5

THE ROUTINES

SELECTING THE RIGHT ROUTINE

The 7-Minute Rotator Cuff Solution contains 5 sets of routines:

- Athlete's Rehab Routine, External Rotator Injury
- Athlete's Rehab Routine, Internal Rotator Injury
- Athlete's Injury-Prevention Routine
- Athlete's Injury-Prevention Routine, Including Delts
- Bodybuilder's Injury-Prevention Routine, Including Delts

If you now have—*or have recently had*—a rotator cuff injury, use the appropriate rehabilition routine.

If you don't currently have a cuff injury and want to reduce your risk of sustaining one, choose between the two *Athlete's Injury-Prevention* routines. Use the version without deltoid exercises if your conditioning regimen includes some other form of *balanced* delt training (or if your coach insists). Use the version *with* delt exercises if there is even a chance your program doesn't promote balanced delt strength (for instance, that it neglects or minimizes the importance of rear-delt training). Remember, the delts and rotator cuff work together when moving the shoulder. A weakness on the part of either increases the risk of injury to both!

If you are incorporating rotator cuff work into your program to reduce risk of injury while bodybuilding, use the *Bodybuilder's Injury-Prevention Routine, Including Delts*. *Health For Life* readers should use these routines in place of the delt routines in **Secrets of Advanced Bodybuilders**.

For the reasons discussed in *The Exercises* chapter, we don't recommend including front delt exercises in a shoulder routine. However, recognizing that you may choose to do them anyway, we have indicated within the bodybuilding routine the "best" place to put them.

LEVELS

Each routine has several levels. Levels identified with letters (such as **Level *A***) are starting points for beginners. If you have conditioning experience, begin at the first numbered level (**Level 1**) of the appropriate routine. The explanations at the beginning of each routine contain recommendations for moving from one level to the next.*

WEIGHT

The exercise chapter contains recommendations for the maximum amounts of weight to use for certain cuff exercises. Those amounts may seem low, compared to the amounts you use for other exercises. They're not. The appropriate load for a particular exercise depends on the muscle being targeted and your leverage during the exercise: you may use only 30 to 40 pounds during one-arm exercises for your biceps, but you wouldn't consider that amount "low" just because you can use much more when doing exercises for your legs. The cuff muscles are small, and most cuff exercises put them at a serious mechanical disadvantage. Even 10 pounds may feel like a tremendous overload when you're working them.

When you begin the routines, start with a *very small* load and work up. Once you've developed a baseline of strength, use

*All of the routines are structured according to guidelines dictated by biomechanical principles. For a detailed explanation of those principles, check out the *Theory* section of *Health For Life's* book, *Secrets of Advanced Bodybuilders.*

The 7-Minute Rotator Cuff Solution

Joseph Horrigan, D.C.
& Jerry Robinson

Health For Life

The 7-Minute Rotator Cuff Solution

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& Jerry Robinson

Health For Life

7-Minute

Look around the gym. Chances are you'll see someone favoring a shoulder. Sooner or later it could be you.

Soft Tissue

Center

Health For Life

is a research and publishing company committed to providing the reader with sound, scientifically based information on all aspects of fitness and conditioning. Through a series of unique training guides, addresses the goals and concerns of a dedicated readership of individuals—now over a quarter of a million strong—who perform a wide variety of physical activities. Every year, receives hundreds of unsolicited endorsements from these readers, as well as their trainers, coaches, and physicians, all attesting to remarkable and unparalleled results.

Shoulder problem? Fix it FAST!

The 7-Minute Rotator Cuff Solution

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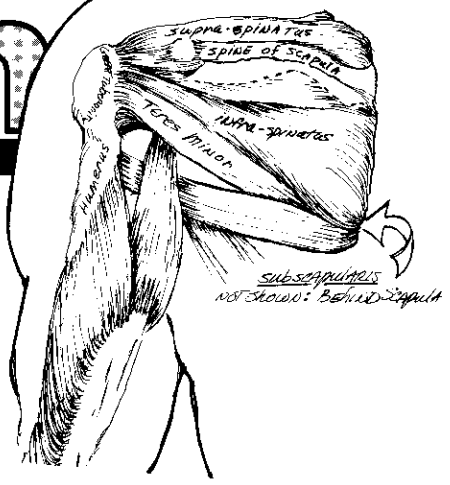

A Comprehensive Program to Prevent and Rehabilitate Rotator Cuff Injuries

Health For Life

So who needs a rotator cuff workout anyway?

Just about everyone. If you do any sort of regular physical activity—from weekend tennis to professional football—you are at high risk for injuring your rotator cuff.

Of course, the more regular the activity, the higher the risk. Almost all serious athletes sustain a cuff injury at some point during their careers. Surprisingly, though, even if you *never* shoot a basketball or lift a weight you are *still* at risk. The rotator cuff—four small muscles that stabilize the shoulder and help with rotation of the arm—gets pulled, stretched, and generally bashed about by regular daily activity. Over time, degeneration of the cuff can limit your shoulders' range of movement and leave you with chronic shoulder pain.

The good news is that most of the injuries can be prevented. The better news is that it takes only a few minutes a week!

The 7-Minute Rotator Cuff Solution is a simple program for the care and feeding of the rotator cuff. It includes separate routines for armor-plating the healthy cuff and for rehabiliting the injured one. Each routine has a number of levels. These will guide you along a controlled path from injury to recovery, from weakness to rock-solid stability.

Along the way you will see just how the cuff works, how it gets injured, and what you should do to prevent injury in the first place. For the serious athlete, we will also take a look at a number of popular weight training exercises that should be modified or eliminated to reduce risk of cuff injury. (Did you know, for instance, that over time, the standard Upright Row is an almost guaranteed cuff killer?)

Get ready for some surprises! **The 7-Minute Rotator Cuff Solution** reflects the most up-to-date thinking on rotator cuff maintenance and rehabilition. And there have been some changes in that thinking of late.

The biggest and best surprise, though, is how quickly and easily you can reduce your risk of ending up on the sidelines due to an injured cuff.

A Quick Note To All Our Readers...

*To make **The 7-Minute Rotator Cuff Solution** most useful both to the athletes who will use it and to health care professionals who diagnose and treat rotator cuff injuries, we're trying something different here—presenting the same background material at two different technical levels.*

*The **Theory** section, beginning on page 1, is for our readers without a technical background who need to understand the workings of the rotator cuff for the sake of their training and health.*

***Appendix A** is for our readers with a technical background, including health care providers, who want up-to-date information on the biomechanics of the rotator cuff, and wish to explore current techniques in non-invasive rotator cuff rehabilitation.*

The approaches and techniques outlined here are drawn from the most up-to-date research available; they have repeatedly proven their effectiveness at the Soft Tissue Center.

Another Quick Note, Just For Longtime Health For Life Customers...

*Sports science evolves constantly. New information becomes available; yesterday's dictum becomes today's error (and sometimes vice versa!). **The 7-Minute Rotator Cuff Solution** promotes the latest thinking about deltoid and rotator cuff training. Some of the information here conflicts with that in older versions of our courses (for instance, with the deltoid routines in the original version of **Secrets of Advanced Bodybuilders**).*

*Where discrepancies exist, follow the recommendations in **The 7-Minute Rotator Cuff Solution**. In general, always follow the recommendations in the course with the later copyright date.*

PART ONE — The Theory

To Janet and Nadine—for your incredible patience with the seemingly endless hours necessary to finish this project.

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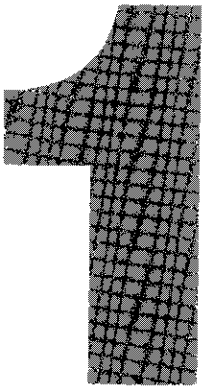
PART ONE

The Theory



WHAT THE ROTATOR CUFF IS

Twenty-five years ago, only a few die-hard bodybuilders and powerlifters trained with weights. Common wisdom back then had it that weight training would make you tight and slow you down.

Today, many athletes competing in a variety of sports lift to improve their overall power, joint stability, muscular endurance, and even speed. Since the fitness boom of the late 70's and the proliferation of the health club, millions of recreational athletes have also begun to pump iron.

In principle, this global embracing of weight training is a good thing. Current research shows that lifting weights can improve fitness in many ways, not limited just to enhancing athletic performance or piling on slabs of muscle.

However, with the good comes the bad: Exercises that once circulated among a relatively small community of die-hard lifters now have a huge constituency. Unfortunately, many of these exercises are not—and never were—biomechanically sound.

As a result, injuries once experienced by a relatively small community now also have a huge constituency. Shoulder pain, in particular, has always been one of the most common complaints from athletes who lift weights. With so many more people lifting, rotator cuff injuries have reached epidemic proportions.

Fortunately, this is one trend that can be stopped dead in its tracks.

Many cuff injuries just don't have to happen. Research has improved our understanding of shoulder biomechanics; armed with that knowlege, we have been able to identify the training errors responsible for many cuff injuries. It has also become possible to design a quick, simple program to prevent many of those injuries in the first place (and to rehabilitate them if they do occur). That simple program is **The 7-Minute Rotator Cuff Solution**.

ANATOMY — A STARTING PLACE

For the rest of this manual to make sense, you need to be familiar with the rotator cuff and surrounding structures. Don't worry. It isn't important to memorize every anatomical fact covered here. What *is* important is getting a basic idea of what the rotator cuff and surrounding structures are and what they do.

A Small Glossary

Let's start with a few terms.

Muscle is a type of soft tissue that contracts when stimulated by your nervous system. **Tendon** connects muscle to bone. **Ligament** connects bone to bone.

A **joint** is formed by two or more bones coming together. Joints are held together by soft tissue—usually ligaments, sometimes tendons and muscles.

A **bursa** (as in ***bursitis***) is a soft sack-like structure near or within a joint. It often contains a fluid. The fluid-filled bursa forms a cushion that decreases the friction between soft tissue elements within joints (usually ligaments and tendons), promoting smooth, hitch-free movement.

Finally, **fascia**, also known as the **fascial sheath**, is a sheet of fibrous tissue beneath the skin that envelopes the whole body. Parts of the fascial sheath enclose muscles or muscle groups; other parts separate muscle layers.

Joints

O.K. Now let's take a look at a few of the major features of the shoulder.

There are actually four separate joints (places where bone meets bone) within the shoulder. We will be interested only in two of those: the **acromio-clavicular joint**, commonly called the **A/C joint** for short, and the **gleno-humeral joint**, which we're going to call the **G/H joint** for short, even though, for some unknown reason, that abbreviation has never caught on in anatomical circles.

The A/C Joint

The **A/C joint** is where your shoulder blade, or **scapula**, meets your collarbone. The particular part of the shoulder blade involved is called the **acromion**; the technical term for the collarbone is the **clavicle**, hence the name, *acromio-clavicular* joint (Fig. 1).

When people talk about having a **separated shoulder**, it's the bones of the A/C joint that have gotten separated. The joint is held together by ligament alone, and a strong impact from the side—such as happens every two seconds when playing football—can stretch or tear that ligament, allowing the acromion to separate from the clavicle.

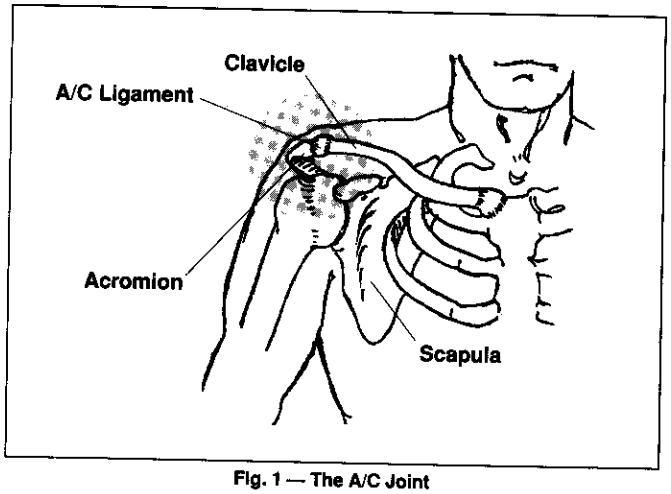


Fig. 1 — The A/C Joint

The G/H Joint

The **G/H Joint** is where your shoulder blade meets your upper arm bone. This is what most people think of as their "shoulder" joint. The particular part of the shoulder blade involved is called the **glenoid fossa**; the technical term for the upper arm bone is the **humerus**, hence the name, *gleno-humeral* joint (Fig. 2).

The glenoid fossa is the depression into which a ball on the end of the humerus fits. That makes the shoulder what's known as a **ball-and-socket** joint, although in the shoulder, the socket is so shallow that the bones play only a minor role in stabilizing the joint. It's the soft tissue—muscles and tendons—that keep the head of the humerus in position against the glenoid fossa. Remember that point. It will be important later on.

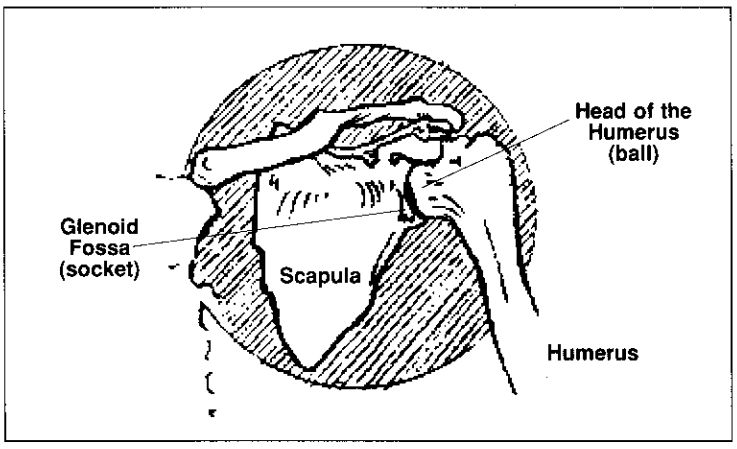


Fig. 2 — The G/H Joint is a Ball-and-Socket Joint

Muscles

A number of muscles cause movement at the shoulder. For our purposes, the important ones are:

- the deltoid ("shoulder" muscle)
- the pectoralis major (chest muscle)
- the teres major
- the latissimus dorsi (commonly called "the lats")
- the biceps
- the triceps

Most muscles, including the ones listed above, are responsible for more than one movement. The biceps, for instance, which we usually associate with *flexing* or bending the elbow, also assists in raising the arm forward at the shoulder. Below, we will describe these six muscles, spotlighting certain of their functions that relate specifically to understanding rotator cuff injuries and conditioning.

Deltoid

Each **Deltoid** has three sections, or **heads**. All attach to basically the same spot on the humerus, but each originates from a different location. Each has a different angle of pull and causes a different movement.

- The front or **anterior** head originates from the outermost third of the collarbone (Fig. 3a). It pulls the arm up to the front.
- The side or **lateral** head originates from on top of the acromion (Fig. 3b). It pulls the arm up to the side.
- The rear or **posterior** head originates from the top rear edge of the shoulder blade (Fig. 4). It pulls the arm horizontally from across the body. (This is sort of the familiar "Get out of my way!" gesture.)

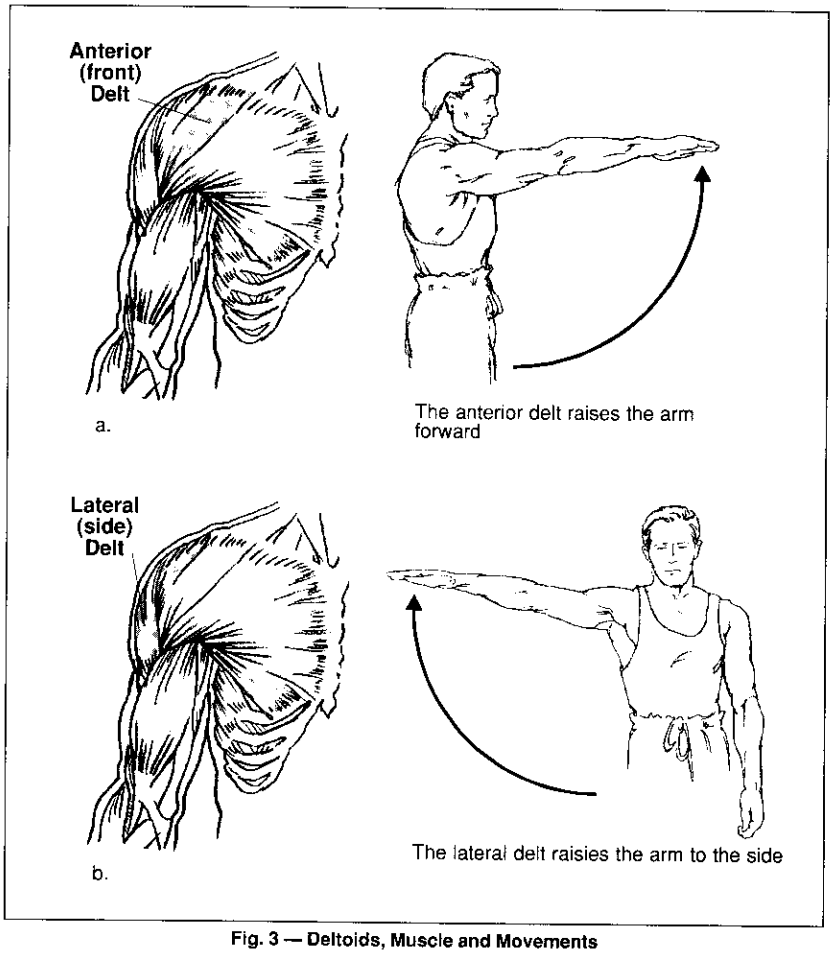


Fig. 3 — Deltoids, Muscle and Movements

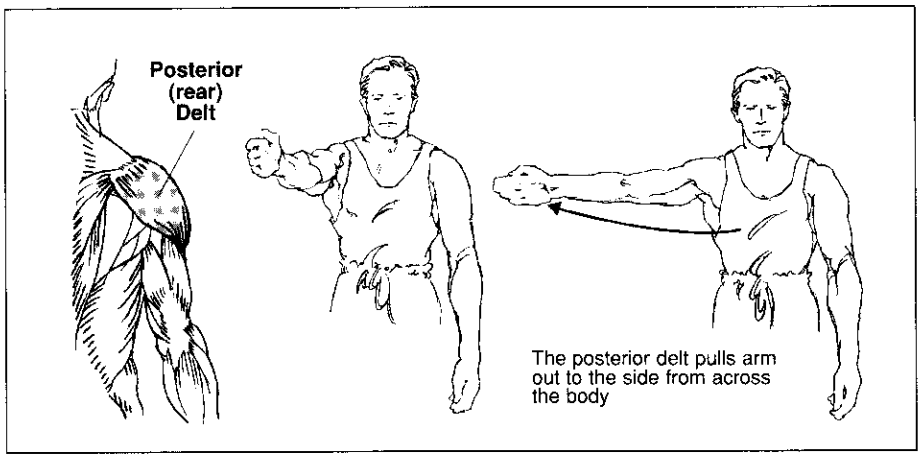


Fig. 4 — The Deltoids, Muscles and Movements (cont.)

Pectoralis Major

The **pectoralis major** is the large chest muscle. It runs from the collarbone, breast bone, and ribs to a bony bump on the humerus. In general, the pec major pulls the arm across the chest. Depending on where your arm is to begin with, it can pull your arm *up* across the chest, *straight* across the chest, or *down* across the chest (Fig. 6, next page).

One more important pec function. The muscle can also **internally rotate** the arm. This movement—which will play a big role throughout **The 7-Minute Rotator Cuff Solution**—looks like the classic "Move along!" gesture (as illustrated in Figure 5 below).

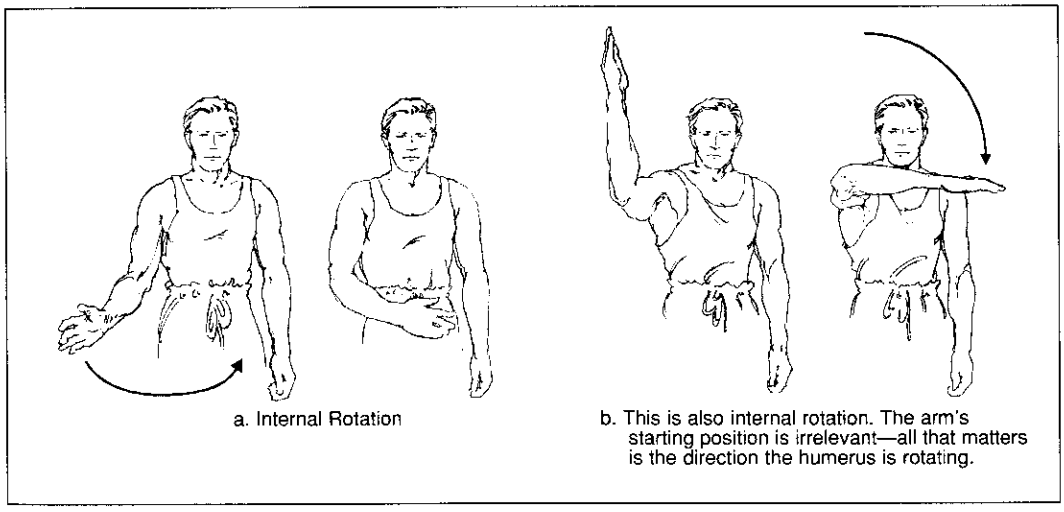


Fig. 5 — Among Other Functions, the Pecs Assist with Internal Rotation

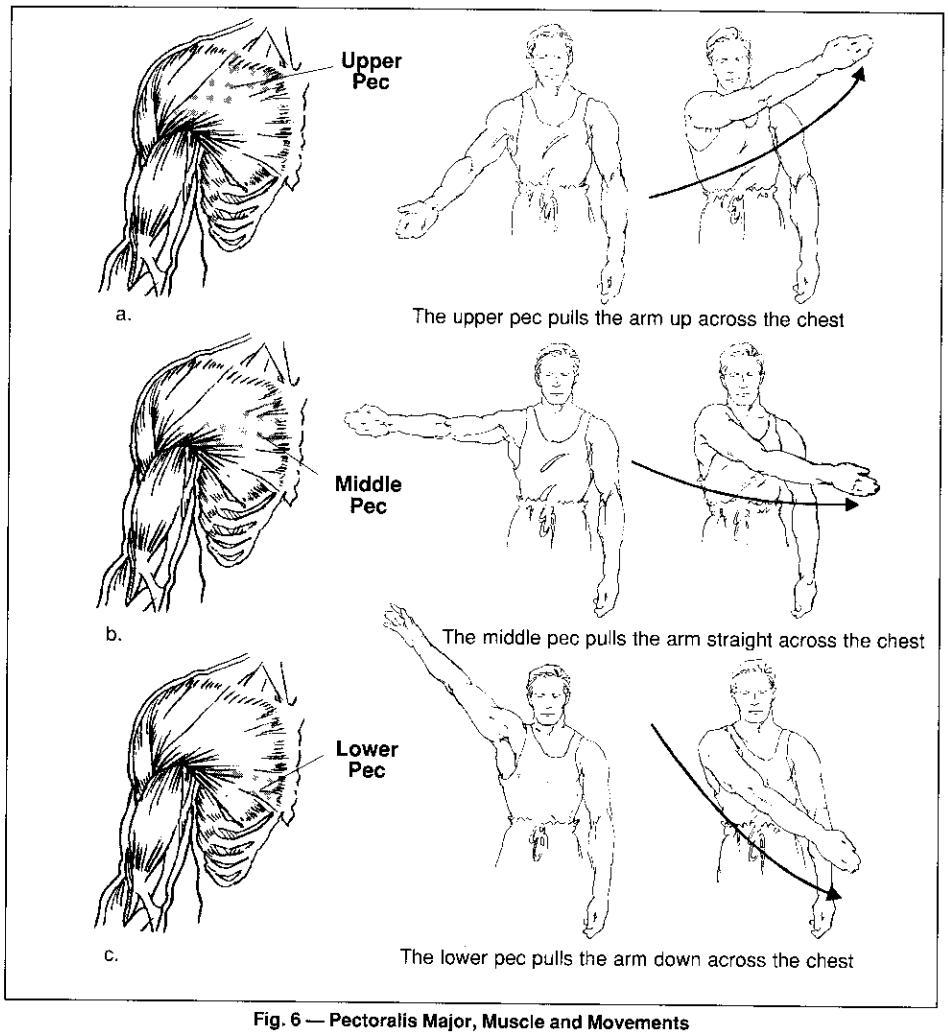


Fig. 6 — Pectoralis Major, Muscle and Movements

Latissimus Dorsi & Teres Major

The **latissimus dorsi** and **teres major** lie next to each other in the upper back; they perform similar functions (Fig. 7).

The *latissimus dorsi* is a large, fan-shaped muscle that runs up the lower back from the lower spine and ribs to a small area on the humerus.

The *teres major* runs from the bottom outside edge of the shoulder blade around to the front of the humerus. It is often referred to as the "upper lat" by weight lifters because of its location just above the latissimus dorsi.

Like the pecs, the lats and teres major internally rotate the arm.

They also pull the arm down to the side or down and back from an overhead position.

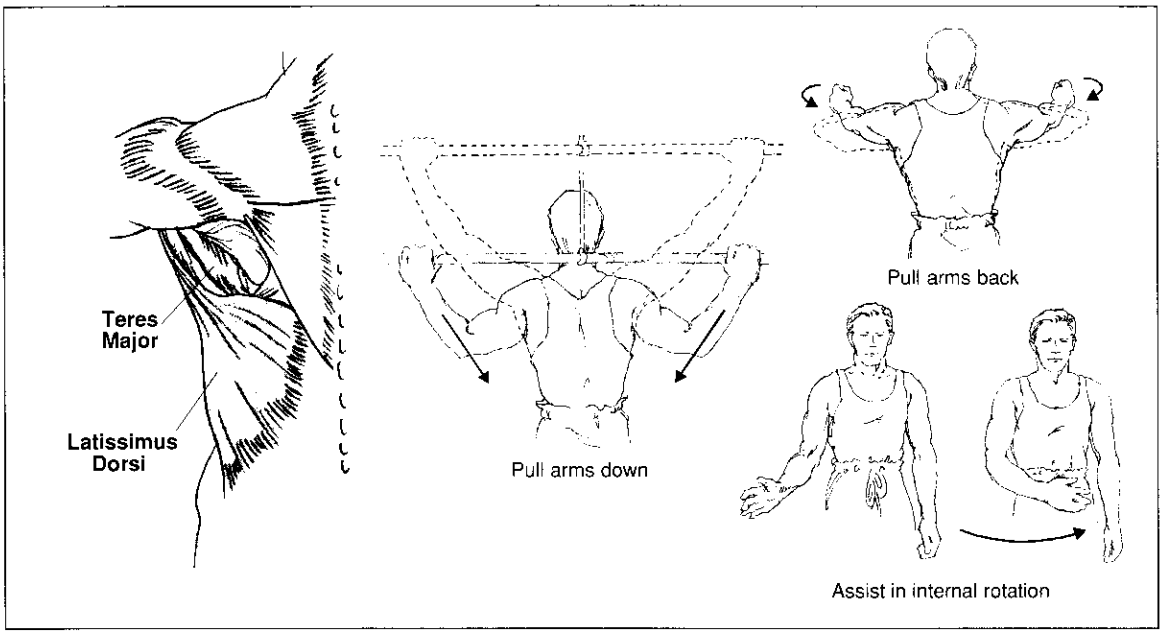


Fig. 7 — Lats and Teres Major, Muscles and Movements

Biceps

The **biceps** has two sections or **heads**. Both originate on the shoulder blade, one from around the top of the shoulder socket, the other from further inward toward the center of the body. Both connect to a point on the forearm (Fig. 8).

As we mentioned at the top of this section, the biceps does more than just bend the elbow. Most importantly for our purposes, it also assists the front deltoid in flexing the shoulder—that is, in raising the arm up to the front.

The biceps acts most powerfully at the shoulder to raise the arm up to the front when your elbow is fully extended.

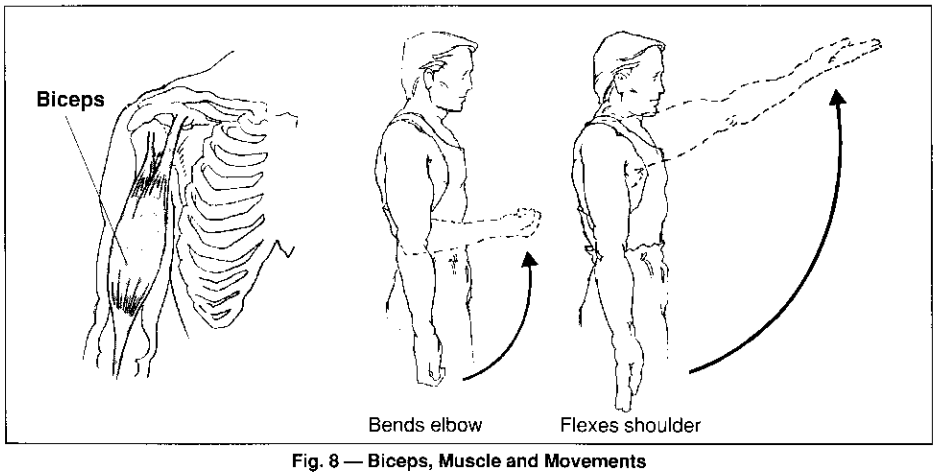


Fig. 8 — Biceps, Muscle and Movements

Triceps

The **triceps** is a three-headed muscle. Two of the heads originate on the humerus; the third originates on the shoulder blade. All three connect to a point on the forearm.

Because the triceps crosses both the elbow and shoulder joint, it causes movement both at the elbow and shoulder: it straightens the elbow and pulls the arm down at the shoulder either from the front or from the side (Fig. 9).

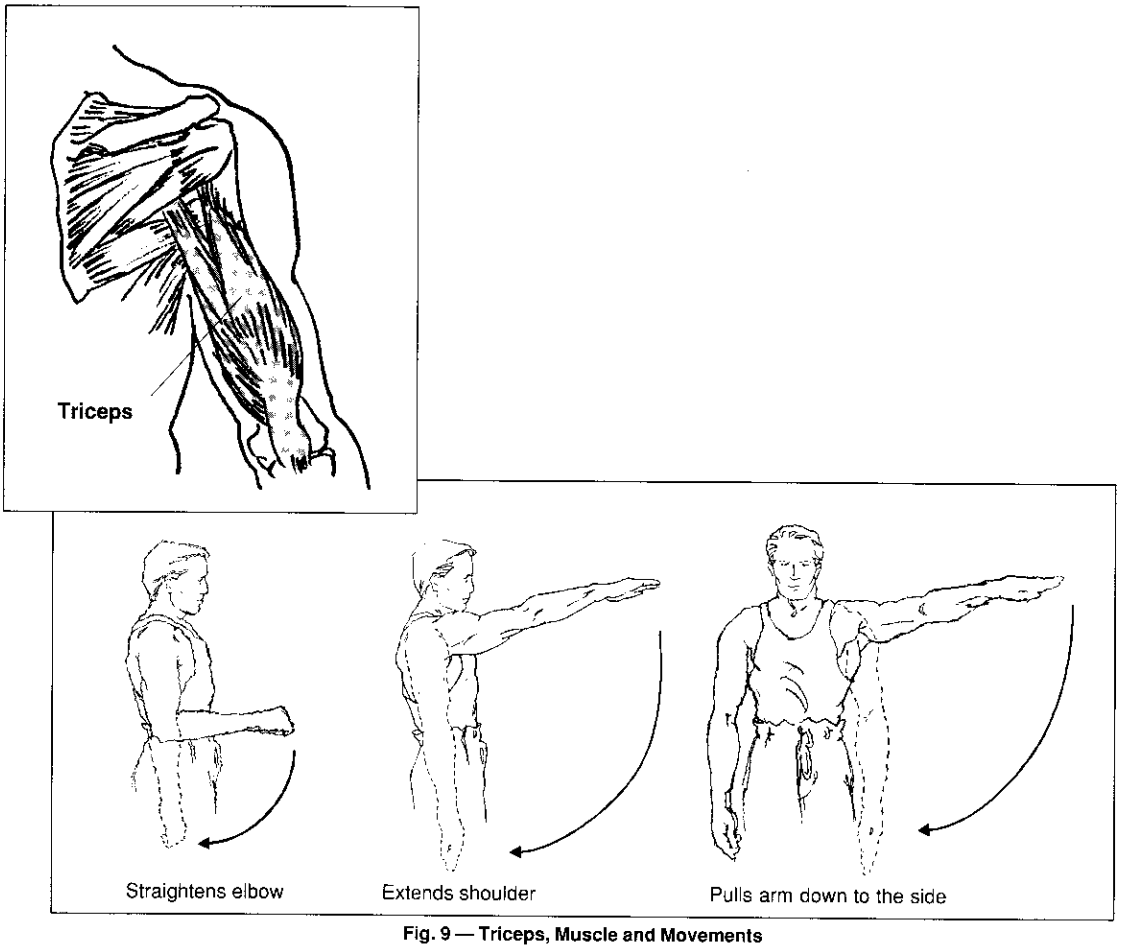


Fig. 9 — Triceps, Muscle and Movements

Rotator Cuff Anatomy

O.K. The stage is adequately set. Now let's start with the cuff. The rotator cuff consists of four muscles that run from the shoulder blade to the humerus. Actually, physiologists think of the cuff as being the *tendons* of these four muscles (remember, tendons connect muscles to bones), but from the perspective of preventing or rehabilitating shoulder injuries, it makes more sense to consider the cuff as including both tendons and muscles.

The four muscles of the rotator cuff are:

- the supraspinatus
- the infraspinatus
- the teres minor
- the subscapularis

Simply put, these four muscles stabilize the shoulder. If, for some reason any of them cannot do its job, major motions of the shoulder become impossible—forget throwing a ball, bench pressing or even reaching overhead! Let's look at each of these muscles individually, and then, in the next chapter, we'll consider how they work together.

Supraspinatus

The **supraspinatus** runs along the top of the shoulder blade, over the point of the shoulder, and connects to the same bony bump on the humerus the pecs do. Basically, the supraspinatus keeps the humerus from falling downward out of the shoulder socket. It does this by pulling in on the humerus to counter the downward pull from the weight of your arm (Fig. 10).

The supraspinatus also acts along with the lateral delt head to raise the arm up to the side.

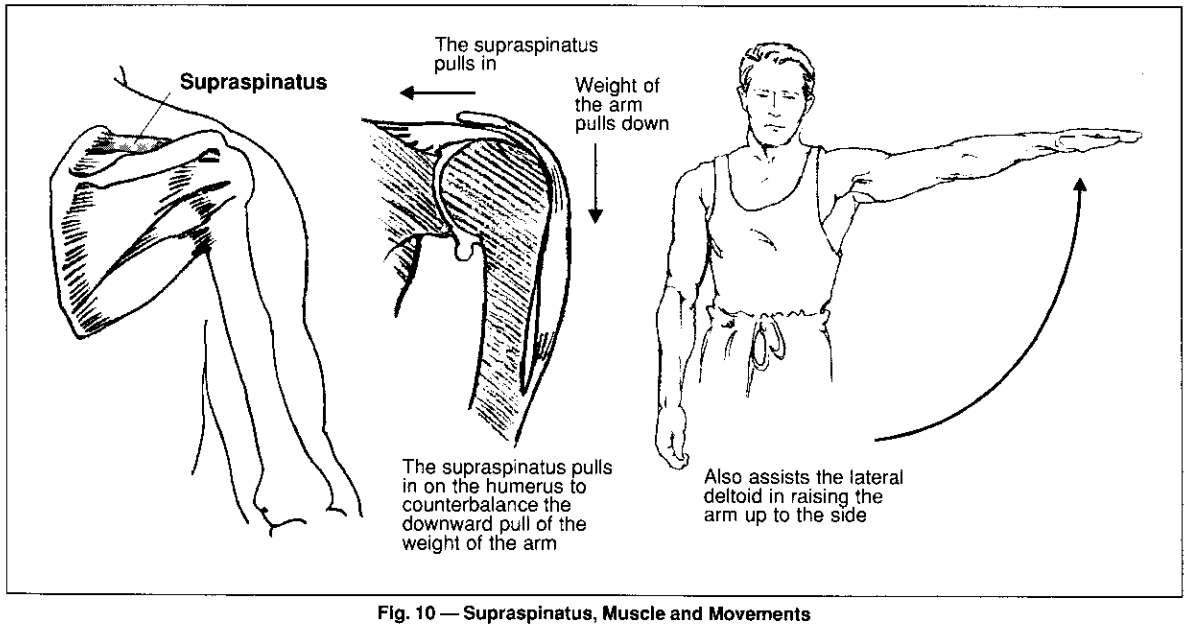


Fig. 10 — Supraspinatus, Muscle and Movements

Infraspinatus & Teres Minor

The **infraspinatus** and **teres minor** both run from the back of the shoulder blade to the back of the humerus, connecting again to the same bony bump as the pecs and supraspinatus. They are responsible for another important shoulder movement, called **external rotation**. Remember *internal* rotation, one of the movements caused by the pecs, lats, and teres major? External rotation is the opposite—it's what you do to get into position to shake someone's hand (Fig. 11).

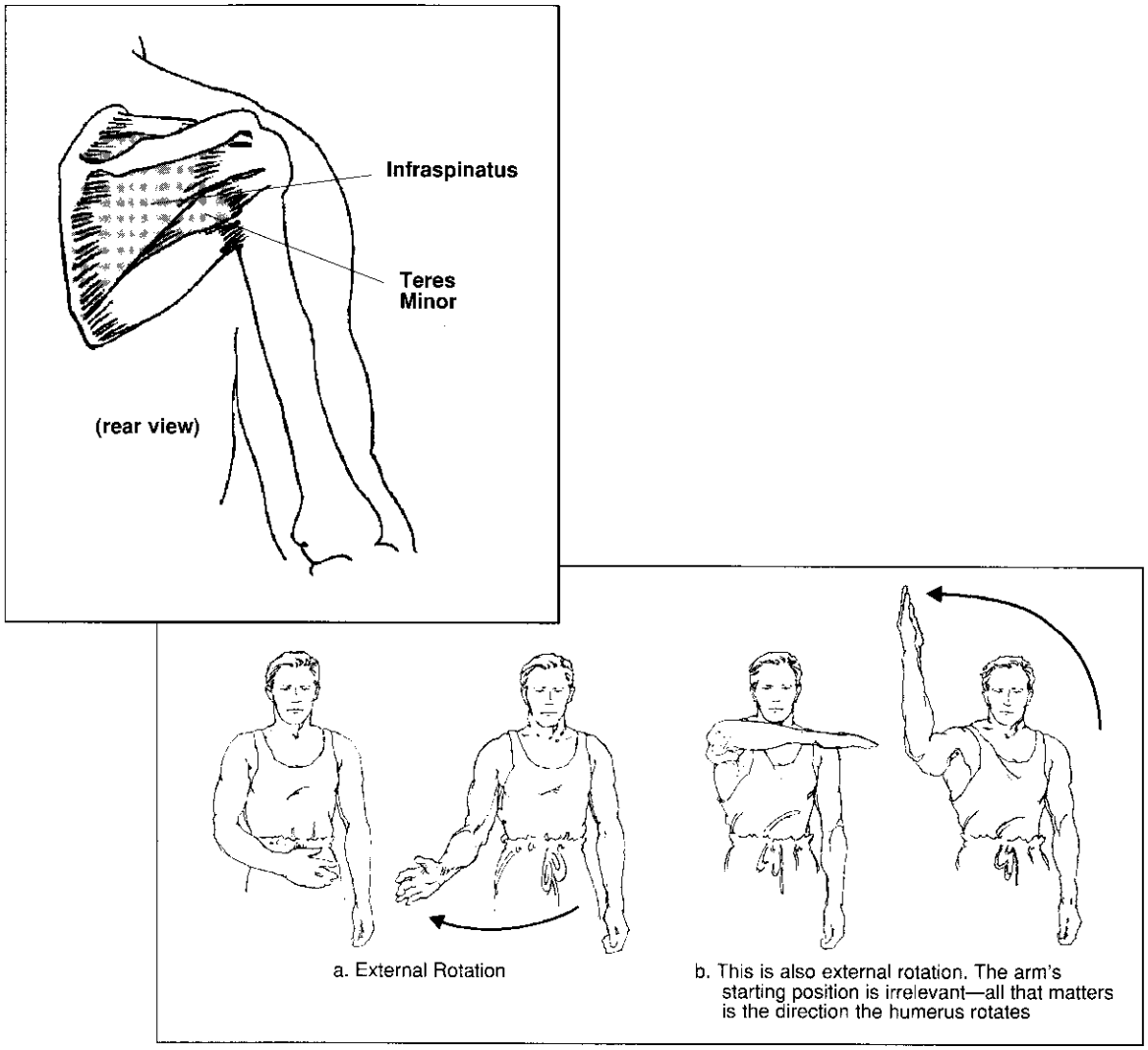


Fig. 11 — The Infraspinatus and Teres Minor Externally Rotate The Humerus

Subscapularis

Finally, the **subscapularis** runs from the underside of the shoulder blade to the front of the humerus. Along with the lats, pecs, and teres major, it assists in internal rotation (Fig. 12).

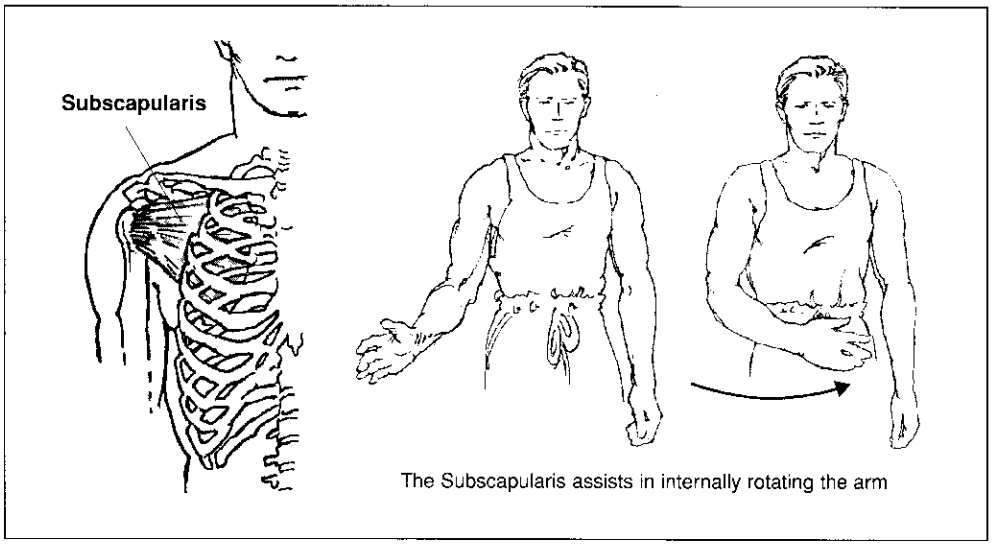


Fig. 12 — Subacapularis, Muscles and Movements

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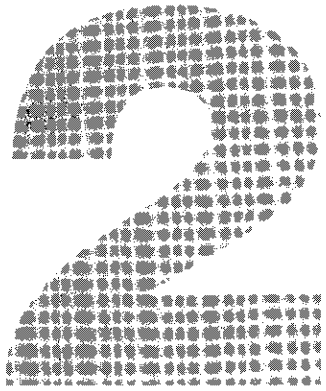

WHAT THE ROTATOR CUFF DOES, AND HOW IT DOES IT

So far, we've presented a sort of snapshot picture of the muscles and joints that play a part in shoulder movement—this muscle starts here and goes there; by itself, it does this.

But, the old 1000 words notwithstanding, a single picture often can't tell the whole story. Both the role the cuff and surrounding structures play in athletics and the injuries they can sustain depend on how all the elements we have just discussed work *together*. So let's see what happens at your shoulder while you are actually doing a few things: raising your arm over your head, performing major upper body motions, and throwing a ball.

RAISING YOUR ARM OVER YOUR HEAD

Pulling the Humerus Down

Imagine you are standing in a relaxed position with your arms hanging at your sides. The muscle fibers in your deltoids (the muscles primarily responsible for raising your arms out to the side) are basically vertical in that position (Fig. 13). Because those fibers are basically vertical, when a deltoid begins to contract, it pulls almost straight up on the humerus.

By rights, it should pull the head of the humerus up into the "roof" of the shoulder, causing bone to strike against bone, and eventually (if it occurred often enough) destroying the joint.

Why doesn't this happen? It doesn't happen because the rotator cuff intervenes. Specifically, three of the rotator cuff muscles—the teres minor, infraspinatus, and subscapularis—pull *down* on the humerus just enough to prevent the collision and to allow the humeral head to move freely (Fig. 13). This is the first way in which the cuff muscles act together: during movement, they counterbalance the upward pull of the deltoids, preventing the head of the humerus from striking the roof of the shoulder.

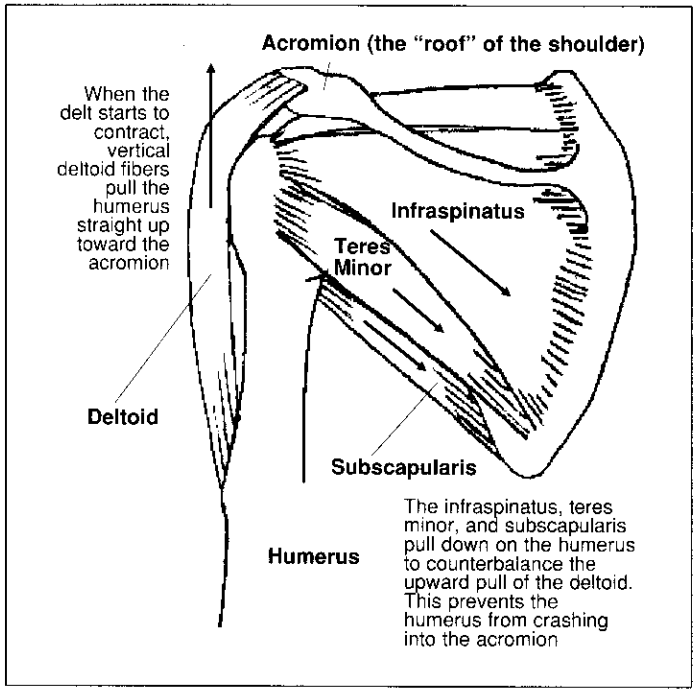

Fig. 13 — Cuff Muscles Pulling the Humerus Down

Externally Rotating the Shoulder

Remember the bony bump we keep mentioning—the spot on the humerus where many of the shoulder and rotator cuff muscles connect? It's called the **greater tubercle**, and it's one of the most important stuctures affecting the biomechanics of the shoulder (Fig. 14a). In fact, when you are raising your arm out to the side and it reaches the point where it's about parallel to the floor, the greater tubercle may crowd the shoulder joint, preventing you from raising your arm further (Fig. 14b).

If you raise your arm in an *internally rotated* position (with your palm facing back and your thumb pointing down), it's inevitable: the greater tubercle *will* run into the acromion (the "roof" of the shoulder), impinging on tendons and bursa that

pass between the two, and making it uncomfortable to raise your arm higher than about parallel with the floor.*

Fortunately, evolution has seen to it that you don't normally raise your arm overhead in an internally rotated position. When performing an overhead press, preparing to pitch a softball, or simply reaching for something on a high shelf, you naturally do exactly the opposite—you *externally rotate.* With the arm externally rotated, the greater tubercle moves behind the acromion, allowing you to raise your arm up to about 120 degrees (Fig. 14c). (You get another 60 degrees of movement out of the shoulder as a result of the shoulder blade moving out along the back, providing a total of 180 degrees of motion to the side when you raise an arm over your head.)

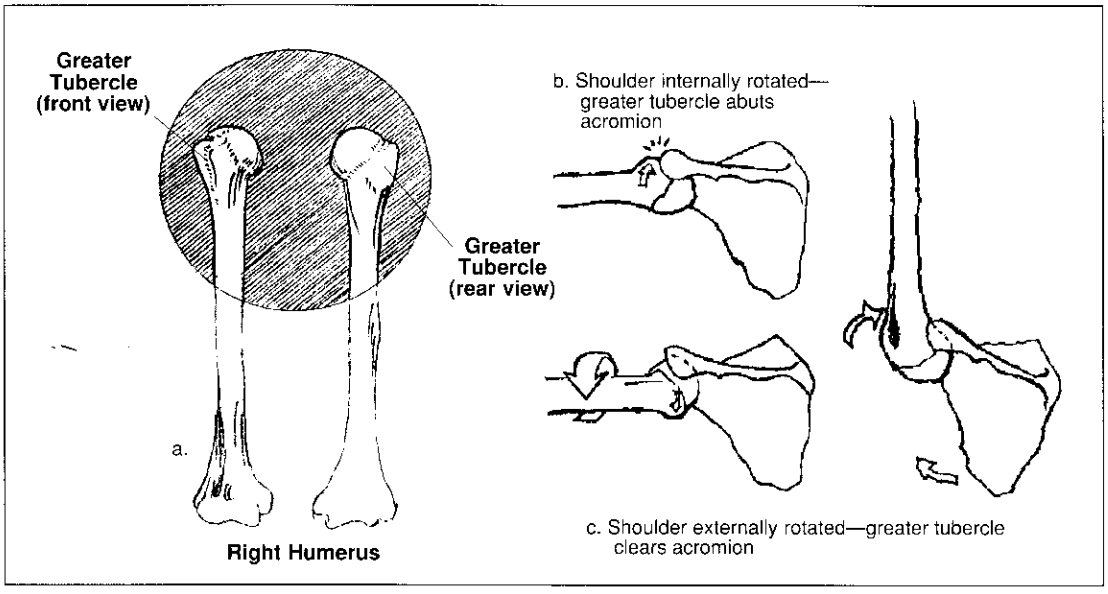

Fig. 14 — Internal Rotation Limits Range of Motion

Try it. Rotate your arm internally and slowly raise it out to the side (Fig. 15a). You should begin to feel resistance in your shoulder when your arm is about parallel to the ground. Now externally rotate your arm (Fig. 15b); you should be able to bring it all the way up against the side of your head.

The fact that raising the arm in an internally rotated position causes impingement on tendons and bursa in the shoulder is

*Some sources say that with the shoulder internally rotated, the greater tubercle will impinge upon a certain ligament when the arm is raised up to the side just 60 degrees.

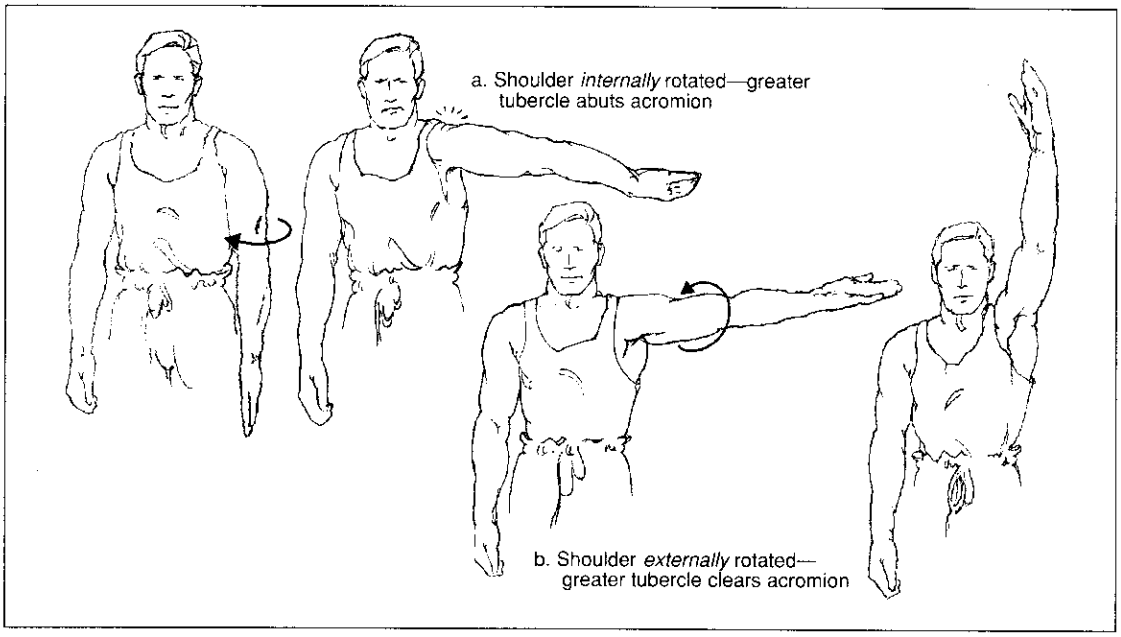

Fig. 15 — External Rotation Allows Full Range of Motion

significant both in causing rotator cuff injuries and in helping you distinguish beneficial, effective exercises from potentially harmful ones. We will return to it in the *What Goes Wrong With the Rotator Cuff* and *The Exercises* chapters.

Now, obviously your arm didn't just externally rotate on its own. We've already covered the muscles responsible for this action: the teres minor and the infraspinatus, two muscles of the rotator cuff. Externally rotating your arm is the second way in which the cuff muscles act together.

PERFORMING MAJOR UPPER BODY MOTIONS

Let's switch gears now and look at the role of the cuff during another movement, or actually, during a class of movements: major upper body motions.

If you've read other *Health For Life* courses, you are familiar with the terms *prime mover*, *synergist*, and *stabilizer*—terms used to describe the way muscles interact during the performance of a movement. The use of those terms has changed slightly in recent years. Since we need to use them here to describe the role of the cuff during major upper body motions, we're going to take a moment to explain the terms from scratch, the way they are now being used.

Prime Movers, Secondary Movers, and Stabilizers

Most movements involve many muscles cooperating together. Usually, one or a small number of muscles is directly responsible for the actual movement, and then a larger number play a peripheral role, holding the body in position so the movement can take place.

The muscle or muscle group primarily responsible for a movement is called the **prime mover**. Muscles that assist the prime mover are called **secondary movers**. And finally, muscles that hold the body in position so the movement can take place are called **stabilizers**.

When you do a Bench Press, for example, the chest is the main muscle responsible for the movement. It's functioning as *prime mover*. The deltoids and triceps contribute directly to your lifting the bar, but are not primarily responsible for the movement. They're functioning as *secondary movers*.

Finally, many muscles contract to keep you from rolling off of the bench. Those muscles are not directly involved in your lifting the bar, but you couldn't lift it without them. They're functioning as *stabilizers*.

Whether a muscle acts as prime mover, secondary mover, or stabilizer depends on the movement. During a Bench Press, the pecs act as the prime mover; during a Triceps Press Down, they act as a stabilizer. During a Bench Press, the triceps act as a secondary mover; during a Triceps Press Down, they act as the prime mover.

Prime Movers, Secondary Movers, Stabilizers, and the Rotator Cuff

O.K., we're ready to get back to the cuff. Earlier, we mentioned that the "socket" part of the shoulder's ball-and-socket joint is extremely shallow—so shallow, in fact, that the job of holding the joint together falls to soft tissue (muscles and tendons). The soft tissue that holds the joint together is the rotator cuff.

During essentially all major upper body motions, the four rotator cuff muscles act together as stabilizers at the shoulder. They are like guy wires pulling on a tent pole: the supraspinatus pulls the head of the humerus into the glenoid fossa from above. The infraspinatus pulls it in from the rear. The teres minor pulls it in from bottom/rear. And the subscapularis pulls it in from the bottom/front (Fig. 16).

This stabilizing allows the other muscles that act at the shoulder, the prime and secondary movers, to perform effectively. That's the third way in which the rotator cuff muscles

work together: they stabilize the shoulder. If the rotator cuff is compromised—through weakness or injury—the prime and secondary movers *cannot* act effectively at the joint, regardless of how strong they are.

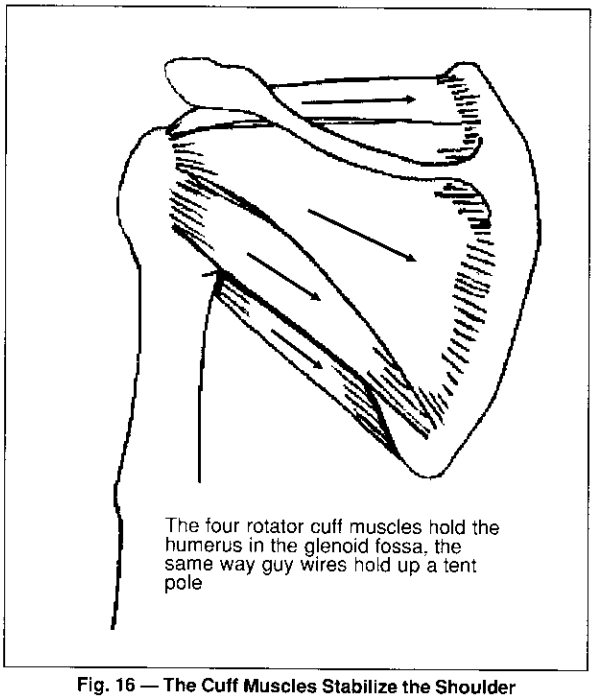

Fig. 16 — The Cuff Muscles Stabilize the Shoulder

THROWING A BALL

Let's take a look at one more motion before turning the spotlight on things that can go wrong with the cuff. That motion is throwing a ball.

Throwing motions involve the cuff in two ways.

First, throwing a ball is basically an attempt to throw your arm away from your body. The rotator cuff muscles, along with several others, prevent you from succeeding.

Second, although throwing involves several actions at the shoulder, it really amounts to a case of high-powered internal rotation. It's the external rotators—the infraspinatus and teres minor—that put on the brakes at the end of the motion.

That's the fourth (and final) way in which the rotator cuff muscles act together: they are involved in decelerating the arm during throwing motions.

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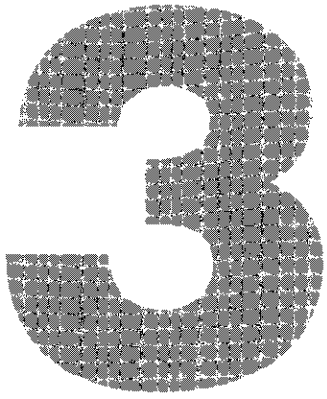


WHAT GOES WRONG WITH THE ROTATOR CUFF

So, the healthy rotator cuff:

- counterbalances the upward pull of the deltoid on the humerus
- externally rotates the shoulder
- provides a stable base from which the prime and secondary movers at the shoulder can act
- decelerates the arm when you throw something

If the cuff is damaged, it may not be able to perform these functions. Many conditions, some mild, some severe, can keep the cuff from doing its jobs properly. In this chapter, we're going to take a look at the more common ones.

CHRONIC DEGENERATION

Everyone over the age of 60 has some degeneration in the rotator cuff, usually in the tendons at or near the greater tubercle. Some sources believe degeneration may be present as early as age 40. Athletics can certainly accelerate the degenerative process well beyond what's expected for an athlete's chronological age.

"—ITISES"

Any athlete involved in weight training or throwing sports runs some risk of developing various "—itises": inflammations of soft tissue in the shoulder brought on by repeated stress.

Inflammation of the shoulder bursa (the soft, sac-like structure that cushions between the ball of the humerus and the socket of the G/H joint) is called **bursitis**. Inflammation of one of the rotator cuff tendons is called **tendonitis**. In the shoulder, tendonitis most commonly afflicts the supraspinatus tendon; it can also afflict the tendon of the long head of the biceps. Inflammation of muscle tissue itself and its associated fascial sheath is called **myofascitis**. And finally, inflammation of the covering of bone (the periosteum) is called **periostitis**.

In athletes, "—itises" usually result from a combination of two things:

- performing exercises improperly
- **overtraining** (training too much, too often)

Runners who overtrain by putting in too many miles can develop hairline fractures in their feet, called stress fractures. So can armed service personnel who march long distances in heavy boots, carrying heavy backpacks. Likewise, athletes who repeatedly stress their shoulders have greater than normal likelihood of developing any of the stress-related "—itises" described above.

Although these inflammations are painful and can interfere directly with sports performance, their potential to promote development of more serious conditions is a bigger problem. More on that in a moment.

Calcium Deposits

Calcium deposits are accumulations of calcium within a muscle or tendon. They occur at high-stress points in the body; in the shoulder, they usually afflict the supraspinatus tendon.

Calcium deposits can contribute to the development of a special kind of "—itis" in which the calcium causes inflammation in muscle tendons or bursae.

The condition often follows on the tail of a rotator cuff sprain or tear.

TEARS

A tear in a ligament is called a **sprain**; a tear in a muscle is called a **strain**; a tear that pulls a tendon off the bone at its insertion site is called an **avulsion**. All three can afflict the rotator cuff.

Falling and heavy lifting often precipitate rotator cuff tears, especially if the cuff has degenerated somewhat beforehand.

When a tear occurs, you experience sudden, severe pain. Occasionally, you may even hear or feel a "snap" at the moment of injury.

Over the next several hours, the muscles that rotate the arm internally and pull the arm to the side usually go into a protective muscle spasm—a response referred to as **guarding** or **splinting**. The combination of *guarding* plus the tear itself can prevent you from raising your arm to the side higher than about 45 degrees; attempts to raise it higher produce a kind of shrugging motion.

The pain from a tear will eventually subside. But without professional treatment followed by a rehabilitation program such as that outlined in the *Program Section*, you may experience permanent weakness in the area and some loss of the shoulder stability the cuff normally provides. In the long term, this may lead to further degeneration, including arthritic changes.

The most common rotator cuff tears affect the supraspinatus and its tendon. Younger athletes usually avulse the tendon (tear it off at its insertion point on the greater tubercle) rather than spraining it.

A complete tear or rupture of the rotator cuff must be surgically repaired.

IMPINGEMENT

Impingement is exactly what it sounds like: one body structure repeatedly pressing—or impinging—on another.

In the shoulder, the stage is set for impingement because the space between the top of the humerus and the bottom of the acromion (the "roof" of the shoulder) is not particularly big. Under certain circumstances, any of the structures running through that space—the supraspinatus tendon, the tendon of the long head of the biceps, and the shoulder bursa—can be impinged upon.

When impingement happens, it usually occurs between the greater tubercle and either the acromion or one of the shoulder ligaments (Fig. 17) (ligament not shown).

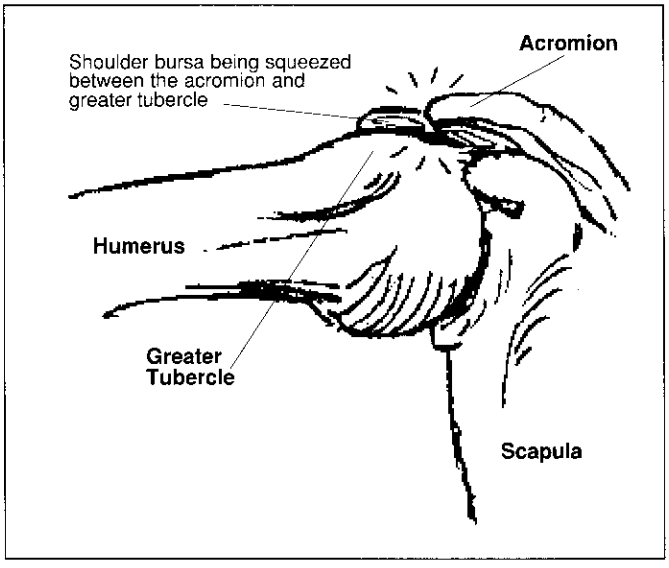


Fig. 17 — Impingement Between Acromion & Greater Tubercle

Several things can cause impingement in the shoulder.

Muscle weakness is one. Sometimes the cuff muscles can't pull the head of the humerus down sufficiently to prevent impingement from occurring when you raise your arm to the side.

Individual anatomy is another. Some people just have very little space between the head of the humerus and the acromion to begin with, leading to impingement during many shoulder movements.

In any case, the 50- to 130-degree arc you make when you raise your arm to the side brings the tendons on the greater tubercle up very close to the acromion. If those tendons and/or the shoulder bursa are at all inflamed, they may take up more space than is available, resulting in impingement.

It's like inflating a raft in a small closet—there just isn't enough room.

Although many things can cause impingement within the shoulder, the most significant for athletes is one we covered in the last chapter: raising the arm to the side, above parallel with the ground, with the shoulder internally rotated. Remember, with the shoulder internally rotated, the greater tubercle

cannot clear the acromion as you raise your arm. Instead of clearing it, the greater tubercle abuts against it, impinging on the structures in the space.

Here's an example straight from the sports arena where this may be occurring: When you swim the butterfly, you raise the arm to the side while internally rotating the shoulder (Fig. 18a). When you throw a pitch, you raise the arm to the side while externally rotating the shoulder (Fig. 18b). The externally rotated position during the pitch allows the tendons and bursa to clear the roof of the shoulder—probably accounting in part for the lower reported incidence of impingement syndrome in pitchers versus swimmers.

In general, activities that call for repeatedly raising the arm to the side in an internally rotated position are likely to cause impingement, and may lead to tendinitis in the shoulder.

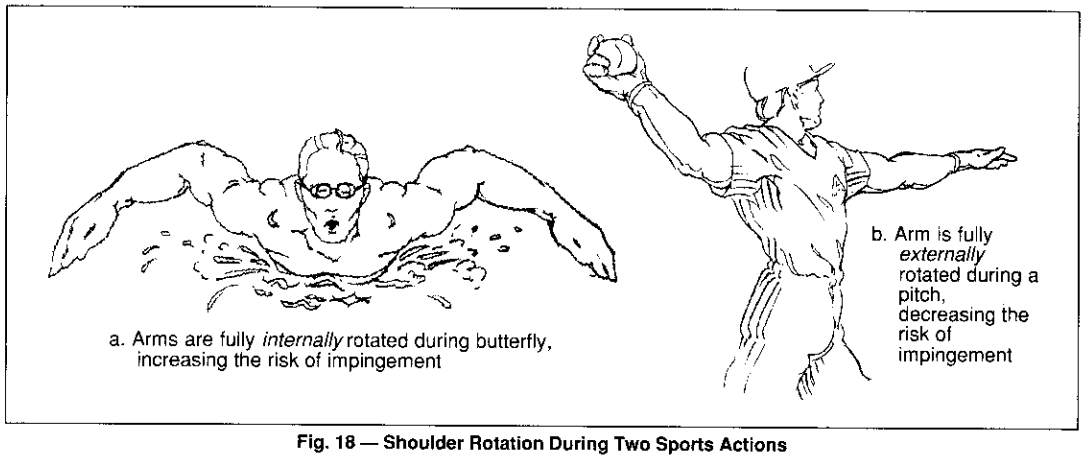


Fig. 18 — Shoulder Rotation During Two Sports Actions

JOINT CONTRACTURE & ADAPTIVE SHORTENING

If you've ever broken a bone and worn a cast, you probably experienced **joint contracture** when the cast came off. Joint contracture is a persistent decrease in the range of motion at a joint.

Actually, the term is a misnomer, because the problem stems largely from the *muscle* acting at a joint, not the joint itself.*

When a muscle remains in a shortened state for a long time, it can develop a lack of flexibility that is resistant to being stretched. This muscle shortening is a major factor behind most joint contractures.

*The fascia and a structure called *the joint capsule* are also involved.

All that said, joint contracture of the shoulder, or **frozen shoulder**, is *not* a common problem among athletes. What *is* a common problem, though, is a lesser version of joint contracture called **adaptive shortening**. As in joint contracture, adaptive shortening involves a loss of muscle flexibility that is resistant to being stretched. Adaptive shortening can have a major impact on athletic performance. Before seeing how, let's look at what causes it.

The most common cause of adaptive shortening in athletes is improper training.

Muscle Imbalance

There are several roads from improper training to adaptive shortening. The first involves development of a muscle imbalance at the shoulder.

Actually, there's a potential imbalance at the joint to begin with. Many of the major upper body muscles—including the lats, pecs, and teres major—*internally rotate* the shoulder. The only muscles that significantly *externally rotate* the shoulder are the relatively small infraspinatus and the teres minor, two muscles of the rotator cuff.* This potential imbalance turns into an actual imbalance as a result of the way most athletes train.

For a number of reasons, most athletes work the back, chest, shoulders, and arms, strengthening (among other muscles) the latissimus dorsi, teres major, and pectorals—all of which internally rotate the shoulder. But they unintentionally ignore or undertrain the infraspinatus and teres minor, the muscles that externally rotate the shoulder.

As a result, the stronger internal rotators overpower the relatively weaker external rotators. Over time, the internal rotators adaptively shorten. You know the "shoulders-hunched-forward" posture typical of many bodybuilders? That posture reflects adaptively shortened internal rotators.

*There is some controversy over whether the rear delt plays a role in externally rotating the shoulder. Current research downplays the muscle's role in that action.

Fibrosis

A second road from improper training to adaptive shortening involves a condition called **fibrosis**. It works like this. Many athletes make the same training mistakes, including:

- choosing biomechanically unsound exercises
- lifting with poor form
- training the same area of the body too often
- training with too much weight
- training the same area of the body with too much weight too often

Any of these may lead to minor trauma and subsequent inflammation in the shoulder. Over the years, repeated abuse can lead to the formation of scar tissue—technically, **fibrous adhesions** or **fibrosis**—around and within muscles and tendons. The adhesions decrease the muscle's ability to stretch and contract. They also increase the risk of reinjury at the site and make painful any attempts to push the muscle beyond its limited range of motion.

In and of itself, the reduced range of motion associated with fibrosis may not be severe enough to be classified as adaptive shortening.

But the pain associated with the condition, coupled with fear of further injury, often leads to it. As you avoid painful movements, your body adapts to not performing them by shortening the muscles involved. Specifically, at the shoulder, pain from fibrosis of the internal rotators may cause you to avoid exercises calling for full external rotation—such as the Behind-the-Neck Press or Behind-the-Neck Pull-Down. In time, the internal rotators undergo adaptive shortening because they are never forced to stretch to the limit of their range of motion.

Injury

The final path from improper training to adaptive shortening involves injury. Either an acute trauma, such as a sprain, or a more chronic one brought on by overtraining (such as any of the "—itises" discussed earlier) may result in your assuming a protective posture.

Typically, someone with a shoulder injury will cross his or her arms, hold an injured arm with the other hand, place the hand of an injured arm in his or her pocket, or hook a thumb on a belt loop. Almost all protective postures place the shoulder in full internal rotation.

If you spend a lot of time in one of these positions while waiting for the injury to heal, the internal rotators are never stretched to the limit of their range of motion and may adaptively shorten.

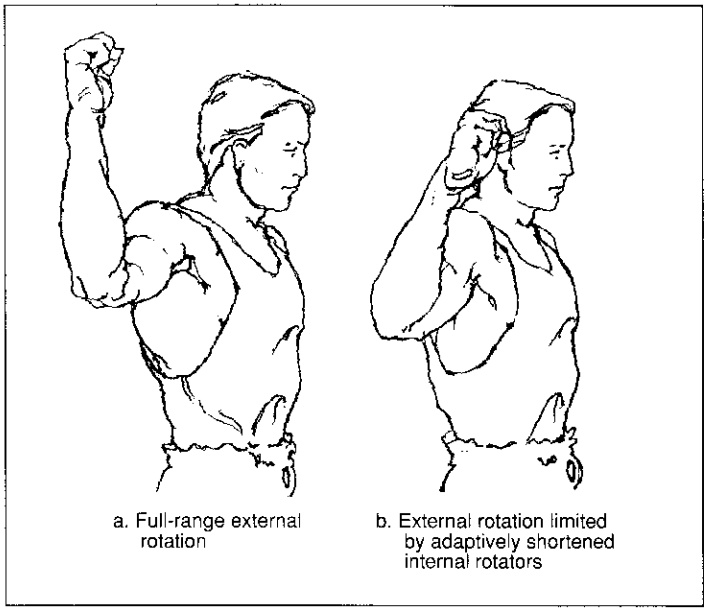


Fig. 19

How Adaptively Shortened Internal Rotators Affect Your Training

So what's the big deal with adaptively shortened internal rotators?

Say you want to externally rotate your arm. Normally, when the external rotators contract to make that action occur, your nervous system sees to it that the opposing internal rotators can't interfere. The internal rotators pull in the opposite direction to the external rotators. If the internals were to contract while you were trying to externally rotate, you'd be pulling in two directions at once, making it difficult to externally rotate your arm.

As we said, though, this doesn't happen because the nervous system prevents the internal rotators from contracting. To put it another way, *in the biomechanically normal shoulder, the internal rotators don't provide much opposition to external rotation.*

That's not the case once the internal rotators have lost some of their flexibility due to adaptive shortening. Now, when the external rotators try to do their job, they are forced to work against not the resistance of internal rotator *contraction* but

something that's just as much of a roadblock—the resistance imposed by internal rotator *inflexibility.* It's a losing battle, and one that leads to progressive microtrauma of both the external and internal rotators.

In fact, if you continue to weight train after the internal rotators adaptively shorten, increased microtrauma within the muscles may eventually reach a point where you are uncomfortable performing *any* exercise requiring both external rotation of the shoulder and stabilization from the cuff.

The first exercises to go are usually the Behind-the-Neck Press and the Behind-the-Neck Pull-Down. Typically, the athlete will comment that he or she "just can't do those exercises anymore." Discomfort in performing the Behind-the-Neck Press arises because the exercise requires your shoulders to be fully externally rotated and your shoulder blades to be pulled in as close to the spine as possible. Both movements are essentially impossible with adaptively shortened internal rotators (Fig. 20).

If you attempt to do the Behind-the-Neck exercise despite having adaptively shortened internal rotators, the external rotators must overwork just to achieve the starting position of full external rotation. The addition of resistance in that position is often too much for the small external rotators to withstand. The cuff muscles—especially the externally rotating infraspinatus and teres minor—are *further* strained.

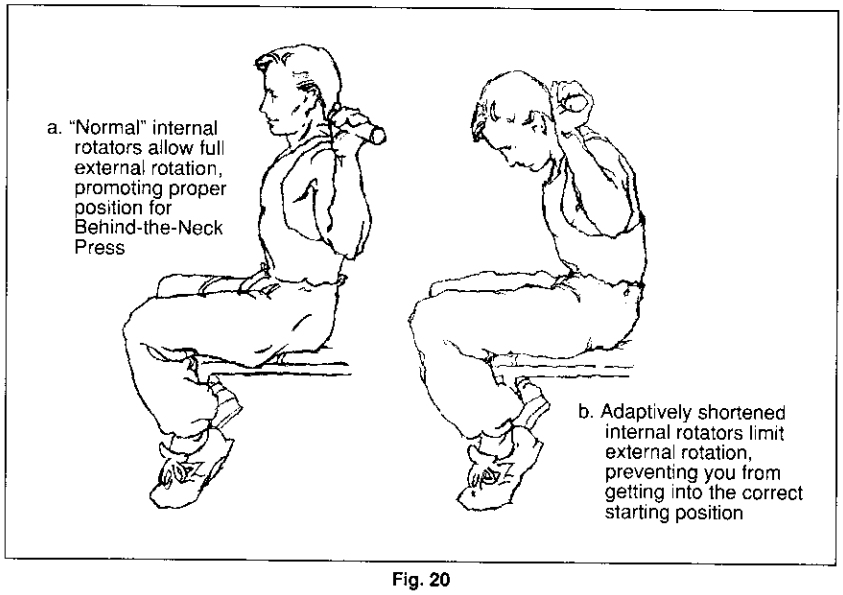


Fig. 20

The progressive loss of external rotation—due to fibrosis or adaptive shortening of the internal rotators (or both)—is a common factor in rotator cuff injuries. It's a vicious cycle: improper exercise technique leads to inflexibility in the internal rotators; this, in turn, limits external rotation; limited external rotation leads to still worse exercise form that further stresses the external rotators, leading to still more loss of external rotation, and so on.

OTHER SPORTS & CUFF INJURIES

Training with weights is certainly not the only way you can injure your rotator cuff. Most sports carry that risk—although it's especially high in activities calling for throwing or hitting.

Tennis, for instance, involves high-velocity shoulder movements that stress the shoulder, especially when serving and trying to put different spins on the ball. Baseball, boxing, and martial arts also place a tremendous stress on the rotator cuff, as well as on other muscles responsible for decelerating the rapidly moving arm.

If you'd like more information about these other sports and cuff injuries, check out *Appendix A*. It goes into greater depth, albeit from a more technical perspective.

Many other shoulder problems can develop from throwing sports, contact sports, and weight training—fractures, avulsions, neurovascular entrapment syndromes, and brachial plexus injuries, just to name a few. Discussion of these is beyond the scope of this book.

DYSFUNCTIONAL SHOULDER BIOMECHANICS

The most important thing to know about cuff injuries is that often the obvious injury—the tear, the inflammation, the fibrosis—simply represents the tip of the iceberg.

The actual iceberg is **dysfunctional shoulder biomechanics**. Dysfunctional shoulder biomechanics, brought about by repeated improper training, consists of a potpourri of the conditions discussed in this chapter, including:

- a muscle imbalance between the internal and external rotators

- adaptively shortened (and perhaps fibrotic*) internal rotators
- inflammed (possibly fibrotic) rotator cuff muscles

The fact that dysfunctional shoulder biomechanics stems from more than one cause means several things.

First, it means that just treating an acute shoulder injury won't work. Just treating an acute injury is a band-aid approach, leaving you vulnerable to almost immediate reinjury. If, for example, you take a four-week layoff from working out to allow inflammation to subside or a tear to mend, you are likely to sustain a similar injury as soon as you start training again—because the *real cause* for the injury (stress imposed by training with an internal rotators/external rotators muscle imbalance coupled with adaptively shortened internal rotators) still exists.

Likewise, it means addressing just one component of the overall condition won't work. That, too, is a band-aid approach, leaving you vulnerable to injury. You can't, for instance, just do external rotation exercises to reduce the muscle imbalance between the internal and external rotators, expecting that to give you athletically "strong" shoulders. Sure, it will reduce the imbalance, but it won't do anything to lengthen adaptively shortened internal rotators or to prevent poor training from causing further inflammation in the cuff and associated muscles.

The bottom line: To be effective, a rotator cuff program must address *all* the components that contribute to dysfunctional shoulder biomechanics. It must...

- strengthen the external rotators
- stretch the internal rotators
- eliminate the training errors that promoted inflammation and started the ball rolling toward dysfunctional shoulder biomechanics in the first place

A program like that will be equally effective rehabilitating the injured cuff and preventing injury in the healthy one. In the next three chapters, we'll cover the details of **The 7-Minute Rotator Cuff Solution** program, showing you exactly how to armor-plate your rotator cuffs.

* ***fibrotic*** **tissue is tissue that has developed any degree of fibrosis.**

Important Note:

Although minor rotator cuff injuries may heal properly without treatment, serious ones won't. Both may present similar symptoms, making it difficult to tell the difference.

A serious rotator cuff injury that goes untreated can lead to a permanent diminishing or loss of shoulder function. If you ever injure your shoulder, you should get a professional diagnosis. And you should do so before beginning a rehabilitative program!

PART TWO

THE PROGRAM

THE EXERCISES

The 7-Minute Rotator Cuff Solution has two purposes—preventing injury in the healthy cuff and rehabilitating the injured one. Both require:

- **strengthening.** Strengthening greatly reduces risk of injury in the healthy cuff and restores function and stability in the injured one.
- **stretching.** Stretching likewise reduces risk of injury in the healthy cuff; it restores range of motion in the injured one.
- **modifying.** Certain exercises are usually done in ways all but guaranteed to traumatize the cuff. These exercises must be modified to reduce their potential to induce cuff injury. In some cases that means eliminating them entirely!

This chapter illustrates all the strengthening and stretching exercises in the routines that make up **The 7-Minute Rotator Cuff Solution**. It also illustrates the exercises that should be modified to reduce risk of cuff injury, even though they are not part of the routines per se.

The resistance (strengthening) exercises just require a pair of dumbbells. They take only a few minutes per workout. If there's a way to do a particular exercise using a machine (Nautilus, Eagle, or whatever), we include both dumbbell and machine versions—use whichever you prefer. Also, since the way you perform certain *deltoid* resistance exercises can have a

direct effect on the continued health (or rapid rehabilitation) of the cuff, this section covers delt training as well as cuff training. Here again, some of the exercises we look at are not part of the routines.

A few of the resistance exercises are performed one shoulder at a time. Even if you are rehabilitating a one-shoulder injury, you should still work *both shoulders*, for three reasons:

- strengthening the uninjured shoulder reduces its risk of being injured in the future
- rehabilitation exercise can result in an injured shoulder ending up stronger than an uninjured one; to ensure balanced strength, it's always a good idea to work both sides
- evidence supports the existence of a "cross training" neurological effect from one side of the body to the other; that means that working an uninjured muscle on one side of the body may positively affect the corresponding muscle on the other

The best way to familiarize yourself with the material in this section is to take **The 7-Minute Rotator Cuff Solution** to the gym with you, and go over all the right and wrong ways of doing the exercises. The details count—especially if you're rehabilitating an injury!

RESISTANCE EXERCISES FOR THE DELTOIDS

The deltoids are not part of the rotator cuff. But they interact with the cuff muscles to such an extent that to deal with one and not the other leaves half the story untold. Common recommendations for the performance of some delt exercises can lead directly to cuff damage. And weakness of the delts, particularly of the rear delt, predisposes the cuff to injury.

On the flip side, deltoid strength, encouraged by correctly performed delt exercises, *decreases* the risk of cuff injury. So as part of our overall plan to promote cuff health, let's take a look at the right and wrong ways to do a number of delt exercises.

Side Delt Flyes

prime mover: lateral head of the deltoids
secondary movers: posterior and anterior deltoids, supraspinatus, upper traps

This exercise can be performed using dumbbells, a cable, or a machine.

With Dumbbells

Standard Technique

Hold a dumbbell in each hand, arms at your sides, palms facing in. Lift the weights out to the side to about shoulder level.

Lower and repeat.

Optimized Technique

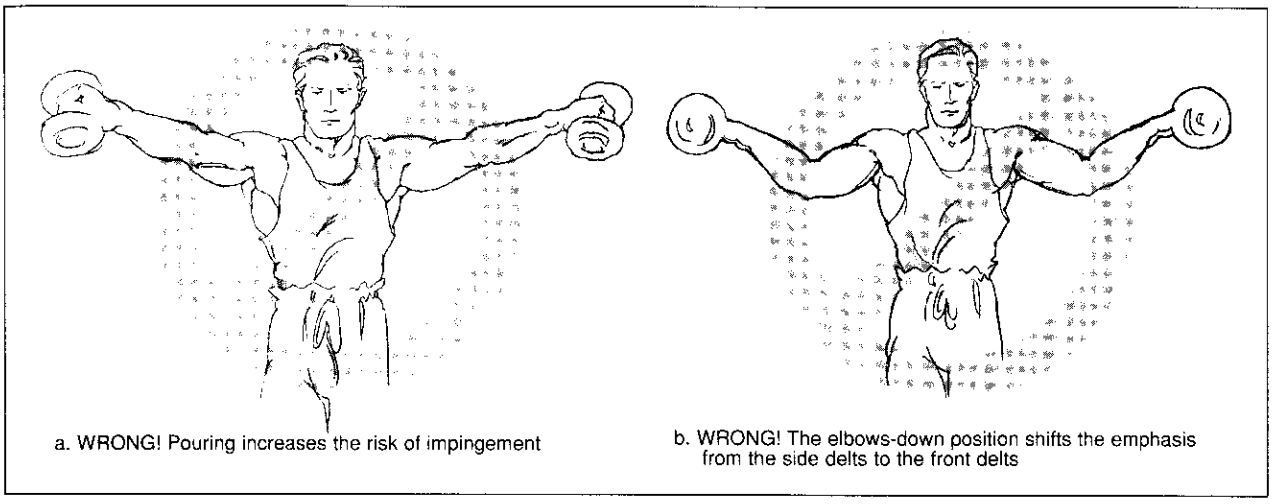
Somewhere along the line, you may have been instructed to tilt the fronts of the dumbbells downward during this exercise as if "pouring water" from them (Fig. 21a).

Pouring does increase the tension in the lateral delt head, increasing the effectiveness of the exercise. *However*—regardless of the effectiveness of this technique for increasing lateral delt development, it puts the shoulder in an internally rotated position. This increases the impingement on the tendons and bursae in the space under the roof of the shoulder, contributing to inflammation and degenerative changes in that soft tissue. If you use the movement consistently, the inflammation may become chronic.

To minimize risk of injury, perform the exercise *without pouring:* Begin with a dumbbell in each hand, arms at your sides,

palms facing in (Fig. 22a). Lift the weights to the side to about shoulder level. At the peak of the movement, your palms should be facing down, and your hands, holding the dumbbells, should be *at the same height as your elbows* (Fig. 22b).

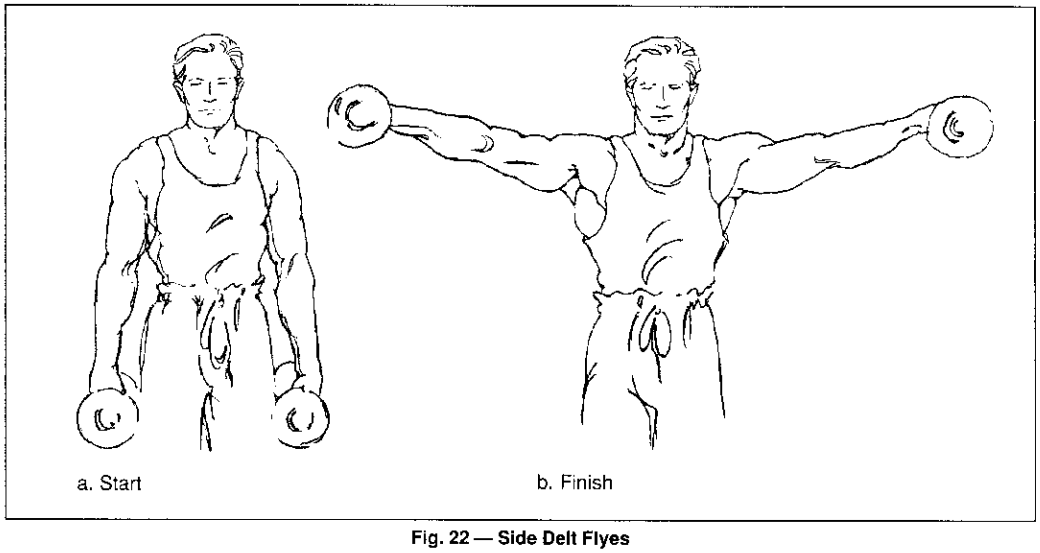
By the way, lifting with elbows pointed straight down—an increasingly popular recommendation in coaching circles—shifts too much of the emphasis onto the front head of the delts, decreasing the effectiveness of the exercise (Fig. 21b, wrong).



a. WRONG! Pouring increases the risk of impingement

b. WRONG! The elbows-down position shifts the emphasis from the side delts to the front delts

Fig. 21 — Side Delt Fly Errors



a. Start

b. Finish

Fig. 22 — Side Delt Flyes

With a Cable

When you do Side Delt Flyes with dumbbells, the tension in the delts is greatest at the *midpoint* of each rep (when your arms are extended out at shoulder level). When you do them with a cable, the tension is greatest at the *beginning* of each rep (when your arm is down by your side).

Having to go from no delt tension to maximum delt tension in no time flat, as you do with each rep with a cable, puts tremendous stress on the cuff. In and of itself, that's not a problem. However, it leaves no room for cheating! If you use the exercise, *don't try to force out one more rep at the end of set by doing the equivalent of a golf swing to generate momentum.* The combination of the already high stress at beginning of each rep plus the force generated by cheating can severely injure the cuff muscles. (If you are rehabilitating a supraspinatus injury, don't use this version of the Side Delt Fly.)

To perform the exercise properly:

Begin standing sideways to a cable machine, holding the handle with your palm facing your side (Fig. 23a). Without jerking the weight or twisting your body, slowly raise your hand to shoulder height (Fig. 23b). Remember—do not succumb to the temptation to use momentum toward the end of the set when your delts get tired, or you risk tearing the cuff.

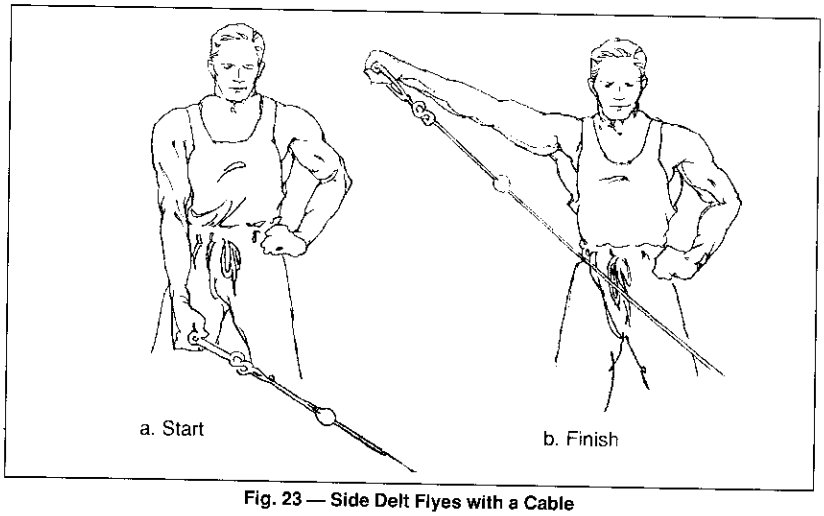


Fig. 23 — Side Delt Flyes with a Cable

With a Machine

The machine version of the Side Delt Fly has one advantage over the freeweight version: there's no torque on the elbows. The torque present during the freeweight version presents a slight risk of injury to those joints. The disadvantage: even on the best machines, the movement feels slightly less "natural."

Optimized Technique

Adjust the height of the machine's seat so that your shoulders are just below the level of the arm pivots (see Fig. 24). If the seat is not adjustable, don't sit. Instead, hold yourself in a partial squat. Adjust the bend in your knees to position yourself correctly in relation to the pivots.

Bend your elbows and bring the sides of your arms up against the arm pads (Fig. 24a). Press the pads up to just above shoulder level (Fig. 24b). Keep your back flat against the seat back throughout the movement. Lower and repeat.

Make sure you press with your upper arms only, not with your forearms. Pressing with the forearms puts strain on the external rotators—and your external rotators can't handle the amount of weight appropriate for a lateral delt exercise. You can injure the cuff if you push up with the forearms.

A final point. When doing Side Delt Flyes with a machine, you have roughly twice the leverage you have when using dumbbells.

That means you can lift roughly twice as much when using a machine as you can when using dumbbells. If you decide to give up the machine in favor of dumbbells, remember to *halve the amount of weight* you have been using with the machine or you may injure yourself.

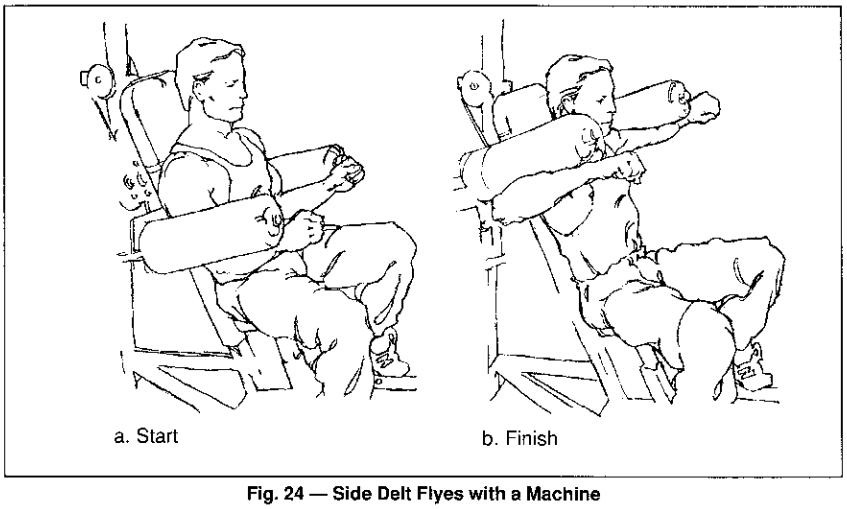


Fig. 24 — Side Delt Flyes with a Machine

Front Delt Flyes

prime mover: anterior (front) head of the delts
secondary movers: upper trapezius

Standard Technique

Hold a dumbbell in each hand, arms at your sides, palms facing back. Keeping the arms parallel, lift the dumbbells forward to about shoulder level. Lower and repeat.

Optimized Technique

There are three problems with the Front Delt Fly, one conceptual, two biomechanical.

The conceptual problem concerns the necessity of even doing isolation work for the front delt. The front delt contributes heavily during Bench Presses, Military Presses, Behind-the-Neck Presses, Incline Presses, Flyes, and Dips, to name a few. It even contributes during *Side* Delt Flyes—because the individual heads of the delts never really act alone. ("Isolation" is a misnomer when applied to delt training; what we're really referring to is increased contribution of one head relative to the others.)

If you are doing a well-rounded weight workout, you are probably *overtraining* your front delts, and might actually make faster gains by eliminating the exercise from your routine!

If you are *not* doing a well-rounded weight workout—perhaps you are using delt-specific resistance work to augment performance of a particular sport—and you want to use the Front Delt Fly to work the front head directly, you should be aware of the biomechanical problems with the exercise.

The biomechanical problems concern the usual position of the shoulders during the movement: partially internally rotated and flexed. Like pouring water during the Side Delt Fly, performing the exercise from this position increases the impingement on tendons and bursae under the roof of the shoulder. This can lead to degenerative changes in that tissue. For that reason alone, *we recommend against anyone doing the standard Front Delt Fly.*

Furthermore, despite the fact that virtually everybody thinks you should perform Front Delt Flyes with the elbows facing out, that's not the most effective way to do them! What really makes the difference in stressing one head of the delts over another during Flyes is not whether you raise your arms for-

ward or to the side, but *whether your shoulders are internally or externally rotated.*

If your elbows face *out* (shoulders partially internally rotated), that distributes the stress over the lateral and front heads, *favoring the lateral head*—regardless of the direction you raise your arms (Fig. 25a, b). If your elbows face *down* (shoulders externally rotated), that favors the *front* head more than the lateral head, again regardless of the direction you raise your arms (Fig. 26a, b).

Yes, doing Front Delt Flyes with elbows facing down brings the biceps into play. But given the limited amount of weight you should use for Front Delt Flyes, your biceps should be up to it.

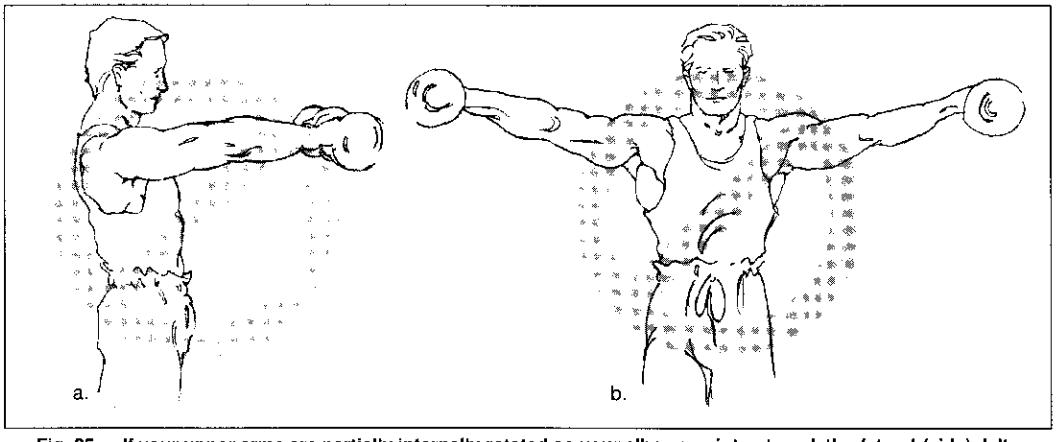


Fig. 25 — If your upper arms are partially internally rotated so your elbows point outward, the *lateral* (side) delts do much of the work when you lift your arms to the front or to the sides

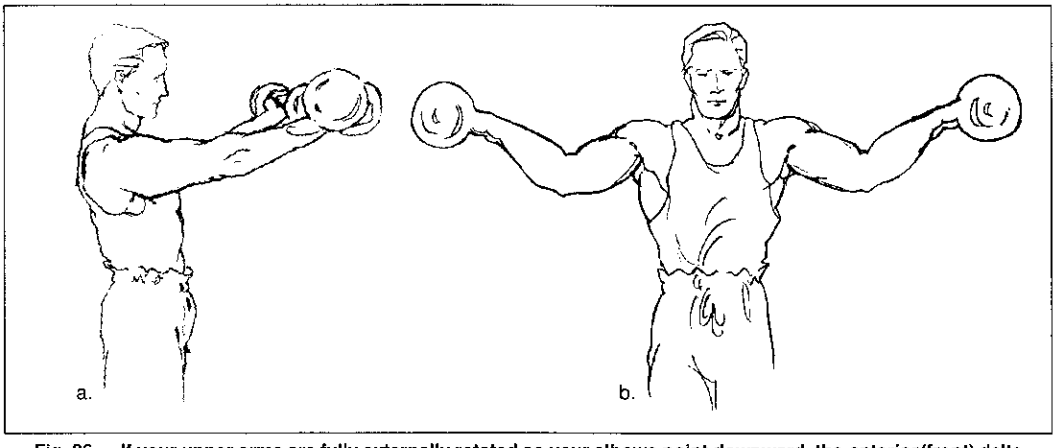


Fig. 26 — If your upper arms are fully externally rotated so your elbows point downward, the *anterior* (front) delts do much of the work when you lift your arms to the front or to the sides

Recalling that there are few instances in which you should even *do* Front Delt Flyes, let's still take a look at the best way to perform the exercise to minimize risk of injury and maximize effectiveness.

With Dumbbells

Hold a dumbbell in each hand, arms at your sides, palms facing *in* (Fig. 27a). Externally rotate your shoulders so your palms face upward as you raise the weights about halfway between forward and to the sides (Fig. 27b). Take care to maintain the slight bend in your elbows throughout the exercise or you risk injuring those joints (Fig. 27d, wrong). Lower and repeat for 6 to 8 reps.

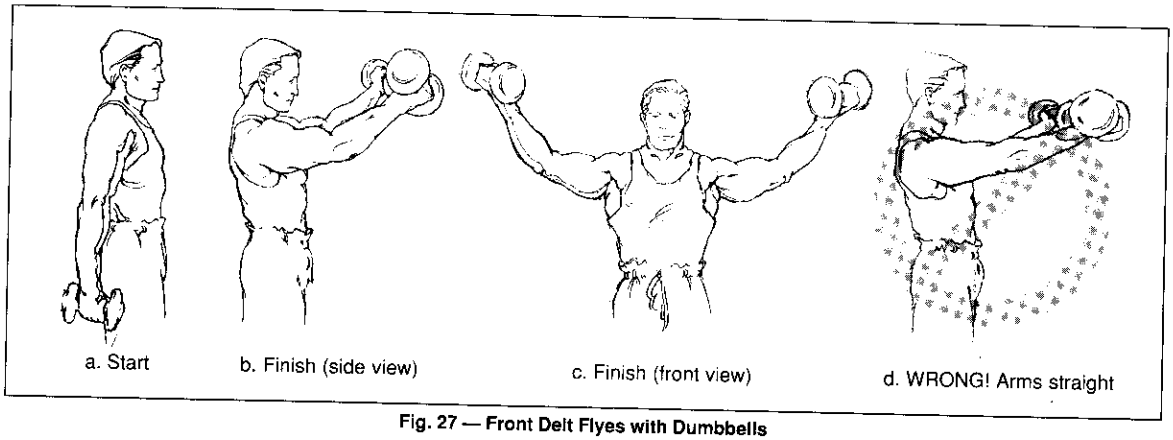


Fig. 27 — Front Delt Flyes with Dumbbells

To avoid overstressing the biceps tendons and risking biceps tendonitis, do not:

- jerk the weights at the beginning of each rep
- use so much weight that you are forced to resort to momentum to get the dumbbells up

With a Machine

This is one case where the machine version of an exercise actually feels better than the freeweight version!

As when doing Side Delt Flyes with a machine, adjust the height of the machine's seat so that your shoulders are just below the level of the arm pivots (see Fig. 28a). If the seat is not adjustable, don't sit. Vary the bend in your knees to position yourself correctly in relation to the pivots.

Catch the machine pads in the crooks of your elbows. Your upper arms should angle just slightly forward; your forearms should point straight up (Fig. 28a).

Push up, bringing the pads together (Fig. 28b). Keep your back flat against the seat back throughout the movement. It helps to think of trying to raise your hands up as high as possible.

Lower and repeat.

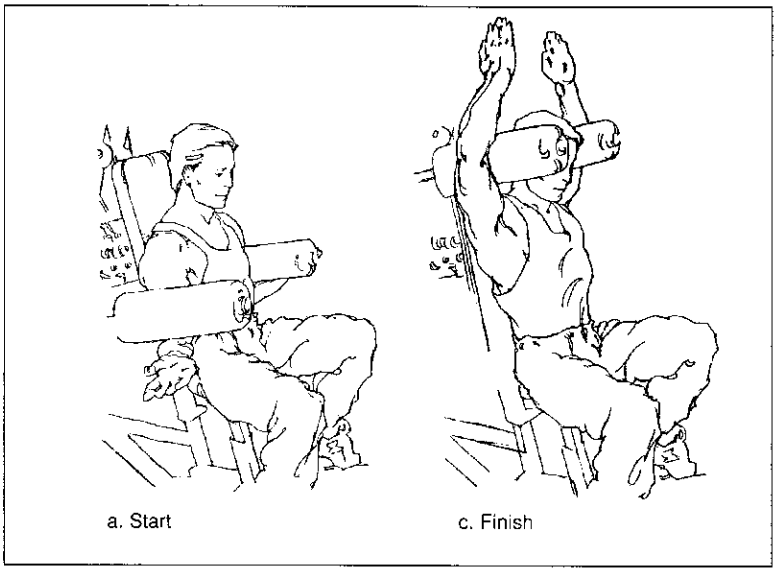


Fig. 28 — Front Delt Flyes with a Machine

Rear Delt Flyes

prime mover: posterior (rear) head of the deltoid
secondary movers: center traps, shoulder external rotators

Standard Technique

Holding a light dumbbell in each hand, bend forward at the waist until your body is parallel with the floor. Your arms should be hanging down in front of you. Raise the weights up to the side to body level. Lower and repeat.

Optimized Technique

This exercise is almost always done wrong. Most people follow the "natural"—read *easy*—line and lift the weights back toward their waists when performing the exercise (Fig. 29a, wrong). If your arms angle back, your *lats*, not your rear delts, do most of the work.

For optimum performance, keep your elbows slightly bent and lift so the weights end up in line *with your ears* (Fig. 29b, c).

One additional point. The rear head of the delt acts to some extent with the rotator cuff muscles to externally rotate the shoulder. You can increase the effectiveness of the Rear Delt Fly in promoting cuff stability by including external rotation in the movement. Do so by bringing the weights up in a slight arc, as illustrated in Figure 29.

Don't get overzealous about this one! The rear delt is a *small* muscle with *poor* leverage. Begin with a very light weight (1 to 5 pounds) and work up slowly from there. Also, as you increase the weight, you might want to do the exercise lying on a high bench to decrease the stress on your lower back.

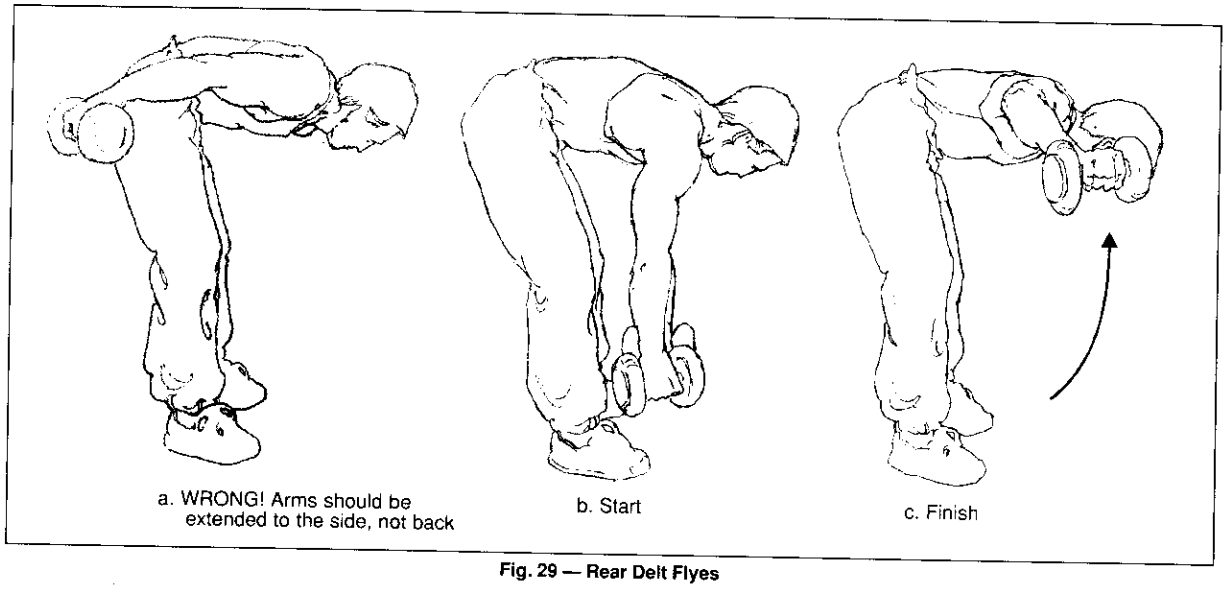


Fig. 29 — Rear Delt Flyes

Side Delt Isometrics

prime mover: lateral head of the deltoids
secondary movers: posterior and anterior deltoids, upper traps

Athletes involved in contact sports often injure the external rotators when they unexpectedly encounter resistance against the side of the arm while the arm is extended down by the side. This frequently happens to martial artists attempting to block low incoming kicks incorrectly (Fig. 30). It's also common among football players and wrestlers. The resulting **isometric contraction** (high contractile tension; no movement) can be sufficient to sprain or strain fibers in the external rotators or lateral delt head.

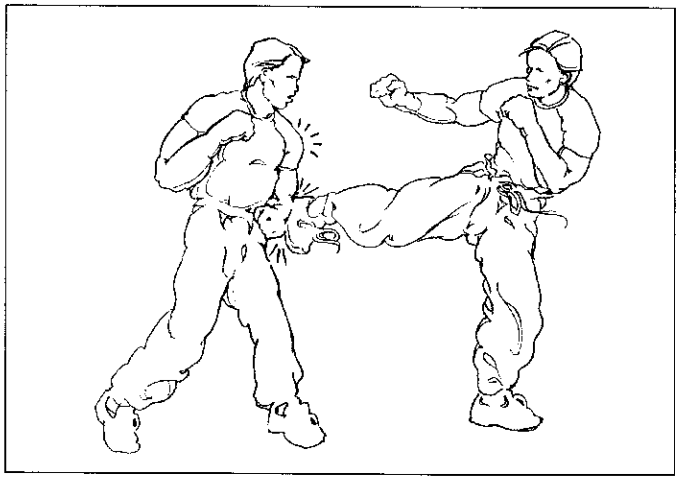


Fig. 30 — Surprise Isometric Contraction Can Cause Injury

You can decrease the risk of incurring this injury by doing a mostly isometric exercise using a delt machine. (This exercise is for athletes with healthy shoulders only! It shouldn't be included in a rehab routine.)

Stand in the delt machine as shown in Figure 31. Bend your knees enough so the areas on the sides of your arms just above the elbows contact the machine pads.

With sufficient weight on the stack to allow only a couple of inches of movement, press out against the pads. Hold the isometric contraction for 6 seconds, then *slowly* release back to the starting position.

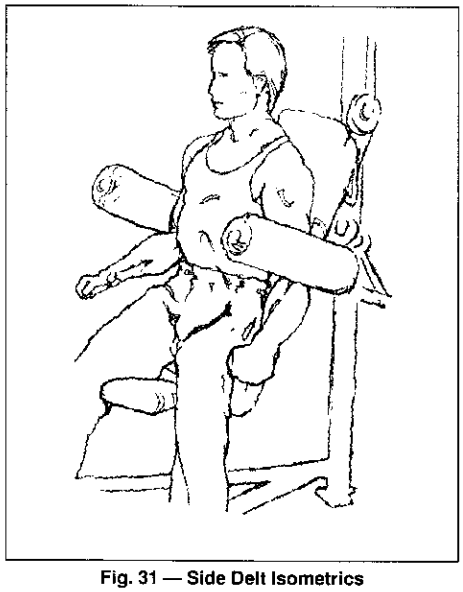


Fig. 31 — Side Delt Isometrics

Behind-the-Neck Press

prime mover: deltoids
secondary movers: triceps

Many athletes have eliminated this exercise from their weight training programs because of shoulder pain. But the problem is not with the exercise itself; it's with the capabilities of those who try to perform it.

As explained in Chapter 3, just getting into the starting position for Behind-the-Neck Press requires maximum external rotation of your shoulders, as well as full scapular adduction—that's the ability to pull your shoulders back as if standing at attention (Fig. 32a).

If you don't have the flexibility to do both these movements easily, your external rotators have to work really hard, pulling against the tight internal rotators, just to get you into position for the exercise. This strain, plus the strain of having to work against the resistance imposed by the weight, is too much to ask of the rotator cuff—over time, it may strain, inflame, become fibrous, and weaken.

Performing Behind-the-Neck Presses requires that you first have the range of motion and flexibility to do so. The *Stretching* section beginning on page 56 includes exercises to help you attain the necessary range of motion.

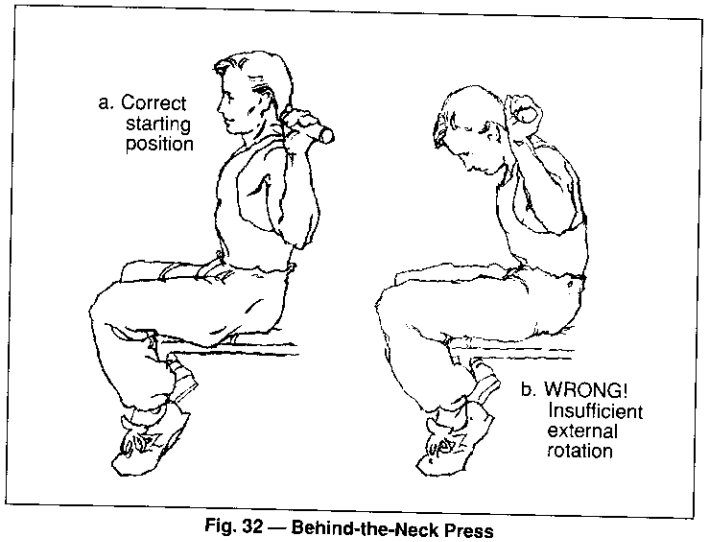


Fig. 32 — Behind-the-Neck Press

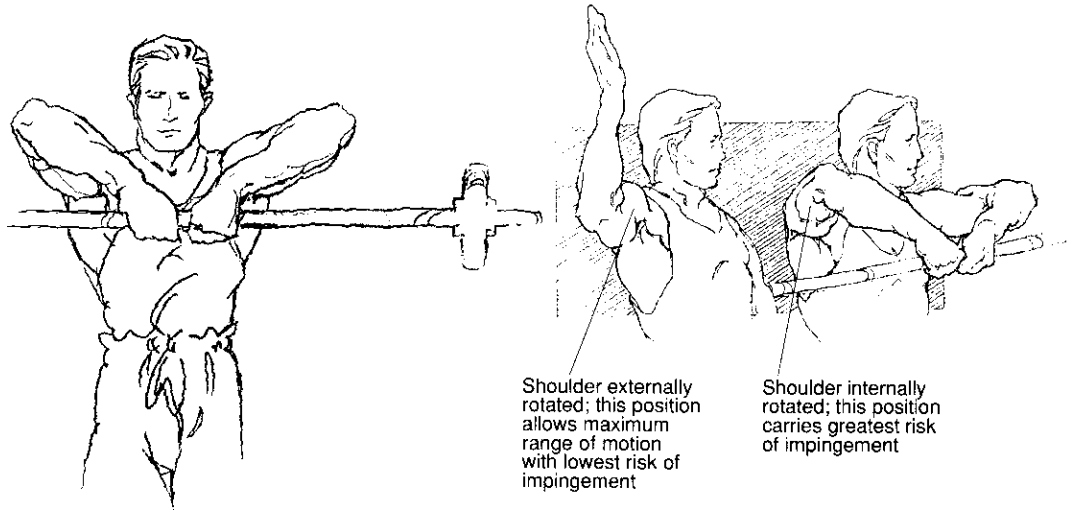
TRAINING ALERT
Upright Rows

One exercise you should eliminate from your weight training program is the *Upright Row*. This exercise places the shoulder in internal rotation as the arm is raised, a position that does not not allow sufficient space for the greater tubercle to clear the acromion.

Supposed "proper form" requires pulling the elbows as high as possible. This simply increases the degree of internal rotation and magnifies the danger of impingement.

The onset of pain from Upright Rows often is not immediate, although it may be. Usually the inflammation in the tendons and bursae increases with shoulder motion after the workout is over. Pain may develop hours or days later, making it difficult to associate the pain with a particular exercise. People with this inflammation usually feel pain during any stressful shoulder exercise—such as Bench Presses, Incline Presses, Behind-the-Neck Presses, Behind-the-Neck Pulldowns, Pullovers, and Military Presses.

Upright Rows accelerate rotator cuff degeneration. If you do them, you risk developing chronic tendinitis or bursitis.



Upright Row

RESISTANCE EXERCISES FOR THE ROTATOR CUFF

Lying "L" Flyes

prime mover: external rotators
secondary movers: rear head of the deltoids

Optimized Technique

Lie on your right side on a supine bench. Your right (supporting) arm should be in one of two positions: either doubled up under your head (Fig. 33a); or extended down toward the ground, acting like the third leg of a tripod (Fig. 33b). Pick whichever position is more comfortable for you.

Your left leg should be lying on top of your right; the knees of both legs should be bent. You may find it comfortable to lock your right foot over the top edge of the bench.

Begin with your left arm bent 90 degrees at the elbow, upper arm along your side, forearm down across your chest. Hold a *very light* dumbbell in your left hand, left palm facing in toward your abdomen. (You can also use a 1-¼ lb. barbell plate, or anything else that's light to provide resistance. Even a can of soup works well during the early stages of the program.) Maintaining the 90-degree bend in your left elbow, slowly lift the weight. If you are rehabilitating an injury, lift only until your forearm is just above parallel with the ground; if you are not rehabilitating an injury, lift your arm as high as you comfortably can (Fig. 33b). Try putting a pillow under your left elbow if you experience any discomfort within your shoulder during the exercise. (If the discomfort is severe, check with your doctor before continuing to use the exercise.)

Lower and repeat for 6 to 8 reps, then reverse position and repeat with the weight in your right hand. Once again, it's important to work both sides even if rehabilitating a one-sided injury.

This exercise should be performed with very little weight. If you are conditioning to rehabilitate an existing injury, use 1 to 5 pounds *at most*; if conditioning to prevent injury, use 5 to 15 pounds. Do not use heavier weights! The external rotators are small muscles and can be easily injured if you try to move mountains with them.

Also, in contrast to most weight training exercises, you shouldn't continue to increase the level of overload as you get stronger. Work up to about 20 pounds, *and stay there.*

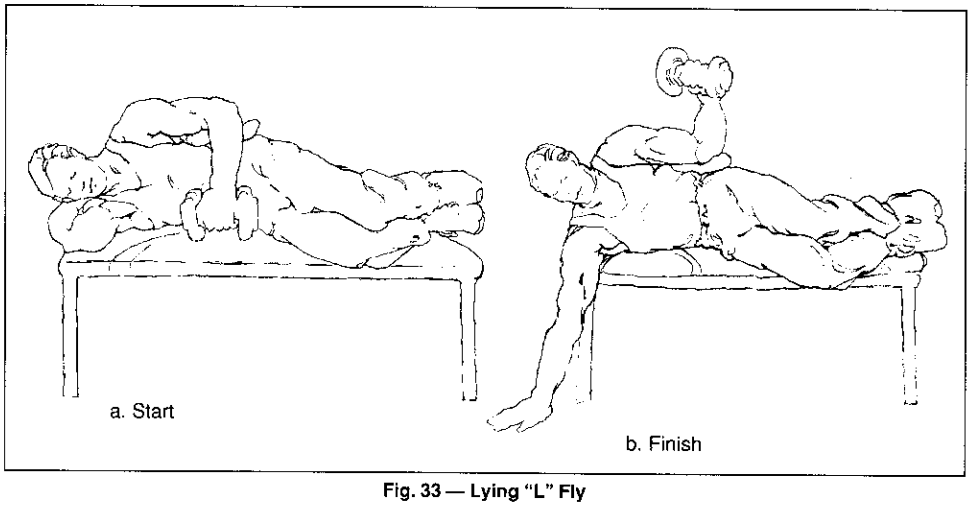


Fig. 33 — Lying "L" Fly

Four common errors to avoid:

- raising your upper arm off your body while performing the exercise (Fig. 34a, wrong). You should keep your arm on your side.
- increasing the bend in the elbow as you lift (Fig. 34b, wrong). You should maintain the 90-degree bend.

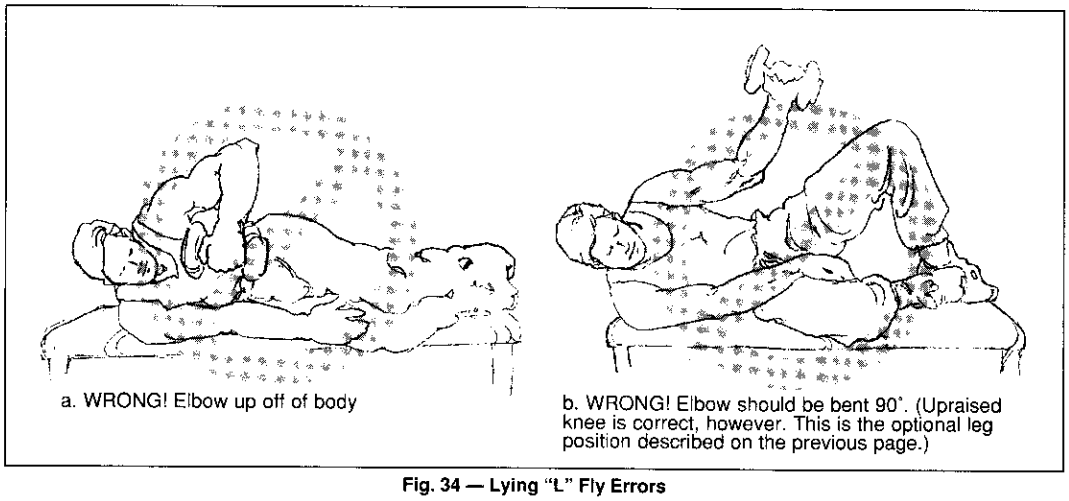
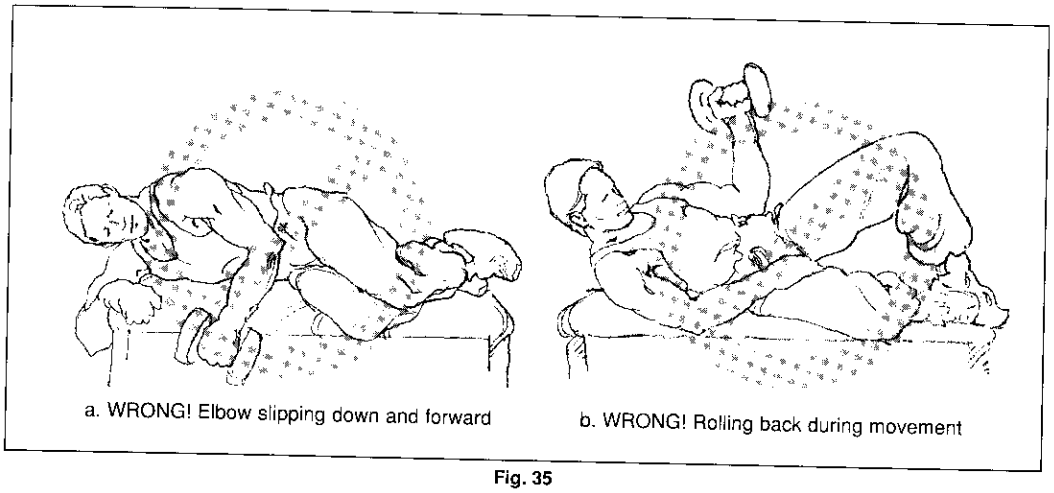


Fig. 34 — Lying "L" Fly Errors

- letting the upper arm slip forward and down before beginning the exercise (Fig. 35a, wrong). You should keep the arm up on your side.
- rolling back as you do the exercise (Fig. 35b, wrong)—keep your upper body in the same plane throughout the movement.



a. WRONG! Elbow slipping down and forward

b. WRONG! Rolling back during movement

Fig. 35

Standing "L" Flyes

prime mover: external rotators
secondary movers: rear head of the deltoids

The Lying "L" Fly puts maximum stress on the external rotators at the *end* of the movement; the Standing "L" Fly puts maximum stress on them at the *beginning*. The Standing "L" Fly is an advanced exercise and, as well as being more difficult, carries a slightly higher risk of injury. Make sure you have reached a moderate strength level using the previous exercise before trying this version! (The Standing "L" Fly should *not* be used at the beginning stages of a rehabilitation program.)

Optimized Technique

For this exercise, you will need a support on which to rest your arm. Ideally, the support should be just below armpit height. An adjustable incline bench works well (see Fig. 36).

Holding a *light* dumbbell (1 to 20 lbs.) in your right hand, rest your right triceps on the support. Your right elbow should be bent 90 degrees. Your body should be at a diagonal to the support as shown in Figure 36. The angle at your shoulder

should be slightly *less* than 90 degrees (Fig. 36a). If necessary, bend your knees to adjust your height relative to the support to achieve the required slightly-less-than-90-degree angle. These adjustments in body position are necessary to decrease the risk of impingement occurring during the exercise.

Maintaining the right angle bend at your elbow, lower the dumbbell until your forearm is just below parallel with the floor. If necessary, you can place the back of your left hand under your right elbow to make the position more comfortable (Fig. 36b).

Still maintaining the right angle bend at your elbow, slowly raise the weight back to the starting position (Fig. 36c). Resist the tendency to jerk the weight as you change from moving down to moving up. Doing so puts potentially injurious stress on the external rotators.

Repeat for 6 to 8 reps with each arm.

As with the previous exercise, you shouldn't continue to increase the level of overload as you get stronger. Work up to 20 pounds maximum here as well.

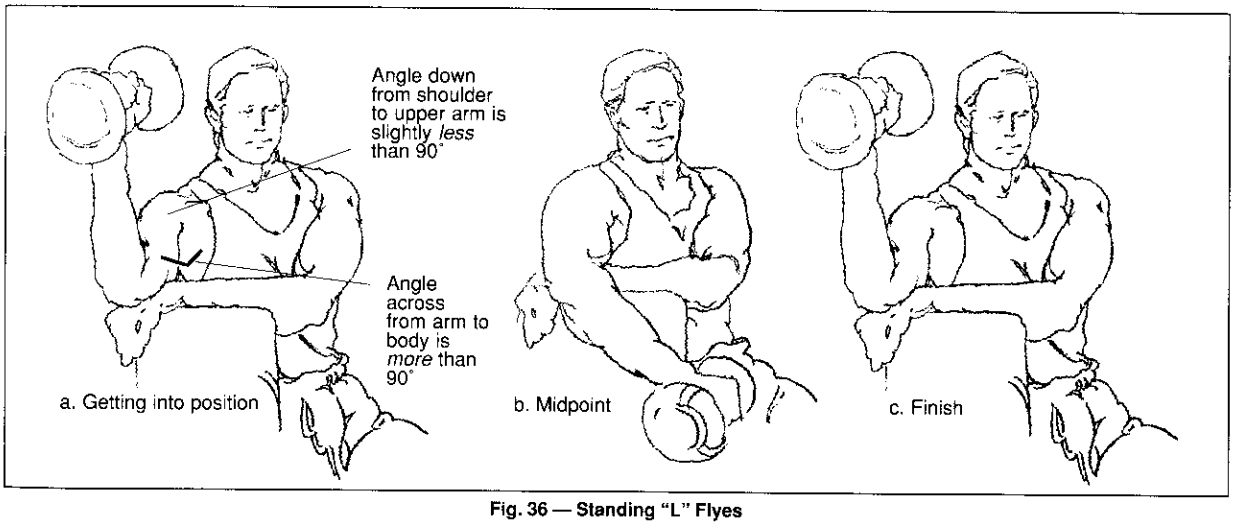


Fig. 36 — Standing "L" Flyes

TRAINING ALERT — The Supraspinatus Fly

The Supraspinatus Fly is often used in physical therapy as part of rehabilitation and strengthening routines for the cuff.

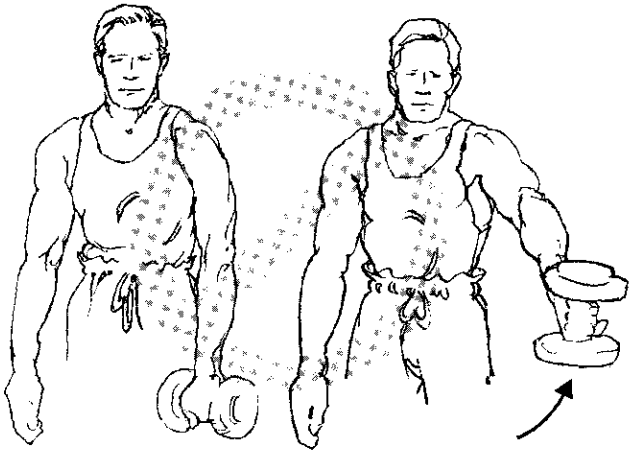
It involves a movement halfway between a Front Delt Fly and a Lateral Delt Fly—but, unlike both those exercises, which are usually performed with the palm facing down, the Supraspinatus Fly is performed with the palm facing *out* (see below).

The idea is that by performing the exercise with the palm facing out, you take a movement usually motivated both by the lateral deltoid and the supraspinatus and decrease the contribution of the lateral deltoid. This should increase the relative contribution of the supraspinatus. EMG studies by various clinics have indicated that the exercise is successful in this regard.

There is a potential problem, though. The movement puts the shoulder in *full internal rotation*. We have already discussed the dangers of impingement during abduction or flexion above 60 degress performed with the shoulder in an internally rotated position. Patients are usually advised not to bring their arm up higher than 90 degrees; this brings them into the range where impingement may occur. Even if the recommendation were changed to limit the movement to under 60 degrees, there is no way to ensure patient compliance outside a clinical setting. Given:

- the potential for impingement when raising the arm forward or to the side with the shoulder internally rotated
- the potential, in the presence of impingement, to increase shoulder inflammation or reinjure the joint
- the existence of safer exercises for the supraspinatus and rear delt

...we recommend against using this exercise in either a rehabilitation or strengthening program.



Lying Flyes

prime mover: rear head of the delts
secondary movers: infraspinatus & teres minor (external rotators), center traps

The rear delt can pull the arm horizontally from across the chest and away from the body through a much greater range than that addressed by most rear-delt exercises. Lying Flyes works the rear delt through the part of the range most other exercises miss: the first 90 degrees. The exercise is especially important for athletes, since many sports motions—the tennis backhand, martial arts backfist, and certain gymnastics techniques, to name a few—make direct demands on the muscle within that range.

Optimized Technique

The starting position is almost the same for this exercise as for Lying "L" Flyes. Lie on your right side on a supine bench. Your right (supporting) arm should be in one of two positions: either extended along the bench, palm resting on your thigh; or extended down toward the ground, acting like the third leg of a tripod (Fig. 37). Pick whichever position is more comfortable for you.

Your right leg, pressing down against the bench, should provide a stable base from which to lift. Your left leg should be in one of two positions: either bent-kneed with your knee aimed almost straight up and the sole of your (left) foot flat on the bench (as in Fig. 37c); or laying on top of your right leg, scissor- fashion (the scissor position is illustrated in Fig. 37a, b).

Begin with your left arm down across your chest. Hold a *very light* dumbbell in your left hand, left palm facing in toward the bench (Fig. 37a). If you are conditioning to rehabilitate an existing injury, use 1 to 5 pounds *at most*; if conditioning to prevent injury, use 1 to 12 pounds. Do not use heavier weights for this exercise! The rear delt has extremely poor leverage in this position and a small increase in weight represents a big increase in stress.

Maintaining a slight but constant bend in your left elbow, slowly lift the weight until your arm is almost pointing straight up. (Fig. 37b). Resist the tendency to roll back as you do the exercise—keep your upper body in the same plane throughout the movement.

Slowly lower and repeat for 6 to 8 reps, then reverse position and repeat holding the weight in your right hand.

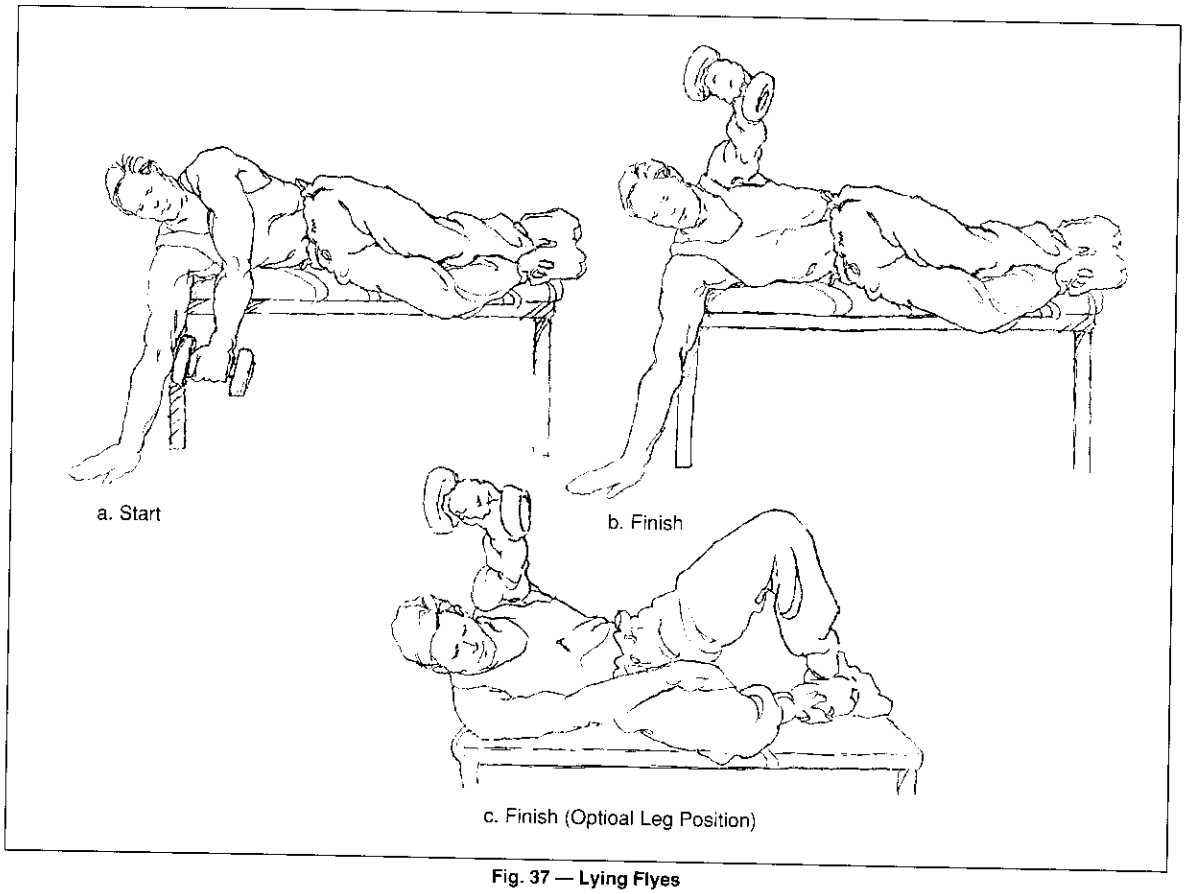


Fig. 37 — Lying Flyes

SPECIAL TECHNIQUE POINT

Internal Rotation Exercises

Contrary to what you may have read elsewhere, you don't need to do separate exercises for the internal rotators unless you are rehabilitating an internal rotator injury.

The internal rotators include two very large muscles: the pectorals and latissimus dorsi. The external rotators are all small, and relatively weaker. The internal rotators get a considerable indirect workout during many common exercises; for all intents and purposes, the external rotators get none. In terms of balance at the shoulder, the pec/lat/teres major combination is much more than a match for the smaller, weaker, external rotators. Doing additional work for internal rotators only exacerbates the existing imbalance.

Internal Rotator Curls

prime mover: internal rotators
secondary movers: pecs, lats, long head of the triceps

If you ever do sustain an internal rotator injury, the following exercise will aid in rehabilitating that muscle group. You will need a cable-and-pulley machine.

Optimized Technique

Sit in front of a low pulley with your body angled about 45 degrees to the machine (Fig. 38a). Hold the pulley handle in the hand closest to the weight stack. Bring you upper arm in against your side. The angle at your elbow should be 90 degrees.

(Note: Depending on the nature of your injury, the slight stretch the internal rotators sustain in this position may be uncomfortable. If so, rotate your body toward the machine to reduce the tension.)

Keeping your upper arm in against your side, pull the handle toward your rear hip by internally rotating your shoulder (Fig. 38b).

Release slowly to return to your starting position. Repeat for 6 to 8 reps.

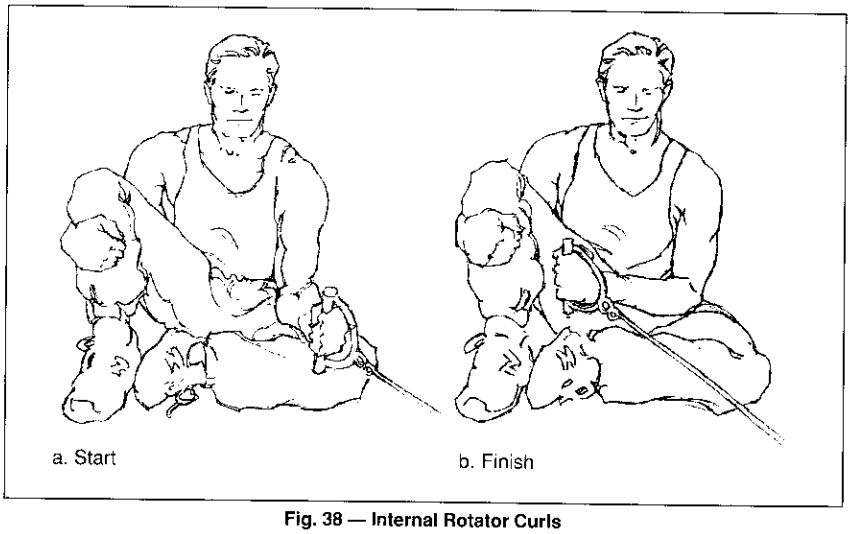


Fig. 38 — Internal Rotator Curls

STRETCHING EXERCISES

Flexibility exercises come in three flavors: **ballistic**, **passive**, and **PNF**.

Ballistic stretches rely on momentum to provide the stretch, as when you bounce to touch your toes. *Passive stretches* rely on gentle, sustained tension to accomplish the same purpose—for example, sitting on the ground with one leg extended, grasping your ankle and slowly pulling your chest toward your knee. *PNF stretches** rely on a more complicated protocol involving alternately contracting, then relaxing and stretching the target muscle.

All three methods effectively increase flexibility. Ballistic stretching, however, with its rather violent movements, carries considerable risk of injury. And PNF is a "big gun" approach most suitable to promoting dramatic flexibility increases in major muscle groups such as the hamstrings. Also, because PNF often involves a high-intensity contraction of the target muscle—a muscle that after being injured, may not be in the best of shape—it may be unsuitable for use in the early stages of a rehabilitation program.

Passive stretching is most suitable for our purposes. It's the basis for the exercises described below.

All passive stretches are performed the same way. You assume the exercise position, then move into the stretch, consciously trying to relax the target muscle or muscles. It helps to "play your breathing": Each time you exhale, try to relax a little more, and to go a little further into the stretch. Hold each stretch for about 10 seconds.

The *external* rotators are almost always the weak link when it comes to rotator cuff strength. The *internal* rotators (primarily the pectoralis major and anterior deltoid) are the weak links when it comes to flexibility, so we will concentrate on them.

One final comment. There is a difference between the dull ache of a muscle being gently stretched and the sharp pain of an injured muscle being further traumatized. The first is a necessity; the second, a setback. Especially when rehabilitating an injury, play your edges gently!

*The term *PNF* (proprioceptive neuromuscular facilitation) actually refers to a complex technique used in stroke rehabilitation. What's called "PNF" in sports circles is a much-simplified version of that technique that has proven effective for increasing flexibility.

Pec Stretch — Bent Arm

target: pec major
secondary target: anterior deltoid

These first two stretches are done one arm at a time. Place your forearm and palm against the inside edge of a door frame. Both your shoulder and elbow should be bent 90 degrees. Now, pretending your body is a column, slowly rotate your body forward away from the stationary arm, feeling for the stretch in your pecs and front deltoid (this rotating doesn't involve taking any steps; Fig. 39a).

The stretch should also be done with the humerus angled upward (Fig. 39b). This shifts the emphasis onto the lower fibers of the pec, an area less addressed by the forearm-parallel-to-the-floor version. If the stretch is painful in this position, don't use it.

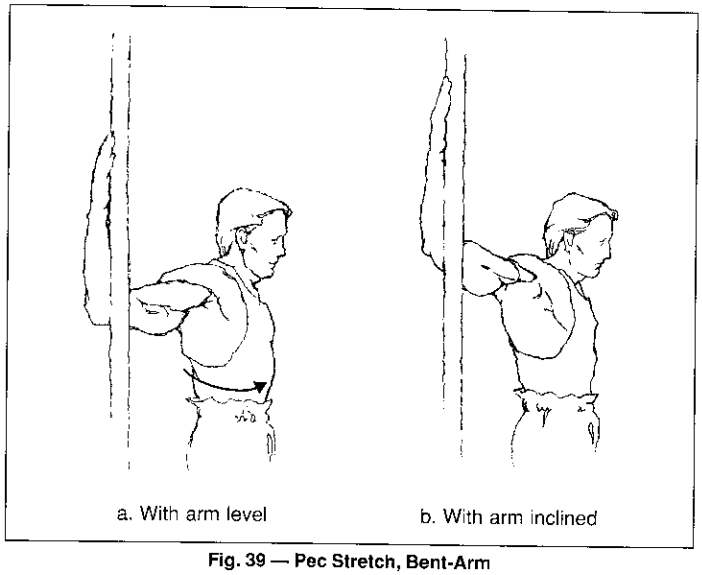


Fig. 39 — Pec Stretch, Bent-Arm

Pec Stretch — Straight Arm

target: pec major
secondary target: anterior deltoid

This stretch gives you better leverage against the pec. Some heavily muscled athletes find it more effective. But it's also easier to do incorrectly, so follow the instructions carefully.

Place your palm against the inside edge of a door frame. Your shoulder should be bent 90 degrees.

Slowly rotate forward, feeling for the stretch in your pecs and front delt (Fig. 40a). Make sure your shoulder travels back

with the stretch. There is a tendency to hold it forward (Fig. 40b, wrong).

Doing so removes most of the tension from the pecs making the stretch essentially worthless.

This stretch should also be performed both with arm parallel to the floor and with the arm angled upward (Fig. 40c).

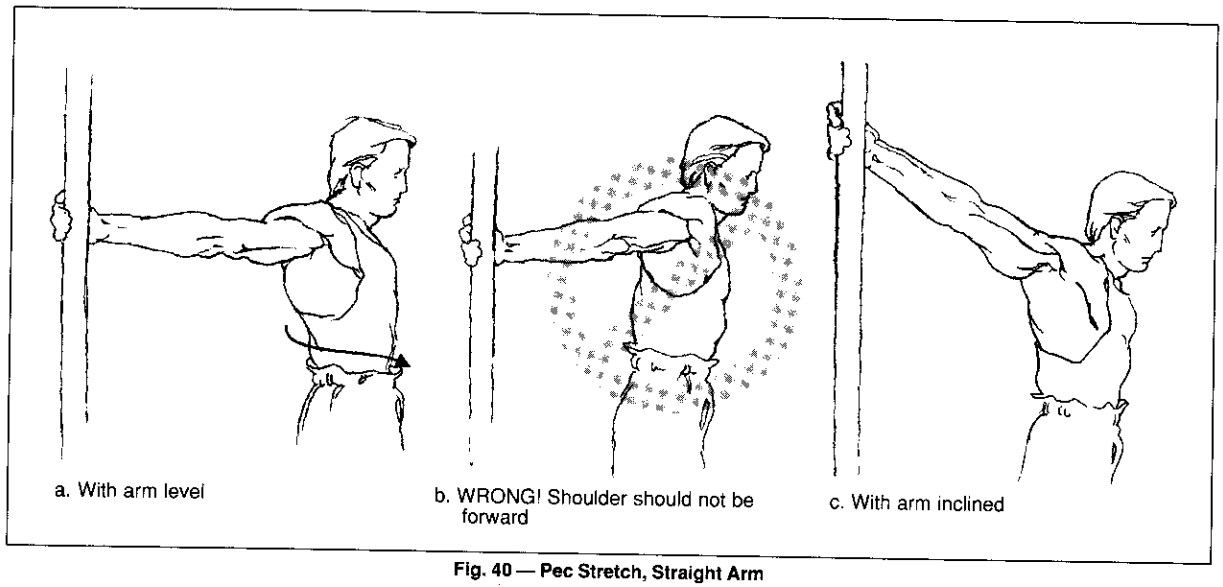


Fig. 40 — Pec Stretch, Straight Arm

Two-Person Pec / Front Delt Stretch

target: pectorals, front delt

This is an advanced exercise. Stand up straight with your elbows bent and your hands resting on top of each another, on your buttocks, palms out. Your partner should stand behind you in the position illustrated in Figure 41. Notice that the partner has his/her elbows out to the sides, and his/her fingers pointing straight up. This position provides the best leverage for assisting with the stretch.

Have your partner slowly press your elbows back and toward one another. Hold for 5 seconds at peak (getting to the peak of the stretch takes about 5 seconds, making for a total stretch time of 10 seconds), then return to the starting position. If you have good upper pectoral development, don't expect your elbows to touch the first few times you do this exercise.

You can intensify the stretch by positioning your hands on your lower back instead of your buttocks.

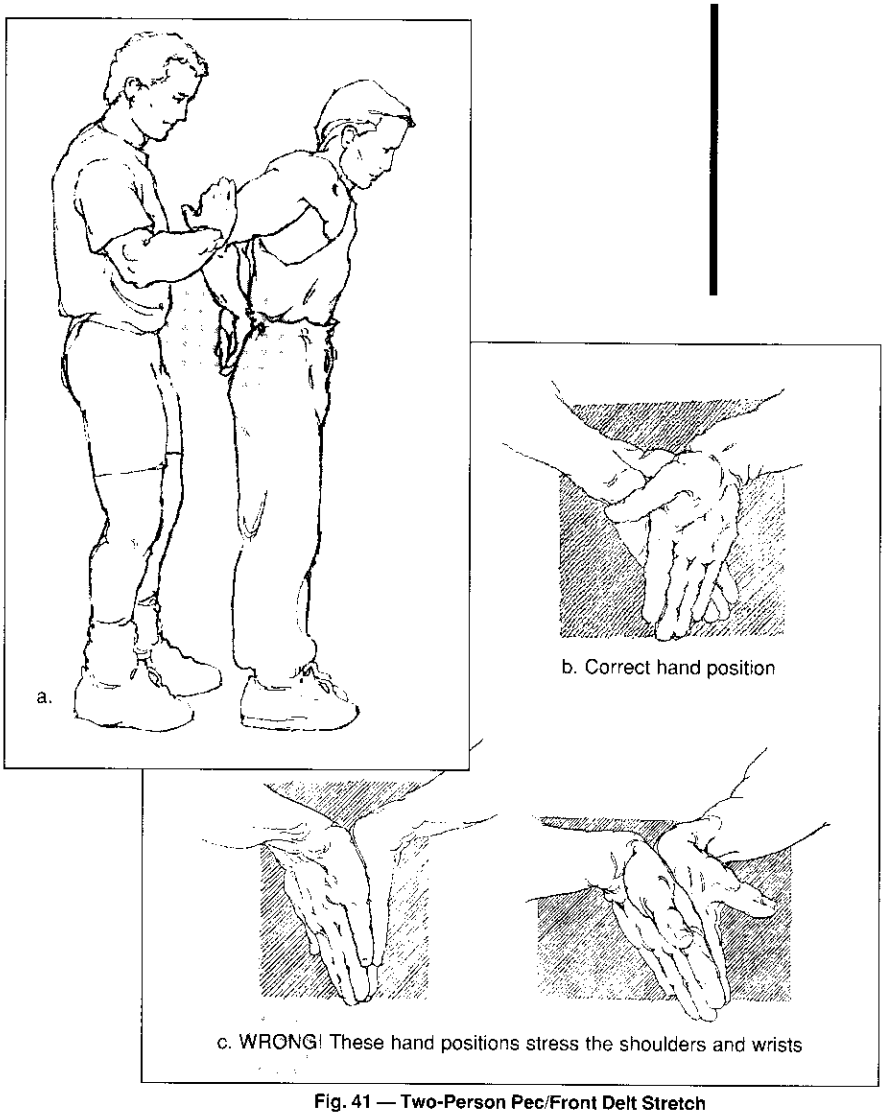


Fig. 41 — Two-Person Pec/Front Delt Stretch

Note: A very small percentage of individuals feel actual pain in the front delt and biceps during this stretch due to nerve impingement. If you experience discomfort other than that normally associated with stretching, skip this one.

Pole Stretch

target: pecs, anterior delts

This exercise addresses the same muscle groups as the previous one. But where the intensity of stretch during the previous exercise can be varied carefully over a broad range, it tends to start at a fairly high level and jump up quickly during this one. Given the diminished control during the Pole Stretch,

we recommend against using it in the early stages of a rehab program. This is an advanced exercise.

Stand up straight and grip a 6-foot pole close to the ends with your palms facing out (Fig. 42a). Keeping your arms locked straight, bring the pole up over your head and down behind you. Stop just below the range within which you feel the stretch (Fig. 42b).

Reverse the motion: keeping your arms locked straight, bring the pole up until it is just above the range during which you feel the stretch. Repeat for 3 to 5 reps.

You only need to maintain your grip on the pole with your thumb and first fingers (Fig. 42c); the movement is just about impossible if you make fists. Narrow your grip slightly between each rep to increase the intensity of the stretch.

This exercise can also be done using a towel in place of the pole.

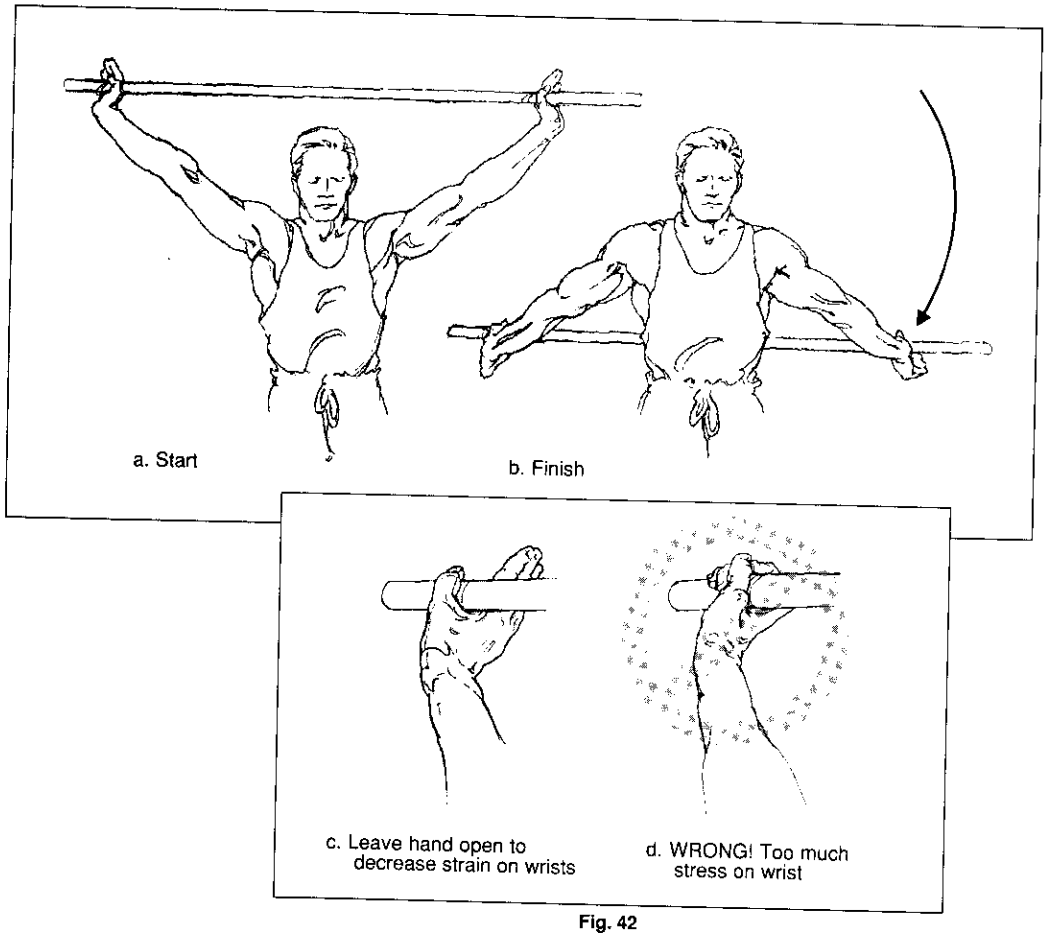


Fig. 42

One-Person Front Delt / Biceps Stretch

target: anterior delt, bicep

Find something you can comfortably grab onto that runs horizontally above the floor at about shoulder height. This could be the top of a piece of exercise equipment in the gym, or the top of a counter (for an easy stretch) or refrigerator (for an advanced stretch) at home.

Bend over at the waist. Extend your arms out behind you. Grasp onto the bar (or rest your wrists on the top of the counter or refrigerator) (Fig. 43). Keeping your back as upright as possible, sink down, feeling for the stretch in your biceps and front shoulder. If you are using a refrigerator, keep your buttocks against it. Relax your arms throughout the exercise. Hold for about 10 seconds, then slowly release.

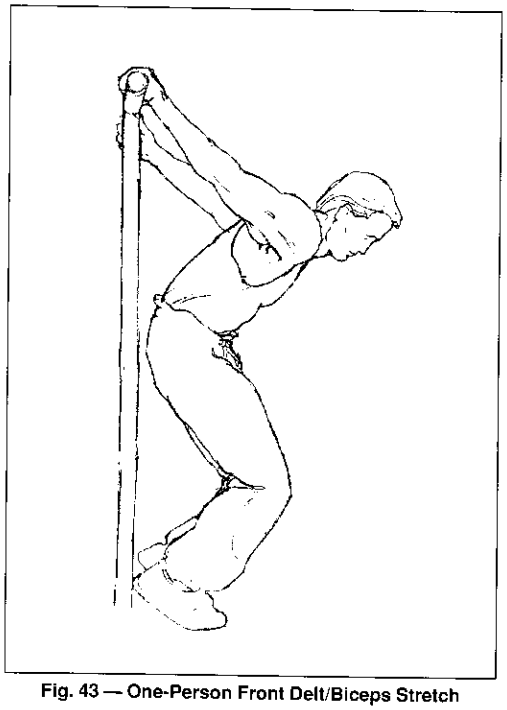


Fig. 43 — One-Person Front Delt/Biceps Stretch

Two-Person Front Delt / Biceps Stretch

target: anterior delt, bicep

This one is identical to the One-Person Front Delt/Biceps Stretch, except that your partner supports your arms.

Stand in front of your partner, facing away. Bend forward, and bend your knees. Extend your arms out behind you, palms facing in. Have your partner reach underneath your

arm, palms forward, and take your wrists into the "Vs" formed by his/her thumbs and index fingers (Fig. 44a).

Now, *slowly* straighten up both at the knees and waist. At the same time, have your partner *slowly* push up on your wrists (Fig. 44b). Hold at peak for about 5 seconds, then slowly release.

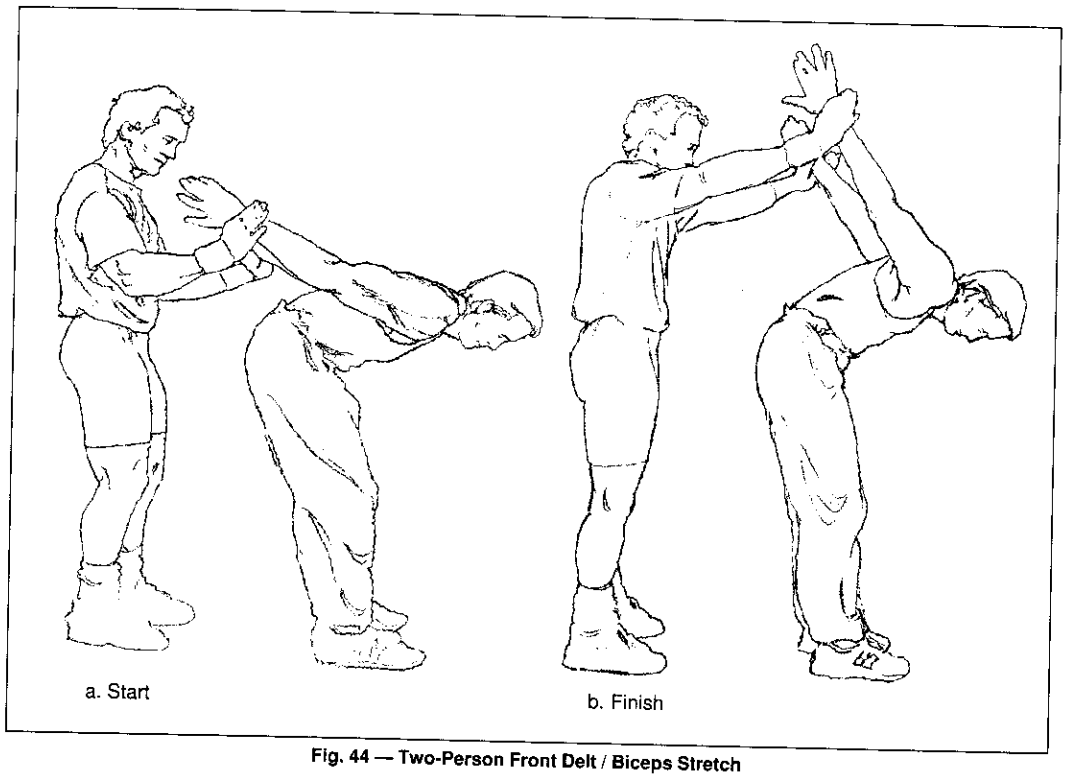


Fig. 44 — Two-Person Front Delt / Biceps Stretch

External Rotators Stretch

target: external rotators

The external rotators are usually flexible enough to not need stretching. However, some sports, such as martial arts, involve movements that push the external rotators to the limits of their flexibility. (The elbow-up block illustrated in Figure 45 is such a move.) Attempting to execute these limit-pushing moves without sufficient external rotator flexibility can tear the cuff.

Athletes who need beyond-average external rotator flexibility should do the following exercise.

Stand up straight. Bend your right elbow, place the back of your right wrist against your ribs, and rotate the elbow forward.

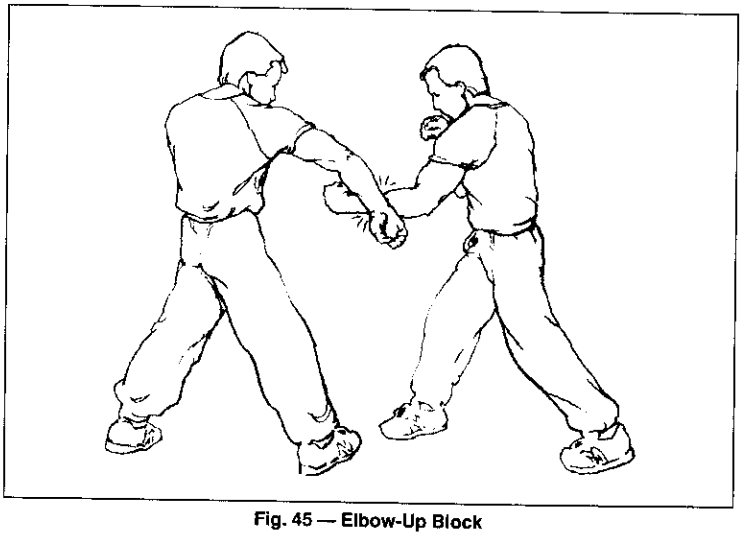


Fig. 45 — Elbow-Up Block

Hold your upper arm just above the elbow with your free hand.

Gently pull across and down (Fig. 46). When you reach maximum stretch, maintain pressure for about 5 seconds, then slowly release. Keep your shoulder down and your torso facing forward throughout the exercise.

The External Rotator Stretch should only be used by athletes with healthy shoulders. And in any case, if you feel any pain during the exercise, don't use it.

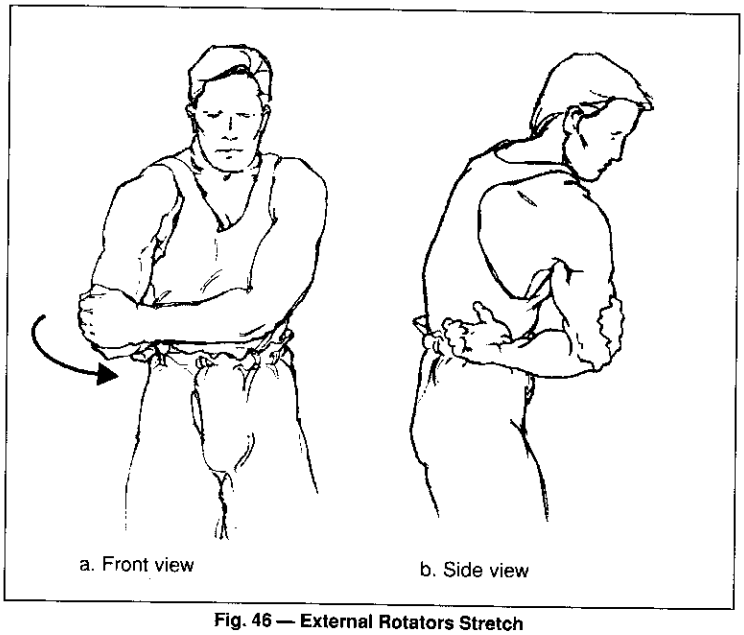


Fig. 46 — External Rotators Stretch

EXERCISES TO MODIFY OR AVOID

Bench Press

prime mover: pectorals
secondary movers: front deltoid, triceps

The Bench Press targets the pectoral (chest) muscles but also makes heavy demands on the triceps and front delts. All three muscles—pecs, front delts, and triceps—act to lift the bar; along with the rotator cuff, all three also stabilize your shoulders during the exercise.

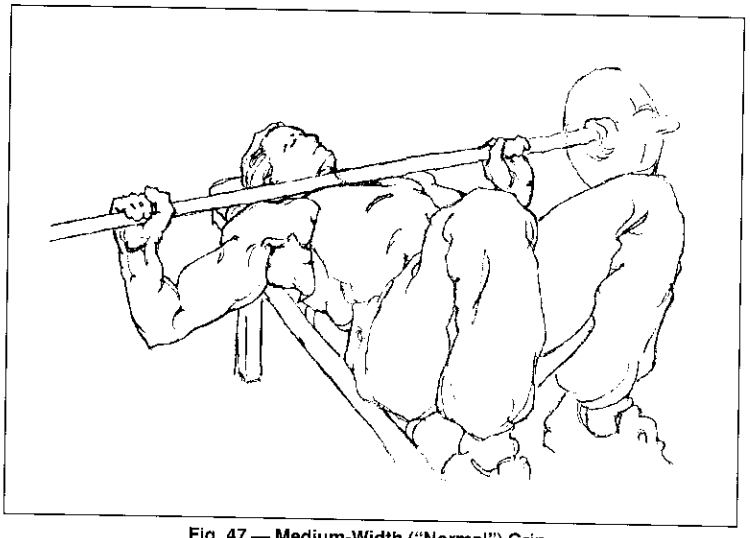


Fig. 47 — Medium-Width ("Normal") Grip; Forearms Angled Out Just Slightly in the Down Position

In an effort to "work different areas of the pecs" and to decrease the involvement of the supporting muscles, athletes have come up with a number of Bench Press variations. Some are O.K. Some are potentially harmful. Let's look at two variations especially likely to produce shoulder injuries:

- using too wide a grip
- touching the bar to the chest too high up

Using Too Wide a Grip

On the plus side, using a wide grip does increase the intensity of pec contraction during the exercise. The position places the pecs on a greater stretch than a shoulder-width grip does,

and the greater stretch causes more muscle fibers to be recruited during each rep (Fig. 48).

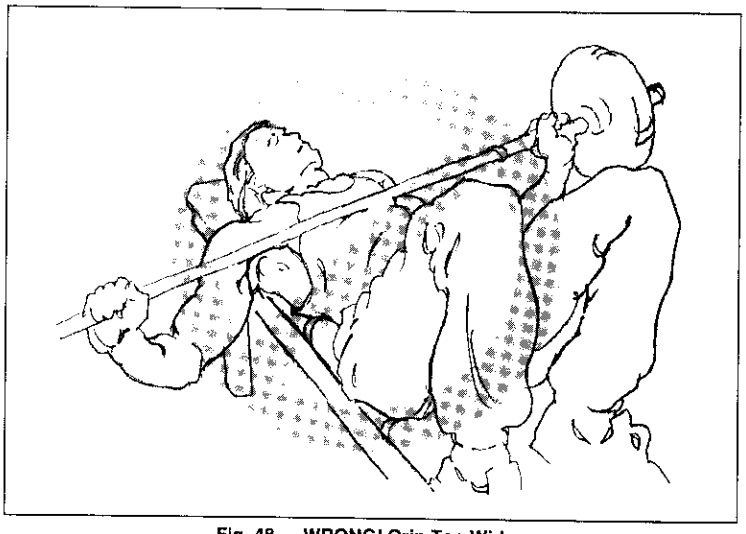
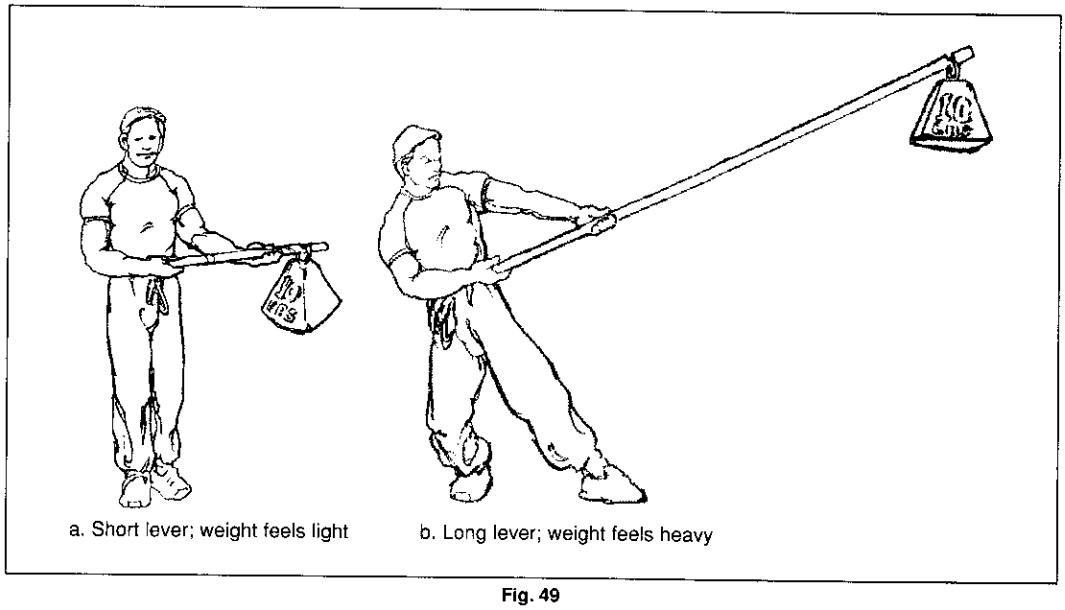


Fig. 48 — WRONG! Grip Too Wide; Forearms Angled Way Out

On the minus side, though, is this: Imagine you are holding up a 10-pound weight on the end of a 1-foot stick (Fig. 49a).

Now imagine you are holding up that same weight on the end of a *10*-foot stick (Fig. 49b). Obviously, it's harder. The longer lever increases the force necessary to hold up the load.



a. Short lever; weight feels light

b. Long lever; weight feels heavy

Fig. 49

Our advice on this exercise: If you have ever separated your shoulder to any degree, don't dip. If you have pain at the top of your shoulder when performing dips, don't dip (this is *not* something you can "work through"). If you have gained a lot of weight, and this exercise does not feel as comfortable as it once did, don't dip.

If, on the other hand, you have been able to dip without pain, you can continue to do so, but allow one set for a special warmup: Do the first rep barely lowering yourself at all. With each subsequent rep, lower yourself a little further so that by the final rep you are moving through the full range of motion for the exercise.

Dumbbell Pullovers

prime mover: lats and triceps
secondary movers: pecs

Now here's an exercise with problems!

Pullovers are supposed to "expand the rib cage." This assumes that ribs will somehow lengthen, or that cartilage will change to allow expansion to take place. Bone just doesn't work that way.

Training of various types can change the **vital capacity** of the lungs—the quantity of air that can be exhaled by the fullest

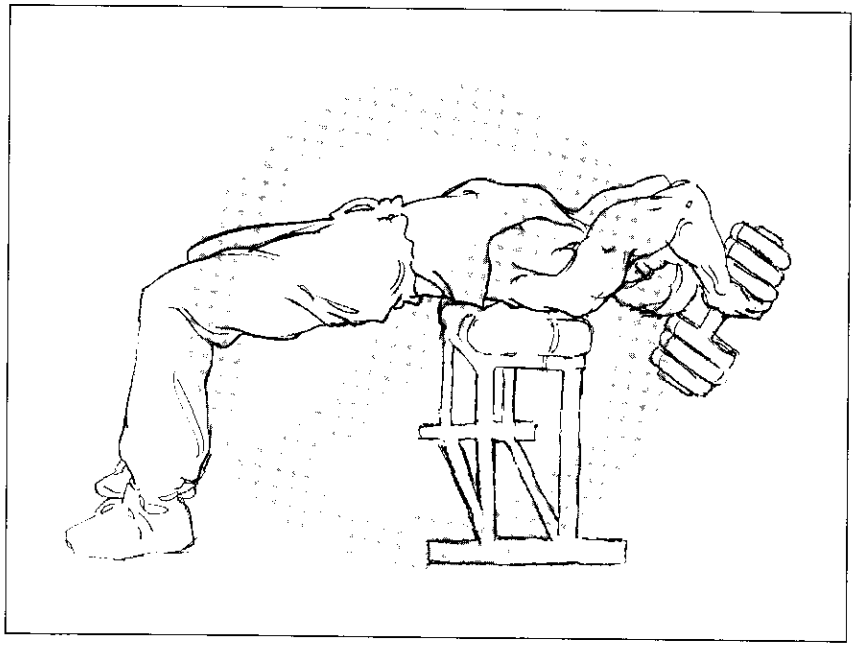


Fig. 52 — Dumbbell Pullovers: High Risk; Little Reward

expiration after making the deepest inspiration. However, much of this change results from the learned ability to use available lung space and from improved control of the diaphragm. Neither change translates into a larger rib cage. Think about it—despite the tremendous vital capacities of opera singers and trumpet players, few (if any!) could win a bodybuilding contest.

Pullovers won't expand your rib cage; but there's a good chance that, in time, doing them will cause shoulder or other injuries. One example: The exercise can stretch the connective tissue that forms the vertical "line" between the abs. If that tissue tears, you have a hernia of the median rectus, which produces a slight bulge in the center of your abs that increases in size when you strain. A hernia of the median rectus is of little clinical significance, but it's certainly *not* what you were trying to develop!* Pullovers also put tremendous stress on the posterior aspect of the shoulder; even before you sustain a clinical injury, they can cause a great deal of pain.

The bottom line: Pullovers won't enlarge your ribcage, and their high potential to injure the rotator cuff and other structures far outweighs whatever minimal muscular gains they may promote.

Upright Rows

prime mover: lateral and anterior delt
secondary mover: upper trapezius

We covered the biomechanical problems with the Upright Row in the *Training Alert* back in the *Deltoid Exercises* section (page 47). Due to its high potential to injure the cuff, we strongly recommend you not do this exercise.

We now have the building blocks for ***The 7-Minute Rotator Cuff Solution.*** *The next section puts it all together.*

*If you have such a bulge in the center of your abs, don't attempt to diagnose yourself. Several conditions could be responsible.

enough weight so you can just barely get out the number of reps specified. That means that, where the specified number of reps for an exercise drops from 10 to 12 reps on one level to 6 to 8 on the next, you will have to *increase* the amount of weight you are using as you move up to the new level. A lower number of reps represents an *increase* in the intensity of the routine.

(When you reach the maximum amount specified in *The Exercises* chapter for a particular movement, stop increasing the weight even if you feel you could lift more.)

REST BETWEEN SETS

If you are rehabilitating an injury, allow 90 seconds between sets. That applies both to the rests between sets of the same exercise, and to the rest between the last set of one exercise and the first set of the next.

If, on the other hand, you are training to prevent an injury, allow no more than 30 to 45 seconds between sets of the same exercise. Don't rest at *all* between the last set of one exercise and the first set of the next.

For both rehab and prevention, when during a single-arm exercise, alternate sets for the left and right arms without resting.

SUPERSETS

Some of **The 7-Minute Rotator Cuff Solution** routines use **supersets**. A *superset* is 2 exercises performed back- to-back without rest.*

For example, the *Level 2, Athlete's Injury Prevention Routine, Including Delts* calls for 2 supersets of Rear Delt Flyes and Lying Flyes. Each superset consists of a set of Rear Delt Flyes followed immediately (without resting) by a set of Lying Flyes.

To perform 2 supersets, you would do: a set of Rear Delt Flyes followed immediately by a set of Lying Flyes (that's the first superset); another set of Rear Delt Flyes followed immediately by another set of Lying Flyes (that's the second superset).

*Strictly speaking, a ***superset*** always involves two exercises for ***opposing muscle groups*** (biceps / triceps, quadriceps / hamstrings, etc.) performed back-to-back without rest. We use the term here in its more common form, referring to ***any*** two exercises performed back-to- back without rest.

If the note "@ arm" appears after the number of reps for an exercise within the superset, like this...

3 supersets
Lying Flyes ..... 6-8 reps @ arm
Behind-the-Neck Press ..... 6-8 reps

...that means one of the exercises in the superset is a single-arm movement. You would do 2 sets of the first exercise —one for each arm—and then do 1 set of the second exercise before starting the second superset (e.g. exercise A, left arm; exercise A, right arm; exercise B; exercise A, left arm, exercise A, right arm; exercise B; and so on).

GIANT SETS

Some of the routines also use **giant sets**. A *giant set* is just like a superset, except, instead of being *two* exercises performed back-to-back without rest, it's *three or more* exercises performed back-to-back without rest.

For example, the *Level 2, Bodybuilder's Injury Prevention Routine, Including Delts* calls for two giant sets of Side Delt Flyes, Front Delt Flyes (modified), and Behind-the-Neck Press. To perform these two giant sets, you would do: a set of Side Delt Flyes, followed immediately by a set of Front Delt Flyes (modified), followed immediately by a set of Behind-the-Neck Press (that's the first superset), then you would repeat the whole cycle.

ILLUSTRATED ROUTINES

Don't be confused. All the routines appear in this chapter twice, first in words, beginning on the next page, then in graphic form, beginning on page 84. Except for the difference in form, the two are identical.

ATHLETE'S REHABILITATION ROUTINE, EXTERNAL ROTATOR INJURY

Use this routine to rehabilitate an external rotator injury. Progress up through the levels slowly—rehabilitation is one place you don't get points for getting to the top of the mountain first! Ice your recovering shoulder for 15 to 20 minutes after each workout.

Level 1

EXERCISES

1 set.....Lying Flyes .....10-12 reps @ arm
1 set.....Lying "L" Flyes.....10-12 reps @ arm

STRETCHES

1 rep.....Pec Stretch/Bent-Arm/Parallel .....5-10 secs @ arm

Level 2

EXERCISES

2 sets .....Lying Flyes .....10-12 reps @ arm
2 sets .....Lying "L" Flyes.....10-12 reps @ arm

STRETCHES

1 rep.....Pec Stretch/Bent-Arm/Parallel .....5-10 secs @ arm
1 rep.....Pec Stretch/Bent-Arm/Angled Up.....5-10 secs @ arm

Level 3

EXERCISES

3 sets .....Lying Flyes .....10-12 reps @ arm
3 sets .....Lying "L" Flyes.....10-12 reps @ arm

STRETCHES

1 rep.....Pec Stretch/Bent-Arm/Parallel .....5-10 secs @ arm
1 rep.....Pec Stretch/Bent-Arm/Angled Up.....5-10 secs @ arm
1 rep.....External Rotators Stretch (Optional) .....5-10 secs @ arm

Level 4

EXERCISES

3 sets .....Lying Flyes .....10-12 reps @ arm
2 sets .....Standing "L" Flyes .....10-12 reps @ arm
2 sets .....Lying "L" Flyes.....10-12 reps @ arm

STRETCHES

1 rep.....Pec Stretch/Bent-Arm/Parallel .....5-10 secs @ arm
1 rep.....Pec Stretch/Bent-Arm/Angled Up.....5-10 secs @ arm
1 rep.....External Rotators Stretch (Optional) .....5-10 secs @ arm

Level 5

EXERCISES

3 sets .....Lying Flyes ..... 10-12 reps @ arm
3 sets .....Standing "L" Flyes..... 10-12 reps @ arm
2 sets .....Lying "L" Flyes ..... 10-12 reps @ arm

STRETCHES

1 rep.....Pec Stretch/Bent-Arm/Parallel .....5-10 secs @ arm
1 rep.....Pec Stretch/Bent-Arm/Angled Up.....5-10 secs @ arm
1 rep..... 1-Person Front Delt/Biceps Stretch .....5-10 secs
1 rep.....External Rotators Stretch (Optional) .....5-10 secs @ arm

Level 6

EXERCISES

3 sets .....Lying Flyes ..... 8-10 reps @ arm
3 sets .....Standing "L" Flyes..... 8-10 reps @ arm
2 sets .....Lying "L" Flyes ..... 8-10 reps @ arm

STRETCHES

1 rep.....Pec Stretch/Bent-Arm/Parallel .....5-10 secs @ arm
1 rep.....Pec Stretch/Bent-Arm/Angled Up.....5-10 secs @ arm
1 rep..... 1-Person Front Delt/Biceps Stretch .....5-10 secs
1 rep.....External Rotators Stretch (Optional).....5-10 secs @ arm

ATHLETIC REHABILITATION ROUTINE, INTERNAL ROTATOR INJURY

Use this routine if you've been diagnosed as having an internal rotator injury. Again, progress up through the levels slowly! Ice your injured shoulder after each workout. When you reach *Level 3* and begin stretching the internal rotators, proceed carefully! If you experience any pain while stretching, stop, and hold off the flexibility work for another week. Likewise, hold off if your shoulder feels O.K. while you are stretching but feels uncomfortable afterward.

When you have successfully rehabilitated the injury and have reached *Level 9* here, go on to either of the *Athlete's Injury-Prevention* routines.

Level 1

EXERCISES

1 set.....Internal Rotator Curls.....10-12 reps @ arm

Level 2

EXERCISES

1 set.....Lying "L" Flyes.....10-12 reps @ arm
2 sets.....Internal Rotator Curls.....10-12 reps @ arm

Level 3

EXERCISES

1 set.....Lying "L" Flyes.....10-12 reps @ arm
3 sets.....Internal Rotator Curls.....10-12 reps @ arm

STRETCHES

1 rep.....Pec Stretch/Bent-Arm/Parallel.....5-10 secs @ arm
1 rep.....Pec Stretch/Bent-Arm/Angled Up.....5-10 secs @ arm
1 rep.....External Rotators Stretch (Optional).....5-10 secs @ arm

Level 4

EXERCISES

3 sets.....Internal Rotator Curls.....10-12 reps @ arm
1 set.....Lying Flyes.....10-12 reps @ arm
1 set.....Lying "L" Flyes.....10-12 reps @ arm

STRETCHES

1 rep.....Pec Stretch/Bent-Arm/Parallel.....5-10 secs @ arm
1 rep.....Pec Stretch/Bent-Arm/Angled Up.....5-10 secs @ arm
1 rep.....External Rotators Stretch (Optional).....5-10 secs @ arm

Level 5

EXERCISES

3 sets.....Internal Rotator Curls.....10-12 reps @ arm
2 sets.....Lying Flyes.....10-12 reps @ arm
2 sets.....Lying "L" Flyes.....10-12 reps @ arm

STRETCHES

1 rep.....Pec Stretch/Bent-Arm/Parallel.....5-10 secs @ arm
1 rep.....Pec Stretch/Bent-Arm/Angled Up.....5-10 secs @ arm
1 rep.....External Rotators Stretch (Optional).....5-10 secs @ arm

Level 6

EXERCISES

3 sets.....Internal Rotator Curls.....10-12 reps @ arm
3 sets.....Lying Flyes.....10-12 reps @ arm
3 sets.....Lying "L" Flyes.....10-12 reps @ arm

STRETCHES

1 rep.....Pec Stretch/Bent-Arm/Parallel.....5-10 secs @ arm
1 rep.....Pec Stretch/Bent-Arm/Angled Up.....5-10 secs @ arm
1 rep.....External Rotators Stretch (Optional).....5-10 secs @ arm

Level 7

EXERCISES

3 sets.....Internal Rotator Curls.....10-12 reps @ arm
3 sets.....Lying Flyes.....10-12 reps @ arm
2 sets.....Standing "L" Flyes.....10-12 reps @ arm
2 sets.....Lying "L" Flyes.....10-12 reps @ arm

STRETCHES

1 rep.....Pec Stretch/Bent-Arm/Parallel.....5-10 secs @ arm
1 rep.....Pec Stretch/Bent-Arm/Angled Up.....5-10 secs @ arm
1 rep.....1-Person Front Delt/Biceps Stretch.....5-10 secs
1 rep.....External Rotators Stretch (Optional).....5-10 secs @ arm

Level 8

EXERCISES

3 sets.....Internal Rotator Curls.....10-12 reps @ arm
3 sets.....Lying Flyes.....10-12 reps @ arm
3 sets.....Standing "L" Flyes.....10-12 reps @ arm
2 sets.....Lying "L" Flyes.....10-12 reps @ arm

STRETCHES

1 rep.....Pec Stretch/Bent-Arm/Parallel.....5-10 secs @ arm

1 rep.....Pec Stretch/Bent-Arm/Angled Up.....5-10 secs @ arm
1 rep.....1-Person Front Delt/Biceps Stretch.....5-10 secs
1 rep.....External Rotators Stretch (Optional).....5-10 secs @ arm

Level 9

EXERCISES

3 sets.....Internal Rotator Curls.....10-12 reps @ arm
3 sets.....Lying Flyes.....8-10 reps @ arm
3 sets.....Standing "L" Flyes.....8-10 reps @ arm
2 sets.....Lying "L" Flyes.....8-10 reps @ arm

STRETCHES

1 rep.....Pec Stretch/Bent-Arm/Parallel.....5-10 secs @ arm
1 rep.....Pec Stretch/Bent-Arm/Angled Up.....5-10 secs @ arm
1 rep.....1-Person Front Delt/Biceps Stretch.....5-10 secs
1 rep.....External Rotators Stretch (Optional).....5-10 secs @ arm

ATHLETE'S INJURY-PREVENTION ROUTINE

This routine is for you if you don't currently have a rotator cuff injury and want to train to reduce risk of getting one. It doesn't include delt exercises, and is based on the assumption that you *are* working your delts using some other form of resistance training. If that's not the case, use the *Athlete's Injury-Prevention Routine, Including Delts* instead.

(If you are starting the *Athlete's Injury-Prevention Routine* after having rehabilitated an injury using either of the routines on pages 74 through 78, you can jump immediately to *Level 3* here.)

Level 1

EXERCISES

3 sets.....Lying Flyes.....10-12 reps @ arm
3 sets.....Lying "L" Flyes.....10-12 reps @ arm

STRETCHES

Select a routine from page 83

Level 2

EXERCISES

3 sets.....Lying Flyes.....10-12 reps @ arm
2 sets.....Standing "L" Flyes.....10-12 reps @ arm
2 sets.....Lying "L" Flyes.....10-12 reps @ arm

STRETCHES

Select a routine from page 83

Level 3

EXERCISES

3 reps.....Side Delt Isometrics.....6 secs per rep
3 sets.....Lying Flyes.....8-10 reps @ arm
3 sets.....Standing "L" Flyes.....8-10 reps @ arm
2 sets.....Lying "L" Flyes.....8-10 reps @ arm

STRETCHES

Select a routine from page 83

ATHLETE'S INJURY-PREVENTION ROUTINE, INCLUDING DELTS

The rotator cuff muscles and deltoids work together when moving the shoulder. Both need to be strengthened to minimize risk of injury to either. This routine addresses that dual concern.

Since the goal here is to get as strong as possible as fast as possible (without injuring yourself in the process, of course), you don't need to linger on each level—about three or four workouts per should be sufficient. Still, don't move up until you feel comfortable doing so.

When you reach the top level, stay with it and concentrate on increasing the amount of weight you use for the *delt*—not rotator cuff—exercises. Follow the guidelines detailed in the Exercise Section for maximum rotator cuff exercise weights. (If you are starting the *Athlete's Injury-Prevention Routine* after having rehabilitated an injury using either of the routines on pages 74 through 78, start at *Level A* here.)

Level A

EXERCISES

2 sets.....Side Delt Flyes.....6-8 reps
2 sets.....Rear Delt Flyes.....6-8 reps
1 set.....Lying Flyes.....10-12 reps @ arm
2 sets.....Lying "L" Flyes.....10-12 reps @ arm

STRETCHES

Select a routine from page 83

Level 1

EXERCISES

3 sets .....Side Delt Flyes ..... 6-8 reps
1 set.....Behind-the-Neck Press ..... 6-8 reps
2 reps .....Side Delt Isometrics .....6 secs per rep
2 sets .....Rear Delt Flyes..... 6-8 reps
2 sets .....Lying Flyes .....10-12 reps @ arm
2 sets .....Lying "L" Flyes.....10-12 reps @ arm

STRETCHES

Select a routine from page 83

Level 2

EXERCISES

2 supersets
Side Delt Flyes ..... 6-8 reps
Behind-the-Neck Press ..... 6-8 reps
3 reps .....Side Delt Isometrics .....6 secs per rep
2 supersets
Rear Delt Flyes..... 6-8 reps
Lying Flyes .....10-12 reps @ arm
2 sets .....Standing "L" Flyes .....10-12 reps @ arm
2 sets .....Lying "L" Flyes.....10-12 reps @ arm

STRETCHES

Select a routine from page 83

Level 3

EXERCISES

3 supersets
Side Delt Flyes ..... 6-8 reps
Behind-the-Neck Press ..... 6-8 reps
3 reps .....Side Delt Isometrics .....6 secs per rep
3 supersets
Rear Delt Flyes..... 6-8 reps
Lying Flyes .....8-10 reps @ arm
3 sets .....Standing "L" Flyes .....8-10 reps @ arm
2 sets .....Lying "L" Flyes.....8-10 reps @ arm

STRETCHES

Select a routine from page 83

BODYBUILDER'S INJURY-PREVENTION ROUTINE, INCLUDING DELTS

Use this routine to *pile the mass on your delts*, while at the same time training the cuff to reduce risk of injury.

Change levels only when your progress slows or your workout begins to feel too easy. Here, the idea is to find a balance between getting all you can out of a level and consistently providing sufficient overload to stimulate growth. Keep in mind, though—if you move up too soon, all you're doing is forcing yourself to work harder and longer than necessary to achieve the results you want!

When you reach *Level 2*, make sure you have sufficient flexibility in your internal rotators to achieve the correct starting position for the Behind-the-Neck Press. If not, don't do the exercise! Instead, stay on *Level 1* and continue to do the internal rotator stretches until you've developed the necessary flexibility. Doing Behind-the-Neck Press without the necessary flexibility begs a cuff injury.

Although you should work to increase the amount of weight you use for the delt exercises, keep the amounts you use for the rotator cuff exercises below the maximums specified in the *Exercise* chapter.

(Once again, we recommend against doing Front Delt Flyes in most situations. We include them in their optimum position within the sequence below in case you need to do them.)

Level A

EXERCISES

1 superset
Side Delt Flyes..... 6-8 reps
Front Delt Flyes (modified)..... 6-8 reps
2 reps.....Side Delt Isometrics.....6 secs per rep
2 sets.....Rear Delt Flyes..... 6-8 reps
1 set.....Lying Flyes ..... 10-12 reps @ arm
1 set.....Lying "L" Flyes ..... 10-12 reps @ arm

STRETCHES

Select a routine from page 83

Level 1

EXERCISES

2 supersets
Side Delt Flyes..... 6-8 reps
Front Delt Flyes (modified)..... 6-8 reps

Level 2

2 sets .....Behind-the-Neck Press ..... 6-8 reps
2 reps .....Side Delt Isometrics .....6 secs per rep
2 sets .....Rear Delt Flyes..... 6-8 reps
2 sets .....Lying Flyes .....10-12 reps @ arm
2 sets .....Lying "L" Flyes.....10-12 reps @ arm

STRETCHES

Select a routine from page 83

Level 3

EXERCISES

3 giant sets
Side Delt Flyes ..... 6-8 reps
Front Delt Flyes (modified)..... 6-8 reps
Behind-the-Neck Press ..... 6-8 reps
3 reps .....Side Delt Isometrics .....6 secs per rep
3 supersets
Rear Delt Flyes..... 6-8 reps
Lying Flyes .....8-10 reps @ arm
3 sets .....Standing "L" Flyes .....8-10 reps @ arm
2 sets .....Lying "L" Flyes.....8-10 reps @ arm

STRETCHES

Select a routine from page 83

STRETCHING ROUTINES

Standard

1 rep.....Pec Stretch/Bent-Arm/Parallel .....5-10 secs @ arm
1 rep.....Pec Stretch/Bent-Arm/Angled Up.....5-10 secs @ arm
3 reps.....Pole Stretch
1 rep.....Front Delt/Biceps Stretch .....5-10 secs
1 rep.....External Rotators Stretch (Optional) .....5-10 secs @ arm

For Heavily Muscled Pecs

1 rep.....Pec Stretch/Straight-Arm/Parallel .....5-10 secs @ arm
1 rep.....Pec Stretch/Straight-Arm/Angled Up.....5-10 secs @ arm
3 reps.....Pole Stretch
1 rep.....1-Person Front Delt/Biceps Stretch .....5-10 secs
1 rep.....External Rotators Stretch (Optional) .....5-10 secs @ arm

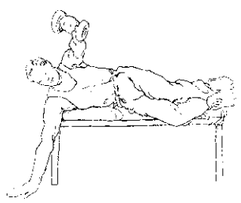
With a Partner

1 rep.....2-Person Pec Stretch .....5-10 secs
1 rep.....Pec Stretch/Straight-Arm/Angled Up.....5-10 secs @ arm
1 rep.....2-Person Front Delt/Biceps Stretch .....5-10 secs
1 rep.....External Rotators Stretch (Optional) .....5-10 secs @ arm

❖ ❖ ❖

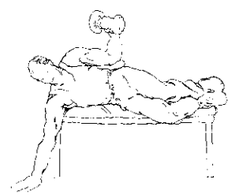
LEVEL 1

LYING FLYES



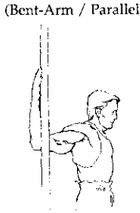
1 set / 10-12 reps @ arm

LYING "L" FLYES



1 set / 10-12 reps @ arm

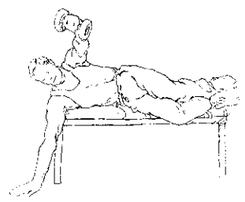
Pec Stretch
(Bent-Arm / Parallel)



1 rep / 5-10 secs @ arm

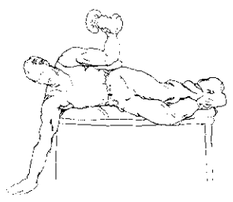
LEVEL 2

LYING FLYES



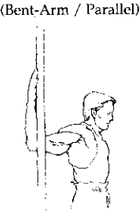
2 sets / 10-12 reps @ arm

LYING "L" FLYES



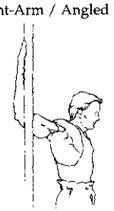
2 sets / 10-12 reps @ arm

PEC STRETCH
(Bent-Arm / Parallel)



1 rep / 5-10 secs @ arm

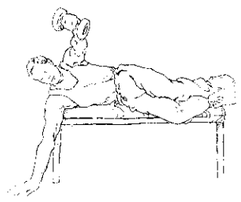
PEC STRETCH
(Bent-Arm / Angled Up)



1 rep / 5-10 secs @ arm

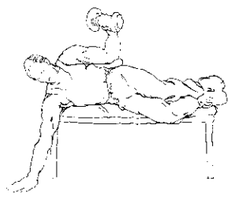
LEVEL 3

LYING FLYES



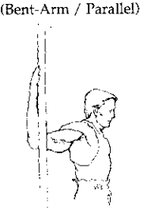
3 sets / 10-12 reps @ arm

LYING "L" FLYES



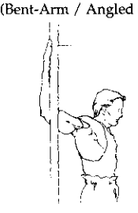
3 sets / 10-12 reps @ arm

PEC STRETCH
(Bent-Arm / Parallel)



1 rep / 5-10 secs @ arm

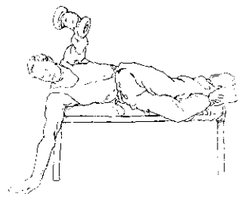
PEC STRETCH
(Bent-Arm / Angled Up)



1 rep / 5-10 secs @ arm

LEVEL 4

LYING FLYES



3 sets / 10-12 reps @ arm

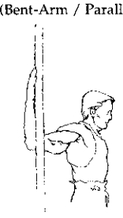
STANDING "L" FLYES

2 sets / 10-12 reps @ arm

LYING "L" FLYES

2 sets / 10-12 reps @ arm

PEC STRETCH
(Bent-Arm / Parallel)



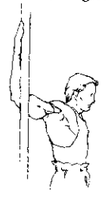
1 rep / 5-10 secs @ arm

Athlete's Rehabilitation Routine, External Rotation Injury Illustrated

EXTERNAL ROTATORS STRETCH
(Optional)

1 rep / 5-10 secs @ arm

PEC STRETCH
(Bent-Arm / Angled Up)



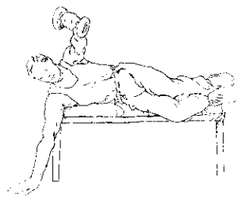
1 rep / 5-10 secs @ arm

EXTERNAL ROTATORS STRETCH
(Optional)

1 rep / 5-10 secs @ arm

LEVEL 5

LYING FLYES

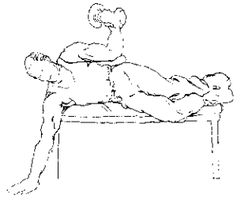


3 sets / 10-12 reps @ arm

STANDING "L" FLYES

3 sets / 10-12 reps @ arm

LYING "L" FLYES

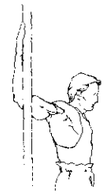


2 sets / 10-12 reps @ arm

PEC STRETCH
(Bent-Arm / Parallel)

1 rep / 5-10 secs @ arm

PEC STRETCH
(Bent-Arm / Angled Up)



1 rep / 5-10 secs @ arm

FRONT DELT/BICEPS STRETCH
(One or Two Person)

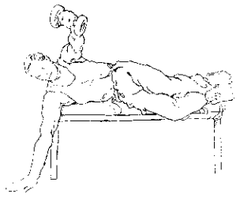
1 rep / 5-10 secs

EXTERNAL ROTATORS STRETCH
(Optional)

1 rep / 5-10 secs @ arm

LEVEL 6

LYING FLYES

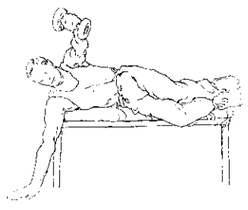


3 sets / 8-10 reps @ arm

STANDING "L" FLYES

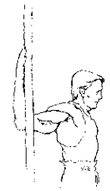
3 sets / 8-10 reps @ arm

LYING "L" FLYES



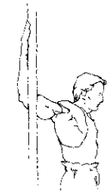
2 sets / 8-10 reps @ arm

PEC STRETCH
(Bent-Arm / Parallel)



1 rep / 5-10 secs @ arm

PEC STRETCH
(Bent-Arm / Angled Up)



1 rep / 5-10 secs @ arm

FRONT DELT/BICEPS STRETCH
(One or Two Person)

1 rep / 5-10 secs

EXTERNAL ROTATORS STRETCH
(Optional)

1 rep / 5-10 secs @ arm

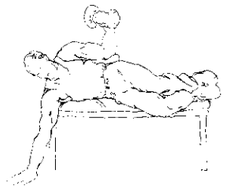
LEVEL 1

INTERNAL ROTATOR CURLS

1 set / 10-12 reps @ arm

LEVEL 2

LYING "L" FLYES



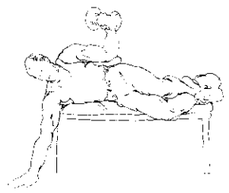
1 set / 10-12 reps @ arm

INTERNAL ROTATOR CURLS

2 sets / 10-12 reps @ arm

LEVEL 3

LYING "L" FLYES



1 set / 10-12 reps @ arm

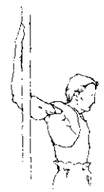
INTERNAL ROTATOR CURLS

3 sets / 10-12 reps @ arm

PEC STRETCH*
(Bent-Arm / Parallel)

1 rep / 5-10 secs @ arm

PEC STRETCH
(Bent-Arm / Angled Up)



1 rep / 5-10 secs @ arm

EXTERNAL ROTATORS STRETCH
(Optional)

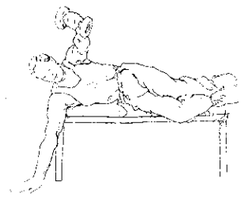
1 rep / 5-10 secs @ arm

LEVEL 4

INTERNAL ROTATOR CURLS

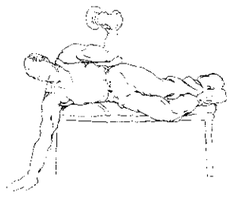
3 sets / 10-12 reps @ arm

LYING FLYES



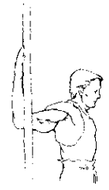
1 set / 10-12 reps @ arm

LYING "L" FLYES



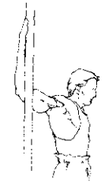
1 set / 10-12 reps @ arm

PEC STRETCH
(Bent-Arm / Parallel)



1 rep / 5-10 secs @ arm

PEC STRETCH
(Bent-Arm / Angled Up)



1 rep / 5-10 secs @ arm

EXTERNAL ROTATORS STRETCH
(Optional)

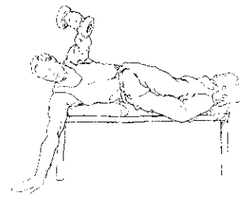
1 rep / 5-10 secs @ arm

LEVEL 5

INTERNAL ROTATOR CURLS

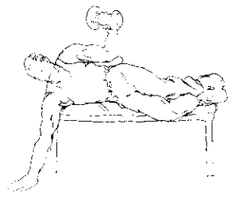
3 sets / 10-12 reps @ arm

LYING FLYES



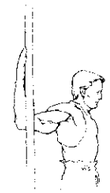
2 sets / 10-12 reps @ arm

LYING "L" FLYES



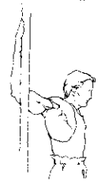
2 sets / 10-12 reps @ arm

PEC STRETCH
(Bent-Arm / Parallel)



1 rep / 5-10 secs @ arm

PEC STRETCH
(Bent-Arm / Angled Up)



1 rep / 5-10 secs @ arm

EXTERNAL ROTATORS STRETCH
(Optional)

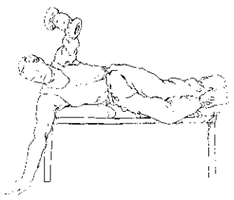
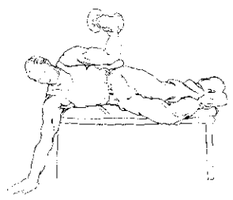
1 rep / 5-10 secs @ arm

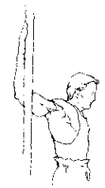
Athlete's Rehabilitation Routine, Internal Rotation Injury

Illustrated

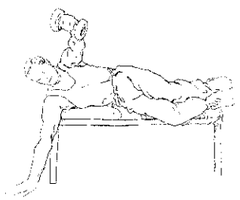
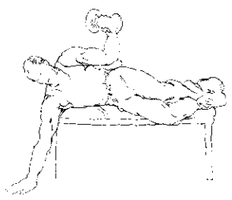
***Note: Be very careful when you begin stretching the internal rotators on *Level 3*. If you feel any pain, hold off doing the stretches for a week or so.**

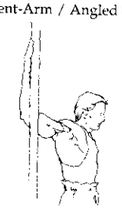
LEVEL 6

INTERNAL ROTATOR CURLS	LYING FLYES	LYING "L" FLYES	PEC STRETCH (Bent-Arm / Parallel)
			
3 sets / 10-12 reps @ arm	3 sets / 10-12 reps @ arm	3 sets / 10-12 reps @ arm	1 rep / 5-10 secs @ arm

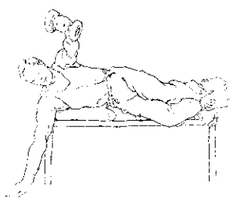
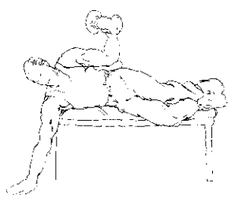
PEC STRETCH (Bent-Arm / Angled Up)	EXTERNAL ROTATORS STRETCH (Optional)
	
1 rep / 5-10 secs @ arm	1 rep / 5-10 secs @ arm

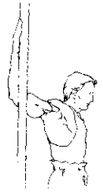
LEVEL 7

INTERNAL ROTATOR CURLS	LYING FLYES	STANDING "L" FLYES	LYING "L" FLYES
			
3 sets / 10-12 reps @ arm	3 sets / 10-12 reps @ arm	2 sets / 10-12 reps @ arm	2 sets / 10-12 reps @ arm

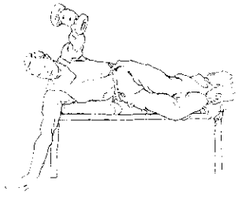
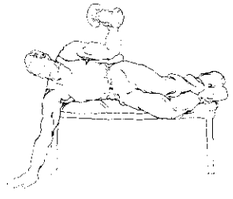
PEC STRETCH (Bent-Arm / Parallel)	PEC STRETCH (Bent-Arm / Angled Up)	FRONT DELT/BICEPS STRETCH (One or Two Person)	EXTERNAL ROTATORS STRETCH (Optional)
			
1 rep / 5-10 secs @ arm	1 rep / 5-10 secs @ arm	1 rep / 5-10 secs	1 rep / 5-10 secs @ arm

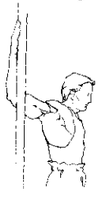
LEVEL 8

INTERNAL ROTATOR CURLS	LYING FLYES	STANDING "L" FLYES	LYING "L" FLYES
			
3 sets / 10-12 reps @ arm	3 sets / 10-12 reps @ arm	3 sets / 10-12 reps @ arm	2 sets / 10-12 reps @ arm

PEC STRETCH (Bent-Arm / Parallel)	PEC STRETCH (Bent-Arm / Angled Up)	FRONT DELT/BICEPS STRETCH (One or Two Person)	EXTERNAL ROTATORS STRETCH (Optional)
			
1 rep / 5-10 secs @ arm	1 rep / 5-10 secs @ arm	1 rep / 5-10 secs	1 rep / 5-10 secs @ arm

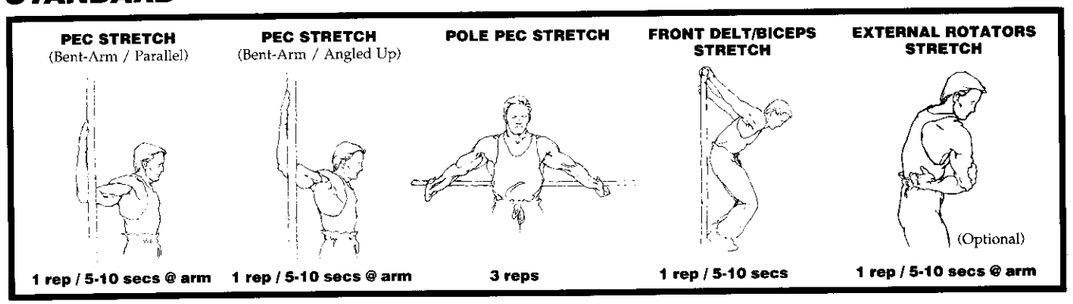
LEVEL 9

INTERNAL ROTATOR CURLS	LYING FLYES	STANDING "L" FLYES	LYING "L" FLYES
			
3 sets / 10-12 reps @ arm	3 sets / 8-10 reps @ arm	3 sets / 8-10 reps @ arm	2 sets / 8-10 reps @ arm

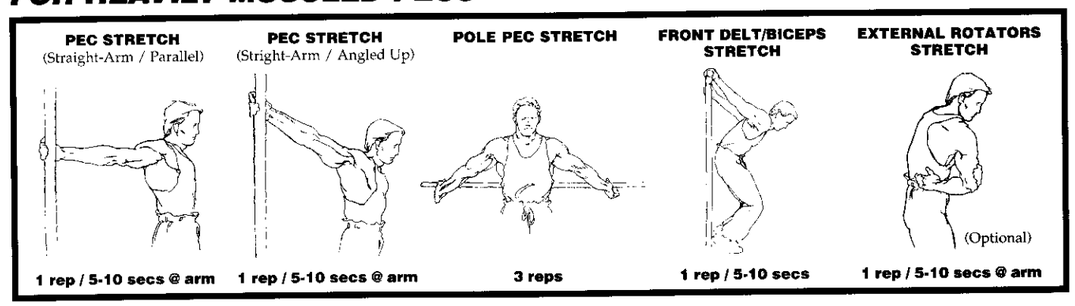
PEC STRETCH (Bent-Arm / Parallel)	PEC STRETCH (Bent-Arm / Angled Up)	FRONT DELT/BICEPS STRETCH (One or Two Person)	EXTERNAL ROTATORS STRETCH (Optional)
			
1 rep / 5-10 secs @ arm	1 rep / 5-10 secs @ arm	1 rep / 5-10 secs	1 rep / 5-10 secs @ arm

Stretching Routines Illustrated

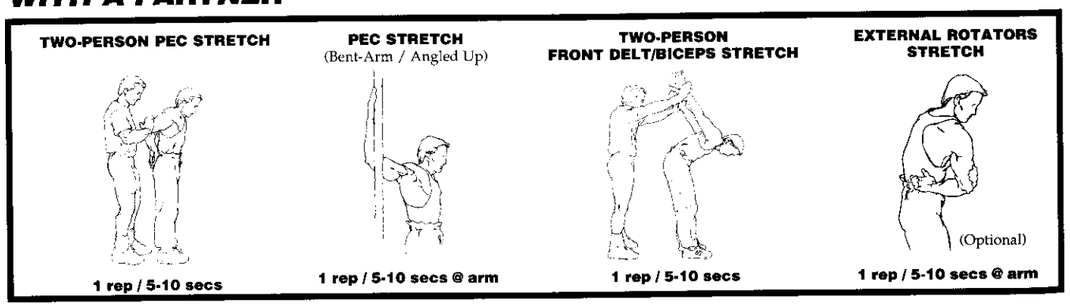
STANDARD



FOR HEAVILY MUSCLED PECS

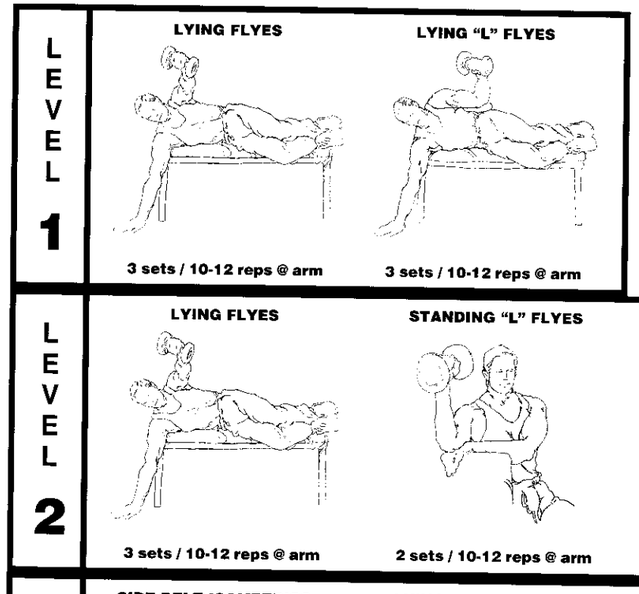


WITH A PARTNER



Athlete's Injury Prevention Routine Illustrated

Finish all levels with a stretch routine from page 92.



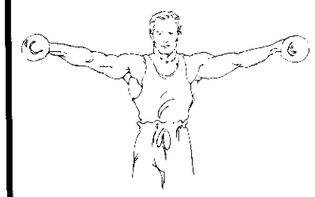
Athlete's Injury Prevention Routine, Including Delts

Illustrated

Finish all levels with a stretch routine from page 92.

LEVEL A

SIDE DELT FLYES

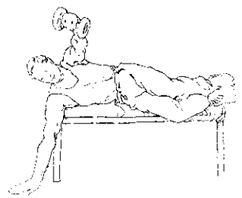


2 sets / 6-8 reps

REAR DELT FLYES

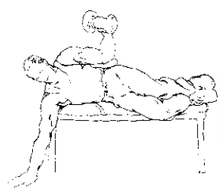
2 sets / 6-8 reps

LYING FLYES



1 set / 10-12 reps @ arm

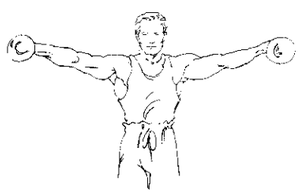
LYING "L" FLYES



2 sets / 10-12 reps @ arm

LEVEL 1

SIDE DELT FLYES



3 sets / 6-8 reps

BEHIND-THE-NECK PRESS

1 set / 6-8 reps @ arm

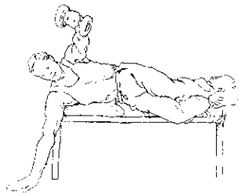
SIDE DELT ISOMETRICS

2 reps / 6 secs per rep

REAR DELT FLYES

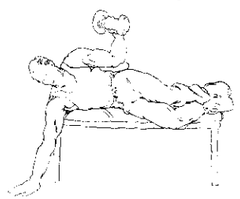
2 sets / 6-8 reps

LYING FLYES



2 sets / 10-12 reps @

LYING "L" FLYES



2 sets / 10-12 reps @ arm

LEVEL 2

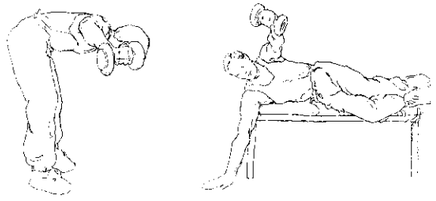
SIDE DELT FLYES • BEHIND-THE-NECK PRESS

2 supersets / 6-8 reps @ arm

SIDE DELT ISOMETRICS

3 reps / 6 secs per rep

REAR DELT FLYES • LYING FLYES

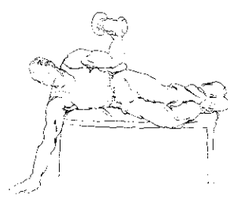


2 supersets / 6-8 reps, 10-12 reps

STANDING "L" FLYES

2 sets / 10-12 reps @ arm

LYING "L" FLYES



2 sets / 10-12 reps @ arm

LEVEL 3

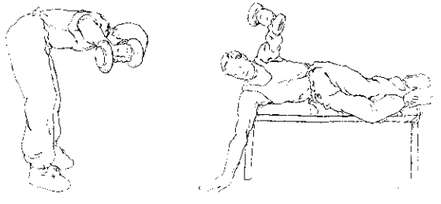
SIDE DELT FLYES • BEHIND-THE-NECK PRESS

3 supersets / 6-8 reps @ arm

SIDE DELT ISOMETRICS

3 reps / 6 secs per rep

REAR DELT FLYES • LYING FLYES

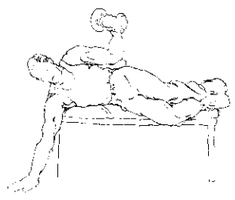


3 supersets / 6-8 reps, 8-10 reps

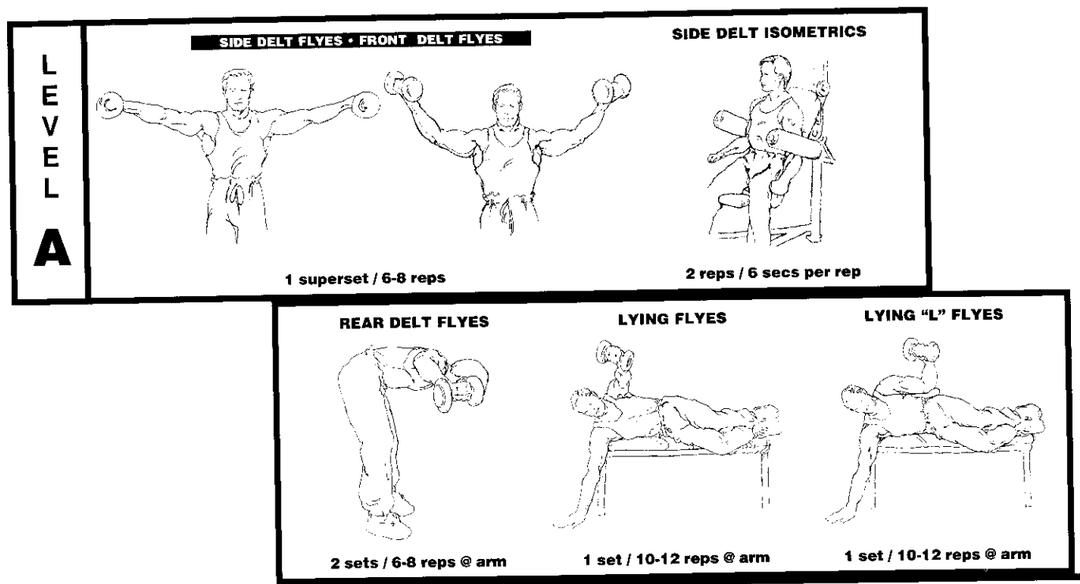
STANDING "L" FLYES

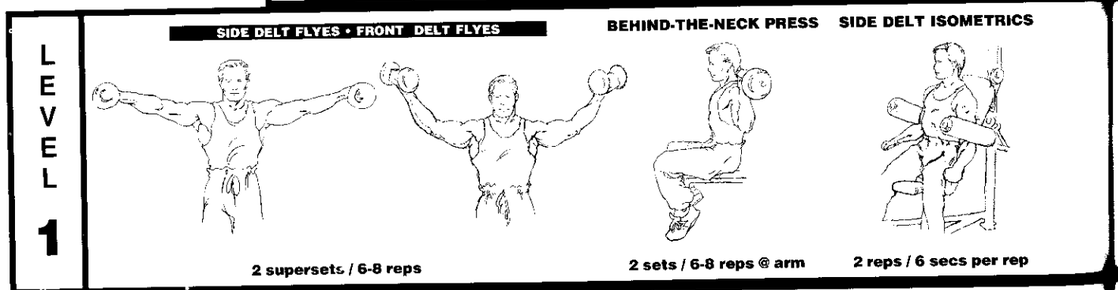
3 sets / 8-10 reps @ arm

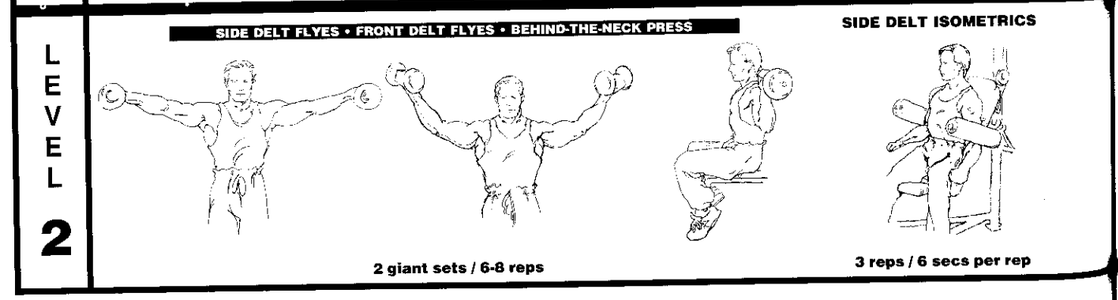
LYING "L" FLYES



2 sets / 8-10 reps @ arm



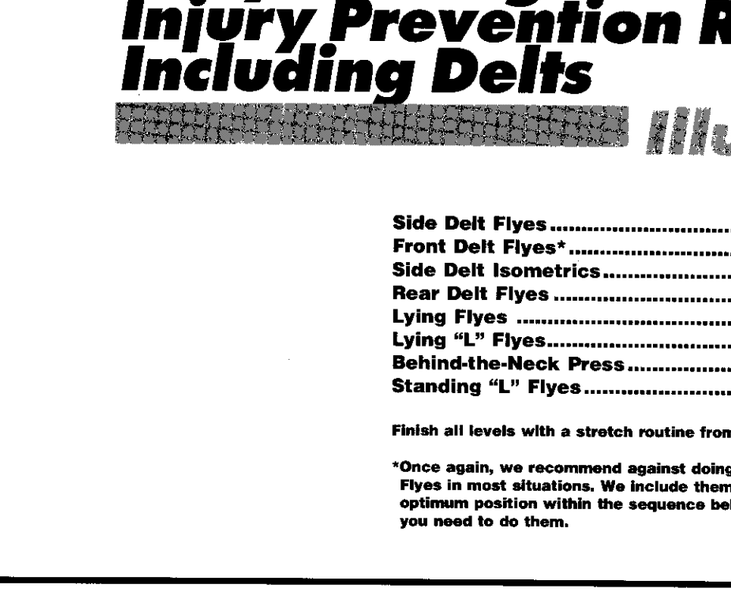


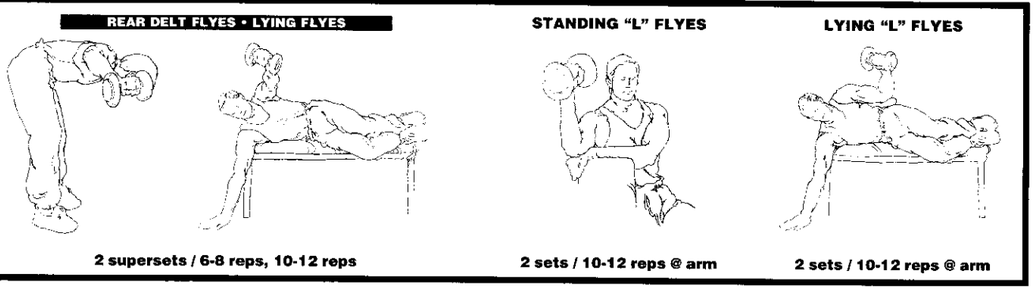


Bodybuilding Injury Prevention Routine, Including Delts Illustrated

Finish all levels with a stretch routine from page 92.

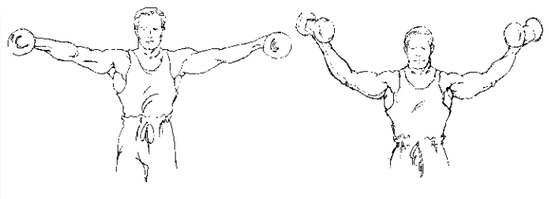
***Once again, we recommend against doing Front Delt Flyes in most situations. We include them in their optimum position within the sequence below in case you need to do them.**





LEVEL 3

SIDE DELT FLYES • FRONT DELT FLYES • BEHIND-THE-NECK PRESS

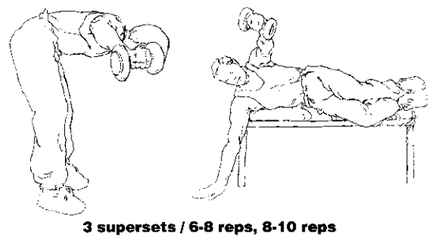


3 giant sets / 6-8 reps

SIDE DELT ISOMETRICS

3 reps / 6 secs per rep

REAR DELT FLYES • LYING FLYES

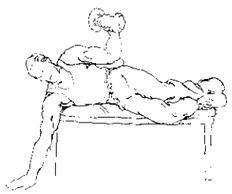


3 supersets / 6-8 reps, 8-10 reps

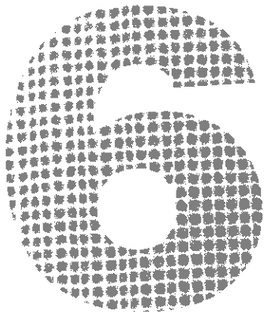
STANDING "L" FLYES

3 sets / 8-10 reps @ arm

LYING "L" FLYES



2 sets / 8-10 reps



HOW MUCH, HOW OFTEN

How you use **The 7-Minute Rotator Cuff Solution** routines—which days on, which days off—depends on whether you are trying to prevent an injury or rehabilitate one.

PREVENTION

If you haven't injured your cuff, count your blessings! Then start *right now* building external rotator strength and internal rotator flexibility.

Begin by picking an appropriate *Athlete's Injury-Prevention* routine from the last chapter. Perform the routine no more than 3 times per week; we recommend 2. Muscle takes a full 36 hours or more to recover from a severe overload. Allowing less time between training sessions can rob you of results and increase your risk of injury.

Also, remember that working to strengthen the cuff is not like pumping to pile mass on your biceps. Don't use more than the recommended amounts of weight listed in *The Exercises* chapter.

Scheduling

Exercise sequence directly affects the effectiveness of a routine. It becomes critical when the muscles you are working perform an essential stabilizing role during other exercises. To

avoid playing rotator cuff Russian roulette, allow at least one rest day before an upper body workout after doing **The 7-Minute Rotator Cuff Solution** program. Working the cuff the day before—or worse, *immediately* before—training upper body decreases shoulder stability enough to put the cuff at risk.

Ideally, the best time to perform rotator cuff exercises is immediately *after* working the upper body. That allows the cuff muscles maximum recovery time before the next upper body workout.

By the same reasoning, martial artists and other athletes should do **The 7-Minute Rotator Cuff Solution** routine *after* performing their skill and strength training.

Split Training

Many athletes **split train**—they work different bodyparts on different days—to decrease training time per workout and conserve energy. If you work an upper-body split, *train the cuff at the end of your last upper-bodypart workout in a cycle of upper-bodypart days.* For example, if you work upper body on Monday and Tuesday, lower body on Wednesday, upper on Thursday and Friday, and lower on Saturday, do **The 7- Minute Rotator Cuff Solution** on Tuesday and Friday. That allows the cuff sufficient time for recovery.

See the charts on the next page for other examples. Again, the idea is never to work any upper bodypart on the day *after* training the cuff. The risk of cuff injury is just too great.

REHABILITATION

If you are (or were recently) injured, do not pass go—get a professional diagnosis. In severe cases, your doctor or therapist may recommend any of several treatments, including laying off training, ultrasound, iontophoresis (trickling electricity through the injured area), and (uh!) possibly even surgery followed by passive exercise. Most cuff injuries don't call for such drastic measures, though.

Regardless of the severity of the injury, effecting a complete recovery will require exercise at some point. That's where **The 7- Minute Rotator Cuff Solution** comes in.

The rehabilitation versions of the program progress at a much slower pace than the prevention ones. Don't hurry through them! While being rehabilitated, the cuff is extremely

EXAMPLES OF OPTIMUM SEQUENCING

If you work your whole body 3 days a week, do **The 7-Minute Rotator Cuff Solution** routines *after* the upper body portion of your routine. If you don't work upper body, do **The 7-Minute Rotator Cuff Solution** routines at the end of your workout.

MONDAY	WEDNESDAY	FRIDAY
Lower Body	Lower Body	Lower Body
Upper Body	Upper Body	Upper Body
7-Minute Rotator Cuff Solution	*7-Minute Rotator Cuff Solution*	*7-Minute Rotator Cuff Solution*

If you use a split routine (different body parts on different days), try to leave as much time between working the cuff and doing your next upper body workouts as possible.

6-day split — Each body part 3 times per week

MONDAY	TUESDAY	WEDNESDAY	THURSDAY	FRIDAY	SATURDAY
Upper Body	Lower Body	Upper Body	Lower Body	Upper Body	Lower Body
7-Min RCS		*7-Min RCS*		*7-Min RCS*	

6-day split — Upper split over 2 days, lower done in 1

MONDAY	TUESDAY	WEDNESDAY	THURSDAY	FRIDAY	SATURDAY
Lower Body	Upper Body	Upper Body	Lower Body	Upper Body	Upper Body
		7-Min RCS			*7-Min RCS*

4-day split — Each body part 2 times per week

MONDAY	TUESDAY	WEDNESDAY	THURSDAY	FRIDAY	SATURDAY
Lower Body	Upper Body	[rest]	Lower Body	Upper Body	[rest]
	7-Min RCS			*7-Min RCS*	

Health For Life's 5-Day / 3-Week Cycle

MONDAY	TUESDAY	WEDNESDAY	THURSDAY	FRIDAY	SATURDAY
Lower Body	Back / Biceps	Chest / Triceps	[rest]	Lower Body	Back / Biceps
		7-Min RCS			*7-Min RCS*
Chest / Triceps	Lower Body	Back / Biceps	[rest]	Chest / Triceps	Lower Body
		7-Min RCS		*7-Min RCS*	
Back / Biceps	Chest / Triceps	Lower Body	[rest]	Back / Biceps	Chest / Triceps
	7-Min RCS				*7-Min RCS*

susceptible to reinjury and you obviously aren't doing yourself any good if you trash it again.

Perform the appropriate rehab routine a maximum of 3 times per week. Allow at least 36 hours between workouts. Although you will be using very light weights, any amount represents a substantial overload to a recovering cuff, so all the rules about recovery time between workouts apply.

We don't recommend you train the major upper body muscles on your injured side while rehabilitating your cuff. It's a good idea to train the major upper body muscles on your *un*injured side, though, because of the cross-training effect explained on the first page of *The Exercises* chapter. If you choose to ignore this warning, at least do your cuff rehab work at the end of your last upper body workout. The basic rule, again, is never to schedule an upper body workout on the day following cuff training. Working upper body with a tired, just-recovering cuff begs reinjury.

If your injury was severe, start the program without using any weight at all. Just move through the exercises, feeling for a slight stretch at the comfortable limit of your range of motion. Then progress to using the 2- or 3-pound dumbbells. Even after you have fully rehabilitated the cuff, you shouldn't work up to much more than about 20 pounds for the Lying Fly, Lying "L" Fly, or Standing "L" Fly. In the initial stages of training, expect to be using less weight during the Lying Fly than during the two kinds of "L" Flyes.

Shoulder injuries don't have to be a "given" of an active lifestyle. Nor is there any reason for minor injuries to the rotator cuff—if they do occur—to develop into chronic physical handicaps. ***The 7-Minute Rotator Cuff Solution*** *routines will guarantee you a stronger, healthier cuff, and afford you the best possible protection against the stresses and strains of athletic activity.*

Use them in good health! Happy training.

❖ ❖ ❖

APPENDIX

A MORE TECHNICAL LOOK AT ROTATOR CUFF BIOMECHANICS AND PATHOLOGY

This appendix covers the same material discussed in chapters 1 through 3, but in greater technical detail.

Muscles of the Rotator Cuff

MUSCLE	ORIGIN	INSERTION
Supraspinatus	Medial 2/3 of the floor of the supraspinous fossa of the scapula	Superior facet of the greater tubercle of the humerus, and shoulder joint capsule
Infraspinatus	Medial 2/3 of the infraspinous fossa	Middle facet on greater tubercle on humerus, and shoulder joint capsule
Teres Minor	Upper 2/3 of the lateral border of the scapula on the dorsal surface, superior to the origin of the teres major	Lowest facet on the greater tubercle, and shoulder joint capsule (Note: The long head of the tricep muscle separates its tendon from the teres major.)
Subscapularis	Medial 2/3 of subscapular fossa of costal surface of scapula	Lesser tubercle of the humerus, and shoulder joint capsule

SHOULDER & ROTATOR CUFF BIOMECHANICS

The basic function of the rotator cuff is to stabilize the shoulder joint and facilitate normal joint motion. To illustrate, let's consider what happens within the shoulder during several common movements: at the beginning of abduction, when raising the arm overhead, and during major upper body motions.

As Abduction Begins

The fibers of the deltoids are primarily vertical when you stand with your arms relaxed at your sides. When the deltoid begins to contract, these vertically oriented fibers pull the head of the humerus superiorly into the joint before actual abduction of the shoulder begins.

Without the action of other muscles, the initial contraction of the deltoid would pull the head of the humerus superiorly without restriction, resulting in the eventual destruction of shoulder joint from bone striking bone. However, the rotator cuff intervenes, performing one of its major functions: depressing the head of the humerus into the G/H joint and stabilizing that joint (Fig. 53).

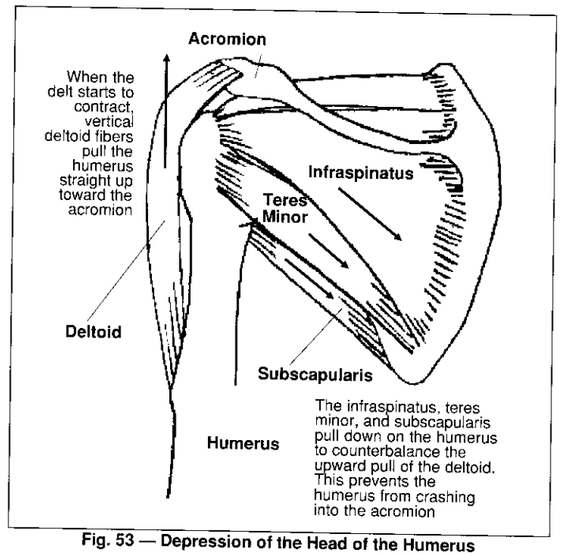


Fig. 53 — Depression of the Head of the Humerus

When Raising the Arm Overhead

During shoulder flexion or abduction, the greater tubercle of the humerus impedes the upward motion in the shoulder joint, by abutting the acromium (Fig. 54a). However, if the humerus is externally rotated before 90 degrees of abduction occurs, the greater tubercle clears the acromion instead of locking against it (Fig. 54b).

If the shoulder is *internally* rotated, the greater tubercle will abut the acromion and/or the coracoacromial ligament at just 60 degrees of abduction. If, on the other hand, the shoulder is externally rotated, the greater tubercle moves behind the acromion and permits 120 degrees of abduction. (Another 60 degrees results from scapulothoracic motion, allowing a total of 180 degrees of abduction.)

We have evolved so as to be in external rotation any time we raise an arm overhead; this action, motivated by two of the rotator cuff muscles, occurs naturally and automatically. Any movement that calls for raising an arm overhead with the shoulder in *internal rotation* has the potential to impinge on the tendons and bursa in the subacromial space and injure those structures.

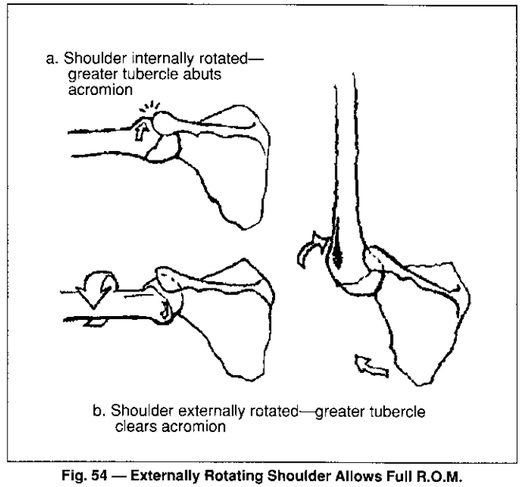


Fig. 54 — Externally Rotating Shoulder Allows Full R.O.M.

During Major Upper Body Motions

The combined actions of the four rotator cuff muscles maintain the stability of the shoulder joint during all motions. This stabilizing allows the prime and secondary movers to act effectively at the shoulder. If the rotator cuff is compromised—through weakness or injury—the prime and secondary movers *cannot* act effectively at that joint, regardless of how strong they are.

Individual Rotator Cuff Muscles

The muscles of the rotator cuff work together to prevent the head of the humerus from striking the roof of the shoulder when the deltoid contracts, to externally rotate the shoulder to prevent impingement, and to stabilize the shoulder to provide a solid base for the larger muscles that act at the joint. Each also acts independently, as explained below.

Supraspinatus

The **supraspinatus** muscle pulls the head of the humerus into the G/H joint. Its position on the scapula allows it to have a very strong pull on the humerus. It also assists in preventing downward dislocation of the head of the humerus (see Figure 55 below and the research note on page 113). The supraspinatus has little, if any, rotatory effect on the shoulder.

The supraspinatus does work with the deltoid to perform abduction of the shoulder. The muscle was once thought to provide the first 30 degrees of abduction, with the deltoid minimally active; the deltoid was supposed to power the majority of the remaining arc of the motion. However, many studies contradict this schema by demonstrating that the activity of the supraspinatus increases progressively with abduction. Currently the supraspinatus is believed to be an accessory to abduction throughout the entire range of movement.

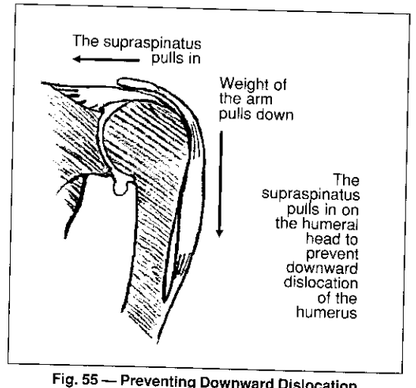


Fig. 55 — Preventing Downward Dislocation of the Humerus

Infraspinatus & Teres Minor

The **infraspinatus** and **teres minor** are adjacent muscles that parallel one another in nature and action. They are tested identically. Their collective action is to externally rotate the shoulder, to depress the head of the humerus in the G/H joint, and to provide continued stability during all movements of the shoulder. Their activity has been shown to rise linearly during abduction.

Subscapularis

The **subscapularis** internally rotates and stabilizes the shoulder by pulling the head of the humerus down and into the joint. The subscapularis reaches a peak in activity at approximately 90 degrees of shoulder abduction, then drops off.

The Role of Other Major Muscles That Act at the Shoulder

The primary purpose of most of the other muscles that act at the shoulder is to move the joint, not to stabilize it (although they do stabilize it to some extent). Several of the muscles exert a rotary influence on the humerus; in some cases, this assists the action of the cuff; in others, it interferes with it. Let's look at those other muscles.

Pectoralis Major

The **pectoralis major** is a large, powerful muscle with various effects on the shoulder joint. It adducts, horizontally adducts, and internally rotates the shoulder. The clavicular head is particularly active and influential in the internal rotation of the humerus, whether there is resistance or not. The clavicular head may also assist the anterior deltoid head in flexion.

Deltoid

All heads of the **deltoid** are active in all movements of the shoulder, but to differing extents. The anterior head of the deltoid promotes flexion, slight abduction, and horizontal adduction. The lateral head abducts and assists somewhat in horizontal flexion and extension. The posterior head extends and horizontally abducts the shoulder.

Recent EMG studies have downplayed the deltoids' role in active rotation of the shoulder. However, less-than-normal extensibility in the anterior deltoid head may play a passive, inhibitory role, presenting resistance to external rotation. (A number of pathologies may result in less-than-normal anterior deltoid extensibility, including fibrosis and adaptive shorten-

Other Muscles That Act At The Shoulder

MUSCLE	ORIGIN	INSERTION
Pectoralis major	Anterior surface of the sternal half of the clavicle, anterior surface of sternum, cartilage of first 6 or 7 ribs, and the aponeurosis of the external oblique muscle	Crest of greater tubercle of the humerus
Deltoid	Anterior: Anterior border, superior surface, of the lateral ⅓ of the clavicle Lateral: Lateral margin and superior surface of the acromion Posterior: Inferior lip of posterior border of spine of the scapula	Deltoid tubercle of the humerus
Teres major	Dorsal surface of the inferior angle and lower ⅓ of lateral border of scapula	Crest of the lesser tubercle of the humerus
Latissimus Dorsi	Spinous processes of last 6 thoracic vertebrae, last 3 or 4 ribs, sacral vertebrae, and posterior ⅓ of external lip of the iliac crest via the thoracolumbar fascia	Intertubercular groove of the humerus
Bicep Brachii	Short head: Apex of the coracoid process of the scapula Long head: Supraglenoid tubercle of the scapula	Radial tubercle; aponeurosis of the biceps brachii
Triceps Brachii	Lateral head: Lateral and posterior surfaces of the proximal half of the body of the humerus Medial head: Distal ⅔ of medial and posterior surface of the humerus below the radial groove Long head: Infraglenoid tubercle of the scapula	Posterior surface of the olecranon process of the ulna and the antebrachial fascia

Other Important Shoulder Structures

STRUCTURE	DESCRIPTION
Subacromial bursa	The subacromial bursa is a vital component of the shoulder joint. This bursa is a large structure that separates the acromion and the superior portion of the deltoid from the muscles that lie on the superior surface of the capsule of the shoulder joint. The synovial fluid within the joint allows the inner surface to slide easily over itself so as to decrease friction during shoulder movement.
Glenoid Labrum	The glenoid labrum is a fibrocartilaginous rim around the glenoid fossa.

ing. These will be discussed in the *Pathology & Dysfunctional Biomechanics* section.)

It is generally accepted that the less-involved heads of the deltoid have some stabilizing effect on the shoulder, although to what degree is not clear.

Teres Major & Latissimus Dorsi

The **teres major** is closely related in action to the **latissimus dorsi.** The teres major demonstrates little activity in motions without resistance. With resistance applied, the teres major performs internal rotation, adduction, and extension of the shoulder. Studies have shown that hyperextension of the shoulder is the only movement that recruits the teres major without resistance. The latissimus dorsi has similar actions, but all of its actions are present in motions without resistance.

Biceps Brachii

The **biceps brachii** plays a significant role at the shoulder due to its anatomic position. Both heads of the biceps are recruited during resisted flexion of the shoulder with the elbows in extension (elbows straight), and also during abduction. In fact, one source states that the biceps brachii provides 15% of abduction power when the shoulder is in full external rotation. Another source states that the biceps' function in abduction is to maintain this fully externally rotated position. The short head is involved in adduction and is minimally involved in internal rotation.

Triceps Brachii

The long head of the **triceps brachii** adducts and extends the shoulder, as well as extending the elbow.

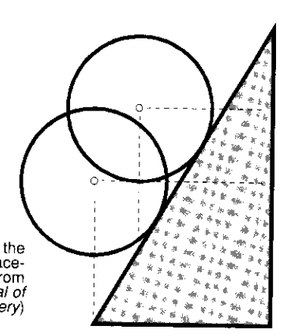
RESEARCH NOTE

Some theorists hold that the more vertically oriented muscles surrounding the shoulder (deltoid, biceps brachii, long head of the triceps) prevent a downward dislocation of the humerus when supporting a load. However, EMG studies indicate this is not the case.

Three factors are critical to shoulder stability in the prevention of downward motion of the humerus:

- The first is the slight upwardly rotated position of the scapula at rest so that the glenoid fossa faces slightly upward.
- The second is the superior aspect of the joint capsule, which, when it becomes taut, prevents the downward displacement of the humerus.
- The third is the activity of the more horizontally oriented muscles, which pull the head of the humerus into the joint, which is upwardly oriented. This acts as a locking mechanism (see illustration).

Electrical studies show the active muscles to be the supraspinatus and a portion of the posterior deltoid. The vertically oriented muscles demonstrate negligible, if any, activity.



The locking mechanism at the shoulder. The farther down the slope the ball slides, the farther it is displaced laterally. If the lateral displacement can be prevented, the ball cannot move downward. (from J.V. Basmajian and F.J. Bazant, © 1959, *Journal of Bone and Joint Surgery*)

Subclavius

Some health care providers believe that the small **subclavius** muscle has a significant effect on shoulder and other actions. However, at least one study calls this into question. Twelve subjects with needle electrodes inserted in the subclavius were put through 31 different movements and postures. Based on when the subclavius was active and when it was not, the authors concluded that the muscle's main function is to assist ligaments in stabilizing the sternoclavicular joint. The muscle does not seem to have other significant biomechanical functions.

Three of the muscles just discussed—the pectoralis major, the teres major, and the latissimus dorsi—internally rotate the shoulder. Along with the subscapularis, they act in opposition to the two small externally rotating muscles of the rotator cuff, the teres minor and the infraspinatus. In all ways—mass, number, and force—the internal rotators overpower the external rotators; this inherent imbalance can lead to a number of problems for the rotator cuff. We will cover those problems late in the next section, *Pathology & Dysfunctional Biomechanics*.

PATHOLOGY & DYSFUNCTIONAL BIOMECHANICS

The healthy cuff acts to stabilize the shoulder, provide a solid base from which the larger prime and secondary movers can act, externally rotate the shoulder, and assist in internally rotating the shoulder. If the cuff is compromised, it may be unable to perform any or all of these functions. A number of pathologies can participate in the compromising. Below, we take each in turn, mild to severe.

Chronic Degeneration

The tendinous fibers of the rotator cuff at or near the tuberosities undergo degenerative changes with age. All people over the age of 60 have some degenerative change. Some sources believe that a degree of deterioration occurs in the rotator cuff by the age of 40. Athletics can certainly accelerate this degeneration well beyond that expected for an athlete's chronological age.

Inflammatory Conditions

Any athlete involved in weight training and/or throwing sports can develop bursitis, tendinitis of the rotator cuff or biceps tendons, or inflammation of muscles, fascia, and joint capsule. These usually manifest as pain in the front of the shoulder; indeed, the area may be very sensitive to the touch, especially deep touch or palpation.

In athletes, the various inflammatory conditions usually result from poor exercise mechanics coupled with excessive training volume. Just as "fatigue" or overuse injuries can afflict the legs and feet from excessive marching or running, so they can afflict the shoulder joint from poor execution of exercises coupled with too great a training load.

RESEARCH NOTE—"Wringing Out" the Supraspinatus

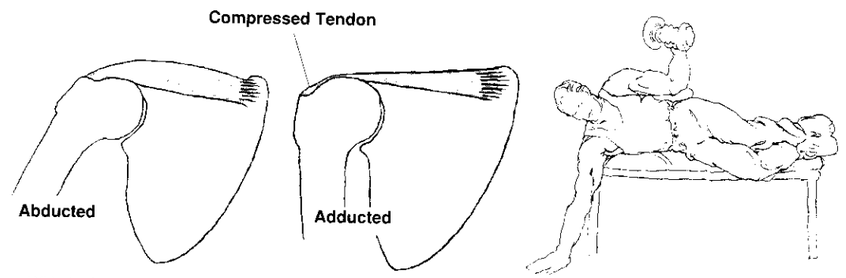
Research has shown that degenerative changes in tendons occur first and most extensively in areas of avascularity. Studies dating back to 1939 (Lindblom) describe an area of relative avascularity in the supraspinatus tendon near its insertion on the greater tubercle. The same study also describes a similar avascular area in the long head of the biceps near its origin on the supraglenoid tubercle.

More recent work (Rathbun and MacNab; 1970) involving infusion of micropaque into the rotator cuff vascular systems in cadavers has shown that the degree of avascularity depends on the position of the humerus. If the humerus is in a neutral position (adducted) when micropaque is injected, an area of tendon adjacent to the supraspinatus insertion remains largely ischemic. On the other hand, if the tension on the supraspinatus is relaxed by passively abducting the humerus, the vessels throughout the tendon—including the area near its point of insertion—fill almost completely.

The authors surmise that the constant pressure exerted on the supraspinatus tendon by the humerus when the arm is fully adducted may "wring out" the vessels in the area (see illustration below). They also note that the intracapsular biceps tendon, similarly stretched over the head of the humerus, shows an area of avascularity near its insertion; the other rotator cuff tendons, not stretched over the head of the humerus, do not.

This study is often cited in support of the recommendation to place a pillow under the elbow during exercises such as the Lying "L" Fly (see below). The rationale is that the slight abduction encouraged by the pillow will prevent wringing out the supraspinatus tendon. This, is turn, is supposed to decrease contribution to the degeneration of that structure.

Although the pillow may, in fact, decrease the supraspinatus avascularity for the 20 seconds or so it takes to do the exercise, it seems unlikely this brief respite is significant in terms of long-term degeneration of the cuff.



a. With the humerus abducted, the tendon is infused with blood

b. With the humerus adducted, the humeral head may "wring out" the supraspinatus tendon*

c. Lying "L" Fly

*From J.B. Rathbun & I. MacNab; *Journal of Bone and Joint Surgery*; Aug. 1970.

Tears

Rotator Cuff tears—which most frequently involve the supraspinatus—often result from falls or from lifting heavy objects. Typically, a tear causes severe, acute pain that increases in the hours following the injury event. The adductors and internal rotators of the shoulder usually go into a guarding or protective muscle spasm.

Patients with cuff tears may be unable to abduct their arms past 45 degrees; attempts to raise the arm further cause a shrugging-like motion. If left untreated, the pain will eventually diminish substantially, but the weakness will remain, and the loss of shoulder stability will cause further degenerative changes. It's very likely some of them will eventually be arthritic changes.

A complete tear or rupture of the rotator cuff needs to be surgically repaired.

Impingement Syndrome

Impingement can involve any tendon, muscle, bursae, ligament, or nerve that is repeatedly subject to compression in a small space.

During full gleno-humeral flexion, any or all of three structures may be impinged upon: the supraspinatus tendon, the tendon of the long head of the biceps, and the subacromial bursa. Two of those structures—the supraspinatus tendon and the subacromial bursa—may also be impinged upon during partial flexion with internal rotation, or partial abduction with

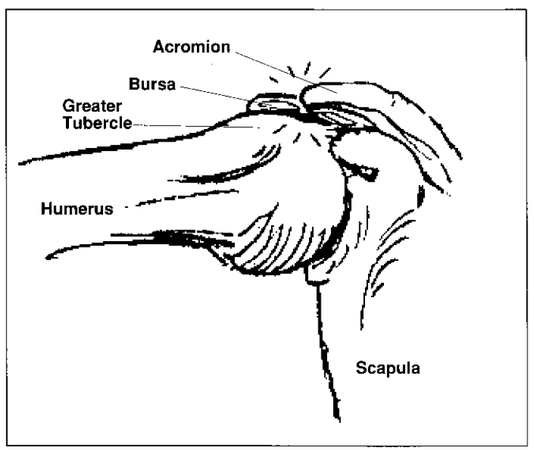


Fig. 56 — Shoulder Bursa Being Impinged Upon

internal rotation. Impingement occurs between the greater tubercle and the "roof" of the shoulder, formed by the acromion and the coracoacromial ligament. Both joint action and indvidual biomechanics determine whether the acromion or the coracoacromial ligament is the primary impingement site.

In general, during gleno-humeral abduction or flexion of 50 to 130 degrees, the greater tubercle rides very close to the roof of the shoulder. A number of factors can decrease the available joint space and increase the degree of impingement, including:

- inflammation and swelling of the supraspinatus tendon, the tendon of the long head of the biceps, or the subacromial bursa
- subacromial or A/C spurs
- hypertrophy of a degenerative A/C joint
- performing abduction or flexion with the humerus internally rotated

Here's one example of a situation in which impingement may be causing disfunction: The shoulders of a swimmer doing the butterfly stroke are *internally* rotated while the arms are being abducted and flexed (from 70 to 120 degrees arc of elevation; Fig. 57a). In contrast, the shoulders of a baseball pitcher are *externally* rotated while the arm is abducted and flexed (Fig. 57b). The pitcher's externally rotated position allows the greater tubercle to clear the coracoacromial structures. The swimmer's internally rotated position may not, perhaps accounting for the greater percentage of impingement syndrome cases in swimmers versus pitchers.

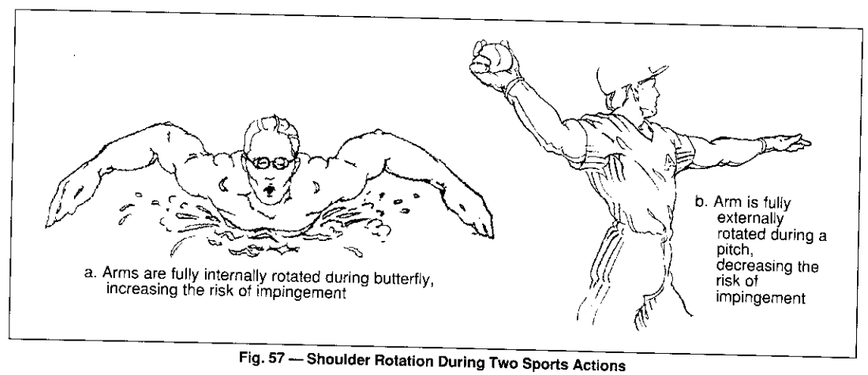


Fig. 57 — Shoulder Rotation During Two Sports Actions

In general, activities which call for repeated abduction and flexion of the shoulder without sufficient external rotation are likely to cause impingement, and may lead to tendinitis in the shoulder.

Calcific Changes

Degenerative changes from chronic tendinitis predispose the tendons to develop calcium deposits. The calcium deposits may work their way to the tendon surface and rupture into the adjacent bursa. A decrease in pain indicates that the calcium has indeed ruptured into the bursa (or into the fascia or biceps tendon). Such a rupture is likely to resolve the condition, but in some cases, it causes increased inflammation of both tendon and bursa, possibly leading to chronic adhesive tenosynovitis and bursitis.

Calcific tendinitis primarily occurs in males in their 30s and 40s. The onset may be either gradual or acute, following a sprain or overuse. One of the most common sites from calcific tendinitis is the supraspinatus tendon—about 3% of the adult population has calcific deposits at that location. Those affected often experience **painful arc syndrome**, pain when moving the shoulder through 50 to 130 degrees of abduction. This is caused by calcium in the tendon coming in intimate contact with the acromion.

Degeneration of the Long-Head-of-the-Biceps Tendon (L/H Biceps Tendon)

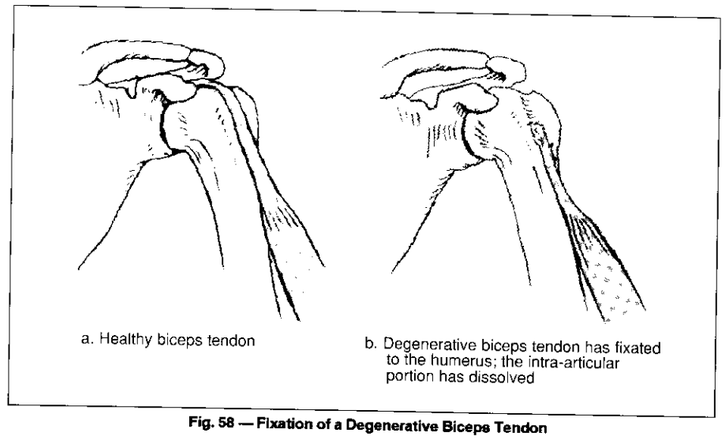
Although not part of the rotator cuff, the tendon of the long head of the biceps (in this text, *the L/H biceps tendon* for short) is anatomically interwoven with other structures surrounding the cuff. It is subject to stress in various sports, especially weight training.

The L/H biceps tendon originates on the scapula above the glenoid fossa. The tendon passes close to the articular surface and travels downward to the bicipital groove, whose walls and floor provide points of insertion for the other shoulder muscles. The groove is covered by fascial extensions of the subscapularis muscle tendon at the upper end, and by fascial extensions of the pectoralis major muscle tendon at the lower end. Within the joint, the L/H biceps tendon is also close to the surface of the capsule and the coracohumeral ligament.

Movement at the glenohumeral joint causes the tendon to glide within the groove.

Degenerative changes of the biceps go hand in hand with degenerative changes of the cuff. These changes can occur from excessive use, major trauma, or the repeated minor trauma of normal activities. Adhesions may form between the biceps tendon and both the transverse humeral ligament and the pectoralis tendon. These adhesions can restrict gliding within the groove, limiting movement in the shoulder joint itself.* Adhesions can cause pain with movement; the pain is probably from tension exerted on the surrounding fascial structures.

In extreme cases, the biceps tendon (Fig. 58a) may actually become fixed against the bicipital groove, after which the intra-articular section of the tendon may dissolve (Fig. 58b). Such fixation of the tendon can result in decreased range of motion.



a. Healthy biceps tendon

b. Degenerative biceps tendon has fixated to the humerus; the intra-articular portion has dissolved

Fig. 58 — Fixation of a Degenerative Biceps Tendon

Contractures, Adaptive Shortening, and Fibrosis

When a muscle and associated fascia and joint capsule remain in a shortened state for a long time, they can develop a gross, persistent shortening that is resistant to stretching. This is called a **joint contracture**. Left untreated, joint contractures eventually become irreversible.

*Some researchers feel that biceps tenosynovitis is a major contributor to joint contracture of the shoulder ("frozen shoulder").

There are many causes of joint contractures. Contractures can arise from ischemia, prolonged muscle imbalance, pain, disuse atrophy, and prolonged immobilization. The most frequent causes for athletes are prolonged muscle imbalance and pain.

From Muscle Imbalance

How do muscle imbalances arise? They usually arise from poor training habits.

For a number of reasons, athletes tend to train only the major muscle groups. They work the back, chest, shoulder, and arms, strengthening (among other muscles) the pectoralis major, teres major, latissimus dorsi, and deltoid—all of which internally rotate the shoulder. They unintentionally ignore or undertrain the infraspinatus, teres minor, and posterior deltoid—the muscles of external rotation. This creates the imbalance.

As a result, the stronger internal rotators overpower the relatively weaker external rotators, and the stage is set for an injury—including contracture of the shoulder due to the eventual shortening of the internal rotators.

From Pain

Strengthening the external rotators can reduce the muscle imbalance, but won't necessarily prevent the development of joint contracture. The athlete may come to the condition along another path, also involving poor training habits.

These include:

- training the same muscle groups too frequently
- training the same muscle groups with too much weight
- training the same muscle groups with too much weight too often

To that list, beginning lifters add:

- poor choice of exercises
- poor lifting technique

Any of these can produce minor trauma and subsequent inflammation. The inflammation may lead to **fibrosis**—the formation of fibrous adhesions around and within muscle that limit range of motion and produce pain.

In and of itself, the reduced range of motion from fibrosis may not be severe enough to be classified as joint contracture. But the pain associated with the condition, coupled with fear

of further injury, often causes a more limited type of contracture, called **precontracture**, or **adaptive shortening**: As the athlete avoids painful movements, the body adapts to not performing them.

For example, in response to pain in the shoulder, the athlete may discard exercises involving overhead motions; the body adapts by shortening the adductors since there is no longer a demand for flexibility on the part of those muscles.

Fibrosis, Adaptive Shortening, and the Rotator Cuff

Within the shoulder, fibrosis and adaptive shortening can affect not only the small muscles of the cuff, but the larger internal rotators (such as the pecs) as well (Fig. 59).

If the athlete continues to weight train after these conditions develop, increased microtrauma within the muscles may eventually reach a point where the athlete is uncomfortable performing *any* exercise requiring both external rotation of the shoulder and stabilization from the cuff.

The progressive loss of external rotation—due to fibrosis and adaptive shortening of the antagonistic internal rotators—is a common denominator in rotator cuff injuries.

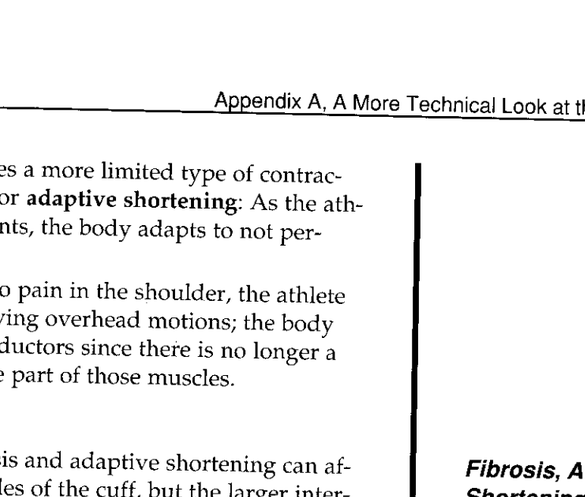


Fig. 59

The first exercises to go are usually the Behind-the-Neck Press and the Behind-the-Neck Pulldown. Typically, the athlete will comment that he or she "just can't do those exercises

anymore." Discomfort in performing the Behind-the-Neck Press arises because the exercise requires full external rotation and scapular retraction—both of which are essentially impossible with shortened internal rotators. If the athlete attempts to do the exercise despite having shortened internal rotators, the external rotators must overwork just to achieve the starting position of full external rotation. The addition of resistance in that position is often too much for the small external rotators to withstand. The cuff muscles—especially the externally rotating infraspinatus and teres minor—are further strained.

It's a vicious cycle: poor form leads to adaptive shortening of the internal rotators, limiting external rotation; this increases stress on and causes microtrauma of the external rotators; which in turn leads to worse form and greater adaptive shortening of the internal rotators; which leads to more stress on and greater micro-trauma of the external rotators, and so on.

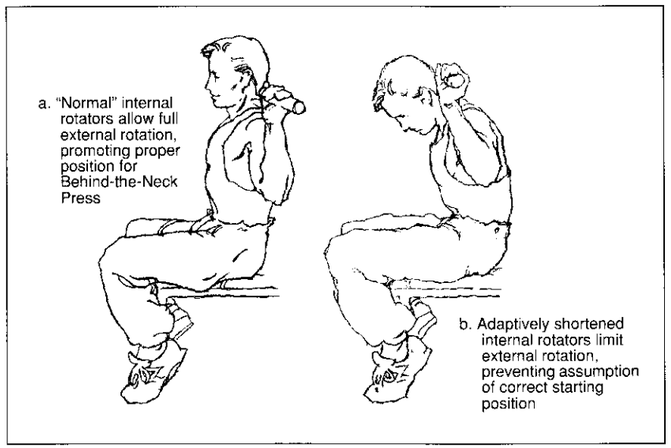


Fig. 60

Rotator Cuff Pathologies From Sports

Weight training is not the only way to injure the rotator cuff. In this section, we look at how three other sports—baseball, tennis and martial arts—may do the job just as well.

Baseball

The speed of a professionally thrown baseball ranges from 85 to 105 mph. At the moment of release, the pitcher's hand is traveling at the same speed. The hand must go from 85 mph

or more to 0 mph at the end of the follow-through—a distance of a little more than four feet. The decelerators must not only slow down the upper limb, they must keep the humeral head from dislocating, because, in essence, throwing a baseball is an attempt to throw the upper limb away from the body.

The main muscles involved in decelerating the arm are the muscles of the rotator cuff, plus the lower and middle trapezius, rhomboids, posterior deltoid, many ligaments, the posterior joint capsule (especially as fatigue becomes a factor), and major muscles of the back and hip.

A typical pre-injury scenario goes like this: Fatigue causes the cuff muscles to lose some of their ability to stabilize the shoulder. Fine motor control degrades. After pitching three base hits in the seventh inning, the pitcher is finally relieved—but by then the shoulder has taken a severe beating. The shoulder requires rest; due to playing schedules, it sometimes doesn't get it. Once again the stage is set for inflamation or a more severe injury.

Several orthopedists have reported posterior shoulder pain occurring during both the follow-through and the cocking phase of throwing. Pain on the follow-through makes sense in light of the demands placed on the rear deltoid and external rotators during the deceleration phase.

Posterior pain on the *cocking* phase, however, is most likely due to adaptive shortening, fibrosis, and postural changes in the accelerator muscles (the internal rotators and adductors). Again, we have the common denominators for rotator cuff injuries: decreased external rotation and scapular retraction. If the pitcher cannot achieve full external rotation, he or she will

RESEARCH NOTE

The glenoid fossa normally tilts slightly posteriorly. However, research indicates that, if the glenoid fossa tilts *anteriorly*, the shoulder is likely to be unstable. Two recent studies revealed that 80% of 21 baseball players with unstable shoulders had an anterior tilt of the glenoid, while only 27% of 50 baseball players with normal shoulders had an anterior tilt.

forcefully contract the external rotators to achieve the necessary range of motion. He or she will also use the momentum of the trunk to achieve a greater degree of rotation and "opening" in the shoulder. This accounts for some of the posterior shoulder pain during the cocking phase.

CASE STUDY

A college baseball pitcher reported to the Soft Tissue Center just after having a cast removed from his arm for a spiral fracture of his humerus.

An evaluation of this athlete disclosed significant loss of external rotation, which is to be expected after six weeks in a cast. The pitcher said, however, that his range of motion had never been much more than normal, indicating that he had been pitching with insufficient external rotation and horizontal extension, since pitching requires a *greater* than normal range of motion.

This athlete's inability to achieve the necessary range of motion, coupled with the rotation demand and the torque generated, placed an enormous rotary stress on his humerus. Eventually, this stress exceeded the strength of the bone and caused a fracture.

With appropriate rehabilitation and training, the underlying biomechanical imbalance was corrected and he returned to pitching with a greater range of motion than before the injury.

Tennis

Tennis and other racquet sports are similar in some respects to throwing a baseball, but the weight of the racquet is an added factor. The speed of a tennis serve may reach 125 mph. The added weight and lever length of the racquet require greater decelerating force to counteract the greater torque about the shoulder. Serve and forehand spins can add to the impingement syndromes because they involve internal rotation. The ballistic and repetitive nature of overhand-delivery sports can easily lead to overuse microtrauma if the musculature is too tight or underconditioned, or if technique is faulty.

Martial Arts

The shoulder injuries of boxers and other martial artists go largely unreported by the sports media. From a news standpoint, shoulder injuries seem second-rate compared with fractures of the hand, jaw, and ribs, tears of the ligaments of the knee, and the sometimes life-threatening neurologic damage experienced by participants in those sports.

In throwing a punch, a boxer hurls the upper limb forward at the greatest possible speed. The rotator cuff has a major task in stopping this motion.

With the ballistic repetition that boxers experience training with the speed bag, the heavy bag, sparring, and shadow boxing, the cuff is chronically strained. Boxers frequently have other, more painful complaints, but shoulder pain is essentially always on the list.

CASE STUDY

Shadow boxing places particularly high stress on the rotator cuff since the muscles alone, not contact with the opponent, must decelerate and stabilize the limb during the follow-though.

A boxer who was experiencing severe pain while shadow boxing demonstrated tenderness on palpation of the infraspinatus and teres minor. Tests for an actual rotator cuff tear were negative. The boxer was instructed to switch from shadow boxing to punching the heavy bag. After he did so, the pain disappeared.

This case is an example of a typical rotator cuff "injury" that may not be a candidate for a more aggressive, invasive approach.

Many other pathologies can occur about the shoulder in throwing sports, contact sports, and weight training—fractures, avulsions, neurovascular entrapment syndromes, cervical disc pathology, and brachial plexus injuries, just to name a few. Discussion of these is beyond the scope of this book.

PREVENTION AND REHABILITATION

Athletes fall into one of four categories:

- Those with biomechanically healthy shoulders and no rotator cuff injuries
- those with biomechanically healthy shoulders, but with an acute cuff injury (usually brought on by an unexpected stress to one or more of the cuff muscles)
- those with biomechanically *un*healthy shoulders, but no specific cuff injury
- those with biomechanically unhealthy shoulders plus an injury that looks as if it were brought on by an acute, unexpected stress to one of the cuff muscles—but is actually a manifestation of chronic dysfunctional shoulder biomechanics. The dysfunction may simply involve a muscular strength imbalance between the internal and external rotators. Or it may be more extensive, involving fibrosis and adaptive shortening

Members of all four groups will benefit from an exercise program designed to promote balanced strength and full range of motion in the cuff.

- The uninjured athlete with healthy shoulders stands to improve cuff stability, very probably improving athletic performance and definitely decreasing risk of cuff injury
- The uninjured athlete with poor shoulder biomechanics stands to improve them, most likely enhancing performance and preventing the occurrence of an injury for which the stage was being set
- The healthy athlete with an acute injury stands to get back on the field faster
- The injured athlete with poor mechanics stands to get back on the field faster, and to begin to reverse a condition that has probably been compromising his or her performance

Of course, some types of injuries may require more extensive preliminary treatments, including surgery; however, *all types of injuries require therapeutic exercise at some point to effect a successful rehabilitation*. In addition, many injuries just don't have to occur in the first place. They can be prevented by proper conditioning. This requires a threefold approach:

- strengthening the external rotators
- stretching the internal rotators
- modifying improper training form

Prevention

Strengthening the External Rotators

Strengthening the external rotators helps restore a balance between the naturally stronger internal rotators (including the subscapularis, pectoralis major, teres major, and latissimus dorsi) and the fewer and weaker external rotators (the teres minor and infraspinatus).

Because the *internal* rotators as a group are naturally stronger, and because the athlete trains them anyway with exercises for the chest and back, we feel strongly that a rotator cuff conditioining program for athletes does not need to include exercises specifically intended to strengthen them.*

One exception to the *no internal rotator work for athletes recommendation*: Studies show that if the shoulder has dislocated repeatedly, resultant weakness in the internally rotating subscapularis becomes a major contributor to ongoing shoulder instability (even though the subscapularis is not usually involved in shoulder injuries). In this case, strengthening the subscapularis and other muscles with similiar actions can reduce this instability. (Strengthening the external rotators also decreases shoulder instability and reduces incidence of anterior dislocation by decreasing the strain on the inferior gleno-humeral ligaments.)

*__Non-__ athletes present a completely different strength-by-muscle profile than athletes. One way this manifests is their having a much higher incidence of internal rotator injuries. At the very least, non-athletes should include internal rotator exercises in their cuff-strengthening routine. Better still, they should begin doing an upper-body strengthening workout and supplement it with *__The 7-Minute Rotator Cuff Solution__* program.

Stretching the Internal Rotators

The second step is *stretching the internal rotators.* Most athletes don't normally do this. In fact, few stretch their upper bodies at all. Couple this lack of flexibility work with the natural overemphasis on training the muscles responsible for internal rotation, and it is pretty obvious why so many athletes end up with adaptively shortened internal rotators. (The protracted-scapulae posture common among bodybuilders is evidence of the condition.)

Regular stretching of the internal rotators—requiring about 2 to 3 minutes per workout—can prevent their adaptively shortening, or reverse the condition if it is already in process.*

Modifying Improper Training Form

The third and final step involves modification of various exercises that improperly stress the cuff. This is largely a matter of preventing impingement by adjusting movements that call for shoulder flexion or abduction with the shoulder in an internally rotated position. Some exercises, such as the Upright Row, are so biomechanically unsound that they should simply be eliminated from the athlete's repertoire (see page 47).

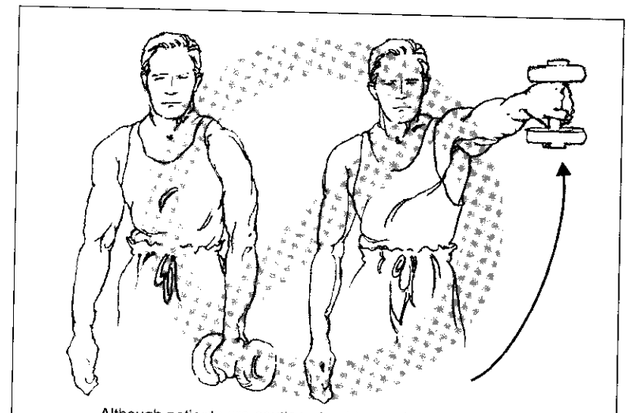
The same thinking applies to exercises specifically intended to rehabilitate. Many shoulder rehabilitation exercises have been around for years. Some are very effective; other less so. Here are two we feel should be retired from the health care provider's arsenal of rotator cuff rehabilitation techniques.

SUPRASPINATUS FLYES. This commonly prescribed exercise is mentioned in a *Training Alert* box on page 52. The Supraspinatus Fly requires the patient to perform a motion halfway between a Front Delt Fly and a Lateral Delt Fly, palm out, with shoulder flexion/abduction occurring at 20 to 40 degrees from midline (Fig. 61). The thinking behind this position is that by internally rotating the shoulder during the exercise, you can take a movement usually motivated both by the deltoid and the supraspinatus—namely abduction—and adjust it to decrease the focus on the deltoid, creating an exercise that better targets the supraspinatus (EMG studies performed at various clinics show that the exercise is effective in this regard).

However, the shoulder is in full internal rotation during this motion. Although patients are usually advised not to flex/abduct higher than about 90 degrees while performing it, there is no way to ensure compliance except under clinical conditions.

We have discussed the hazards of subacromial impingement possibly with as little as 60 degrees of shoulder abduction or flexion with internal rotation. Indeed, there are orthopedic tests that mimic the movement of this exercise whose purpose is to illicit symptoms of pathology in the suprahumeral structures in the subacromial space. Although the exercise is effective at strengthening the supraspinatus, instructing an athlete to perform such a motion as part of a rehabilitation routine may contribute to or exacerbate the patient's symptoms.

*Severe adaptive shortening involving extensive fibrosis may require techniques beyond passive stretching to effect a reversal.



Although patients are cautioned not to go above the 60-degree mark when doing the Supraspinatus Fly, there is no way to ensure compliance. Often, the exercise is done as illustrated above, with the arm exceeding the 60-degree point.

Fig. 61 — The Supraspinatus Fly

ELBOW-DOWN, STRAIGHT-ARM FRONT DELT FLY. Another exercise often used in rehabilitation programs to develop shoulder strength and range of motion, this move is basically a Front Delt Fly performed with the arms fully externally rotated and the elbows fully extended (Fig. 62, next page).

The exercise presents a certain hazard. The position recruits the long head of the biceps and places excessive mechanical stress on the proximal tendon of the long head of the biceps. This puts the patient at risk for the development of biceps tendonitis. Since a similar, but safer alternative exists (as detailed on page 40 in *The Exercises* chapter), we question the need for this type of exercise.

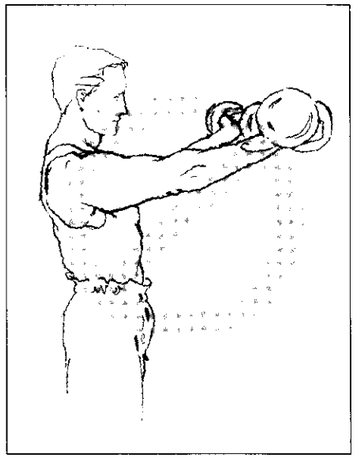


Fig. 62 — The Straight-Arm Front Delt Fly

For a full discussion of exercises for conditioning and rehabilitating the rotator cuff, see *The Exercises* chapter, starting on page 34.

Rehabilitation

Movement—as opposed to immobilization—is the foundation of effective athletic rehabilitation.

R. B. Salter, M.D., a well-known orthopedist and research physician, studied the healing time of damaged tissue when motion was incorporated into the recovery/rehabilitation period. The study involved the damaged knee cartilage of rabbits. One set of rabbits was immobilized for prolonged periods (the old approach to an injury); the other set had the injured limb moved continuously by a small machine. The end result was dramatic. The group whose limbs had been moved continuously showed substantially better healing than the immobilized group.

We see the human application of this work today with patients who have had total knee replacements. While the patients are in recovery, units that produce continuous passive motion (CPM) move the patients' replaced knees. More rapid healing results.

In general today, health care providers encourage patients to begin to move much sooner after various surgical procedures;

the days of prolonged bed rest are gone. Indeed, when patients are kept moving, the prognosis seems much improved. Rotator cuff rehabilitation also progresses most quickly when the rehab program rests on a foundation of movement, not immobilization.

Even in the case of an extreme cuff injury requiring surgery and subsequent casting, gentle passive shoulder movement soon after the cast comes off can accelerate healing. And in the vast majority of rotator cuff injury cases—those that *don't* require surgery—therapeutic exercise (such as the program described in the *Routines Section*) will get the athlete back on the field much more rapidly than other rehab modalities. Indeed, in many cases, therapeutic exercise can get the athlete back on the field where other modalities have failed!

That's not to say that other modalities have no place in a rehabilitiation program. Subacromial injection, if properly placed, can alleviate the inflammation that results from impingement. The same holds true for training layoffs, anti-inflammatory medications, ultrasound, and electric muscle stimulation.

However, it's important to realize that none of these address the biomechanics of the shoulder. If those biomechanics are dysfunctional, as they often are in athletes, thanks to improper training, a rehab program that just treats an inflammed or torn rotator cuff muscle *will* fail. Same goes for a rehab program that just aims to strengthen a recovering cuff muscle. The muscles of a fibrotic cuff, or one whose action is limited by adaptively shortened or fibrotic internal rotators (or both), will not respond to training as normal, uninjured muscles would. Indeed, throwing strengthening exercises at a dysfunctional shoulder may well make the problem worse.

Bottom line: Most cuff injuries require more than a simple, single-modality approach. To be effective, a sound rehabilitation program must simultaneously address the disparate aspects of the dysfunction: the acute injury must be treated, weakened muscles must be strengthened, shortened muscles must be stretched, and poor training techniques must be eliminated from the athlete's conditioning routine.

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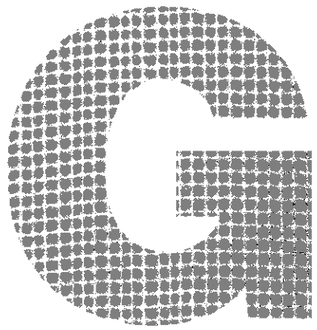

GLOSSARY

Abduction, shoulder: Raising the arm to the side.

Acromion: The part of the scapula that forms the "roof" of the shoulder. The acromion and clavicle together form the acromio-clavicular joint.

Acromio-clavicular Joint: A shoulder joint formed by the abutting of the acromion and clavicle.

Adduction, shoulder: Bringing the arm down to the side from an abducted position.

Anterior: Front.

Balanced Development: Proportional development of the strength of each of the muscles of an opposing muscle-group pair at some joint (e.g. biceps/triceps).

Biomechanics: The scientific study of the mechanics of human movement. Also called *kinesiology*.

Clavicle: The collar bone.

Compound Set: Two exercises for the *same* muscle or muscle group performed back-to-back without rest. (Compare *Superset*.)

Deltoids: The three-headed shoulder muscle.

Extension, shoulder: Bringing the arm down from a raised-to-the-front position.

External Rotation, shoulder: Rotating the shoulder outward. Also called *lateral* rotation.

Flexion, elbow: Bending the elbow

Flexion, shoulder: Raising the arm to the front.

Functional Strength: The ability of the body to bring a coordinated muscular effort to bear on external resistance in everyday situations, such as moving a refrigerator.

Functional Strength Exercise: Exercises that most closely duplicate movements in everyday life.

Giant Set: Three or more exercises for the same body part performed back-to-back without rest.

Gleno-Humeral Joint: What most people refer to as the "shoulder joint." The gleno-humeral joint is a ball-and-socket joint, with the head of the humerus acting as the ball, and the glenoid fossa acting as the socket. The joint is held together by soft tissue.

Glenoid Fossa: A depression in the scapula that forms the "socket" part of the gleno-humeral joint's ball-and-socket.

Horizontal abduction, shoulder: Beginning with the arm raised to the front, moving the arm horizontally to the side.

Horizontal adduction, shoulder: Beginning with the arm raised to the side, moving the arm horizontally across to the front.

Humerus: The upper arm bone.

Infraspinatus: One of the four rotator cuff muscles. The infraspinatus runs from the scapulae to a large knob on the end of the humerus called the *greater tubercle*. Along with the teres minor, it externally rotates the shoulder. It also draws the head of the humerus toward the glenoid fossa, strengthening the shoulder joint.

Internal Rotation, shoulder: Rotating the shoulder inward. Also called *medial* rotation.

Kinesiology: The scientific study of the mechanics of human movement. Also called *biomechanics*.

Lateral: Side.

Latissimus Dorsi: (The "lats.") A fan- shaped muscle of the back. The latissimus dorsi pulls the arm back and down. Along with the pecs and subscapularis, it also internally rotates the humerus.

Leverage: The mechanical advantage provided by position.

Load: The opposition to motion provided by weight.

Optimization: Maximizing output for a given input.

Overloading: Forcing a muscle to act against resistance greater than that which it can easily overcome.

Pectoralis Major: Fan-shaped muscle of the chest. The pectoralis major can be thought of as consisting of three muscle segments—the *clavicular* portion ("upper" pec) which pulls the arm up across the chest, the *sternal* portion ("middle" pec) which pulls the arm straight across the chest, and the *costal* portion ("lower" pec) which pulls the arm down across the chest. Along with the subscapularis and latissimus dorsi, the pectoralis major also internally rotates the humerus.

Posterior: Rear.

Prime Mover: The main muscle or muscle group responsible for a movement.

Resistance: The opposition to motion resulting from the combined effect of load and leverage.

Rotator Cuff: A system of four muscles—the supraspinatus, infraspinatus, teres minor, and subscapularis—that stabilize and rotate the shoulder.

Scapula: The shoulder blade.

Secondary Mover: A muscle or muscle group that directly assists the prime mover.

Stabilizer: A muscle or muscle group that holds the body in position so the prime and secondary movers can act effectively.

Subscapularis: One of the four rotator cuff muscles. The subscapularis lies under the scapulae and internally rotates the shoulder. It also draws the humerus toward the glenoid fossa, strengthening the shoulder joint.

Superset: Two exercises, one each for each of the muscle groups in an *opposing* pair (e.g. biceps/triceps) performed back- to-back without rest. (Compare *Compound Set*.)

Supraspinatus: One of the four rotator cuff muscles. The supraspinatus runs along the upper edge of the scapulae to a large knob on the end of the humerus called the *greater tubercle*. Along with the lateral head of the deltoids, it abducts (raises to the side) the arm. It also draws the head of the humerus toward the glenoid fossa, strengthening the shoulder joint.

Synergism: Combining elements to create a whole greater than just the sum of those elements.

Tension: Muscular contractile force.

Teres Major: A muscle of the upper back that acts with the lats to pull the arm down and back.

Teres Minor: One of the four rotator cuff muscles. The teres minor runs from the scapulae to a large knob on the end of the humerus called the *greater tubercle*. Along with the infraspinatus, it externally rotates the shoulder. It also draws the head of the humerus toward the glenoid fossa, strengthening the shoulder joint.

Timing: (Also called *pace*.) The combination of rep speed, rests between sets, and rests between exercises.

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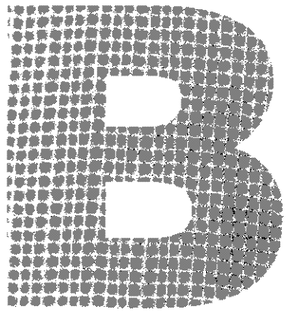

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ABOUT THE AUTHORS

Joseph M. Horrigan, D.C.

Joseph Horrigan, D.C.

Joseph M. Horrigan, D.C., is the president and developer of *The Soft Tissue Center* in Los Angeles, CA, an athletic rehabilitation facility serving elite athletes from all sports. He has spent 12 years in the health care field performing various types of physical therapy ranging from stroke rehabilitation to the current soft tissue therapy. Through *The Soft Tissue Center*, Horrigan provides specialty consultation and rehabilitation to numerous professional sports teams. His patients have included 19 athletes from 6 countries competing in the 1988 Summer Olympics, including 4 medal-winners, as well as players from 14 National Hockey League (NHL) teams.

Horrigan developed the method of *soft tissue mobilization (STM)* in use at *The Soft Tissue Center*, a rehabilitative approach substantially different from other commonly employed modalities (such as ultrasound, iontophoresis, and surgery). *The Soft Tissue Center* reports many instances where STM has succeeded after other forms of therapy have failed, including cases of shoulder impingement symptoms disappearing after very limited treatment, and one case of a world-class sprinter whose stride was increased by 10 inches by the technique.

In addition to its patient treatment facility, *The Soft Tissue Center* trains physical therapists and chiropractors in its unique form of tissue therapy and works with various hospitals to develop similar independent and satellite centers. Horrigan writes a monthly sportsmedicine column for *Ironman* magazine and is a frequent contributor to other periodicals.

Jerry Robinson

Jerry Robinson

Jerry Robinson is president and founder of *Health For Life*, a research and publishing company specializing in athletic conditioning. Robinson is a regular guest on the nationally syndicated radio show, *Best of Health*, and writes the monthly *Optimum Workout* column in *Ironman* magazine. He is also a frequent contributor to other fitness magazines. In addition, Robinson directs *Health For Life's* ongoing biomechanics research has authored over 20 books on various aspects of athletic training, including the best-selling *Legendary Abs* abdominal conditioning program.

Robinson graduated from Stanford University in 1980, after completing advanced work in biomechanics. He taught biomechanics on the staff at Stanford for two years, using his first book, *Conditioning to Win*, as text. An avid bodybuilder and martial artist for 23 years, Robinson has taught conditioning and martial arts since 1974.