

## PART 3: IMPROVING NECK AND SHOULDER FUNCTION

“Practice does not make perfect, it makes permanent.” Stuart McGill

### INTRODUCTION

Some initial comments concerning upper body posture during training:

- Correcting faulty neck posture is integral to correcting neck function. This can be a very big first step, requiring constant attention on the part of the trainer and the client. Things to look for include:

Posture during activities – Neck neutral spine. Scapula/shoulder and trunk posturing

Tongue to the roof of the mouth stabilizes the suprahyoid muscles to stabilize the deep neck flexors.

- When elevating the arm in internal rotation the greater tuberosity of the humerus impinges into the subacromial arch and soft tissues. To avoid impingement and other disagreeable situations, always elevate the shoulder into external rotation. This action also activates the external rotators and scapular depressors, important stabilizers for the shoulder.
- Proximal stability before distal mobility: The scapula should set before arm movement. If this fails to occur training needs to be separate out the individual movements by consciously, activity setting the scapula before arm movement begins.
- Observe good posture. The key things to watch for are:
  - Keeping the neck retracted in neutral position
  - Proper scapular timing, especially during elevation
  - Set the scapula: “Shoulder blade in your back pocket”, that’s the opposite pocket. Minimize winging
  - Maintain abdominal bracing
  - Preserve a Neutral spine/neck
  - Breathe independent of the movement pattern (core training)

**Functional Training:** Efficient function, with maximal performance and minimal injury risk, requires optimum activation of all links in the kinetic chain. Injury is often associated with alterations in force production or regulation capabilities in links that may be distant to the site of injury. (Ben Kibler 2004) Functional training encourages force couples to work in concert and therefore improve joint protection. Synchronizing the force-couple activity will improve dynamic stability, minimize chronic microtrauma caused by unnecessary humeral-head translation and therefore, decrease the incidence of shoulder pain. Training should progress throughout the season, placing emphasis on external-rotation strength and endurance of the glenohumeral and scapulothoracic musculature. (Swanik 2002)

For optimal athletic performance, the dynamic stabilizers of the shoulder complex must fire in a consistent and coordinated fashion. Conditioning exercises should replicate the functional requirements associated with sport-specific skills. Maximum recruitment of muscles responsible for humeral and scapular rotation and stabilization is necessary to provide dynamic stability of the glenohumeral joint and scapulothoracic articulation. Exercises should be implemented in positions of vulnerability, thus inducing neural adaptation for dynamic restraint. Therefore, internal- and external- exercises should progress to the shoulder abducted to 90°. (Swanik 2002)

**Fatigue:** Fatigue of the rotator cuff muscles appears to decrease neuromuscular control, allowing for the superior humeral head migration and increasing the stress on both static and dynamic shoulder stabilizers. With fatigue, a muscle’s capacity to absorb energy is reduced, thus compromising dynamic joint stability. In swimming, this might alter scapulothoracic and glenohumeral mechanics, further predisposing the athlete to injury. (Swanik 2002)

Scapulohumeral rhythm deteriorates with fatigue, and, conversely, the deterioration in the scapulohumeral rhythm is associated with fatigue. Shoulder fatigue affects the way in which the scapula moves concomitantly with the humerus. Fatigue tends to result in increased motion of the scapula, which alters the scapulohumeral rhythm. (McQuade 1998)

## KINETIC CHAINS AND TRAINING

The kinetic chain principle implies that weakness in any segment of the chain may result in inefficient organization of activation throughout the chain. When an athlete with a deficiency at one link of a kinetic chain tries to compensate by increasing the demands on the other segments, overload occurs and injury can result. (Fleisig, 1996)

**Closed Kinetic Chain Exercises (CKC)**, as with hands anchored on the floor, are described as a means to increase strength while balancing glenohumeral compression and shear forces. This is believed to limit translation and strengthen the shoulder, with less resulting tensile stress on the capsuloligamentous complex making this protocol more appropriate in the initial phases of rehabilitation after an injury. Research supports the role of CKC exercises in improving shoulder rotation strength. Specifically, CKC exercises are effective in improving concentric shoulder internal rotation strength. However, the ability of CKC exercise to improve eccentric shoulder rotation strength is unclear. CKC exercises have also been described as a means to enhance or restore dynamic shoulder stability by facilitating shoulder muscle coactivation resulting from joint approximation. Joint approximation is believed to stimulate peripheral afferent activity, which then stimulates reflexive muscle stabilization and helps improve shoulder proprioception and neuromuscular control. (Padua 2004)

The scapula-linked muscles are placed under greatest tension during shoulder movement when scapular movement is relatively restricted (i.e., CKC). This might lead to an increase in muscle tension resulting in increased activation of intramuscular receptors. In addition, when the scapula is supported (as in CKC), movement of the glenohumeral joint might cause the skin around the shoulder complex to stretch, activating cutaneous mechanoreceptors. (Swanik et al. 2002)

**Open Kinetic Chain Exercise (OKC)**, where the hands are free to move, typically involves the use of dumbbells or cables. These exercises place resistive, distraction, and rotary forces on the shoulder, which might facilitate a stable base of support, peripheral afferent deformation, concentric acceleration, eccentric deceleration, and assimilation of function. More recently, OKC exercise has been suggested to address proprioception and neuromuscular control by emphasizing joint position awareness. (Padua 2004)

**Proprioceptive-Neuromuscular-Facilitation Training (PNF)** The spiral and diagonal motion patterns incorporated during PNF shoulder exercise share biomechanical characteristics of common upper extremity movements. This might allow for improved muscle strength and coordination during functional movement patterns. PNF exercises are also believed to enhance motor learning by incorporating functional motion patterns. Basic principles of PNF state that joint approximation and traction should occur throughout the patterns of motion. As previously stated, joint approximation is believed to stimulate cocontraction, which might enhance shoulder neuromuscular control and dynamic stability, similar to CKC exercises. Padua et. al. concluded that by improving shoulder rotation strength, as well as functional performance, PNF exercise appears to be the most efficient of the training methods (CKC, OKC, and PNF) used in their study. (Padua 2004)

## PROPRIOCEPTION AND NEUROMUSCULAR RETRAINING - AN OVERVIEW

The definition of proprioception is generally accepted as a specialized variation of the sensory modality of touch that encompasses the sensation of joint movement (kinesthesia) and joint position (joint position sense). The sensory receptors (primarily mechanoreceptors) found in the skin, muscles, joints, ligaments and tendons, as well as the visual and vestibular centers contribute input to the central nervous system regarding body position and balance. Trauma to tissues that contain these receptors can lead to proprioceptive deficits. Proprioception may play a more significant role than pain impulses in preventing injury in the acute setting. The incidence of reinjury and the cause of chronic injuries may be attributed, to a greater extent, to proprioceptive deficits. Regaining neuromuscular control after injury or surgery is a necessary prerequisite for athletes wishing to return to competition. (Lephart, 1997)

The objectives of proprioceptive rehabilitation are to retrain altered afferent pathways to enhance the sensation of joint movement. The resulting neuromuscular control of joints takes into account three distinct levels of motor activation within the CNS. Reflexes at the spinal level mediate movement patterns that are received from higher levels of the nervous system. This action provides for reflex joint stabilization during conditions of abnormal stress about the joint. Exercises that facilitate dynamic joint stabilization may result in the improvement of this neuromuscular mechanism. To stimulate reflex joint stabilization which emanates from the spinal cord, activities should focus on sudden alterations in joint positioning that necessitate reflex neuromuscular control. (Lephart, 1997)

The second level of control, located within the brainstem, receives input from joint mechanoreceptors, vestibular centers, and visual input to maintain posture and balance of the body. Reactive neuromuscular activities can be used to enhance brainstem function. This can be achieved by performing balance and postural activities, both with and without visual input. (Lephart, 1997)

The highest CNS function provides cognitive awareness of body position and movement in which motor commands are initiated for voluntary movements. Use of the cortical pathway allows movements that are repeated and stored as central commands to

be performed without continuous reference to consciousness (commonly known as “grooving”). Kinesthetic and proprioception training can enhance this function. Maximally stimulating the conversion of conscious to unconscious motor programming can be achieved by performing joint positioning activities, especially at joint end ranges. With repetition, the cerebral cortex can determine the most effective motor pattern for a given task, based on the proprioceptive information of previous attempts. (Lephart, 1997)

To maximally restore proprioception and neuromuscular control, it is recommended that the following progression of activities be conducted to allow the return of an athlete to functional levels:

- Position sensibility activities designed to restore joint position sense and kinesthesia.
- Dynamic joint stabilization to stimulate muscular coactivation.
- Reactive neuromuscular control to integrate both spinal and cognitive levels (e.g. plyometrics).
- Functionally specific activities designed to restore functional motor patterns. (Lephart, 1997)

## RETRAINING THE DYNAMIC STABILIZERS OF THE SHOULDER

**Rotator Cuff:** Strengthening of the internal and external rotators should start with the arm at lower levels of abduction, in positions that avoid impingement, and then progress to 90° of abduction in phases. (Ticker, 1996)

- Infraspinatus/Teres Minor Complex: External rotation: side lying free weights, cables to 90° abduction (begin movement with a scapular set).
- Subscapularis: Internal rotation: cables, to 90° abduction (return to a scapular set).

**Serratus Anterior:** The exercises that maintain an upwardly rotated scapula while accentuating scapular protraction, such as the push-up plus and the dynamic hug, elicited the greatest activity from the serratus anterior muscle. (Decker 1999) However, elevation of the scapula engages the scapular elevators (upper trapezius and levator scapulae), which is often a situation that needs to be avoided.

- Wall push-ups.
- Push-up plus.
- Dynamic Bear Hugs.

**Mid And Lower Traps:** “In the back pocket.”

- Scapular setting (Shoulder in the back pocket): Raise the arm in positions of scaption, abduction and flexion; increase weight (arm externally rotated) as control improves.
- Straight-arm dips.
- Prone on ball arm raise: in Extension, Horizontal abduction, and Flexion.
- Straight-arm pulldowns.
- Others include: lat pulldowns, rows, etc, with approximation and depression of scapula. “In the back pocket.”

## INTEGRATED EXERCISES

**Gym-Ball Exercises:** Especially good for improving reactivity and stability.

- Walk-outs
- Push-up plus: hands on floor, ball, two balls
- Transfer weight side-to-side
- Raise one leg
- Single hand holds
- Sport specific: use of barbells for cycling, cables for swimming, etc.

**Cable Exercises:** With the use of cables the exercises can be designed to better correspond to specific needs.

- Flexion/Extension

- Adduction/Abduction (2:1)
- Internal/External Rotation (3:2)
- Diagonals (Scapular Patterns)
  - Upper cut – Low 5
  - Sword – Throw the Pie

**Plyometrics:** Developing power

- Jumping Push-up, progressing from wall to floor, keeping hands slightly above the head maintains proper activations.
- Pull-ups
- Medicine ball throws
- Thrusters, push presses, kettlebell throws, Olympic lifts and the like

**Legend:**

PBP: Patient body position.

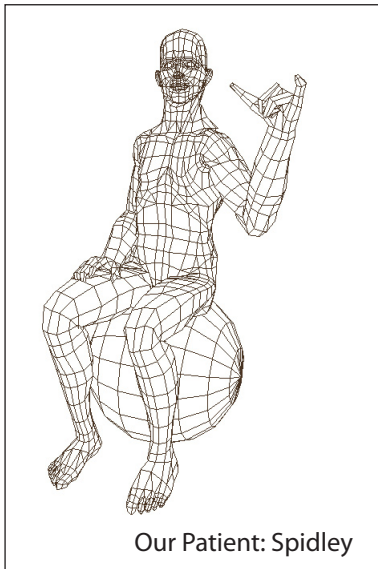
Hand Reference: right unless otherwise noted

## PROGRESSIVE SHOULDER EXERCISE TRACKS

### THE EXERCISE TRACKS

The following sections present progressive tracks for shoulder external rotation, scapular protraction and scapular posterior depression. These examples are meant to complement the usual routines commonly used in a training program. Often, issues of scapula and shoulder stabilization are left out of these routines, contributing to the risk of injury to the upper back, neck and upper extremities. The sections that follow are intended to demonstrate the design of progressive exercise tracks, how to incorporate exercises that allow ongoing evaluation and the utilization of exercises that progress through increasing demands.

The intent of presenting these tracks is to provide some examples of how an exercise can be varied in order to make its focus either easier or harder to better match the level of the person you are working with. This collection of progressions is not meant to be exhaustive. Generally, a progression tends to develop from stationary to dynamic, stable to unstable, and from exercises focused on a specific muscle or muscle group to global, that is, involving multiple muscle groups. Although written with the athlete in mind, these tracks can be attenuated and modified to address other training goals as well.



Our Patient: Spidley

When determining the starting point in the exercise track the following guidelines may help:

- The patient has to be able to perform the exercise with the proper form throughout every repetition of each set
- The exercise should be performed with enough repetitions to allow the exercise to be progressive (neither too many or too few reps)
- The patient has to feel comfortable performing the exercise for the prescribed sets/reps
- Loss of form determines maximum reps in that particular set.

### TRAINING VOLUME

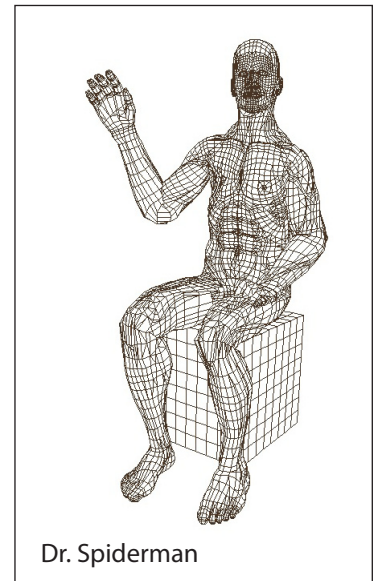
The proper training volume is specific for each individual and can only be determined by evaluating the patient's performance. For the purpose of this discussion, fatigue will represent loss of control or form, not merely inability for a muscle to perform a task. Often, if fatigue is reached during a set, each successive set demonstrates a reduction in the number of repetitions. Initially, the prescription should be just short of maximum reps to insure proper form, to allow familiarization and to encourage success. Practicing the proper movement results in grooving effective movement

patterns in the machinery of higher neurology and insures proper motor control and sequencing during rapid or automatic movements.

**Load and resistance:** When working with the stabilizers of the shoulder, initial goals should focus on developing stabilization and coordination, before endurance and strength. Development of power should begin after adequate endurance and strength have been established. With exercises more focused on stabilization, low resistance (1-5#) is suggested coupled with higher reps (up to 20 reps). This is a sound approach in that it improves endurance as well as provides a high number repetitions necessary to groove the movement and make it automatic. As the movements become more global, more groups of muscles become involved in producing movement and the resistance can increase. At no time should the resistance compromise absolute control. If control loses out to increases in resistance, dysfunctional movements can become grooved leading to inappropriate motor control and movement patterns, tissue overload, and injury.

### SPECIFICITY

Current research has substantiated the notion that the closer the training replicates the target activity the better the results. The initial steps in a training program should address proper core stabilization. Applying the concept that trunk muscles activate before the muscles of the shoulder or arm, (Hodges P, et.al., 1999; Hodges PW, et.al., 1997) the program should insure proper trunk function before proceeding to scapular stabilization. Furthermore, the initial stage training should include practices that correct any faulty technique that may be evident. Once stabilization and technique issues have been adequately addressed,



Dr. Spiderman

progressions to endurance, strength, and then power development can begin that is specific to the goals of your patient. Initial choice of exercises is rather generalized and applicable for most all patients. However, as training progresses the training becomes more individualized and addresses weaknesses, technical difficulties and demands specific for their goals.

## SCAPULAR SETTING

Proper function of the upper extremities requires both motion and stability of the scapula. The ability to control scapular setting improves scapular stability throughout many movements of the neck, shoulder and upper extremity. Furthermore, the scapular muscles influence the function of the cervical and thoracic regions. (Larique J, 2003.) The initial step in upper body training should insure that proper posture and efficient stabilization is attained before advancing to other training protocols. Depression and retraction of the scapula, "scapular setting," is an important scapular stabilization mechanism that is often inadequate, especially in patients with a history of a shoulder condition.

### TECHNIQUE

Patient is sitting or standing. Patient sets the scapula into the "back pocket" by depressing and retracting the scapula. For many patients this is a foreign movement to cognate, often they need guidance for this movement: Stand facing the patient to the right side. Place your left hand on the inferior angle of their scapula and your right hand on the front of their shoulder. Use a verbal cue such as "raise your shoulder to your nose" while you initiate the movement by guiding their shoulder with your left hand into anterior elevation. Likewise, use a cue of "pull your shoulder back and down into your back pocket" while you guide the movement with your right hand into posterior depression, the "set" position.

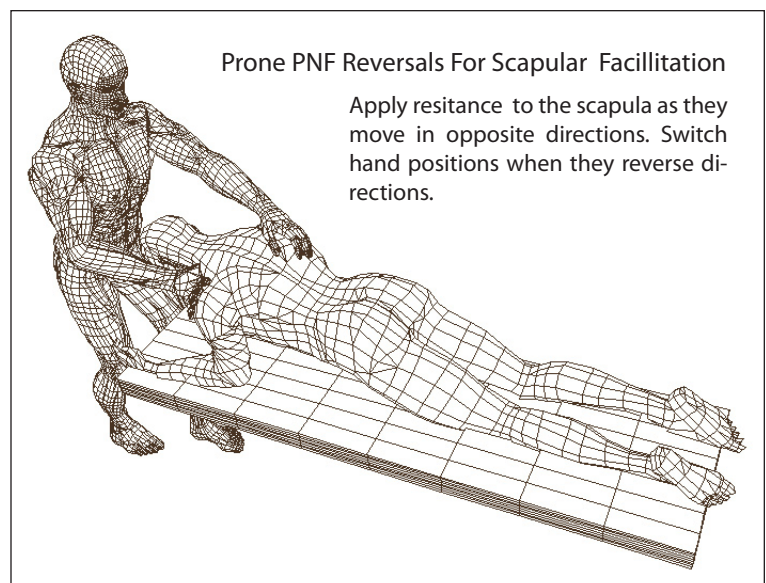
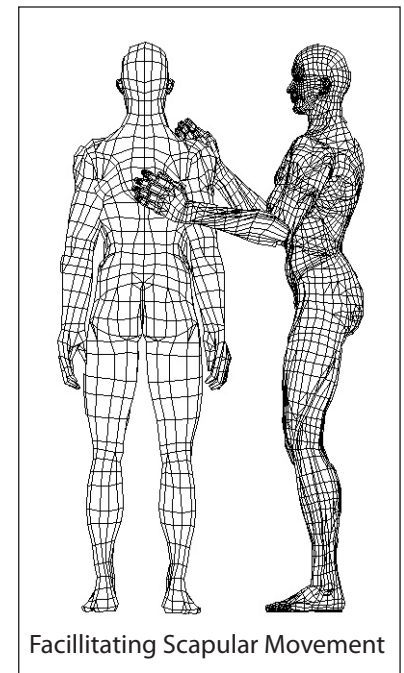
After repeating reversals between anterior elevation and posterior depression a few times and they can perform the movement on their own, have the patient hold their scapula in the set position and explain to them "this is the set position." Ask them to continue to hold the position. At this point, move behind them and watch to see if they are able to maintain the position. If they begin to raise their scapula, ask them to set it again. Sometimes you can facilitate the movement by simply stroking obliquely down and across the lower scapula in the direction of the setting motion.

### Progressions:

- Have the patient begin with setting the scapula while the arm is relaxed at the side. The set position is maintained as the straight arm is slowly raised in scaption with external rotation to a level just below 90° of elevation, lowered, and repeated.
- Include movement in abduction, then flexion.
- Movement with resistance (dumbbells) in scaption, then abduction; and, finally, flexion.

### MANUAL FACILITATION OF THE SCAPULAR DEPRESSORS

Manually Facilitating Scapular Depressors: Utilizing the PNF scapular patterns of facilitation, a sequence to facilitate scapular posterior depression begins with guided movement: This progression often begins with the patient in the side-lying position. Utilizing the anterior elevation/posterior depression diagonal, working in one direction at a time, guide the movement with increasing patient participation through the diagonal pattern until performed smoothly and well controlled. Follow this technique by rhythmically alternating between the directions while the patient helps maintain the movement, eventually becoming in control and performing the movement entirely by themselves. The movement of the scapula should curve along an arc of the patient's torso. Furthermore, the patient should not roll forward, backward or twist.



After developing a smooth, controlled and rhythmic movement, increase the demand for control by utilizing resistance at the end range followed by eccentric resistance (combination of isotonic), hold and relax, or contract and relax techniques. Further progressions could include the patient lying prone on elbows with you standing at their head and utilizing the above techniques unilaterally, then bilaterally with both scapulae moving in parallel and then in opposite directions. (Larique J, 2003)

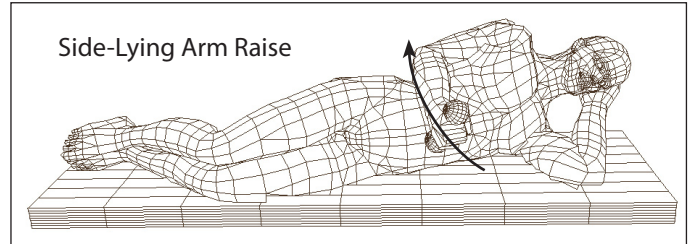
## EXTERNAL SHOULDER ROTATION

### FOCUSED

**Side-lying Arm Raise:** Side-lying on bench with active arm up, head properly supported, elbow at side (can be supported by a small towel, if needed), maintaining 90° elbow flexion, with forearm resting across the body and holding a 1# dumbbell. Set scapula, raise weight to level with or slightly higher than the elbow. End with thumb side of hand up. Elbow remains against the side (or towel) throughout the movement to minimize secondary recruitment. Should feel it in the back of the shoulder blade.

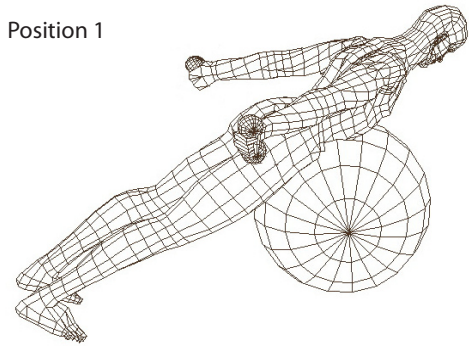
Progressions:

- Straight arm with thumb pointing up
- Rotate arm from thumb down to thumb up during the raise.
- Prone on ball, feet on floor, neck/back in neutral. Elbow at 90°, weight resting on floor. Keeping a stationary elbow position, raise weight, keeping elbow at 90°. Bilateral, Unilateral. Progress to holding elbow at shoulder height.
- Prone On Ball Arm Raises: neck in neutral, arms straight, hands at waist level, resting on floor with 1# dumbbell. Raise straight arms while rotating into external rotation and pulling scapulae together, until the arms are level with the body. Bilateral, Unilateral.



Side-Lying Arm Raise

Position 1

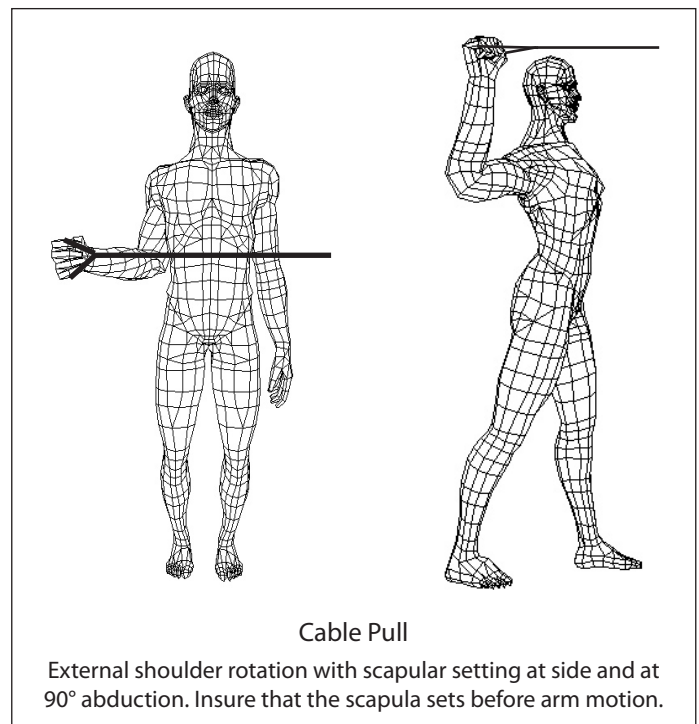


Prone On Ball Arm Raises

**Cable Pull:** PBP: Begin by simply demonstrating the movement without explanation. PBP: Standing parallel to band. Initially, have the patient keep their elbow to their side and simply pull to the right. Have patient perform repeats of the movement with both arms and watch from behind for timing of initiation of scapular setting. Setting should occur before or at the onset of arm movement. A dysfunctional shoulder will often demonstrate delayed scapular setting. (This is usually very noticeable when comparing sides.) If this is the case, the patient must perform their exercises by initiating setting before pulling out to external rotation. Cue: "Set...pull. Completely separate the activities." By setting the scapula before the pull the proper stabilization pattern can be reinforced. A piece of paper placed between the body and elbow provides feedback for maintaining elbow position, producing pure rotation at the shoulder and minimizing secondary recruitment.

Progressions:

- PBP: parallel to band. Elbow remains at side.
  - Seated on bench
  - Seated on ball
  - Standing
- PBP: 45° open to band. Elbow 90°, stationary at 45° elevation in scaption.
- PBP: 45° open to band. Raises arm from across their body to 45° scaption.
- PBP: 90° open to band. Elbow stationary at 90° elevation in abduction.
- PBP: 90° open to band. Raises arm from a forward reach to 90° abduction.



Cable Pull

External shoulder rotation with scapular setting at side and at 90° abduction. Insure that the scapula sets before arm motion.

## GLOBAL MOVEMENTS UTILIZING EXTERNAL ROTATION

**Translation:** PBP: Parallel to cable. Hold handle at body midline (“belt buckle”), with a stance slightly wider than shoulders, and with toes facing forward. Set neutral spine and abdominal brace. Keeping the trunk rigid and moving only from the hips, rotate to the right about the central axis, set scapula and pull. Keep elbow at side. (Place a sheet of paper under elbow)

Progressions:

- Begin by translating weight laterally to the right and backward (“toward the outside of your heel” into a slight squat position), rotate, set, and pull. Progress to wider stances to produce more body translation.
- Start with feet together, step to the side (keeping toes facing forward), translate weight, rotate, set, and pull.
- End with the elbow in higher positions as the body position opens relative to the cable.

**Lunge:** Standing facing the anchor of the cable with feet squat width apart, holding the cable handle in front of you, maintain an abdominal brace while stepping back with the left foot, pulling with right arm to a 90/90 arm position. End with the scapula set, and left foot pointing forward. Eliminating trunk/pelvis twisting demonstrates good core stabilization. Begin the pull after the left foot is placed on the floor to insure stability as the pull proceeds.

Progressions:

- Increase range of motion of the pull, maintaining neutral spine and proper lower extremity alignments especially during the forward reach
- Pull before the left foot is placed. Minimize rotation.

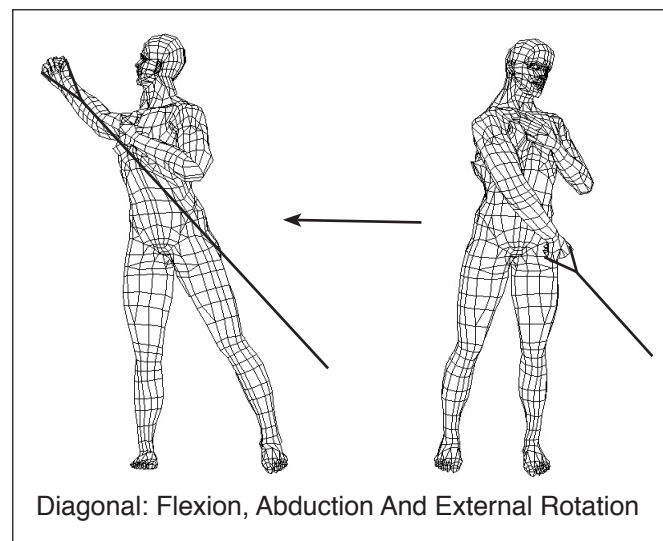
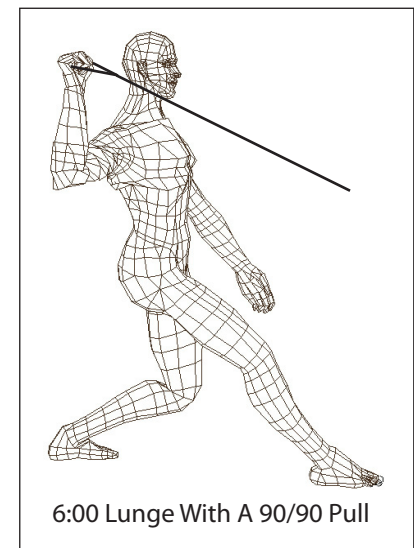
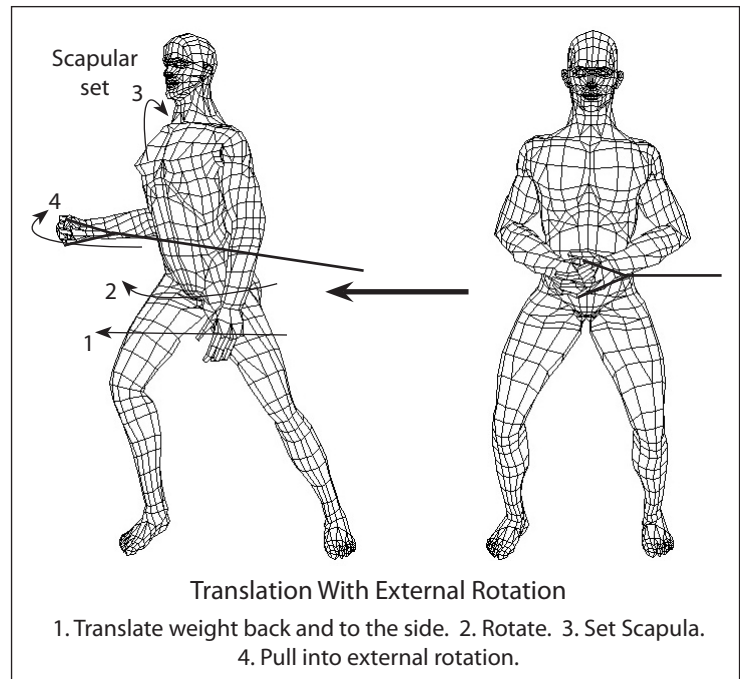
**Diagonal:** Flexion, Abduction And External Rotation. PBP: Facing a cable anchored slightly forward, below and to the left. Beginning with palm facing waist, pull the cable up and outside as the forearm supinates so the movement ends at 90/90 with the palm facing inwards. End in scapular set.

Variation: If supination is difficult, step back a little, eliminate supination and end with the palm facing forward.

## EXPLOSIVE MOVEMENTS UTILIZING EXTERNAL ROTATION

**Translation:** PBP: Parallel to cable. Hold handle at body midline (“belt buckle”). Begin with feet together, step to the right (keeping toes facing forward), translate weight to right foot (outside of heel), rotate, set, and pull. Decrease the resistance and increase the speed of movement, as in a sideways throw. End the movement at a point where the arm is forward of the shoulder and not at end of range of extension. Here, control, range of motion and engaging proper sequencing is paramount to minimize shoulder overload.

**Back Hand Ball Throw:** Holding a small plyo ball in front of your body with elbow at 90°, set the scapula, and make a lateral throw to the right at same level as starting position. Keep the forearm in neutral and extend the wrist at the end of the throw to increase power.





## SCAPULAR RETRACTION AND DEPRESSION

### FOCUSED

**Scapular Setting:** See above.

**Prone On Ball Arm Raises:** As above: Prone on ball, neck/back in neutral, arms straight, hands at waist level, resting on floor. Raise straight arms while rotating (external rotation) to a position of thumbs up and slightly away from the body, ending with arms level with body (not in extension). End with shoulders pulled together (scapular set).

Progressions:

- Progress to arms to 90° abduction (hands and shoulders in line), then to 180° flexion (overhead).
- Increase weight, or hold dumbbells at one end.

**Straight Arm Dips:** Sit on a chair (minimal padding, no armrests), or 18" box of similar dimensions. Knees bent in front of you, support body weight with straight arms, hands on the sides of the chair/box, and move your hips forward off the edge of the chair/box. Maintain an upright back (neutral spine), neutral neck, and elbows straight. Without bending elbows drop down between your shoulders then push yourself up while squeezing your shoulders together, chest out. This exercise is a kind of a reverse shrug, instead of pulling up, as in the shrug; you are pushing down and raising your body up.

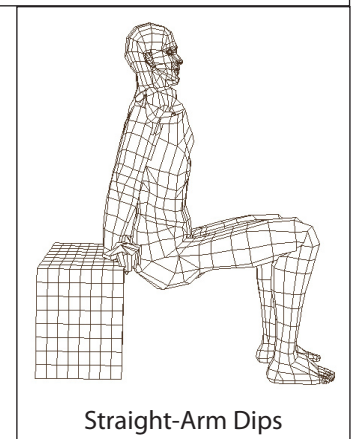
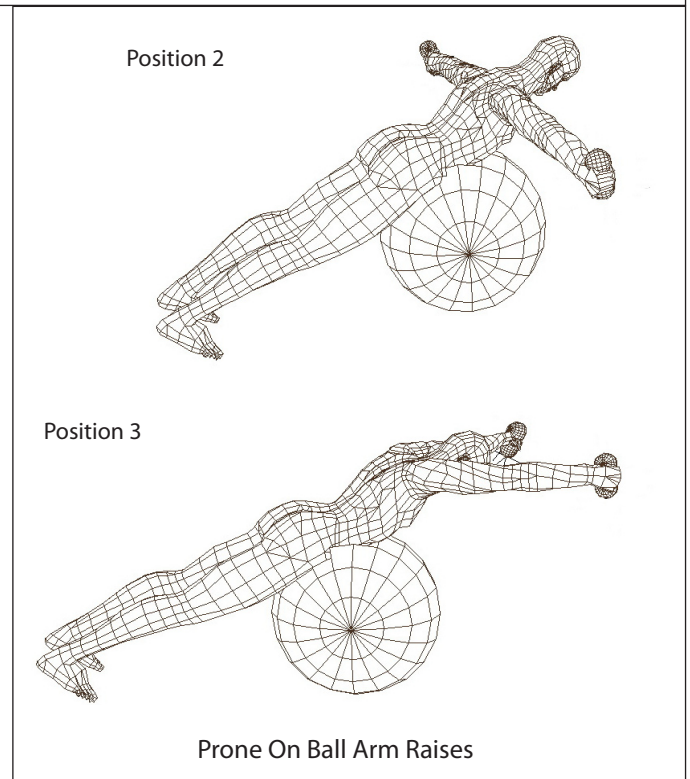
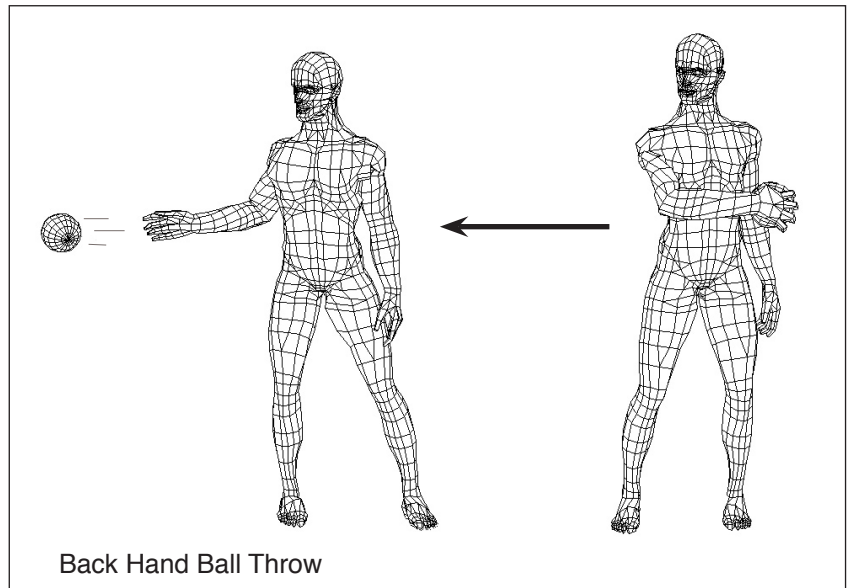
Progressions:

- Straighten legs.
- Perform on two plyo balls.
- Perform on parallel bars, legs hanging.
- Combine with conventional dip

**Straight Arm Lat Pulls:** BBP: facing two cable pulls. Anchor cables overhead so that when grasping the handles with straight arms your arms are raised to 45° above the horizontal. Keeping arms/elbows straight, pull straight back and down, chest out. Keep neck in neutral.

Progressions:

- Single or alternate arms, keep your body from rotating.
- Lat Pulls: drawing with shoulder blades first, bend elbows and pull your arms back so that elbows are even with shoulders. At no time should shoulders stretch into extension as this places a stretch on the anterior capsule and can contribute to anterior instability. Variations include elbows at the side (cable straight ahead) and elbows at shoulder height (cable level or overhead 45°).
- Lat Pulls, Single Or Alternate Arms: keeping body from rotating. Pull with the shoulder blades, ending in a set scapula.
- Upright Rows. Set a barbell in a rack. Lying under the barbell facing up, grasp the barbell. With a straight and rigid body, pivoting only on your heels, raise your body to the barbell, lower, repeat. Use your shoulder blades for the pull.
- C-2 Row Machine. (More dynamic and global) Pull with your shoulder blades. End the pull with scapulae together.



**Pull-Ups:** Standing below a bar that is anchored a little higher than arms length above your head, grab the bar with a grip a little wider than shoulder's width. Pull yourself up until your chin is above the bar, let down, repeat.

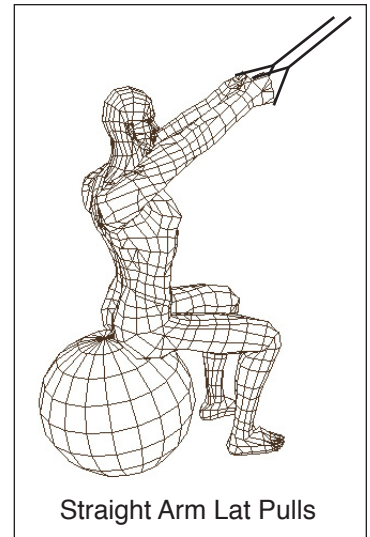
### GLOBAL MOVEMENTS UTILIZING SCAPULAR RETRACTION AND DEPRESSION

**Diagonals:** For more discussion on diagonals see the discussion below in integrative exercises.

Extension, abduction and internal rotation. PBP: Facing towards a cable anchored overhead, forward and to the left. Grasp the cable handle with your palm facing the left chest. Pull the cable down to the right, pronate, extend the wrist, and bring your hand to your side, knuckles forward and finish with scapular depression.

Flexion, Abduction And External Rotation. PBP: Facing toward a cable anchored below, slightly forward, and to the left. Beginning with your palm facing your waist, pull the cable up and outside and supinate the forearm so the movement ends at 90/90 with your palm facing inwards. End in scapular set.

Variation: If supination is difficult, eliminate it and end with palm facing forward.



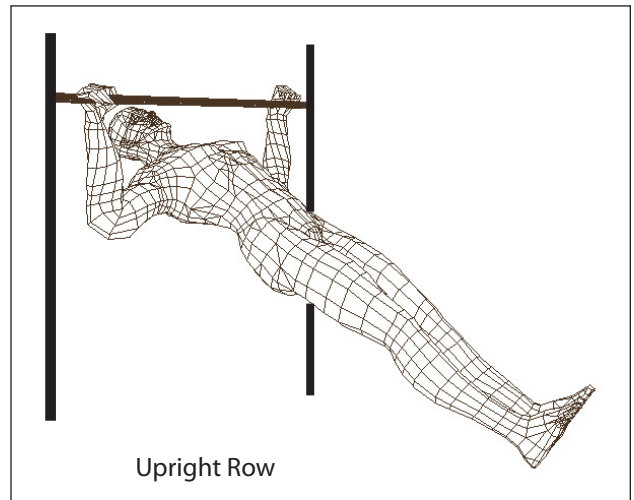
Straight Arm Lat Pulls

### EXPLOSIVE MOVEMENTS UTILIZING SCAPULAR RETRACTION AND DEPRESSION

**Kettlebell Swings:** Holding the kettlebell with a bilateral overhand grip, maintaining arms straight and wrists in neutral, and utilizing an explosive upward squat, throw the kettlebell up in front of you. As the kettlebell raises draw your shoulder blades together, chest out. At shoulder height, allow the kettlebell to drop, catch it in a squat position and repeat. Scapular retraction is necessary to protect the shoulder from distracting and overloading the structures of the glenohumeral joint. Control must be maintained at all times and a pure squat position used: chest up, gaze at or above eye level, drive with your heels. With proper explosive power, the kettlebell keeps in line with the arms. A common mistake is allowing the kettlebell to droop, especially at the top of the swing.

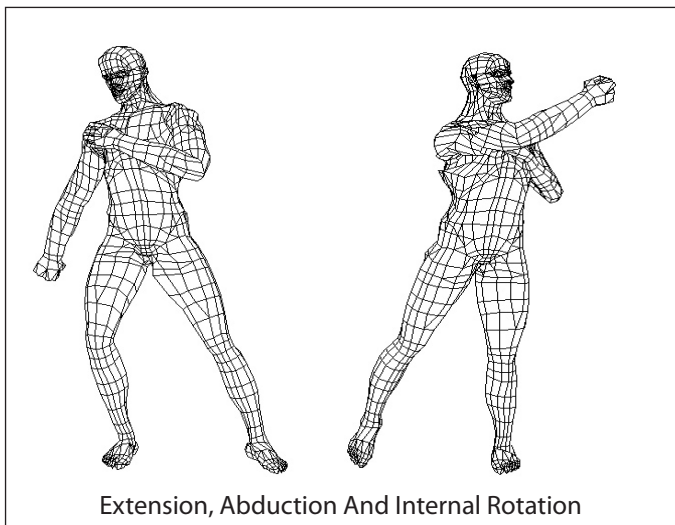
Progressions:

- Raise kettlebell overhead.
- Single arm swings.

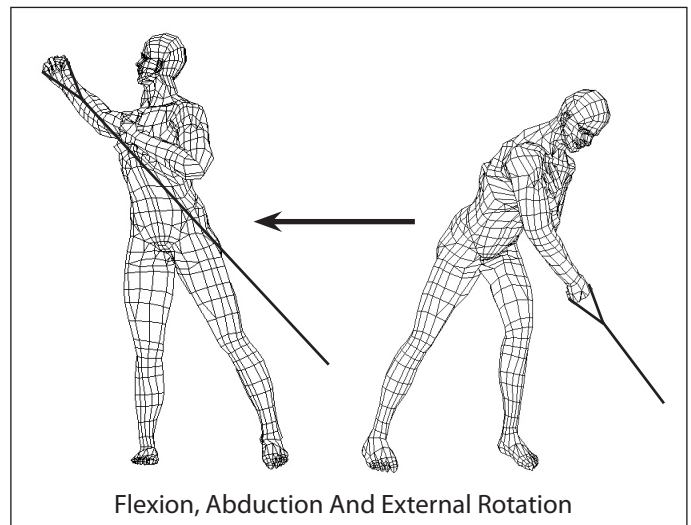


Upright Row

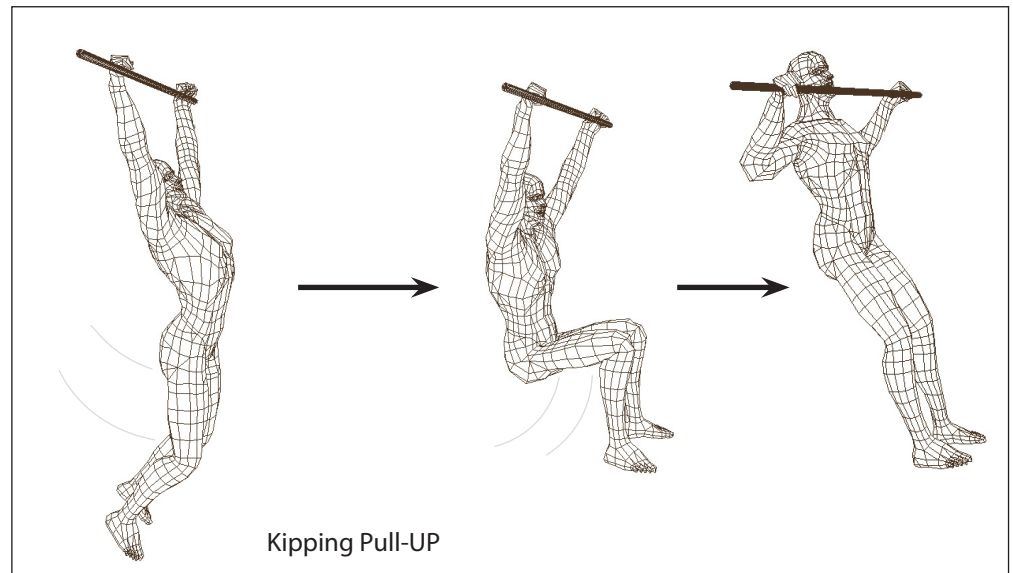
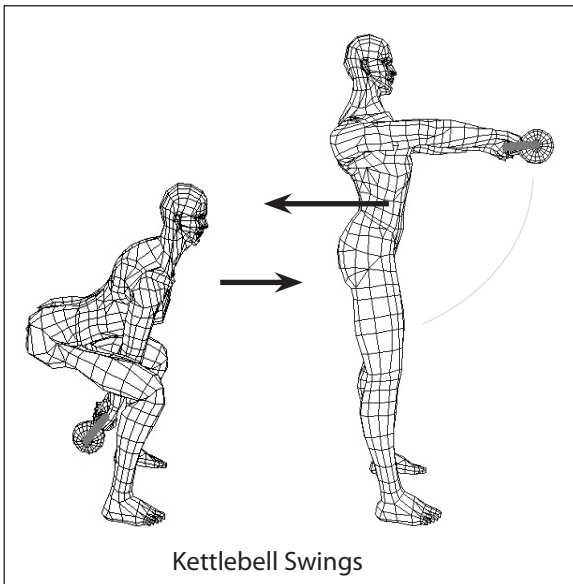
**Kipping Pull-Ups:** This is a cheating pull-up. Cheating provides more global effort to produce the desired movement. Use a Kip-up to increase your upward momentum: initiate your pull-up by swinging your feet forward, quickly pulling your knees up and finishing with a pull-up. At the top, push yourself away from the bar to initiate the next swing into the pull.



Extension, Abduction And Internal Rotation



Flexion, Abduction And External Rotation



### SCAPULAR PROTRACTION

This sequence includes closed kinetic chain stabilization exercises so important to establish rotator cuff activation during rehabilitation or prehabilitation protocol. During protraction reducing or eliminating scapular elevation is paramount to training proper stabilization movements. The use of the scapular elevators can result in inappropriate scapular positioning, inhibition of the scapular depressors and overload on the neck.

#### FOCUSED

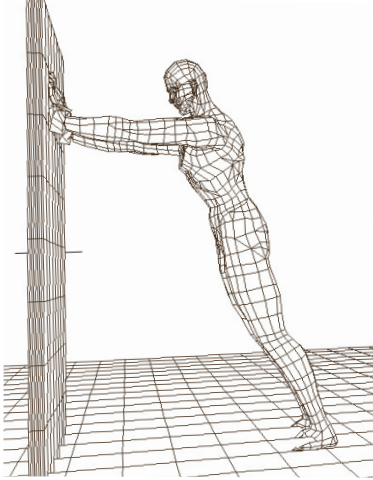
**Push-up (+):** Lying prone on both elbows, in push-up position with elbows under the shoulders, body straight and rigid, and both knees in contact with the floor, feet resting on floor. Maintaining neutral neck, drop to floor between the shoulders without rocking forward or backward. There isn't much movement with this exercise. Push back up as high as possible so the shoulders are very rounded but body remains straight and rigid. Keep trunk straight, no twisting.

Progressions;

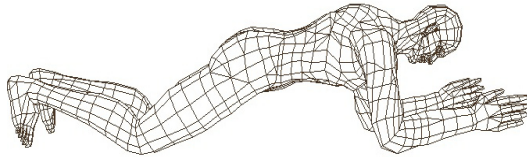
- Two elbows, both feet
- Two elbows, one knee. One set per knee. Keep trunk level, no twisting.
- Two elbows, one foot. One set per foot. Keep trunk level, no twisting.
- One elbow, both knees. One set per elbow. Keep shoulders parallel to ground. Hand on low back.
- One elbow, both feet. One set per elbow. Keep shoulders parallel to ground. Hand on low back.

## Push-Up (+) Sequence

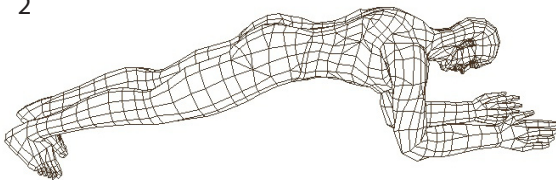
Remedial



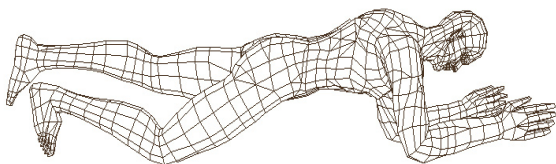
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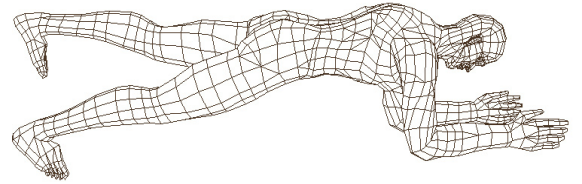
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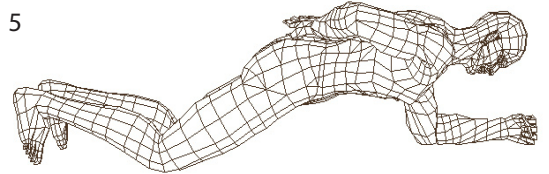
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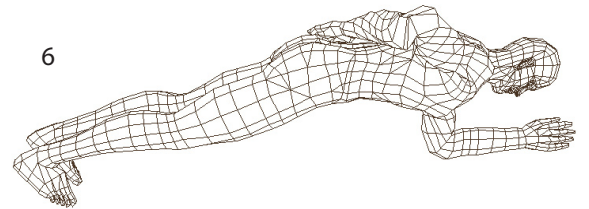
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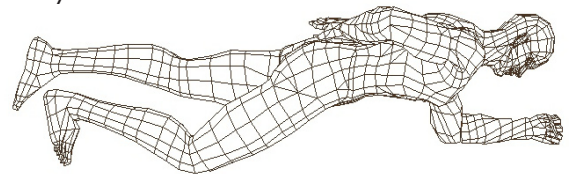
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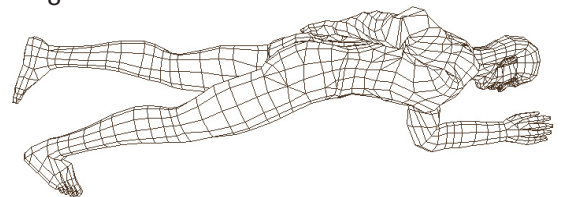
6



7



8



- One elbow, opposite one knee. One set per side. Keep shoulders parallel to ground. Hand on low back.
- One elbow, opposite one foot. One set per side. Keep shoulders parallel to ground. Hand on low back.

**Bench Press/Shoulder Press:** This is the standard bench press used in traditional weight training programs utilizing a barbell. Adhering to the five-point contact rule is important: Head, upper back, pelvis and both feet remain in contact with the bench/floor. In addition, activating an abdominal brace and keeping neutral spine is important to provide control and core activation during the lift. To reduce injury to the anterior capsule of the shoulder the shoulders should not extend to end range of motion. Placing a four-inch pad on the chest is a good way to limit shoulder extension. To encourage increased activation of shoulder protractors, a full protraction at the top of the lift should be encouraged.

Progressions:

- Use dumbbells and alternate arms, maintain core stability by minimizing movement of the trunk
- Use a single dumbbell; maintain core stability by minimizing movement of the trunk

- Reduce the weight and increase the speed
- Replace the bench with an exercise ball, with feet wide apart
- On ball, move feet together

**Cable Pushes:** Seated or standing facing away from cable anchor. Insure an abdominal brace, neutral spine and scapular set. Simply push the cable forward at waist level. As you return to starting position set the scapula. With excellent core stabilization there will be no rotation of the hips during the movement.

#### Progressions

- If training for seated activities progress from a bench to using a ball.
- If training for standing activities progressions can include single leg standing postures.
- Incorporate a forward lunge; wait until the foot plants before beginning the push. Keep the weights moving. Opposite leg lunges forward relative to arm used.
- Change angle of pushes.
- Reduce weight, increase speed.

**Push-up:** Stand facing a wall, a little more than arms length away, with hands on wall slightly above shoulder level. Keep shoulders protracted, a body rigid, and pivot on your forefoot, maintaining neutral neck/spine throughout the movement. Scapular stability is demonstrated when the scapulae remain fixed during the entire push-up cycle. Incorporate a (+) into the standard push-up: roll shoulders forward by over-pushing the top of the push-up.

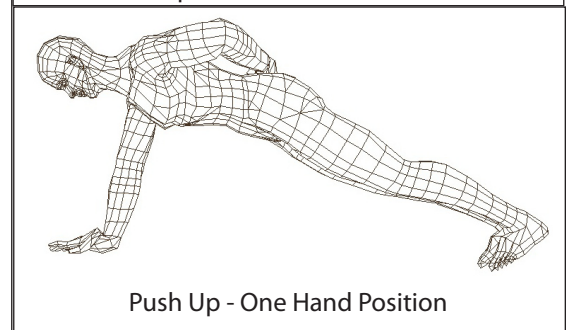
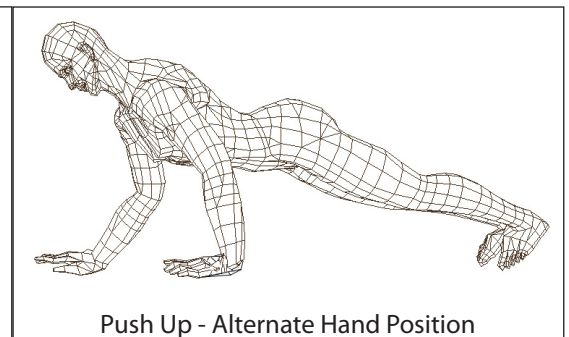
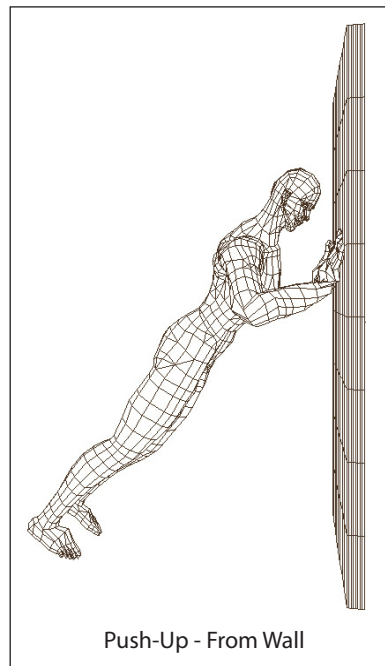
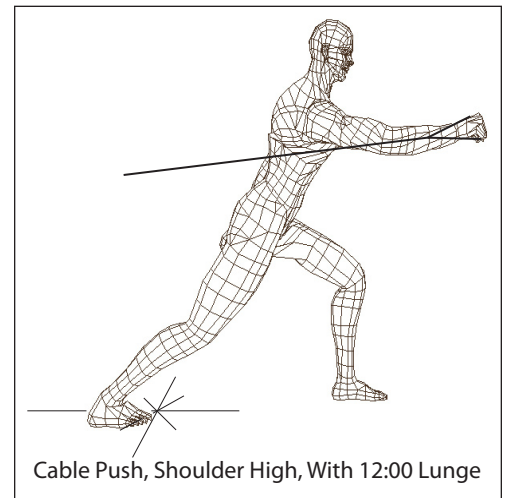
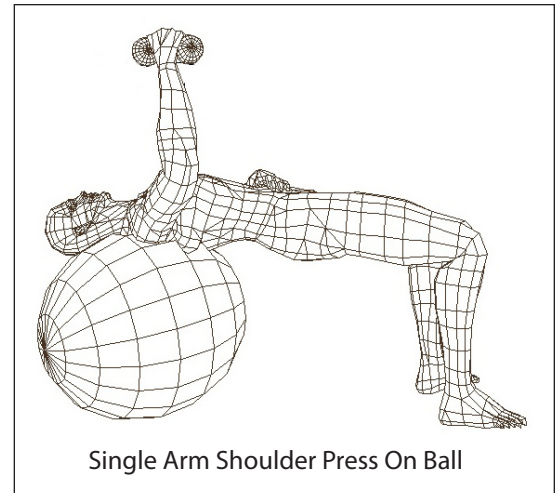
#### Progressions:

- Move hands down the wall or to the edge of a kitchen counter, keeping the same rigid body position as above.
- Move hands to foot stool or bench and knees on floor. Then up on your feet. Progress from a wide foot stance to feet together.
- Perform Push-up on floor, on knees. Progress to feet wide apart, then feet together.
- To increase core utilization add alternate hand positions, single leg push-ups, single arm push-ups, and push-ups with hands or legs on various labile surfaces such as rockerboards, wobbleboards, a bosu, an exercise ball, or one or two medicine balls, etc.

**Handstand Push-Up:** After Push-ups are mastered on the floor, raise the legs by placing your feet on a bench. Care should be taken to maintain a neutral spine/neck and eliminate inappropriate scapular elevation.

#### Progressions

- Knees on bench.
- Feet on bench, pike position
- Knees on bench, pike position.
- Feet up (hand stand position), sliding feet along a wall.
- Hand stand position, free standing.

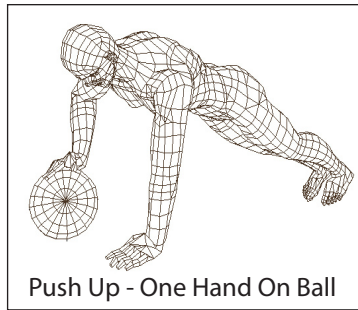


## GLOBAL MOVEMENTS UTILIZING SCAPULAR PROTRACTION

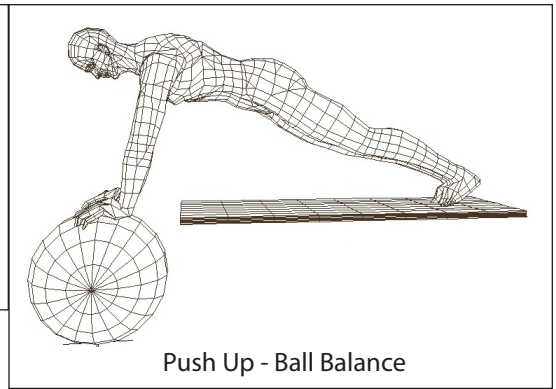
**Walkovers:** Place two lines on the floor 12" apart. Starting in the push-up (+) posture (fully protracted shoulders) with hands straddling one line, feet centered between the lines, neutral spine, neutral neck and with a strong abdominal brace, walk back and forth between the lines, straddling each line each time. Keep the shoulders fully protracted and maintain a rigid body. With excellent core stabilization there will be no trunk rotation or lateral bending during this activity.

Progressions:

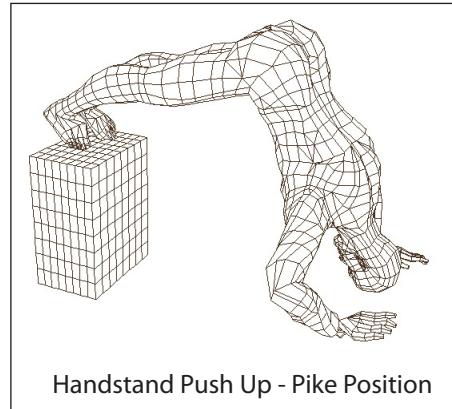
- Walk with both hands outside the lines then spread the lines apart.
- Walk up and over a 4" box, increase box height
- Perform a Push-up (+) with one hand on a medicine ball and one on the floor. Switch hand/ball each repeat.
- Place 5 Medicine Balls in a row. Begin with one hand outside the line of balls and one on the first ball. Perform a push-up (+) then move down the line so the outside hand is now on the first ball the other is between the first two balls. The balls remain in their original spot. Continue the process down and back, walking the feet as you go. Maintain protracted scapulae, neutral neck/spine, and minimal trunk movement.



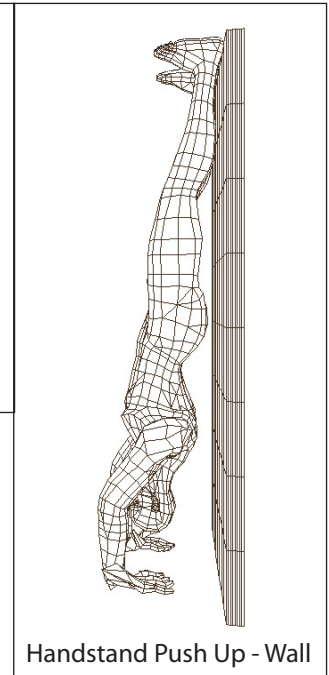
Push Up - One Hand On Ball



Push Up - Ball Balance



Handstand Push Up - Pike Position



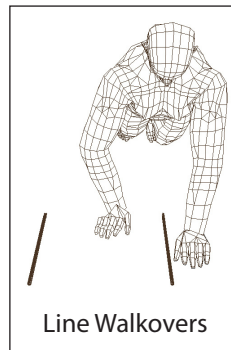
Handstand Push Up - Wall

## EXPLOSIVE MOVEMENTS UTILIZING SCAPULAR PROTRACTION

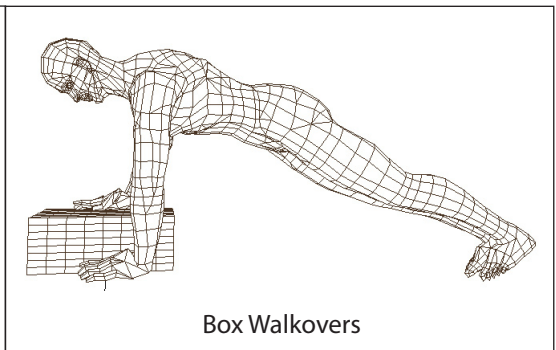
**Plyometric Push-ups:** Stand facing a wall, feet slightly further than arms length from the wall, with hands on the wall slightly above shoulder height. Drop to the wall and explosively push yourself back so that you fly away from the wall. Be sure to get a full push each time (shoulders protracted). Fall back to the wall, catch your fall by bending your arms to absorb the energy, and then repeat. Maintain protracted scapulae, neutral neck/spine, and minimal trunk movement. Maintain proper scapular depression throughout the movement.

Progressions:

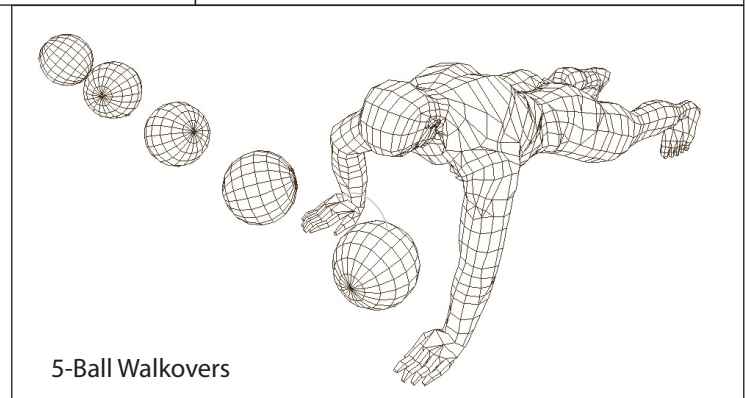
- Progress to lower surfaces such as kitchen counter, footstool, then finally to the floor.
- Push up, on the floor, to a "T" formation.
- Place a line on the floor, jump side-to-side across the line catching your fall by bending the arms each time.
- Place two lines on the floor close together. Jump across the lines. Progress to wider lines.
- Clapping push-ups: Clap between push-ups. Progress to two claps.
- Jump onto a 2" box and back down same side. Progress to up-and-overs then back again. Increase height of box.



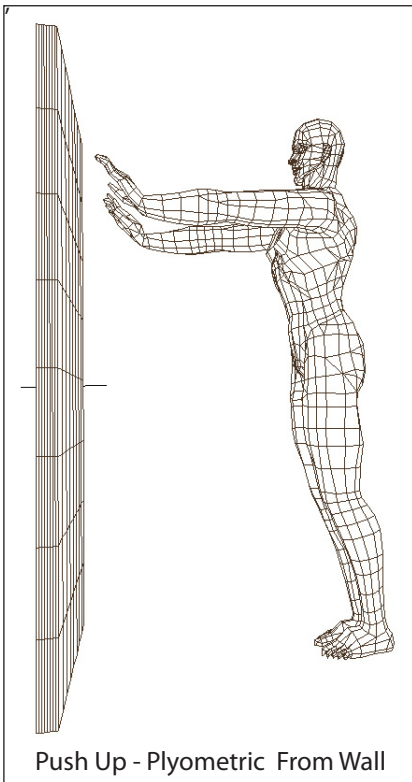
Line Walkovers



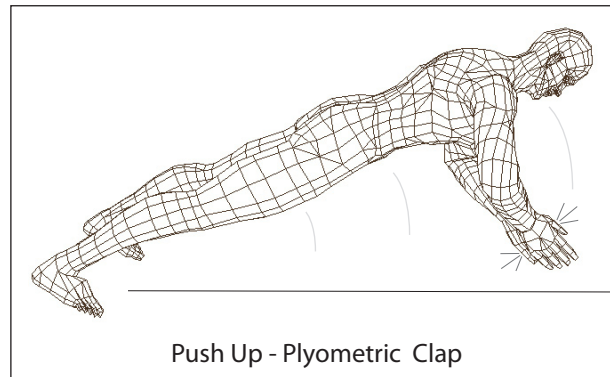
Box Walkovers



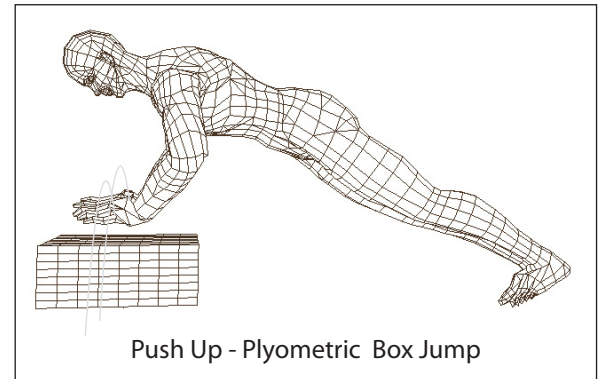
5-Ball Walkovers



Push Up - Plyometric From Wall



Push Up - Plyometric Clap



Push Up - Plyometric Box Jump

## DYNAMIC INTEGRATIVE ACTIVITIES WITH EMPHASIS ON THE SHOULDER

### CLOSED KINETIC CHAIN STABILIZATION ACTIVITIES

**Bird dog:** On the floor in quadruped with hands under the shoulders and knees under the hips, maintain a neutral spine/neck, abdominal brace and scapular protraction. Begin by raising a straight leg. Good scapular stabilization is seen when the shoulder blade of the support arm remains protracted and fixed. Proper core stabilization would hold the core rigid without twist or dropping. Effective neck stabilization will control neck positioning. Watch for scapular winging, hip hiking and chin poking. If you place a dowel along their spine it should contact at the back of their head, between their shoulders and at the sacrum. Placing a long dowel across the low back will provide feedback for any trunk twisting occurring during the exercise.

Progressions:

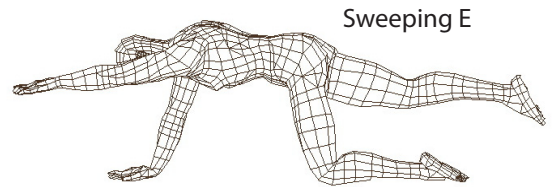
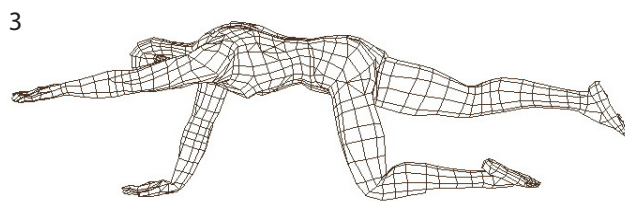
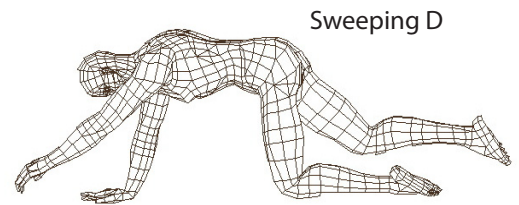
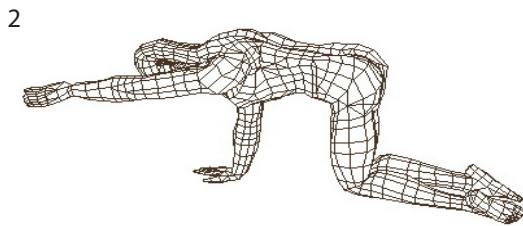
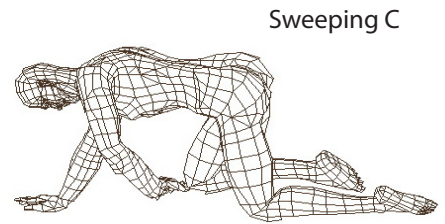
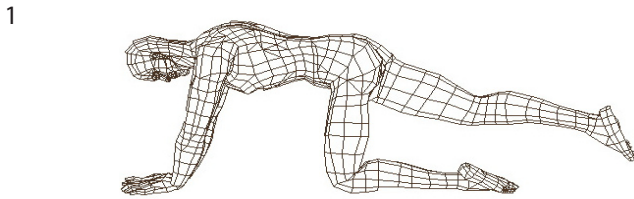
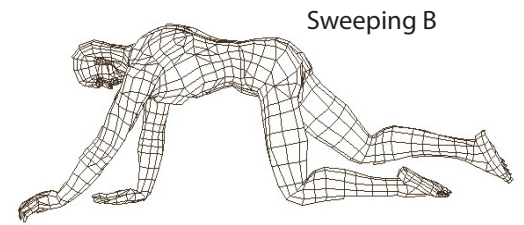
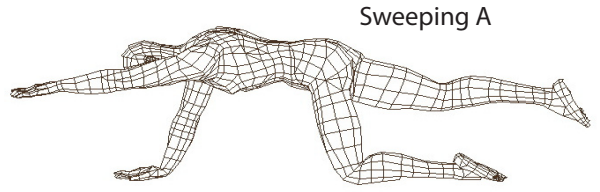
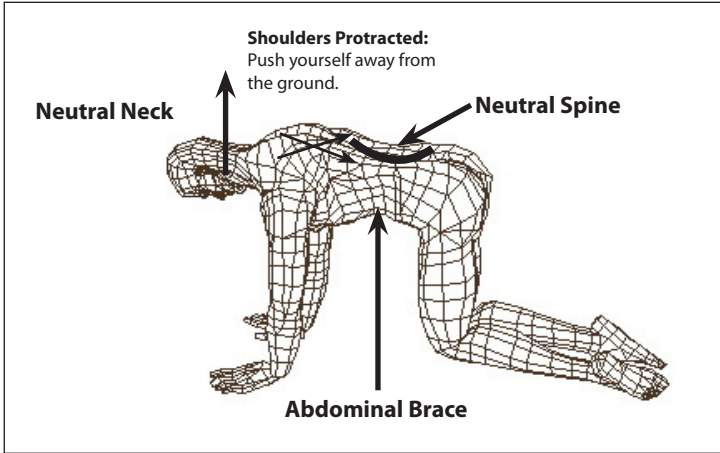
- Raise a straight arm forward.
- Raise an arm and the opposite leg.
- Reach with opposite arm and leg.
- Sweep the opposite arm and leg.
- In unison, move the opposite arm and leg away from center line
- Use weights, labile surfaces or provocation.

**Prone on Ball:** Lying prone on an exercise ball with hands on the ground, body straight and parallel with floor, and scapulae protracted, walk out to the point where your knees are on the ball. Walk back and repeat. Keeping the feet slightly apart will increase the stability on the ball. Maintain protracted scapulae, neutral neck/spine, abdominal brace; and minimal trunk drop, rotation and side movement during all progressions of this exercise.

Progressions:

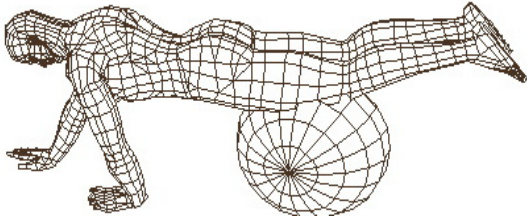
- Walk out to where the ball is under your feet. This position requires more anterior abdominal effort to maintain a neutral spine.
- Walk out to where the ball is under your knees. Perform a Push-up (+), Progress to push-ups and ball under your feet.
- Walk out to where the ball is under your knees. Transfer your weight from hand to hand, keeping your body rigid, back and legs in line, rolling the ball as you go. Progress to ball under your feet.

# Birddog

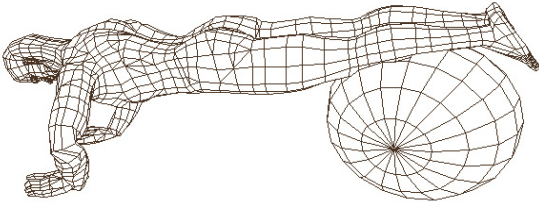




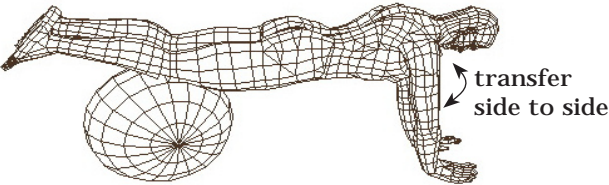
Prone on Ball Stabilization Activities



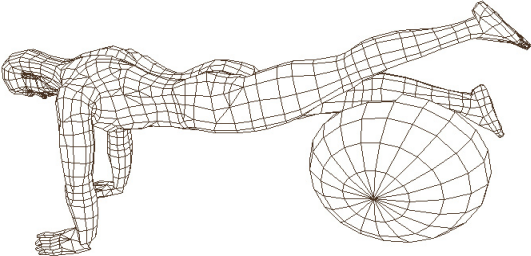
Prone On Ball - Walk Outs



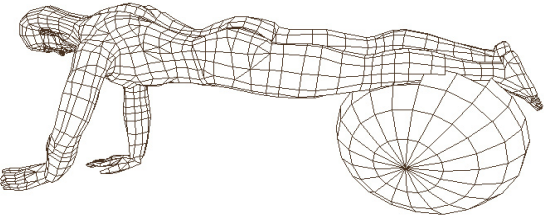
Prone On Ball - Push Ups



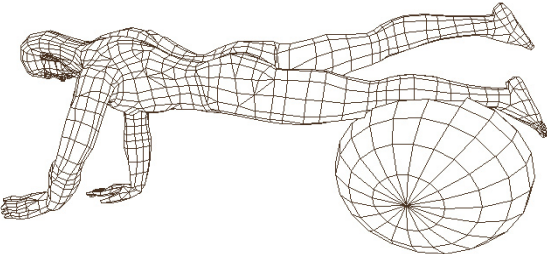
Prone On Ball - transfer Side To Side



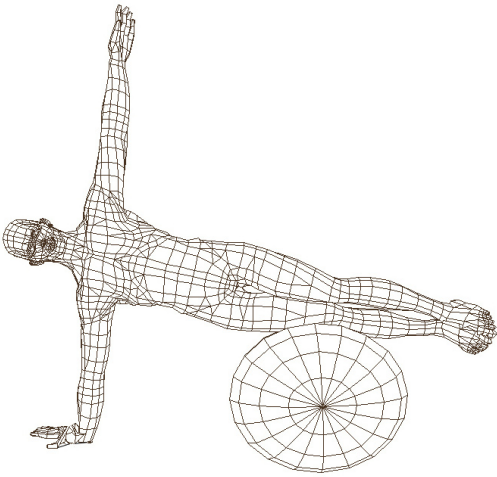
Prone On Ball - Leg Raise



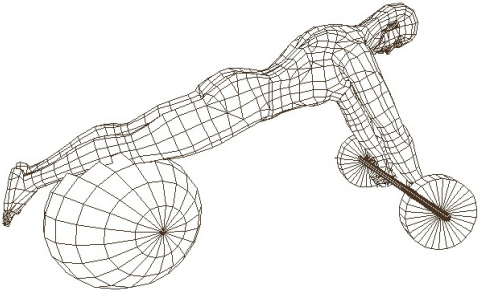
Prone On Ball - Arm Raise



Prone On Ball - Arm/leg Raise



Prone On Ball - Rotate To "T" Position



Prone On Ball - On Barbell

- Walk out to where the ball is under your knees. Raise one leg. Alternate legs. Keep the ball still as you raise your leg. Progress to ball under your feet
- Walk out to where the ball is under your knees. Raise one hand, alternate hands. Progress to ball under your feet.
- Walk out to where the ball is under your knees. Raise one hand and alternate knee at the same time. Progress to ball under your feet.
- Walk out to where the ball is under your knees. Keep your knees together and rotate to the side and on one knee, knees together. Progress to ball under your feet.
- Walk out to where the ball is under your knees. Roll your body and raise your arm so you are in the "T" posture with only one hand on the floor and only one knee on the ball. Maintain rigid trunk during rotation. Progress to ball under your feet.

Variations:

- Follow the above progressions after walking out to a barbell (bicycling), rockerboard, wobbleboard, foam roll, medicine ball or any other labile surface.

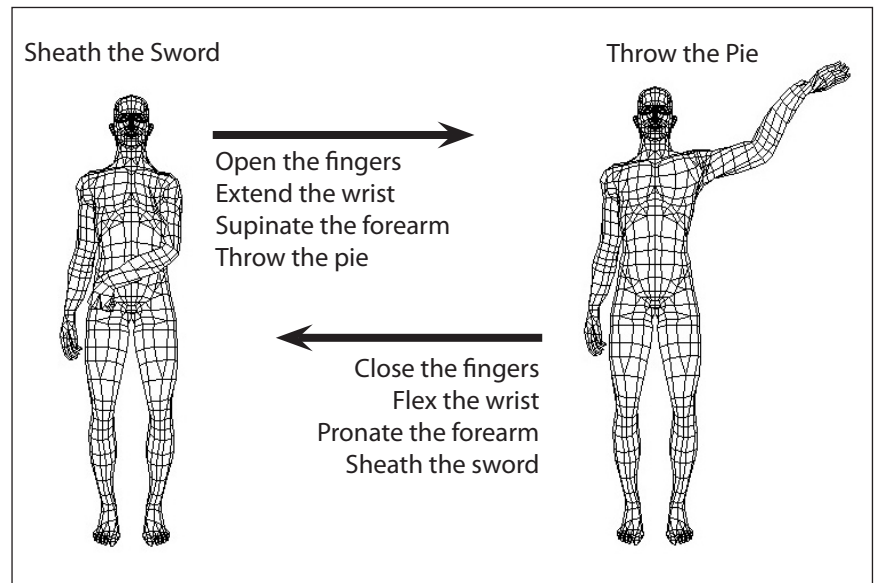
## OPEN KINETIC CHAIN STABILIZATION ACTIVITIES

**Patterns of Facilitation:** There are two patterns of facilitation, or diagonals, for the scapula:

1. Anterior elevation and Posterior depression
2. Anterior depression and Posterior elevation

Likewise, there are two patterns of facilitation, or diagonals, for the upper extremity (based on shoulder position) (Adler S):

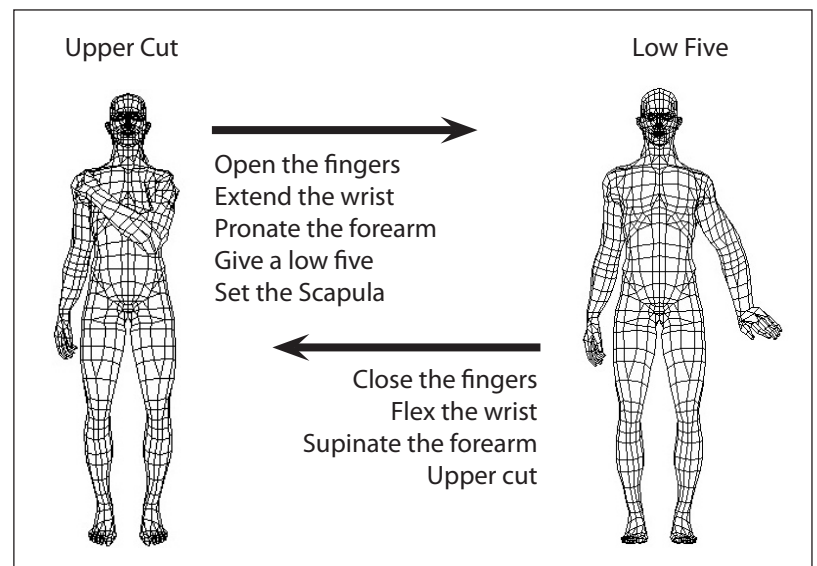
1. Flexion – abduction – external rotation and Extension – adduction – internal rotation.  
Trow the Pie - Sheath the Sward or Same Shoulder - Opposite Hip
2. Flexion – adduction – external rotation and Extension – abduction – internal rotation.  
Upper Cut - Low Five or Opposite Shoulder - Same Hip



Timing of movement of the extremities follows two rules (Larique J. 12/2003, Adler S.):

1. Proximal stability before distal mobility
2. Distal component moves first

Utilizing the patterns of facilitation can have dramatic effects. Proprioceptive facilitation spreads within the synergistic patterns, both distally and proximally, and from one pattern to related patterns of motion. Therefore, the use of this irradiation from the synergistic combinations of muscles (patterns) to strengthen the desired muscle groups or reinforce the desired functional motions influences the motor cortex which then organizes and generates these synergistic muscle combinations. With these sequences, not single muscles or parts of muscles are activated, but muscle groups that are functionally interrelated. (Larique J. 12/2003)

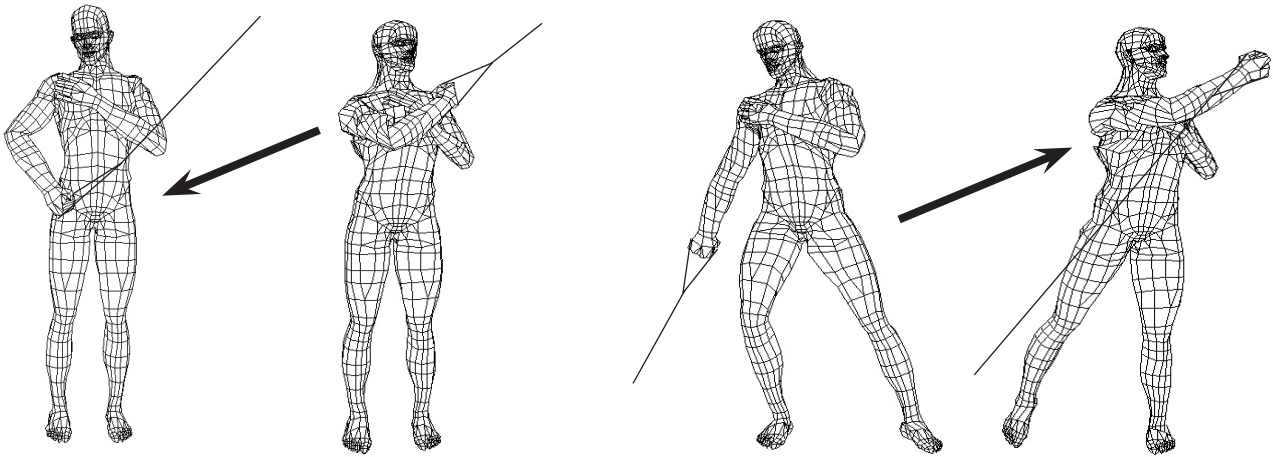


Progressions:

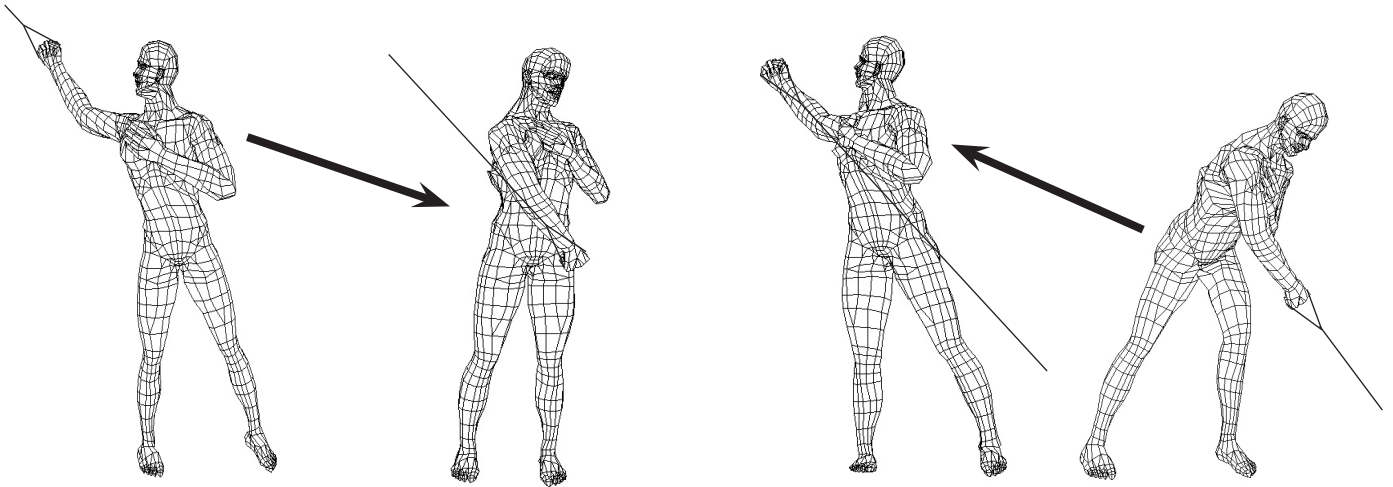
- Cable pulls: Using a cable with minimal resistance perform the diagonals. Progress to utilizing lunges and squats in

## Cable Pulls Using the Patterns of Facilitation

### Opposite Shoulder/Same Hip



### Same Shoulder/Opposite Hip



the direction appropriate to each pull.

## THROWS

Not only are throws probably the most enjoyed activities presented here, throws are excellent for developing coordination through out the entire body utilizing a multitude of directions. They can be performed with both arms or just one, sitting or standing, with the feet even or staggered, stepping into the throw or not, or even while in motion. Initially throws should be controlled, follow good technique and be performed with light balls. Maintaining proper core stabilization is paramount to producing efficient energy transfer from the lower body to the upper body. Maintaining neutral spine not only makes for a safer technique but also contributes to a more efficient utilization of the body's leverages. With increasing weights for throws that replicate sport specific activities that demand precision, consideration should be given to the possibility of changes that may affect accuracy.

Progressions: Throws begin with light weights and simple more focused technique. As an example, a chest pass. Begin by

standing facing your target, throw the ball while keeping the rest of the body steady. Here the movement is more focused on having the arms more involved in the throw. Because of this isolation, less power can be developed. Incorporating a knee bend with the chest pass includes more lower extremity activation as does standing with the feet staggered. Increasing the speed of the pass can put more demands on the abdominal flexors, while throwing from a Bosu adds an element of balance. Finally, throwing during a walking or running task, with or without distractions can increase demands and can become more sport specific.

- Static Posture: movement comes primarily from the arms.
- Staggered Feet: integrating more core and legs in movement.
- Lunges: Incorporates movement and elements of timing and stability.
- Squats And Jumps: Integrates power from the hips transferred through the core to the arms.
- Single Leg Stand: Proprioceptive training, balance, core and hip stability.
- Various labile surfaces such as rockerboard, wobbleboard, bosu, ball, or balance beam: Balance, proprioceptive training.
- During Movement: Reactivity – add distractions such as hurdles, box drops, or last moment verbal or visual cues.

**Chest Pass:** Stand facing a wall or partner. Hold the ball near your chest, hands cradling the ball from below and behind. Set the shoulders back, abdominal brace. Throw with a straight body, from the core, not so much from the arms. Before repeating next throw, insure the shoulders are set.

Progressions:

- Incorporate the lower body with a dynamic squat movement.
- Increase weight or increase distance.
- Single arm chest pass
- Stance - stagger feet; stand on one leg.
- Throw and catch ball while standing on a rockerboard, bosu, or while walking along a balance beam.
- Drop from a box and immediately throw to a moving partner

**Forward Rotational Ball Throw:** Stand facing a wall (or partner), feet square with the wall. Hold ball at waist level and arms nearly straight. Rotate from your feet, legs and hips, keeping the trunk rigid, hurl the ball forward creating your power with your legs and hips. By keeping the core tight and minimizing trunk twisting you have better power transfer from your legs to your upper body.

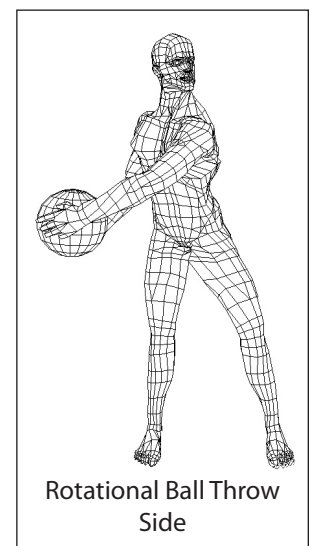
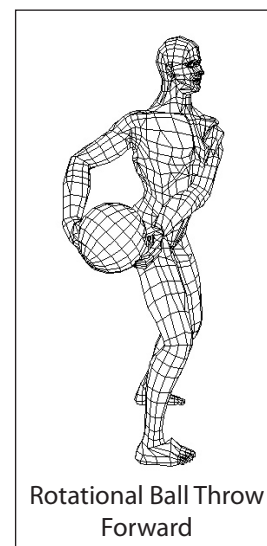
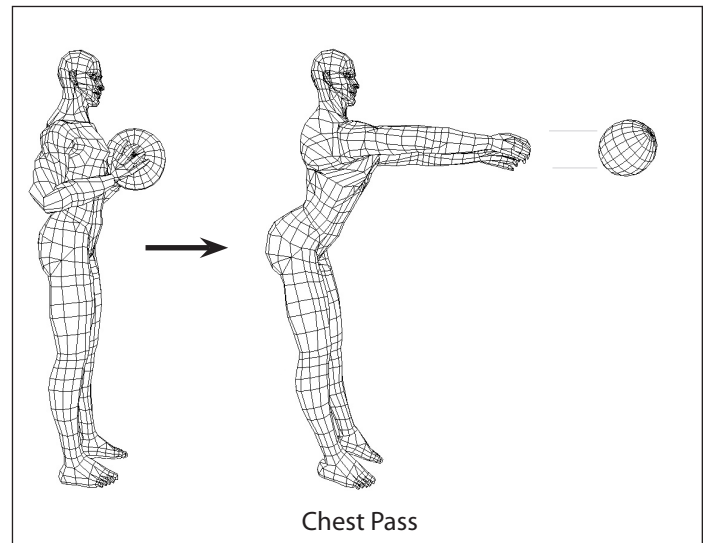
Variations:

- Single Arm Forward Rotational Throw: Same type of throw except holding with one hand under and behind the ball.
- Single Arm Around The Back Forward Rotational Throw: Same throw as single arm forward rotational throw except pass the ball behind your back with the left hand to your right then throw it forward.
- Add Changing Targets, Partner Moving,

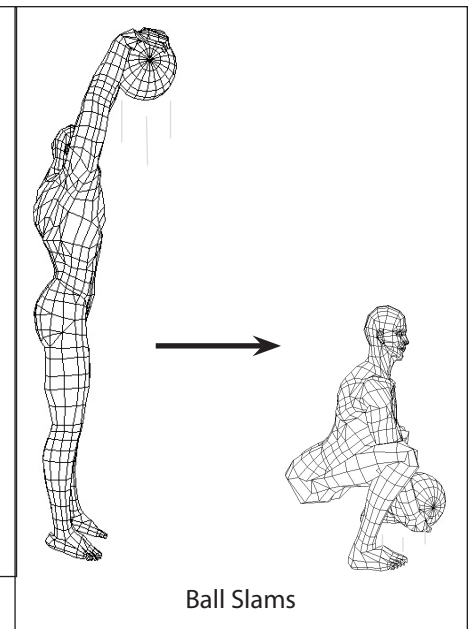
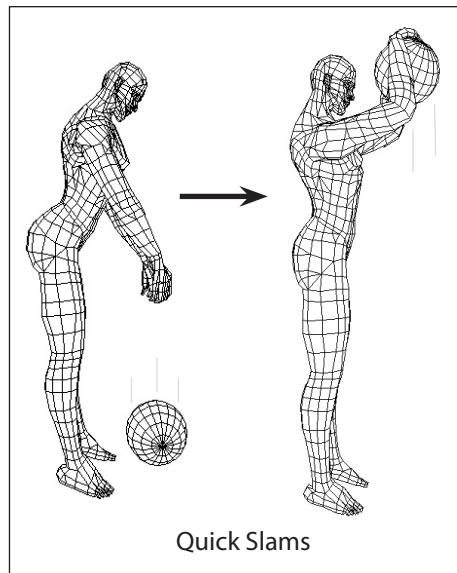
**Side Rotational Ball Throw:** Stand perpendicular to the wall, left shoulder closest the wall. The movement is essentially the same as the Forward Rotational Ball Throw, except you are throwing to the side.

Variation:

**Throw Using The Diagonal:** Load your bent right leg to the outside of your heel, ball low and outside right. Throw the ball up and to the left. Begin the movement with a push off from the right foot and end by extending your body up and to the left. Keep a neutral spine/neck, chest up, scapulae stable. Throw from your core.

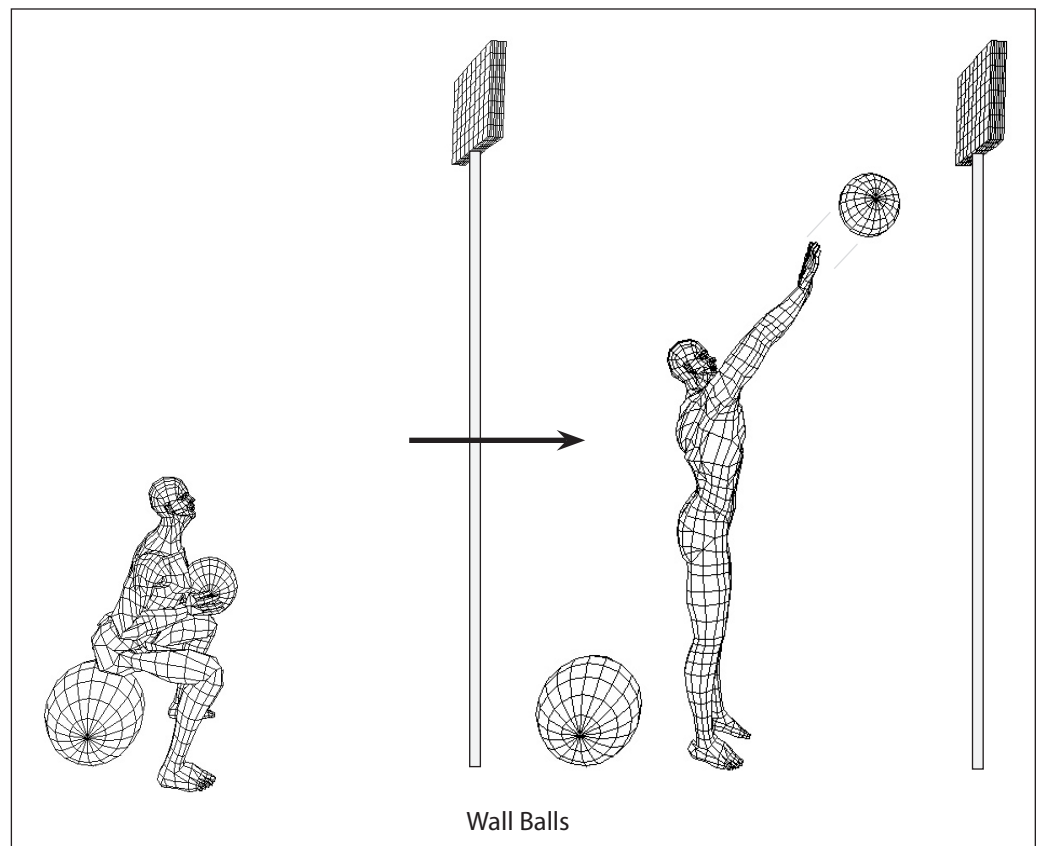


**Quick Slams:** Using a bouncable medicine ball, raise the ball over your head and throw to the ground just in front of your feet. Catch the ball on the up bounce at about chest high and repeat without hesitation. This goes rather quickly. This throw utilizes the core to develop power, the shoulders are used to a lesser extent as is usually thought. Throw from your core/abdominals. If the power is developed properly the feet will naturally come off the ground when slamming the ball. If the ball is being slammed really hard but the feet remain on the ground, then the shoulders are being used too much. Encourage more of a crunch motion.



**Ball Slams:** Use a D-Ball (no bounce). Raise the ball overhead, hands on top of the ball, and slam the ball to the floor, hard. The ball will bounce a couple of inches. Drop immediately into a squat (Chest up, Feet hip width apart, weight to the heels), and catch the ball from below. Throw the ball up over your head (drive with your heels) without letting go of the ball. Transfer your hands to the top of the ball and repeat the throw. This is good training for Olympic lifts. Therefore, appropriate Olympic technique is mandatory for efficiency, safety and grooving good technique.

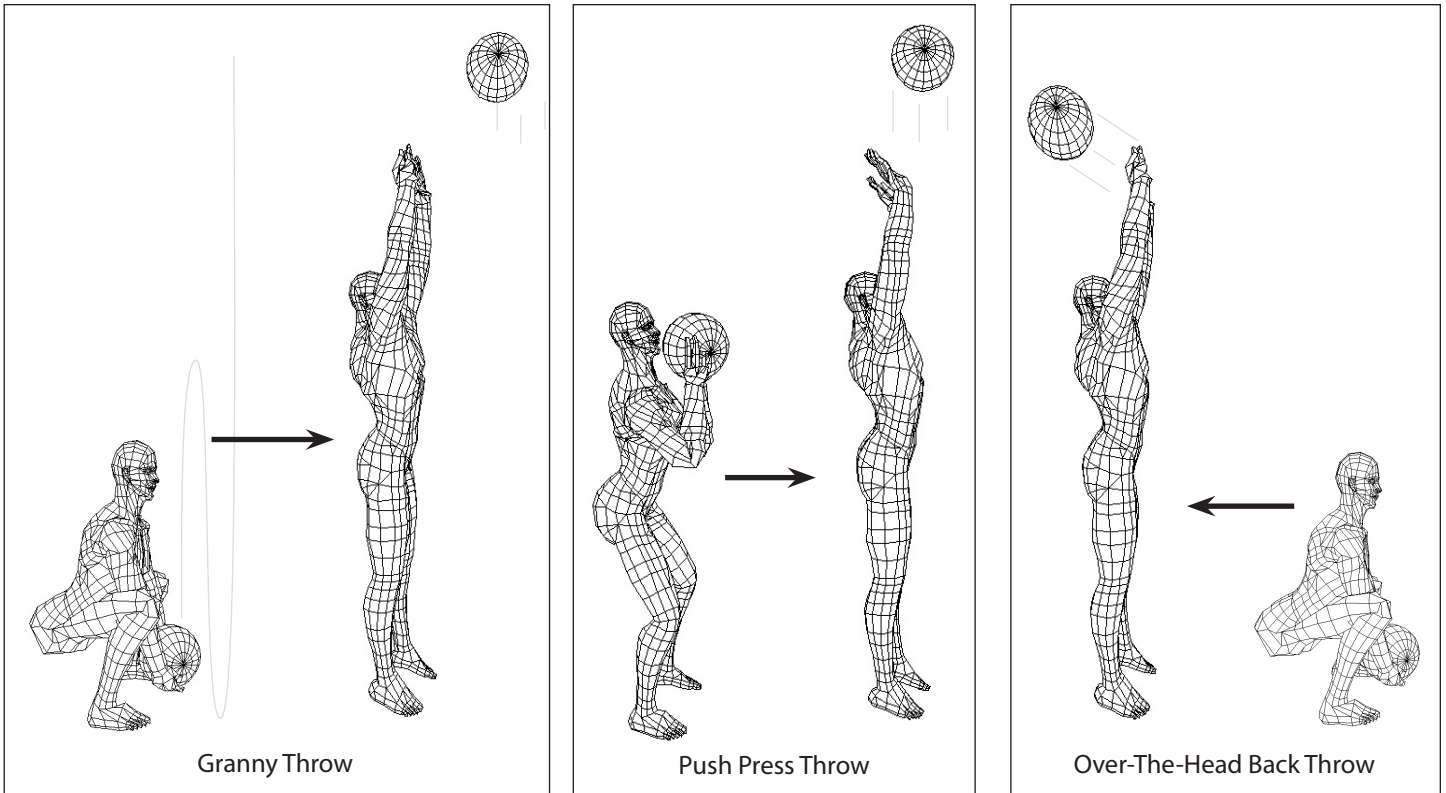
**Wall Balls:** Draw a line on a high wall 8-12 feet above the ground. Stand facing the wall with a 16" dynamax ball or box behind you. Hold the medicine ball at chest level, hands underneath the ball with palms facing up. Squat to the ball/box. Driving with your heels, jump up and throw the ball over the line on the wall. Catch the ball in the same position, at chest level, and immediately repeat by squatting to the ball and jumping again.



**Granny Throw:** Beginning from a squat with the ball between your feet, drive out of the squat and throw the ball up overhead as high as you can. Allow the ball to bounce once. When the ball drops for a second bounce, drop to a squat, catch the ball before it hits the ground, and repeat the throw. Move around to position yourself to properly catch the ball in an appropriate position.

Variation:

- Same as above except catch the ball on the first up-bounce and throw it. This may be a little easier, but much quicker in execution.
- Catch the ball on the down drop without allowing it to bounce.



**Push Press Throw:** Hold the medicine ball at chin level, hands underneath the ball with palms facing up. Throw the ball as high as possible, catching the ball again at chin level. Reach for the ball and absorb the energy from the throw by bending the arms to the starting position.

Progressions:

- Add a dip-and-drive: A quick short squat, weight back and drive with the heels.

**Over-The-Head Back Throw:** Begin with the ball in front of you with your hands under the ball. Keep hold of the ball and quickly squat, allowing the your hands and ball to drop back between your legs. Without hesitation drive out of the squat position, throwing the ball overhead behind you as far back as you can. Have your partner throw the ball back and repeat the throw.

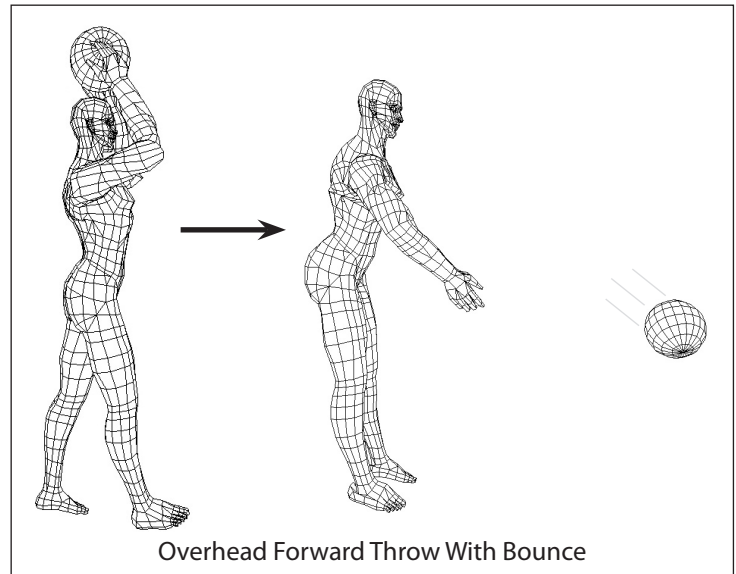
Variations:

- Single arm over-the-head back throw: Same throw except using one arm.

**Overhead Forward Throw With Bounce.** Holding the ball from behind, throw the ball from over your head bouncing it on the ground to hit a target in front of you.

Variation:

- Overhead Forward Pass Without Bounce: Same except don't allow the ball to bounce before hitting the target.



Overhead Forward Throw With Bounce

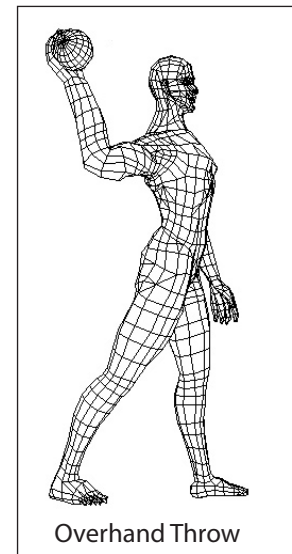
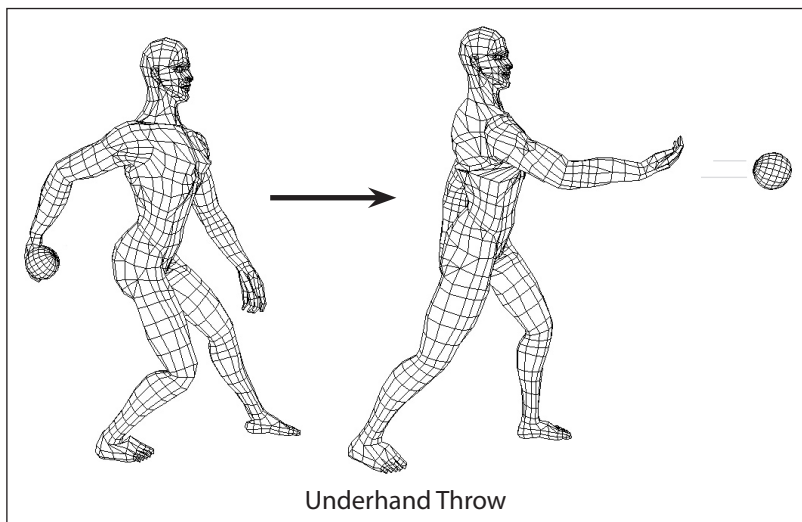
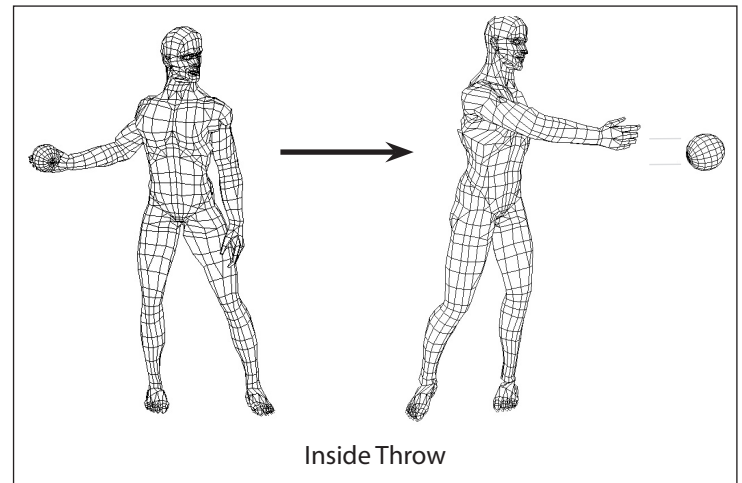
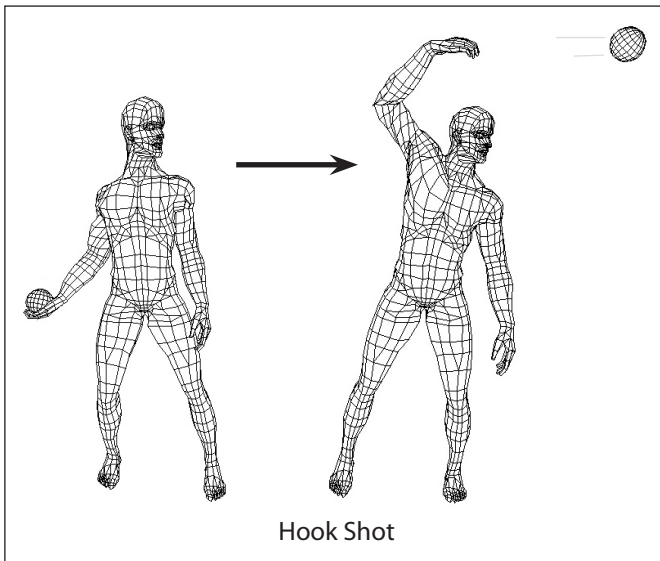
### Single Arm Throws:

- Internal Rotation or Inside Throw: Hold a small light weighted ball to the right of your body with your elbow away from your side, scapula set and your elbow at 90° flexion. Throw the ball to the left. Use wrist flexion to increase power.
- External Rotation: We have discussed this throw above. Hold a small light weighted ball across your body and throw it to the right by setting the scapula followed immediately with a throw. Use wrist extension to increase power.

Variations:

- Use different arm positions that gradually increase in difficulty to replicate sport specific needs.

- Hook Shot: Hold a ball from the bottom at your side. Swing your arm into abduction and throw the ball over your head to hit a target to the left. This replicates the traditional hook shot from basketball.



### OLYMPIC AND ALLIED LIFTS:

Olympic and allied lifts require contribution from all of the neuromuscular systems controlling and producing movement. The explanation of proper form and technique is beyond the intentions for this discussion. More information on this subject can be found on the website for USA Weightlifting. Some techniques that favor the shoulders include:

#### Variations:

- Shoulder Press
- Push Press
- Push Jerk
- Thrusters
- Kettlebell swings

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