CHAPTER 8: EXERCISE APPLICATION

Step 1: Determine the Motion

What is the motion to be performed?

This is determined by three factors:

1. The client’s goal/need/want
2. The client’s anatomy
3. The client’s current ability!

Step 2: Determine the Direction of Resistance

From what direction is the force being applied? Resistance must be in opposition to the motion.

- Gravity
- Tubing
- Cable
- Machines
- Cam
- Etc.

The Force Angle of Resistance

The force applied to a muscle or a bone is actually the resultant of the pull of all fibers that compose that muscle at a common point of attachment. This comes in handy when analyzing penniform muscles like the pectoralis major and/or deltoids. These muscles have fibers that run in different directions, and in some instances, opposite each other. The action line exists in the direction of pull created by the fibers or tendons of the muscle at the point of application.

**Translatory Motion** is the movement in which all points of a moving body move uniformly in the same line or direction.

**Rotary Motion** is the movement of an object around a fixed axis in a curved path. Direction of motion is always perpendicular to the limb. The force is applied in one direction, but the limb moves in a different direction.

In this image, you see the translatory force of resistance (ft), gravity (g), and the force of rotation (fr).
Step 3: Determine the Starting Position

• Position the body so motion opposes the resistance.
• Exact position should be determined by:
  Goal/need–individual anatomy–level of control

Principal of Progression

1. Stable ___________________________ Unstable
2. Static ___________________________ Dynamic
3. Slow ___________________________ Fast
4. Simple __________________________ Complex

Step 4: Continually Monitor Joint Position

Stabilization

Prioritize in this order:

1. The spine
2. The joints closest to the moving joint/weight.
3. All other joints

Step 5: Continually Monitor the Path of Motion

• Path determined in step 1.
• Increased concern with increased freedom
• Active participation

Step 6: Determine and Monitor the Range of Motion

Traditional Definition
—vs—
Anatomical Definition

Although “the more the better” may apply to improving the skill of performance, it may adversely affect the well-being of the performer

Three Types of ROM

1. Passive Range of Motion (PROM)
   • Movement produced via an external force
   • Normally the greatest ROM
2. Active Range of Motion (AROM)
   • Your muscular ability to move
3. Resisted Range of Motion (RROM)
   • Mover’s ability loaded
   • ROM will change in respect to goal,

Six Steps Summary

1. Determine the Motion.*
2. Determine the direction of resistance.
3. Determine the starting position.
4. Monitor the joint position/stabilization.
5. Continually monitor the path of motion.
6. Determine and monitor the range of motion.
   * For body motion to occur, the effort force must overcome the resistive force

The Spine

Vertebral Column
Intervertebral Disc
Spinal Motions

SPINAL COLUMN

Flexion—head and trunk bend forward.
Extension—head and trunk bend backward.
Lateral Flexion—right/left head and trunk bend to one side.
Rotation—clockwise or counterclockwise turn of the head.

Pelvic Tilting

Anterior tilt
Posterior tilt
Lumbar

One of the most vulnerable positions for the disk appears during flexion under compression. Current estimates suggest that approximately 80% of the adult population will have lower back pain significant enough to miss work and/or see a doctor during their lifetime. Some major causes of back pain are weak abdominals, tight hip flexors, hamstrings, and lower back muscles.

Everyday positions.
- Sitting causes 30-40% more intradiscal pressure than standing.
- #1 job in the world is a sit-down job.
- #1 cause of back pain—long periods out of neutral.
- Assess your seated position!

Range of motion. The lumbar facets favor movement in the sagittal plane, are most stable in full extension, and offer limited range of motion in rotation.

Internal/External Obliques
- Strong spinal stabilizers and movers.
- Spinal flexion when acting bilaterally (both sides).
- Unilateral—right external, left internal act as a force couple to perform a concentric, diagonal motion to the left.

Rectus Abdominus
- Superficial, long flat muscle.
- Horizontal divided into small squares by fibrous bands.
- Upper and lower abs do not imply cranial and caudal segments!
- Can create regional emphasis because of segmental innervation.

Review

Erector Spinae
- There are numerous small muscles constituting the erector muscle group that can be classified into two subgroups: erector spinae and the deep posterior or paravertebral muscles.
- These muscles run up and down the spinal column in pairs and create extension when activated together. In addition, these muscles also provide posterior stability to the vertebral column, counteract gravity in the maintenance of upright erect posture, and control forward flexion.

Facts
- Trunk muscles consist of back extensors that bend the trunk backward, lateral flexors that bend it sideways, and anterior abdominals that bend it forward. All of these muscles play a role...
in stabilizing the trunk.

- Movements of the extremities originate in and emanate outward from the core. Studies on motor control and muscle recruitment patterns have conclusively shown that the deep abdominal wall muscles are activated approximately 30-50 ms before the arm or leg muscles in any activity. Such core activation is essential to stabilize the pelvis and rib cage, which in turn provide the working foundation for the legs and shoulder girdle.

**Conclusion**

- The body is equipped with a functional suspension system for dissipating forces away from the spinal joints and structures.

- It is generally (not always) through bad postural habits, overexposure to furniture, lack of exercise, and/or poor exercise technique that the system begins to fail.

- It is important to know how to prescribe proper exercises for the trunk muscles because of the effect that weakness has on overall posture and its relationship to painful problems.

**Posture**

- The ideal skeletal alignment involves a minimal amount of stress and strain, and is conducive to maximal efficiency of the body.

- Ideal alignment must exist during exercise to achieve optimal recruitment for muscle development and to develop motor patterns that support long-term joint function!

**Structural Integrity Assessment**

**Know your limitations.**

- At the NCCPT we teach a *simplified* assessment.

**Know when to refer.**

- Physical therapists and physicians who practice “manual medicine” are often qualified to give a much more complete assessment.

**Minimize clothing.**

- Spandex, shorts, bare feet, and symmetrically “tucked in” clothing will make the evaluation more accurate.

**Analyze “natural” posture.**

- If possible, perform the assessment while the client is not concentrating on posture.

**Standard Posture**

**Side view:**

- **Head:** Neutral position, not tilted forward or back.
• **Cervical Spine:** Normal curve, slightly convex anteriorly.
• **Scapulae:** Flat against upper back.
• **Thoracic Spine:** Normal curve, slightly convex posteriorly.
• **Lumbar Spine:** Normal curve, slightly convex anteriorly.
• **Pelvis:** Neutral position, anterior superior spines in same vertical plane as symphysis pubis.
• **Hip Joints:** Neutral position, neither flexed nor extended.
• **Knee Joints:** Neutral position, neither flexed nor hyperextended.
• **Ankle Joints:** Neutral position, leg vertical and at a right angle to sole of the foot.

**Back view:**
• **Head:** Neutral position, neither tilted nor rotated. Cervical spine is straight.
• **Shoulders:** Level, not elevated or depressed.
• **Scapulae:** Neutral position, medial borders essentially parallel and about 3 inches apart.
• **Thoracic and Lumbar Spines:** Straight.
• **Pelvis:** Level, both posterior iliac spines in same transverse plane.
• **Hip joints:** Neutral position, neither adducted nor abducted.
• **Lower extremities:** Straight.
• **Feet:** Parallel or toeing out slightly.

**Common Muscle Imbalances and Related Postures**

• **Postural fault:** Forward head.
• **Anatomical joint position:** Cervical spine in hyperextension.
• **Muscles in a shortened position:** Cervical extensors, upper traps, and levator.
• **Muscles in a lengthened position:** Cervical spine flexors.

**Exercise Process**

Teach proper body alignment!
• If cervical spine extensors are short, stretch by trying to flatten the cervical spine.
• Strengthen cervical spine flexors if weak.

**Common Muscle Imbalances and Related Postures**

• **Postural fault:** Protracted shoulder girdle (forward shoulders).
• **Anatomical position:** Scapulae abducted and (usually) elevated.
• **Muscles in shortened position:**
Serratus anterior, pectoralis major, anterior deltoids, subscapularis, pectoralis minor, upper trapezius.

A forward head position is usually the result of faulty upper back posture. If neck muscles are not tight posteriorly, the head position will usually correct as the upper back is corrected.

- **Muscles in lengthened position**: Middle & lower trapezius, rhomboids, and thoracis spinal extensors

**Exercise Process**

**Teach proper body alignment!**
- Stretch pectoralis minor.
- Stretch shoulder adductors and internal rotators, if short.
- Strengthen middle and lower trapezius.
- Strengthen thoracic spine extensors.

**Common Muscle Imbalances and Related Postures**

- **Postural fault**: Anterior pelvic tilt.
- **Anatomical position**: Lumbar hyperextension, hip joint flexion.
- **Muscles in a shortened position**: Low back erector spinae, hip flexors.
- **Muscles in a lengthened position**: Abdominals, especially external oblique; hip extensors.

**Exercise Process**

**Teach proper body alignment!**
- Stretch low back muscles, if tight.
- Stretch hip flexors, if tight.
- Strengthen hip extensors, if weak.
- Strengthen abdominals with posterior pelvic tilt exercise—avoid overemphasis of hip flexors (anchoring feet, sit-ups, etc.).

Weak abdominals can also contribute to low back pain.

**Common Muscle Imbalances and Related Postures**

- **Postural fault**: Posterior pelvic tilt.
- **Anatomical position**: Lumbar spine flexion, hip joint extension. Tight hamstrings can contribute to low back pain.
- **Muscles in a shortened position**: Anterior abdominals, hip extensors.
- **Muscles in a lengthened position**: Low back erector spinae, hip flexors (one joint).

**Exercise Process**

**Teach proper body alignment!**
- Stretch hamstrings, if tight.
- Strengthen hip flexors to help produce normal anterior lumbar curve. Avoid prone hyperextension because it increases the posterior pelvic tilt and stretches hip flexors.
- Low back muscles are seldom weak; but if they are, strengthen them with proper exercise to restore a normal anterior curve.
- Strengthen hip extensors, if weak.
- Strengthen abdominals with posterior pelvic tilt exercise–avoid overemphasis of hip flexors (anchoring feet, sit-ups, etc.).

**Common Muscle Imbalances and Related Postures**

- **Postural fault**: Pronation (ankle rolls in).
- **Anatomical position**: Foot eversion (a combination of pronation and forefoot abduction).
- **Muscles in a shortened position**: Peroneals and toe extensors.
- **Muscles in a lengthened position**: Tibialis posterior and long toe flexors.

**Exercise Process**

**Teach proper body alignment!**
- Stretch low back muscles, if tight.
- Stretch hip flexors, if tight.
- Strengthen hip extensors, if weak.
- Strengthen abdominals with posterior.
Strengthen for Postural Endurance

Trainer process:
1. Find client’s ideal alignment (neutral).
2. Teach awareness.
3. Challenge ideal alignment.

Sometimes the ability to stabilize will depend more on skill than strength.

Stability Before Mobility

Know where to begin the strength program!

Many individuals begin strengthening by using exercises that are way too demanding, primarily addressing the outer muscles.

• Assessment question: Are the deep muscles working with the contraction of the outer muscles?

The Law of Facilitation

When an impulse passes once through a given set of neurons to the exclusion of others, it will tend to do so again; and each time it transverses this path, the resistance will be lesser.

We must know where to begin the strength program! Improper exercise form will cause poor neuromuscular motor programming, leading to or exacerbating musculoskeletal imbalances.

Seated Posture Trainer

Goal: to teach proper body alignment and increase postural control and strength.

Level 1: Stable platform (bench chair)
• Seated with arms crossed—for comfort and to nullify any temptation to push with the hands.
• Thighs parallel to ground (may have to manipulate to maintain neutral). Thighs too high encourages slouched posture.
• Lift chest up.
• Head up over shoulders. Optimal: cheek bone bisecting with collar bone.
• Position pelvis in neutral (teach pelvic “rock” awareness).
• Feet flat with a wide base of support.
• Ask how this new position “feels.” Depending on imbalances, this may be very challenging.
• Progress when remaining seated for 30-60 seconds is no longer a challenge.

Seated Posture Exercise Progressions

Different levels will depend on the client’s level of control. Can your client maintain optimal joint alignment? If the client deviates, you must correct!

Progress slowly!

Examples:
• Smaller base of support.
• Lift one leg up—switch.
• Stable object under foot, progress to unstable objects.
• No feet.
• Close one eye—switch—both eyes.
• Manual resistance.
Unstable Seated Posture Exercise

Unstable platform:
• Same guidelines as stable exercise.
• Start by just sitting for 30-60 seconds, then progress.

Stability ball guidelines:
• Changing position on ball = different challenge.
• Balance affects the level of complexity, determined by the base of support (changing the firmness of the ball).

The goal is to translate awareness/strength to all exercises as well as everyday life.

Coordination Assessment

Abdominal coordination: The ability to stabilize the pelvis and lumbar curvature while simultaneously raising and lowering the leg(s).

Mechanical points:
• Lie supine, knees bent and feet flat on the floor.
• Place fingers under lumbar region (to feel what is happening in the spine).
• Draw belly button to spine (you should feel pressure against your fingers).
• While holding pressure against your fingers, raise and lower one leg.
• STOP if your ability to keep the back flat against your fingers diminishes.
• Alternate right to left.
• End stage = both legs are able to raise and lower while maintaining neutral alignment.
• Mastery requires 15 repetitions at end stage.

If one cannot achieve end stage, refer to isometric ab exercises. Use this assessment as a tool to prescribe and progress.

Abdominal Isometrics

Level 1: Supine Pelvic Hold

How to position: Lie with back arched naturally. Feet portioned as close to buttocks as possible.

Motion: Draw your lower abdominals toward your chest (try to pull your navel toward your back). Without depressing the rib cage, hold pelvic position and breathe naturally.

Mechanical points:
• Place hands under lumbar curvature to feel slight pressure (ensuring activation).
• Hold pressure, breathe diaphragmatically (rise from belly then chest).
• Avoid pushing down with your feet during this
movement, as this will transfer emphasis to the gluteal muscles.
• Progress to level 2 when a 60-second pelvic hold is no longer a challenge.

Level 2: Supine Pelvic Hold

Start: Same as level 1.

Motion:
• Slowly slide one foot away from you. Extend leg only as far as you can while maintaining pelvic position. Make sure to keep firm pressure on your hands; then slide leg back up to the bent knee position.
• Move leg out as far as you can control. The further you move the leg from the trunk, the more difficult it is to maintain pelvic position. The pressure on your hands should be your guide. When 10 repetitions with an extended leg is no longer a challenge, progress to level 3.

Level 3: Supine Pelvic Hold

Start: Lie supine with both knees bent.

Motion:
• Perform pelvic hold (see Level 1) and then slowly raise one knee toward your chest; return your foot to the floor without losing pelvic position. Make sure to maintain pressure on hands.

Level 4: Lying Supine with Both Knees Bent

Start: Lie supine with both knees bent.

Motion:
• Build up to six repetitions with each leg, progressing to both legs at the same time.
Chapter 8: Exercise Application: Page 154

Back Isometrics

Stability Ball

Start: Stand or kneel in ideal alignment, fold arms across chest (if standing, bend knees slightly).

Motion:

- Tense gluteus muscles, then slightly bend forward from the hip (not spine). The goal is to maintain ideal alignment. You should feel tension in your back muscles as well as your posterior leg muscles.
- The goal is to work up to a 2-minute hold.
- To progress, increase the angle of the body against gravity (90° of hip flexion being the most difficult).
- Arm position can change the level of challenge.
- As with all exercises, work through a pain-free range.

Standing or Kneeling Isometric Holds

Mechanical points:
- The ball acts as a support mechanism.
- Resistance changes with varied positions.
- Balance also affects level of difficulty, which is determined by the firmness of the ball (base of support). Narrowing or widening the base (changing the firmness of the ball) changes the level of intensity (wider = easier, narrower = harder).

Back Extension Machine

Start: Seated in ideal alignment with arms crossed,
Motion:

- Maintaining ideal alignment, move through concentric-eccentric.
- The key is control. Do not allow the machine to push you into a slouched position (spinal flexion).

45° Bench

Mechanical points:
- Machine positions the body at a 45° to gravity (start).
- Position pelvis (ASIS) with edge of pad.
- Analyze individual anatomy with machine design.

Dynamic Abdominal Movements

Knee Ups

Start: Lying on your back, knees pointed upward and hip flexed 90°.

Motion: Roll pelvis back until flattened against the floor. Try to raise your knees vertically toward the ceiling, allowing a vertical movement through the thighs.

Mechanical points:
- Concentrate on rolling pelvis with lower abdominals.
- This is also an active low back stretch.
- Placing arms above head helps to counterbalance the weight of the body.
- Build up to 15 repetitions.

Reverse Crunch

Start: Lie supine without flattening the lower back.

Motion: Roll pelvis backward until abdominals are fully contracted.

Mechanical points:
- Do not throw the legs!
- Placing arms above head will help balance.
- Do not move legs past the point of full abdominal contraction, as this strains the neck.
- Knees should not be used as a reference point as to how far to extend, because individual anatomy (torso length) may vary.
Abdominal Crunch

**Start:** Lie supine with knees bent (only as far as needed).

**Motion:** Tighten abs and pull your ribs slowly toward the pelvis.

**Mechanical points:**

- Do not overuse. May lead to shortening of abs, rounded shoulders, forward head posture.
- Crunches with hands behind head may lead to weak cervical links.
- Option: hands under chin.
- Do not anchor feet. Anchoring the feet tends to overemphasize the psoas.
- Arm position changes load.

Machine Crunches

Crunch machines have become a popular item in the health club industry. Listed are a few precautions you should consider before use:

- A vast majority of abdominal machines apply resistance at the shoulders, with the axis lined up with the spine. This path will introduce hip motion with little resisted spine motion.
- Pre-flexed ab benches.
- Anchoring feet increases hip flexor involvement.

**Position/motion:**

- Cross arms and place pad on lower part of sternum.
- Scoot up on the chair as far as possible, limiting the desire to flex the hip.
- Use the downward path of machine.
Dynamic Back Movements

Stability Ball Extensions

Start: Allow your back to controllably round over the ball. Place hands at your sides.

Motion: Slowly raise your body off the ball.

Mechanical points:
- Avoid hyperextension.
- Extending your arms over your head increases the challenge.
- Level of difficulty changes the varied positions.

Oblique Training

Objectives Analysis

1. Seated rotatory machine

2. Ab rollers (flexor chain)
The Shoulder Girdle

- The shoulder girdle is composed of the clavicle and scapula.
- The shoulder girdle is the foundation for the head, neck, and upper extremities.

The Scapular Musculature

- Trapezius
- Rhomboid Minor
- Rhomboid Major
- Levator Scapulae
- Serratus Anterior
- Pectoralis Minor

The Glenohumeral Joint

Key Landmarks

- Glenoid Fossa
- Humeral Head
- Greater Tubercle
- Lesser Tubercle
- Acromion
- Coracoid Process
- GH Joint (which has more freedom than any other joint in the body).
- Close-Packed Position

Motions of the Shoulder Girdle

- Elevation
- Depression
- Abduction
- Adduction
- Upward Rotation
- Downward Rotation
Shoulder Motions and Positions

- Shoulder Flexion: 160-180°
- Shoulder Extension: 40-60°
- Abduction: 160-180°
- Adduction: 50-75°
- Internal/External: 45°
- Horizontal Flexion: 135°
- Horizontal Adduction: 90° (glenohumeral joint alone)
- Horizontal Abduction/Extension: 45°
- Circumduction: Cone-shaped movement.

Scapulohumeral Rhythm

- Scapulohumeral rhythm is the relationship between the shoulder (glenohumeral) joint and the scapulothoracic joint.
- There are two degrees of shoulder motion for every one degree of scapula-thoracic motion.

Musculotendinous Cuff “SITS” Muscles

- Supraspinatus
- Infraspinatus
- Teres Minor
- Subscapularis

Dynamic Stability

- The true function of the MTC is dynamic stability.
- Maintains an instantaneous axis of rotation.
Exercises for the MTC

Goal: Train for a level of tissue integrity.

Mechanical points:
- Isometrics in various positions.
- Performing longitudinal rotation (internal/external).
- Range of motion varies with different shoulder positions.
- Tubing application will allow full rotation at start position.
- Supraspinatus is best addressed within 40-60°.
- If the goal is to emphasize the MTC, stabilizing the scapulae may be helpful.

The Latissimus Dorsi and Teres Major

- The latissimus dorsi is the broadest muscle of the back. Its thin, superficial fibers originate at the low back, ascend the side of the trunk, and merge into a thick bundle at the axilla.
- The latissimus dorsi not only moves the arm, but because of its broad origin, can also affect the trunk and spine.
- The teres major is called “lats’ little helper” because it is a complete synergist with the lat.

Front Pulldowns

Motion: Concentric Shoulder adduction.

Direction of resistance: Upward.

Body position: Seated.

Mechanical points:
- Assess active range of motion in shoulder for proper body position.
- Maintain neutral spinal alignment.
- Leaning back occurs at the hips, not the spine.
- From a side view, the forearms should line up with the line of resistance (cable).
- Motion occurs in the scapulothoracic joint as well as the glenohumeral.
• The shoulder girdle (scapulae, clavicle) works with the arms, both concentrically and eccentrically.
• Range of motion is as far as you can control. The final relationship between the bar and the body is irrelevant!
• Different bars put the body in different planes, creating different variations.

Seated Cable Row

Motion: Concentric shoulder extension.

Direction of resistance: Outward.

Body position: Seated.

Mechanical points:
• Maintain neutral spinal alignment. Do not flex the spine!
• Bending from the hip to perform eccentric hip flexion with eccentric shoulder flexion via concentric hip extension with concentric shoulder extension is an advanced variation. Note, no bending takes place in the spine!
• If knees are straight with feet too high on the bench, the hamstrings can pull on the pelvis to cause a loss of spinal alignment. A slight bend to the knees and dropping the feet may be encouraged.
• The bar does not have to touch the body. Range of motion is not determined by how far the bar moves! Monitor control.

Seated Cable Row Grip Variations

Pronated: Great for rounded shoulder syndrome. Prone radioulnar position, with elbows high, emphasizes the shoulder adductors (antagonist to the protractors, which pull the head/shoulders forward).

Supinated: Increase the tendency for biceps brachii involvement. Easier to move in shoulder extension, which decreases the shoulder blade adductor involvement.

Neutral: Great for lat emphasis. This radioulnar position allows shoulder extension to occur more freely.
Single handle: To overcome a deficit. Helps mobilization in the thoracic spine, creates an asymmetrical force across thoracic spine.

Machine Analysis

**Question 1: Does the equipment match the motion of the body?**
- First, identify the path through which the body moves.
- Do not conform to the machine—the machine should conform to you!

**Question 2: How does the machine apply resistance?**
- Pulleys
- Cam
- Rotary path
- Linear path

*Do not let the machine decide the exercise. Decide the exercise based on the motion(s) you can control, then decide if the machine is appropriate.*

Risk/Benefit Analysis: The Behind Head Lat Pulldown

**Motion:** Concentric shoulder adduction.

**Direction of Resistance:** Upward.

**Body Position:** Seated.

**Risk**
- Assess active ROM and compare it to behind-head position. Average is 160° not 180°.
- In order to go behind head, many will activate hip flexors, perform horizontal shoulder ab, and couple this with external rotation so the bar does not hit the head. This places a lot of stress on the anterior joint capsule!
- Promotes forward head posture.
- Less than optimal fiber opposition.

**Benefit**
- Lat stimulus.
Risk/Benefit Analysis: Dumbbell Pullover

**Motion:** Concentric shoulder extension.

**Direction of Resistance:** Down (gravity).

**Body Position:** Supine.

**Risk**
- Greatest load placement where there is the greatest opportunity for risk.
- Bench behind shoulders creates a seesaw.
- Arms at full length will increase the distance of the weight from the shoulder joint, increasing the speed at which the dumbbell is moving.
- Where the body has the greatest opportunity for work, the resistance is balanced.

**Benefit**
- Minimal lat stimulus.

**Make It Safer!**
- Decline bench to create a better shoulder position.
- Alter speed.
- Bend elbows.
- Apply resistance via a cable crossover.

The pectoralis major is a broad, powerful, penniform muscle. It is divided into three segments: clavicular, sternal, and costal fibers. A bilateral shortened chest musculature produces a forward-leaning posture by pulling the shoulders forward.

Research employing electromyographic analysis concluded the range from 30° above the horizontal plane of the shoulder joint to 15° below to be the optimal angles for training the pecs.

Both incline and decline activate the upper pec muscles equally. The lower pecs, however, are activated to a greater extent on declines, which increase overall motor unit activation.

If the goal is pectoralis emphasis, maintenance near the horizontal plane (arms nearly straight out from the shoulder joints, not the top of the deltoids) is optimal.

**How Genetics Affect Pec Emphasis**
- The distance from the sternum to the shoulder can dramatically affect the force angle.
- If a person has a thin rib cage, their potential for power lifting is greatly reduced.
- To increase pec emphasis, the shoulder blades may be set into a position that is based on rib cage thickness, ability, and comfort. This would not be
part of functional strength, as the body works as a unit. What is the goal?

**Range Of Motion For Pectoralis Training**

Many people are not automatically designed to perform chest exercises, as they are generally taught in strength tests and by coaches.

**Problems With the Traditional Bench Press Technique**

- The bar is lowered until it touches the chest. To perform this exercise under such guidelines requires a greater range of motion than is found in the shoulder joint of most people.
- Loading the shoulder and forcing it beyond the functional range of motion will stretch the joint capsule.
- If the exercise is performed on a flat weight lifting bench, normal movement of the shoulder blades (scapulae) may be disrupted. This demands that more movement must occur in the shoulder joint itself. The heavier the lift, the more important this is.

**Individual Range of Motion Assessment**

- Place arms in goal position.
- Allow the arm (unloaded) to lower to the end range. This is the position at which the arm naturally stops without being forced. At this point the shoulder joint capsule becomes the primary restraint.
- Once identified, move forward 10-15° to build a buffer zone, which will help protect the shoulder from overload.
- This assessment is designed to determine the margin based on individual anatomy.

*Note: It is well known among physiotherapists and exercise scientists that there is approximately a 15° carryover of strength developed at any specific joint angle with strength training.*

**Risk/Benefit Analysis: The Dumbbell Fly**

**Motion:** Concentric horizontal shoulder adduction.

**Direction of Resistance:** Downward.

**Body Position:** Supine.

**Risk**

- The further the dumbbell is from the axis (shoulder), the faster it moves relative to the earth and gravity. Measured linearly, each point moves a different distance.
- Resistance profile is maximal where the pec gets mechanically weaker.
- Advanced in terms of control.
- Dangerous for the shoulder joint.

**Benefit**

- Pec stimulus
Risk/Benefit Analysis: The Barbell Bench Press

**Motion:** Horizontal shoulder adduction concentrically.

**Direction of Resistance:** Downward.

**Body Position:** Supine.

**Risk**

- Compound movement with the end fixed in a plane of motion.
- Predictable outcome.
- The joints involved work independently.
- The joint forces increase, not necessarily the chest involvement.

A barbell bench press is a skill utilizing many muscles maximally.

---

The Pec Deck

**Motion:** Concentric horizontal shoulder adduction.

**Direction of resistance:** Posteriorly applied across the humerus.

**Body position:** Seated.

**Mechanical points:**

- Assess active range of motion.
- Set range of motion device to obey individual anatomy.
- Line up shoulders with axes.
- Close-packed position or internally rotate to neutral before performing horizontal shoulder adduction.
The Deltoids

Single fan-shaped muscle, as opposed to three independent muscles. The deltoid attaches to the clavicle, acromion, and spine of the scapula, converging half the way down the humerus.

Different Shoulder Joint Positions

Motion: Concentric horizontal abduction.

Direction of resistance: Anterior, medial.

Body Position: Seated.

Mechanical points:
- Assess active range of motion.
- Set range of motion device to obey individual anatomy.
- Align shoulders with axes.
- Identifying shoulder joint position before performing motion determines the emphasis.
  Example: Overhead presses are performed with the arm in external rotation. This emphasizes the anterior deltoid and the anterior portion of the middle deltoid, regardless of the plane of motion. The posterior deltoid undergoes an inversion of action, as it is now positioned beneath the axis and not in opposition to the load.

- All anterior/posterior exercises affect the deltoids to different degrees.

- If overall fitness is the goal, shoulder motion must be addressed in every possible plane. Exact motions should be determined by client anatomy/need and levels of control.

Risk/Benefit Analysis: The Barbell Upright Row*

Motion: Shoulder abduction, concentric shoulder girdle elevation.

Direction of resistance: Down (gravity).

Body position: Standing.

Risk

- Biceps tendon irritation
- Shoulder impingement
- External rotation against an excessive load
- Excessive internal rotation (passive) during abduction
• Wrist position (ulnar deviation) may be excessive

* Depending on exact performance, the risk/benefit may change.

The Elbow Joint

• The elbow is a true hinge joint comprised of the humerus, radius, and ulna.
• The joint limits are 0 to 135-160°.
• Bony structure and ligaments restrict lateral/medial motion.

The Elbow Flexors

The biceps brachii lies superficially on the anterior arm. It has a long head and a short head that merge together to form a long, oval belly. The brachialis is a strong elbow flexor that lies deep to the biceps brachii on the anterior arm. It has a flat, yet thick, belly. The brachioradialis is superficial on the lateral side of forearm. It has a long oval belly that forms a dividing line between the flexors and extensors of the wrist and hand.

The Elbow Extensors

The triceps brachii has three heads:
• Long
• Lateral
• Medial

Aside from its proximal portion, which is deep to the deltoid, the triceps are completely superficial.

Carrying Angle

The humerus and forearm do not form a straight line. The forearm angles laterally (out to the sides). This angle is called the “carrying” or “anatomical” angle. When the hands are locked together as in a barbell curl, you must address the carrying angle. This does not apply to dumbbells, as the hands can move freely.
Elbow Flexors And Radioulnar Positions

All three elbow flexors take part in elbow flexion, but their degree of involvement changes with different radioulnar positions.

Supination:
Biceps is the primary elbow flexor.

Neutral position:
Brachioradialis is emphasized.

Pronation position:
Brachialis is emphasized (by default)

The goal will determine which position is most appropriate.

A position of full pronation on a bar presents the problem of unwinding. As the elbow nears full extension, the shoulder internally rotates in an attempt to decrease pronation, due to a fixed hand grip.

The neutral position of a long rope or shoulder-width parallel-handled bar is ideal. Due to the triceps attachment (olecranon process of ulna), different radioulnar positions will not influence one head more than another.

Flexor and Extensor Exercise Variations

1. Radioulnar position
2. Shoulder position
3. Load application
4. Type of load

Allow the individual’s anatomy and levels of control to guide you.
The Hip Joint

Each hip bone is formed by three fused bones:

- Ilium
- Ischium
- Pubis

The femur is the longest, heaviest and strongest bone in the body.

Hip Joint Motions

- Flexion: 90-120°
- Extension: 15-30°
- Abduction: 30-45°
- Adduction: 30°
- External Rotation: 45°
- Internal Rotation: 35-40°
- Circumduction: Cone-shaped movement

Posterior and Lateral Hip Muscles

- Gluteus Maximus
- Gluteus Medius
- Gluteus Minimus

Hamstrings

- Semitendinosus

Anterior and Medial Hip Muscles

- Psoas major
- Iliacus

Adductor Group

- Adductor Magnus
- Adductor Longus
The Abductors

The true function of the abductors is to maintain pelvic stability in single-leg standing.

Risk/Benefit Analysis: The Hip Abductor Machine

**Motion:** Concentric horizontal hip abduction.

**Direction of resistance:** Across femur.

**Body position:** Seated hip flexed 90°.

**Risk**

- Perpetuates spot reduction myth
- Load applied across femur vs. through adductor stretch
- Pattern overload

**Benefit**

- Gluteus stimulus
The Butt Blaster Machine

**Motion:** Hip and knee extension concentrically.

**Direction of resistance:** Anterior.

**Body position:** Quadruped (start).

**Risk**

- Body weight plus resistance rests on one knee.
- Very difficult to stabilize spine.
- ROM in hip extension beyond neutral = 10-30°.
- Perpetuates spot reduction myth.
- Limited range to work glutes.

**Benefit**

- Minimal gluteus stimulus.

The 4-Way Hip Machine

**Mechanical points:**

- Variations: hip flexion, extension, adduction, abduction.
- Provides rotational resistance.
- Applies resistance beyond neutral hip position, allowing a great range of resisted motion.
- Great stability exercise for the stationary leg.
- Assess active range of motion before applying load.
Chapter 8: Exercise Application: Page 172

The Knee Joint

The knee is formed by the articulation of the distal femur and the proximal tibia. Together they form the tibia femoral (of the knee) joint, the largest synovial joint in the body. The knee is a modified hinge joint with 0-5° of extension and 130-140° of flexion.

Quadriceps Femoris Group

1. Rectus femoris
2. Vastus intermedius
3. Vastus medialis obliques
4. Vastus lateralis

Hamstrings

Comparatively, the hamstrings are not as massive as the quadriceps femoris group, yet they are strong hip extensors and knee flexors.

Posterior View

1. Biceps femoris–long head.
2. Semitendinosus.
3. Semimembranosus.

Exercise Analysis: The Lying Leg Curl

Motion: Concentric knee flexion.

Direction of resistance: Anterior.

Body position: Prone.

Mechanical points:

- The abdominals will be critical in stabilizing the spine and hip.
- Variation can be created by changing hip position. The key is to stabilize the hip once a position is determined.
- Slight internal rotation at the hip may be suggested to allow the knee to flex without attempting to move medially.
- Ankle position is goal dependent. If the goal is hamstrings, the gastrocnemius should be de-emphasized by relaxing the ankle or by very slight plantar flexion.

The Seated Leg Extension

Motion: Concentric knee extension.

Direction of resistance: Posterior.

Body position: Seated.

Mechanical points:

- Non-functional means of load application.
- The axis of each knee must be aligned forward and backward and also relative to rotation (and adduction).
- Patellae should point straight up so they appear to be centered.
- The foot position is not an indicator of knee alignment.
• The entire leg should be held firmly against the seat to prevent the butt from raising in response to the initial lifting of the load, and to prevent a seesaw action from lifting more weight.
• Ankle position is mechanically unrelated to the knee in this exercise. However, dorsi flexion is neurologically related to knee extension (gait).

Lower Extremity Alignment

Mechanical points:
• Lower extremity alignment is accomplished by ensuring that the femur is directed toward the toes.
• Exact placement should not be encouraged. Allow comfort to be the guide.

Regardless of foot width, the lower extremity alignment must be maintained.

The Q-angle is formed by the superior iliac spine, the longitudinal axis of the femur, through the line of pull of the patellar ligament, and the mechanical axis of the hip. Very small Q-angles create a condition known as genu varum, or bowleggedness. Large Q-angles create a genu valgum, or knock-kneed position.

A Q-angle cannot be corrected with exercise, but can be allowed for through alignment during exercise.

An individual’s mechanical ability to perform multiple joint movements simultaneously under load is primarily based upon the length of the levers or segments connecting these joints.

Mechanical points:
• Increasing foot width (from hip joints) changes the plane in which the femur moves. This decreases forward movement of the knee and posterior movement of the hip.

Strengthening the stabilizers within the chain (hip and ankle) may prevent it from worsening.

Individual Lever Lengths
For many individuals, squats are more easily performed on the Smith machine. Since the resistance does not need to be maintained directly over the feet, the distribution of forces can be more easily manipulated.

**Mechanical points:**
- Keep the feet as close to the line of resistance as possible.
- Not as neurologically challenging (linear guided path).
- Bar should not rest on the cervical spine.
- Angled smith machine can be used so that, relative to the individual, the bar moves backward as it lowers.
- Smith squat vs. squat.

- Foot placement on the machine will vary with individuals, goals, and types of press machines.
- The load line will be altered with foot-height changes.
- The further the joints move from the load line (resistance), the more stress is placed on each joint; and subsequently, the more load placed on the muscles moving that joint.
The Ankle Joint

- The ankle is a hinge joint formed by the tibia, fibula, and talus.
- Plantar flexion: 45°.
- Dorsiflexion: 10-20° (20° with knee flexed).

The Subtalar Joint

- Below the talus is the calcaneus, which makes up the subtalar joint.
- Inversion: 30°.
- Eversion: 20°.

Posterior Ankle Joint Muscles

- Gastrocnemius and soleus form the “calf muscles,” or triceps surae, of the posterior leg.
- The small “flexors” of the foot and ankle include the tibialis posterior, flexor digitorum longus, and flexor hallucis longus. They are deep to the gastrocnemius and soleus on the posterior leg.

Anterior Ankle Joint Muscles

- The “extensors” of the foot and ankle (tibialis anterior, extensor digitorum longus, and extensor hallucis longus) are layered together on the anterior leg and dorsum of the foot.

Exercise Analysis: The Seated Calf Raise

Motion: Concentric ankle plantar flexion.

Direction of resistance: Down.

Body position: Seated.

Mechanical points:
- Feet parallel.
- Stop just short of relaxing the calf during the extremes of eccentric dorsiflexion.
- Lean forward at hip (not spine) to prevent the use of hip flexors.
- Do not tug on handles, they were built for safety.

Plyometrics

Plyometrics is the combination of the Greek words plio, to increase measurement, and metric, meaning measurement. Plyometric exercises are quick, powerful movements involving a prestretch that engage the stretch reflex, activated via sensory receptors (muscle spindles) that lie parallel to the muscle fiber. The purpose of plyometrics is to use the natural elastic components of the muscle, tendons, and stretch reflex to increase power.

In the mechanical model, elastic energy is increased in the musculotendinous components when a rapid prestretch occurs. When a concentric contraction occurs immediately after the prestretch, stored elastic energy is released, thereby increasing total force production. The rate of the stretch is key. The quicker and more intense the countermovement, prestretch, or eccentric contraction, the greater the elastic energy stored, resulting in greater power or force. However, if the concentric contraction does not occur immediately following the eccentric contraction, the eccentric phase is too long and the stored elastic energy will be lost. There is a point of diminishing returns. If the prestretch is too intense (you jump off a six-foot box), the forces may be too great for the body to overcome, exposing the client to a possible injury.

The Stretch-Shortening Cycle

There are three phases of the stretch-shortening cycle:

- **Eccentric Phase:** This phase involves eccentric contraction, quickly lengthening the agonist. As the tissues are stretched, the muscle spindles send a signal to the brain.
- **Amortization Phase:** This is the time between the end of the eccentric phase and the initiation of the concentric phase. The brain returns the signal from the eccentric phase, triggering the agonists to contract. This phase cannot last too long or the stored energy will be lost as heat.
- **Concentric Phase:** The agonists complete the movement using the stored elastic energy from the eccentric phase along with the response from the amortization phase. The force production is
greater than an isolated concentric contraction.

Plyometrics can be performed for the lower body and the upper body. Performing plyometrics for the trunk are not as successful. They can be done, but the range of motion must be shorter and quicker for stimulation of the stretch reflex.

Training with Plyometrics

In general, similar to all training, volume decreases as intensity increases. 48 to 72 hours of rest are recommended between plyometric training sessions. Clients may perform two to four sessions a week, depending on the goal or sporting season. However, plyometrics for a given body part should not be performed two days in a row.

When performing plyometrics with your clients, think of these exercises as power training, not cardio. When performing high-intensity plyos such as depth jumps, your client may have to rest 5-10 seconds between each effort and two to three minutes between sets. Plyometrics for the lower body may be measured in foot-contacts, distance, or time, while upper body plyometric volume is measured in number of throws, catches, or time.

Always warm up before performing plyometrics, and progress with caution. For example, when training clients that are over 40, there may be some orthopedic decline from aging. Be cautious. With this demographic, the volume should be lower and the intensity should be low to moderate. The program shouldn’t exceed five exercises per body region. Also with this age group, recovery time should be three to four days in between sessions.

When combining plyos with resistance training, perform lower body resistance with upper body plyometrics and upper body resistance with lower body plyometrics. Certain clients or athletes may be able to endure both resistance exercise and plyometrics on the same body part in the same day. In these cases, recovery time will be key. When performing plyometrics in conjunction with aerobic exercise, perform plyometrics first.

Plyometrics Program Design

Before attempting plyos with your clients, you must ensure they can perform the activity with proper technique, particularly in the landing or deceleration phase. When landing, the shoulders should be over the knees. Clients should be able to squat 1.5 times their body weight before performing lower body plyometrics, and be able to bench press their body weight before performing upper body plyos. Your client must also be able to balance on each leg for 30 seconds without losing their balance. Clients over 200-220 pounds will be at increased risk when performing plyometrics. Remember, any previous injuries or abnormalities of the spine or lower or upper extremities may increase a client’s risk of injury. With heavier clients or overweight clients, a mini-trampoline may be used to introduce plyometrics; however, similar to thick mats, mini-trampolines are not as effective for plyometrics because the amortization phase is too long. However, for those recovering from musculoskeletal system injuries, mini-trampolines may be a great tool for introducing plyometrics into their program.

Equipment

Boxes for depth jumps can range from 6 to 42 inches, and the landing surfaces should be strong, stable, and at least 18-24 inches wide. 42 inches may be too high for many clients to overcome the downward force. The greater height may increase the duration of the amortization phase, extending it too long and defeating the purpose of the exercise. Start short—12-24 inches—and progress from there. Shoes should have adequate support and cushion. Running shoes may be too narrow.

Spotting

When training your clients, you may need to “spot” them for a variety of reasons. The spotter’s primary responsibility is the safety of the client, especially with a novice. You may need to spot a beginner (protection) as they attempt a new exercise. You may also need to help in the completion of forced repetitions (motivation), sometimes referred to as partner-assisted reps. Often when using these techniques, leading or pushing clients
beyond their normal limits, the importance of promoting safety cannot be overstated. Before you spot someone, communication is key. Prior to the spot, discuss what will be spotted, how the barbell, dumbbell, exercise equipment, or body part will be handled, and how many repetitions will be attempted.

The Liftoff

The term “liftoff” applies in instances where you place the barbell or dumbbells into the client’s hands or help move the barbell or dumbbells to the proper starting position. In many instances, the starting position for an exercise is the weakest position. For example, in a bench press, the bar is not exactly in the transverse plane and is difficult for the client to lift from the supports. In a selectorized seated chest press or Hammer chest press, the handles are in the weaker bottom position and you may have to help your client with a liftoff to get them started.

If a liftoff is needed, instruct your client in advance on the verbal cue. It may be as simple as “when I say up,” or “on the count of three.” In the latter, you lift the bar on “three.” When spotting a client lifting a weight that is too heavy for you, use an additional spotter. In the case of a heavy squat or bench press, two spotters are needed. However, one spotter should assist with the liftoff and then quickly move to the end of the bar while the second spotter is already at the other end. When two spotters are used, both should help with any assistance needed, as well as return the bar back to the supports together. Two spotters should always be used when the weight exceeds the spotter’s ability to protect their client or themselves, or when the spotter is inexperienced. When possible, one spotter is preferred. Keep in mind: As the number of spotters increases, so does the chance for error.

How Much “Spotting” is Needed?

For a novice, you may need to keep your hands on the barbell, dumbbell, body part, or exercise equipment throughout the entire movement to help control or guide your client. However, most clients will typically need just enough help to complete the repetition. You must remain vigilant. As the client reaches their “sticking point,” quickly provide just enough assistance to keep the exercise moving at approximately the same speed. Don’t just yank the bar or dumbbell away from them. It’s important to communicate in advance with your client. Are they going to alert you when they want a spot with a verbal command such as “take it,” at which point you quickly and smoothly keep the exercise moving? Or, are they going to alert you when they can no longer provide any effort, and therefore require you to quickly save them, take the bar and rack it?

Types of Exercises or Equipment

Spotting selecterized equipment as opposed to free weights is much simpler. As opposed to free weights, the motion is guided with selecterized equipment, therefore much safer for the user. Free weights are a different story. When spotting overhead exercises or exercises involving the bar on the back or front shoulders, it’s best to perform inside a power rack.

When spotting over-the-face exercises, we recommend you liftoff with an alternative grip, and spot with either a supinated or pronated grip. For dumbbell exercises, spot your client as close to the dumbbells as possible. For example, when spotting dumbbell flys, place your hands on the client’s forearms or wrists.

Spotting exercises performed to the front (standing curl) or to the side (lateral raises) are much easier.

Before you train your clients, remember that you are the fitness professional. Refer back to the Code of Conduct in Chapter One. Consider these 12 points any time you administer exercise to your clients.

Exercise Application

1. Name of exercise and what it’s used for: It’s important to teach the name(s) and purpose of any exercise you demonstrate.

2. Name of equipment, product information, and safety features: Fitness equipment is the tool of our trade. You’re legally required to demonstrate the safety features of any pieces of equipment you demonstrate to a client.
3. **Direction of Resistance/Path of Motion of the Resistance and the Resistance Profile:** As a personal trainer, you are going to apply force to your clients. Force is applied via the resistance you choose. However, you need to consider not only the direction and the path of motion the resistance is moving in, but where the resistance becomes harder or easier for your client. This is called the *resistance profile*. For example, in a supine chest fly on a bench, the resistance is harder when the arms are abducted (parallel to the ground) and becomes easier as the arms adduct at the top of the motion.

4. **Joints Involved:** Most clients will speak in terms of training their muscles. You know better. It is the *joint* that rules. Always consider joint contact surface and joint mechanics before applying force to a client.

5. **Muscles Involved:** For any given exercise, you should know which muscles are acting as prime movers both concentrically and eccentrically— which muscles are the antagonists and which muscles are acting as stabilizers.

6. **Muscle Type:** Muscles are categorized in many different ways. Some muscles have a greater cross section of muscle fibers, as in a *penniform* muscle. Muscles may also have greater endurance capabilities, as in a *slow-twitch* muscle compared to a *fast-twitch* muscle. Muscles may also have a tendency to be tight or “facilitated” as in the concept of *tonic-phasic* musculature.

7. **Range of Motion:** Although everyone is different, we all have what is considered a normal or a safe range of motion. Be very observant. One client’s normal ROM may be very dangerous compared to that of another client.

8. **Strength Profile:** When the segments of multi-joint movements used in a bench press, leg press, squat, and power clean approach full extension, the musculoskeletal lever system gains mechanical advantage. These exercises have *ascending strength*. In a *descending strength* profile, maximum strength is produced at the start of the lift. Examples are pull-ups, chin-ups, lat pull-downs, and bent-over rows. Single joint exercises have more of a *bell-shaped* curve where maximum strength occurs around the middle of the lift. Examples are arm or leg curls, leg extension, or triceps extension.

9. **Execution:** Always observe your clients form from start to finish; teach them how to breathe and how to spot.

10. **Modification:** As a fitness professional, you must be able to adapt both exercises and exercise equipment to suit the client’s needs. Before you modify, consider the first 10 points.

11. **Spotting:** Know your client’s abilities. Be ready to spot your client when needed.

12. **Breathing:** In most instances we recommended exhaling when exerting force. However, when the exercise involves the rib cage (hyperextension bench), we recommend inhaling when exerting force. In some cases, when heavy lifts are being performed, it may be advantageous to slightly hold one’s breath during the transition from eccentric to concentric.
Exercises: Legs, Calves, and Glutes

1. Leg Press

**Agonist:** Quadriceps muscle group: Rectus Femoris, Vastus Intermedius, Vastus Lateralis, Vastus Medialis.

**Antagonist:** Hamstrings muscle group: Semitendinosus, Semimembranosus, Biceps Femoris.

**Stabilizer:** Hip Rotators.

**Other Muscles:** Gluteus Maximus.

**Training Tips:** Shoulders should remain back against the pad. A neutral spine (lumbar lordosis) and cervical alignment should be maintained. The pelvis should remain in contact with the pad at all times, foot position will depend on femur length (try different foot positions until client is comfortable). Work through a controlled full range of motion without locking out the knee (hyperextending). Knees should track over the second and third toes.

2. Horizontal Leg Press

**Agonist:** Quadriceps muscle group: Rectus Femoris, Vastus Intermedius, Vastus Lateralis, Vastus Medialis.

**Antagonist:** Hamstrings muscle group: Semitendinosus, Semimembranosus, Biceps Femoris.

**Stabilizer:** Hip Rotators.

**Other Muscles:** Gluteus Maximus.

**Training Tips:** Shoulders should remain back against the pad. A neutral spine (lumbar lordosis) and cervical alignment should be maintained. The pelvis should remain in contact with the pad at all times. Foot position will depend on femur length (try different foot positions until client is comfortable). Work through a controlled full range of motion without locking out the knee (hyperextending). Knees should track over the
second and third toes.

3. Squat


Antagonist: Hamstrings muscle group: Semitendinosus, Semimembranosus, Biceps Femoris.

Stabilizer: Hip Rotators.

Other Muscles: Gluteus Maximus.

Training Tips: Vary the foot position depending on the mechanics of the individual. Position the feet approximately shoulder-width apart or slightly wider. External rotation at the hip should not exceed 30°. Maintain a neutral spine (lumbar lordosis) and cervical alignment. The eyes should be level with the horizon. The bar placement should be approximately on the posterior deltoids and across the meaty portion of the trapezius (above T-1). Knees should track over the second and third toes. Weight should be balanced between the forefoot and the heels.

4A. Lunge


Antagonist: Hamstrings muscle group: Semitendinosus, Semimembranosus, Biceps Femoris.

Stabilizer: Hip Rotators.

Other Muscles: Gluteus Maximus.

Training Tips: Maintain a neutral spine (lumbar lordosis) and cervical alignment. Chest should remain elevated. Knees should track over the second and third toes. Weight should be balanced between the forefoot
and the heels. Slowly lower in a controlled manner and return to the starting position. Work through a controlled, full range of motion. Range of motion will vary with each individual.

5. Leg Extension

**Agonist:** Quadriceps muscle group: Rectus Femoris, Vastus Intermedius, Vastus Lateralis, Vastus Medialis.

**Antagonist:** Hamstrings muscle group: Semitendinosus, Semimembranosus, Biceps Femoris.

**Stabilizer:** Abdominals.

**Training Tips:** Line up the pivot point of the knee with the pivot point of the machine. Line up the extremity pad where it is most comfortable for the client. Patella should be centered on top of the leg so the axis of the knee is lined up (avoid external or internal rotation). Feet should remain in a neutral position. Maintain a neutral spine and cervical alignment, work through a controlled full range of motion. Range of motion will vary with each individual.

6. Prone Leg Curl

**Agonist:** Hamstrings muscle group: Semitendinosus, Semimembranosus, Biceps Femoris.

**Antagonist:** Quadriceps muscle group: Rectus Femoris, Vastus Intermedius, Vastus Lateralis.

**Stabilizer:** Abdominals.

**Training Tips:** Line up the pivot point of the knee with the pivot point of the machine. Line up the extremity pad where it is most comfortable for the client. Patella should be centered on top of the leg so the axis of the knee is lined up (avoid external or internal rotation). Feet should remain in a neutral position. Maintain a neutral spine and cervical alignment, work through a controlled full range of motion. Range of motion will vary with each individual.
7. Seated Leg Curl

**Agonist:** Hamstrings muscle group: Semitendinosus, Semimembranosus, Biceps Femoris.

**Antagonist:** Quadriceps muscle group: Rectus Femoris, Vastus Intermedius, Vastus Lateralis, Vastus Medialis.

**Stabilizer:** Abdominals.

**Training Tips:** Align the pivot point of the machine with the axis of the knee joint. Position the lower extremity pad around the achilles tendon area or where is it most comfortable for the client. If aligned correctly, the pad will not move up and down the leg. The patella should be pointing straight toward the ceiling (avoid external or internal rotation). Maintain a neutral spine and cervical alignment. Work through a controlled full range of motion. Range of motion will vary with each individual.

8. Stiff-Legged Dead Lift (hip extension)

**Agonist:** Hamstrings muscle group: Semitendinosus, Semimembranosus, Biceps Femoris.

**Antagonist:** Quadriceps muscle group: Rectus Femoris, Vastus Intermedius, Vastus Lateralis, Vastus Medialis.

**Stabilizer:** Hip Rotators.

**Other Muscles:** Gluteus Maximus, Gluteus Minimus.

**Training Tips:** Legs should be bent to approximately 15°. Maintain a neutral spine and cervical alignment. Slowly lower the bar in a controlled manner and return to starting position. Work through a controlled full range of motion. Range of motion will vary with each individual. Alternate grip is most common. Try the “Sumo” style to allow for different femur lengths.
9. Standing Calf Raise

**Agonist:** Triceps Surae (Gastrocnemius emphasized).

**Antagonist:** Tibialis Anterior.

**Stabilizer:** Foot & Ankle Complex.

**Training Tips:** Place the feet facing forward on platform. Feet should be about hip-width apart (avoid internal and external rotation). Knee should be in a controlled extension (not hyperextension). Maintain a neutral spine and cervical alignment. Work through a controlled range of motion. Range of motion will vary with each individual.

10. Seated Calf Raise

**Agonist:** Triceps Surae (Soleus emphasized).

**Antagonist:** Tibialis Anterior.

**Stabilizer:** Foot & Ankle Complex.

**Training Tips:** Place the feet facing forward on platform. Feet should be about hip-width apart (avoid internal and external rotation). Knee should be bent with thigh pad on lower portion of quadriceps. Maintain a neutral spine and cervical alignment. Work through a controlled range of motion. Range of motion will vary with each individual.
11. Multi-Hip (Extension)

**Agonist:** Gluteus Maximus (Gluteus Medius on the stationary leg).

**Antagonist:** Iliopsoas (Psoas Major, Iliacus).

**Stabilizer:** Gluteus Medius on the contralateral side.

**Other Muscles:** Hamstrings muscle group: Semitendinosus, Semimembranosus, Biceps Femoris, Erector Spinae.

**Training Tips:** Place the pad on lower portion of the hamstring above the knee. Grab the bar with your hands to help stabilize. Maintain neutral spine and cervical alignment. Slowly extend leg in a controlled manner and return to the starting position. Work through a controlled full range of motion. Range of motion will vary with each individual.

12. Multi-Hip (Adduction)

**Agonist:** Adductor Magnus, Adductor Brevis (Gluteus Medius on the stationary leg).

**Antagonist:** Gluteus Medius, Gluteus Minimus, Tensor Fascia Latae.

**Stabilizer:** Gluteus Medius on the contralateral side.

**Training Tips:** Place the pad above the knee on the medial aspect of leg. Place hands on the bar to help stabilize. Maintain neutral spine and cervical alignment. Slowly adduct the leg in a controlled manner and return.
to the starting position. Work through a controlled full range of motion. Range of motion will vary with each individual.

13. Multi-Hip (Abduction)

**START**

**FINISH**

Agonist: Gluteus Medius (Gluteus Medius on the stationary leg).

Antagonist: Adductor Magnus, Adductor Brevis.

Stabilizer: Gluteus Medius on the contralateral side.

Other Muscles: Gluteus Minimus, Tensor Fascia Latae, Gluteus Maximus (upper fibers).

Training Tips: Place the pad above the knee on the lateral aspect of leg, place hands on the bar to help stabilize. Maintain neutral spine and cervical alignment. Slowly abduct the leg in a controlled manner and return to the starting position. Work through a controlled range of motion. Range of motion will vary with each individual.

14. Multi-Hip (Flexion)

**START**

**FINISH**

Agonist: Iliopsoas, (Psoas Major, Iliacus), (Gluteus Medius on the stationary leg).

Antagonist: Gluteus Maximus.

Stabilizer: Gluteus Medius on the contralateral side.

Training Tips: Place the pad on the lower portion
of the quadriceps above the knee. Grab the bar with your hands to help stabilize. Maintain neutral spine and cervical alignment. Slowly flex the leg in a controlled manner and return to the starting position. Work through a controlled full range of motion. Range of motion will vary with each individual.

**Trunk and Lower Back**

1. **Sit-ups**

   ![Start of Sit-ups](image1)

   ![Finish of Sit-ups](image2)

   **Agonist:** Rectus Abdominis, Hip Flexors.

   **Antagonist:** Erector Spinae.

   **Stabilizer:** Deep Abdominal Wall.

   **Training Tips:** Have the client lie supine. Place their hands across their chest or on the floor. Maintain cervical alignment. Maintain contraction in abdominals and flex trunk toward the pelvis (do not lead with the head). Slowly return to the starting position maintaining contraction in the abdominals. Only allow the client to work through a range of motion that is comfortable for them.

2. **Crunches**

   ![Start of Crunches](image3)

   ![Finish of Crunches](image4)

   **Agonist:** Rectus Abdominis.

   **Antagonist:** Erector Spinae.

   **Stabilizer:** Deep Abdominal Wall.

   **Training Tips:** Have the client lie supine. Place their hands across their chest or on the floor. Maintain cervical alignment. Maintain contraction in abdominals and flex trunk toward the pelvis (do not lead with head). Slowly return to the starting position maintaining contraction in the abdominals. Only allow the client to work through a range of motion that is comfortable for them.
3. Ab Machine

**Agonist:** Rectus Abdominis (upper portion emphasized).

**Antagonist:** Erector Spinae.

**Stabilizer:** Deep Abdominal Wall.

**Training Tips:** Align the client so the pivot point of the machine aligns with the axis of rotation of the body (not the hip). Maintain cervical alignment. Maintain the contraction in the abdominals and flex the trunk toward the pelvis (do not lead with the head). Slowly return to the starting position, maintaining contraction in the abdominals. Only allow client to work through a range of motion that is comfortable for them.

4. Hanging Oblique Leg Raises (Straps) &

**Agonist:** Iliopsoas (predominantly) and other hip flexors, Rectus Abdominis on the moving side.

**Antagonist:** Erector Spinae & Gluteus Maximus.

**Stabilizer:** Deep Abdominal Wall.

**Training Tips:** Legs should be flexed at the hip. Rotate pelvis backward until abdominals are fully contracted. Try to only perform trunk motion and not hip motion. Slowly return to the starting position, maintaining a
contraction in the abdomen. Only allow the client to work through a range of motion that is comfortable for them. Obliques will be emphasized when flexing the spine laterally as shown above.

5. Hyper-Extension Bench (45°)

![Image of Hyper-Extension Bench](image)

**Agonist:** Erector Spinae, Hip Extensors.

**Antagonist:** Hip Flexors.

**Stabilizer:** Deep Abdominal Wall.

**Training Tips:** Position the client so the top of pelvis is aligned with the top of the pad. Have client cross their arms on their chest and slowly allow trunk to move toward their pelvis. When returning to the starting position, do not allow client to hyperextend. Maintain cervical alignment. Only allow client to move through a range of motion that is comfortable for them.

### Triceps

1. Standing Triceps Push-Down

![Image of Standing Triceps Push-Down](image)

**Agonist:** Triceps Brachii.

**Antagonist:** Biceps Brachii.

**Stabilizer:** Rotator Cuff Musculature: Supraspinatus, Infraspinatus, Teres Minor, Subscapularis.

**Training Tips:** Grab the bar with about a shoulder-
width grip. Bend forward slightly at the hip. The elbow should remain at the sides of the body through the entire movement (where it starts is where it stays). Maintain a neutral spine and cervical alignment. Work through a controlled full range of motion.

2. One Arm Triceps Extension

START

FINISH

Agonist: Triceps Brachii (long head emphasized).

Antagonist: Biceps Brachii.

Stabilizer: Rotator Cuff Musculature: Supraspinatus, Infraspinatus, Teres Minor, Subscapularis.

Training Tips: Flex the shoulder to about 90°.

3. Triceps Kickback

START

FINISH

Agonist: Triceps Brachii.

Antagonist: Biceps Brachii.

Stabilizer: Rotator Cuff Musculature: Supraspinatus, Infraspinatus, Teres Minor, Subscapularis.

Training Tips: Position the upper body parallel to the ground, humerus in line with body. The elbow should remain at the side of the body through the entire
movement (where it starts is where it stays). Maintain a neutral spine and cervical alignment. Work through a controlled full range of motion. Don’t swing the weight.

4. Dips

**Agonist:** Anterior Deltoid, Triceps Brachii.

**Antagonist:** Posterior Deltoid, Biceps Brachii.

**Stabilizer:** Rotator Cuff Musculature: Supraspinatus, Infraspinatus, Teres Minor, Subscapularis.

**Other Muscles:** Pectoralis Major.

**Training Tips:** Grasp the handle with a neutral hand position. When lowering the body, stop when the humerus is approximately parallel to the floor or slightly prior (do not exceed a 90° angle between the upper and lower arm). Maintain a neutral spine and cervical alignment, work through a controlled full range of motion. Range of motion will depend on the individual.

5. Bench Press (Narrow Grip)

**Agonist:** Anterior Deltoid, Triceps Brachii.

**Antagonist:** Posterior Deltoid, Biceps Brachii.

**Stabilizer:** Rotator Cuff Musculature: Supraspinatus, Infraspinatus, Teres Minor, Subscapularis.

**Other Muscles:** Pectoralis Major.

**Training Tips:** Grasp the bar with a shoulder-width grip. When lowering the bar, stop when the elbow is at about 90°. Maintain a neutral spine and cervical alignment. Work through a controlled full range of motion.
6. Supine Triceps Extension (Skull Crushers)

**Agonist:** Triceps Brachii.

**Antagonist:** Biceps Brachii.

**Stabilizer:** Rotator Cuff Musculature: Supraspinatus, Infraspinatus, Teres Minor, Subscapularis.

**Training Tips:** Flex the shoulder to about 90°. Stabilize the shoulder and extend the elbow. The shoulder should not move (where it starts is where it stays). Maintain a neutral spine and cervical alignment. Work through a controlled full range of motion. Try pronated, neutral, and supinated grips.

---

**Shoulders**

1. Military Press (Standing, Barbell)

**Agonist:** Anterior Deltoid.

**Antagonist:** Posterior Deltoid, Latissimus Dorsi.

**Stabilizer:** Rotator Cuff Musculature: Supraspinatus, Infraspinatus, Teres Minor, Subscapularis.

**Other Muscles:** Triceps Brachii.

**Training Tips:** Take a parallel stance with the feet spaced comfortably for the client (approximately shoulder width). Maintain a neutral spine and cervical alignment. Push the bar overhead until the elbows are
just prior to locking out. As you slowly lower the bar, stop just before it touches the chest (bar should never rest on chest). Work through a full range of motion that is comfortable for the client.

2. Military Press (Seated, Dumbbell)

![START]

**Agonist:** Anterior Deltoid, some Middle Deltoid.

**Antagonist:** Posterior Deltoid, Latissimus Dorsi, Teres Major.

**Stabilizer:** Rotator Cuff Musculature: Supraspinatus, Infraspinatus, Teres Minor, Subscapularis.

**Other Muscles:** Triceps Brachii.

**Training Tips:** The pelvis should be firmly on the pad and the feet should be placed firmly on the floor. A neutral spine and cervical alignment should be maintained. When working through a full range of motion, the dumbbells should be pushed overhead until the elbows are just prior to locking out. The dumbbells should not be lowered to a position much lower than level with the shoulder, thus allowing for the different lengths of the ulna and radius. Only allow the client to work in a comfortable range.

3a. Lateral Raise (Anterior)

![START]

**Agonist:** Middle Deltoid, Supraspinatus.

**Antagonist:** Pectoralis Major, Latissimus Dorsi, Teres Major.
**Stabilizer:** Rotator Cuff Musculature: Supraspinatus, Infraspinatus, Teres Minor, Subscapularis.

**Training Tips:** Grasp the dumbbells with a neutral hand position, slowly abduct arm to a position of about 90° or slightly less (avoid shoulder impingement). Control the movement on the way back to starting position. Maintain a neutral spine and cervical alignment. Only allow the client to work through a range of motion that is comfortable for them.

### 3b. Lateral Raise (Posterior)

**Agonist:** Posterior Deltoid, Latissimus Dorsi, Biceps Brachii.

**Antagonist:** Anterior Deltoid, Pectoralis Major.

**Stabilizer:** Rotator Cuff Musculature: Supraspinatus, Infraspinatus, Teres Minor, Subscapularis.

**Other Muscles:** Core Musculature.

**Training Tips:** Take a parallel stance with the feet spaced comfortably for the client (approximately shoulder width). A neutral spine and cervical alignment should be maintained. Bend the knees slightly, with a 60-90° bend at the waist. Start by retracting the scapulae and abduct until the arms are parallel with the floor. Maintain wrists under the elbows.

### 4. Front Raise
**Agonist:** Anterior Deltoid.

**Antagonist:** Latissimus Dorsi, Posterior Deltoid.

**Stabilizer:** Rotator Cuff Musculature: Supraspinatus, Infraspinatus, Teres Minor, Subscapularis.

**Training Tips:** Grasp the dumbbells. Slowly raise the arm (shoulder flexion) to a position that is comfortable for the client. Return slowly under control to the starting position. Maintain a neutral spine and cervical alignment. Only allow client to work through a range of motion that is comfortable for them.

---

**Back**

1. Front Lat-Pulldown

**Agonist:** Latissimus Dorsi.

**Antagonist:** Anterior Deltoid, Pectoralis Major.

**Stabilizer:** Rotator Cuff Musculature: Supraspinatus, Infraspinatus, Teres Minor, Subscapularis.

**Other Muscles:** Rhomboids, Trapezius, Teres Major, Posterior Deltoid, Biceps Brachii.

**Training Tips:** Position the client under the boom arm so the bar line falls in front of their head. Have the client horizontally abduct to 90° with their forearms facing the ceiling as if imitating a goal post. Have the client grasp the bar with the hands slightly narrower than the 90° formed by the upper and lower arms. Have the client lean back slightly. Maintain a neutral spine and cervical alignment. Have the client pull the bar down toward the upper chest and bring the arms into the side of the body, maintaining the forearms vertically toward the ceiling. Return slowly under control to the starting position. Keep constant tension at the top. Don’t let them just “hang.” Only allow the client to work through a range of motion that is comfortable for them.

2. Seated Cable Row

**Agonist:** Latissimus Dorsi.

**Antagonist:** Pectoralis Major, Anterior Deltoid.
**Stabilizer:** Rotator Cuff Musculature: Supraspinatus, Infraspinatus, Teres Minor, Subscapularis.

**Other Muscles:** Rhomboids, Trapezius, Teres Major, Posterior Deltoid, Biceps Brachii.

**Training Tips:** Bend at the knees and maintain spinal alignment. Lean forward to grab the bar, then sit down on pad with the legs slightly bent. Place the feet on the foot rest to help stabilize the body. Elevate the chest. Maintain a neutral spine and cervical alignment. The trunk should terminate extension at the same time the bar touches the chest. Only allow the client to work in a range that is comfortable for them. Take care to choose a bar width that allows the client’s elbows to extend past their trunk without internally rotating.

### 3. Straight Arm Pull-Down

![Image of a person performing a straight arm pull-down](image)

**Agonist:** Latissimus Dorsi.

**Antagonist:** Anterior Deltoid, Pectoralis Major.

**Stabilizer:** Rotator Cuff Musculature: Supraspinatus, Infraspinatus, Teres Minor, Subscapularis.

**Other Muscles:** Rhomboids, Trapezius, Teres Major, Posterior Deltoid, Biceps Brachii.

**Training Tips:** Position the client under the boom arm so the bar line falls in front of client’s head. Grasp the bar with the hand. Have the client lean back slightly. Maintain a neutral spine and cervical alignment. Have the client pull the bar down toward the ground and then toward the thighs. Return slowly under control to the starting position. Only allow the client to work through a range of motion that is comfortable for them.

### 4. Seated Row Machine

![Image of a person performing a seated row machine](image)
Agonist: Latissimus Dorsi.

Antagonist: Anterior Deltoid, Pectoralis Major.

Stabilizer: Rotator Cuff Musculature: Supraspinatus, Infraspinatus, Teres Minor, Subscapularis.

Other Muscles: Rhomboids, Trapezius, Teres Major, Posterior Deltoid, Biceps Brachii.

Training Tips: The pelvis should be firmly on the pad, (to increase stabilization requirements, don’t use the pad). The feet should be firmly pressed on the floor. A neutral spine and cervical alignment should be maintained. At the termination of the movement, there should be a 90° angle between the upper and lower arm. Only allow the client to work in a range that is comfortable for them.

5. One Arm Dumbbell Row

Agonist: Latissimus Dorsi.

Antagonist: Pectoralis Major, Anterior Deltoid.

Stabilizer: Rotator Cuff Musculature: Supraspinatus, Infraspinatus, Teres Minor, Subscapularis.

Other Muscles: Rhomboids, Trapezius, Teres Major, Posterior Deltoid, Biceps Brachii.

Training Tips: Align the trunk parallel to the floor. The upper arm (humerus) should be at the side of the body, parallel to the floor. Maintain a neutral spine and cervical alignment. Pull the dumbbell toward the chest and slowly lower the bar in a controlled manner. Be careful not to rotate the spine or “swing” the weight. Only allow the client to work through a range of motion that is comfortable for them.
6. Bent Over Row

**Agonist:** Latissimus Dorsi.

**Antagonist:** Pectoralis Major.

**Stabilizer:** Rotator Cuff Musculature: Supraspinatus, Infraspinatus, Teres Minor, Subscapularis.

**Other Muscles:** Rhomboids, Trapezius, Teres Major, Posterior Deltoid, Biceps Brachii.

**Training Tips:** Legs should be bent to approximately 15°. Trunk should be placed at a 45-60° angle. Maintain a neutral spine and cervical alignment. Pull the bar toward the chest and slowly lower the bar in a controlled manner. Only allow the client to work through a range of motion that is comfortable for them.

7. T-Bar Row

**Agonist:** Latissimus Dorsi.

**Antagonist:** Pectoralis Major.

**Stabilizer:** Rotator Cuff Musculature: Supraspinatus, Infraspinatus, Teres Minor, Subscapularis.

**Other Muscles:** Rhomboids, Trapezius, Teres Major, Posterior Deltoid, Biceps Brachii.

**Training Tips:** Legs should be bent to approximately 15°. Trunk should be placed at a 45-60° angle. Maintain a neutral spine and cervical alignment. Pull the bar
toward the chest and slowly lower the bar in a controlled manner. Only allow the client to work through a range of motion that is comfortable for them.

**Biceps and Forearms**

1. **Dumbbell Curl**

   ![Dumbbell Curl Images]

   **Agonist:** Biceps Brachii.
   
   **Antagonist:** Triceps Brachii.
   
   **Stabilizer:** Rotator Cuff Musculature: Supraspinatus, Infraspinatus, Teres Minor, Subscapularis.
   
   **Other Muscles:** Brachialis, Brachioradialis.
   
   **Training Tips:** Grab the dumbbells to allow for a carrying angle (supinated grip). Let the elbows relax at the side of the body. The elbow should remain at the sides of the body through the entire movement (where it starts is where it stays). Maintain a neutral spine and cervical alignment. Work through a controlled full range of motion.

3. **Barbell Curl**

   ![Barbell Curl Images]

   **Agonist:** Biceps Brachii.
   
   **Antagonist:** Triceps Brachii.
   
   **Stabilizer:** Rotator Cuff Musculature: Supraspinatus, Infraspinatus, Teres Minor, Subscapularis.
   
   **Other Muscles:** Brachialis, Brachioradialis.
   
   **Training Tips:** Grab the barbell to allow for carrying angle (supinated grip). Let the elbows relax at their side of the body. The elbow should remain at the sides of the body through the entire movement (where it starts is where it stays). Maintain a neutral spine and cervical alignment. Work through a controlled full range of motion.
4. Concentration Curl

Agonist: Biceps Brachii.

Antagonist: Triceps Brachii.

Stabilizer: Rotator Cuff Musculature: Supraspinatus, Infraspinatus, Teres Minor, Subscapularis.

Other Muscles: Brachialis, Brachioradialis.

Training Tips: Grab the dumbbells with a supinated grip. Let the back of the arm relax against the inside of the leg. The elbow should remain in the same position through the entire movement (where it starts is where it stays). Maintain a neutral spine and cervical alignment.

Work through a controlled full range of motion.

5. Preacher Curl

Agonist: Biceps Brachii.

Antagonist: Triceps Brachii.

Stabilizer: Rotator Cuff Musculature: Supraspinatus, Infraspinatus, Teres Minor, Subscapularis.

Other Muscles: Brachialis, Brachioradialis.

Training Tips: Grab the barbell to allow for a carrying angle (supinated grip). Let the back of the arms rest against the pad of the bench. The back of the
arm should remain against the pad at all times. Keep the elbow in the same position through the entire movement (where it starts is where it stays). Maintain a neutral spine and cervical alignment. Work through a controlled full range of motion.

6. Reverse (French) Curl

**Agonist:** Brachialis, Brachioradialis, Biceps Brachii.

**Antagonist:** Triceps Brachii.

**Stabilizer:** Rotator Cuff Musculature: Supraspinatus, Infraspinatus, Teres Minor, Subscapularis.

**Training Tips:** Grasp the bar with a pronated grip. Let the elbows relax at the side of body. The elbow should remain at the sides of the body through the entire movement (where it starts is where it stays). Maintain a neutral spine and cervical alignment. Work through a controlled full range of motion.

7. Wrist Curl

**Agonist:** Wrist Flexors.

**Antagonist:** Wrist Extensors.

**Stabilizer:** Rotator Cuff Musculature: Supraspinatus, Infraspinatus, Teres Minor, Subscapularis.

**Training Tips:** Grasp the bar with a supinated grip. Let the arms relax against the bench. Wrists and hands should hang slightly off the bench. Flex the wrist slowly and under control. Slowly allow the wrist to extend under control back to starting position. Maintain a neutral spine and cervical alignment. Work through a controlled full range of motion.
Chest

1. Flat Bench Press

**Agonist**: Pectoralis Major, Anterior and Middle Deltoids and Triceps Brachii.

**Antagonist**: Latissimis Dorsi, Teres Major, Posterior Deltoid.

**Stabilizer**: Rotator Cuff Musculature: Supraspinatus, Infraspinatus, Teres Minor, Subscapularis and Scapular Musculature: Serratus Anterior, Rhomboids, Trapezius.

**Other Muscles**: Coracobrachialis.

**Training Tips**: When lying supine on the pad, the eyes should be approximately directly below the bar, the pelvis should be firmly on the pad (pelvis should never come off of the bench), the feet should be firmly pressed on the floor, and a neutral spine should be maintained. When working through a full range of motion, the bar should end just prior to locking out the elbow joint, and the range of motion should end when there is approximately a 90° angle between the upper and lower arm. Only allow the client to work through a range that is comfortable for them.

2. Incline Bench Press

**Agonist**: Pectoralis Major (Upper Fibers Emphasized).

**Antagonist**: Rhomboids, Trapezius, Posterior Deltoid.

**Stabilizer**: Rotator Cuff Musculature: Supraspinatus, Infraspinatus, Teres Minor, Subscapularis.

**Other Muscles**: Anterior Deltoid, Triceps Brachii.

**Training Tips**: When lying on the pad, the eyes should be approximately directly below the bar, the pelvis should be firmly on the pad (pelvis should never come off of the bench), the feet should be firmly pressed on the floor, and a neutral spine should be maintained. When working through a full range of motion, the bar should end just prior to locking out the elbow joint and the range of motion should end when there is
approximately a 90° angle between the upper and lower arm. Only allow the client to work through a range that is comfortable for them.

3. Decline Bench Press

Agonist: Pectoralis Major (All Fibers Emphasized).

Antagonist: Rhomboids, Trapezius, Posterior Deltoid.

Stabilizer: Rotator Cuff Musculature: Supraspinatus, Infraspinatus, Teres Minor, Subscapularis.

Other Muscles: Anterior Deltoid, Triceps Brachii.

Training Tips: When lying on the pad, the eyes should be approximately directly below the bar, the pelvis should be firmly on the pad (pelvis should never come off of the bench), and a neutral spine should be maintained. When working through a full range of motion, the bar should end just prior to locking out the elbow joint and the range of motion should end when there is approximately a 90° angle between the upper and lower arm. Only allow the client to work through a range that is comfortable for them.

4. Seated Bench Press Machine

Agonist: Pectoralis Major.

Antagonist: Rhomboids, Trapezius, Posterior Deltoid.

Stabilizer: Rotator Cuff Musculature: Supraspinatus, Infraspinatus, Teres Minor, Subscapularis.

Other Muscles: Anterior Deltoid, Triceps Brachii.

Training Tips: Adjust the seat height so the path of motion of the individual and the path of motion of the machine are as close as possible. A neutral spine should be maintained. When working through a full range of motion, the bar should end just prior to locking
out the elbow joint; and when returning to starting position, the range of motion should end when there is approximately a 90° angle between the upper and lower arm. Only allow the client to work through a range that is comfortable for them.

5. Dumbbell Flys

5. Dumbbell Flys

Agonist: Pectoralis Major.

Antagonist: Rhomboids, Trapezius, Posterior Deltoid.

Stabilizer: Rotator Cuff Musculature: Supraspinatus, Infraspinatus, Teres Minor, Subscapularis.

Other Muscles: Anterior Deltoid, Triceps Brachii.

Training Tips: When the client is supine on bench with arms extended, turn the weights toward each other (neutral hand position) and place a slight bend in the elbow. The pelvis should be firmly on the pad (pelvis should never come off of the pad). A neutral spine should be maintained. Let the arms come out (abduct) as far as the client can control, only allow the client to come down until the humerus (upper arm) is parallel to the floor. Individual range of motion (flexibility) will vary. Only allow the client to work through a range that is comfortable for them. Do not externally or internally rotate at the shoulder.

6. Cable Crossover

6. Cable Crossover

Agonist: Pectoralis Major.

Antagonist: Rhomboids, Trapezius, Posterior Deltoid.

Stabilizer: Rotator Cuff Musculature: Supraspinatus, Infraspinatus, Teres Minor, Subscapularis.
Other Muscles: Anterior Deltoid, Triceps Brachii.

Training Tips: Grasp the handles and align the trunk so the resistance is opposing your motion. A neutral spine and cervical alignment should be maintained. Only allow the client’s arms to extend until the elbow is straight out from the shoulder joint, under control. Individual range of motion (flexibility) will vary. Only allow the client to work through a range that is comfortable for them.

References


“It’s not WHAT you do…
It’s HOW you do it!”
— Focus on Fitness