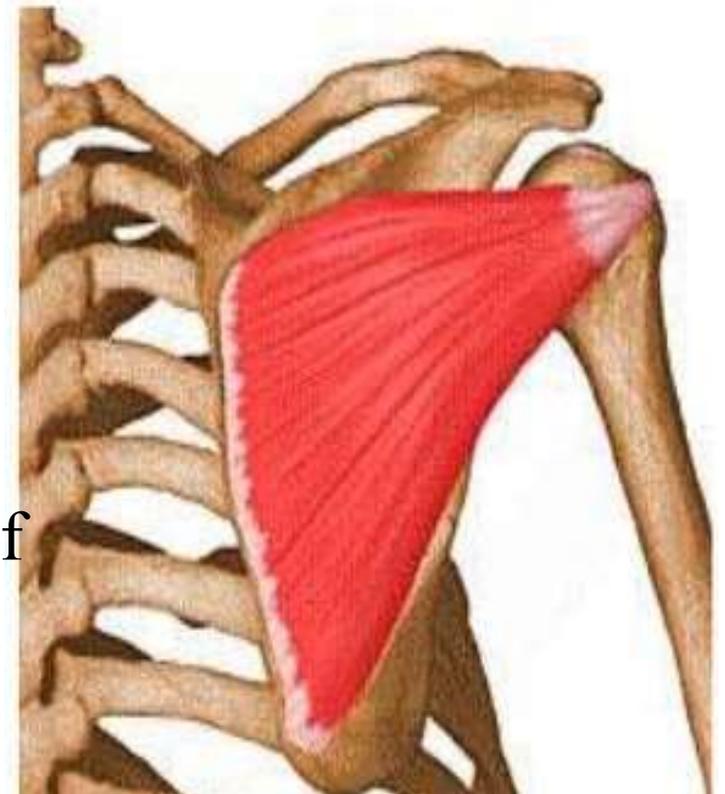
# Infraspinatus

Origin: infraspinous fossa of the scapula

Insertion: posterior aspect of greater tubercle of humerus

Action: lateral rotation and adduction of arm and stabilizes humerus

Innervation: suprascapular nerve



# Subscapularis

Origin: subscapular fossa of scapula

Insertion: lesser tubercle of humerus

Action: internally (medially) rotates humerus; stabilizes shoulder

Innervation: upper subscapular nerve, lower subscapular nerve (C5, C6)



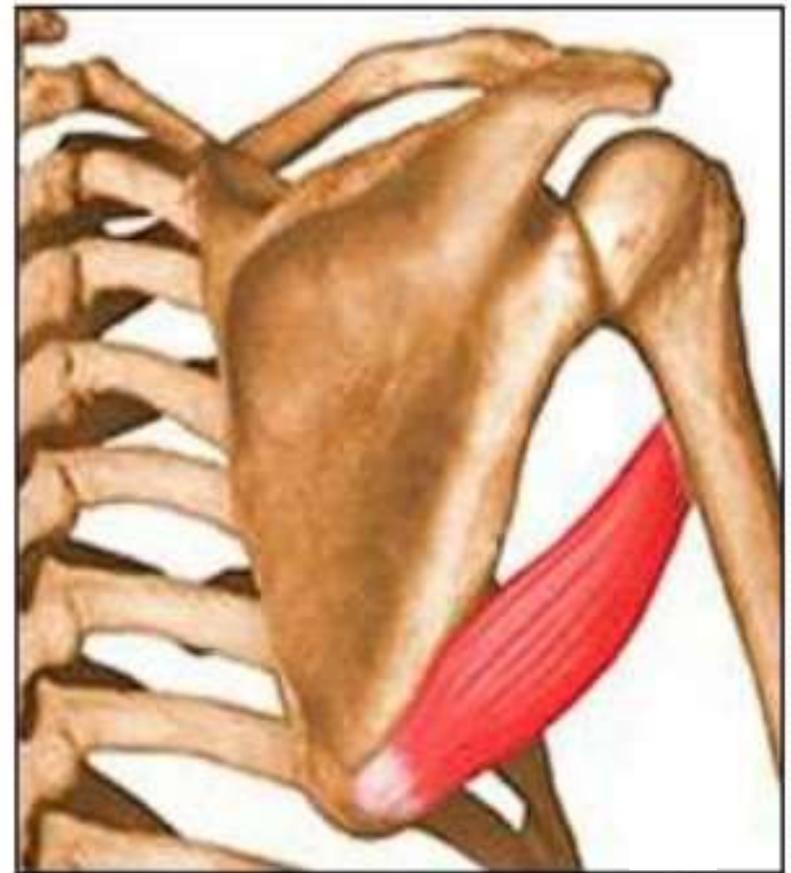
# Teres Major

Origin: posterior aspect of the inferior angle of the scapula

Insertion: medial lip of the intertubercular sulcus of the humerus

Action: adduct the humerus, internal rotation (medial rotation) of the humerus, extend the humerus from flexed position, protracts scapula, depresses shoulder

Innervation: lower subscapular nerve (C5, C6)



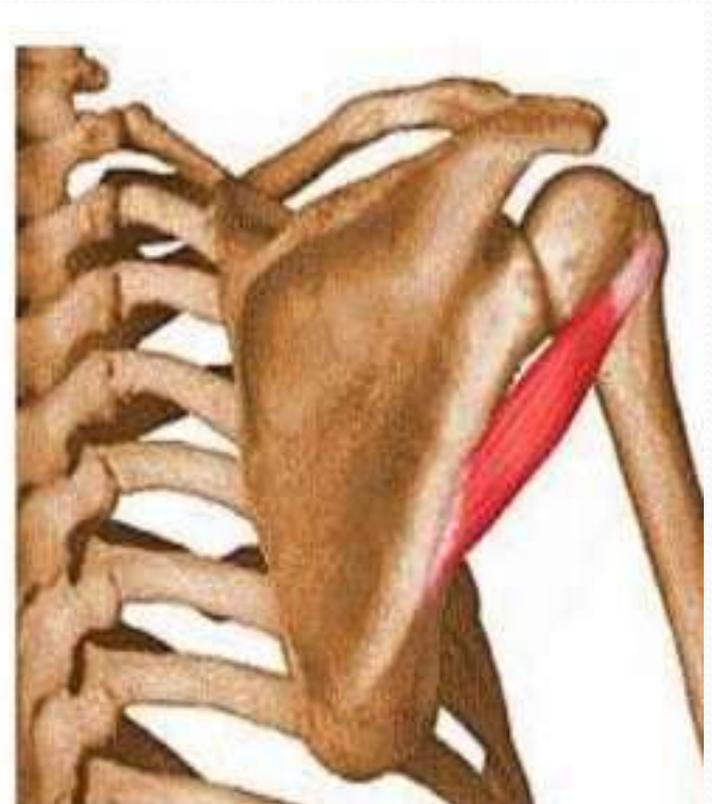
# Teres Minor

Origin: lateral border of the scapula

Insertion: inferior aspect of greater tubercle of the humerus

Action: laterally rotates, extends and adducts the arm, and stabilizes humerus

Innervation: axillary nerve



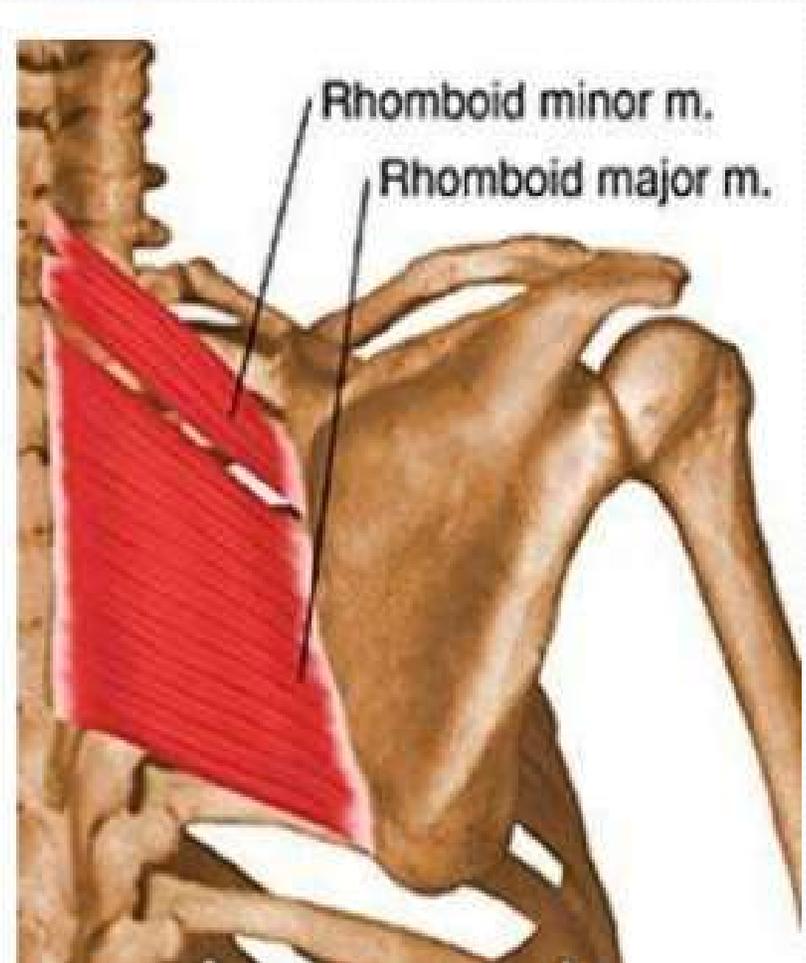
# Rhomboid Major

Origin: spinous processes of the T2 to T5 vertebrae

Insertion: medial border of the scapula, inferior to the insertion of rhomboid minor muscle

Action: retracts, elevates and adducts the scapula and rotates it downward; also stabilizes the scapula to the thoracic wall.

Innervation: dorsal scapular nerve (C4, C5)



# Rhomboid Minor

Origin: nuchal ligaments and spinous processes of C7-T1

Insertion: medial border of scapula, superior to the insertion of rhomboid major muscle

Action: retracts, elevates and adducts the scapula and rotates it downward; also stabilizes the scapula to the thoracic wall.

Innervation: dorsal scapular nerve (C4, C5)



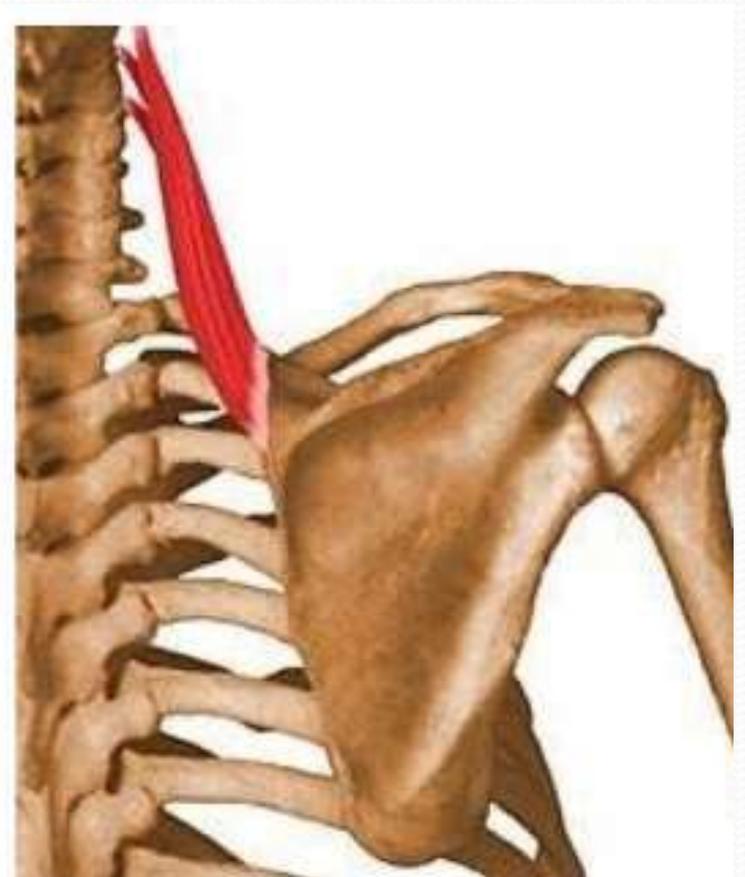
# Levator Scapulae

**Origin:** Posterior tubercles of transverse processes of C1 - C4 vertebrae

**Insertion:** Superior part of medial border of scapula

**Action:** elevates scapula and tilts its glenoid cavity inferiorly by rotating scapula

**Innervation:** cervical nerve (C3, C4) and dorsal scapular nerve (C5)



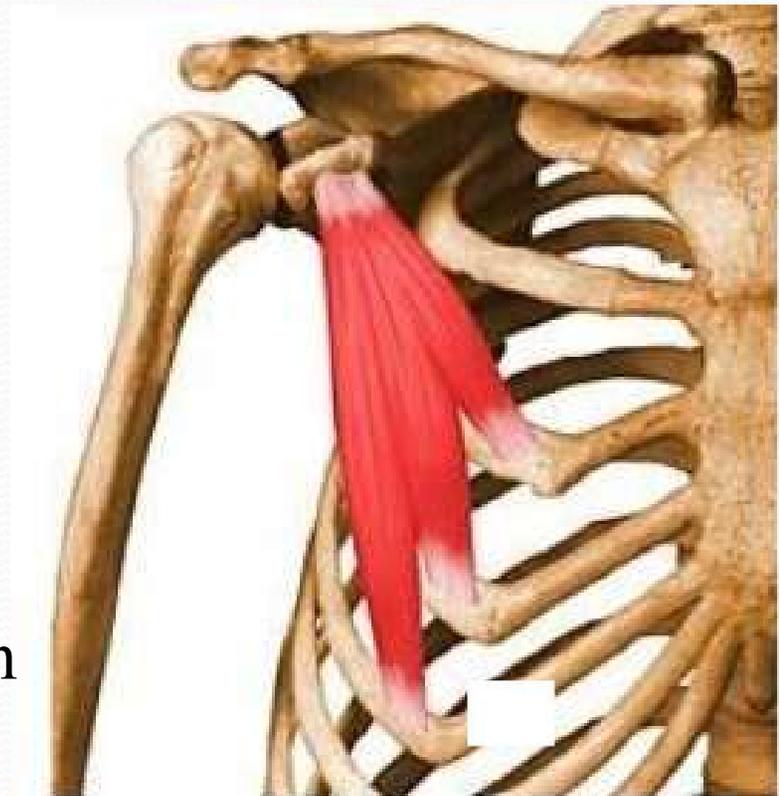
# Pectoralis Minor

Origin: third to fifth ribs, near their costal cartilages

Insertion: medial border and superior surface of the coracoid process of the scapula

Action: stabilizes the scapula by drawing it inferiorly and anteriorly against the thoracic wall, raises ribs in inspiration

Innervation: medial pectoral nerve (C8, T1)



# Coracobrachialis

Origin: coracoid process of scapula

Insertion: medial surface of shaft of humerus

Action: adducts humerus, flexes the arm at glenohumeral joint

Innervation: musculocutaneous nerve (C5, C6, and C7)



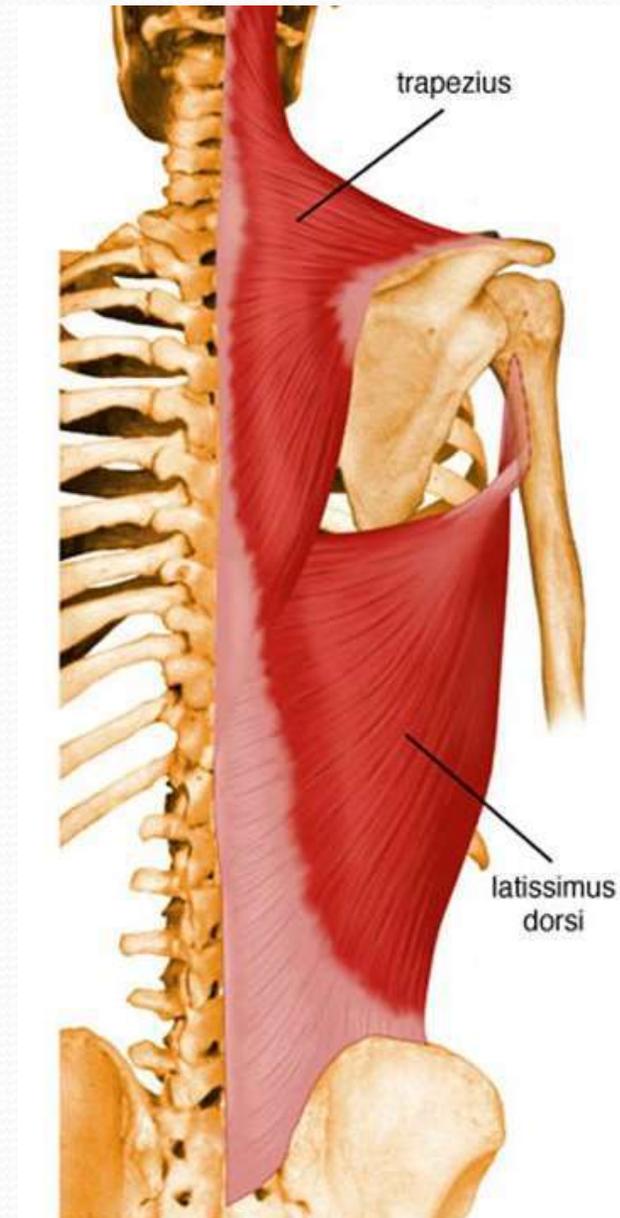
# Latissimus Dorsi

Origin: spinous processes of vertebrae T7-T12, thoracolumbar fascia, iliac crest, inferior 3 or 4 ribs and inferior angle of scapula

Insertion: intertubercular groove of the humerus

Action: Adducts, extends and internally rotates the arm, rotates the trunk and raises body towards arms during climbing

Innervation: thoracodorsal nerve (C6,C7,C8)



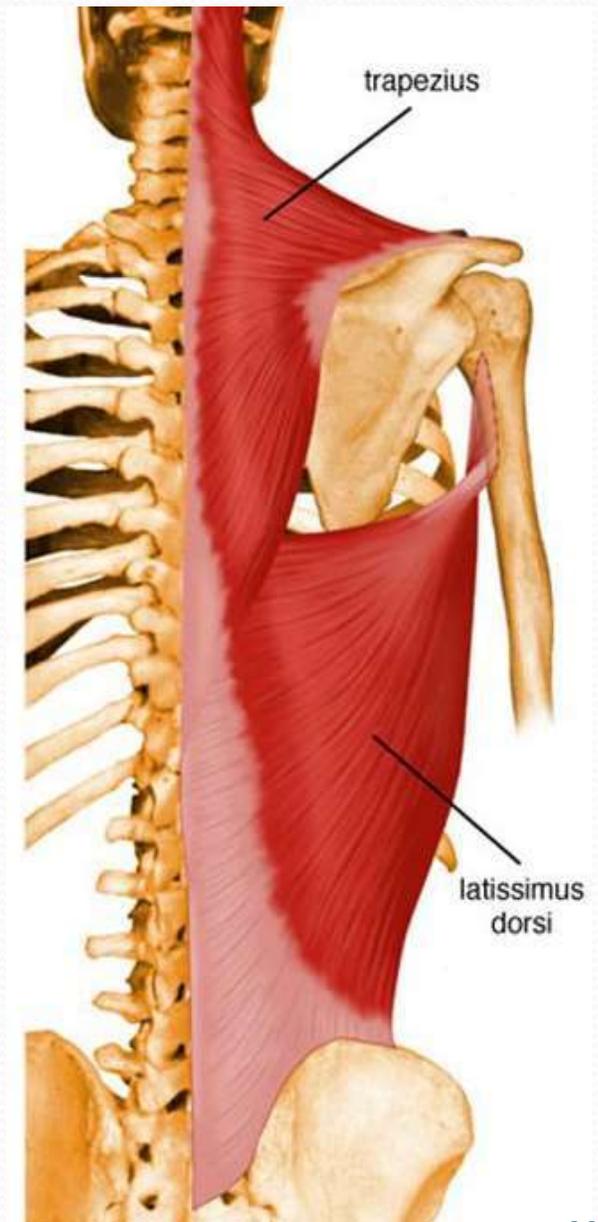
# Trapezius

Origin: medial superior nuchal line and external occipital protuberance of occipital bone, nuchal ligament and spinous processes of vertebrae C7-T12

Insertion: posterior border of the lateral third of the clavicle, acromion process, and spine of scapula

Action: superior fibers elevate and upwardly rotate scapula and extend neck; middle fibers adduct (retract) scapula; inferior fibers depress scapula; superior and inferior fibers act together in superior rotation of scapula

Innervation: CN XI accessory nerve (motor) cervical spinal nerves C3, C4 (pain and proprioception)



# Serratus Anterior

Origin: outer surface of upper 8 or 9 ribs

Insertion: vertebral border and inferior angle of the scapula

Action: protracts and stabilizes scapula, assists in upward rotation, elevates ribs when scapula stabilized

Innervation: long thoracic nerve (from roots of brachial plexus C5, C6, C7)



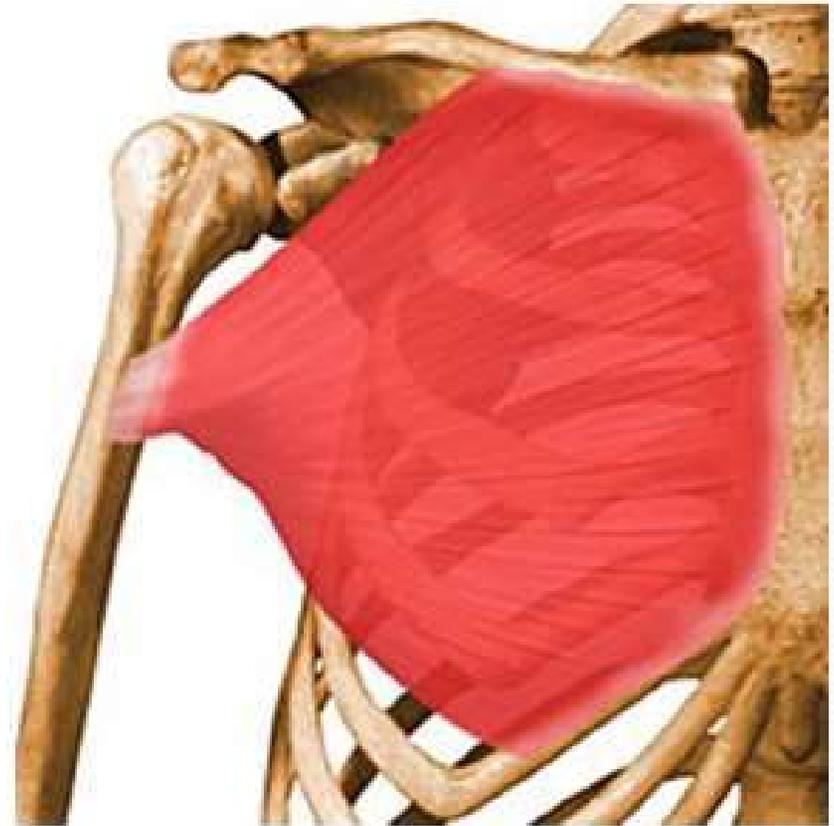
# Pectoralis Major

Origin: clavicular head: anterior border of the medial half of the clavicle. sternocostal head: anterior surface of the sternum, the superior six costal cartilages, and the aponeurosis of the external oblique muscle

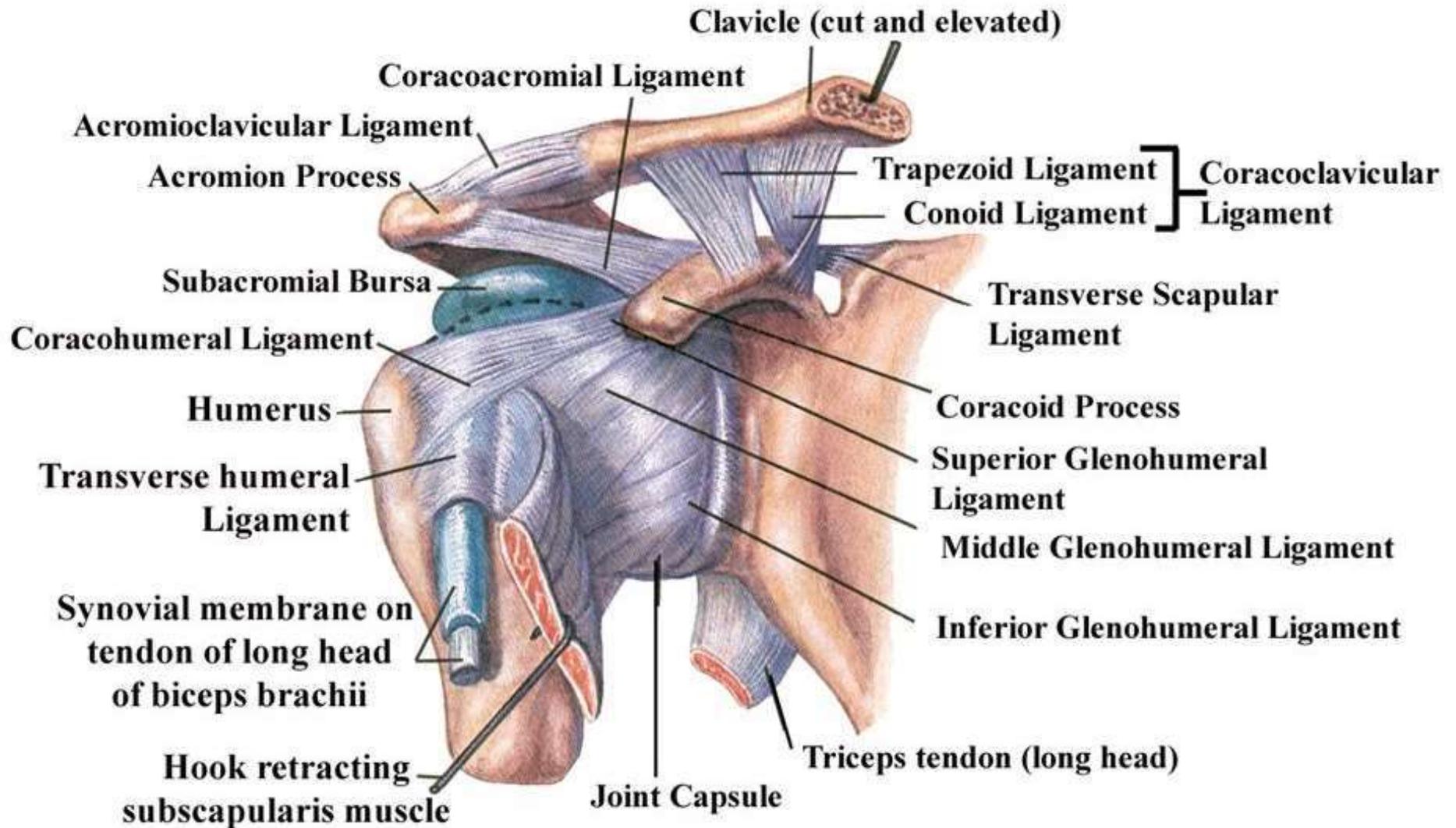
Insertion: lateral lip of the intertubercular (bicipital) groove of the humerus and crest of the greater tubercle of the humerus

Action: clavicular head: flexes the arm at the glenohumeral joint. sternal head: extends the arm at the glenohumeral joint from a flexed position. both heads working together: medially rotate the arm at the glenohumeral joint. adduct the arm at the glenohumeral joint.

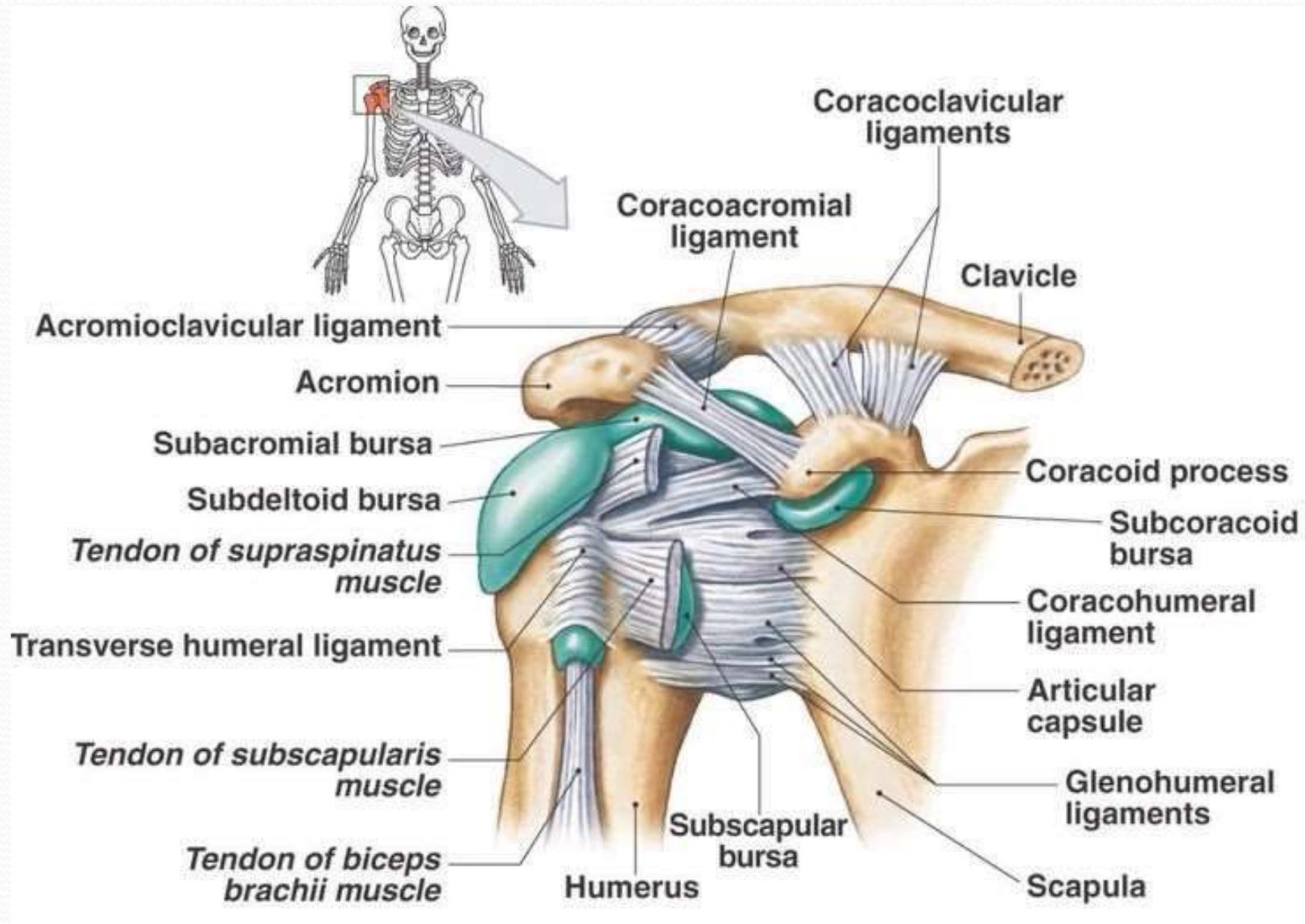
Innervation: lateral pectoral nerve and medial pectoral nerve; clavicular head: C5, C6 ~ sternocostal head: C7, C8, T1



# The Ligaments of The Shoulder



# The Bursae of The Shoulder



# **The Shoulder**

## **History & Exam**



# **Why The History & Exam?**

**So lets take a look at the rationale for the history and exam.**

**Essentially there are four reasons:**

- 1. Determine if the new patient is a chiropractic case.**
- 2. Proper diagnosis.**
- 3. Proper prognosis.**
- 4. Determine proper care strategies and case management.**

# Why The History & Exam?

## **1. Determine if the new patient is a chiropractic case.**

Is this patient actually a chiropractic case or should we refer out? I am always looking for a reason NOT to adjust versus a reason to adjust. As a chiropractor I am always adjusting, so if I shouldn't then I need to find that reason. If I can't find a reason to hold off on the adjustment or to refer then the adjustment is indicated and away we go.

**Primary reasons NOT to adjust: (for all anatomical regions, not just shoulder)**

- 1. Visceral pathology**
- 2. Systemic pathology**
- 3. Fracture (new or old) X-rays to determine**
- 4. Bony block (degeneration, osteophytes, etc) X-rays to determine**
- 5. Soft tissue damage (cartilage, ligament, disc, muscle, tendon, bursa) MRI to determine**
- 6. Surgeries causing limitations (jt replacement, pins, implants, etc)**
- 7. Excessive acute or chronic inflammation (limiting jt ROM or patient comfort)**
- 8. Patient apprehension (discomfort, mentally not ready)**
- 9. DC apprehension (clinically unsure)**

**The DC should bare all of the above in mind as they go through the History & Exam**

# Why The History & Exam?

## 2. Proper diagnosis.

**Making an accurate diagnosis is important for three reasons:**

### 1. Proper management & care plan.

**An accurate diagnosis will allow the DC to properly manage the patient case & design a quality care plan. The better the care plan, the better the results in managing the injury and the faster the patient will get better and return to normal activities. (oh did I say more referrals too)**

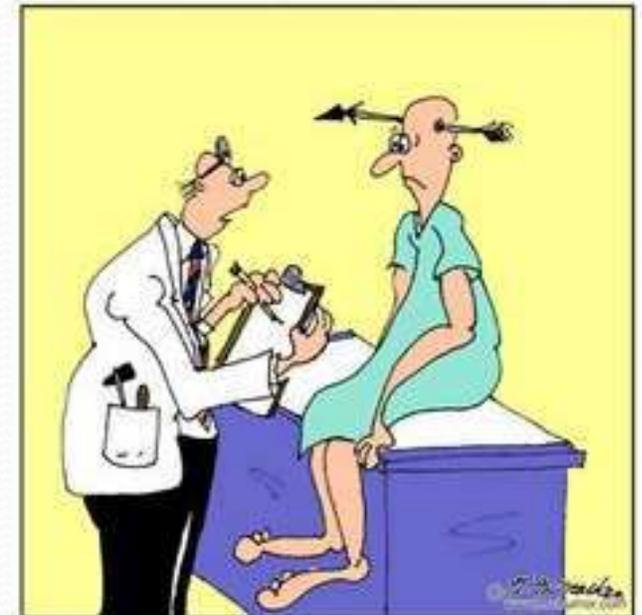
### 2. Better billing.

**An accurate diagnosis will allow for proper insurance billing, higher quality reports & yes even getting paid expeditiously.**

### 3. Proper prognosis.

**A proper diagnosis leads to a more accurate prognosis.**

**(next slide please)**

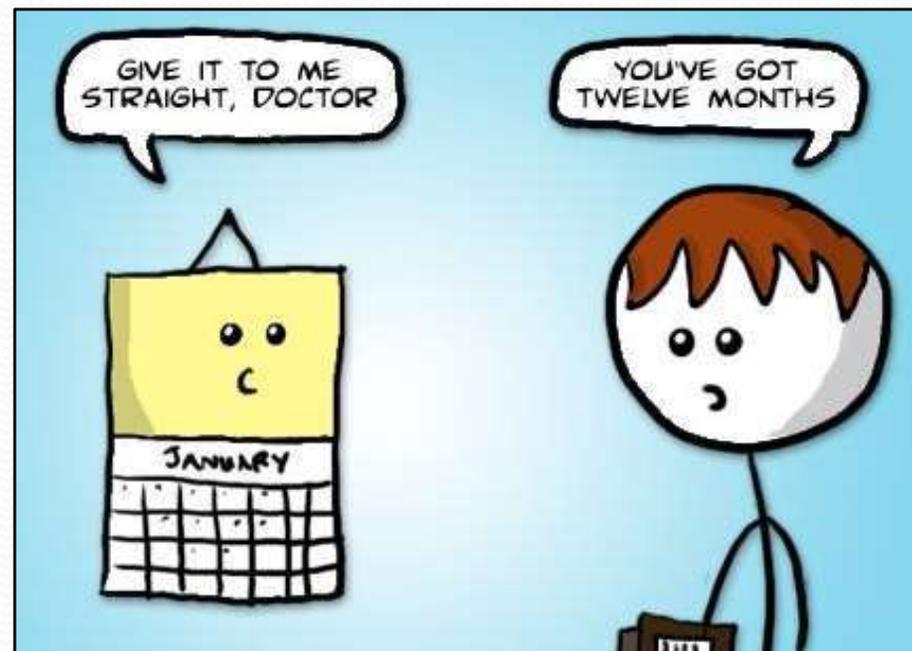


**"Off hand, I'd say you're suffering from an arrow through your head, but just to play it safe, I'm ordering a bunch of tests."**

# Why The History & Exam?

## 3. Proper prognosis.

Making an accurate prognosis is tremendously important. With a proper history & exam the DC should be able to determine an accurate prognosis. The patient is relying on your expertise to inform them on how long it will take to “fix” their problem. The more accurate you are, the more confidence that will be instilled in the patient and the insurance company you are billing. (oh did I say more referrals too)



# Why The History & Exam?

## 4. Determine proper care strategies and case management.

Now that we have determined that the patient is a chiropractic case and we know what the problem is (diagnosis) we can proceed to considering the proper care strategies and case management.

As you will see in this presentation; how we approach each case (what area of the injury we work on first) is important as results will be much improved if we use the techniques and strategies in the proper sequences.

But first the Exam!



# The Shoulder

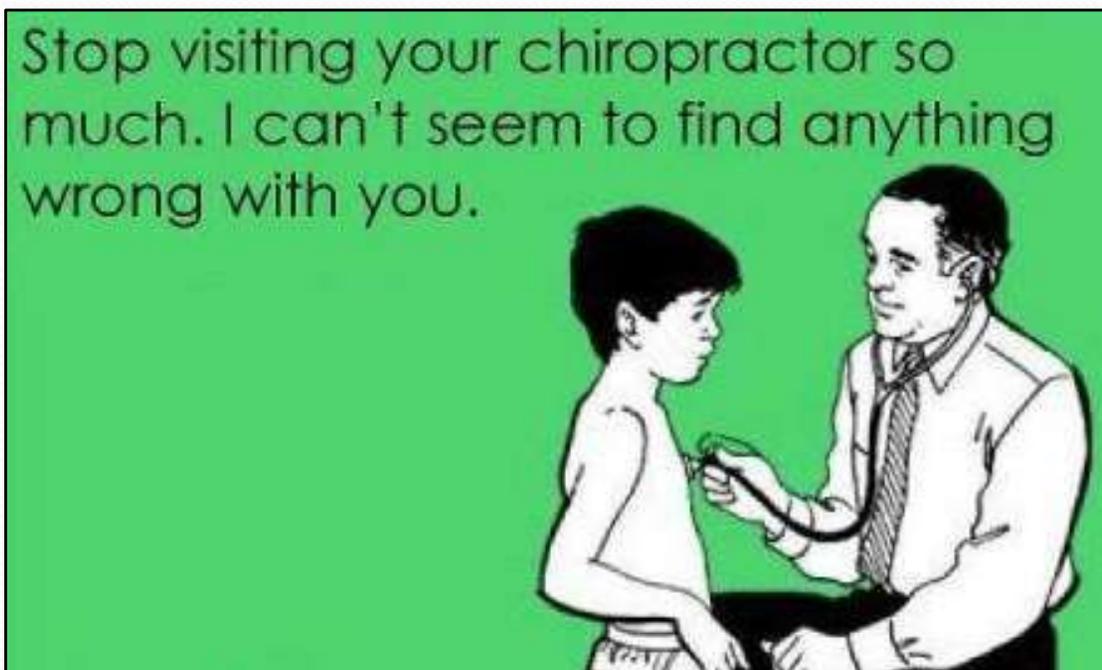
## Physical Examination



# Why So Many Exams?

Often DC's will ask why are there so many exam procedures.

The answer is that one or two tests will probably not lead to the correct diagnosis. The more exams performed the higher the level of certainty and safety for the pt. When a pt is acute often tests can not be performed due to excessive pain. That is a huge sign of something is wrong and reason to proceed with extra caution.



# Shoulder Physical Exam

All exam forms on website click on: Free Materials

For each exam reviewed please take the time to grab a partner and perform the exam procedure.

## Shoulder

### Inspection

Finding	Positive
Mass	
Swelling	
Discoloration	
Deformity	
Cicatrix	
Joint Play	
Bony Palpation	
Soft Tissue Palpation	
Scapular Rhythm 2:1	

### Passive Range Of Motion

Shoulder	Norm	Exam	Pain
Abd (hum int rot)			
Abd (hum ext rot)			
Adduction			
Flexion			
Extension			
Internal Rotation			
External Rotation			

### Active Range Of Motion

Shoulder	Norm	Exam	Pain
Abd (hum int rot)			
Abd (hum ext rot)			
Adduction			
Flexion			
Extension			
Internal Rotation			
External Rotation			

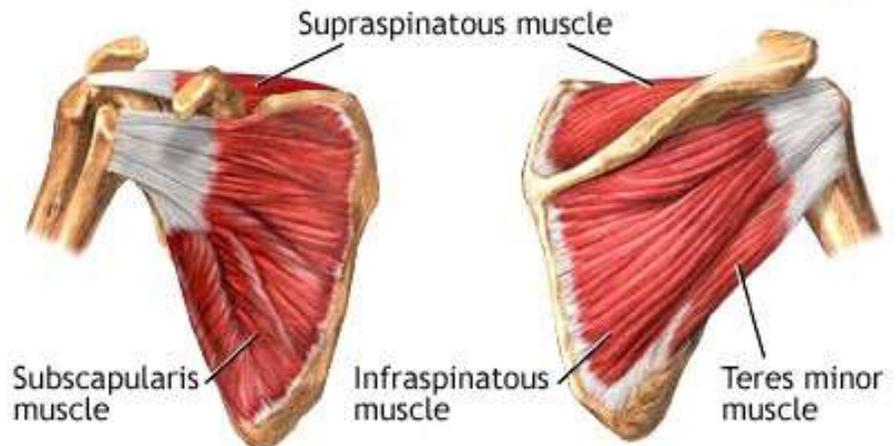
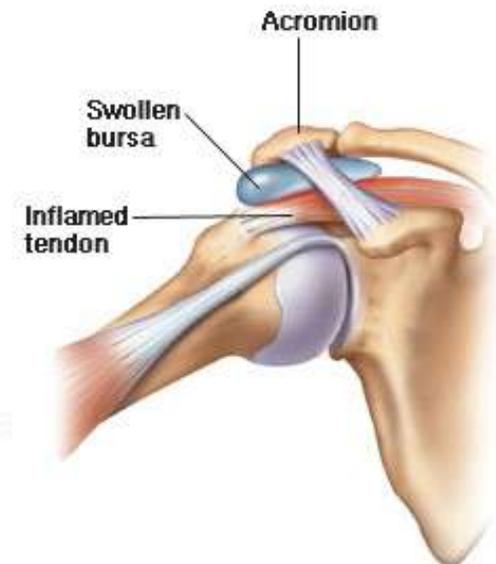
### Orth/Neuro Tests

Test	Left	Right
Yergason's		
Drop Arm		
Apprehension		
Apley's		
Dugas'		
Jobe's		
Disappearing Bursa		

### Muscle Strength

Test	Left	Right
Pec Major		
Pec Minor		
Ant Deltoid		
Middle Deltoid		
Post Deltoid		
Rhomboids		
Trapezius		
Suorasp inatus		
Infraspinatus		
Teres Minor		
Teres Major		
Suscapularis		
Latissimus Dorsi		

- 5 = normal; full ROM, full resistance
- 4 = good; full ROM, some resistance
- 3 = fair; full ROM, against gravity
- 2 = poor; full ROM, no gravity
- 1 = trace; no motion, with contractility
- 0 = zero; no motion, no contractility



Anterior shoulder

Posterior shoulder

# Shoulder Joint Physical Examination

## Range of Motion

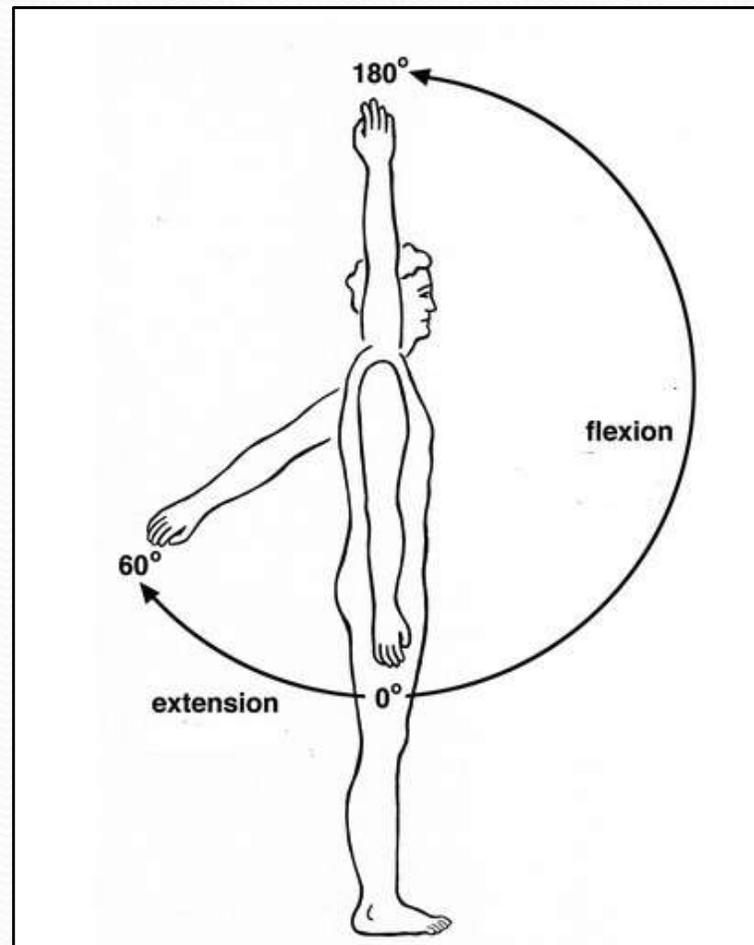
**For each exam reviewed please take the time to grab a partner and perform the exam procedure.**

<u>Motion</u>	<u>Normal</u>
Flexion	180°
Extension	60°
Adduction	45°
Abduction	180°
Internal Rotation	70°
External Rotation	90°

# Shoulder Joint Physical Examination

## Range of Motion ~ Flexion & Extension

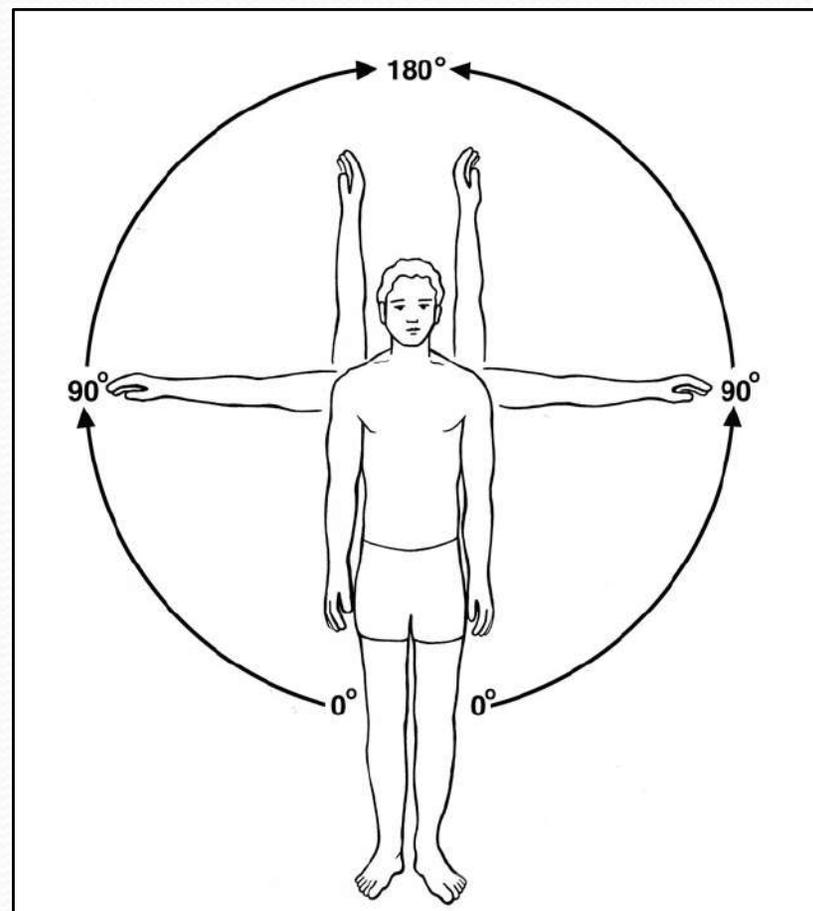
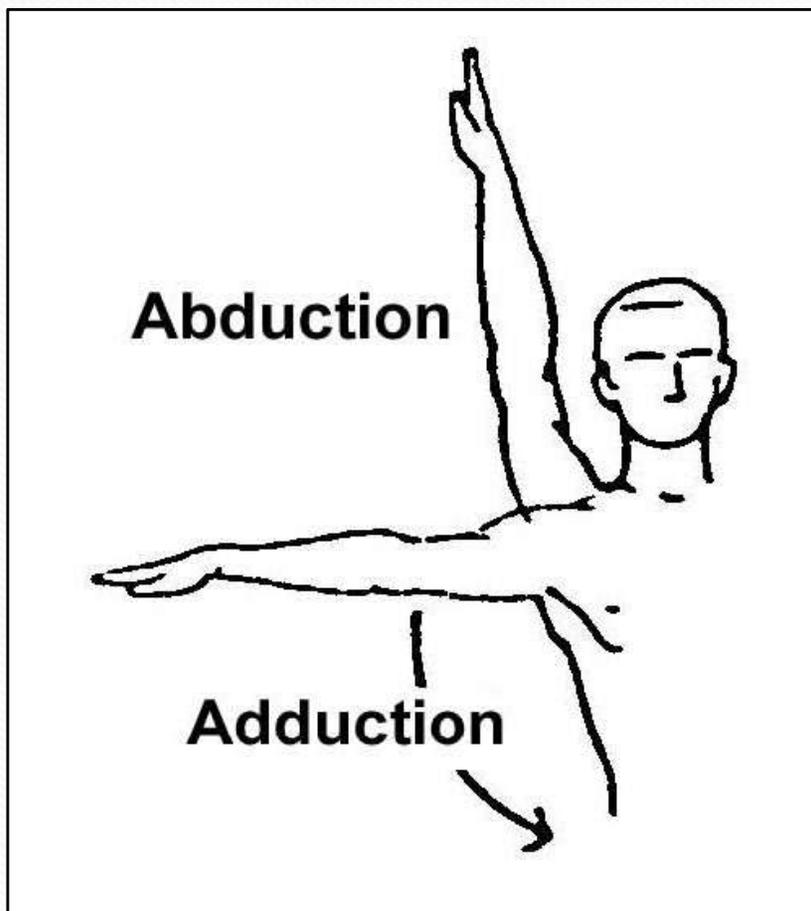
**For each exam reviewed please take the time to grab a partner and perform the exam procedure.**



# Shoulder Joint Physical Examination

## Range of Motion ~ Abduction & Adduction

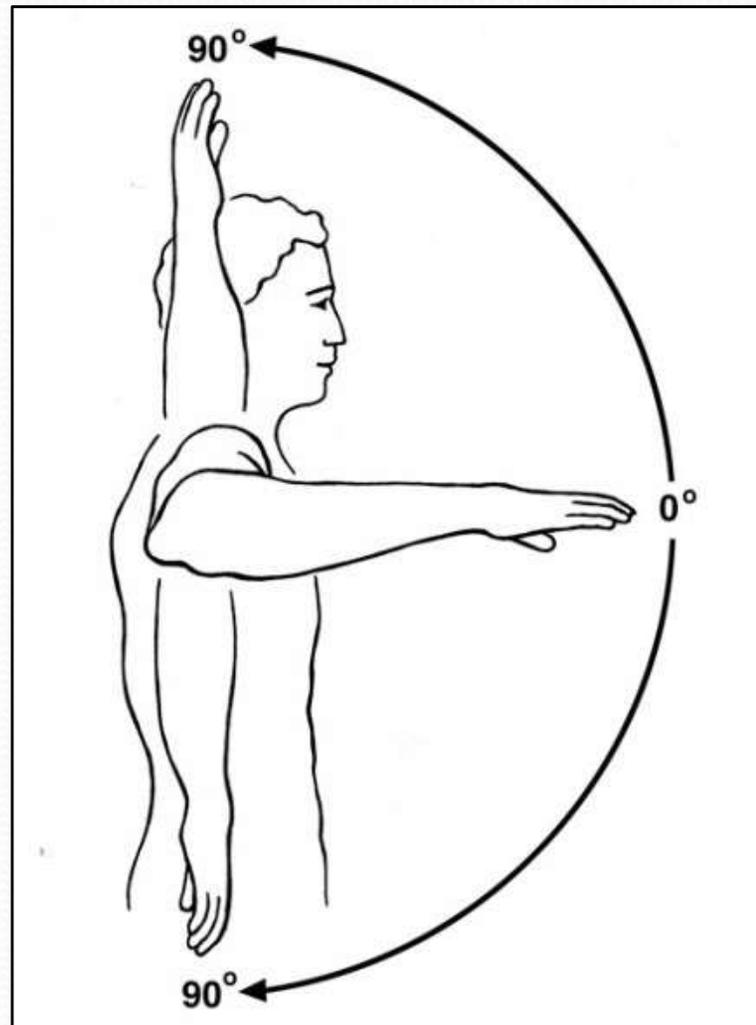
**For each exam reviewed please take the time to grab a partner and perform the exam procedure.**



# Shoulder Joint Physical Examination

## Range of Motion ~ Internal & External Rotation

**For each exam reviewed please take the time to grab a partner and perform the exam procedure.**



# Shoulder Joint Physical Examination

**For each exam reviewed please take the time to grab a partner and perform the exam procedure.**

## **Yergason's Test**

Pt's elbow is flexed to 90° and forearm pronated.

DC holds their arm at the wrist.

Pt actively supinates against resistance.

### **Positive:**

Pain in bicipital groove area, indicates bicipital tendonitis.



# Shoulder Joint Physical Examination

**For each exam reviewed please take the time to grab a partner and perform the exam procedure.**

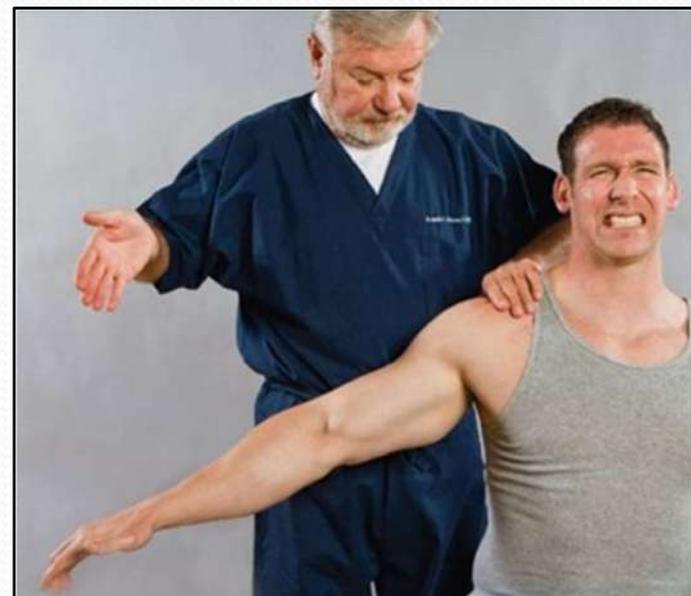
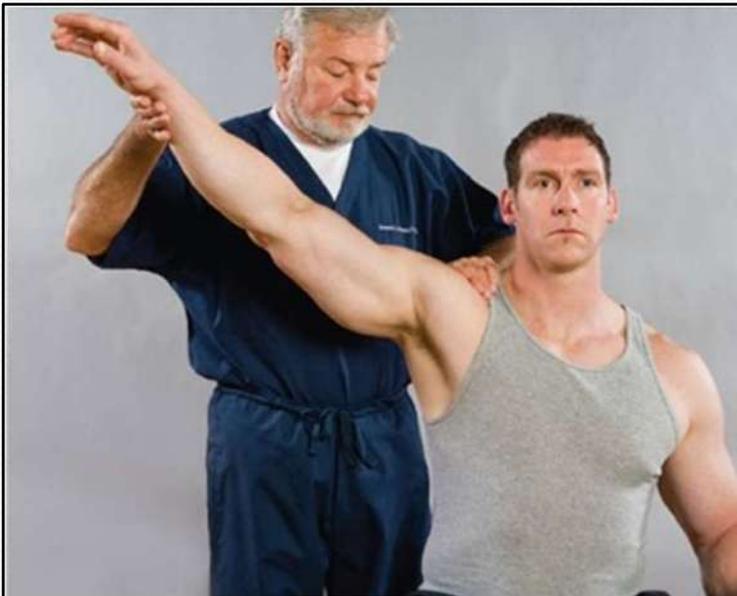
## **Drop Arm Test (Codman's)**

Passively abduct the shoulder to 90-120°, flex shoulder forward to 30°, elbows locked, and point thumbs down. DC drops pt's arms.

### **Positive:**

Pt is unable to keep arm elevated after the DC releases.

Indicates rotator cuff tear: supraspinatus muscle/tendon tear/involvement.



# Shoulder Joint Physical Examination

**For each exam reviewed please take the time to grab a partner and perform the exam procedure.**

## Apprehension Test

Pt is supine with the scapula supported by the edge of exam table. The arm is positioned in 90° abduction and external rotation. With increasing external rotation the DC watches for pt apprehension. If pt seated DC exerts an anterior translatory force with their thumb placed posteriorly on the humerus. However, their fingers are anterior to control any sudden instability episode that may occur.

## Positive:

Pt apprehension. Pain alone is not a positive test. A positive test indicates a labral lesion and/or bony lesion at the anterior inferior rim of the glenoid.



# Shoulder Joint Physical Examination

**For each exam reviewed please take the time to grab a partner and perform the exam procedure.**

## Apley's Scratch Test

1. Pt tries to reach behind their neck to touch between scapulae.

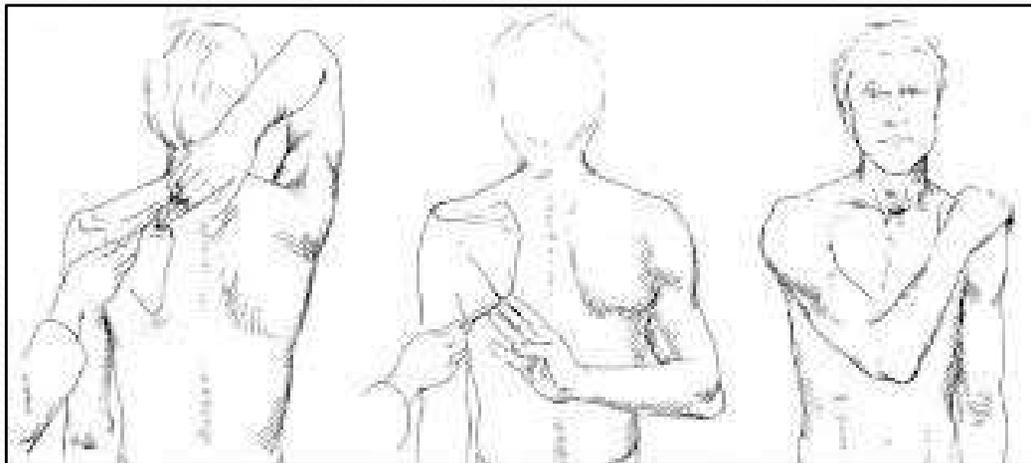
**Positive:** Decreased motion on involved side. Checks glenohumeral abduction, external rotation and scapular upward rotation and elevation.

2. Pt tries to reach up to shoulder blades as far as they can, starting from their lower back.

**Positive:** Decreased motion on involved side. Checks glenohumeral adduction, internal rotation and scapular retraction with downward rotation

3. Pt tries to touch opposite shoulder. Compare bilaterally.

**Positive:** Decreased motion on involved side. Checks glenohumeral adduction, internal rotation, horizontal adduction and scapular protraction.



# Shoulder Joint

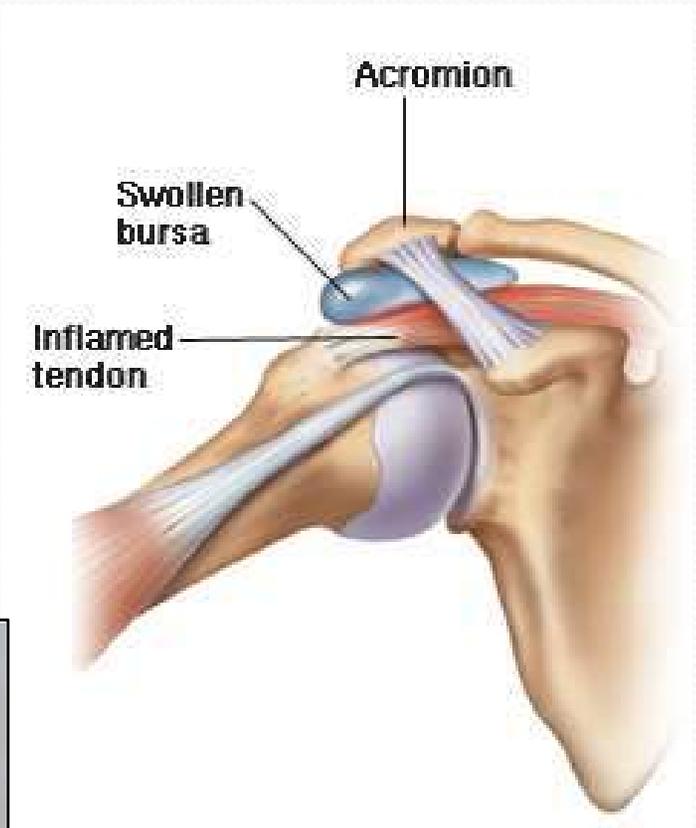
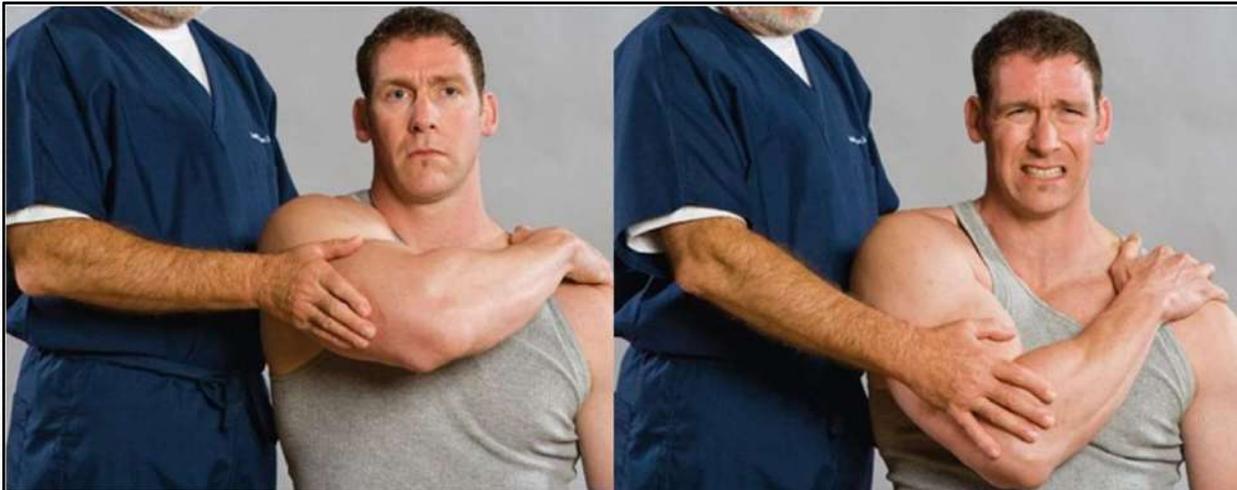
## Physical Examination

**For each exam reviewed please take the time to grab a partner and perform the exam procedure.**

### Dugas's Test

Pt attempts to place the hand of the involved side on the opposite shoulder and touch their elbow to their chest.

**Positive:** Pt can not perform test, indicates a dislocated shoulder.



# Shoulder Joint

## Physical Examination

**For each exam reviewed please take the time to grab a partner and perform the exam procedure.**

### Jobe's Test

Passively abduct pt's shoulder to 90°, flex shoulder to 30° and point thumbs down.

In this position, provide resistance as the pt lifts upward.

**Positive:** Pain or weakness suggests possible supraspinatus involvement or tear.



# Shoulder Joint

## Physical Examination

**For each exam reviewed please take the time to grab a partner and perform the exam procedure.**

### Disappearing Bursa

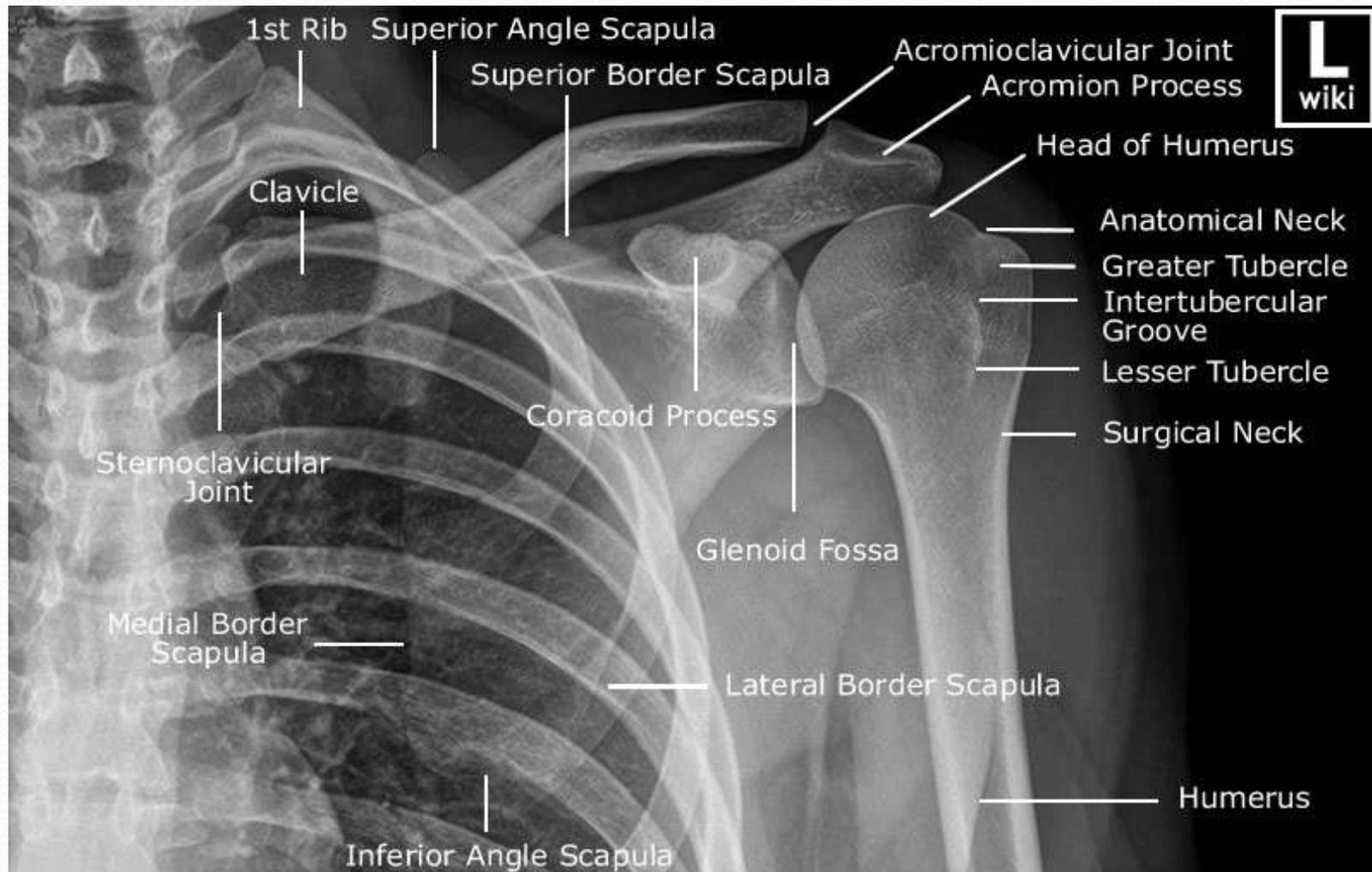
Pt seated. DC palpates painful subacromial bursa and passively abducts arm.

**Positive:** Pain disappears with increasing abduction indicates subacromial bursitis.



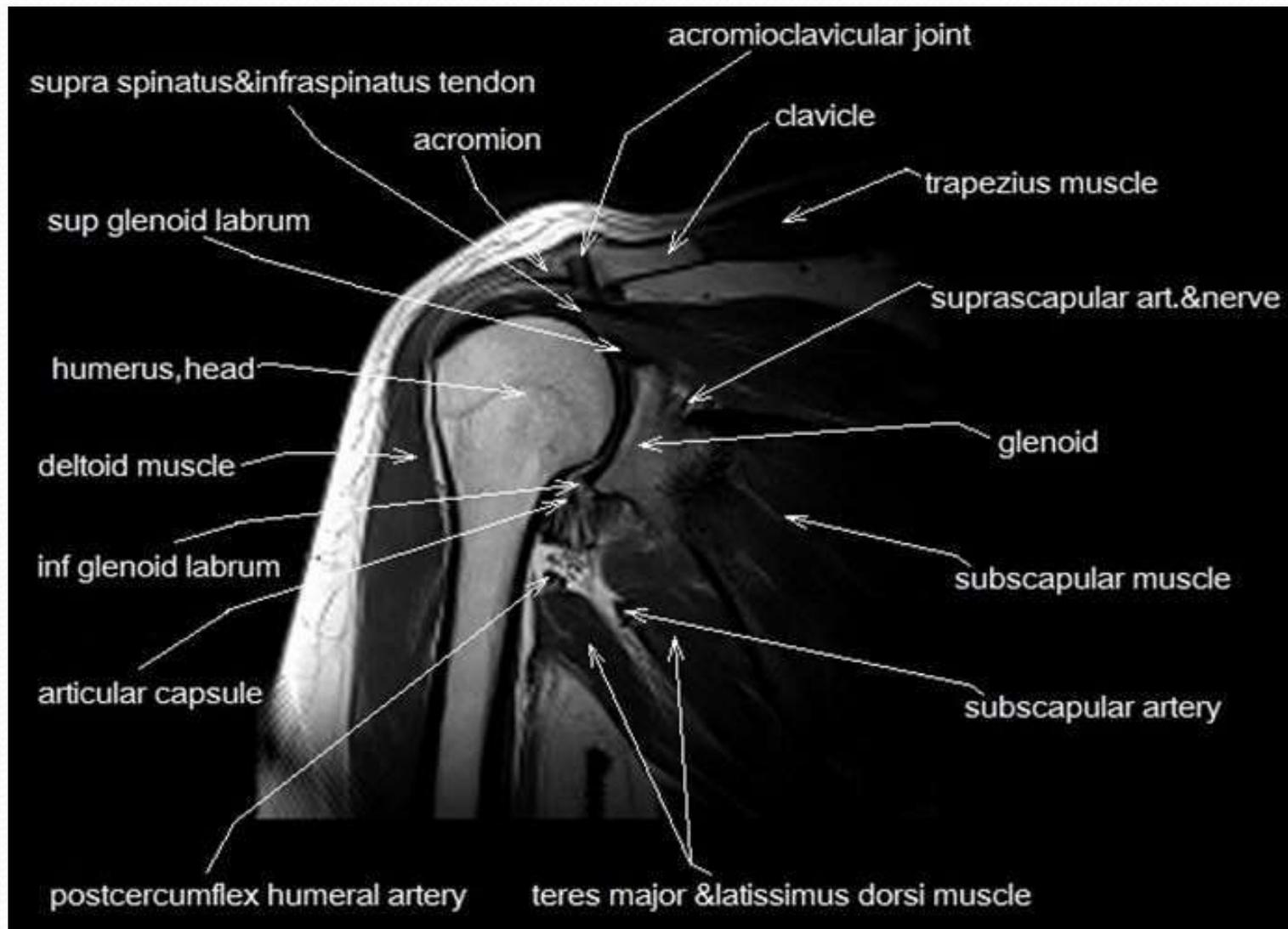
# Further Studies? Take A Picture?

Okay so now that the history and exam are complete you should be able to determine if the patient needs X-Rays. Suspect a structural issue: fracture, dislocation, bony block (degeneration, osteophytes), if so take the films or send out, (however you manage).



## Further Studies? Slice It Up With AN MRI.

Okay so now that the history and exam are complete you should be able to determine if the patient needs an MRI. Suspect a soft tissue issue: soft tissue damage (cartilage, ligament, muscle, tendon, bursa) then refer for an MRI.



# Is It A Chiropractic Case?

**Okay, all the evidence is in. Do we refer out?  
If not, then lets get started!**



# Strategies for Clinical Care

(These ideas can be applied for any region of the body or injury)

The history & exam should give us our primary diagnosis. Often the DC will focus **ONLY** on the specific muscle(s) or region from their primary diagnosis (allowing their **diagnosis to dictate the care**).

Most injuries if not all involve multiple components & regions.

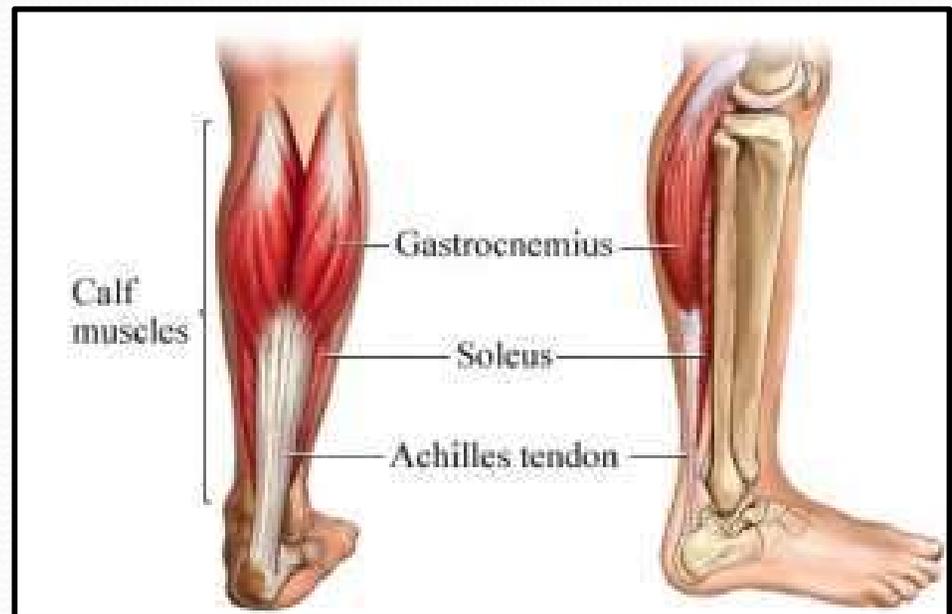
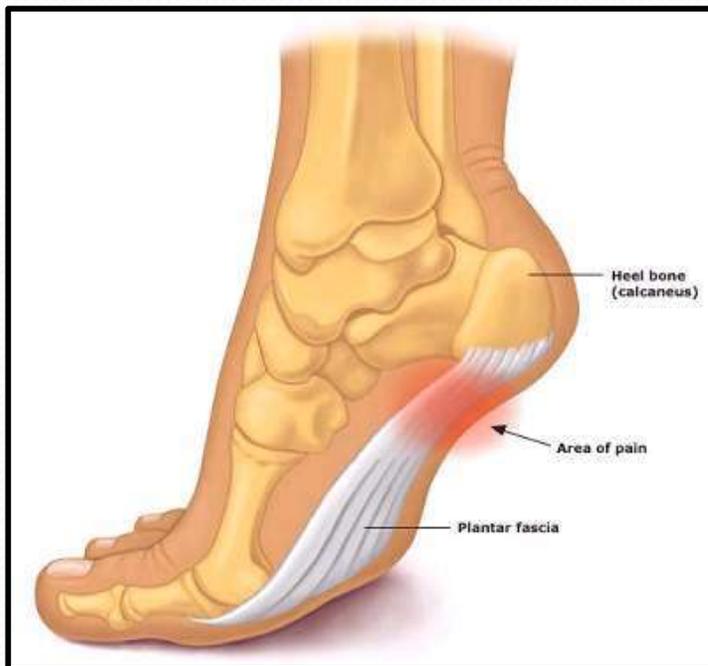
**DON'T** forget to address all the secondary issues as well. If the secondary issues are not address the patient's recovery may be slowed and the desired results may come up short. Not good!



# Some Examples Of Diagnosis Dictating Care?

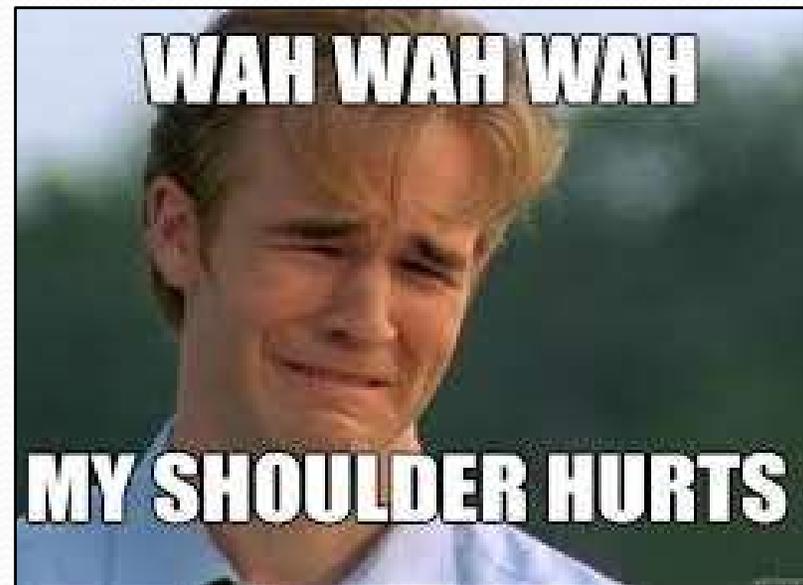
If a pt has plantar fasciitis often a DC will only work on the bottom of the foot but the calf muscles (gastrocnemius and soleus), hamstrings, gluts & low back will likely be involved as well.

**Try this:** No really, stand up for a moment. Pretend you have plantar fasciitis in your right foot. Now take a step forward and gingerly and carefully place pressure on that injured foot. Feel how your calf, hamstrings, gluts and low back tighten? That IS the problem. All these areas are involved as well and they need to be worked if you want the best clinical results. Skipping these areas will result in less than optimal results!



## Some Examples Of Diagnosis Dictating Care?

Now back (possible pun) to the shoulder. Let's say that your exam revealed the supraspinatus muscle was the primary muscle of involvement. It's not possible that all the other shoulder girdle muscles are perfectly fine. So the same logic will apply, let's work on all the muscles of the shoulder girdle to achieve optimal results.



## Order? Is There Any Order?

Okay so now what? Is there a proper order to work on all these involved areas? Yes! We want to always start at the point furthest away from the primary injury site and work towards it. The logic here is if we start furthest away, the primary site will likely have calmed down and will be easier to work on. Often the pain and muscular spasms of the primary site will have significantly diminished by working on the secondary regions first. Injuries that you could have not touched will become more accessible and consequently easier to work on, leading to better results!

**Note:** Don't forget to tell the patient about your strategy. This will avoid the, "hey doc the injury is over here, you're working on the wrong spot", comment!



# Key Concepts!

Before we dive into this we need to review a couple key concepts:

1. Muscle Fiber Shapes & Orientation
2. Joint Motion
3. Adhesion Formation



# 1. Muscle Fiber Shapes & Orientation

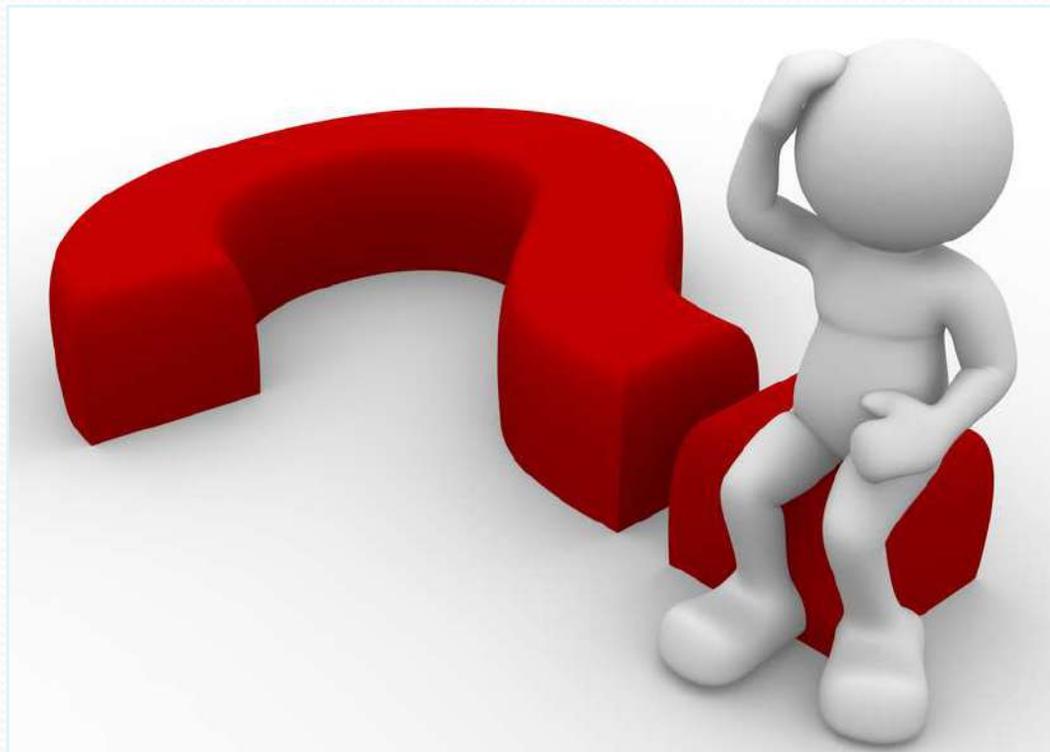
Okay so take out your muscle flash cards!

You know origin, insertion, action, innervation.

Remember memorizing all those?

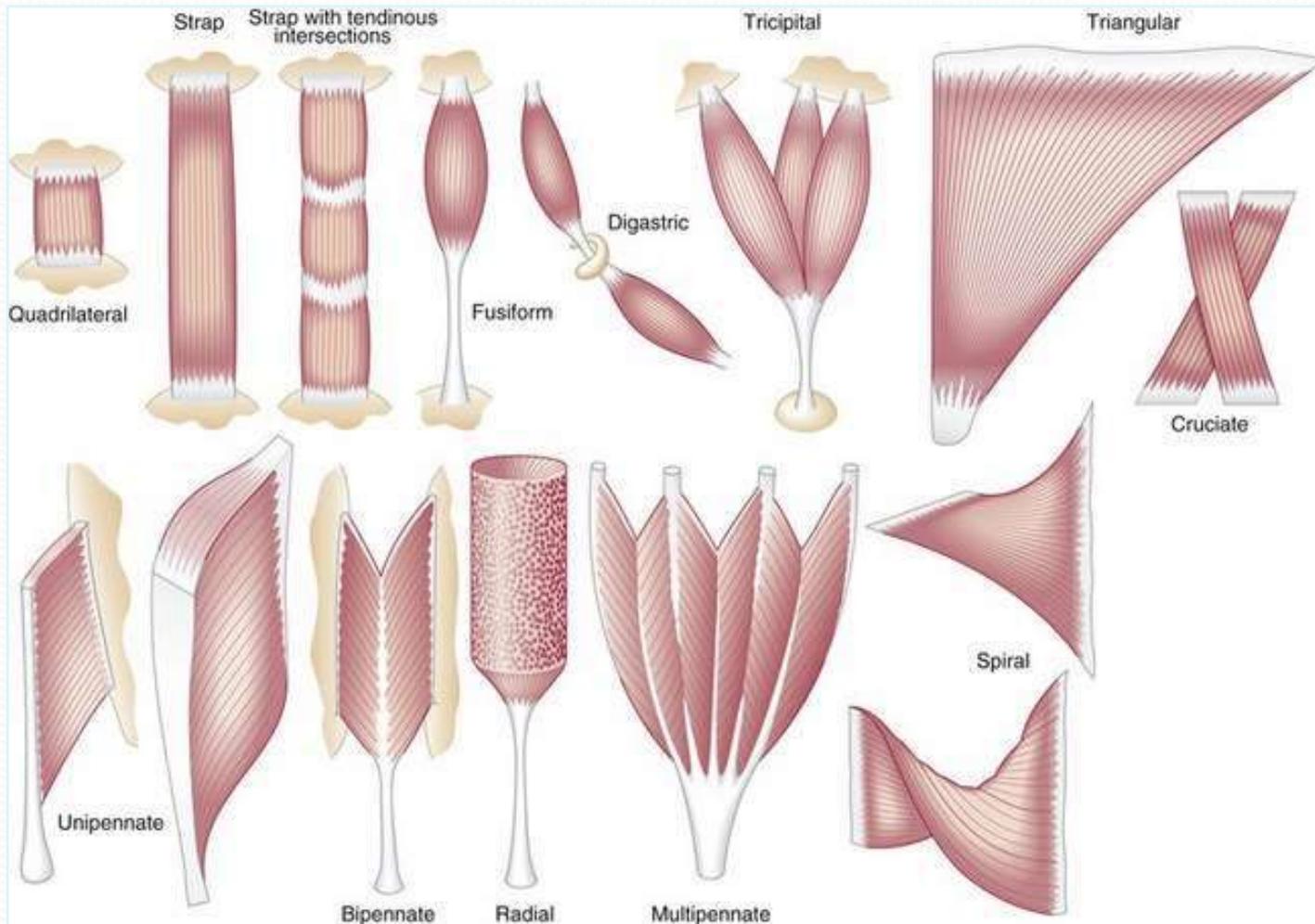
Remember how happy you were when a muscle card had just one action?

Ever wonder why a muscle has a singular action versus multiple actions?



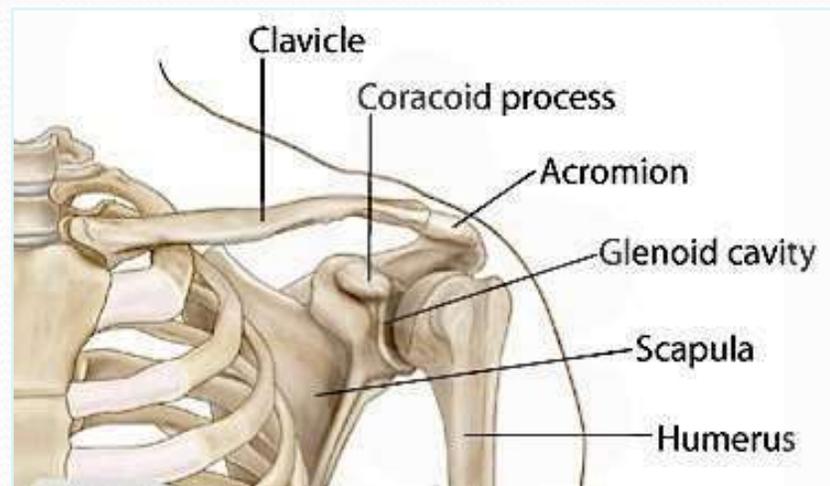
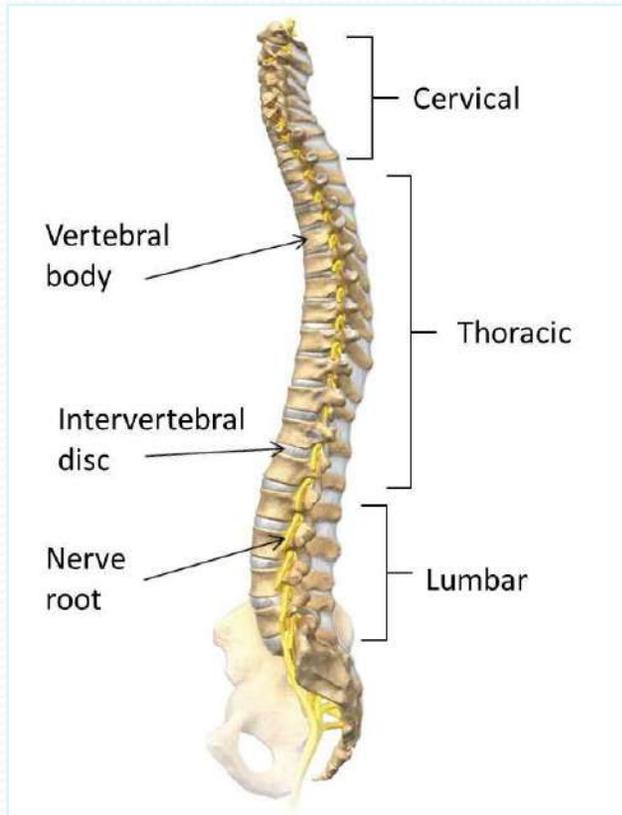
# 1. Muscle Fiber Shapes & Orientation

One reason is muscles have many different fiber shapes.



## 2. Joint Motion

Another reason is joints have different biomechanical motion potentials. Due to their structure some joints can move in many directions (spine & shoulder) and some in just one (hinge joint, knee).



# Muscle Action Rules

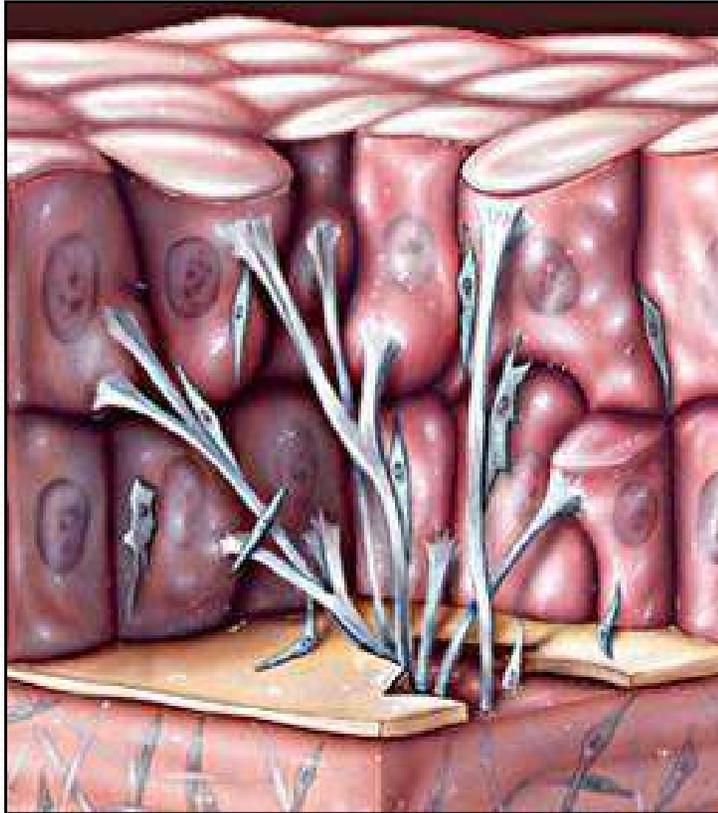
**Here are the rules:**

**1. Single Action.** For a muscle to have just a single action, (think hamstring crossing knee joint), they have to have singular fiber directions **OR** cross a joint that has the biomechanical limitation to move in only one direction, thus just one action, (think hinge joints, ex. knee joint).

**2. Multiple Actions.** For a muscle to have multiple actions, (think trapezius or lats or pec major), they have to have multiple fiber directions **AND** cross joints that have the biomechanical potential to move in multiple directions, thus multiple actions, (so the joints of the spine, shoulder, hip, etc. all have this characteristic).



### 3. Adhesion Formation



**Fibrin deposits  
result in chronic  
inflammatory  
conditions.**

**Spine, 1987**

**Adhesions begin to form in 4 days microscopically  
It is likely they start forming right away!**

# 3. Adhesion Formation

## Muscle Strain Injuries

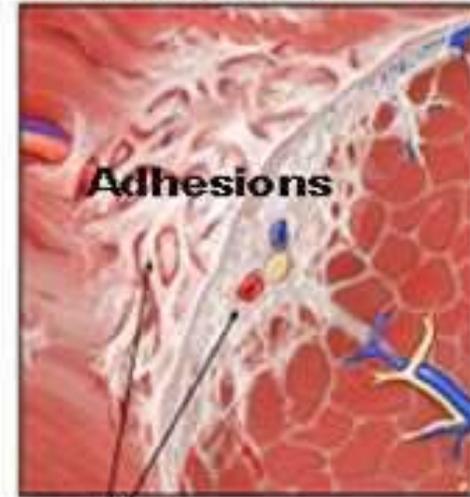


**Excessively Stretched Muscles**



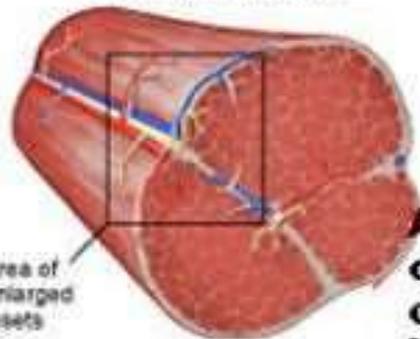
Microtears and swelling impinge upon nerves and vessels

**Excessively Stretched Muscles After Healing**



Adhesions and scar tissue entrap nerves and vessels

**Normal Muscle**



Area of enlarged insets

### Symptoms:

- Radicular pain down both lower extremities.
- Radicular pain in both arms and hands.
- Pain in neck and lower back.
- Burning sensation in back.
- Pain between scapulae.
- Difficulty swallowing.

**Adhesions can lie in any direction and therefore can restrict range of motion in the muscle.**

# 3. Adhesion Formation

## How Scar Tissue Forms In Muscles

1 Muscle Tears



An Injury like Whiplash  
Or a sporting Injury



The body senses the tear  
and repairs the break with  
scar tissue

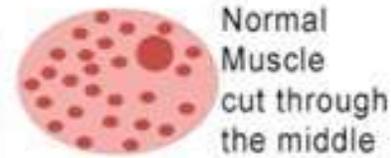
2 Micro-Tears In Muscles 3 Sustained Contraction



Repetitively using a muscle  
resulting in small tears of  
the muscle fibres

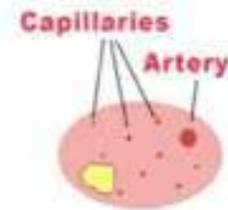


The body senses the  
micro-tears and repairs  
them with scar tissue



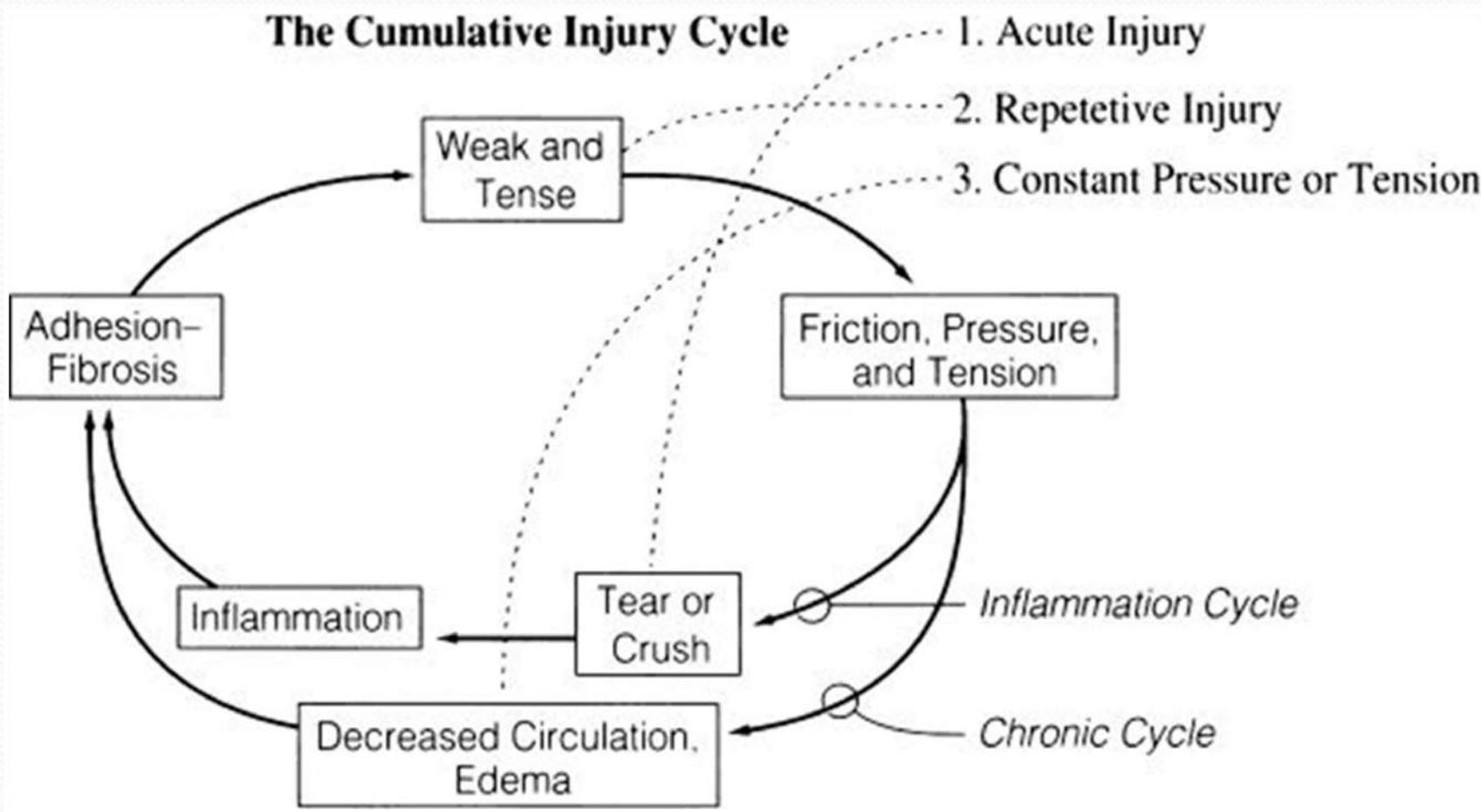
Normal  
Muscle  
cut through  
the middle

Muscles held in tension  
for long amounts of time  
e.g from bad posture or  
working on a Computer



Because the muscle is  
held tight blood can't get  
to all the parts of the  
muscle. The part that  
doesn't get enough  
Oxygen dies and scar  
tissue forms.

### 3. Adhesion Formation



## Experience The Adhesions

Dig into the extensors on your forearm, it will likely be uncomfortable and feel as if someone put Rice Krispies under your skin and in your muscles. You should also be able to easily feel adhesions in the adductors in your hands and the plantar fascia of your foot.

SNAP, CRACKLE, POP!



# Adhesion Analogies For Patients

**Scattered toothpicks: all angles and orientations, different depths as well, (superficial/deep).**

**Shrink wrap: tight & restricts motion.**

**Spider web: tight & restricts motion.**



# Why Should We Care?

Muscle fiber shapes & orientation, joint motion and adhesion formation are all super important factors in regards to the application of PNF, soft tissue work, motion therapy and the adjustment. All the techniques above MUST be performed in every direction and every depth to maximize that techniques effectiveness on the joint and surrounding tissues (muscle fibers & adhesions) and to have the best possible patient outcome.



# The Shoulder ~ Before The Adjustment

## More Strategies

Okay slow down, we're not ready to adjust just yet. Remember we want optimal results and a great adjustment, so to achieve these goals there are a few things we may want to do first before we adjust.

Yes a couple extra tricks up my sleeve!

1. PNF Proprioceptive Neuromuscular Facilitation
2. Traction (with a twist)
3. Soft Tissue Work
4. Adjustment (finally)

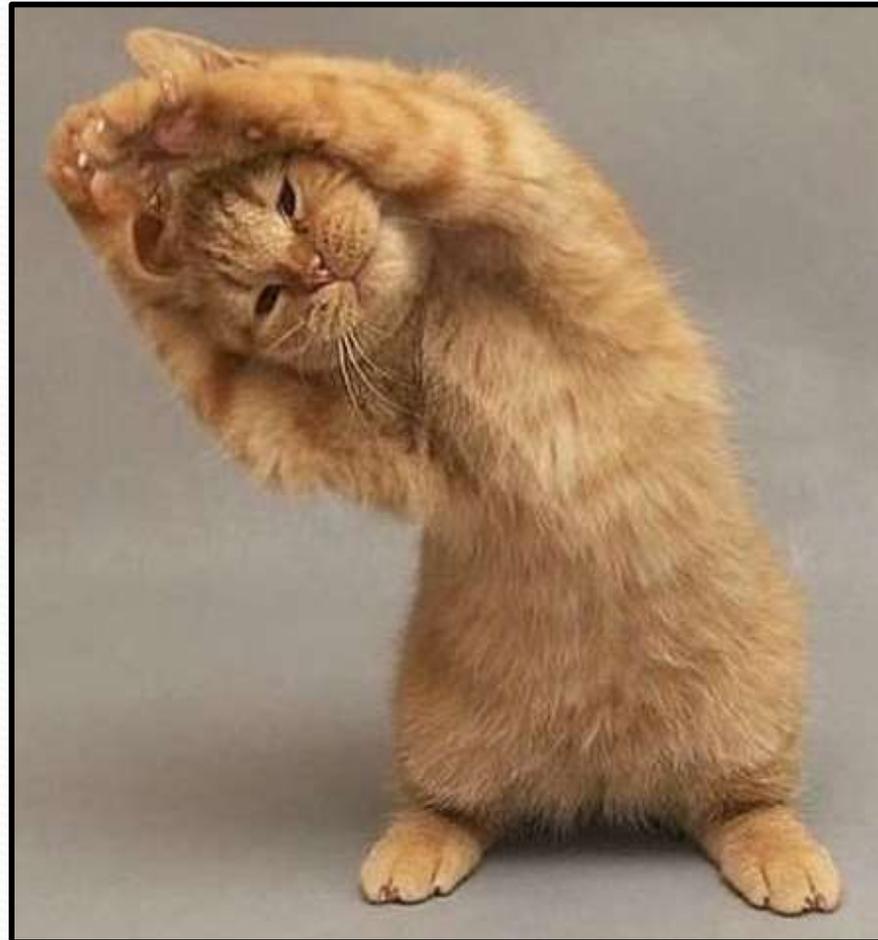


Yes, I have tricks in my pocket, I have things up my sleeve. But I am the opposite of a stage magician. He gives you illusion that has the appearance of truth. I give you truth in the pleasant disguise of illusion.

(Tennessee Williams)



# Review of Proprioceptive Neuromuscular Facilitation Stretching



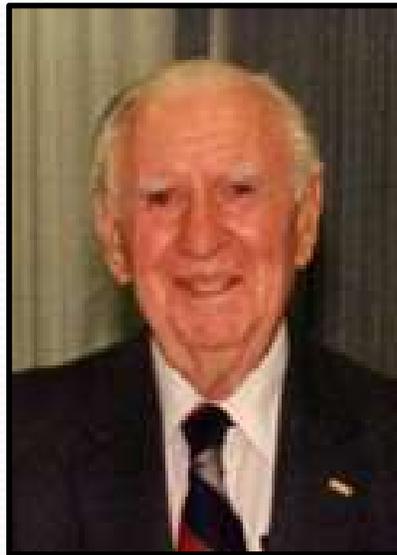
# PNF Gets Started?

In the early to mid 1900s physiologist **Sir Charles Scott Sherrington** popularized a model for neuromuscular facilitation and inhibition. He received the Nobel Prize in Physiology or Medicine with Edgar Adrian, 1st Baron Adrian, in 1932 for their work on the functions of neurons. Prior to the work of Sherrington and Adrian, it was widely accepted that reflexes occurred as isolated activity within a reflex arc. Sherrington received the prize for showing that reflexes require integrated activation and demonstrated reciprocal innervation of muscles, (Sherrington's law), yes reciprocal inhibition.



# Who Developed PNF?

**Dr. Herman Kabat** and **Maggie Knott** in the late 1940s and early 1950s used PNF as a means of rehabilitation for neurological disorders such as multiple sclerosis, cerebral palsy and poliomyelitis.



# My History With PNF

**I was first introduced to PNF in 1987 when I attended San Diego State in a kinesiology class. I was reintroduced to PNF in 1995, at Life West, by Dr. Carrie Picker. I then wrote the course notes and taught the Physiotherapy Rehab class from 1997-2002 at Life West.**

**They are still using those notes today.**

**It was during those years when I started applying PNF to the chiropractic adjustment. I discovered how much easier it was to adjust if I used the PNF protocols right before delivering the adjustment.**

**And that is what I will share with you today.**



**LIFE CHIROPRACTIC  
COLLEGE WEST**

# Why Use PNF?

The goal is simple: make the adjustment easier.

If the muscles surrounding the joint to be adjusted are relatively relaxed then the adjustment will be easier to deliver and more effective.

**Try this: Have your partner standing. Have them bend their elbow into flexion and contract their bicep. Try pulling their arm down. It's difficult. How come? Simple answer: the muscle is contracting and is restricting joint motion (in this case the elbow joint). Now have them loosely contract their bicep and then pull their arm down. Much easier! Why? The muscle is not contracting as much. So any time we can decrease the contractility of a muscle we know that it will be easier to increase joint motion.**

So now apply this to an adjustment. I'm about to adjust a patient's low back in side posture or adjust a patient's shoulder. We know the muscles are in a contracted state restricting proper joint motion, (that is why we are adjusting it). What would make this adjustment easier? Yes, decreasing the contractility of the involved muscles **BEFORE** the adjustment. And this is where the PNF comes in. Now lets review the principals & protocols of PNF.

Yes this is the same stuff you saw in my general technique courses, as the PNF can be applied to all adjustments!

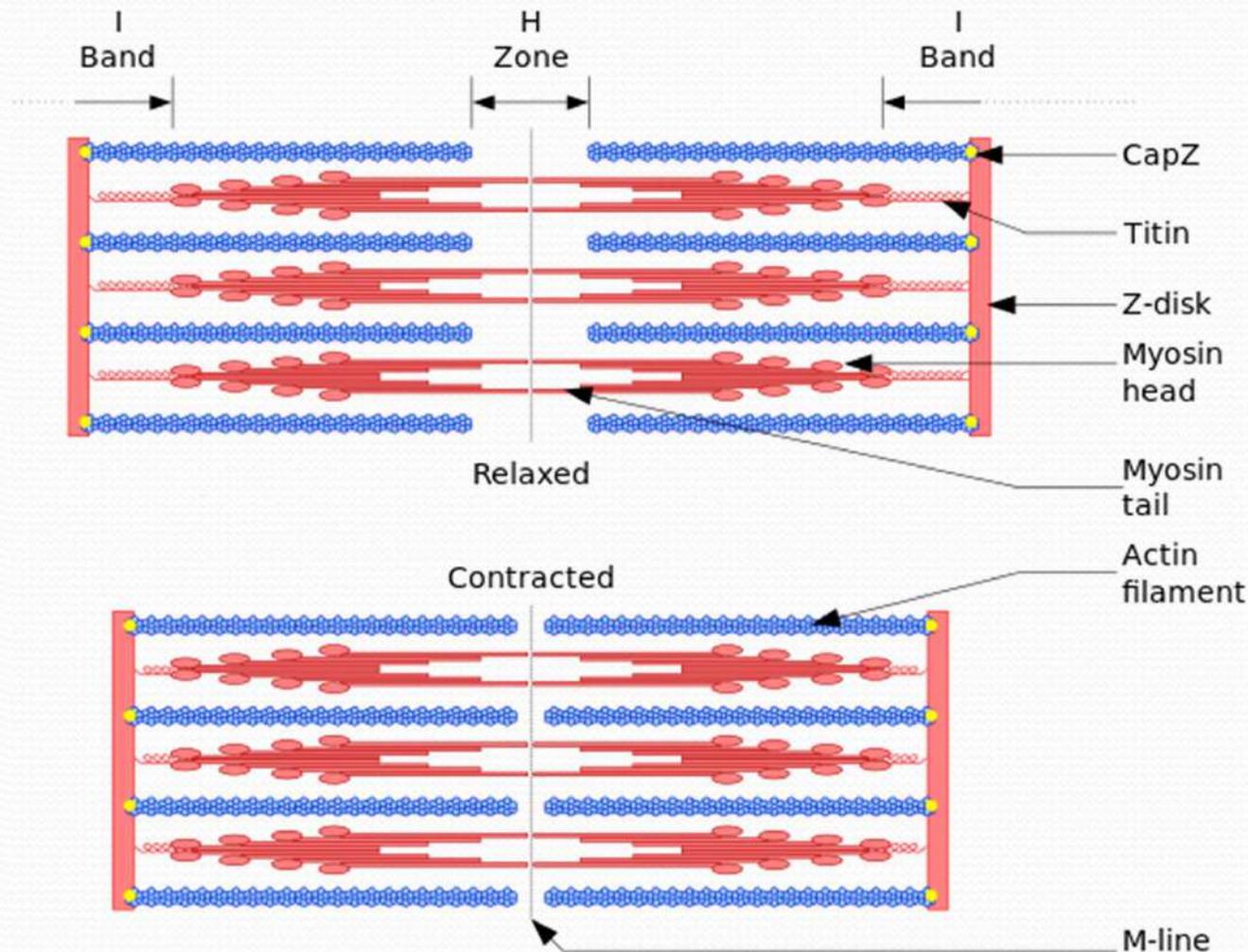
# Sarcomere Complex

Muscle contraction is NOT an on-off switch, all or none phenomenon.

Muscles are rarely 100% on or 100% off.

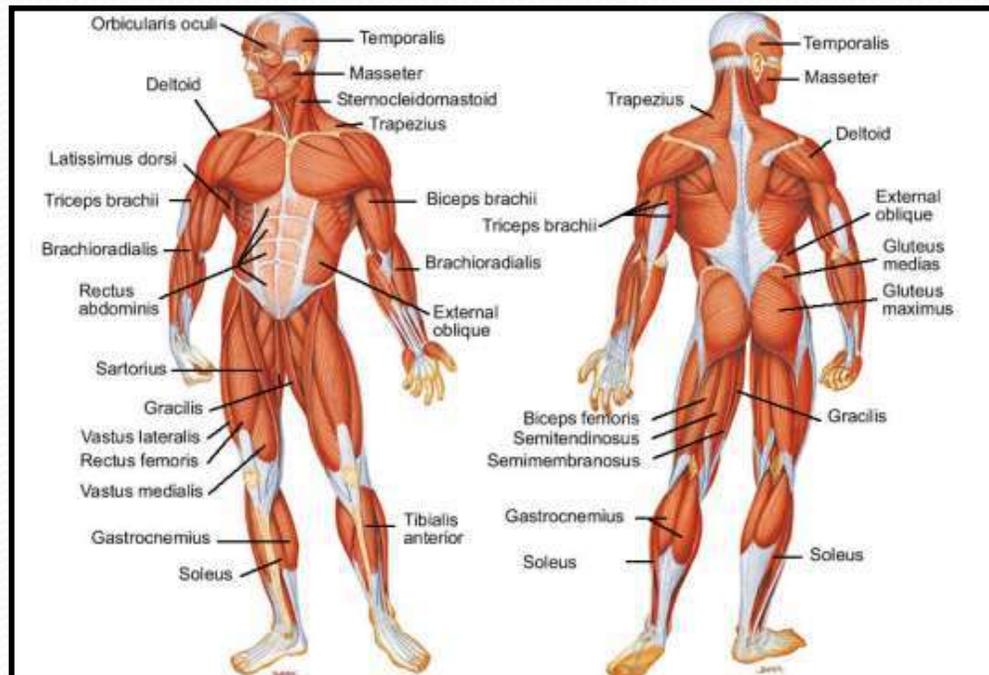
Muscles most often are in a partially contracted state.

So think of a dimmer switch where the muscle can be partially contracted.



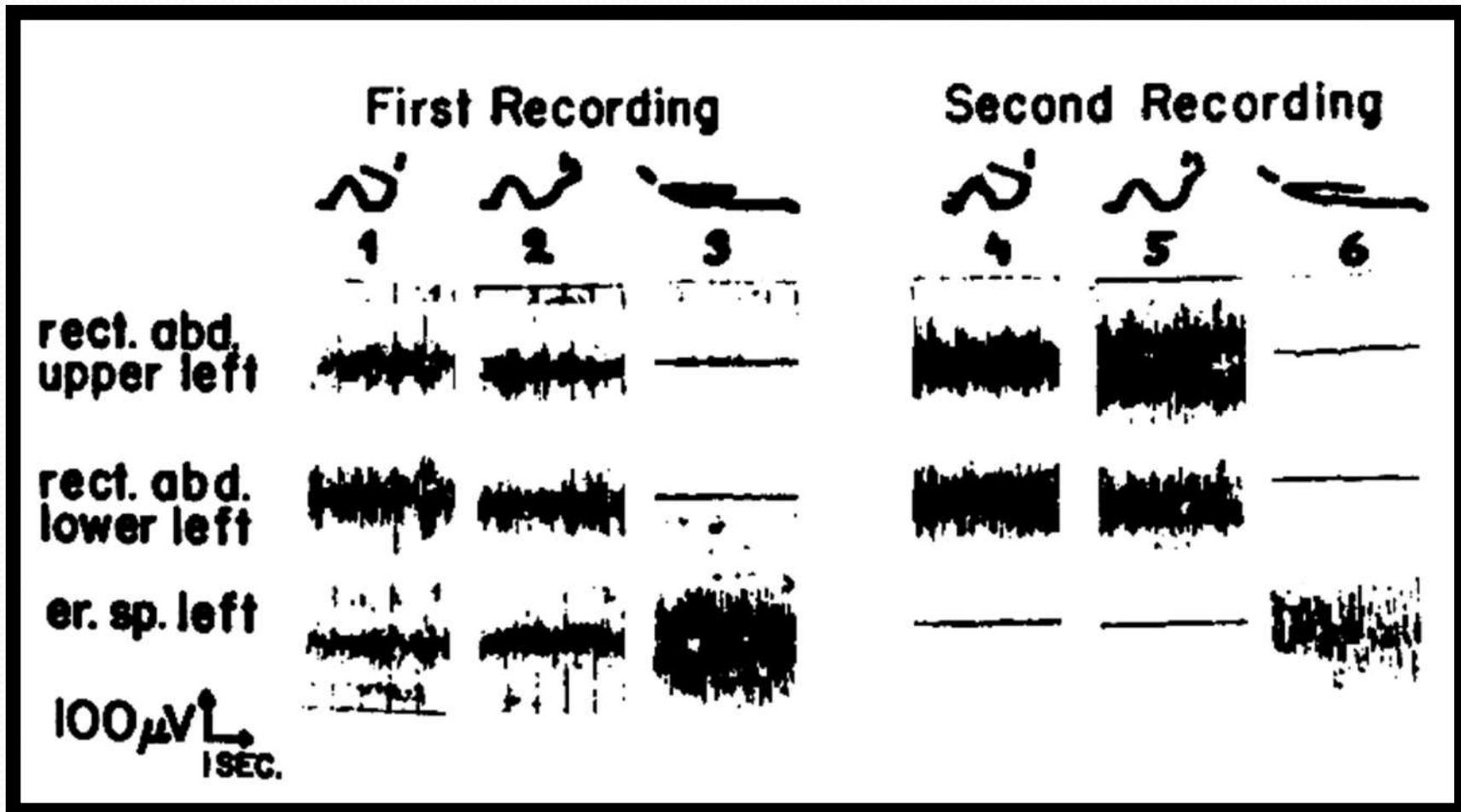
# What Muscle Is Contracting?

When performing a bicep curl what muscles contract? The primary mover is the biceps & brachioradialis (going through a full range of motion). But most muscles in your body will contract isometrically as well. Your forearm flexors & extensors are acting as primary stabilizers, along with the shoulder girdle muscles (deltoids). Your postural muscles throughout your body will also be contracting at some lower level acting as secondary stabilizers, allowing you to perform the bicep curl. So at some level they are all contracting. The point being, most muscles are usually in a partially contracted state.



# EMG Before & After PNF

Korr IM, Neurobiologic Mechanisms in Manipulative Therapy, 1978





In the 1<sup>st</sup> recording the pt has unbalanced muscles. With inhibited abs & overly excited erector spinae muscles. When they attempt a crunch the abs only fire part way & the erector spinae DO NOT shut off. Then after stretching, in the second recording you can see the muscle groups become balanced.

If you attempted to adjust the patient's low back after the second recording it would be much easier as the low back muscles are not overly contracted (they may shut off completely or partially).

How long would this take? That would depend upon the severity of the imbalance, muscle memory & activities of daily living. A few seconds if it's only a muscle spasm, perhaps years if it's chronic.

# Relaxing Muscles

So how can we relax a contracting muscle or muscle group?

Here is the list: (some can be used before an adjustment to decrease pain and relax the muscles or after the adjustment for added benefit)

- 1. Slow deep breathing**
- 2. Ice massage**
- 3. Heat massage**
- 4. Modalities (electric stim, ultrasound etc.)**
- 5. Activator**
- 6. Ischemic compression (tendon insertions or muscle belly)**
- 7. PNF ~ Reciprocal Inhibition**
- 8. PNF ~ Contract-Relax-Passive Stretch**
- 9. PNF ~ Contract-Relax-Contract Stretch**
- 10. Soft tissue work**
- 11. Motion Therapy**
- 12. Adjustment (best for last)**

**For this presentation we will focus on the ones in red**

## Slow Deep Breathing

Slow deep breaths are an excellent way of helping muscles relax quickly.

### Try This:

Sit on the floor with your feet out in front of you. Try & touch your toes.

Now take a slow breath (2-5 secs) in and out and try to touch your toes again.

Should be easier.

This of course effects all your muscles and would work for all regions of your body.

This is why it's so important to have the pt take a breath before an adjustment.

What would happen if they took 2 breaths or even 3? Stop that would make the adjustment too easy!



## PNF Protocols

### PNF ~ Reciprocal Inhibition:

Take muscle to be stretched to tension. Have patient contract antagonist muscle.

This inhibits the agonist. Excellent for take home stretches.

Contract antagonist & hold stretch for 15-30 seconds or less based on patient tolerance/comfort.

Repeat 3-5x or less based on patient tolerance/comfort or need.

Allow 30-60 second rest between repetitions.

### Try This:

Sit on the floor with your feet out in front of you.

Contract your anterior thigh & leg muscles

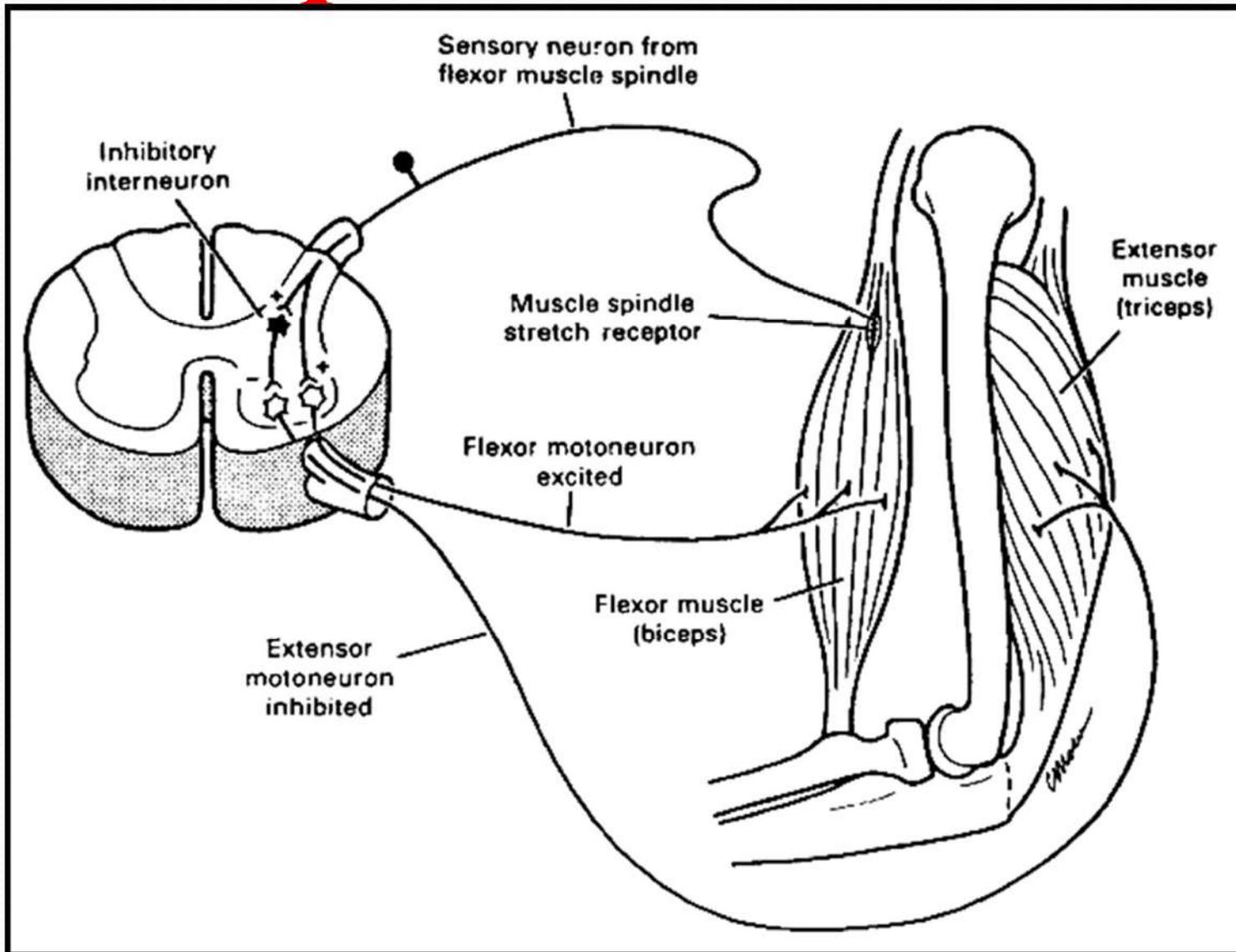
(the opposing muscle group from the hamstrings) for 2-5 secs.

Then stop contracting & try touching your toes.

You should notice an increase in flexibility.



# Reciprocal Inhibition



# The Rules of Reciprocal Inhibition

## 1. Anterior Muscles vs Posterior Muscles

When an anterior muscle contracts than the opposing posterior muscle will relax.

When a posterior muscle contracts than the opposing anterior muscle will relax.

## 2. Left Lateral Muscles vs Right Lateral Muscles

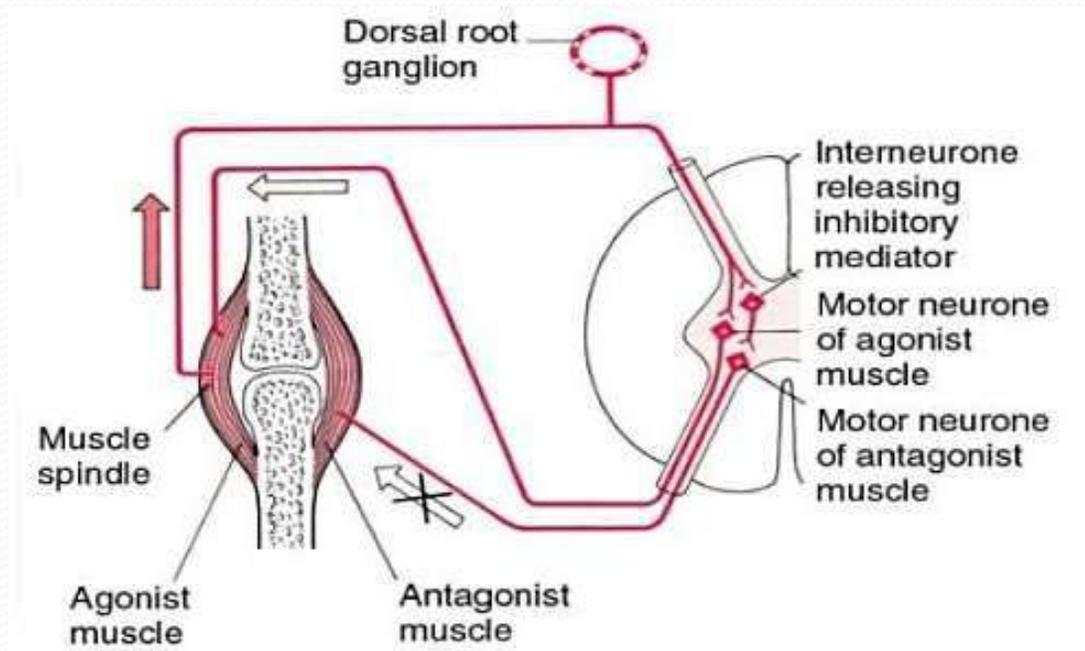
When a left lateral muscle contracts than the opposing right lateral muscle will relax.

When a right lateral muscle contracts than the opposing left lateral muscle will relax.

## 3. Left Rotational Muscles vs Right Rotational Muscles

When a left rotational muscle contracts than the opposing right rotational muscle will relax.

When a right rotational muscle contracts than the opposing left rotational muscle will relax.



# PNF Protocols

## PNF ~ Contract-Relax-Passive Stretch

Contract agonist for 5-10 seconds.

Relax for 1-2 seconds, while patient takes a slow deep breath.

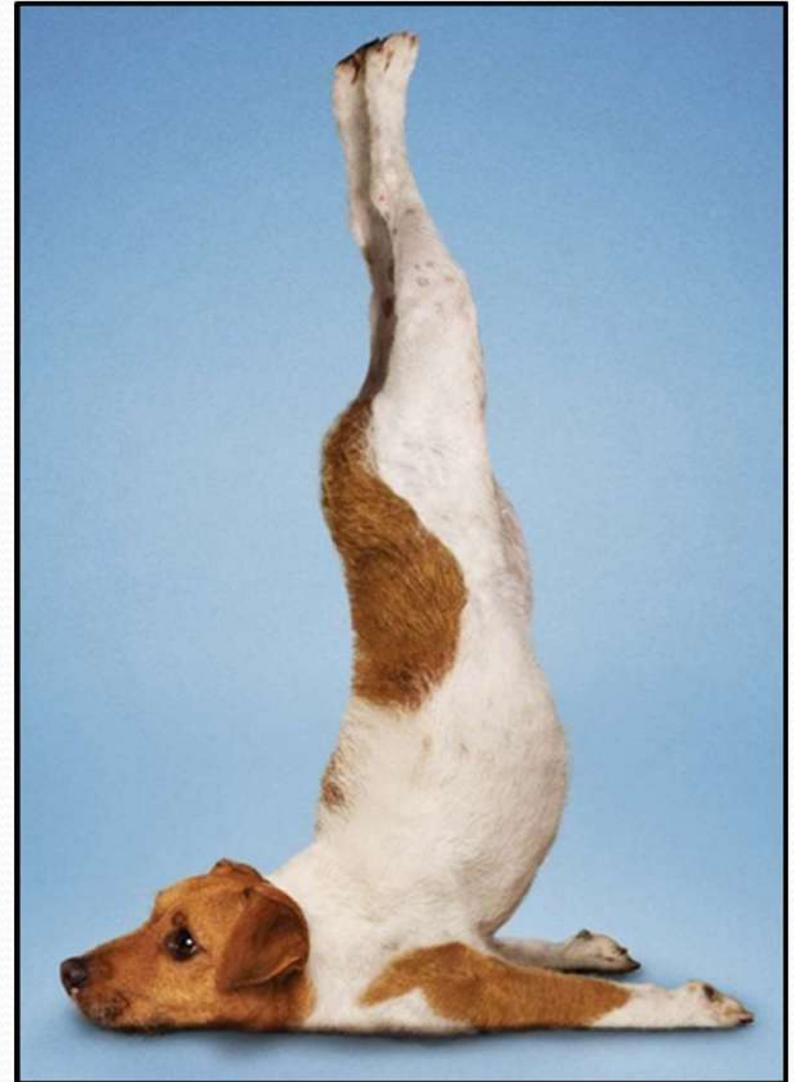
Passively stretch agonist & hold stretch for 15-30 seconds or less based on patient tolerance/comfort.

Repeat 3-5x or less based on patient tolerance/comfort or need.

Allow 30-60 second rest between repetitions.

### Try This:

Sit on the floor with your feet out in front of you. Contract the agonist group (hamstrings & calves), for 2-5 secs. Then stop contracting & try touching your toes. You should notice an increase in flexibility.



## PNF Protocols

### PNF ~ Contract-Relax-Contract Stretch

Contract agonist for 5-10 secs.

Relax for 1-2 secs, pt takes a slow deep breath.

Contract antagonist & hold stretch for 15-30 secs or less based on pt tolerance/comfort.

Repeat 3-5x or less based on patient tolerance/comfort or need.

Allow 30-60 sec rest between repetitions.

### Try This:

Sit on the floor with your feet out in front of you. Contract the antagonist group & then the agonist group for maximal gain.



# PNF Protocols Summary

The PNF provides a significant change in muscle relaxation and joint motion. All the PNF protocols work well if applied **BEFORE** the adjustment, allowing for easier and more effective adjusting. Try it.

## Which muscle group should I contract first?

Whether I am adjusting, training or rehabing a patient I disregard which muscle is the agonist or antagonist and I **ALWAYS** will contract the over active muscle first and the inhibited muscle second.

**Why?** The overactive group is inhibiting the opposing muscle. By contracting it first it will actually dampen, which allows the inhibited group to become stronger and thus more effective when it contracts.



## How Much Change With PNF?

Good question. The range of motion change can be amazing, maybe 50% or better after one session!

Acute spasms may stop in just a few seconds.

Long term chronic patterns, (think pt over 40 with chronic low back tightness), can be more difficult and may never return to 100% normal.

The goal is to move away from the muscular imbalance and get closer to balanced muscles.

This will help you deliver even better adjustments.

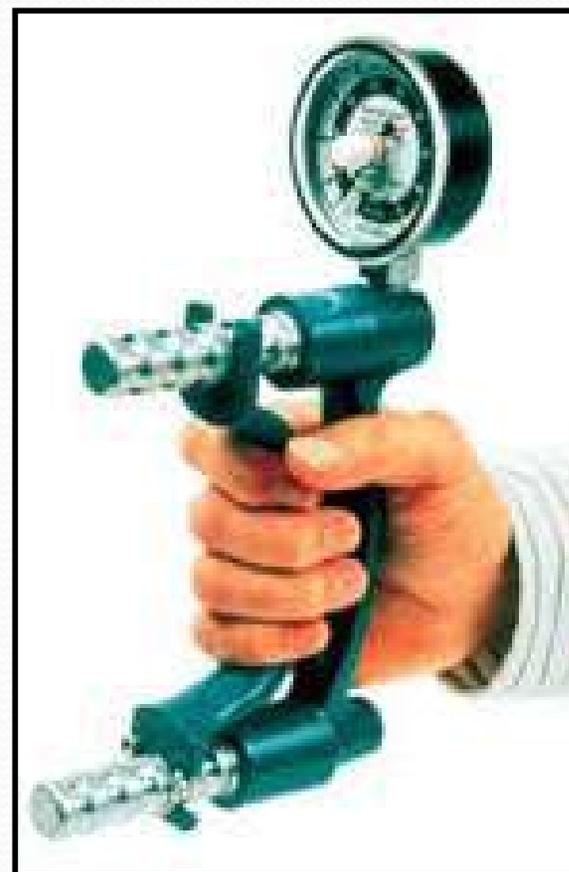


## The Dynamometer Effect

Ever wonder why a pt is not the strongest on the first squeeze on a dynamometer? When a pt squeezes typically the strongest is the 2<sup>nd</sup> or 3<sup>rd</sup> squeeze.

Why?

On the 1<sup>st</sup> attempt the forearm muscles are already in a shortened state & can NOT fully contract. During the 1st attempt the muscle contracts & then relaxes and becomes longer. On the 2<sup>nd</sup> attempt the muscle can contract through a more complete ROM, recruiting more muscle fibers, thus having more power. This will repeat for the 3<sup>rd</sup> attempt depending on the state of the muscle, so again increased strength and then on further attempts the muscle will begin to fatigue. This same phenomenon will occur during weight lifting as well. Weaker on the first rep and stronger on the next 2 or 3 and then the slow decline of strength from muscular fatigue.



# The Shoulder

## Strategies for Clinical Care



I went to the doctor for my shoulder pain and he said, “Well, there’s nothing I can do”.

# Let's Get To Work

I know that took a bit, so here we go!

My shoulder protocol is:

1. PNF on shoulder
2. Traction
3. Soft tissue work

After each step above I assess if I can adjust or not, still always considering safety. Of course I may adjust before any of the above steps or maybe not at all. **It is always a case by case basis.**



# The Shoulder & PNF

## Worst For Last

So after your history & exam you should know which shoulder muscles are most involved & which actions are most limited.

I always leave the most involved muscle group & most limited action for last. That way once I get to the primary muscle, it is likely to be easier to work on as all the secondary surrounding muscles will have calmed down and in turn so will have the primary muscles.



# The Shoulder & PNF

## The Protocol : Step 1 Isometrics

Always start with the least involved muscle group or action and have the patient contract that muscle isometrically, (no motion) against your resistance. Resistance will vary from case to case, so use your best judgement and let patient comfort and/or tolerance be your guide.

Then go to the second least involved muscle group or action, and have the patient contract that muscle isometrically, (no motion) against your resistance and so forth, until you have gone through **ALL** ranges of motion and muscle groups of the shoulder with isometric contractions.

After this I always have the patient actively try all the ranges of motion. Almost always there is a significant change in motion accompanied by “ooing & ahing” from the patient and/or onlookers!



# The Shoulder & PNF

## **The Protocol : Step 2 Partial Range of Motion**

Always start with the least involved muscle group or action and have the patient contract that muscle through a partial range of motion against your resistance. Resistance will vary from case to case, so use your best judgement and let patient comfort and/or tolerance be your guide.

Then go to the second least involved muscle group or action, and have the patient contract that muscle through a partial range of motion against your resistance and so forth, until you have gone through **ALL** ranges of motion and muscle groups of the shoulder with partial range of motion contractions.

**How much range of motion?** This really depends on the severity of the case. The more severe the case (inflammation, pain, possible micro-tears) the more conservative I will be. Try the isometrics first and then maybe a partial range of motion of 20%, then another round of 40% and then 60% and then 80% of the range. With a less severe case perhaps I just do 50% of the range of motion and then move on to full range.

# The Shoulder & PNF

## The Protocol : Step 3 Full Range of Motion

Always start with the least involved muscle group or action and have the patient contract that muscle through a full range of motion against your resistance. Resistance will vary from case to case, so use your best judgement and let patient comfort and/or tolerance be your guide.

Then go to the second least involved muscle group or action, and have the patient contract that muscle through a full range of motion against your resistance and so forth, until you have gone through **ALL** ranges of motion and muscle groups of the shoulder with full range of motion contractions.

After this I always have the patient actively try all the ranges of motion. Almost always there is a significant change in motion and “ooing & ahing” from the patient and/or onlookers!



# The Shoulder & PNF

## Expect Results

I expect dramatic results! The PNF will immediately increase the range of motion as the major mechanism that is restricting the motion IS the partially contracted muscles.

Most practitioners miss this point and attempt to stretch & strengthen the muscles of the joint while the muscles are still in a partially contracted state. Or they only work on the primary muscle group involved and skip working on the secondary groups.



# The Shoulder & PNF

## Will It Work On Acute & Chronic Shoulders?

The simple answer is YES.

Shoulders with acute injuries may not respond as well as inflammation and/or micro-tears may be slowing the response.

Chronic long term injuries often respond surprisingly well as inflammation is NOT a factor.

Even though adhesions do contribute to shoulder problems they are not the primary issue with decreased range of motion.



# The Shoulder & PNF

## How Long Will The Results Last?

Of course that depends on many factors. The primary factor is: was this shoulder injury from a one time trauma, (car accident, sports injury, etc.) or was it from repetitive micro-trauma, (sitting at a computer all day for years, driving, etc.).

One time traumas can respond surprisingly well as the mechanism of injury will not repeat, (hopefully). I have seen many old injuries improve dramatically. With the old, “I have been to so many other experts and...”

The repetitive micro-trauma cases will reoccur if the activity that causes the problem is not stopped or modified. If not then ongoing care can be beneficial.



# After The PNF

## Adjust Now Or Later?

So after the PNF you may want to adjust the shoulder or stop right there as you have made great gains already and you are still not 100% sure that an adjustment is safe. Okay so caution on the side of safety and we are done. Or continue into soft tissue work, traction protocols and the adjustment, (it's your clinical decision).



# Why Soft Tissue Work?

Okay we have used the PNF and now for the next step soft tissue work. This is to break up adhesions, increase fluid flow and increase and help maintain the joint motion we just gained with the PNF.

(Yes the adjustment is still coming)

Adjusting joints is extremely effective. The shortcoming though is when the pt's problem is far away from the joint complex. Large muscles often have fibers that radiate far away from the primary joint which makes it more difficult for the adjustment to work on those distant fibers.

The following muscles are prime examples: masseter, scalenes, middle trapezius, muscles of the shoulder and upper arm, forearm muscles, lats, quadratus lumborum, gluts, quads, hamstrings, calves and plantar fasciia.

So for these groups we need to do some soft tissue work and then adjust.

The extra work will pay off as you will be fixing patients that no one else could.

# Soft Tissue Work: Goals

↑ fluid flow, trapped waste products out, new nutrients in

Allow for muscles to relax to regain elasticity and length

↓ pulling tension on the tendons and ligaments

Break up and/or elongate adhesions to allow for their reabsorption

↑ joint motion

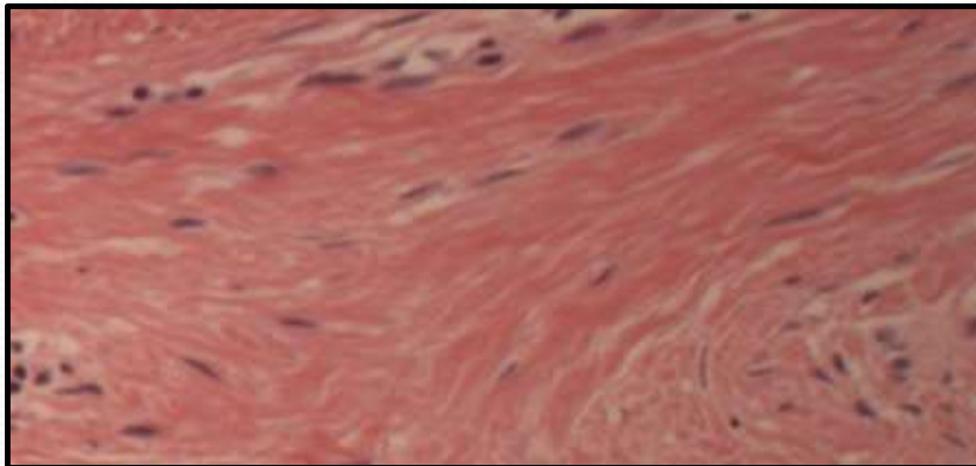
↓ pain

↓ probability of having surgery



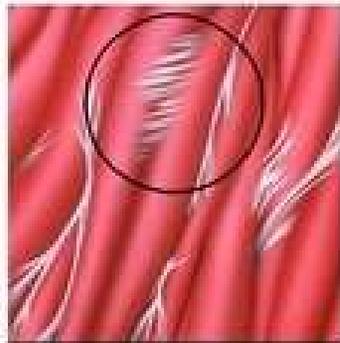
# Soft Tissue Work: Protocols

1. Be as aggressive as the pt can tolerate. This is important as this is NOT a soft loving massage.
2. Start away from the most sensitive area & work toward it.
3. Dig in ALL directions: some say to go with the fibers, some say to go cross-friction across the fibers, but the best way is to go in ALL directions. So with the fibers (toward the heart to protect the vein's valves) cross fiber and at oblique angles as well. Why? Adhesions form in random directions at all depths.



# Soft Tissue Work: Protocols

4. Be sure to get all the surrounding tissues. You will likely find adhesions in areas that do not hurt, so make sure you work that tissue as well.
5. Do this once a week for 4 weeks or as necessary.
6. No ice afterward as we are trying to induce fluid flow and cause some inflammation to help the tissue recover and heal.



Muscle fibers become "stuck" together stabilizing the injury & forming an "internal cast"

# Adhesion Analogies For Patients

Scattered toothpicks: all angles and orientations, different depths as well, (superficial/deep).

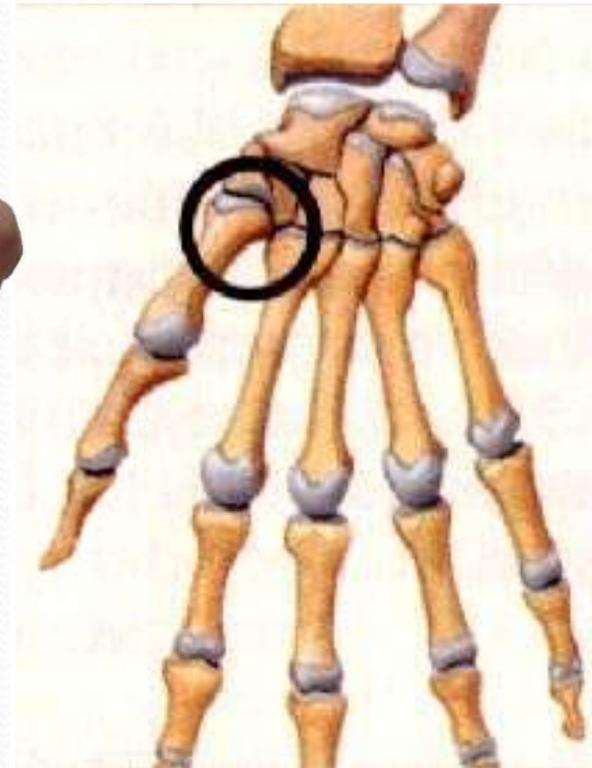
Shrink wrap: tight & restricts motion.

Spider web: tight & restricts motion.



# Soft Tissue Work: Methods

The key is to be aggressive, work in multiple directions and go deep. Dig in with your elbow or use your fist by twisting it back and forth. There are also a variety of tools and knobs that can be used. Careful using too much thumb, that saddle joint will wear down in time.



# Shoulder ~ Motion Therapy

## Manual Traction

Okay now for some motion therapy.

The shoulder is an excellent example for the idea: “motion therapy must go through a complete range of motion”.

**Try this:** Stand up and have your hands by your side, thumbs pointing forward. Now with elbows locked touch your hands together directly over your head.

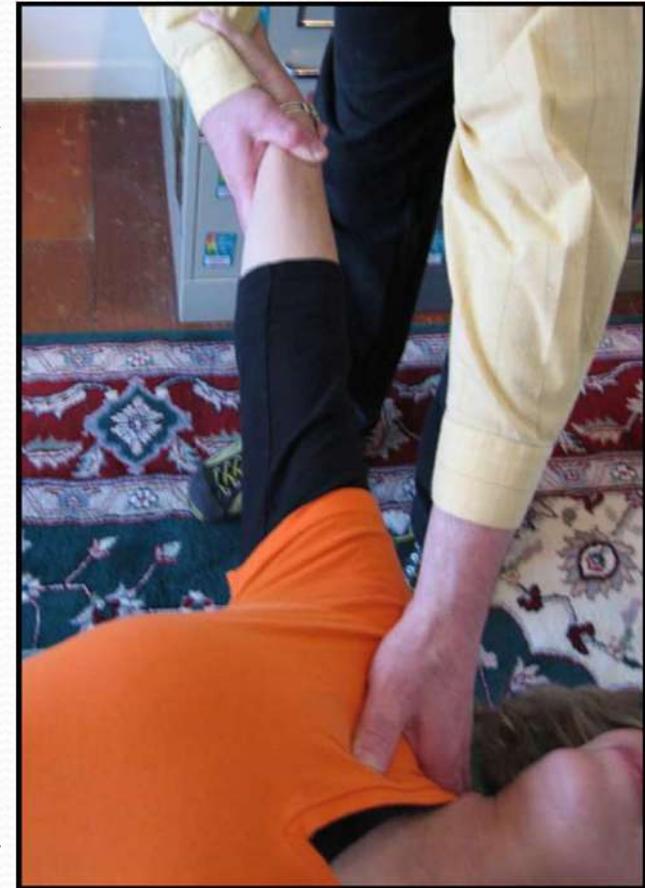
Repeat with shoulder in full external rotation (thumbs rotated out) and again with shoulder in full internal rotation (thumbs rotated in). You will notice that the ROM is not the same based on the rotation of the shoulder.

Most books say to stretch with the thumb rotated out for maximum ROM. My strong recommendation is to stretch and traction the shoulder in ALL positions, both internal and external rotation and everything in between. This allows to stretch ALL the muscles and soft tissue, not just the ones in the external rotation position.

# Stretching & Traction Techniques For Shoulder Injuries

1. Pt is supine, start arm/shoulder in neutral position, even with the plane of the pt's body. Yes do that in internal & external rotation too.
2. To be most effective also traction in arcs that will go below and above the table. Same idea as the previous slide we want to stretch as many muscle fibers as possible so traction of the shoulder must be done at every angle possible through a full ROM.
3. As you traction attempt to take pt's arm all the way to the top of the table.
4. At the point the pt says "ouch" stop & go the other way. Make several attempts to get past the point of "ouch".

**Note: the pt must be able to tolerate this, if they can't then push it right to the point of tolerance.**



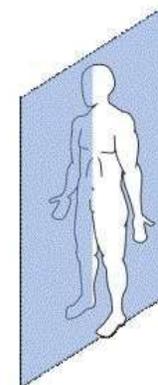
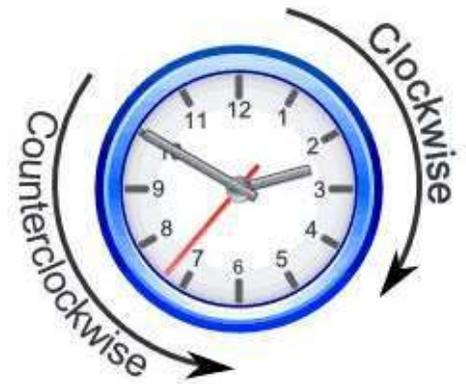
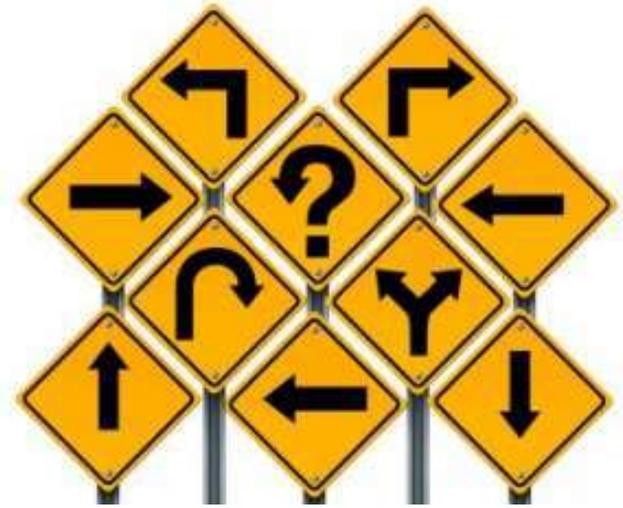
# Shoulder Traction All Directions

**Important: as this will stretch ALL tissues**

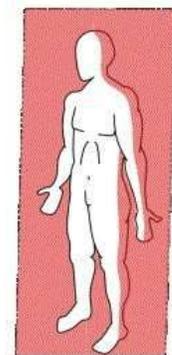
6. While the DC tractions the shoulder I suggest also moving it in clockwise and counter clockwise circles. Large and small circles.
7. Often you can get the pt's arm above their head by making a loop in front of the pt's body. Now you can work above the pt's head. Then return to the bottom & see if you can make a complete pass. Now they are ready to adjust.

All the ideas given for the shoulder would be true for any joint in the body: wrist, hip, knee, ankle etc.

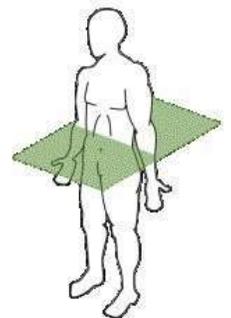
Make sure the joints and surrounding soft tissue are healthy enough to handle the stretching and traction.



Sagittal



Frontal



Transverse

# Shoulder Traction All Directions

8. Lastly “wring it out” when possible. Using a long twisting motion is great when possible as that rotational twisting can really elongate the fibers, much like wringing water out of a towel.





## Codman's Pendulum Exercises

Nice safe take home exercise.

Allow arm to dangle & have pt move shoulder through all ROM's or spell the alphabet. Great for frozen shoulders.

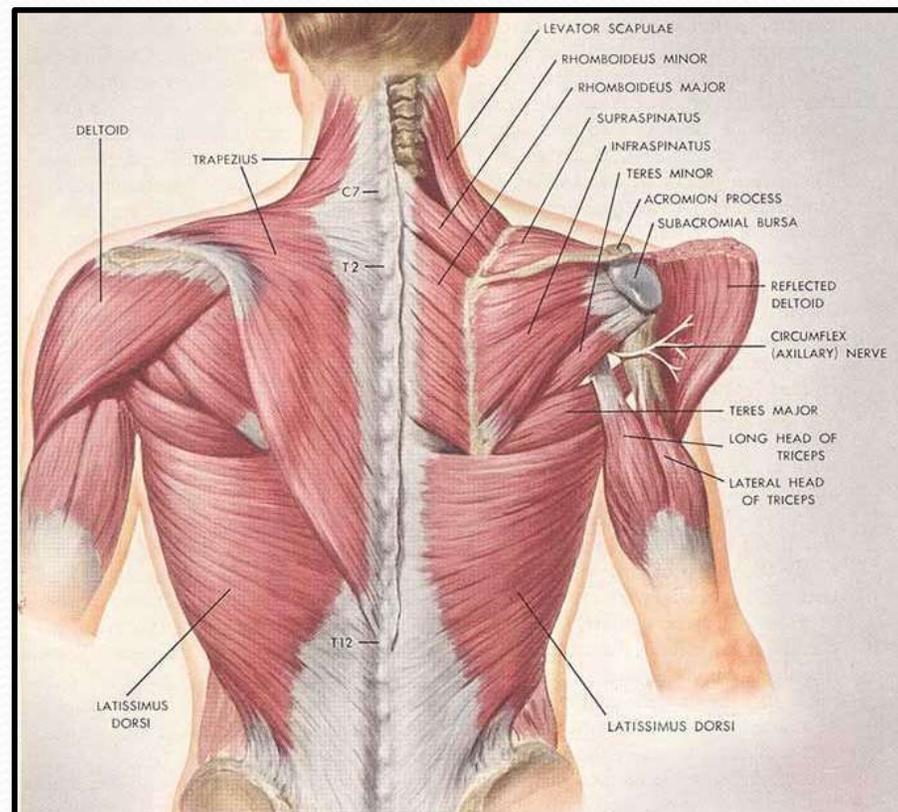
Limitation is that as the arm swings back & forth the tissues never go through a full range of motion. This limits the recovery of the damaged tissue.

# The Shoulder Adjustment Finally!

## Shoulder adjustments using manual & drop maneuvers.

So after the PNF, soft tissue work & motion therapy we are finally ready for the chiropractic adjustment. This is easily our most powerful tool. All the preceding work was to increase the probability of delivering a highly effective adjustment.

*Chiropractors  
Adjust More  
Than Just  
The Spine!*

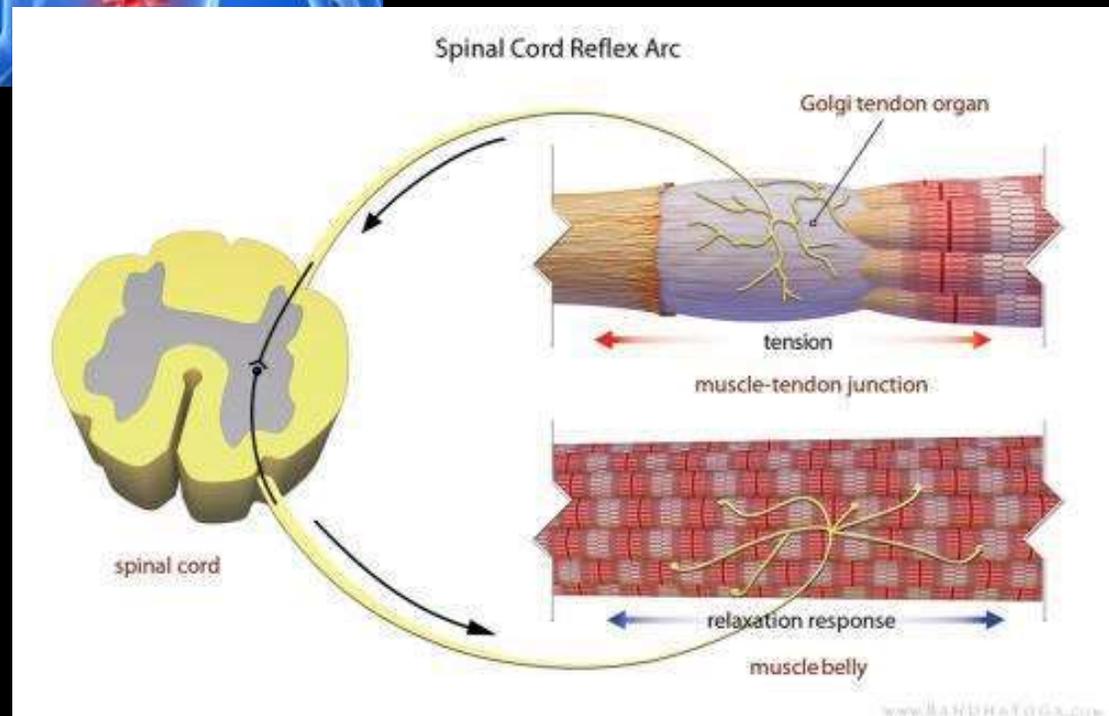
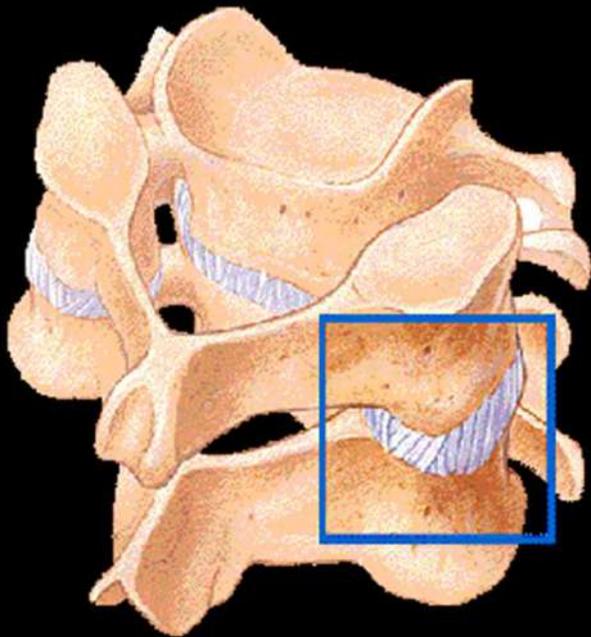
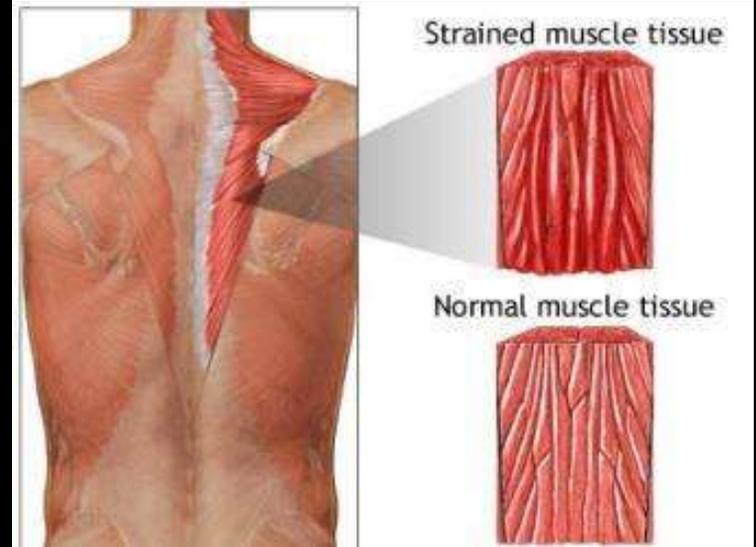
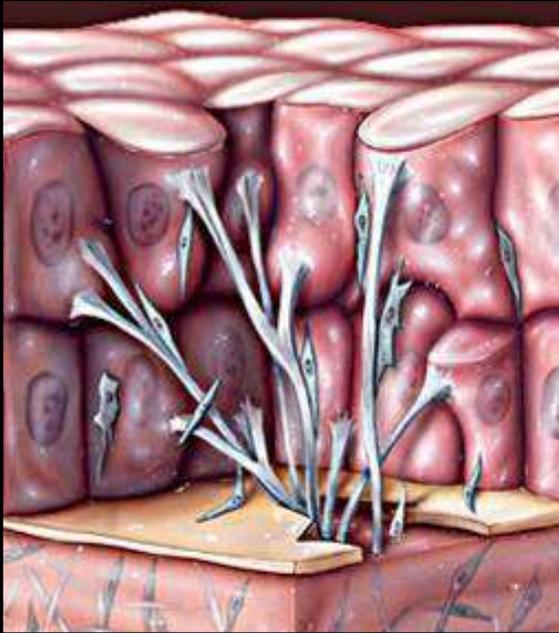


# What Are We Doing!

**Shoulder Adjustments:** (true for all adjustments)

1. Relax tight contracting muscles
2. Allow new chemicals to flow into the cells
3. Allow acute/chronic inflammatory chemicals & normal natural metabolic cellular waste products to flow out
4. Stretch and/or break up adhesions
5. Allow for improved joint motion

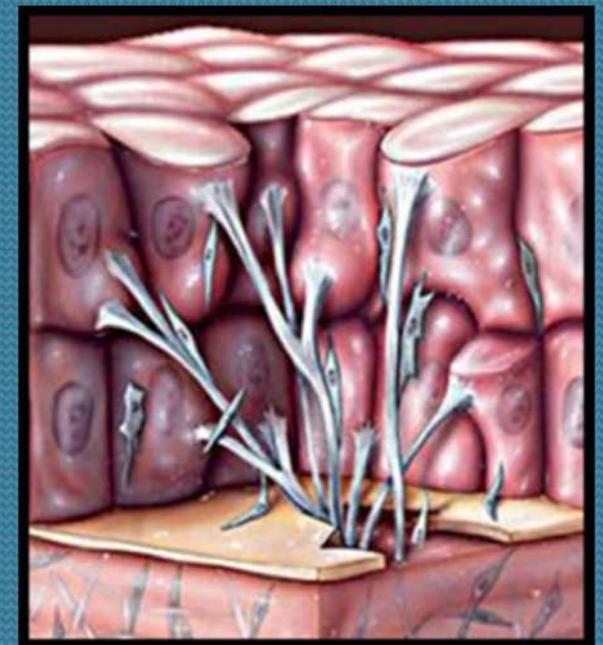
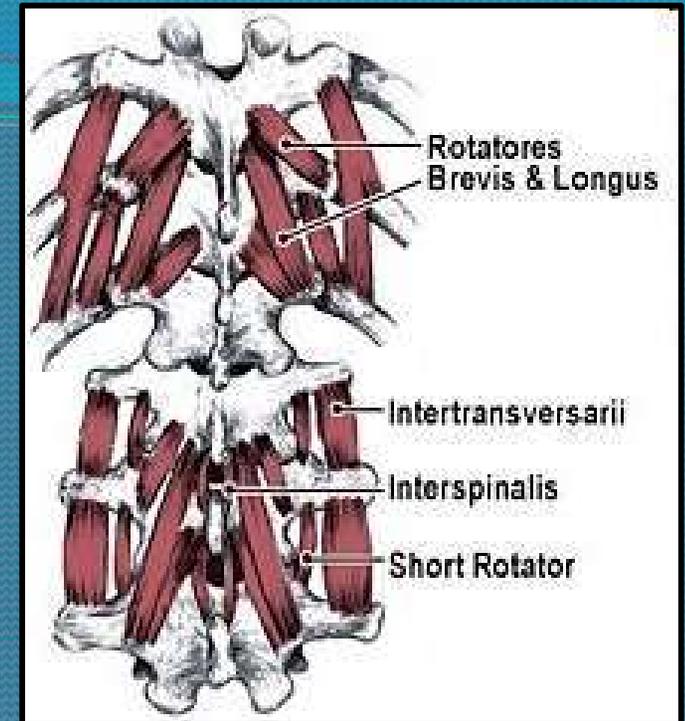
# What Are We Doing!



## Muscle Fiber Direction

The more vectors and/or torque you can include in your adjustment the easier the jt will release.

This is true because of the biomechanics of the bony jt & that the muscle fiber angles vary for a given joint. Using multiple directions maximizes GTO firing in the highest number of muscle fibers. Also maximal adhesions are broken and/or stretched & the pt is more relaxed & comfortable.



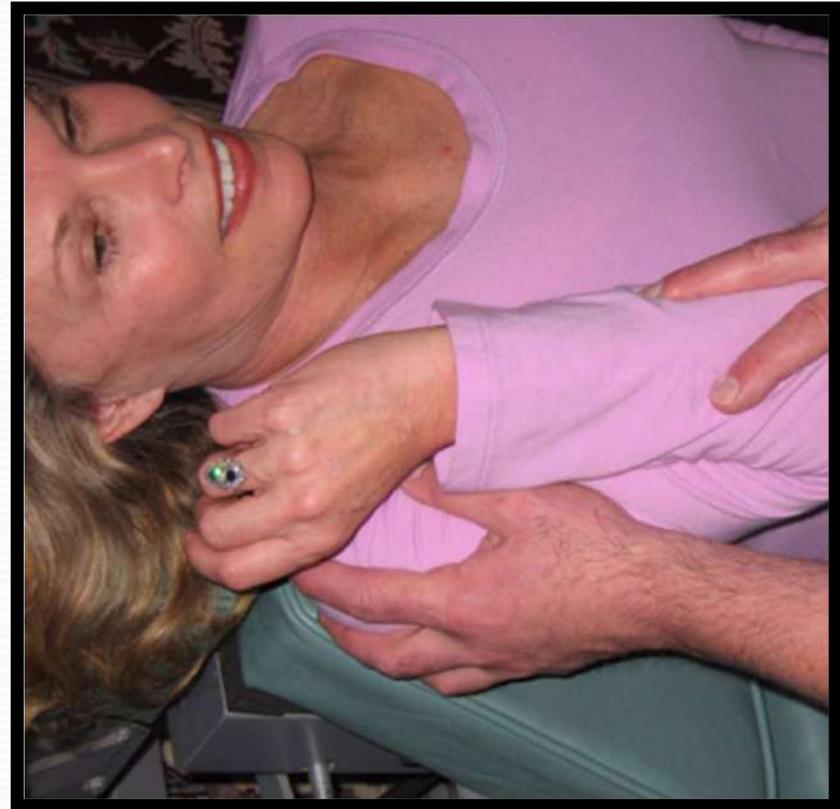
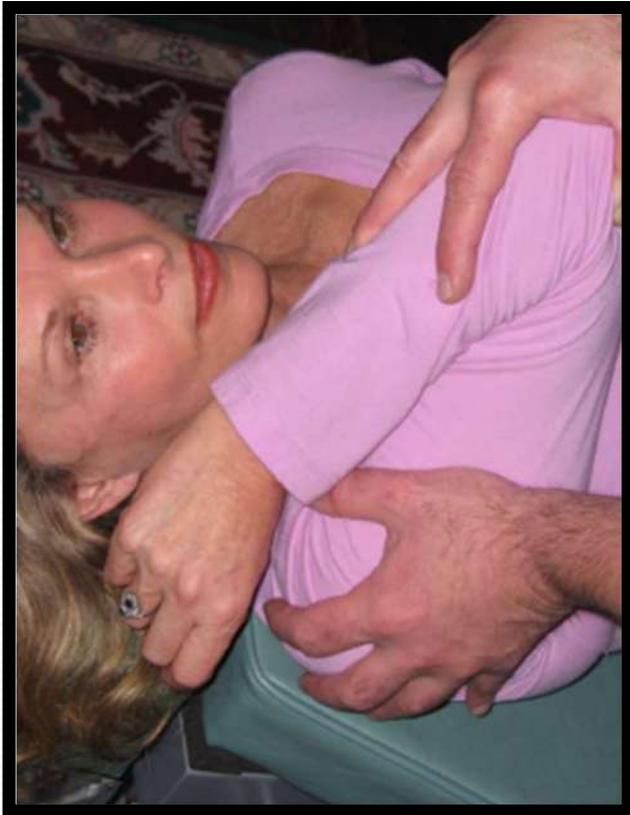
# Shoulder Tugs: AI-EX Moves



Great for releasing rotator cuff & frozen shoulder.

Before thrusting shake the shoulder around in ALL directions. This ensures the pt can tolerate the adjustment & loosens the tissues.

# Shoulder Drops: AI & EX Moves



If the shoulder is sensitive than you can use **LIGHT** drops in all the different directions.

# Shoulders & Posture

## Drops “Y” Position: Pec Minor



Use drop table. DC pushes in direction of fibers or direction arms are hanging. 2-3 drops per visit on most pts, as 80-90% of pts have rounded shoulders and anterior head translation.

# Tubing for Posture



During the adjustment place a foam roll (about 1 foot long) vertically between the scapulae. For home use the pt can lie over the top of the foam roll as much as possible. Start with 1-5 minutes per day for 2 weeks as they will likely experience discomfort initially. Then the pt can go as long as 20 minutes per session.

## **Last Words (and then one more slide)**

Okay I know I gave you a lot of information and some new tools to work on shoulders and general adjusting. Review and practice these ideas and begin to implement them into your patient care. Remember you don't have to do all of these things on every patient. Use your clinical judgment to decide and watch the amazing results begin!



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