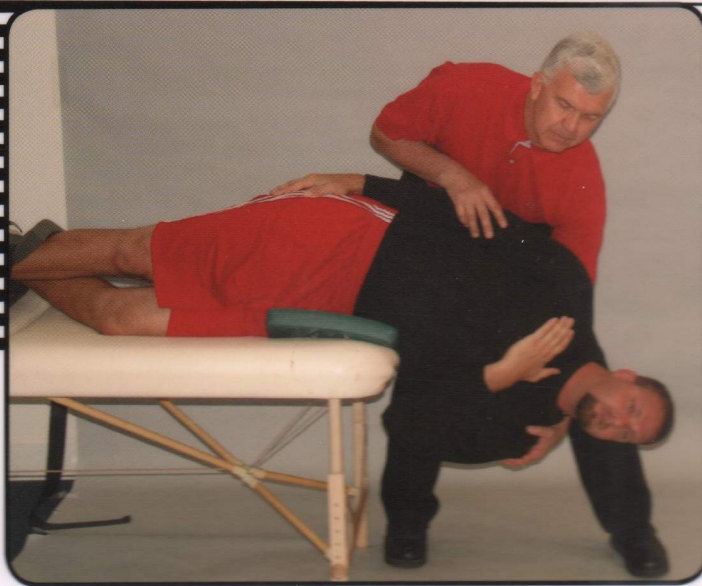
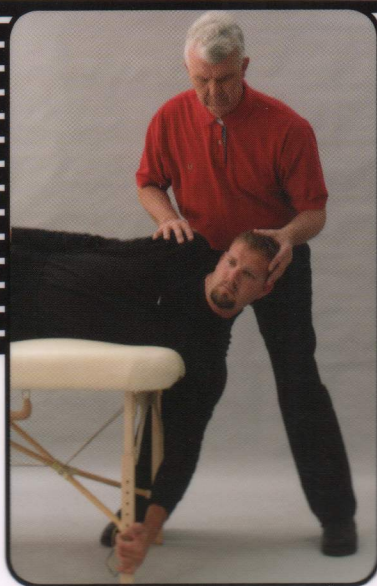


ACTIVE ISOLATED STRENGTHENING: THE MATTES METHOD



BY
AARON L. MATTES



ACTIVE ISOLATED STRENGTHENING: THE MATTES METHOD

By
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Preface

The material contained in this book changed my life. After a series of injuries and the loss of all function in my right shoulder, I was given a poor prognosis. I achieved full rehabilitation by following Aaron Mattes' stretching and strengthening program. In the process, Aaron has mentored me and encouraged my professional development from massage therapist through the study of physical medicine to my current career as a rehabilitation physician. From first hand experience, I know that the exercises contained in this book are effective, and furthermore, have the power to transform "hands-on" medicine as it is practiced today.

Nearly forty years ago, Aaron Mattes began to dissect movement and develop exercise protocols to increase flexibility and strengthen specific muscle groups, individual muscles, and designated parts of those muscles. Throughout the intervening years of work with thousands of people, he has revised and refined these exercises. The principal reason for the success of Aaron's exercises is his continued adherence to a well-honed and precisely-followed technique.

Aaron's flexibility work is world-renowned and has been used by countless Olympic medalists, as well as health professionals and other athletes of all abilities. His strengthening work, while equally important, has not gotten the attention it deserves. His combined flexibility and strengthening training employs orthopedically sound exercises that are systematic, progressive, and unsurpassed in effectiveness when delivered in an instructive and positively reinforcing environment. Together, they comprise a complete package for everyday wellness, sports training or rehabilitation.

To maximize strength training, these key ingredients are important: 1) specificity, 2) concentrative exercises that maximize the brain-muscle connection, 3) an optimally aroused and motivated mental and physical state, and 4) genetic predisposition. While we can't control our genes, Aaron's strength program integrates the first three ingredients for beneficial results.

The Aaron Mattes Method of strength training is highly specific. While it is holistic and treats the body as a unit, its primary characteristic is its capability to break down the body to treat isolated parts. There are protocols for every primary muscle of the body. The Mattes Method follows the training specificity principle (to become better at a particular exercise or skill, you must repetitively perform that exercise or skill) by identifying and resolving specific strength and functional deficits. The Mattes Method then employs full range of motion movements to contract and strengthen targeted muscles (the prime movers) while at the same time stretches the opposing (antagonist) muscles. The result is increased muscle strength, joint flexibility, and balance across joints.

The Mattes Method is focused. It emphasizes, in one exercise, two controlled contractions that must be performed slowly with precision and accuracy—first, the upward initial contraction of the muscle (the concentric phase or shortening of the muscle) and second, the downward release of the previously shortened muscle (the eccentric phase or lengthening contraction.) Control is especially important during this eccentric release or, as weight-lifters say, the "negative," because a slow downward movement fosters the brain-muscle connection. In contrast, moving at a fast pace, momentum (not the muscle) does much of the work.

The Mattes Method is motivating. An optimally aroused and motivated mental and physical state means more than just warming up before exercise because the brain, as well as the muscles, must be ready to perform. The Mattes Method helps us understand the utility and mechanics of the exercises.

After repetitive use, injury, surgery and even inactivity, muscles and joints lose flexibility, range of motion, strength and local general stamina. The Mattes Method of strengthening is intended to develop specific muscle support, overcome weakness, and provide for local joint stamina. Strength training restores the muscle elasticity, crucial to strength and flexibility that erodes with age and lack of use. Mattes exercises promote range of motion, restore or develop brain-muscle connectivity, and increase muscle strength as well as that of the tendons and ligaments. The Mattes Method of strength training distinguishes itself by the precision of the work and the exactness of the application of movement. It is so simple that everyone can do it; yet, it is profound in its attention to detail. The results have widespread benefit, from individuals with aches and pains to elite athletes recovering from injuries or working to improve performance.

As an innovator, Aaron Mattes gives those with whom he works information and tools that are understandable and useful. He has demonstrated that it doesn't take a roomful of expensive equipment to obtain world-class results in strength and flexibility. Aaron teaches exercises that can be performed simply, using a limb, body part, dumbbell, ankle weight, towel, soft ball, or rubber band in the office, clinic or home. For the thousands of us lucky enough to be treated by or work with him, Aaron Mattes, through his discipline and dedication to his work, is a constant source of inspiration and motivation.

This manual is intended to address most injuries, muscle diseases, arthritic and neurological conditions, and pain. It is also an excellent guide to conditioning or preventive exercises. Everyone—physicians, chiropractors, physical therapists, exercise physiologists, massage therapists, trainers, coaches, athletes as well as anyone concerned about wellness and health—will find this book informative and effective in rehabilitating, strengthening and conditioning, restoring and expanding range of motion, developing and refining the brain-muscle connection, enhancing performance, and preventing injury.

Jeffrey P. Hagquist DO

Introduction

Thirty-six years ago I began to dissect movement and gather strength exercise protocols designed to specifically strengthen muscles that surround regions that span and support joints. Recognizing that specific functional strength training is important we need to understand that Active Isolated Strength training should precede functional strength training. Allied with Active Isolated Stretching, strength should be specific and enable one to practice these movements without a room full of expensive equipment. The resistance is specific to each movement and overloaded according to joint-muscle ability.

The exercises contained within these pages will assist in overcoming weakness, postural problems, local joint stamina and pain. Specificity is important for exactness of results. Resistance may be increased one pound or less specifically accommodating the ability of the participant.

Following injury, surgery or inactivity muscles and joints lose flexibility, range of motion, strength and general localized stamina. You will be introduced to manual (use of hand applied resistance) exercises whereas the trainer-therapist may apply specific pressure to help develop the tissues that cross that region.

When performing resistance (strengthening) exercises control of the resistance is very important. The resistance may be as simple as the limb or body part, to the dumbbell, ankle weight, towel, soft ball, rubber band, etc., to achieve specific strength.

Movements should be performed slowly with precision and accuracy in order to achieve a maximum result. Resistance upward during the shortening movement is called "concentric contraction" or positive resistance. Movement lengthening the muscles downward to the starting position is called "eccentric contraction" or negative resistance. Both concentric (shortening) and eccentric (lengthening) contractions should be performed slowly with exactness of technique. A good rule of thumb is 2-3 seconds for each repetition during the shortening (concentric) contraction. The lengthening (eccentric) contraction is 4-5 seconds for each repetition.

Repetitions and resistance may be increased as joint capability allows or pain levels decrease. More advanced exercises may be substituted as ability to perform lower level work advances.

Active Isolated Strengthening is intended to develop specific muscle support and help acquire local joint stamina. These exercises enable the performer to work and develop strength in the office, small clinic or home environment.

The following chapters are intended to strengthen problems such as specific injuries, muscle diseases, arthritic conditions, cerebral vascular accidents (CVA), diabetes, scoliosis, kyphosis, osteoporosis, post fracture, post surgery including joint replacements and various pains such as rheumatoid arthritis, lupus, fibromyalgia and carpal tunnel syndrome. Active Isolated Strengthening: The Mattes Method is an excellent strengthening program for seniors, beginning exercisers including youngsters and athletes of all ages and levels. Hundreds of high school, college, Olympic and professional athletes have incorporated Active Isolated Strength exercises with success.

Aaron L. Mattes MS, RKT, LMT.

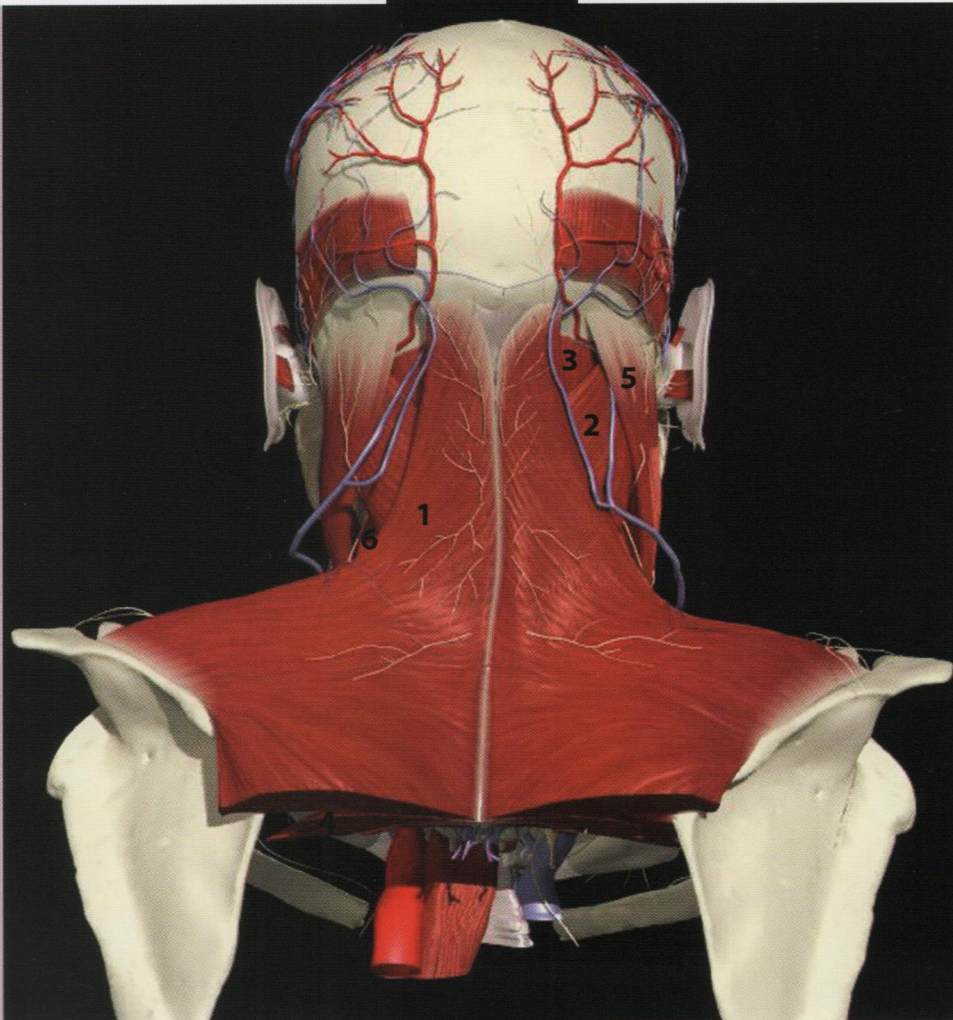


Muscle Anatomy

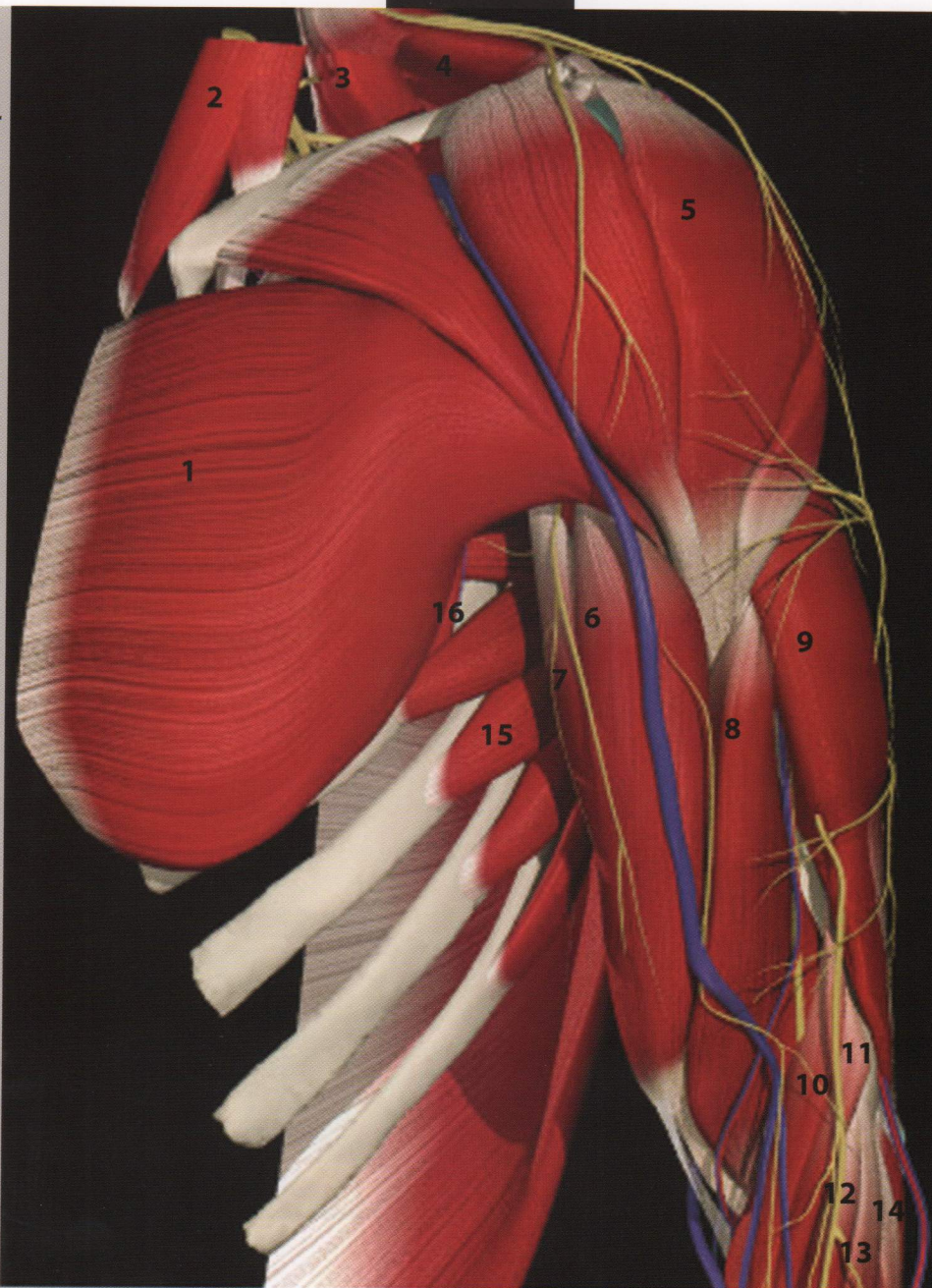
1. Trapezius
2. Sternocleidomastoid-
Clavicular Head
3. Sternocleidomastoid-
Sternal Head
4. Subclavius
5. Sternohyoid
6. Omohyoid:
Superior Belly
7. Omohyoid:
Inferior Belly
8. Sternothyroid



1. Trapezius
2. Splenius
Capitis
3. Transverso-
spinalis: Semi-
spinalis Capitis
4. Rhomboi-
deus Major
5. Sterno-
cleidomastiod
6. Levator
Scapulae

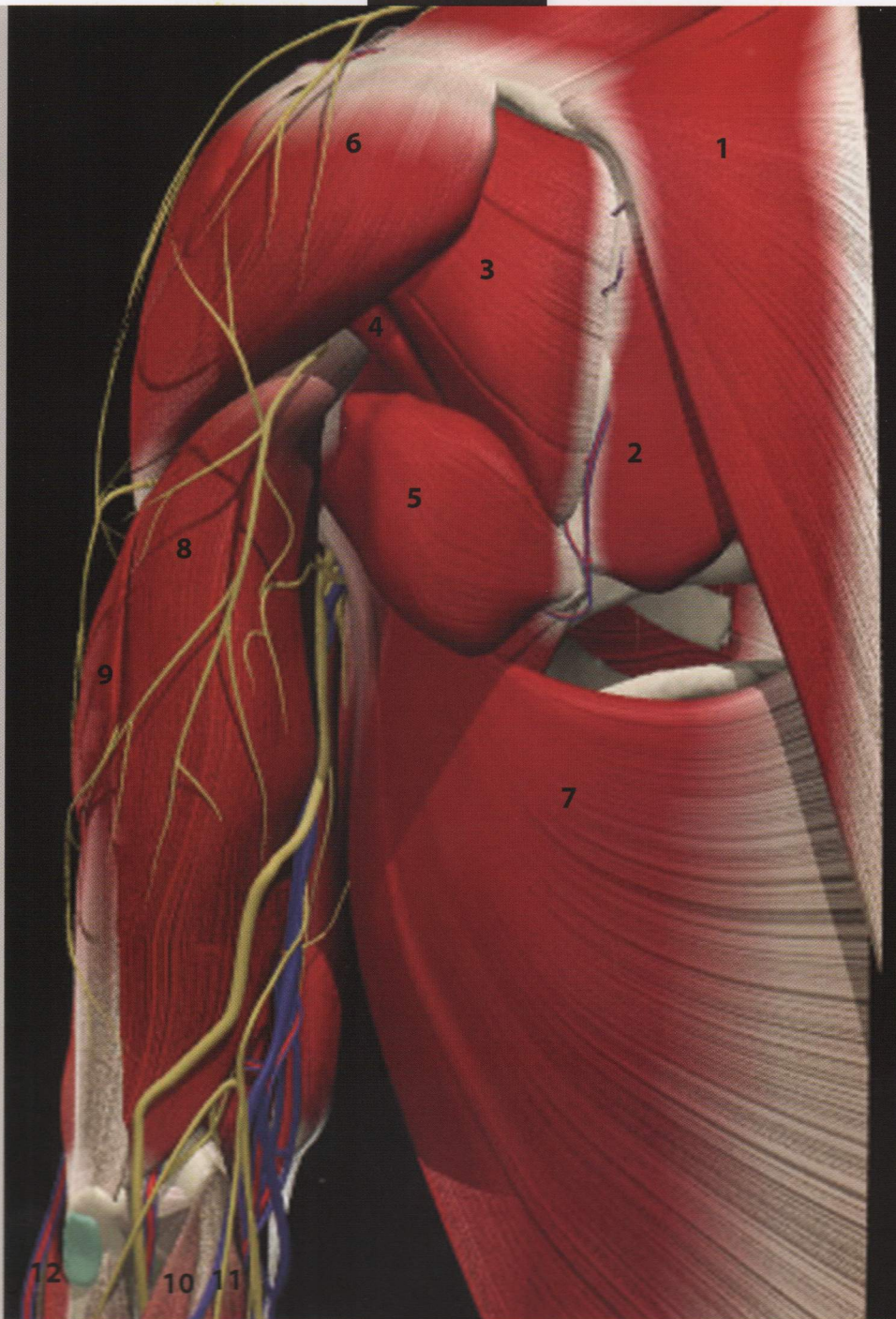


1. Pectoralis Major
2. Sternocleidomastoid
3. Levator Scapulae
4. Trapezius
5. Deltoid
6. Biceps Brachii- Long Head
7. Biceps Brachii- Short Head
8. Brachialis
9. Triceps Brachii- Lateral Head
10. Brachioradialis
11. Extensor Carpi Radialis Longus
12. Extensor Carpi Radialis Brevis
13. Extensor Digitorum
14. Extensor Carpi Ulnaris

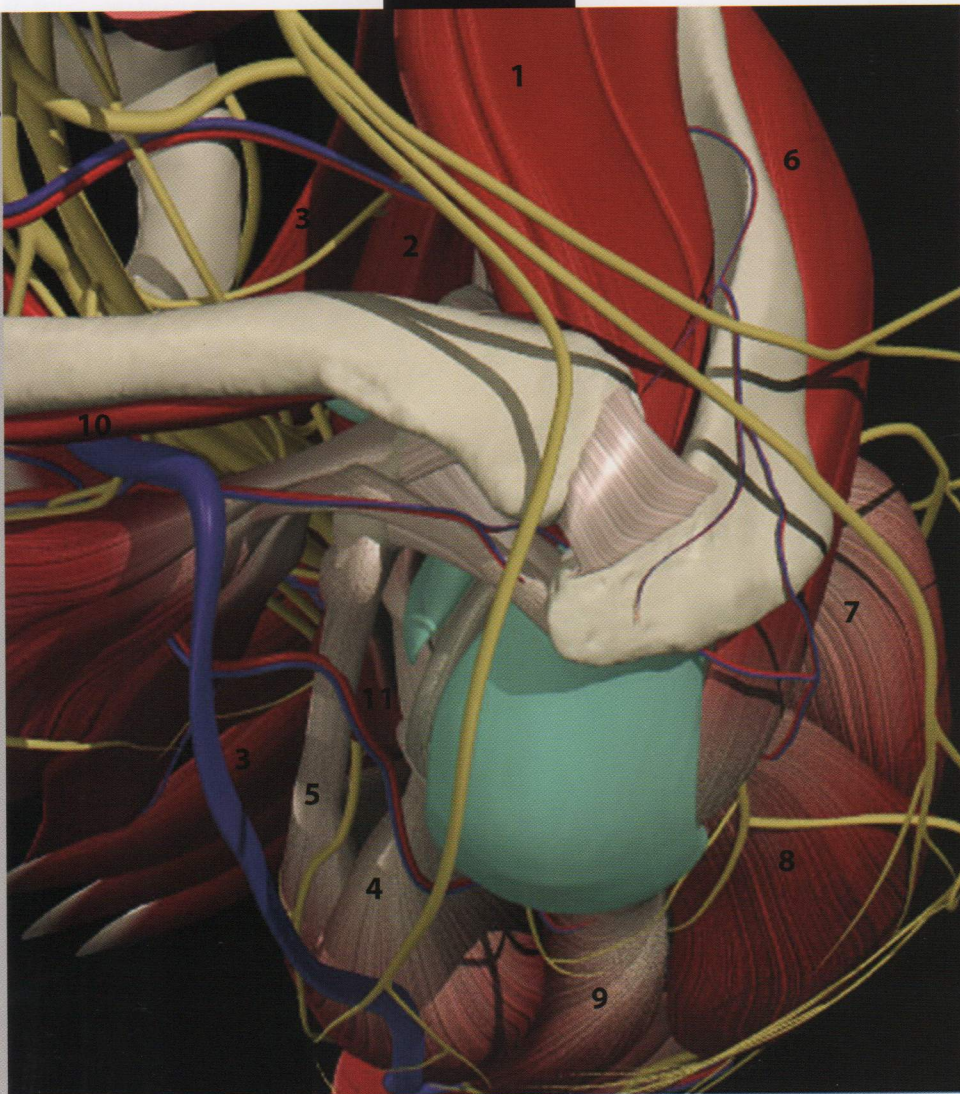


15. Serratus Anterior
16. Pectoralis Minor

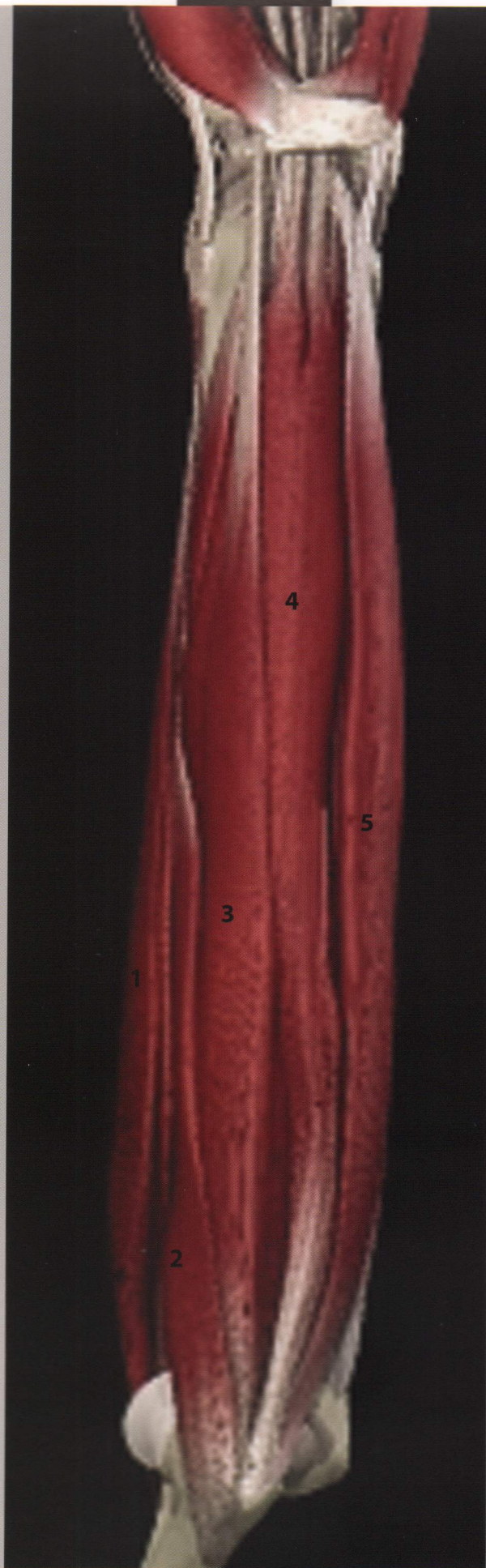
1. Trapezius
2. Rhomboides Major
3. Infraspinatus
4. Teres Minor
5. Teres Major
6. Deltoid
7. Latissimus Dorsi
8. Triceps Rachii- Long Head
9. Triceps Brachii- Lateral Head
10. Flexor Carpi Ulnaris
11. Flexor Carpi Radialis
12. Anconeus



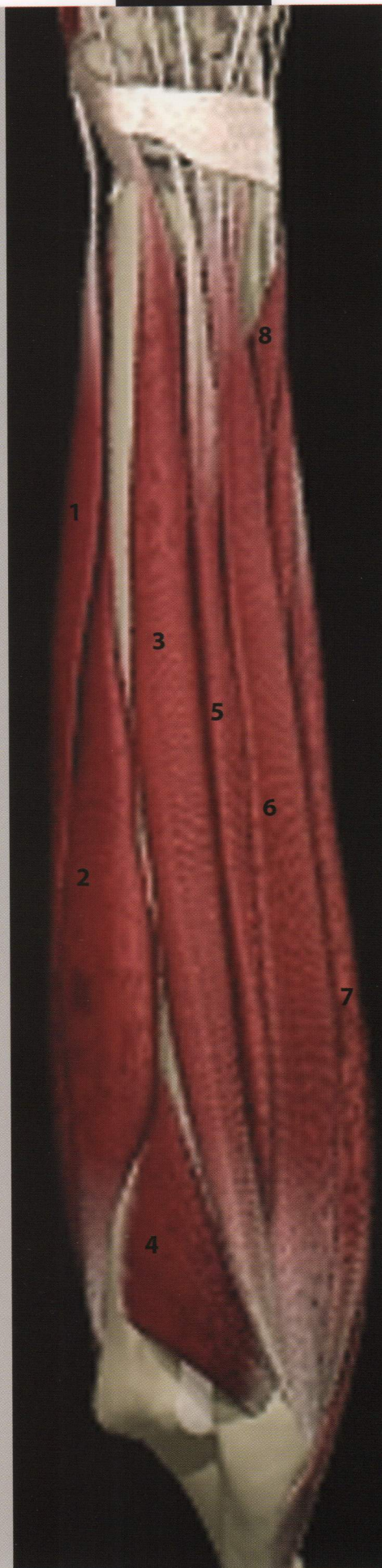
1. Suprspinatus
2. Subscapularis
3. Serratus Anterior
4. Biceps Brachii- Long Head
5. Biceps Brachii- Short Head
6. Infraspinatus
7. Triceps Brachii- Long Head
8. Triceps Brachii- Lateral Head
9. Brachialis
10. Subclavius
11. Coracobrachialis



1. Extensor Carpi Radialis Longus
2. Pronator Teres
3. Flexor Carpi Radialis
4. Flexor Digitorum Superficialis
5. Flexor Carpi Ulnaris



1. Flexor Carpi Ulnaris
2. Flexor Digitorum Profundus
3. Extensor Carpi Ulnaris
4. Anconeus
5. Extensor Digiti Minimi
6. Extensor Digitorum
7. Extensor Carpi Radialis Brevis
8. Extensor Pollicis Brevis



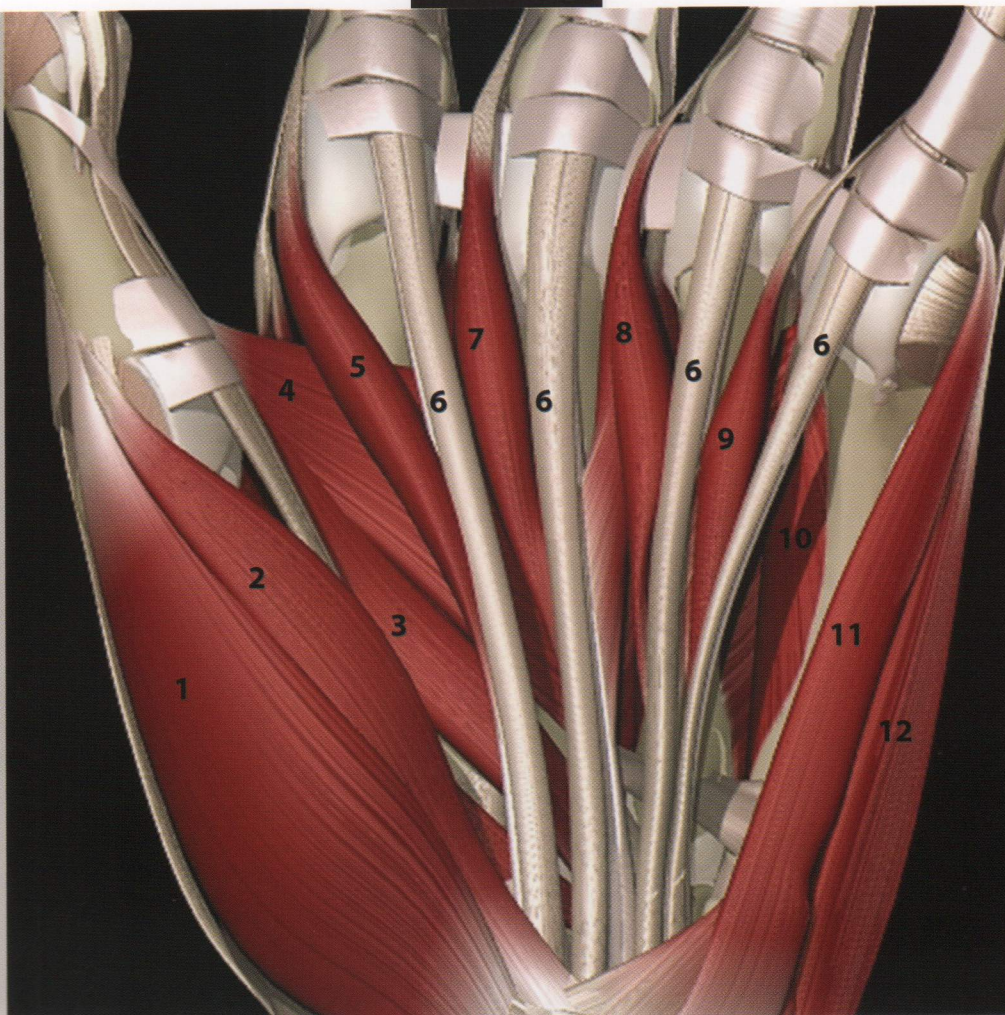
1. Abductor Digiti Minimi
2. Fourth Dorsal Interosseous
3. Third Dorsal Interosseous
4. Second Dorsal Interosseous
5. First Dorsal Interosseous
6. Extensor Pollicis Longus
7. Extensor Pollicis Brevis
8. Extensor Retinaculum
9. Extensor Digitorum (Communis)
10. Extensor Digiti Minimi
11. Extensor Carpi Ulnaris
12. Extensor Carpi Radialis Brevis



- 1. Abductor Pollicis Brevis
- 2. Flexor Pollicis Brevis
- 3. Adductor Pollicis: Oblique Head
- 4. Adductor Pollicis: Transverse Head
- 5. First Lumbrical
- 6. Flexor Digitorum Superficialis
- 7. Second Lumbrical
- 8. Third Lumbrical
- 9. Forth Lumbrical
- 10. Forth Dorsal Interosseous
- 11. Flexor Digiti Minimi Brevis
- 12. Abductor Digiti Minimi
- 13. Flexor Retinaculum
- 14. Flexor Carpi Ulnaris
- 15. Flexor Carpi Radialis
- 16. Abductor Pollicis Longus



1. Abductor Pollicis Brevis
2. Flexor Pollicis Brevis
3. Adductor Pollicis: Oblique Head
4. Adductor Pollicis: Transverse Head
5. First Lumbrical
6. Flexor Digitorum Superficialis
7. Second Lumbrical
8. Third Lumbrical
9. Fourth Lumbrical
10. Fourth Dorsal Interosseous
11. Flexor Digiti Minimi Brevis
12. Abductor Digiti Minimi



1. Pectoralis Major

2. Rectus Abdominis

3. Internal Oblique

**4. Conjoined Muscle
and Tendon of Psoas
Major and Iliacus**



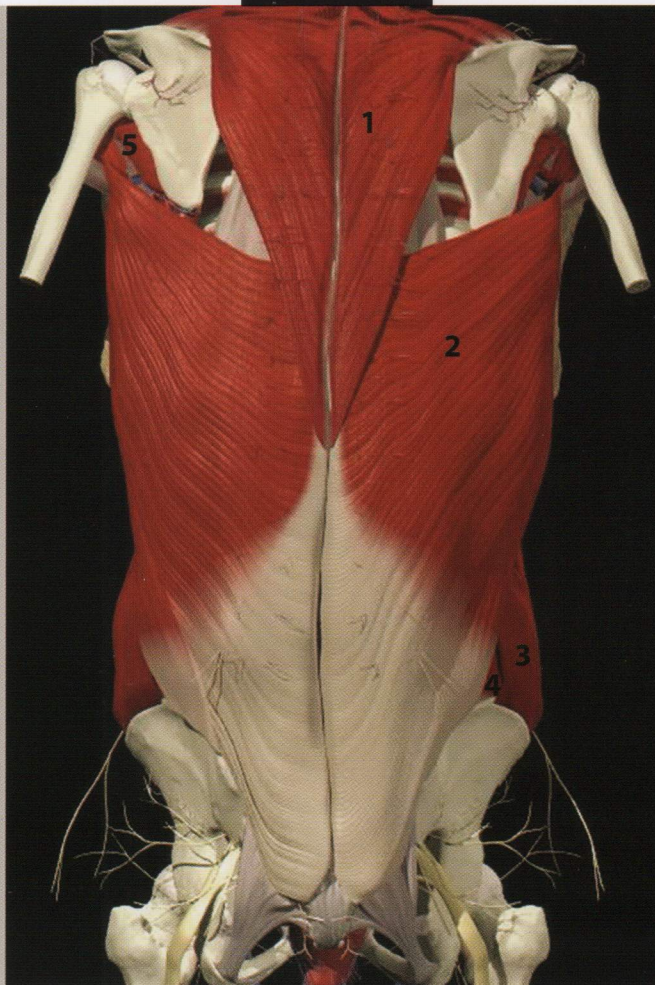
1. Trapezius

2. Latissimus Dorsi

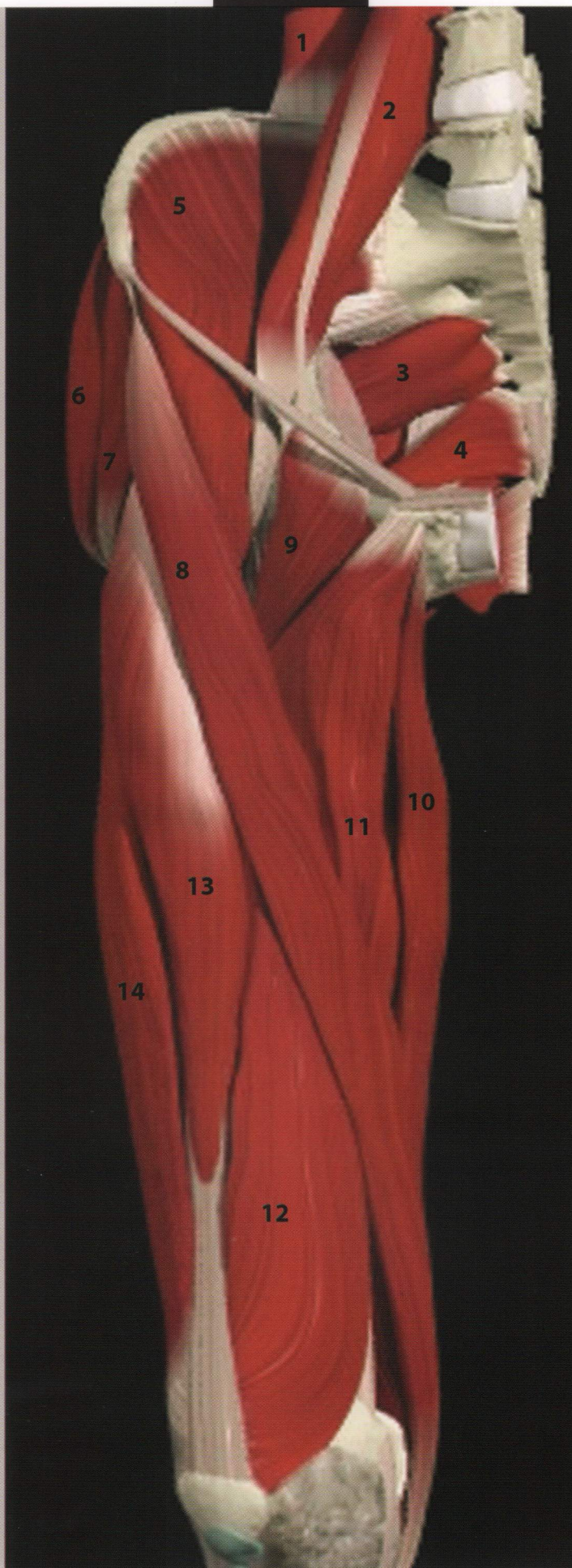
**3. External
Oblique**

4. Internal Oblique

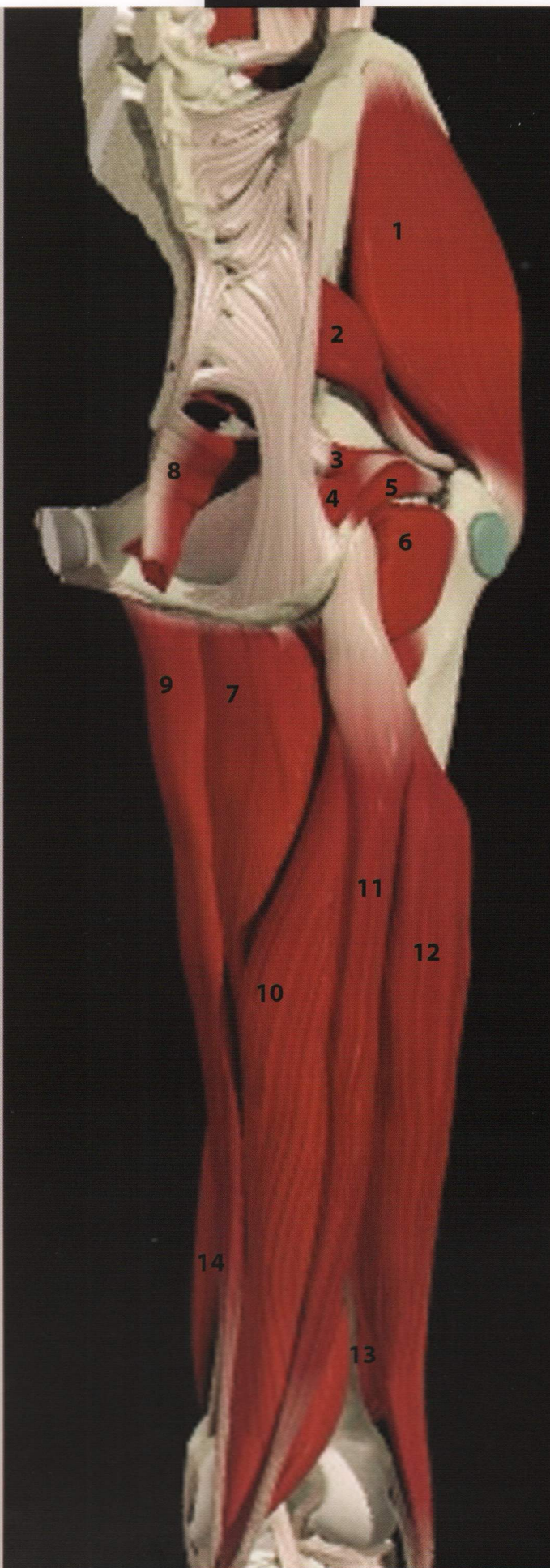
5. Subscapularis



1. Quadratus Lumborum
2. Psoas Major
3. Piriformis
4. Coccygeus
5. Iliacus
6. Gluteus Medius
7. Gluteus Minimus
8. Sartorius
9. Adductor Longus
10. Gracilis
11. Adductor Magnus
12. Vastus Medialis
13. Rectus Femoris
14. Vastus Lateralis



1. Gluteus Medius
2. Piriformis
3. Superior Gemellus
4. Obturator Internus
5. Inferior Gemellus
6. Quadratus Femoris
7. Adductor Magnus
8. Levator Ani
9. Gracilis
10. Semimembranosus
11. Semitendinosis
12. Biceps Femoris: Long Head
13. Vastus Intermedius
14. Vastus Medialis



1. Gastrocnemius

2. Soleus

**3. Peroneus
Longus**

**4. Extensor
Digitorum
Longus**

**5. Tibialis
Anterior**

**6. Peroneus
Brevis**

**7. Extensor
Digitorum
Brevis**



1. Soleus

**2. Peroneus
Brevis**

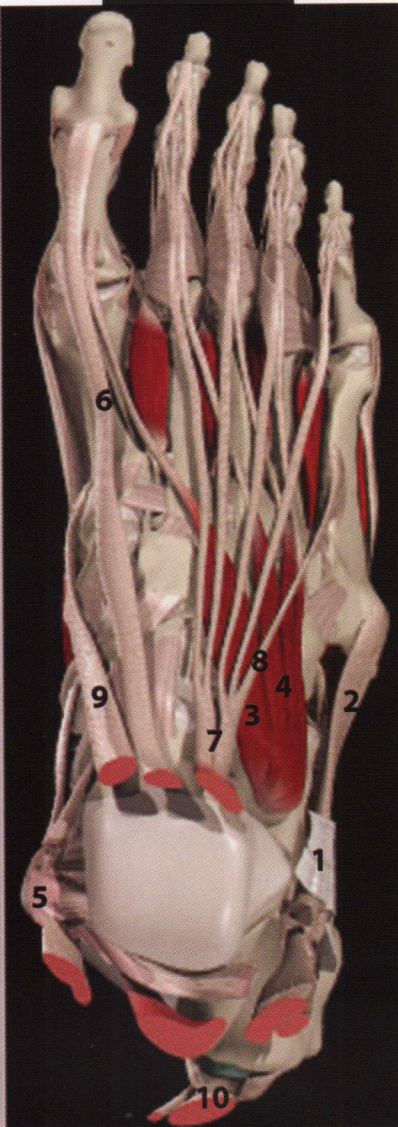
**3. Flexor Hallucis
Longus**

4. Popliteus

5. Plantaris



1. Inferior Peroneal Retinaculum
2. Peroneus Brevis
3. Extensor Hallucis Brevis
4. Extensor Digitorum Brevis
5. Deltoid Ligaments
6. Extensor Hallucis Longus
7. Extensor Digitorum Longus
8. Peroneus Tertius
9. Tibialis Anterior
10. Tendo Calcaneus (Achilles Tendon)



**1. Flexor Digiti
Minimi**

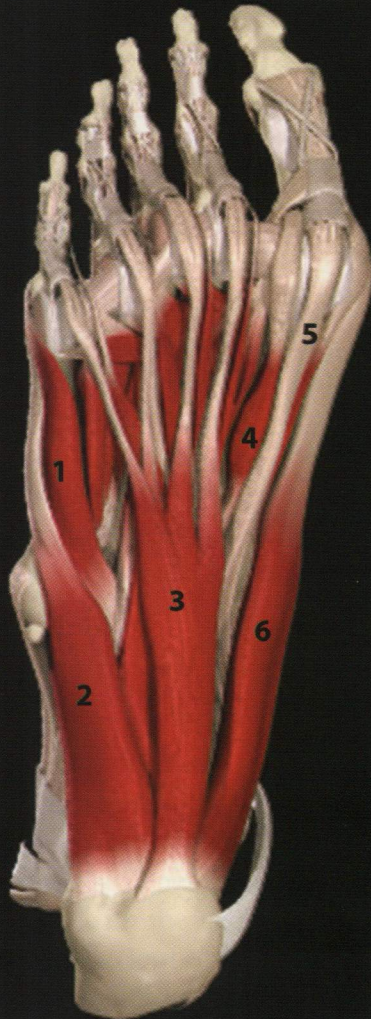
**2. Abductor
Digiti Minimi**

**3. Flexor
Digitorum
Brevis**

**4. Flexor
Hallucis
Brevis**

**5. Flexor
Hallucis
Longus**

**6. Abductor
Hallucis**

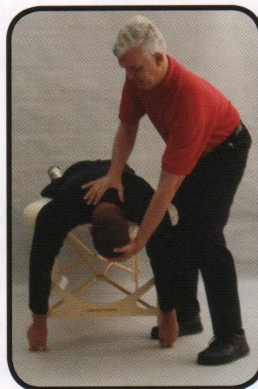


Neck Routine – Assisted

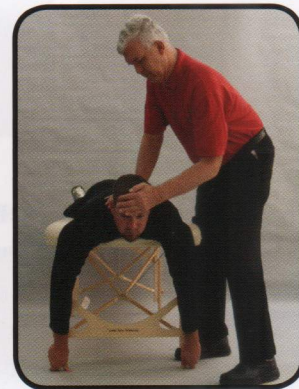
Assisted neck flexibility exercises are intended to aid people, who have suffered a strain, sprain or post-fracture that has healed properly and who have obtained medical authorization to begin neck flexibility and strengthening exercises. The subject moves their head against gravity and is guided by the therapist in the correct plane and gently assisted where necessary. The therapist counterbalances whatever the patient cannot control without excessive muscle strain. This series of exercises also specifically strengthens the agonist muscles moving the head.

1. (A, B) Assisted Cervical Hyperextension:

Strengthen the upper erector spinae, splenius cervicis, splenius capitus, semispinalis cervicis and semispinalis capitus while stretching the sternocleidomastoid, anterior, middle and posterior scalene muscles and prevertebral muscles. In the prone position with the neck extended beyond the end of the table, the subject grasps the legs of the table to keep the movement localized in the cervical spine. The assistant stands at the side of the subject, placing one hand under the forehead and the other hand on the upper thoracic spine to prevent thoracic movement (1A). The hand on the forehead guides the head in the sagittal plane and assists stretching at the end of active movement. Exercise through a full range of motion, stretch gently and repeat (1B). Use great care with herniated disc(s) or post-traumatic neck conditions. Begin with 5 to 8 repetitions and gradually increase to 15, as the subject is capable. Normally perform 2-3 sets.



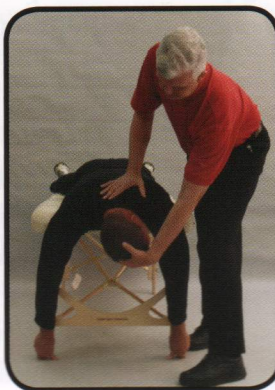
1A



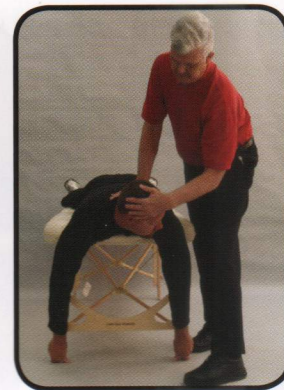
1B

2. (A, B) Assisted Cervical Hyperextension-Oblique:

To more completely isolate the upper trapezius and a single side of the cervical (neck) extensor muscles while stretching the sternocleidomastoid, anterior-lateral scalenes and prevertebral muscles. In the prone position with the neck extended beyond the table, the subject grasps the legs of the table to isolate the cervical neck extensors. The subject turns the head 45-degree centering the nose above the breast and moving the head toward the outside of the scapula (shoulder blade). The assistant stands to that side of the subject. (2A) Place one hand on the bottom side of the head, which guides the head 45-degrees posterior oblique and provides gentle assisted stretch at the end of active movement. (2B)



2A

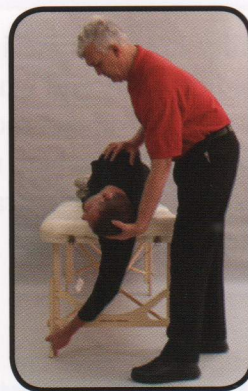


2B

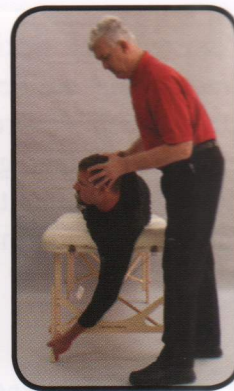
The opposite hand is placed firmly on the upper thoracic vertebral to prevent thoracic movement. Use great caution with herniated disk(s) or post-traumatic neck conditions. Begin with 5-8 repetitions and gradually increase to 15 as capable. Normally perform 2-3 sets.

3. (A, B) Assisted Cervical Lateral Flexion-Right:

Strengthen the anterior, middle and posterior scalenes, sternocleidomastoid, erector spinae and prevertebral muscles while stretching the opposite side scalene, sternocleidomastoid, erector spinae and prevertebral muscles on the opposite side. (3A) Subject assumes a side-lying position with the neck hanging beyond the end of the table with the lower hand grasping a table leg. The assistant stands behind the subject placing one hand on the lower side of the head and the opposite hand on the top shoulder to prevent shrugging. The subject begins the exercise with the head near the shoulder. The assistant guides the head to prevent forward movement, backward movement or rotation. (3B) The subject moves the head (ear toward front of shoulder) as far as possible. The assistant then helps provide a gentle stretch. Return to the starting position and repeat. Begin 5-8 repetitions and move to 15 as capable. Normally perform 2-3 sets.



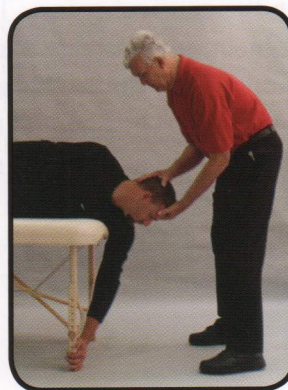
3A



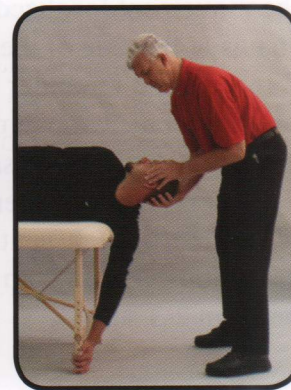
3B

4. (A, B) Assisted Cervical Rotation-Right:

Cervical rotation right will strengthen the right sternocleidomastoid, deep posterior spinal muscles, longissimus cervicus, splenius capitus, splenius cervicus and erector spinae muscles, stretching the same muscles on the left side. Ask the subject to assume a side-lying position with the neck beyond the end of the table and the lower hand clasp the table leg. Assistant stands near the top of the subject's head and places hands on the forehead and back of the head to help counterbalance the weight of the head and prevent flexion, hyperextension or lateral flexion.



4A

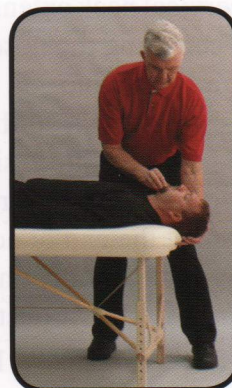


4B

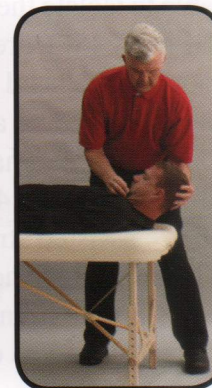
(4A) The subject will rotate the head from a downward position slowly upward (right) with the assistant providing gentle stretch at the end of active movement. (4B) Return to the starting position and repeat. The assistant should prevent the top shoulder from shrugging. Begin with one set of 5-8 repetitions and progress to 2-3 sets of 15 as capable.

5. (A, B) Assisted Cervical Flexion: Supine:

Cervical flexion strengthens the sternocleidomastoid and prevertebral muscles while stretching the upper erector spinae, upper trapezius, splenius cervicus, splenius capitus, semispinalis cervicus and semispinalis capitus. Ask the subject to assume a supine position with the head on the table. The shoulders and upper back should remain on the table throughout this exercise. The assistant stands at the patient's side with one hand behind the upper posterior head and the other hand around the lower border of the jaw. (5A) From the neutral position, ask the subject to tuck the chin as close as possible near the neck and lift the head in a close tuck without allowing the thoracic spine to leave the surface. The assistant will assist the subject in tucking the chin and counterbalances the weight of the head if needed, providing gentle assistance at



5A

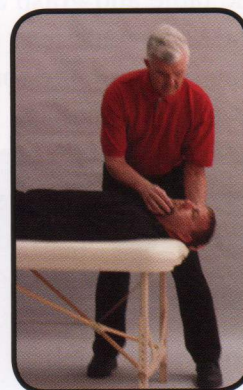


5B

the end of active movement. (5B) Tuck the chin close to the neck and return the head slowly to the starting position. Perform the movement 5-8 repetitions and increase to 15 as capable. Normally perform 2-3 sets.

6. (A, B) Assisted Cervical Flexion – 45 degrees:

This exercise is performed by rotating the head 45-degrees, tucking the chin and moving the head toward the center of the breast (45-degree angle). The chin is also tucked on the way down. The assistant guides the movement in both directions keeping the chin tucked and providing assistive stretch at the end of active movement. After each set, repeat the cervical flexion exercise in the opposite direction. The assistant stands on the side the movement is occurring. Begin with 5-8 repetitions, progress to 15 as capable. Normally perform 2-3 sets.



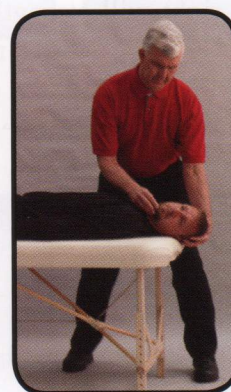
6A



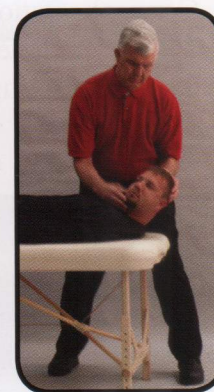
6B

7. (A, B) Assisted Cervical Flexion – Oblique:

The subject turns the head 45 degrees (nose pointed over center of breast.) The head remains in a neutral position. The subject moves the top ear toward the center of the opposite breast. The assistant guides the movement by controlling proper head position angle with both hands sandwiched along side of the head, assisting with mild stretch at the end of movement. Assistant stands at the side of the direction of movement. Begin with 5-8 repetitions and progress to 15 as capable. Normally perform 2-3 sets.



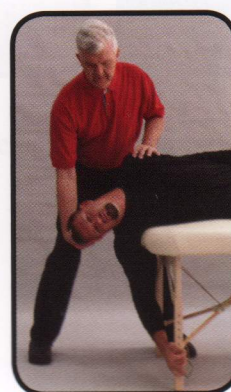
7A



7B

8. (A, B) Assisted Cervical Lateral Flexion: Left:

This exercise strengthens the left anterior, middle and posterior scalene muscles, sternocleidomastoid, erector spinae and prevertebral muscles while stretching the same muscles on the other side of the neck. The subject assumes a side-lying position with the neck beyond the end of the table. The lower hand stabilizes by grasping a table leg. The assistant stands behind the patient, placing one hand on the lower side of the head and the opposite hand on the top shoulder to prevent shrugging. The subject begins the exercise with the head near the right shoulder (8A). The therapist guides the head to prevent forward movement, backward movement, or rotation. The subject moves the head (ear to front of shoulder) as far as possible and then gentle assistance is provided by the assistant (8B). Caution the subject not to shrug the top shoulder. Return to starting the position and perform 5-8 repetitions gradually increasing to 15 repetitions. The normal program is 2-3 sets.



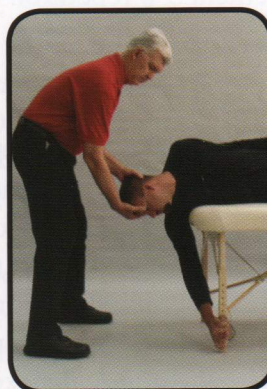
8A



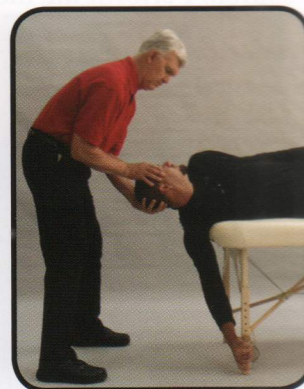
8B

9. (A, B) Assisted Cervical Rotation: Left:

This strengthens the left sternocleidomastoid, deep posterior spinal muscles, longissimus cervicis, splenius capitis, splenius cervicis and erector spinae muscle while stretching the same muscles on the right side on the neck. From a side-lying position, the subject should extend the neck beyond the end of the table and grasp a table leg with the lower hand. The assistant stands near the top of the subject's head, placing the hands on the forehead and back of the head to help to counterbalance the weight of the head and prevent flexion, extension or lateral flexion. (9A). The subject will rotate the head from a downward position slowly moving upward (left) with the assistant providing gentle stretch at the end of active movements. (9B). Return to starting position and repeat. Begin with 5-8 repetitions and gradually increase to 15 as capable. The normal program is 2-3 sets.



9A



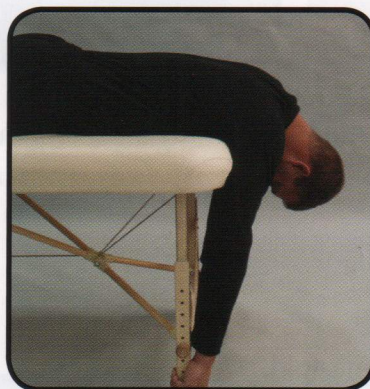
9B

Neck Routine – Active

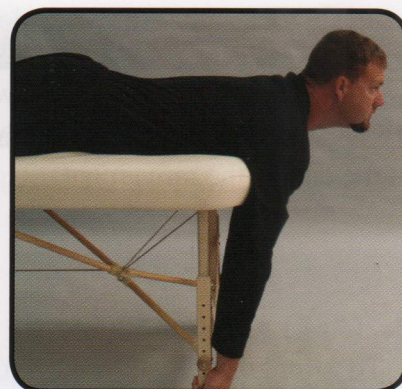
The Active Neck Routine is intended as a rehabilitation or conditioning program using specific exercises to increase the strength, flexibility, range of motion and endurance of the neck. Begin with 5 repetitions and advance as capable to 15 repetitions. Perform 2-3 sets.

1. (A, B) Neck Hyperextension:

To strengthen the upper erector spinal, splenius cervicis, splenius capitis, semispinalis cervicis and semispinalis capitis, and stretch the sternocleidomastoid and prevertebral muscles. Stabilize the cervical spine by hanging on to the table legs. Lower the head slowly downward (1A) and slowly raise the head upward toward the ceiling (1B). Do not extend the lower back while doing this exercise.



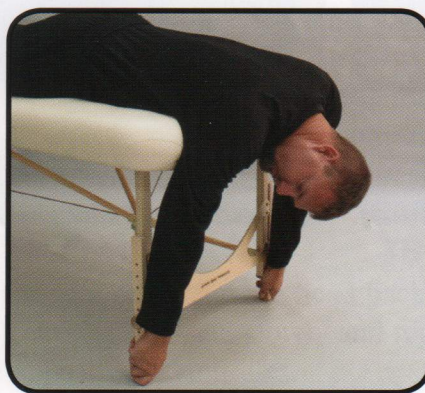
1A



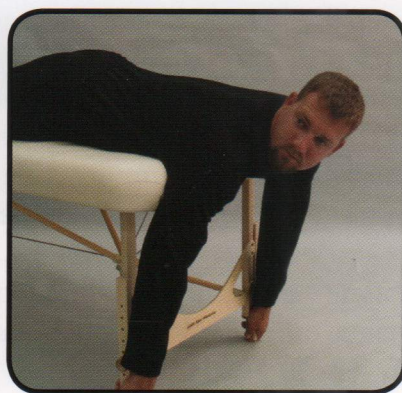
1B

2. (A,B) Cervical Hyperextension – Oblique:

To isolate one side of the upper trapezius, upper erector spinal, splenius cervicis, splenius capitis, semispinalis cervicis and semispinalis capitis, and to stretch the sternocleidomastoid, anterior, middle and posterior scalenes and other prevertebral muscles. Stabilize the cervical spine (neck) by hanging on to the table legs with the arms completely extended (2A). Rotate the head 45-degrees (nose above center of breast). (2B). Raise the head obliquely at a 45-degree angle moving the ear toward the center of the breast. Stretch gently at end of movement. Lower the head slowly.



2A



2B

3. (A, B) Lateral Flexion – Right:

To strengthen the anterior, middle and posterior scalenes, sternocleidomastoid, erector spinal and prevertebral muscles and stretch the opposite side of the group of previously mentioned muscles. Lateral flexion is accomplished by hanging onto the table leg to stabilize the lower spinal muscles. Focus vision on an object directly in front of something eye level. Maintain movement in the frontal plane moving downward to full extreme (3A) and then raising the head laterally moving the ear toward the front of the shoulder without rotating the head (3B). Raise and lower the head slowly. Subject should stretch easily at the end of the movement.



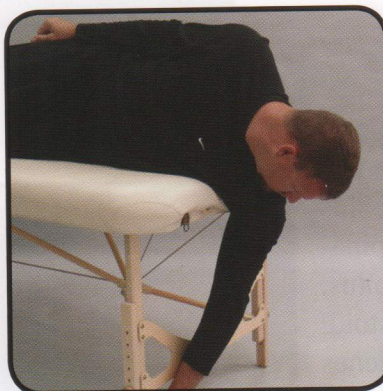
3A



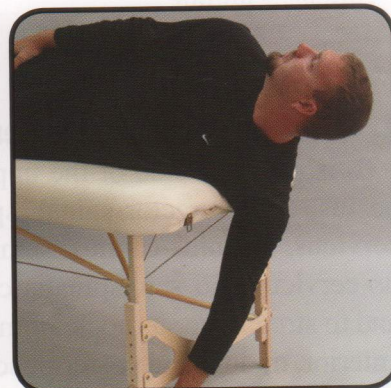
3B

4. (A, B) Rotation-Right:

To strengthen the sternocleidomastoid, deep posterior spinal muscles, splenius cervicis, splenius capitis and erector spinal muscles, stretching their counterpart muscles on the opposite side. Cervical rotation right is performed in a side lying position. Stabilize the lower spine by hanging on to a table leg. Begin exercise by rotating the head toward the floor (4A). Slowly rotate the head upward, offering a gentle stretch at the terminal point of movement (4B).



4A



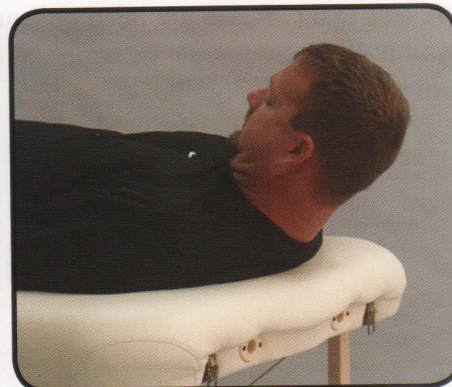
4B

5. (A, B) Flexion:

To strengthen the sternocleidomastoid and prevertebral muscles and stretch the cervical extensor muscles. (5A) Tuck the chin as close as possible and lift the head off from the surface as far as comfortable without lifting the shoulders or flexing the trunk. (5B). Keep the chin tucked and slowly lower the head back to the surface.



5A



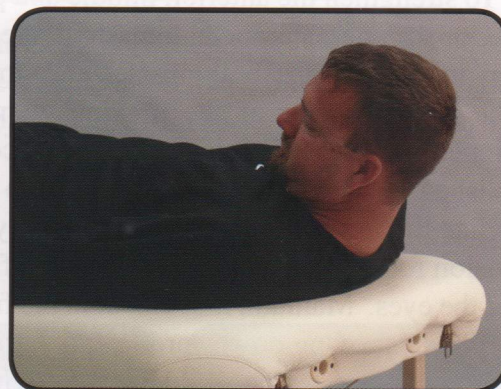
5B

6. (A, B) Flexion 45-degree angle:

Flexion is also performed at a 45 degree angle to isolate additional muscle and angular fibers of muscles exercised during flexion. Lift the head off the surface and rotate the head 45 degrees, pointing the nose toward the center of the breast. (6A) Tuck the



6A



6B

chin close to the neck and move the head upward keeping the back and shoulders on the surface. (6B) Keep the chin tucked and lower the head slowly to the surface. Repeat in the opposite direction.

7. (A, B) Flexion - Oblique:

Subject is laying flat on the surface. The head is rotated 45 degrees, pointing the nose toward the center of the breast. (7A) To exercise the muscles move the ear towards the center of the



7A

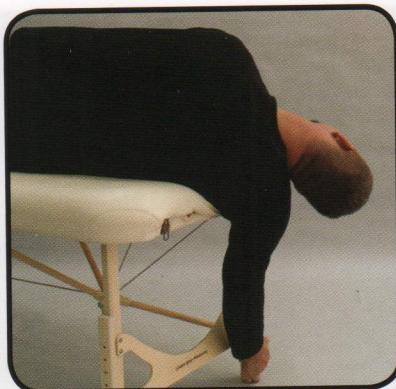


7B

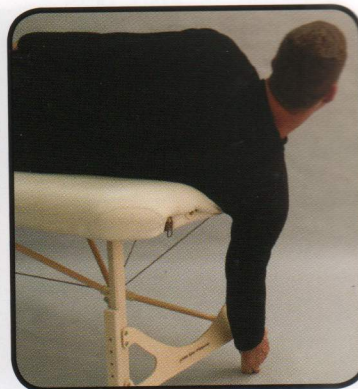
opposite breast. Do not flex the head forward or extend the head backward during the exercise. Stretch gently at the end of the movement (7B). Lower the head slowly and repeat. Perform the same movement in the opposite direction to exercise the opposite side muscles.

8. (A, B) Lateral Flexion – Left:

To strengthen the anterior, middle and posterior scalenes, sternocleidomastoid, erector spinae and prevertebral muscles and stretch the opposite side of the previously mentioned muscles. Lateral flexion is accomplished by hanging onto the table leg to stabilize the lower spinal muscles. Keep your vision focused on an object directly in front of the eyes. Maintain movement in the frontal plane moving downward to full extreme (8A). Then raise your head laterally moving the ear toward the shoulder without rotating the head (8B). Lift and lower the head slowly. Subject should stretch easily at the end of the movement.



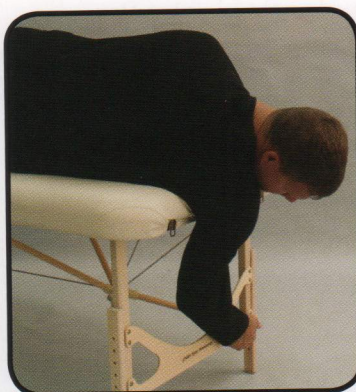
8A



8B

9. (A, B) Rotation Left:

To strengthen sternocleidomastoid, deep posterior spinal muscles, splenius capitus, splenius cervicus and erector spinal muscles, stretching their counterpart muscles on the opposite side. Rotation left is accomplished in a side lying position. Stabilize the lower spine by hanging onto the table leg. Begin the exercise by rotating the head toward the floor (9A). Slowly rotate the head upward offering a gentle stretch at the terminal point of movement (9B).



9A



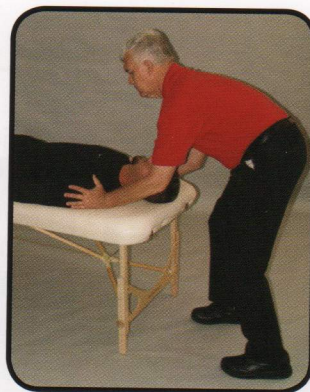
9B

Shoulder Girdle Routine (Manual)

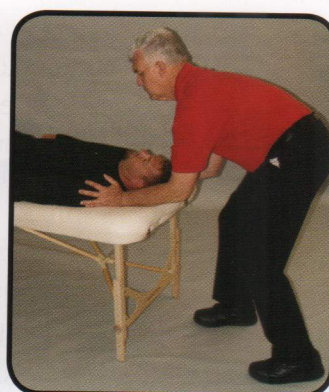
The shoulder girdle routine (manual) is specific exercise for post-surgical, post-traumatic or chronic conditions of the neck, upper back and shoulder girdle region as the subject's condition may indicate. Begin with 2 sets of 5-8 repetitions and increase numbers and resistance as subject improves (3 sets of 10 repetitions).

1. (A, B) Elevation (Manual Shrug):

This movement strengthens levator scapulae, rhomboid major, rhomboid minor and trapezius muscles. The subject relaxes their arms along side of the body. (1A) Subject pushes (shrugs) shoulder upward keeping the scapulae in contact with the table. The assistant offers resistance placing the hands on top of the shoulders as the subject shrugs and provides gentle upward stretch with the fingers at the end of each repetition (1B). As capable, advance to shoulder shrugs with weights. (See Active Shoulder Section). Perform 3 sets of 10 repetitions.



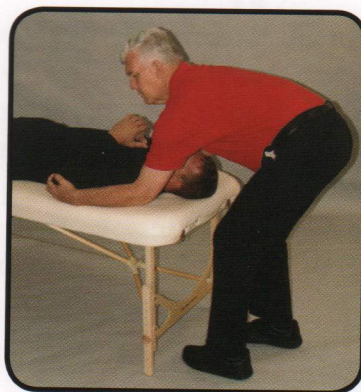
1A



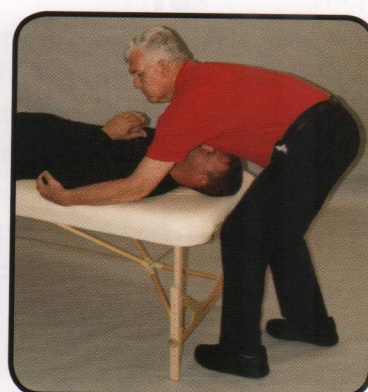
1B

2. (A, B) Depression:

This movement strengthens the lattismus dorsi and teres major muscles. Subject maintains the arms along side of the body, elbows flexed (2A). Assistant offers resistance by cupping the hands around the elbows giving steady pressure as the subject moves the shoulders from the starting position of upward elevation (shrugs) to completion in full downward depression (2B). Perform 3 sets of 10 repetitions.



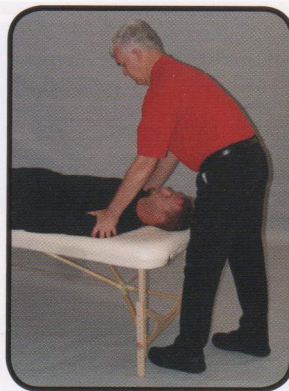
2A



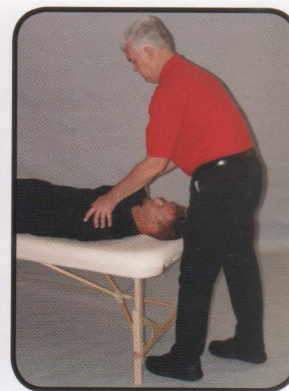
2B

3. (A, B) Abduction:

This movement strengthens the pectoralis minor and serratus anterior muscles. The subject is lying on their back and rolling the shoulders forward toward the anterior (front) midline. The assistant offers resistance throughout the forward abduction movement and light assistive stretch at the end of movement as required. (3A) Weights may be substituted as condition of patient permits. See Active Shoulder section. Perform 3 sets of 10 repetitions.



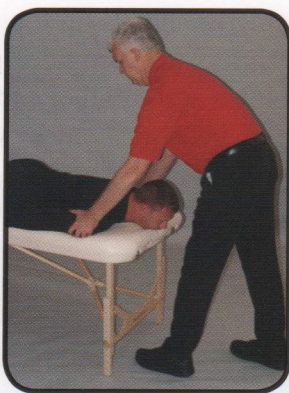
3A



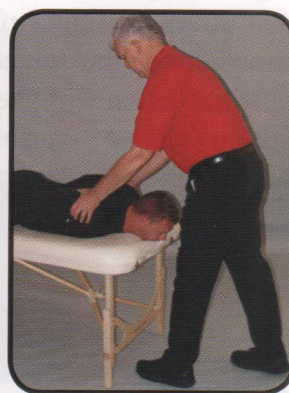
3B

4. (A, B) Adduction:

This movement strengthens the trapezius, rhomboid major and rhomboid minor muscles. The subject assumes a prone position. (4A) Exercise consists of rolling the shoulder blades toward the posterior midline (spine). The assistant places their hands over the posterior shoulders, offering resistance as the subject rolls the shoulders backward. The assistant gives light assistive stretch with the fingers at the end of the movement. (4B) As capable, have the subject use small dumbbells for resistance. (See Active Shoulder section) Perform 3 sets 10 repetitions.



4A



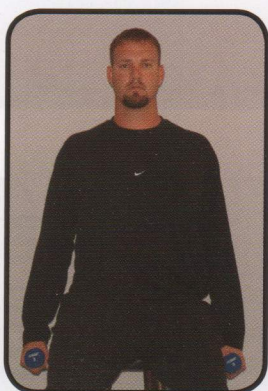
4B

Shoulder Joint Exercises

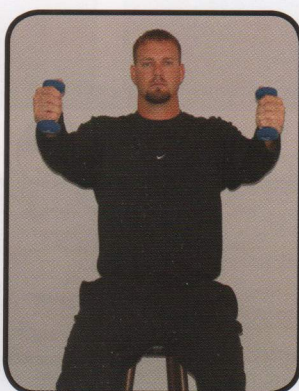
The shoulder joint exercises are designed for subjects with common disabilities of the glenohumeral joint, clavicle, scapula and sternal structures and to strengthen and condition the shoulder. The main objective of this program is to restore muscular strength, flexibility, joint range of motion and muscular endurance to the fundamental movements of the shoulder joint. The duration of the routine normally consists of 3-5 sets of 10 repetitions. The shoulder joint exercises are also designed for use in sports conditioning and injury prevention programs. Care should be exercised to prevent compensation by swinging the weights upward or allowing them to fall rapidly without muscle contraction or control.

1. (A, B, C, D) Flexion:

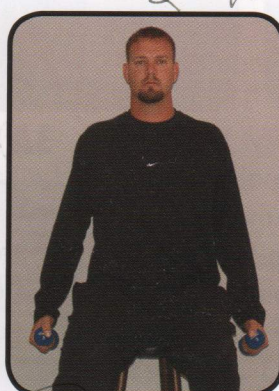
The purpose of shoulder flexion is to strengthen the anterior deltoid and clavicular head of the pectoralis major, and to stretch



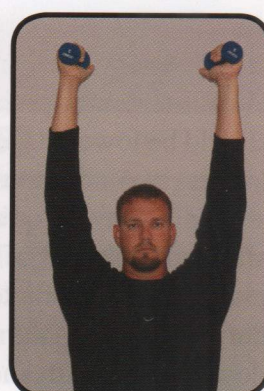
1A



1B



1C

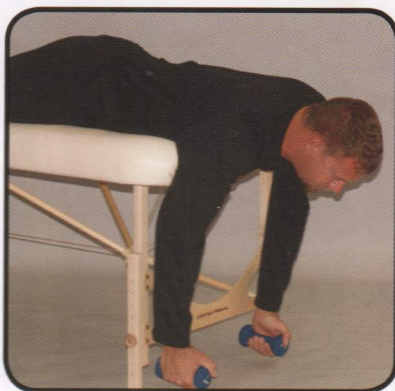


1D

the latissimus dorsi, teres major, posterior deltoid and long head of the triceps brachii muscles. The subject assumes a standing and/or sitting position with the arms relaxed, palms facing toward the midline and hanging at the side. Movement is performed by raising both arms forward toward shoulder level. As the shoulder becomes pain free and is quite strong, extend the arms to a position directly overhead. A more advanced exercise is accomplished in a prone position, shoulder flexing to complete "forward elevation." A modification may be necessary in more acute, post operative or following long-term bed rest. 1A and 1B would then be performed while lying on the back. Perform 3-5 sets of 10 repetitions.

2. (A, B) Shoulder Forward Elevation:

The purpose of shoulder forward elevation is to strengthen the anterior deltoid, pectoralis major (clavicular position), coracobrachialis and subscapularis muscles. Muscles stretched include the posterior deltoid, pectoralis major (sternal portion), latissimus dorsi and teres major. (2A) From a prone position maintain el-



2A



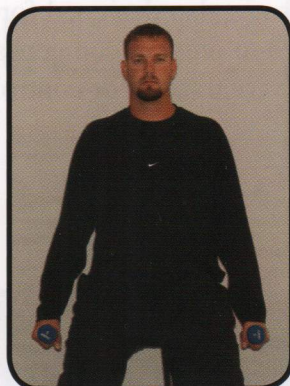
2B

bows full extension, vertical position. (2B) Reach upward in full horizontal position, elbows locked, palms facing inward. Lower weights slowly under control. Perform 3-5 sets of 10 repetitions.

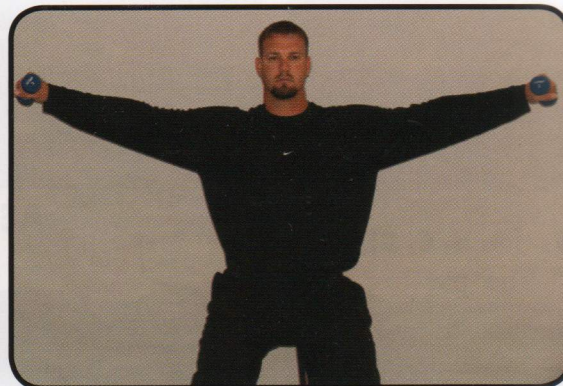
3. (A, B, C, D) Abduction:

The purpose of shoulder abduction is to strengthen the middle deltoid and supraspinatus, and to stretch the latissimus dorsi and teres major muscles. (3A) The subject assumes a standing or sitting position with the hanging arms relaxed and palms facing toward the side of the body. (3B) The subject moves the arms side ward toward shoulder level in the frontal plane. The weight should be lowered slowly. Elevation (shrugging) of the shoulder girdle should be prevented as much as possible with the aid of an assistant by placing his hand on top of the shoulder and holding the shoulder girdle down. (3C) Advanced exercise is "side ward elevation" which is accomplished by abducting the shoulder to 90 degrees, then rotate the shoulder externally by quickly rotating the arms where the palms face upward just before the arms reach

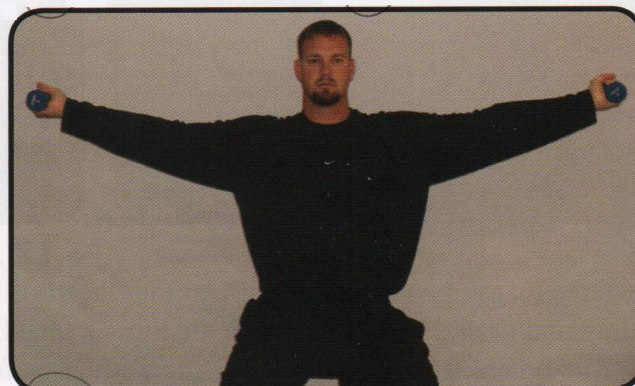
shoulder high, to a full overhead position. On the downward movement, quickly turn the palms downward just before reaching shoulder high and return to the side. Perform 3-5 sets of 10 repetitions.



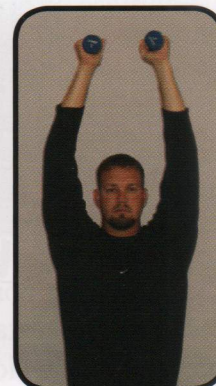
3A



3B



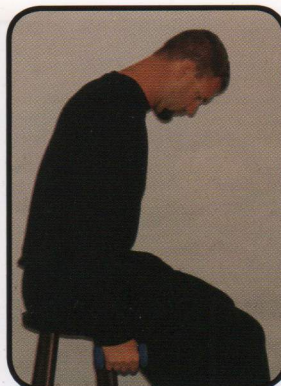
3C



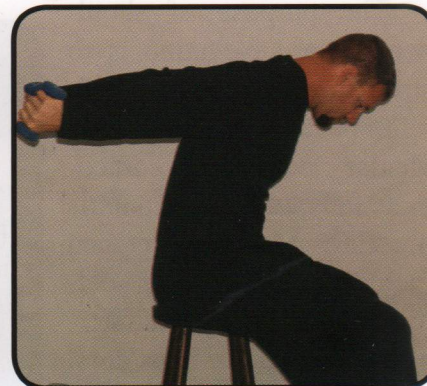
3D

4. (A, B) Hyperextension:

The purpose of shoulder hyperextension is to strengthen the upper triceps, posterior deltoid, latissimus dorsi and teres major, and to stretch the anterior deltoid, the short head of the biceps brachii and the clavicular head of the pectoralis major. The subject assumes a standing or sitting position, bending slightly at the waist, elbows straight, with the palms facing the body. Movement is performed by instructing the subject to raise both arms backward as high as possible in the sagittal plane. Maintain the arm position as close to the side as possible throughout the ex-



4A



4B

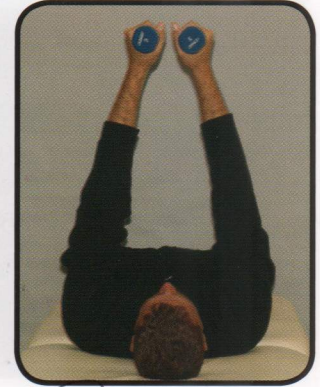
ercise. If the palm is facing upward during hyperextension, the latissimus dorsi is emphasized. Abduct the shoulder at a 45-degree angle posterior emphasizing the posterior deltoid. Perform 3 sets of 10 repetitions.

*Triceps P51
3-10*

5. (A, B) Horizontal Adduction:



5A

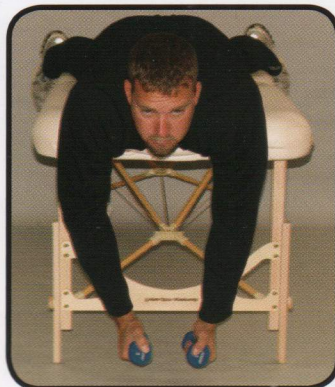


5B

The purpose of horizontal adduction is to strengthen the subscapularis and pectoralis major and to stretch the infraspinatus and teres minor muscles. Positioned in a supine position, palms facing upward, flex the shoulder until the arms are overhead. Lower slowly under control. If the arms are inclined higher upward, the sternal pectoral fibers are emphasized. Dropping the arms lower as on a decline will help isolate the lower pectoral fibers. You may need to bend the elbows 5 degrees when using a heavier weight or if having pain in the shoulder(s). Perform 3-5 sets 10 repetitions.

6. (A, B) Horizontal Abduction:

The purpose of horizontal abduction is to strengthen the lower trapezius, rhomboid major and rhomboid minor, middle deltoid; posterior deltoid, infraspinatus and teres minor and stretch the anterior deltoid,



6A



6B

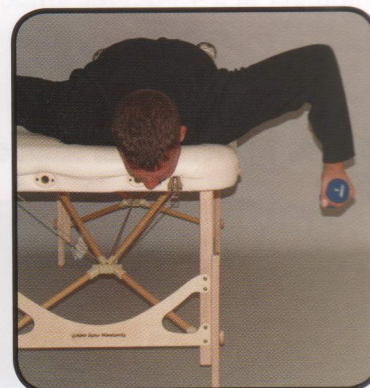
pectoralis major and coracobrachialis muscles. Maintain the head upward with the palms facing inward. Lift the arms to shoulder height. Position the arms at a 90-degree angle to the upper trunk (directly out from shoulders) throughout the entire movement. The subject may require assistance and if compensating, place one hand on the scapula providing stabilization while the arm is lifting upward. Perform 3-5 sets of 10 repetitions. Increase resistance as tolerable.

7. (A, B) Single Arm Horizontal Extension:

The purpose of single arm horizontal extension is to strengthen the middle and posterior deltoid muscles, latissimus dorsi, teres major, infraspinatus, teres minor, trapezius II, III, and IV, rhomboid major and rhomboid minor. Muscles stretched are the pectoralis major, anterior deltoid and coracobrachialis muscles. In a prone position and the elbow positioned at 95-100 degree angle, move the flexed arm upward as far as possible. Assistance may be necessary. Perform 3-5 sets of 10 repetitions. Increase resistance as capable. This is useful for post stroke, neurological conditions, post fracture or surgery where exercising one arm at a time may be the original protocol.



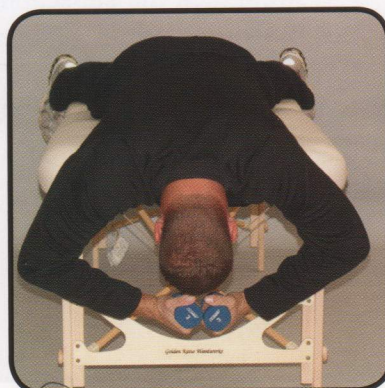
7A



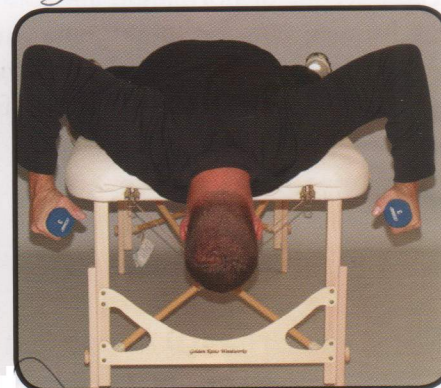
7B

8. (A, B) Shoulder Girdle Adduction:

The purpose of shoulder girdle adduction is to strengthen the rhomboid, major, rhomboid minor, trapezius, middle and posterior deltoid muscles stretching the pectoralis major, pectoralis minor and serratus anterior muscles. In a prone position, with the head downward to relax the upper trapezius muscles, maintain the elbows at a 95-100 degree angle. Angle the upper arms downward 45 degrees towards the middle of the scapulae for greater scapular isolation. Simultaneously, move both scapulae toward the spine (midline), moving the arms toward the ceiling without an additional bending of the elbows. Perform 3 sets of 10 repetitions.



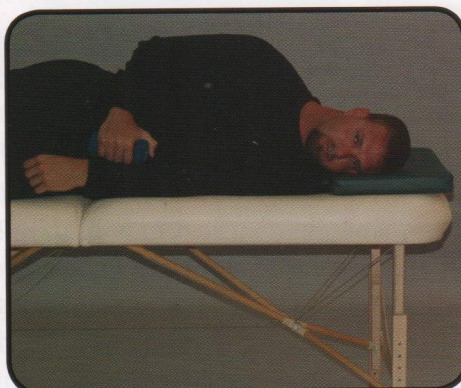
8A



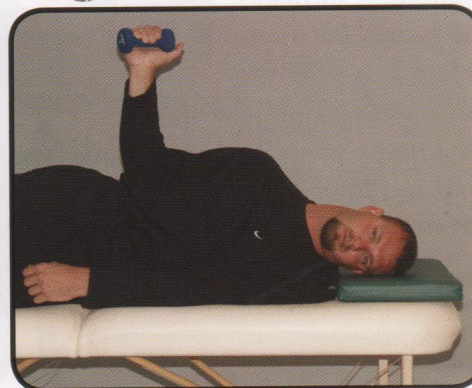
8B

9. (A, B) External (lateral) shoulder rotation:

The External Shoulder Rotation exercise maybe performed in a side lying position if using a dumbbell; a standing or seated position if employing a pulley, elastic band or surgical tubing. The elbow is bent at a 90-degree angle and maintained against the body (trunk). Contract the supraspinatus, infraspinatus and teres minor muscles (posterior rotator cuff). Lift the weight, having the hand positioned above the elbow, with the palm facing



9A



9B

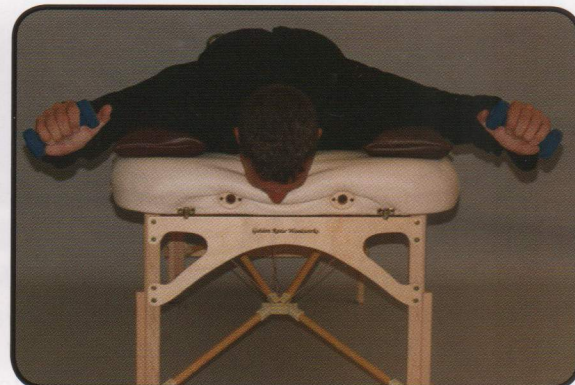
forward throughout the movement. Raise and lower weight slowly. Muscles stretched include the pectoralis major, subscapularis, teres major and latissimus dorsi. Perform 3-5 sets of 10 repetitions.

10. (A, B) External (Lateral) Rotation:

The purpose of external rotation is to strengthen the infraspinatus and teres minor and to stretch the teres major, pectoralis major, latissimus dorsi and subscapularis muscles. Position the body in a



10A



10B

prone position, having the palms face toward the feet. Maintain each elbow at a 90-degree angle to the upper trunk. Rotate the shoulder externally, maintaining a prone position (lateral) with a pad or firm towel placed under the elbow region. Move the hand as the humerus rotates toward shoulder high. Lower the weight slowly. Perform 3-5 sets of 10 repetitions. Gradually increase the resistance as capable.

11. (A, B) Internal (Medial) Shoulder Rotation:

3-10



11A

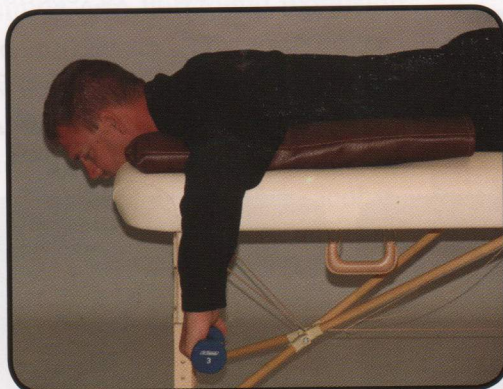


11B

Internal Shoulder Rotation may be performed from a side lying position with a dumbbell; a standing or seated position if employing a pulley, elastic band or surgical tubing. The elbow is bent at a 90-degree angle and maintained against the body. Place a dumbbell in the hand with the palm facing the body. Contract the pectoralis major, subscapularis, teres major and latissimus dorsi muscles (muscles strengthened) and lift the weight above the elbow until touching the body. The supraspinatus, infraspinatus and teres minor muscles are lengthened. Raise and lower the resistance slowly. Later, as capable, a more advanced exercise may also be performed with the elbow at a right angle to the body in a prone position. (See following exercise) Perform 3-5 sets of 10 repetitions.

12. (A, B) Internal (Medial) Rotation:

The purpose of internal rotation is to strengthen the pectoralis major, latissimus dorsi, subscapularis and teres major muscles. Muscles stretched are the infraspinatus, teres minor and supraspinatus.



12A

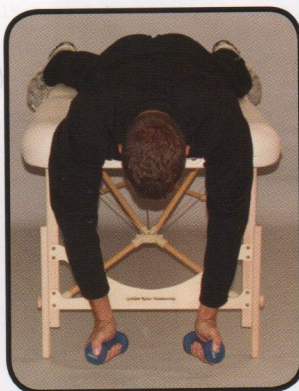


12B

Rotate the shoulder internally, keeping the front of the shoulder on the table. The palm should face toward the feet to prevent biceps interference. This movement may require slight assistance or stretch if lacking total range. This exercise is omitted initially following surgery and is generally omitted in serious pre-and post-operative conditions and shoulder dislocations until the physician gives approval and the strength, range and endurance of the other shoulder muscles are at a high level. Perform 3-5 sets 10 repetitions. Gradually increase the resistance.

13. (A, B) Shoulder Forward Elevation 45 Degree Angle:

The purpose of shoulder forward elevation- 45-degree angle is to strengthen the deltoids, serratus anterior, supraspinatus, biceps (long head) and pectoralis major (clavicular portion). Muscles stretched are the triceps, serratus posterior and latissimus dorsi. Laying face down (prone) the palm of the hand faces the midline, arms in a vertical position. The arms move at a 45-degree angle to a horizontal position. Lower the weights slowly. Perform 3-5 sets of 10 repetitions.



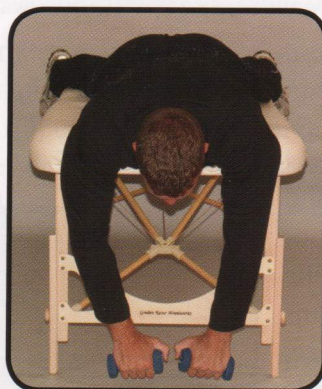
13A



13B

14. (A, B) Shoulder Horizontal Extension-Internal Rotation:

The subject is placed in a prone (face down) position using a bench, table or leaning forward to a near 90-degree angle on a chair. Palms are facing backward shoulder(s) internally rotated. Keeping the elbows completely extended, raise the arms upward as high as possible. This exercise will



14A

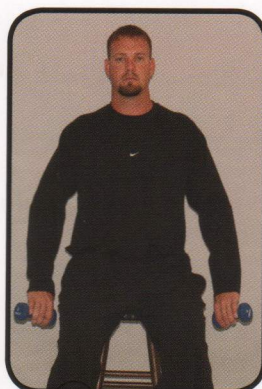


14B

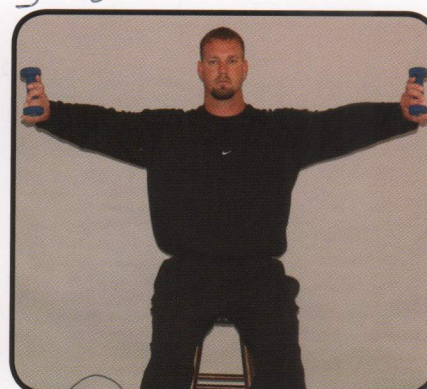
strengthen the long head of the triceps, posterior deltoid and final ranges of the infraspinatus and teres minor muscles. Raise and lower the arms slowly. Increase the resistance as tolerable. Perform 3-5 sets of 10 repetitions.

15. (A, B) Supraspinatus Exercise (Empty Can):

The supraspinatus exercise is performed from a sitting or standing position. Begin the exercise with the arms along side of the body, having the palms facing outward. The arms move half way, between directly out in front and directly out side ward at a 45-degree angle. Hold the resistance as if emptying a can of its contents. Outstanding exercise to strengthen the supraspinatus muscle and involves the rest of posterior rotator cuff (infraspinatus, teres minor). Raise and lower the weight slowly. Increase the resistance as tolerable. Perform 3-5 sets of 10 repetitions.



15A



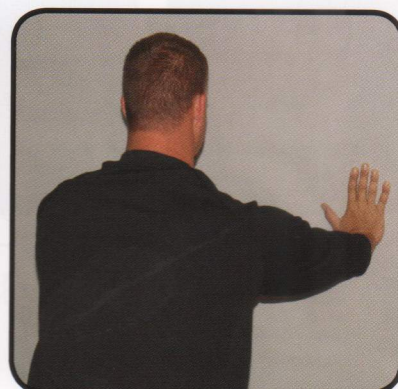
15B

16. (A, B) Winged Scapulae Stabilization Exercise:

The subject stands feet positioned 30-36 inches from a wall or solid door leaning against the surface with locked elbows. This exercise is designed to help stabilize the scapula or assist in correcting "winged scapula." The subject will perform wall pushup without bending (flexing) the elbows. The participant can progress to a normal pushup position, however, elbows do not bend as when performing a normal pushup. This exercise may later be performed in a supine position using dumb-



16A

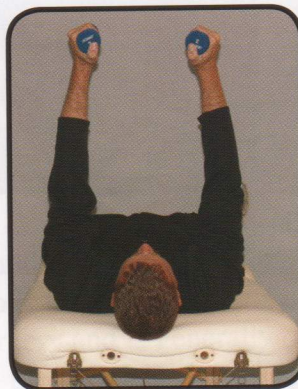


16B

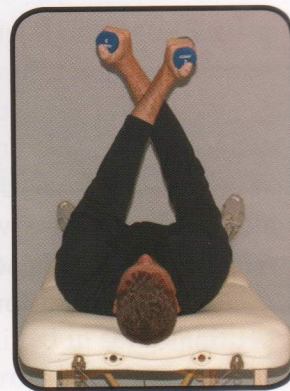
bells (see following exercise). Purpose is to strengthen the anterior serratus, pectoralis minor and subclavius muscles. Perform 3-5 sets of 10 repetitions. Gradually increase repetitions to 15 per set.

17. (A, B) Scapular Stabilization Exercise:

This exercise will strengthen the anterior scapula and sternoclavicular joint. The subject assumes a supine position (on back). The arms are fully extended above the shoulders with the palms facing inward. Exercise begins with the shoulder blades (scapulae) resting on the surface. Maintain the body (trunk) on the surface, raising while crossing the arms as high as possible with the elbows locked. The shoulder blades move away from the spine and off from the surface. Purpose is to strengthen the anterior serratus, pectoralis minor and subclavius shoulder girdle muscles. Overload the muscles by using dumbbells or wrist weights. Increase the resistance as capable. Perform 3-5 sets of 10 repetitions.



17A



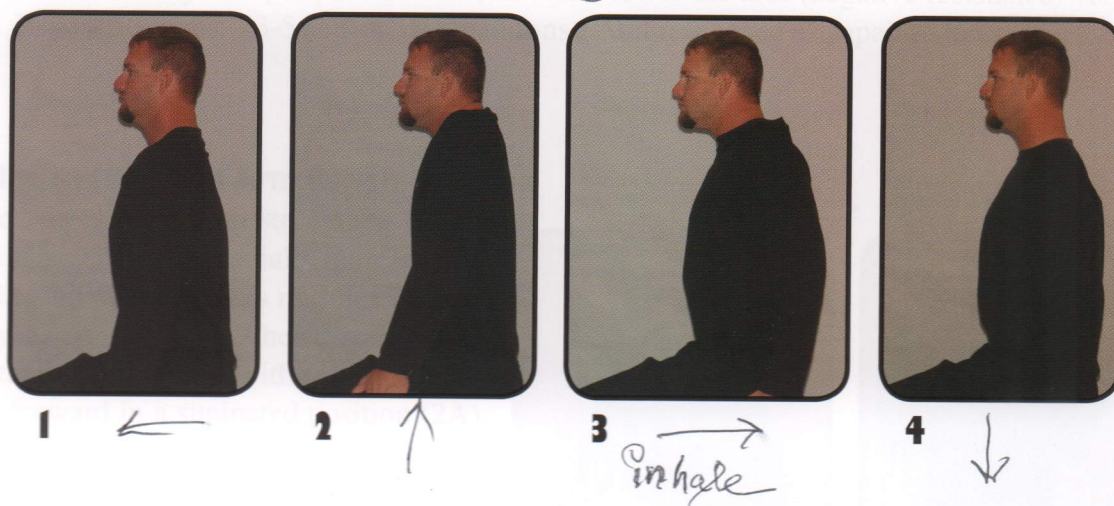
17B

Shoulder Shrug Exercise

The purpose of the shoulder shrug exercise is to strengthen the posterior cervical, thoracic spinal musculature, especially the elevator muscles (levator scapulae, trapezius I, II) and the adductor muscles (rhomboid major and rhomboid minor, trapezius III) and to stretch the abductors, primarily the pectoralis minor, pectoralis major and serratus anterior. The pectoralis major is often lacking range of motion and is also stretched as the shoulder girdle is adducted backward toward the spinal column.

Subject is standing or sitting erect holding the dumbbells or barbell, feet slightly spread for balance. The arms remain straight throughout the exercise. The exercise should be accomplished in a continuous rhythmical movement. Allow 15-30 seconds rest between sets. Recommend exercise level is 3-5 sets of 10 repetitions.

1. Shoulders move slightly forward. Exhale.
2. Elevate shoulders upward as far as possible.
3. Inhale and adduct the scapulae, pulling the shoulder blades backward toward the spinal column as far as possible.
4. Allow the shoulders to return to a resting position.



The Elbow

The elbow region receives strain during lifting, throwing, pushing and pulling. Injuries occur during repeated activities involving the elbow. The elbow that is structurally over extended or cannot totally extend is vulnerable to injury. The following elbow exercises are intended to aid in elbow rehabilitation or training to improve performance and help prevent injuries. This should be combined with shoulder, radioulnar, and wrist-hand exercises to help condition the entire arm.

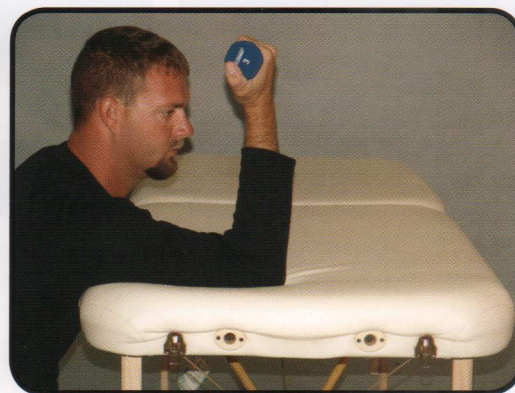
Elbow Flexion

1 (A, B) Elbow Flexion (Seated):

The purpose of elbow flexion with the humerus elevated to shoulder level is to strengthen the brachialis muscle. The potential contraction of the biceps brachii muscles is limited in this position. (1A) The arm should be level with the shoulder when executing this



1A

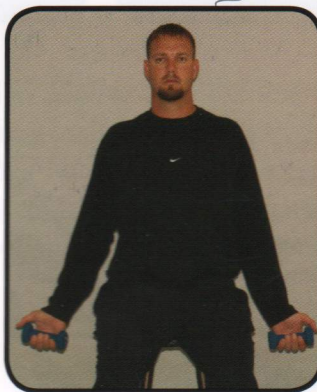


1B

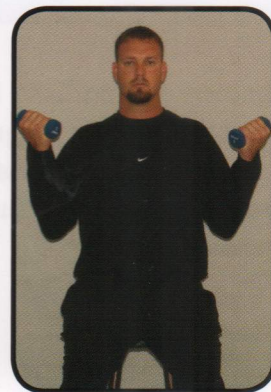
exercise. Place the hand in a supine (palm up) position. Do not bend the elbow beyond 90 degrees unless executing the exercise on an inclined surface (1B). This is a good exercise for elbow strains such as excessive throwing, "tennis elbow", congenital hyper extended elbows, injury produced hyper extended elbows and common muscle strains and joint sprains. For the best result lower the arm (negative resistance) very slow (8-10 count). Repeat 10 times. (3-5 sets of 10 repetitions.) Add resistance as capable.

2 (A, B) Elbow Flexion (Standing Arm Curls):

The purpose of elbow flexion is to strengthen the biceps brachii, brachialis and brachioradialis muscles, and stretch the triceps brachii and anconeus muscles. Elbow flexion (curls) may be executed in either a standing or sitting position. Stabilize the elbow with the hand positioned palm facing forward in a supinated position (2A). Flex the arm through a full range. Bend and extend the arm with a controlled speed. You may exercise both arms simultaneously. This exercise is used for conditions such as elbow hyperextension, "tennis elbow," "little league elbow" and common joint sprains and muscle strains.



2A



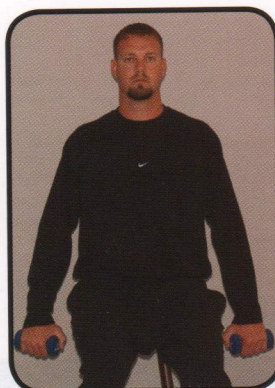
2B

3-10
Then Turn Palms Down
See Next Page

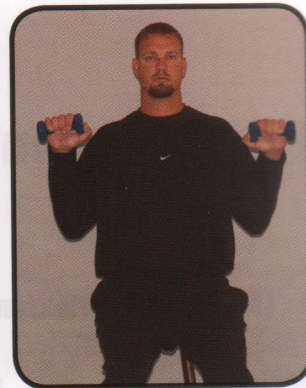
Repeat 10 times. Care should be exercised so that excessive body movement does not accompany the curl. Elbow flexion is often contraindicated in cases where there is limited elbow extension. Perform 3-5 sets 10 repetitions.

3 (A, B) Elbow Flexion (Hand Prone):

The purpose of elbow flexion with the palm facing downward is to primarily isolate the brachioradialis, with secondary exercise of the remaining elbow flexors: brachialis and biceps brachii. Stabilize the elbow at the side of the body with the palm of the hand pointing downward. Palm pointing downward; flex the elbow as far as possible, lower slowly to the starting position. Repeat 10 times. Perform 3-5 sets of 10 repetitions. Add resistance as capable.



3A



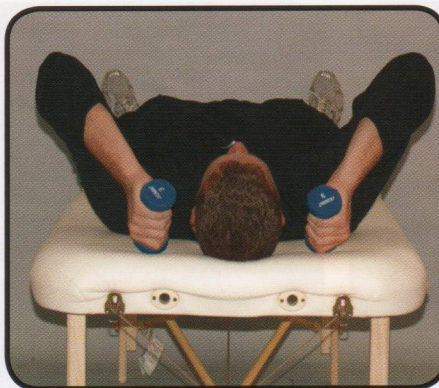
3B

Elbow Extension

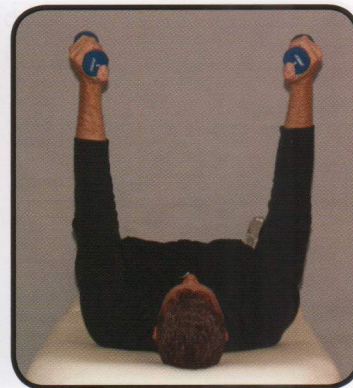
Elbow extension exercises are designed for general conditioning, post fracture, tendonitis, tennis elbow and sports conditioning for improved performance. Execute exercises non-ballistically throughout a full range of motion. Flexion of the elbow is often contraindicated until near normal extension is achieved. As capable, pushups are excellent conditioning exercises for the triceps. Suggested exercise bout is 3-5 sets of 10 repetitions, increasing or decreasing the amount according to the individual condition.

1 (A, B) Elbow Extension-Supine:

To strengthen the triceps brachii and anconeus muscles. Middle head of triceps receives the greatest resistance in a supine position. Stabilize upper arm and point elbow directly over the shoulder initiating the exercise in a maximally flexed position. (A) Palm of the hand is facing toward the body. Extend the elbow as completely as possible. (1B) Lower slowly under control. Both elbows may be exercised simultaneously. Perform 3-5 sets of 10. Add resistance as capable.



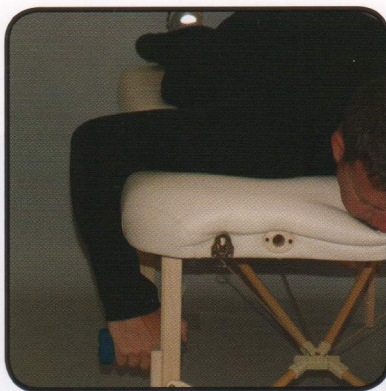
1A



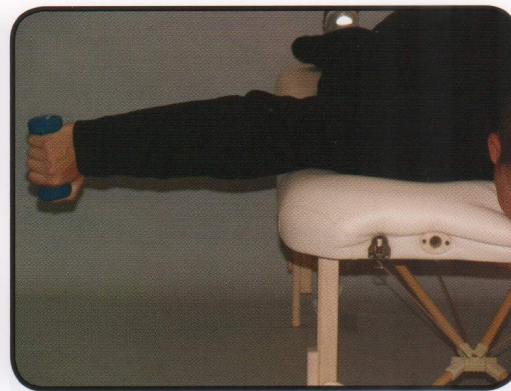
1B

2 (A, B) Elbow Extension-Prone:

The purpose of elbow extension prone is to strengthen the triceps brachii and anconeus muscles and stretch the biceps brachii and brachialis muscles. The lower head of the triceps receives the greatest resistance in a prone position. Place a pad under the elbow(s) assuring that the elbow is level with the shoulder(s) (2A). The palm of the hand is facing toward the feet. Extend



2A

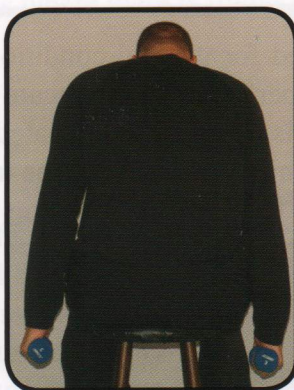


2B

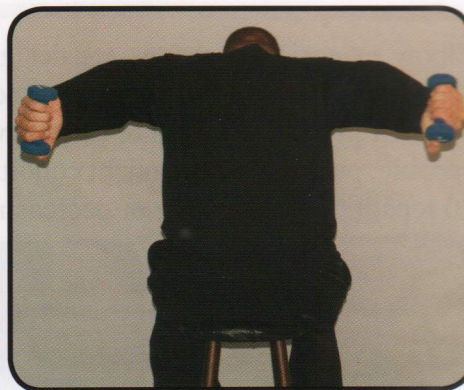
the elbow under control (2B) and lower the weight slowly. Maintain full-extended position two seconds before lowering to the starting position (2A). A therapist may assist if range is missing by placing one hand just above the elbow to stabilize the joint and place the other hand around the wrist to add assistive stretch at terminal end of movement, providing the patient is still contracting the triceps muscle. If normal range of motion exists, you may exercise both elbows simultaneously. Perform 3-5 sets of 10. Add resistance as capable.

3 (A, B) Shoulder Hyperextension:

The purpose of shoulder hyperextension is to strengthen the upper triceps and posterior shoulder muscles. The subject assumes a standing or sitting position. The subject bends slightly at the waist, elbows straight and the head forward 10-15 degrees. Maintain the arms close to the side throughout the movement. (3A) Movement is performed by raising both arms backward as high as possible. (3B) Lower the weight slowly to the starting position. Perform 3-5 sets of 10. Add resistance as capable.



3A



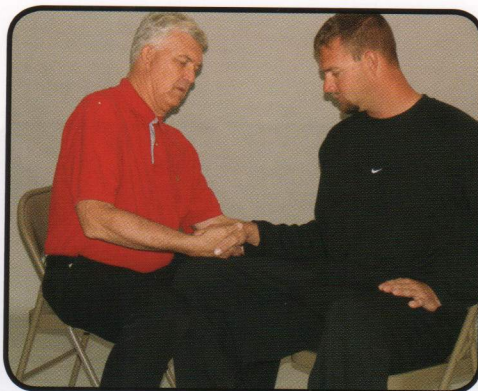
3B

Radio-Ulnar Routine (Manual)

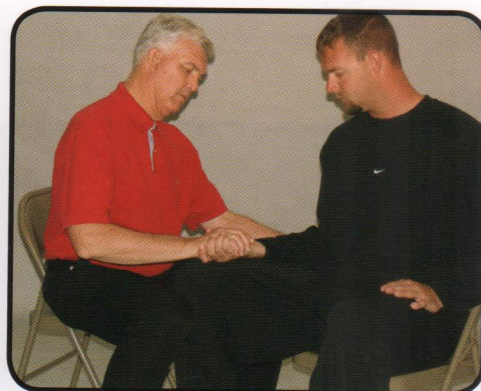
The Radioulnar Joint rotates the forearm and allows the elbow and wrist-hand to work properly. The manual Radio-Ulnar Routine is prescribed for fracture, overuse injuries, surgery, or conditions resulting from neurological deficit which affect the shoulder, elbow, radio-ulnar joint, wrist or hand. Recommend 3-5 sets of 10 repetitions, which may be decreased if the condition requires. Progress to active (weights) as seen in the following section.

1 (A, B) Supination:

The patient MUST place the elbow against the side of the body to prevent substitution by rotating the shoulder outward. The movement is executed from a palm down position. Resistance is applied throughout the range of motion to a complete palm upward position, applying a light stretch if required. Supination is an



1A

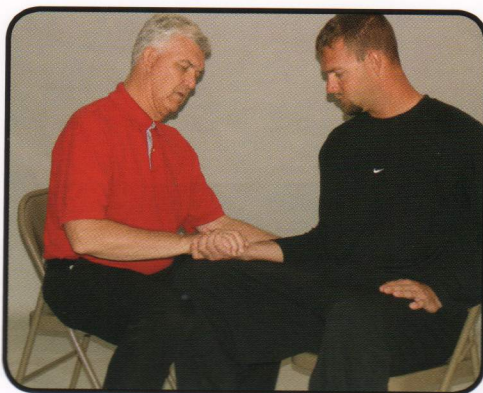


1B

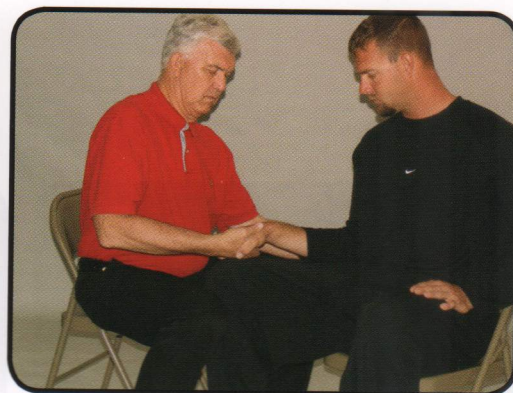
exercise to strengthen the supinator and biceps brachii muscles and stretch the pronator teres and pronator quadratus muscles. Negative resistance may be included for extremely weak post operative or any type of neurological affliction including stroke and various nerve/muscle diseases by having the subject resist the assistant's gentle force back to the starting position of pronation. Perform 3-5 sets of 5-8 repetitions.

2 (A, B) Pronation:

The subject MUST place the elbow against the side of the body to prevent substitution by rotating the shoulder inward. The movement is executed from a palm up position, rotating the forearm against resistance until the palm is facing downward. The assistant offers resistance



2A



2B

based on the tolerance and ability of the patient and slight stretch at the end of movement as required. The purpose of the manual pronation exercise is to strengthen the pronator teres and pronator quadratus muscles and to stretch the supinator and biceps brachii muscles. Following a stroke or any type of extreme weakness including muscle diseases such as Parkinson's, Lou Gehrig's Disease and Multiple Sclerosis, negative resistance may be included by having the subject resist the assistant's gentle resistive force back to the starting position of supination. Perform 3-5 sets of 5-8 repetitions.

Radio-Ulnar Routine (Active)

The Active Radio-Ulnar Routine is designed to increase the strength, flexibility, joint range of motion and muscular endurance of the radio-ulnar joint, provide training for sports performance, attempt to prevent injuries, or rehabilitate injuries such as tennis elbow, baseball elbow, post fracture or post surgery of the elbow, wrist or hand. It will also improve the torque ability or rotational capacity of the forearm in throwing or striking a ball. A strong radioulnar joint greatly reduces the stress factors affecting the shoulder, elbow and wrist joints. Duration of the routine consists of 3-5 sets of 10 repetitions for each exercise. In special cases, the duration may be reduced or increased. Add resistance as stronger. Tubing or a cable system may be used as resistance when the subject is much stronger.

1 (A, B) Pronation:

The purpose of the pronation exercise is to strengthen the pronator quadratus and pronator teres muscles, and to stretch the supinator and biceps brachii muscles.

(1A) The subject assumes a side lying position. To prevent internal rotation of the shoulder during pronation, the elbow is flexed to a 90-degree angle and held against the body.



1A



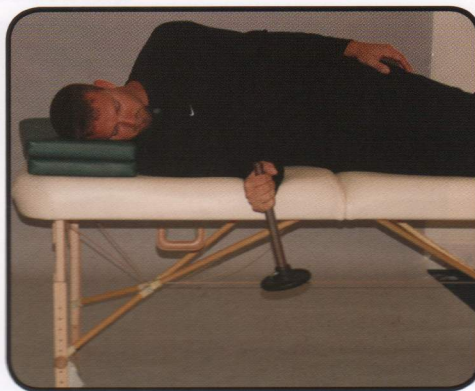
1B

The hand clasps the bar firmly with the thumb pointing downward. (1B) Movement is performed by controlled rotation of the hand (forearm) from a thumb down to a thumb up position (concentric movement.) Try not to allow the wrist to bend. Movement back to the starting position is executed slowly (eccentric movement). Complete 10 repetitions for one set. Perform 3-5 sets of 10 repetitions. Add additional weight as capable.

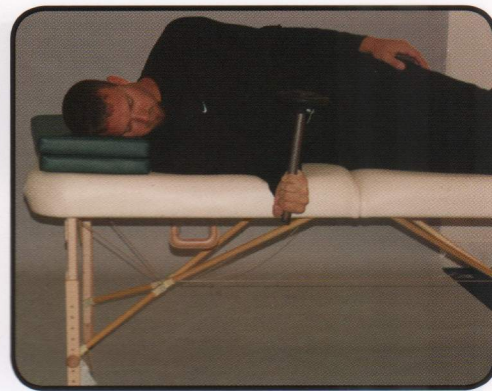
2 (A, B) Supination:

The purpose of the supination exercise is to strengthen the supinator and biceps brachii muscles, and to stretch the pronator quadratus and pronator teres muscles.

(2A) The subject assumes a side lying position. To prevent external rotation of the shoulder during supination, the elbow is flexed to a 90-degree angle and held against the body.



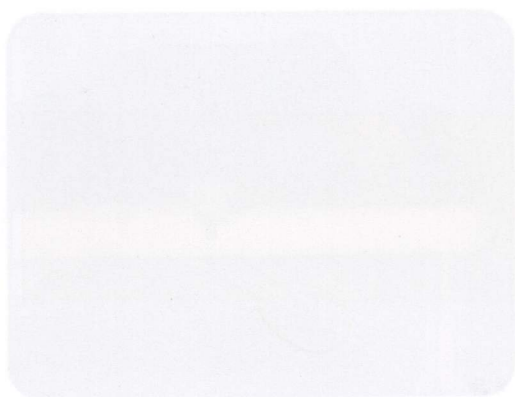
2A



2B

The hand clasps the bar firmly with the thumb pointing upward. (2B) Move-

ment is performed by controlled rotation of the hand (forearm) from a thumb up to a thumb down position (concentric movement). Movement back to the starting position is executed slowly (eccentric contraction). Complete 10 repetitions for one set. Perform 3-5 sets of 10 repetitions. Add additional weight as capable.

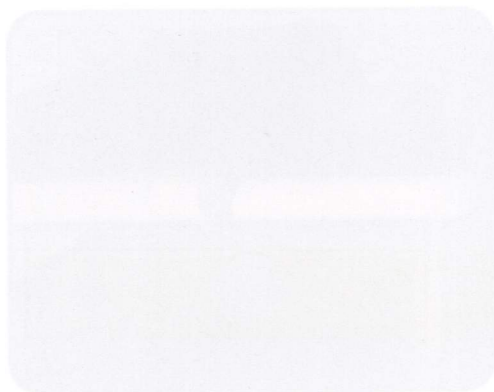


1B

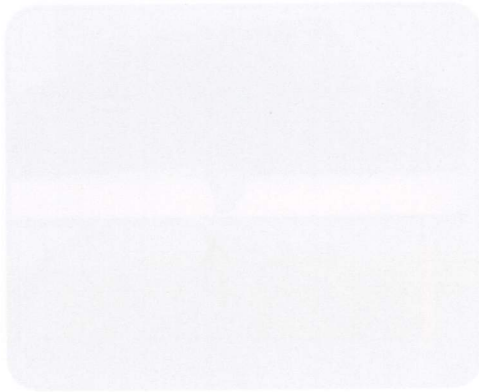


1A

1 (A, B) Pronation: The purpose of the pronation exercise is to strengthen the pronator quadratus and pronator teres muscles, and to stretch the supinator and biceps brachii muscles. (1A) The subject assumes a side lying position. To prevent internal rotation of the shoulder during pronation, the elbow is fixed to a 90-degree angle and held against the body. The hand clasp the bar firmly with the thumb pointing downward. (1B) Movement is performed by controlled rotation of the hand (forearm) from a thumb down to a thumb up position (concentric movement). Movement back to the starting position is executed slowly (eccentric movement). Complete 10 repetitions for one set. Perform 3-5 sets of 10 repetitions. Add additional weight as capable.



2B



2A

2 (A, B) Supination: The purpose of the supination exercise is to strengthen the supinator and biceps brachii muscles, and to stretch the pronator quadratus and pronator teres muscles. (2A) The subject assumes a side lying position. To prevent external rotation of the shoulder during supination, the elbow is fixed to a 90-degree angle and held against the body. The hand clasp the bar firmly with the thumb pointing upward. (2B) Movement is performed by controlled rotation of the hand (forearm) from a thumb up to a thumb down position (concentric movement). Movement back to the starting position is executed slowly (eccentric contraction). Complete 10 repetitions for one set. Perform 3-5 sets of 10 repetitions. Add additional weight as capable.

Wrist Routine (Manual)

The wrist routine is designed for those patients with common disabilities of the wrist such as post fracture, sprain, tendonitis and neurological limitations. Duration of the routine consists of 3-5 sets of 10 repetitions for each exercise. In cases where the patient has restricted mobility or upon physician recommendation, assistive manual stretch may be manually applied by the therapist to stretch the antagonistic muscle group and connective tissue. The therapist may apply manual resistance for all the movements of the wrist. Negative manual resistance, in all movements, is especially good for the neurologically affected subject. (Subject attempts to prevent assistant from moving the hand back to the starting position). Progress to active (weights) resistance as seen in the following section.

1 (A, B) Hyperextension:

The purpose of wrist hyperextension is to strengthen the extensor carpi radialis longus, extensor carpi radialis brevis and the extensor carpi ulnaris, and to stretch the flexor carpi radialis, palmaris longus and the flexor carpi ulnaris. (1A) The subject is sitting with the



1A



1B

affected arm positioned so that the wrist can be relaxed in a prone position over the end of a stable surface. The assistant stabilizes the forearm with one hand and clasps the subject's hand with the other. (1B) Instruct the subject to extend the wrist upward toward the ceiling. The assistant applies resistance to the back of the hand and, if movement is less than 175-180 degrees, apply gentle assistive stretch at the terminal joint movement as the subject continues to attempt the extension movement. For extreme weakness including stroke or muscle diseases, manual eccentric (negative) resistance may be applied by having the assistant gently move the hand-wrist downward as the subject offers resistance. Progress to the normal manual wrist routine and beyond to the active weight program. Perform 3-5 sets of 10 repetitions.

2 (A, B) Radial Flexion (Abduction):

The purpose of radial flexion is to strengthen the extensor carpi radialis longus and the flexor carpi radialis and to stretch the extensor carpi ulnaris and flexor carpi ulnaris. (2A) The subject's arm is resting on a stable surface with the wrist relaxed over the end, thumb pointing upward (shake hands position). In cases where the shoulder, elbow or radioulnar joint prevents this po-



2A

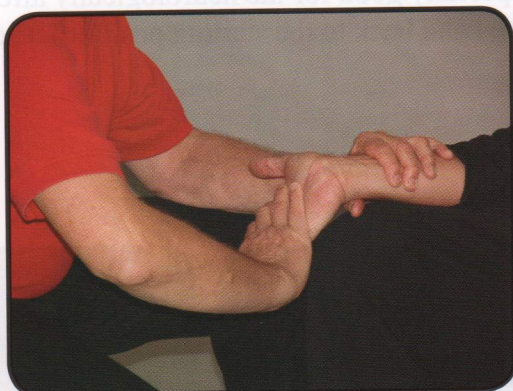


2B

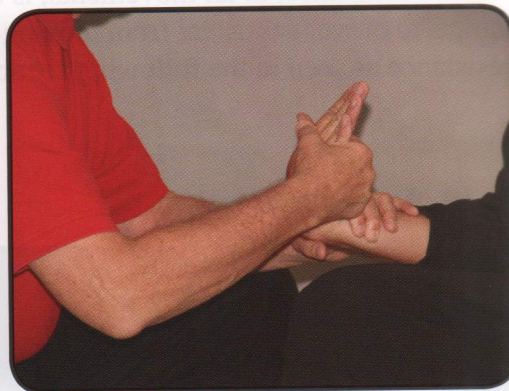
sition, the hand may be placed in an agravity (prone) position. (2B) The assistant will stabilize the forearm clasp the subject's hand in a handshake position. The assistant offers resistance and/or assistance as the patient flexes the wrist radially (thumb toward same side of forearm). Assistant offers light assistive stretch if range of motion has been lost. For extreme weakness including stroke or muscle diseases, manual eccentric (negative) resistance may be applied by having the assistant move the wrist downward (toward ulna) as the subject offers resistance. Progress to active weight resistance. Perform 3-5 sets of 10 repetitions.

3 (A, B) Flexion:

The purpose of wrist flexion is to strengthen the flexor carpi radialis, palmaris longus and flexor carpi ulnaris and to stretch the extensor carpi radialis longus, extensor carpi radialis brevis and the extensor carpi ulnaris. (3A)



3A



3B

The subject assumes a sitting position with the wrist relaxed over the edge of a stable surface with the palm facing upward. The assistant stabilizes the forearm with one hand and grasps the subject's hand with the other. (3B) Movement is performed by the subject, flexing the wrist (palm up) toward wrist. The assistant offers manual resistance and/or assistance throughout the full range with light assistive stretch at terminal end of movement. For extreme weakness, stroke or muscle diseases, manual eccentric (negative) resistance may be applied by having the assistant move the wrist-hand downward as the subject resists the movement. Progress to active (weights) resistance. Perform 3-5 sets of 10 repetitions.

4 (A, B) Ulnar Flexion (Adduction):

The purpose of ulnar flexion is to strengthen the extensor carpi ulnaris and flexor carpi ulnaris and to stretch the extensor carpi radialis longus and flexor carpi radialis. (4A) The subject rotates the shoulder inward, positioning the wrist over the end of the table, thumb pointing downward.



4A



4B

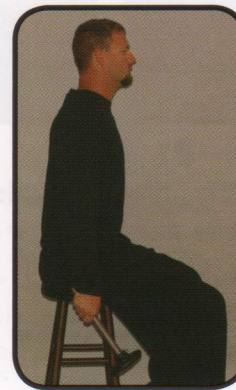
The exercise may be executed with the palm pointing down if the patient has shoulder or elbow problem. The assistant grasps the subject's hand with one hand and stabilizes the forearm with the other. (4B) The subject ulnar flexes the wrist (little finger toward same side of forearm). The assistant gives manual resistance and/or assistance through full range with light assistive stretch at the terminal point of movement. Manual eccentric (negative) resistance may be applied by having the assistant move the wrist-hand toward the radius (thumb side) as the subject resists the movement. Negative manual resistance is especially good for extreme weakness and the neurologically affected. The subject will progress to active (weights) resistance. Perform 3-5 sets of 10 repetitions.

Wrist Routine (Resistive)

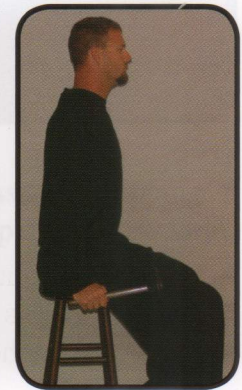
The Resistive Wrist Routine is designed for persons who have normal range of motion and need to develop muscular strength and endurance in the fundamental movements of the wrist joint. Duration consists of 3-5 sets of 10 repetitions for radial flexion, ulnar flexion, wrist flexion and wrist hyperextension and 3-5 round trips with the wrist roller for wrist hyperextension and flexion. Weights are progressively added to the bar and wrist roller in small increments. All movements are performed through full range of motion, slowly, against gravity and negatively back downward under muscle control

1 (A, B) Radial Flexion (Abduction):

The purpose of radial flexion is to strengthen the flexor carpi radialis, extensor carpi radialis longus and extensor carpi radialis brevis, and to stretch the flexor carpi ulnaris and extensor carpi ulnaris. (1A) The subject is standing or sitting with the arm hanging straight at the side. The starting position begins with the wrist ulnar flexed with a resistance bar held firmly in the hand. (1B) Movement is performed by radially flexing the wrist and raising the bar as high as possible while maintaining an extended elbow and firm grip. Additional positions of resistance are also offered by moving the wrist and bar 45-degrees outward; followed by 45-degrees inward. Lower the bar through full range slowly and repeat the movement. Perform 3-5 sets of 10 repetitions.



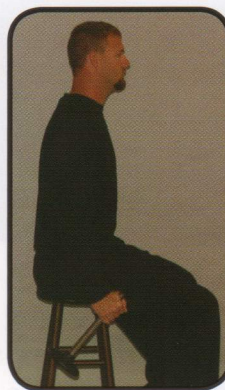
1A



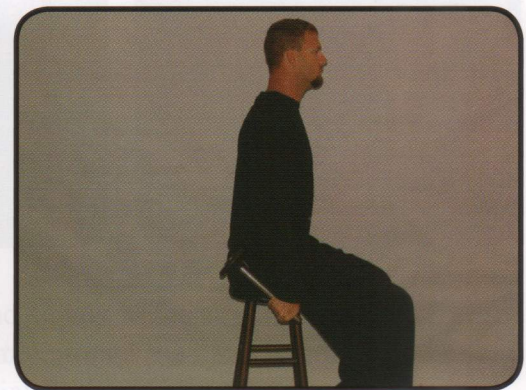
1B

2 (A, B) Ulnar Flexion (Adduction):

The purpose of the ulnar flexion exercise is to strengthen the flexor carpi ulnaris and extensor carpi ulnaris and to stretch the flexor carpi radialis, extensor carpi radialis longus and extensor carpi radialis brevis. (2A, 2B) The starting position of movement is performed by radial flexing of the wrist and then raising the bar as high as possible without releasing the grip or allowing the elbow to bend. Lower the weight slowly to the starting position. Additional positions of resistance are also offered by moving the wrist and bar 45-degrees outward; followed by 45-degrees inward. The radius bone is maintained in an upward posture throughout all three of the exercise positions. Perform 3-5 sets of 10 repetitions.



2A



2B

Wrist Flexion and Hyperextension

3 (A, B) Wrist Flexion:

The exercise is to isolate the wrist flexors and specifically strengthen the flexor carpi radialis, palmaris longus and flexor carpi ulnaris while stretching the extensor carpi radialis longus, extensor carpi radialis brevis and extensor carpi ulnaris. Grip the weight loosely stabilizing the forearm on your thigh or other supporting surface. Begin the exercise from a full-extended position and then flex the wrist moving upward through full range. Lower the weight slowly. This exercise may be performed with a small ankle weight wrapped firmly around the hand, eliminating the necessity of gripping the weight. This allows greater range potential for a weak or painful wrist. Repeat 10 repetitions. Perform 3-5 sets of 10 repetitions.



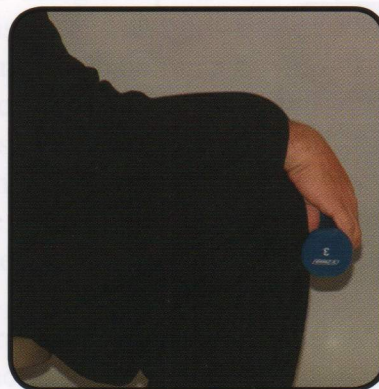
1A



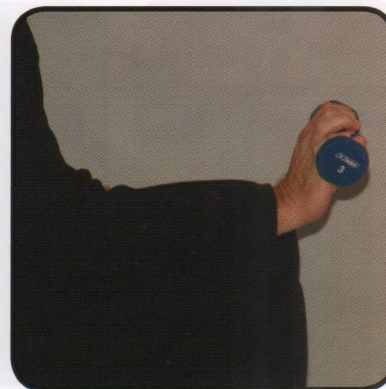
1B

4 (A, B) Wrist Hyperextension:

Isolation of the wrist extensor muscles is accomplished by extending the wrist beyond the end of the knee with the forearm stabilized on the thigh or beyond a table, desk or other suitable stabilizing surface. The muscles strengthened are the extensor carpi radialis longus, extensor carpi radialis brevis and extensor carpi ulnaris. The muscles stretched are the flexor carpi radialis, flexor carpi ulnaris and palmaris longus. Begin the exercise from a full flexed position and then extend the wrist upward as far as possible with a most relaxed grip. Lower the hand slowly to the starting position. This exercise may be performed with a small ankle weight wrapped firmly around the hand eliminating the necessity of gripping the weight. This allows greater range potential for a weak or painful wrist. Repeat 10 repetitions. Perform 3-5 sets of 10 repetitions.



2A

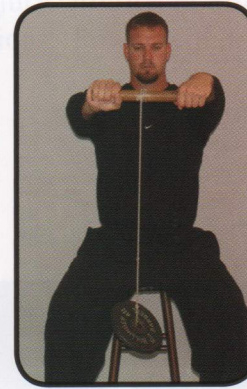


2B

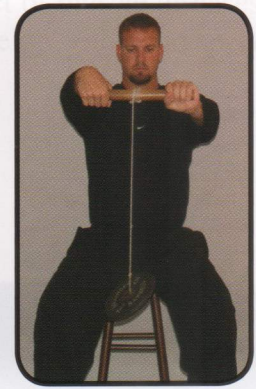
Wrist Roller: Wrist-Forearm Flexion, Hyperextension

5 (A, B) Hyperextension:

The purpose of the Wrist Hyperextension Exercise using a rope is to strengthen the extensor carpi radialis longus, extensor carpi radialis brevis and extensor carpi ulnaris, and to stretch the flexor carpi radialis, palmaris longus and flexor carpi ulnaris muscles. (5A) The subject is standing or sitting with the shoulders flexed to 90-degrees. (For shoulder problems, patient may need to rest the elbows on a table or supportive surface). The right wrist is hyper extended while the left wrist is flexed. The rope is positioned on the outside surface of the bar. (5B) Movement is performed by extending the right wrist to full range and flexing the left wrist in preparation for the resistance. The movement of the wrist is alternated until the rope is completely wound up. Lower the weight by alternate full range movements until back in starting position (5A) and then repeat in both directions. The hands may be further isolated by performing the hyperextension exercise involving only the fingertips without using the palms of the hands. Perform 3-5 rounds trips upward and back downward.



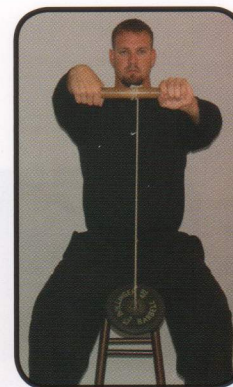
5A



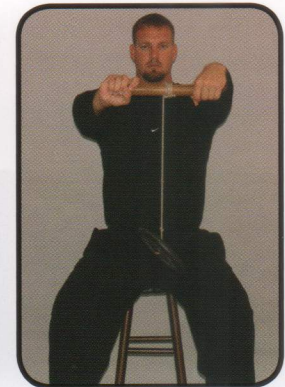
5B

6 (A, B) Flexion:

The purpose of the wrist flexion exercise using a rope is to strengthen the flexor carpi radialis, palmaris longus and flexor carpi ulnaris and to stretch the extensor carpi radialis longus, extensor carpi radialis brevis and extensor carpi ulnaris. (6A.) The subject stands or sits with the shoulders flexed 90 degrees. For shoulder or elbow problem the patient may need to rest the elbows on a table or supportive surface. The right wrist is flexed while the left wrist is moving into hyperextension. The rope is positioned on the inside surface of the stick. (6B) Movement is performed by flexing the right wrist to full range and extending the left wrist in preparation for the resistance. The movement of the wrist is alternated until the rope is completely wound up. Lower the weight slowly with alternate full range movements until back in the starting position (6A) and then repeat in both directions. The hands may be further isolated by performing flexion involving only the fingertips without using the palms of the hands. Perform 3-5 round trips upward and back downward.



6A



6B

Thumb Exercises

The Thumb's usefulness is mainly due to its position of opposition to the fingers and its fine ability to grasp and hold objects between them. Man excels over all other animals with combined manipulation of the fingers and thumb. The following exercises will help train greater specificity for increased skill, coordination or rehabilitation from lost movements. Intended for post injury, arthritis or effect of muscle diseases. Stamina will gradually increase with time and numbers of repetitions. Power will develop with rapid speed of movement.

1. Thumb Abduction:

To strengthen the abductor pollicis longus and abductor pollicis brevis. Place your hand in the shake hand position. Place a rubber band around the outside of the thumb and anchor the opposite end of the band. Having the thumb nail pointed vertical, move the thumb directly horizontal away from the index finger as far as possible and return slowly. Gradually work to rapid speed for greater strength, stamina and power. Perform 3-5 sets of 10, gradually working up to 3-5 sets of 20 repetitions.



1A



1B

2. Thumb Extension - Proximal:

For greatest isolation of the extensor pollicis brevis, extensor pollicis longus and abductor pollicis longus. Place a rubber band above the metacarpal-phalangeal joint and anchor opposite end of band. This saddle joint has received a lot of stress in many professions and is subject to trauma and arthritic change. From the shake hand position, rest the thumb on the index finger. Place free hand with thumb below metacarpal-phalangeal joint and fingers around opposite side tissues. Extend the thumb upward without moving the wrist into radial flexion. Involve the distal phalangeal joint of the thumb minimally. Lower the thumb slowly and repeat the movement. Perform 3-5 sets of 10 repetitions gradually increase to 3-5 sets of 20 repetitions. As capable, increase speed of movement to help develop power, stamina and greater skill.



2A



2B

3. Thumb Extension – Distal:

For special isolation of the extensor pollicis longus, including the extensor pollicis brevis and abductor pollicis longus muscles. Place rubber band above distal phalangeal joint and anchor opposite end of band. Place opposite hand thumb just below the distal phalangeal joint. Four fingers will stabilize the rest of the thumb for as little movement below the distal joint as possible. Extend distal joint upward and return to full flexed position. Perform 3-5 sets 10 repetitions. Increase to 3-5 sets of 20 repetitions. Increase to rapid movement as strength improves.



3A



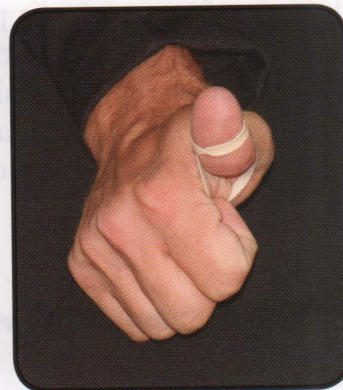
3B

4. Thumb Circumduction:

A complete circular movement involving abduction, extension and adduction that will strengthen the tissues from the base of the radius to the base of the thumb over to the base of the index finger. This is a counter clockwise movement with a rubber band fastened around the base of the distal interphalangeal joint of the thumb and anchored on the other end. This is followed by a clockwise movement of the thumb. Excellent for thumb rehabilitation and post wrist fracture. Preventive exercise for therapists and athletes. Perform 3-5 sets, 10 repetitions. Increase to 3-5 sets of 20 repetitions. Increase speed as capable.



4A



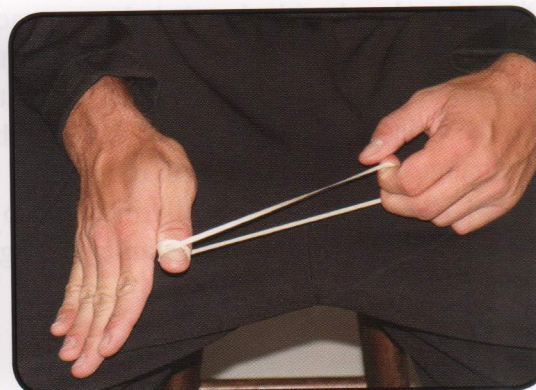
4B

5. Thumb Adduction:

Inflexibility of the thumb's web and weakness of the adductor pollicis are instrumental in many thumb problems. The hand is placed in a shake hand position with the thumbnail pointed vertically. The adductor pollicis may also be strengthened with a rubber band. Place the rubber band around the thumb and anchor the opposite end of the band. In the "shake hand" position, (5A) begin with the thumb abducted (spread) and move the thumb toward the index finger. (5B) Move the thumb back to abduction very slowly.



5A

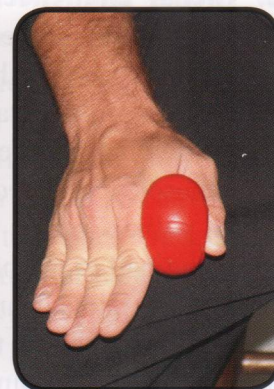


5B

(5C) Place the ball between the thumb and index finger. (5D) Move the thumb toward the index finger and release slowly. Perform 3 sets of 10 repetitions, gradually increasing to 20 repetitions. Add rapid speed when capable.



5C



5D

6. Thumb Hyperadduction:

The thumb is capable of 15 degrees hyperadduction. The adductor pollicis and the extensor pollicis brevis are the muscles strengthened. Use a soft ball and roll the thumb through the center of the ball across the index finger. Many small muscles near the wrist are also exercised. A rubber band may also be used with the same movement. Perform 3 sets 10 repetitions. Gradually increase to 3-5 sets of 20 repetitions. Add rapid movements as capable.



6A

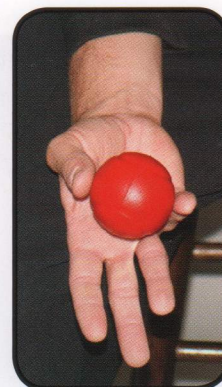


6B

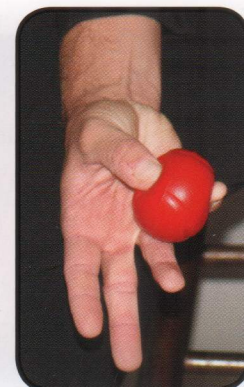
7. Thumb Opposition:

These exercises are specific for the thenar eminence region that moves the thumb across toward the little finger. The muscles include opponens pollicis, flexor pollicis brevis and abductor pollicis brevis. The hypothenar eminence includes the little finger, specifically the flexor digiti minimi and many of the 11 small intrinsic muscles of the hand.

Place a ball in the hand and flex the thumb toward the little finger and little finger toward the thumb. Release the flexion slowly. The exercise may be escalated by using one rubber band around the little finger and anchoring the band. The second rubber band is positioned around the thumb and anchored. Both thumb and index finger move toward the center of hand simultaneously. Perform 3-5 sets, 10 repetitions. Gradually work up to 3-5 sets of 20 repetitions. Speed movements when capable.



7A



7B

8. Thenar Eminence:

The proximal palmer thumb muscles are often affected by neurological problems affecting the nerves serving the region, fractures, neck and elbow problems affecting the nerve innervation of the hand. The muscles affected are the opponens pollicis, flexor pollicis brevis and abductor pollicis brevis. Place the ball at the base of the thumb, maintaining both thumb joints in an extended position. Move the fully extended thumb toward the little finger without flexing the thumb joints. The thumb is then moved toward the middle finger, thumb extended. This is followed by moving the thumb towards the index

finger with the thumb extended. On each strength movement, the thumb does not touch the ball. Eventually perform with speed. These movements will quickly develop the thenar eminence. A rubber band may be substituted for the ball. Perform 3-5 sets, 10 repetitions, advancing to 3-5 sets of 20 repetitions.



8A



8B

Finger - Thumb Exercises

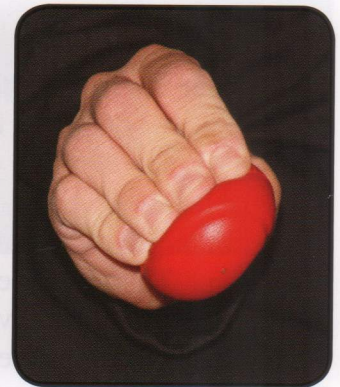
Finger muscles perform the movements of flexion, extension, abduction and adduction. The fingers work with the thumb for a precision grip such as writing, eating and other fine movements that require exact finger muscle control. For squeezing, gripping, carrying, sports activities and work activities, employing the power grip enables the task to be accomplished without dropping the item(s). Human skill is an elaboration of the central nervous system and not of a specialization of the hand and is developed to greater strength and precision through specificity of movement. These exercises are useful in rehabilitation of hand problems including stroke, Parkinson's, post fracture, post surgery, arthritis and carpal tunnel syndrome. To develop power and stamina, gradually perform these exercises with increased speed.

9. Finger - Thumb Distal Flexors:

Place a ball in the tips of the fingers and thumb. Squeeze all simultaneously. Greater emphasis is placed on the flexor digitorum profundus, flexor digitorum superficialis, lumbricals and flexor pollicis longus. The flexor pollicis brevis, flexor adductor pollicis and opponens pollicis are also exercised. Perform 3-5 sets of 10 repetitions.



9A



9B

10. Finger-Thumb Flexors - Single:

Isolating a single finger and thumb. Perform with all four fingers one at a time 3-5 sets. Exercising the flexor digitorum profundus and flexor digitorum superficialis, lumbricals, flexor pollicis longus, flexor pollicis brevis, adductor pollicis and opponens pollicis muscles. Perform 3-5 sets of 10 repetitions.



10A



10B

11. Finger Flexors:

An excellent exercise to strengthen the flexor digitorum superficialis, flexor digitorum profundus, lumbricals, flexor carpi radialis, palmaris longus and intrinsic muscles of the hand. Excluding the thumb will isolate the flexors more completely than when the thumb is involved. Perform 3-5 sets of 10 repetitions. Faster movements as capable.



11A



11B

12. Finger Flexor- Single:

For greater finger flexor isolation bend a single finger using a ball or band. The remaining fingers should remain at full extension. This exercise will develop a greater individual strength and control potential. Perform 3-5 sets of 10 repetitions. Faster movements as capable.



12A



12B

13. Finger Flexor – Individual Digit:

Using a rubber band as resistance wrap the end digit to isolate the flexor digitorum profundus which is the only muscle that can flex the distal phalanges of the fingers. (13A) Attach the opposite end of the band. Use the free hand to prevent the rest of the finger from being involved. (13B) Once exercised, move the band downward to the middle phalangeal joint. (13C) Exercise, (13D) and then move down to the metacarpal-phalangeal joint and isolate. (13E) The flexor digitorum superficialis is best exercised this way. (13F) This is an excellent series to help restore or improve hand use. Perform 3-5 sets of 10 repetitions. Increase to faster movements as capable.



13A



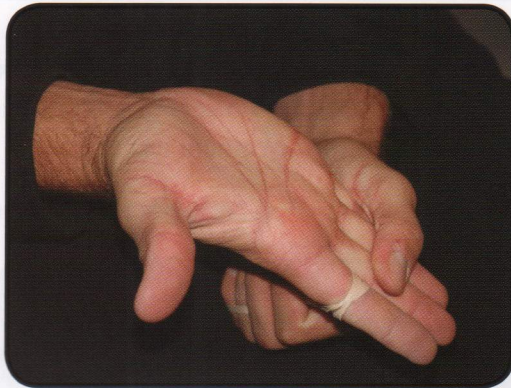
13B



13C



13D



13E



13F

14. Finger Adduction:

In order to strengthen the palmar interossei muscle, place a ball between two fingers. Flex both fingers against the ball. Prevent cumulative assistance by preventing the remaining two fingers from extending. Each finger can be exercised individually using a rubber



14A



14B

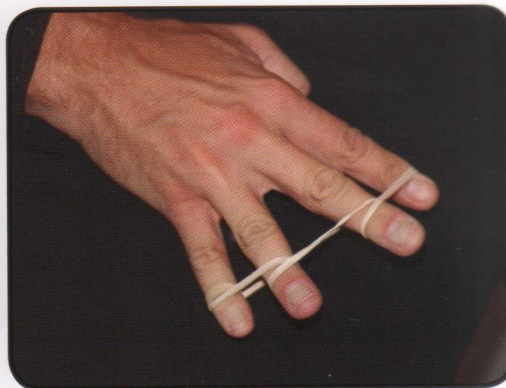
band. Place one end of the band around finger and attach opposite end to a stable object or hold band in free hand. Excellent exercise for hand and forearm problems. Perform 3-5 sets of 10 repetitions increasing gradually to 3-5 sets of 20 repetitions. Increase speed of movement as capable.

15. Finger Abduction:

Place a rubber band around the outside of all fingers. Wrap band under and around the ring finger and under and around the middle finger in order to exercise all four fingers in abduction. Exercise to strengthen the dorsal interossei. The digiti minimi muscle which



15A



15B

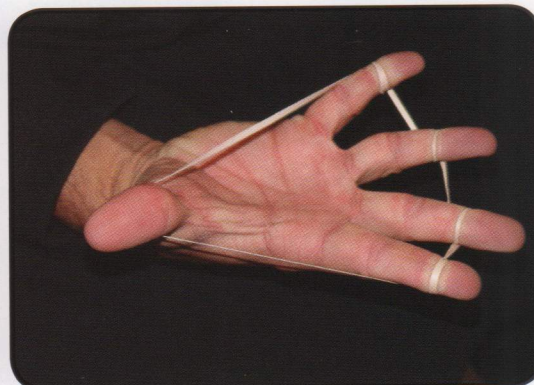
spreads (abducts) the little finger is exercised this way. Each finger may be individually exercised using a rubber band anchoring the opposite end of the band. Perform 3-5 sets of 10 repetitions, increasing gradually to 3-5 sets of 20 repetitions. Progress to greater speed of movement as capable.

16. Finger - Thumb Extension:

Place a rubber band around the outside of all the fingers and the thumb. The band may be wrapped around an individual finger if the band is slipping. An exercise that will strengthen the extensor digitorum communis, extensor indices (second finger), extensor digiti minimi (little finger) and extensor pollicis longus, extensor pollicis brevis,



16A



16B

abductor pollicis longus and abductor pollicis brevis. Good for carpal tunnel syndrome and sports injuries of hand, wrist, elbow regions. Perform 3-5 sets 10 eventually work up to 3-5 sets of 20 repetitions. Progress to greater speed of movement as capable.

17. Extension – Metacarpophalangeal Joint:

Wrap rubber band below middle phalangeal joint. Begin with the entire straight finger flexed only at the knuckle and stabilize the opposite end of the band. Extend the straight finger upward to full extension and return to flexion.

Exercise for extensor digitorum muscles. Perform 3-5 sets of 10. Progress to 3-5 sets of 20. Increase speed as capable.



17A



17B

18. Extension – Middle Phalangeal Joint:

Exercise to develop the finger extensor muscles. Wrap the rubber band above the middle phalangeal joint. Stabilize the area below the middle phalangeal joint with the opposite hand. Bend the middle phalangeal joint and anchor the end of the rubber band.



18A



18B

Extend the middle joint against the resistance. Perform 3-5 sets of 10 repetitions gradually increase to 3-5 sets of 20 repetitions.

19. Distal Phalangeal Joint:

Wrap the rubber band around the distal phalangeal joint. Anchor the other end of the band. Place the free hand (thumb-index finger) around the rest of finger below the distal phalangeal joint. Extend the end of the finger only emphasizing the extensor digitorum



19A



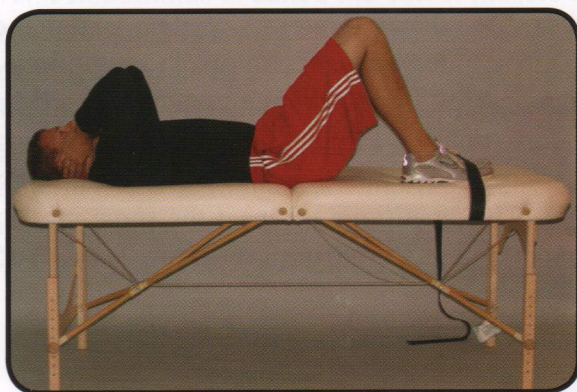
19B

longus. For developing stamina, strength, skill and dexterity of the fingers. Perform 3-5 sets of 10 gradually increasing to 3-5 sets of 20 repetitions.

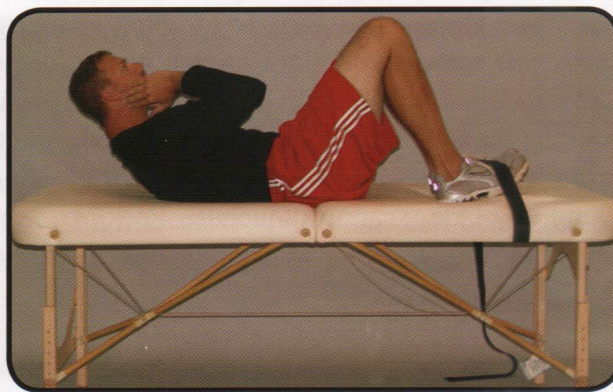
Trunk Program: Abdominal-Back Exercises

Trunk exercises are designed to treat the thoracic spine, lumbar spine, pelvic girdle and hip muscles that affect the core (support and anti-gravity muscles) of the body. Core muscles affect posture, support the trunk, hold back the organs, stabilize the pelvis and spine and assist in breathing and waste elimination. These muscles help prevent spinal conditions such as scoliosis (lateral curve), lordosis (excessive swayback) and kyphosis (mid back hump). The following are specific exercises intended to help treat pre and post surgical conditions, treat back pain and muscle strain and to help correct postural conditions. These exercises help serve as a preventive program and a major part of the sports training program for the trunk.

1. (A, B) Bent Knee Trunk Flexion (Trunk Curls):



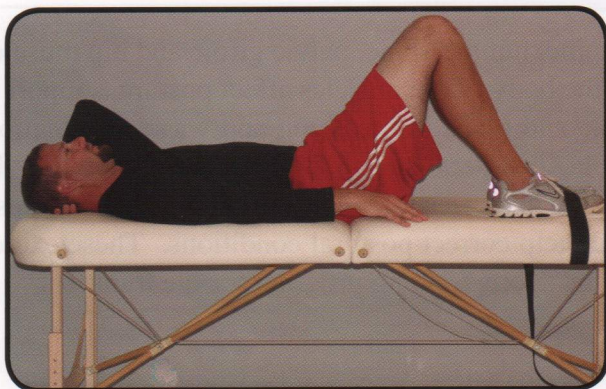
1A



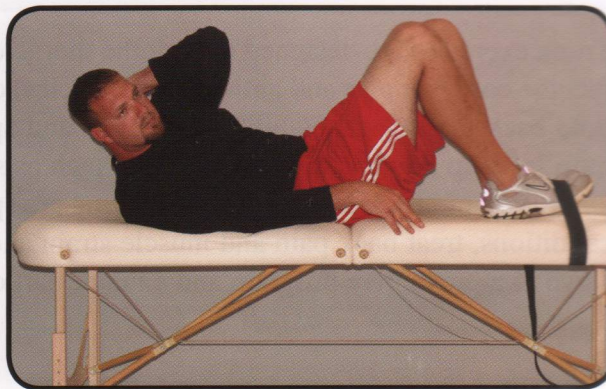
1B

The subject assumes a supine position. The purpose of trunk flexion is to strengthen the upper rectus abdominis, external oblique and internal oblique muscles while stretching the deep posterior spinal and erector spinae group. The hands may be placed under the thighs to assist subjects too weak to curl up without jerking, have had surgery or are in early stage rehabilitation of a back problem. When capable, fold the arms across the chest for greater resistance. Eventually, place an ankle weight on the chest or place the hands behind the head for greater resistance. Step one – Tilt the pelvis backward against the surface. Step two – Exhale while curling slowly upward, bringing the breastbone toward the navel, with one vertebrae at a time leaving surface while maintaining the lower back against the surface. (Flex upward 25-30 degrees). Begin inhaling and lower downward slowly, keeping the back flat, touching one vertebrae at a time. Perform 2 sets of 5 to 8 repetitions. Gradually add a repetition as capable until arriving at 2-3 sets of 15 repetitions. Greater overload is accomplished with a weight placed on the chest, placing the hands behind the head or use of an incline board.

2. (A, B) Oblique Trunk Flexion:



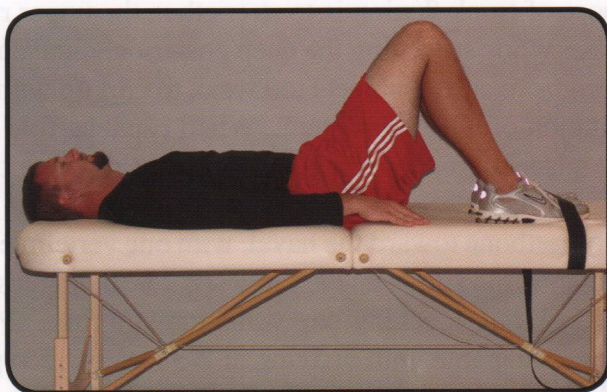
2A



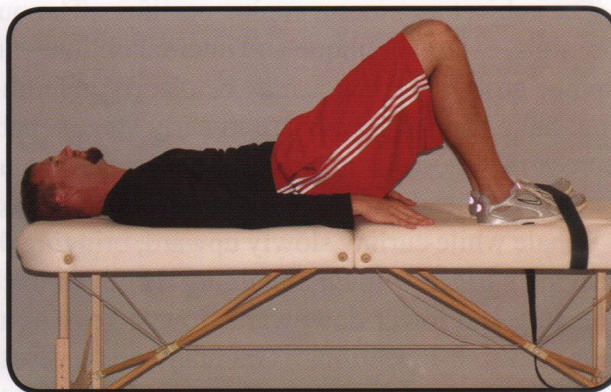
2B

Assuming a supine position, place one hand behind the head. This also serves as a head support to help prevent neck strain. The purpose of oblique sit-ups is to strengthen the internal oblique, external oblique and same side rectus abdominis, stretching the erector spinae, interspinales, rotators and multifidus. Step one-Tilt pelvis back (flat back). Step two-Begin exhaling and roll up slowly one vertebrae at a time, obliquely moving the elbow towards the opposite hip joint (approximately 45-degrees). Upon return, begin inhaling and tilt the pelvis backwards to flatten the back one vertebrae at a time in the same oblique angle until the shoulder blade (scapula) touches. Perform 2 sets of 8-10 repetitions. Repeat the same movement on the opposite side. Increase as capable, one additional repetition at a time, until reaching 2 sets of 15.

3. (A, B) Pelvic Tilt:



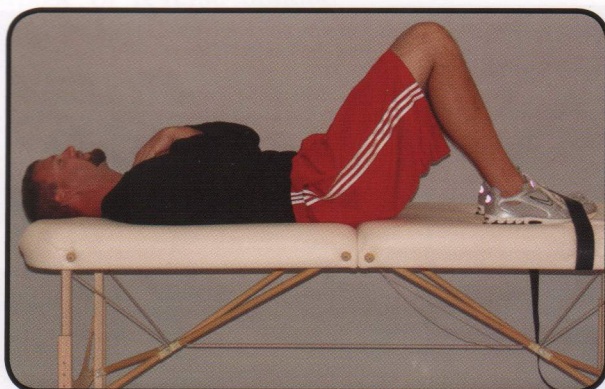
3A



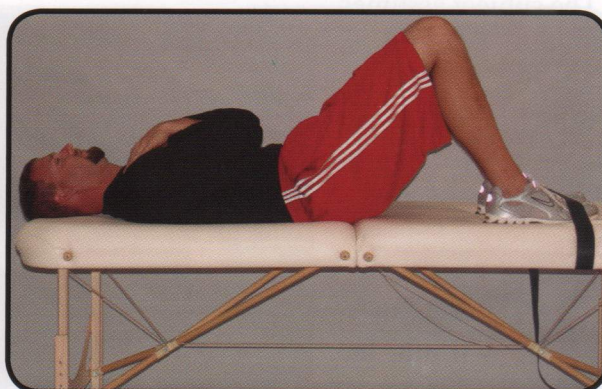
3B

The purpose of the pelvic tilt exercise is to isometrically strengthen the lower rectus abdominus muscles and distal internal, external oblique fibers, reducing stress on the lumbar extensor muscles. The distal end of the pelvis is lifted slightly and the top end of the pelvis is tilted backward. Begin by exhaling and contracting the lower abdominal muscles while mildly stretching the sacral, lumbar tissues and posterior hip area. Hold the contraction from 3-5 seconds. Inhale and release to the starting position and repeat 2 sets of 10 repetitions. Gradually increase to 15-20 repetitions in a set. The exercise may be performed in a laying, sitting or standing position.

4. (A, B) Transverse Abdominus Exercise:



4A



4B

The transverse abdominus is called the corset muscle because it wraps around the abdomen, functioning to hold in the abdomen. The subject will lie on the back; tilt the pelvis back, squeeze the buttocks together raising the pelvis off the surface 1-2 inches. Slowly exhale and draw the sides of the lower trunk area below the navel towards the center of the body. Contract the muscles for 3-5 seconds. This exercise may also be done sitting or standing to help maintain the transverse abdominus. The reverse trunk oblique, oblique trunk flexion and lateral trunk flexion are advanced exercises. For serious back problems, perform 3 sets of 5 repetitions. Gradually work up to 3 sets of 10 repetitions. The transverse abdominus can be exercised more than once a day.

5. (A, B) Seated Reverse Trunk Flexion (Reverse Sit-ups):

Sitting on the end of a table, desk or counter, maintain the upper body in a vertical posture stabilizing the upper torso by holding on with the hands. Do not pull with the arms, but rather look downward and gently lean the upper body against the arms. Begin exhaling and tilt the pelvis backward by contracting the lower rectus abdominis, lower internal, external oblique muscles and the iliopsoas muscles (lift from the pubis). Exhale during the shortening phase, inhale during the lengthening return. The lower back, erector spinae and buttock muscles are stretched. Lift and lower the legs slowly. Perform 2-3 sets of 5-10 repetitions gradually increasing to 15-20 repetitions per set. Additional resistance such as ankle weights may be added as desired.



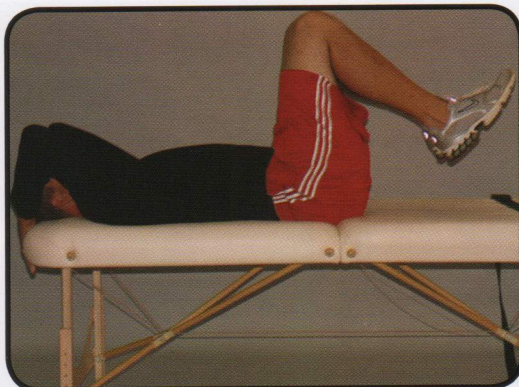
5A



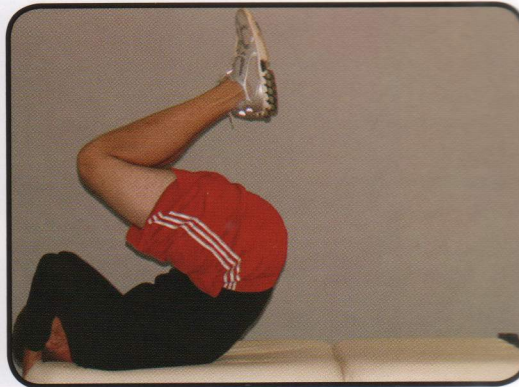
5B

6. (A, B) Supine Reverse Trunk Flexion (Reverse Sit-ups):

The subject assumes a supine position on their back. The purpose is to strengthen the lower rectus abdominis, internal and external obliques and stretch the lower back muscles. The subject will tilt the pelvis in reverse, maintaining a 90-degree angle between the trunk and thighs throughout the entire exercise movement. Contract the lower abdominals, exhale and attempt to lift the pelvis and lower back off the surface one vertebrae at a time until touching the scapulae flat on the table. Inhale while lowering the trunk slowly one vertebrae at a time using the same muscles. Arms should stabilize upper torso while minimally assisting the effort of lifting the lower body. Repeat 2 sets 5-8 repetitions and gradually increase to 2-3 sets of 15 repetitions. Use of ankle weights, an incline board or lower level pulley is more advanced work.



6A



6B

7. (A, B) Seated Oblique Reverse Trunk Flexion (Oblique Reverse Sit-ups):

The purpose of oblique reverse sit-ups is to isolate each side of the abdominal region individually, also strengthening the small spinal rotators. Gently lean the upper body forward against the arms. Do not assist the effort by pulling with the arms. Begin exhaling and lift the pubis upward, tilt and rotate the pelvis to one side bringing both knees toward the opposite side arm pit (axilla), contracting the same side lower rectus abdominis, internal obliques, external obliques, iliopsoas and transverse abdominus muscles. The antagonist back and gluteals muscles are lengthened. Begin exhaling and slowly return the lower body at the same angle. Lift (exhale) and lower (inhale) slowly. Repeat 2-3 sets of 5-10 repetitions each side. Increase to 15-20 repetitions each set. Resistance may be added (ankle weights) or performed from a hanging position.



7A



7B



7C

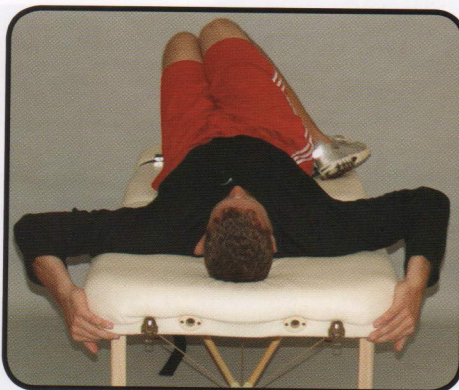


7D

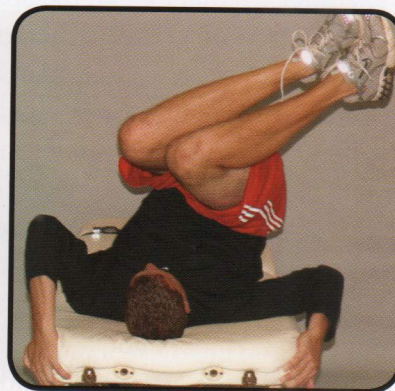
8. (A, B) Supine Oblique Reverse Trunk Flexion (Oblique Reverse Sit-ups):

The purpose of reverse oblique trunk flexion is to strengthen the distal end of the internal and external oblique muscles and further isolate the same side rectus abdominus muscles, especially the lower end (distal). The lower back and oblique back muscles are being stretched.

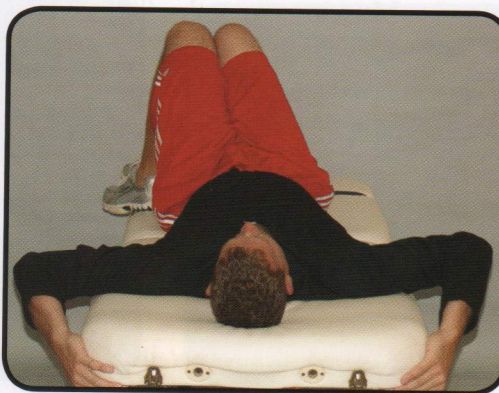
The pelvis is tilted backwards and completely rotated to one side. Begin exhaling and contract the hip flexor and abdominal muscles, lifting the rotated pelvis and both knees toward the opposite arm pit (axilla). Begin inhaling and slowly lower the body at the same angle on the negative resistance downward. Perform 2-3 sets of 5-10 repetitions. Increase to 2-3 sets of 15 adding one repetition at a time as capable. Ankle weights or an incline board may be used as additional resistance if desirable, especially for training athletes.



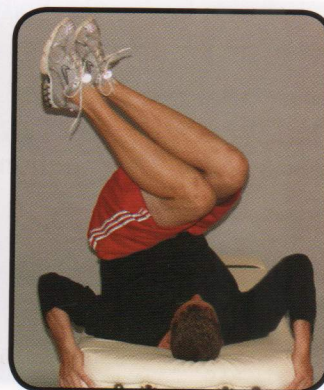
8A



8B

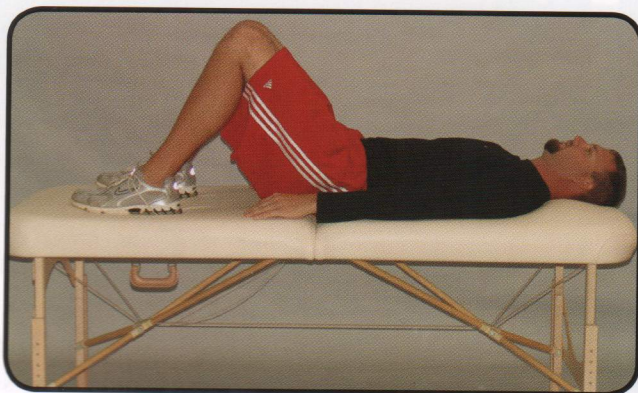


8C

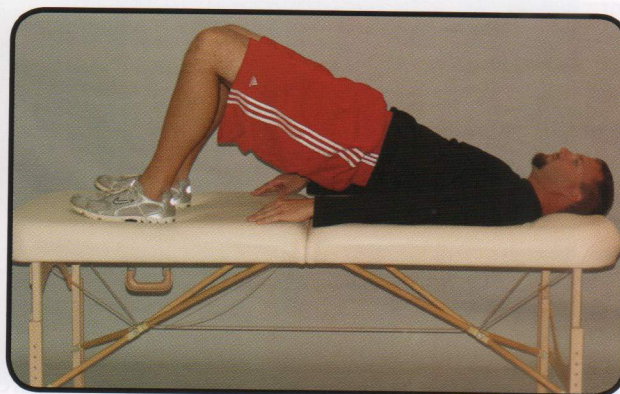


8D

9. (A, B) Pelvic Lift: (Bridge):



9A

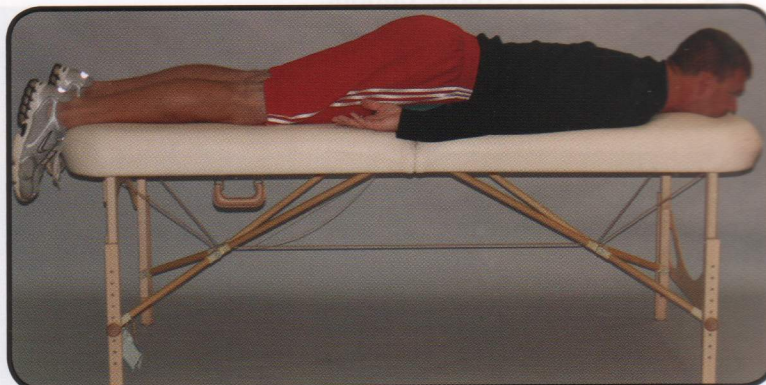


9B

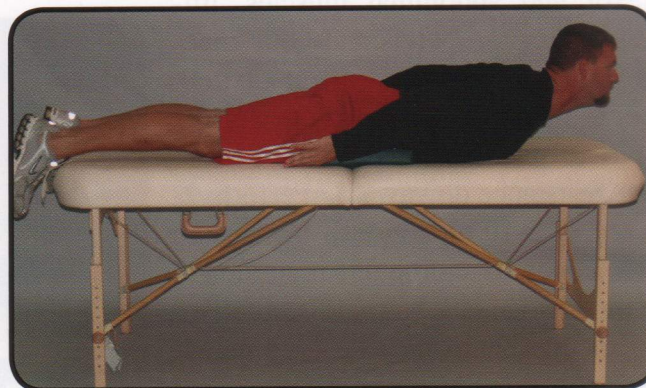
From the supine position, the lower back is exercised carefully, especially for conditions involving weakness and pain. The purpose of the exercise is to isolate the lower back muscles (sacrospinalis), lower erector spinae and gluteus maximus muscles. Bend the knees 60-degrees when increased pain and disc involvement exists and up to 90-degrees with decreased pain or orthopedic involvement. Contract both gluteus maximus together followed by the lower back (sacrospinalis) and long back muscles (erector spinae). Exhale; slowly lifting the torso until the lower back is extended which also lengthens the abdominal muscles. Hold the extended position 3-5 seconds. Inhale and lower the body slowly. Try not to do most of the work pushing with the legs. Repeat 2-3 sets of 5-10 repetitions depending on the condition of the individual. Gradually increase to 2-3 sets of 15 repetitions. Weighted resistance may be applied on top of the pelvis as capable.

10. (A, B) Trunk Hyperextension Modified:

The muscles that extend the spine are resisting the force of gravity whenever sitting or standing. In order to maintain erect posture and help prevent abnormal spinal curvatures, the erector spinae and numerous long spinal extensor muscles must be exercised. In early stages, the hands may be placed in a pushup position under the shoulders to counterbalance a portion of the resistance until strong enough to do independently. Lying in a prone position with the arms by the side, place a pad under the pelvis. Lift the upper body while exhaling. Lower the body slowly. Muscles strengthened are the spinal extensors. Muscles stretched are the rectus abdominis and obliques. Repeat the exercise 2-3 sets of 5-10 repetitions. Gradually increased to 2-3 sets of 15 repetitions.

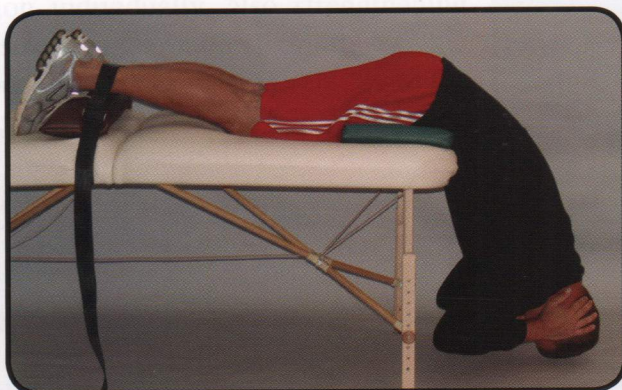


10A

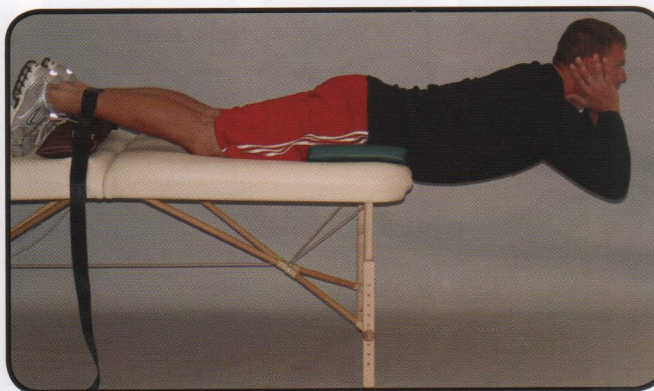


10B

11. (A, B) Trunk Hyperextension:



11A

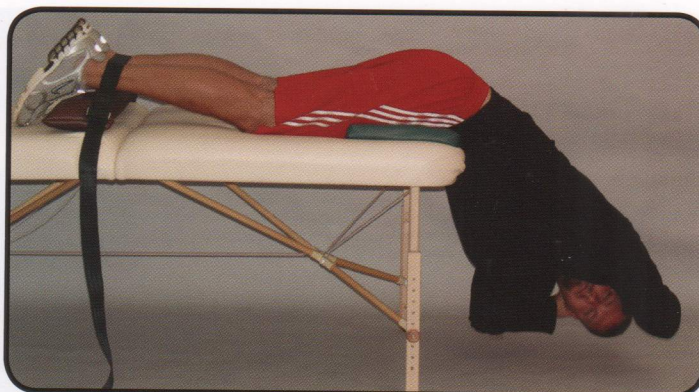


11B

The long spine muscles (erector spinae) extend from the base of the skull to the tailbone (coccyx). The erector spinae are the most important vertical posture muscles. Exercise care with back histories. The subject assumes a prone position with the hips near the end of a table or Roman Chair (apparatus for trunk extension). When the upper body is off the table, place the hands on the floor or rest the upper body on a stool including between each set. Hook the legs under the Roman Chair stabilizer or firmly seatbelt the ankles before moving the upper body over the table edge. When exercising, lace the fingers behind the head and keep the elbows together to ensure greater exercise of the upper cervical and thoracic extensors. Exhale and move the body upward extending the head backward with the elbows together to table height or slightly above the table as better conditioned. Lower slowly as far down toward the floor as possible and repeat. Exercise will stretch rectus abdominus, transverse abdominus, internal and external oblique abdominals on opposite side. Exercise 2-3 sets of 8-10 repetitions. Gradually increase to 2-3 sets of 15-20 repetitions each set, especially for athletes. You may add additional resistance with a weight behind the head as capable.

12. (A, B) Oblique Trunk (Back) Hyperextension (Rotation):

The purpose of trunk hyperextension with rotation is to isolate one side of the erector spinae, latissimus dorsi, interspinales and quadratus lumborum muscles, stretching the rectus abdominus, internal oblique and external oblique abdominal muscles. Exercising in a prone position, place the hands behind the head and rotate the upper body as far as possible maintaining the pelvis in a flat, neutral position throughout the exercise. Maintain a rotated position until extending the trunk upward level with the surface. Maintain the twist as the body is lowered slowly to the starting position. Alternate each repetition in the opposite direction, extending upward and lowering downward slowly under control. In conditions where one side has less strength and development, such as scoliosis, isolate the weaker side with more repetitions than the stronger or more developed side. Begin with 2 sets of 5-10 repetitions. Gradually increase to 2-3 sets of 15-20 repetitions. Especially good exercise for athletes or advanced stages of rehabilitation. Add additional resistive weight behind the head if greater strength and development is desirable.



12A

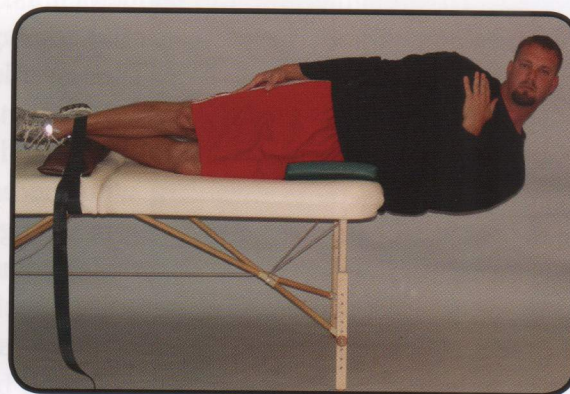


12B

13. (A, B) Lateral (side) Trunk Flexion:



13A



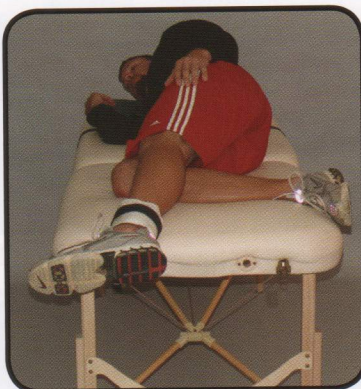
13B

Side (lateral) flexion of the spine isolates a number of muscles important in strengthening the back and helping correct trunk weakness, scoliosis, post operative and post fracture problems. The muscles strengthened include the erector spinae, quadratus lumborum, latissimus dorsi, psoas major, transversalis, transverse abdominus and intertransversarii. Place individual on the side. Place one arm on top of the thigh, with the opposite hand on top of the shoulder. The movement may be initiated on any flat surface. As capable, advance to a position where the hip is near the edge of a table or "Roman Chair." Hook the top leg under the leg stabilizer of the Roman Chair or fasten the top with a strap or seatbelt on a table. A stool may be used to support the trunk when resting between sets. As capable, add a weight under the top armpit (axilla) for greater overload. A dumbbell, pulley or anchored surgical tubing may be used for lateral flexion if a table

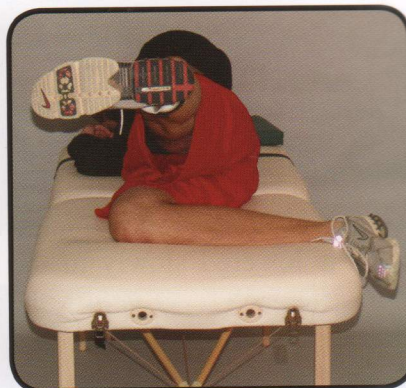
or Roman Chair is not available. Perform 3 sets of 5, progressing to 3 sets of 20 as capable.

14. (A, B) Hip Abduction:

Lift the top hip away from the midline and lower under control. Keep the hips stacked vertically (shoulder, hip and knee in a straight line). Do not allow the hip to move forward of the frontal plane or rotate outward during the movement. Keep the foot dorsal flexed (toes toward nose) in a horizontal (level) position. The hip abduction exercise is to strengthen the gluteus medius, gluteus minimus, tensor fascia latae and sartorius muscles and stretch the adductor magnus, adductor longus, adductor brevis and pectinius and gracilis muscles. To best isolate the tensor fascia latae and Iliotibial band (IT band), position the leg 15 degrees in front of straight-line upper body. The foot is positioned the same for gluteus minimus and gluteus medius. Perform 2-3 sets of 10 repetitions. Add weighted resistance as capable.



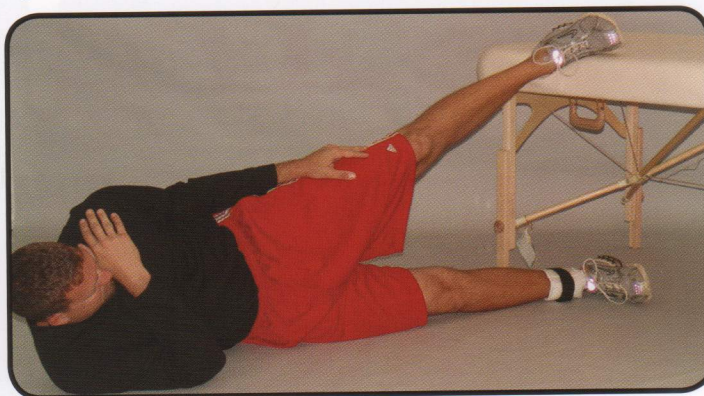
14A



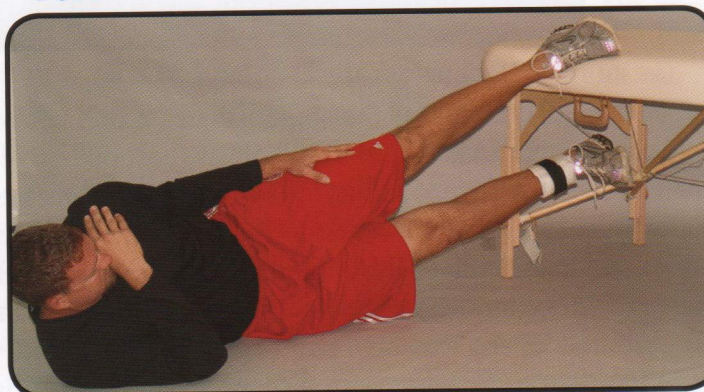
14B

15. (A, B) Hip Hyperadduction:

The hip adductors and abductors help stabilize the pelvic girdle on the lower (inferior) end of the pelvis. Attaching to the symphysis pubis, flexibility and strength of the adductors affect a lateral tilt of the pelvis. To strengthen the hip adductors, assume a side lying position. Rest the inactive top leg on top of a table, desk or taller chair. The lower leg is extended, the ankle dorsal flexed and the foot in a horizontal position. The top leg is supported and relaxed. Do not pull downward with the upper leg. Lift the contracting lower leg to strengthen the adductor longus, adductor brevis, adductor magnus, gracilis and pectinius muscles. Perform 3-5 sets of 10 repetitions. Work to progressive weighted resistance as capable.



15A



15B

16. (A, B) Hip Hyperextension:



16A



16B

To strengthen the gluteus maximus and hamstring muscles and to stretch the flexor muscles of the hip. Remove weight from the legs and rest the trunk upon the table. The non-exercising leg should be flexed, non-weight bearing and drawn under the edge of the table to stabilize the pelvis and prevent low back extension. The exercising leg should be flexed (bent) at the knee at an angle of 95-100 degrees to prevent the rectus femoris tension from interfering with the movement. Contract the buttock and hamstring muscles extending the flexed leg toward the ceiling. Maintain the exercising leg in an adducted position (in against the remaining thigh) throughout the entire range. Execute a smooth non-bouncing stretch at the terminal point of movement. Add resistance as capable. Perform 2-3 sets of 10. Gradually increase to 2-3 sets of 15-20 repetitions.

17. (A, B) Straight Leg Hip Hyperextension:

An exercise that will strengthen each region of the gluteus maximus and proximal hamstring muscles. This is also a program to help condition the muscles when knee joint range of motion is contraindicated because of knee chondromalacia or severe arthritis. The pelvis and upper body are firmly supported on a table. Do not allow the exercising side of the pelvis to lift off the surface. Both legs are completely extended; prevent weight bearing on the uninvolved leg. The leg turned inward will isolate the proximal semi-tendinosus, semi-membranosus and inner gluteus maximus muscles. The leg turned outward isolates the proximal biceps femoris muscle and outer gluteus maximus. Maintaining a straight leg in a neutral position will exercise the medial gluteus maximus and upper hamstrings as a unit. Slowly lift the leg with the knee extended to a position level with the upper body and lower the leg slowly. Excellent exercise for back and hip problems, athletic training and greater hip explosion. Perform 3-5 sets of 10 repetitions. Add additional resistance as capable.



17A



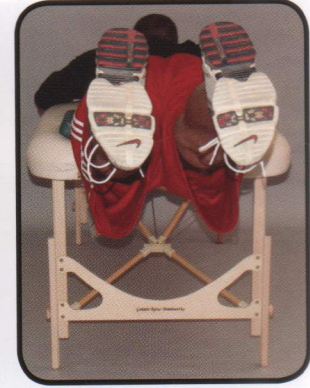
17B

18. (A, B) Double Leg Raise Prone:

To exercise sacrospinalis (low back), multifidus, quadratus lumborum, gluteals and hamstring muscles. Support the entire pelvic girdle and upper body on the table. Stabilize the upper body by extending the arms and grasping the table. Keep the head on the table throughout the exercise. Exercise by squeezing the buttocks together. Lock the knees and lift the legs to table top height. Lower the legs to the floor slowly and release the tension. Rest one second and repeat the exercise process. Perform 3-5 sets of 5-10 repetitions. Gradually increase to 20 repetitions in a set. Add additional weight as capable, especially for training athletes.



18A



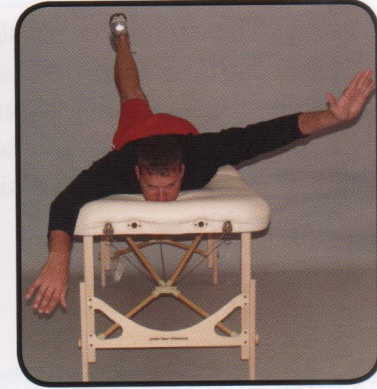
18B

19 (A, B) Trunk Stabilization Exercise:

The purpose of the stabilization exercise is to simultaneously develop the erector spinae and shoulder girdle muscles in the upper trunk by lifting the extended (straight) arm and upper body off the surface. At the same time, the opposite side leg is completely lengthened at the knee with the foot and hip extending, maintaining the flattened pelvis on the surface. This will strengthen the lower erector spinae, sacrospinalis muscles, multifidus, quadratus lumborum, gluteus maximus (buttock) and upper hamstrings (posterior thigh) muscles. As the muscles become stronger, light resistance is placed in the hands and around the ankles. The Trunk Stabilization exercise may be performed by doing consecutive left arm, right leg for the prescribed number or alternating sides after each repetition. Begin with 2-3 sets of 5 repetitions, advancing to 3 sets of 10-15 repetitions. Add weight resistance as capable.



19A



19B

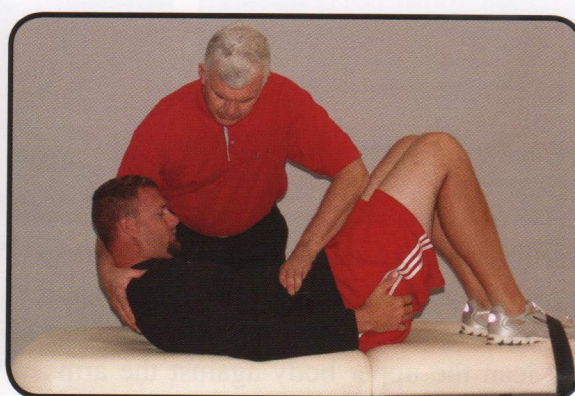
Trunk Exercises - Assisted

The body's core support system is responsible for supporting the back, assisting in organ support, breathing, elimination and is a key component of good posture. The trunk muscles help prevent spinal conditions such as scoliosis (lateral curve), lordosis (excessive swayback) and kyphosis (mid-back hump). The back is frequently an area of great discomfort from overweight status, poor posture, improper lifting and numerous structural and soft tissue conditions. The exercises of the trunk (core) are intended to help treat pre and post surgical conditions, back pain, muscle strain and help correct postural conditions. These exercises help serve as a preventive program and a major part of the sports training program for the trunk.

1. (A, B) Trunk Flexion (trunk curls) – Assisted:



1A

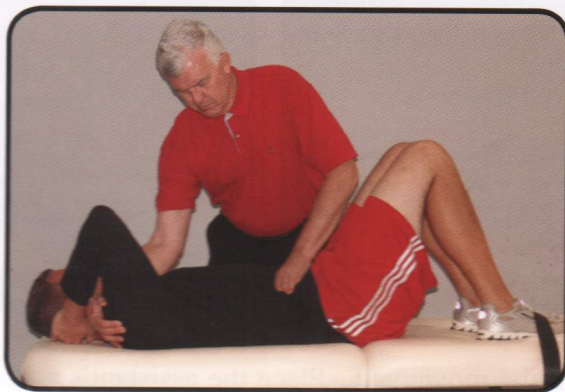


1B

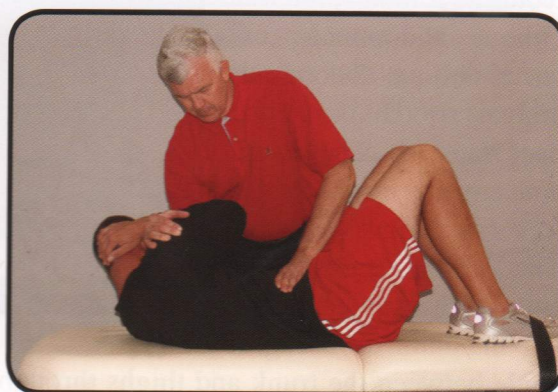
When in a weakened state or your status is postoperative, postpartum (childbearing) or have one of numerous painful back conditions, careful assistance may be indicated. In order to strengthen the upper rectus abdominus, oblique abdominals and minimally involve the hip flexors, the assistant will help tilt the pelvis back toward the surface with one hand pressing just below the top of the anterior (front) pelvis. The assistant will place the opposite arm underneath the upper back and help support the trunk and head. As the subject begins to curl forward, involving the upper two heads of the rectus abdominus, the subject will gently exhale. Contract the same muscles and slowly inhale on the way down. Repeat 2-3 sets of 5-10 repetitions. Advance to active trunk flexion without assistance when capable.

2. (A, B) Oblique Trunk Flexion – Assisted:

The angular abdominal muscles are important for trunk and spinal support. Due to pain, weakness, back conditions, post surgery or pre-or



2A

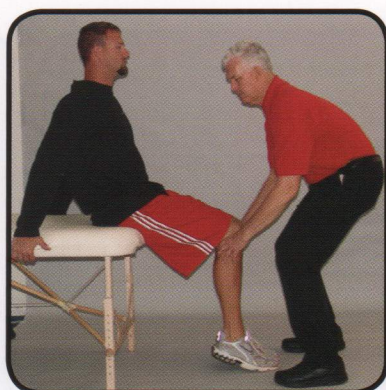


2B

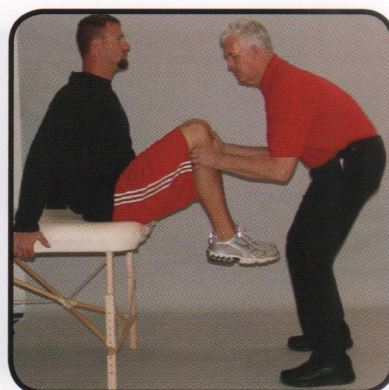
post child delivery, patient assistance may be indicated. Strength of the internal oblique, external oblique or same side rectus abdominus muscles are isolated performing oblique trunk flexion. The muscles stretched include the erector spinae, interspinales, quadratus lumborum and multifidus muscles. The subject lies on the back, one hand behind the head. The assistant helps assist maintaining stabilization of the superior (upper) posterior pelvis with one hand providing mild pressure against the front of the pelvis. The subject, with assistant head and trunk support, lifts one shoulder and slowly curls toward the last rib on the opposite side at a 45-degree angle, exhaling on the way upward. Inhale; contract the same muscles, returning slowly to the starting position one vertebrae at a time. Following 3-6 repetitions, repeat in the opposite direction. Perform 2-3 sets of 3-8 repetitions; gradually increase to 3 sets of 12 repetitions.

3. (A, B) Seated Reverse Trunk Flexion (Reverse Sit-ups) – Assisted:

The lower abdominal muscles are often quite weak. Reasons include seldom exercising those muscles, post surgical repair, hysterectomy, post child delivery (postpartum) or numerous back conditions including surgery. Sitting on the end of a table, desk or counter, maintain the trunk in a vertical posture stabilizing the upper torso by holding on with the hands. Do not pull with the arms. Look downward and gently lean the upper body against the arms. Tilt the pelvis backward by contracting the



3A

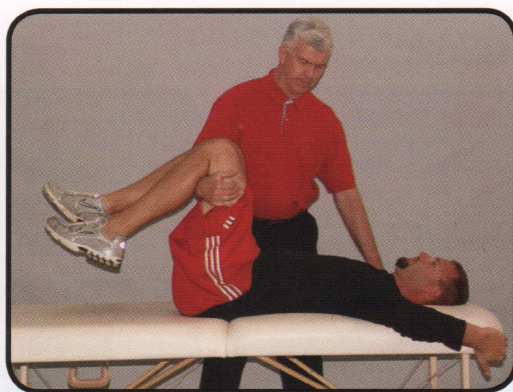


3B

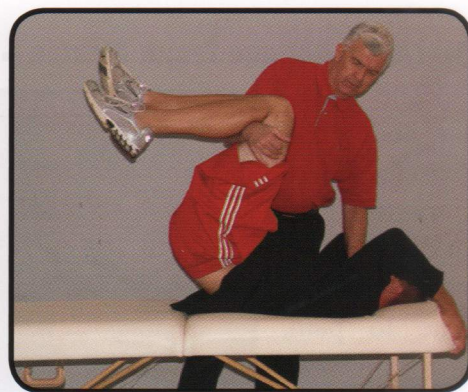
lower rectus abdominus, lower internal obliques, lower external obliques and iliopsoas muscles. (Lift from the pubis). Exhale during the shortening phase and inhale during the lengthening return. The lower back, erector spinae and buttock muscles are stretched. The assistant, standing or seated in front of the subject, places the hands under the knees and helps guide the legs to a position level with the hips, counterbalancing whatever leg weight the subject needs help with. The assistant then guides the legs down slowly. Repeat 2-3 sets of 5. Gradually increase to 2-3 sets of 10, assigning the active unassisted program as capable.

4. (A, B) Supine Reverse Trunk Flexion (Reverse Sit-ups) Assisted:

Purpose of reverse sit-ups is to strengthen the lower rectus abdominus, internal oblique abdominals, external oblique abdominals and to stretch the lower back muscles. This is advancement from Seated Reverse Trunk Flexion. The assistant stands at the side of the subject, helping maintain a 90-degree



4A



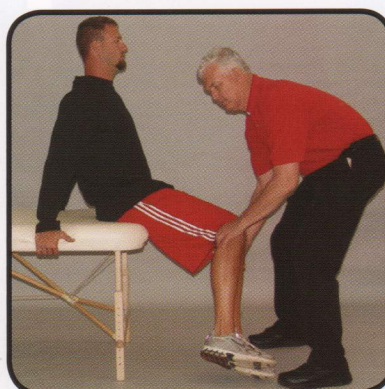
4B

angle between the trunk and thighs throughout the movement. Place the assistant's arm under the knees. The subject will tilt the pelvis in reverse, firmly squeezing the assistant's arm. This action activates the

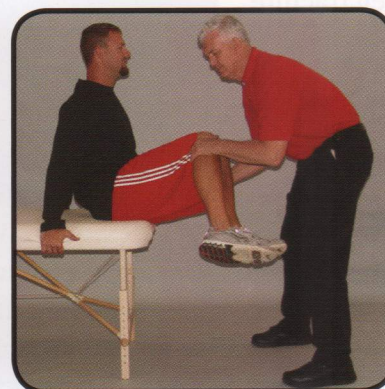
desired muscles. Exhale and attempt to lift the pelvis and lower back off the surface one vertebra at a time with the assistant counterbalancing a percentage of the subjects weight as required. Inhale, while lowering the trunk slowly using the same muscles. The arms should stabilize the upper torso. Assist minimally with the arms when lifting the lower body. Repeat 2 sets of 3-6 repetitions and gradually increase to 2-3 sets of 10 repetitions. Begin an active program without an assistant when capable.

5. (A, B) Seated Reverse Oblique Sit-ups – Assisted:

Seated oblique reverse sit-ups are an exercise to strengthen the lower internal and external obliques and lower rectus abdominus muscles on one side. From a seated position, the subject will bend the head forward holding onto the side of the table. Lean the body weight forward lightly against the arms to prevent pulling from the arms. Tilt the pubis backward, obliquely flex and completely rotate the pelvis to one side. Contract the muscles on that side lifting upward toward the armpit. Lifting upward (exhale) and returning downward slowly (inhale). The assistant will counterbalance and assist as necessary. Repeat 2-3 sets of 5-10 repetitions. Gradually work towards the unassisted program.



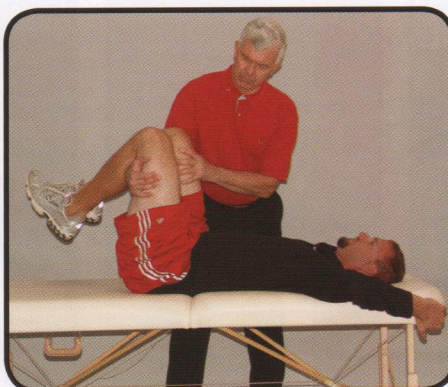
5A



5B

6. (A, B) Supine Reverse Oblique Sit-ups – Assisted:

An advancement from the seated reverse oblique sit-ups - assisted, the supine reverse oblique trunk flexion exercise will strengthen the distal end of the internal and external oblique muscles and further isolate the same side rectus abdominus muscles, especially the lower end (distal). The lower back and oblique back muscles are being stretched. The assistant places one arm under the subject's knees. The pelvis is tilted backwards and rotated to one side. Contracting the hip flexor and abdominal muscles, exhale and lift the pelvis and both knees toward the armpit (axilla). Inhale and lower the body at the same angle on the negative resistance downward. Perform 2-3 sets of 5. Increase to 2-3 sets of 15, adding one repetition at a time as capable.



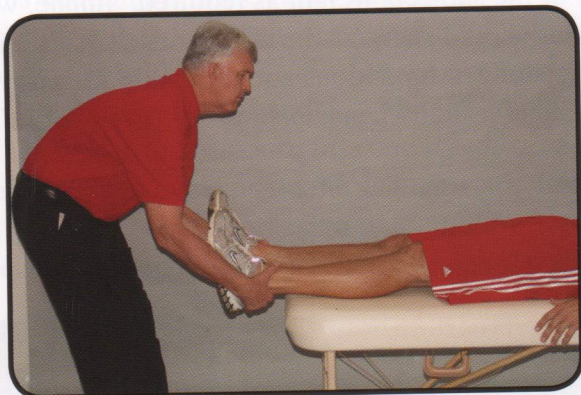
6A



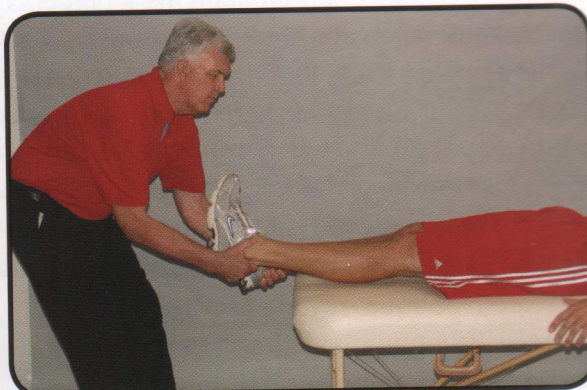
6B

7. (A, B) Hip Hiker Exercise – Assisted:

Leg length discrepancy is a frequent occurrence when working with a history of leg fracture, surgery or back problems. Fol-



7A

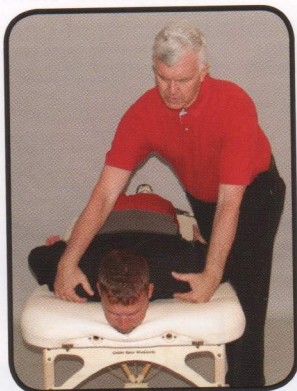


7B

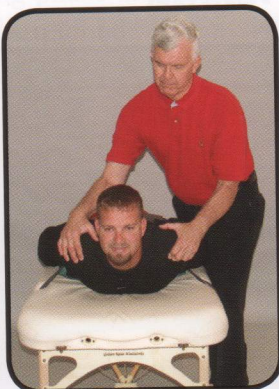
lowing determination of which side has a leg length shortening or/and which side has a hiked (elevated) pelvis, incorporate a specific exercise to help correct this condition. The side to be stretched usually has tight muscles including the multifidus, quadratus lumborum, internal oblique abdominals and external oblique abdominals. The same opposite side muscles are simultaneously strengthened. The subject is lying on the back (supine), holding onto the top or side of the table. The subject's legs are fully extended. The assistant will clasp both legs around the lower posterior ankle. The assistant pulls down on the leg on the hiked pelvis side and simultaneously provides resistance to the opposite leg. The subject is hiking the lower (long) side against resistance, while at the same time having the opposite side leg pulled down to lengthen the short side. Perform 3-5 sets of 10 repetitions.

8. (A, B, C, D) Thoracic Extension – Assisted:

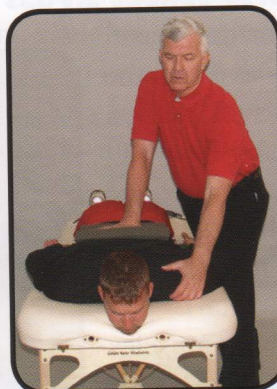
The thoracic spine is frequently a major postural weakness. Vertebral osteopenia or osteoporosis in which the matrix of



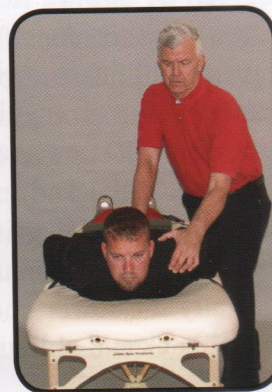
8A



8B



8C



8D

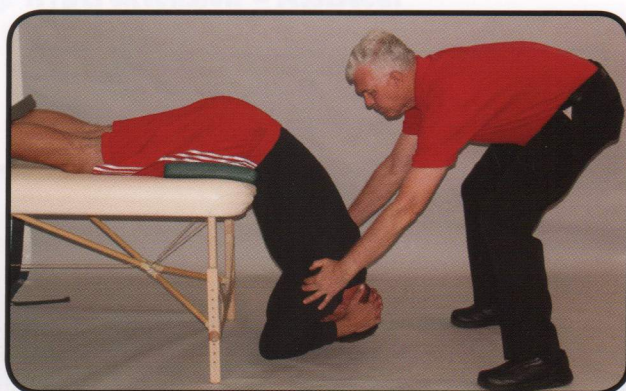
the vertebral body becomes porous as the vertebrae is decreasing in density and losing calcium. Be cautious using very gentle assistance when working with osteoporosis. Forward spinal curvature is often the result of years of bending forward in work such as physical labor, computer work and heavy book bags at an early age or general anti-gravity muscle weakness of the neck, posterior shoulder and back muscles. The shoulders become rounded and the mid-spine (thoracic) increased a forward inclination and may become a condition called kyphosis. The condition initially becomes crystallized and is easier to correct. If not corrected early, the thoracic region will calcify and osteoporosis will frequently result, especially when progressing in age.

The subject will assume a prone position. Place 2-3 inches of padding under the pelvic girdle. If available, strap the body at the ankles. The major stabilization will be placed across the 9th thoracic vertebrae, with a foam pad and strap(s) to stabilize and help eliminate as much lumbar extension as possible. The subject

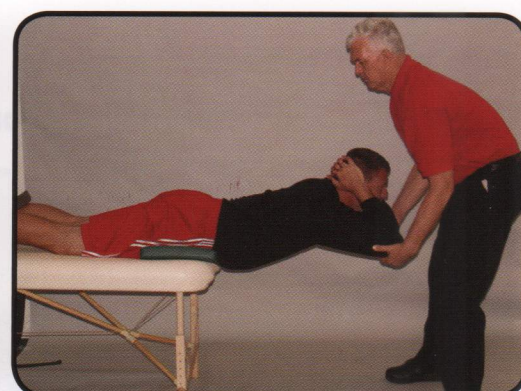
will lift the upper body upward while the assistant gives additional help to facilitate stretching the shortened anterior (front) thoracic spine. The same may be accomplished by having two people place a hand firmly, with a straight elbow, and a downward forward (45-degree angle) of pressure at thoracic 9, attempting to eliminate lumbar compensation. Perform 3 sets of 6-10 repetitions. Advance to trunk hyperextension as the forward thoracic (kyphosis) spinal condition disappears.

9. (A, B) Trunk Hyperextension – Assisted:

The long spinal muscles (erector spinae) extend from the base of the neck and attach at the coccyx (tailbone). These muscles are most impor-



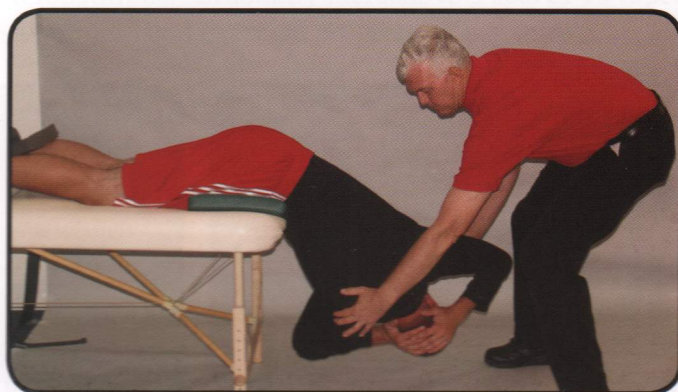
9A



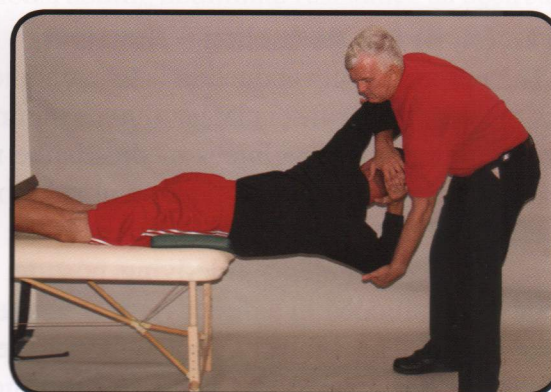
9B

tant to help maintain a vertical posture. Be careful for those with a serious back history. The subject assumes a prone (face down) position with the hips near the end of the table. The upper body is off the table supported with the hands on the floor or the trunk resting on a stool. Strap the ankles with a seatbelt or hook the ankles under the "Roman Chair" stabilizer. When exercising, interlace the fingers behind the head and bring the elbows close together to prevent upper erector spinal development limitations. As the body extends upward, exhale and extend the neck and entire trunk to the height of the table. Lower the body and inhale while slowly returning downward. Repeat the exercise 5-8 repetitions. Perform 3 sets 5-8, gradually increasing to 3 sets of 15. Be careful not to extend above the table level in the early stages. Progress to active unassisted trunk hyperextension.

10. (A, B) Oblique Trunk Hyperextension (Rotation) – Assisted:



10A



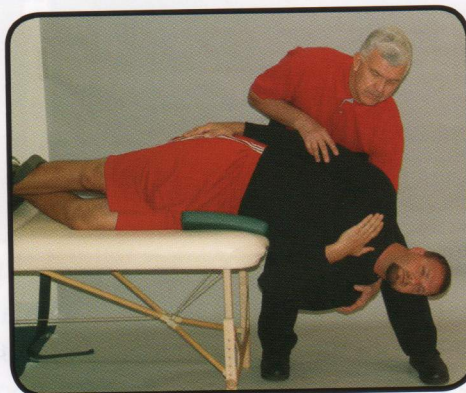
10B

Quite frequently back muscles may be developed more on one side than another. Scoliosis or lateral curvature of the spine is an example of unequal development of the spinal muscles and may occur in any or all segments of the cervical, thoracic or lumbar spine. The subject assumes a prone position with the pelvis

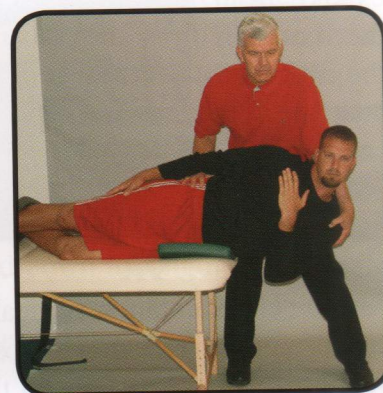
on the end of the table (hip bones 1-2 inches from edge) and the upper body extending over the end. Place a pad under the ankles and secure the legs with a seatbelt across the ankles. Place a small piece of foam or towel under the strap for greater comfort. Securing the hands behind the head, the subject rotates the entire upper body in one direction, which helps isolate one side of the erector spinae, and sacrospinalis muscle groups. The subject lifts the body (trunk) upward to table level as the assistant guides or helps counterbalance the effort. Begin with 3-5 reps in one direction then turn the upper body so that the opposite side spine may received the same exercise effort. In cases of notable underdevelopment on one side, greater exercise emphasis is placed on that side. Rest the upper body on a stool between sets. Advance to 3 sets and 10-15 repetitions per set as capable.

11. (A, B) Lateral (side) Trunk Flexion – Assisted:

A number of muscles receive greater isolation in a side flexion spinal position: the latissimus dorsi, erector spinae, transversalis, quadratus lumborum, psoas major, intertransversarii and external abdominal oblique. Excellent exercise for scoliosis (lateral spinal curvature), more advanced recovery stages of a weak back, post-operative back, post fracture spine or for isolating weak muscles on the less developed side. Begin with the



11A

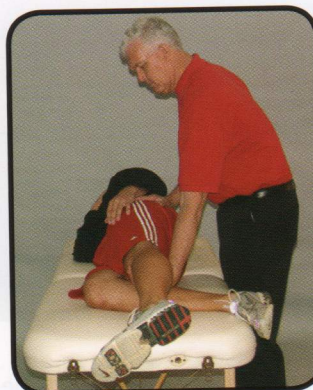


11B

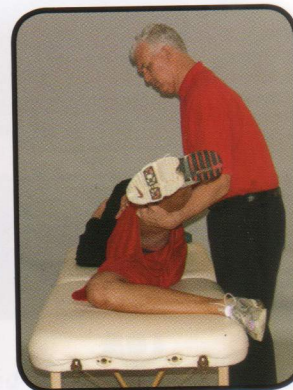
entire body on the top of a table. Place the top arm on the side and the lower arm around the top shoulder. The assistant stands behind the subject and assists, guides and counter-balances the body in a straight line. Following this elementary stage, position the subject's pelvis near the end of the table. Secure the top leg with a seatbelt or stabilizing strap around the ankle. The subject places one arm along the side and the opposite hand on the top of the shoulder. The assistant stands behind the subject to assist, guide or counterbalance the movement in a straight line. Begin with 2-3 sets of 5 repetitions and advance to 3 sets of 10 repetitions. The active lateral trunk program without assistance is the next step in progression.

12. (A, B) Hip Abduction – Assisted:

The purpose of hip abduction is to strengthen the gluteus medius, tensor fascia latae, gluteus minimus and sartorius muscles. The gluteus medius is the most important muscle to maintain a horizontal positioned (stable) pelvis and help prevent lateral stress to the lower back. The subject assumes a side-lying posture. The lower body is positioned in a direct vertical line under the upper torso. The subject's foot is dorsal flexed (pulled back and maintained in a level position (horizontal) to prevent anterior thigh substitution. The upper hip is positioned directly above the lower hip throughout the exercise. The assistant stands behind the subject, placing one hand behind the upper pelvis. The opposite hand is placed under the lower thigh-knee region to



12A

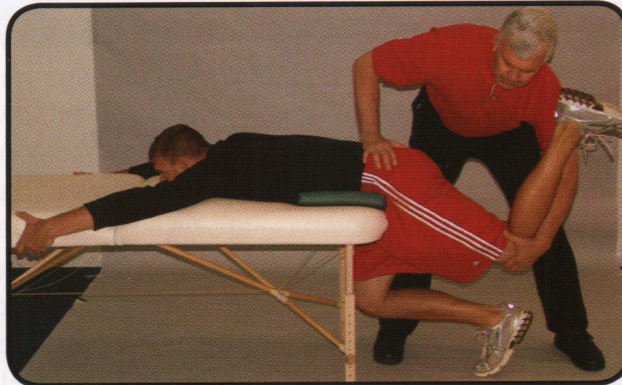


12B

help maintain the in-line postures or counterbalance the amount of leg weight the subject may be unable to lift. The hip abductor muscle contraction should be able to lift the thigh 45-60 degrees. The leg should be lowered slowly under good control as the lengthening eccentric contraction (negative resistance) strengthens muscles more rapidly than concentric contraction (positive resistance). Suggested exercise is 3 sets of 5-8 repetitions. Gradually increase to 3 sets of 15 repetitions. Add weight resistance as capable, working towards an unassisted program as soon as possible.

13. (A, B) Hip Hyperextension – Assisted:

The bent leg hip hyperextension exercise is intended to strengthen the gluteus maximus muscle and to a lesser degree strengthen the posterior



13A



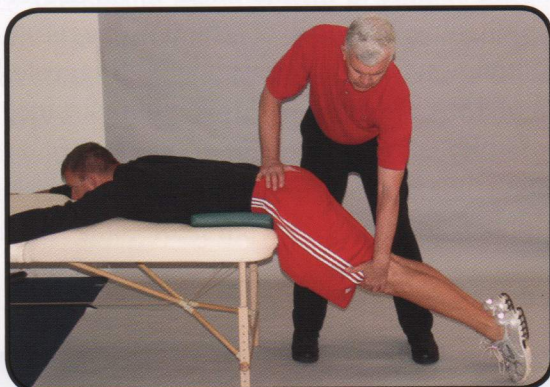
13B

thigh (hamstring) muscles. The hip flexors, especially the psoas major and iliacus are lengthened during the exercise.

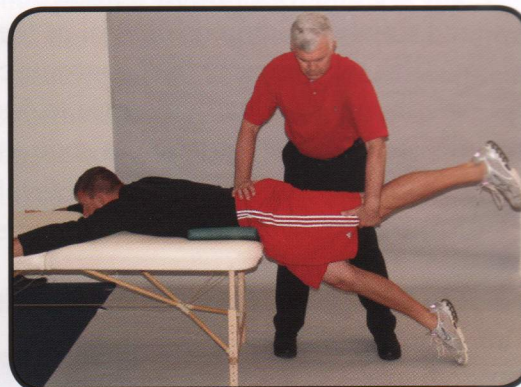
The subject will assume a prone (face down) position with the head rotated in the direction of the side being strengthened. A correct head position also reduces the stress to the same side upper back and shoulder region. The non-exercising leg should be flexed (bent), near non-weight bearing, and pulled forward under the edge of the table to stabilize the pelvis and prevent low back extension. The exercising leg should be bent at the knee at an angle of 95-100 degrees to prevent the front thigh rectus femoris muscle shortness from interfering with the movement. The assistant stands behind the stabilized resting leg and places the near side hand above the exercising side of the pelvis to prevent pelvic hiking. The far side hand wraps around the outside of the exercising side knee to guide the movement and provide assistive stretch at the end. The resting leg is also stabilized by the assistant's near side knee. Begin the exercise program with 2-3 sets of 5-8 repetitions. Gradually increase to 3 sets of 15 repetitions, adding additional resistance as desired. Move to a non-assisted exercise program as capable.

14. (A, B) Straight Leg Hip Hyperextension – Assisted:

The Straight Leg Hip Hyperextension-Assisted is an exercise that will specifically strengthen each region of the gluteus maximus and proximal hamstring muscles. This is also a program to condition



14A

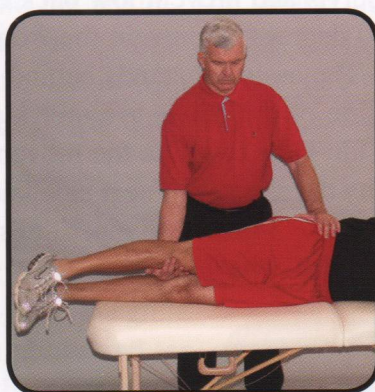


14B

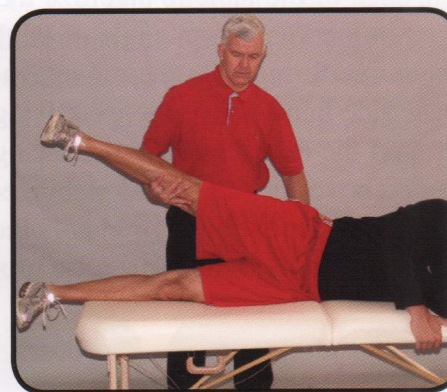
the gluteals when knee problems such as arthritis or severe chondromalacia may limit knee flexion. The pelvis and upper body are supported on a table. Do not allow the exercising side of the pelvis to lift off the table. Both legs are completely extended with the feet plantar flexed downward, preventing push-off of the non-exercising leg. The lifting leg, in a neutral position, will exercise the linear gluteus maximus muscle tissues and all the upper hamstrings. The entire leg turned inward will exercise the medial (inward) gluteus maximus muscle fibers and the proximal semi-tendinosus and semi-membranosus (medial hamstrings) muscles. The leg turned outward isolates the lateral gluteus maximus muscle fibers and the biceps femoris muscles (lateral hamstring). Slowly lift the leg with the knee extended to a position level with the upper body and then lower the leg slowly. This is an excellent program for lower back and hip problems. Begin the program with 3 sets of 5-8 repetitions. Gradually increase to 3 sets of 10-15 repetitions. Add additional resistance if desirable. Move to non-assisted straight leg hip hyperextension as capable.

15. (A, B) Hip Hyperadduction – Assisted:

The role of the hip adductors is to help stabilize the pelvic girdle on the lower (inferior) aspect and help balance the center of the body (core). In order to strengthen the hip adductor muscles, instruct the subject to lie on one side. The assistant will hold the top leg, help balance the pelvis in a neutral position and instruct the subject to lift the lower leg toward the upper leg. This exercise will strengthen the adductor magnus, adductor longus, adductor brevis, pectini



15A



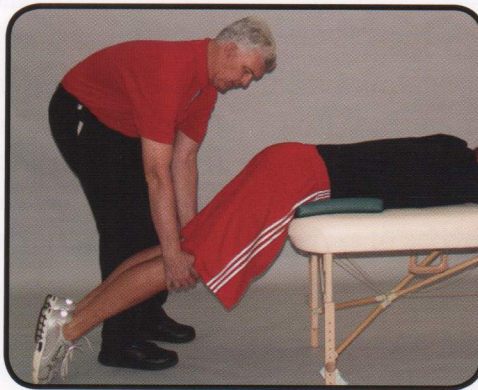
15B

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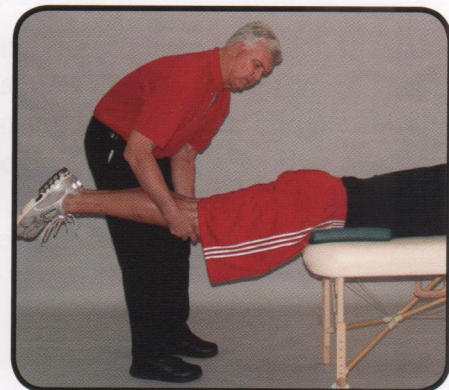
Exercise 3 sets of 5-8 repetitions and increase to 3 sets of 10-15 as capable. Add mild resistance when stronger. Advance to active hip hyperadduction as soon as capable.

16. (A, B) Double Leg Raise Prone – Assisted:

Lower back pain is a problem with many people including young people and athletes. The lower back (sacrospinalis), gluteals and upper hamstring muscles are major lower back stabilizers. The subject will lay prone with the pelvis and upper body supported on a table. The subject will grasp the table with extended arms. Extend the knees, squeeze the



16A

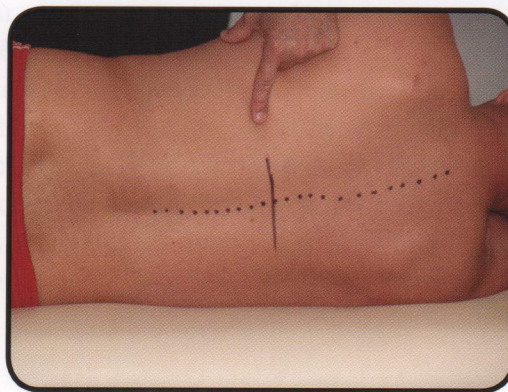


16B

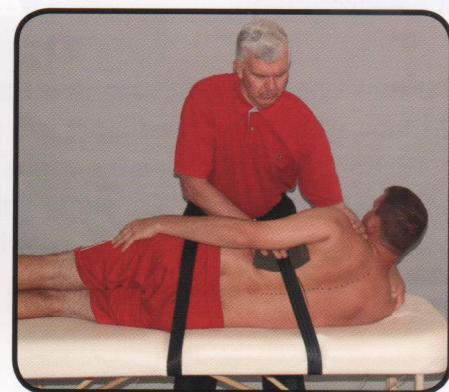
buttocks firmly together and lift the legs to tabletop level. Lower the legs slowly to the floor, inhale, rest the legs for one second and exhale as the subject repeats the exercise. The assistant stands at the subject's side with hands on the side of both legs. The assistant will prevent the legs from moving to either side and counterbalance the weight of the legs as needed to help reach table high. Exercise 2 sets of 5-8 repetitions. Gradually increase to 2-3 sets of 10-15 repetitions. Progress to active double leg raise without assistance as capable.

17. (A, B) Scoliosis – Lateral Trunk Isolation – Assisted:

Scoliosis is a lateral curvature or series of abnormal lateral curves of the spine. Muscle and fascia tightness and regional muscle weakness are both important issues. Isolated strengthening of the quadratus lumborum, psoas major, external abdominal oblique and transversalis. Once the tips of each spinous process are



17A



17B

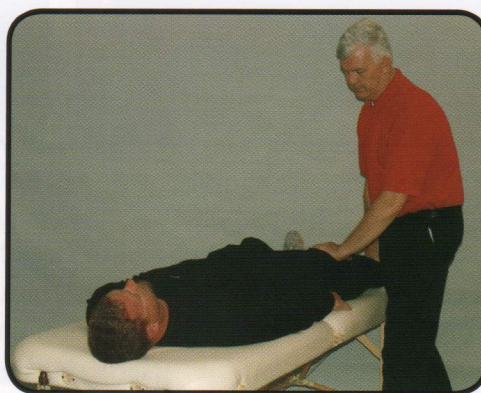
marked with a marker, identify the base of each curve and which direction the open end is pointed. The open end of the curve is pointed downward during the exercise, with the patient lying on that side. A seatbelt is fastened firmly at the base of the curve with a pad under the strap. A second strap is fastened across the top ankle to stabilize the movement. The assistant stands behind the subject with one hand under the subject's bottom shoulder and the top hand assisting the strap to stabilize the area below the curve with a downward/forward (45degree angle) directed pressure. Exercise each curve 3-5 sets of 5-8 repetitions increasing to 3-5 sets of 12 repetitions. If more than a single curve, place each curve with the open end down and exercise with isolation.

Hip Routine (Manual)

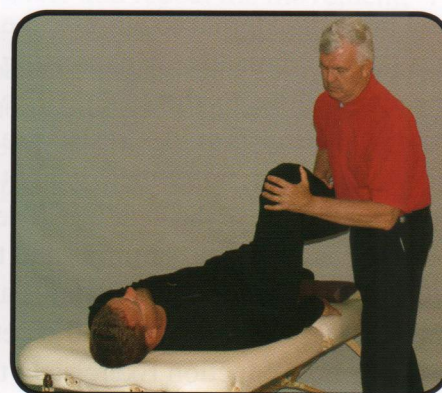
The purpose of the Hip Routine: Manual is to specifically exercise the individual group of muscles responsible for each fundamental hip movement using the therapist/trainers hand as the resistance force. This is often one of the best therapeutic methods following post fracture, post hip replacement, chronic muscle weakness or fatigue, muscle problems such as fibromyalgia or neurological conditions such as Multiple Sclerosis, Parkinson's Disease or Post Polio Syndrome. Begin with 2-3 sets of 5-8 repetitions and progress to 3 sets of 10 repetitions. When further advanced, progress to active resistance exercises in the following section.

1. (A, B) Hip Flexion (Manual):

Exercising in the supine position, place a small pillow or rolled towel under the patient's knees. The purpose of hip flexion is to strengthen the psoas major, iliacus, upper rectus femoris and lower abdominal muscles and stretch the gluteus maximus and proximal hamstring muscles. The assistant places one hand on the anterior thigh just above the knee, the more distal hand around the patient's ankle. The assistant will provide resistance with the proximal hand through full range with mild stretch at the end. Use care that the limb returns under control. Do not allow the knee to snap. The assistant will be most effective by shifting the weight from the far leg to the near leg during resistance and back to the near leg for the beginning of the next repetition. Begin the program with 2-3 sets of 5-8 repetitions. Advance to 3 sets of 10 repetitions. Progress to supine or seated active resistance when appropriate.



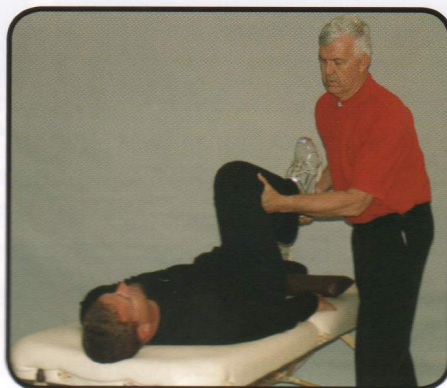
1A



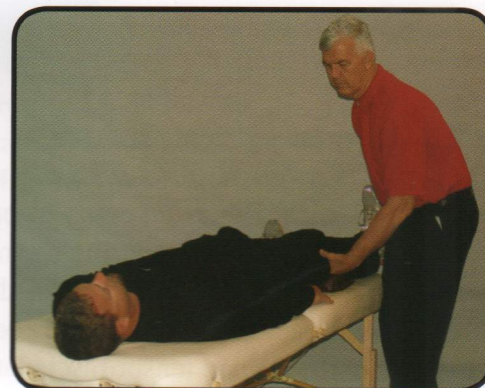
1B

2. (A, B) Hip Extension (Manual):

The subject is positioned in a supine position on the back. Place a rolled towel or pad under the patient's knees. From a 90-degree angle, place the proximal hand under the knee and the distal hand under the patient's heel. Provide resistance with the distal hand maintaining the subject's foot on the surface during hip extension. Prevent the knee from snapping by having the free hand under the knee. The assistant should shift the body weight from one



2A



2B

from snapping by having the free hand under the knee. The assistant should shift the body weight from one

leg to another during the resistance and then back to the starting position. The purpose of hip extension is to strengthen the hamstrings, gluteus maximus and quadriceps muscles. Perform 2-3 sets of 7-10 repetitions. Progress to 3-4 sets of 10 repetitions. Progress to wall squats later if it is not contraindicated. Progress to active resistance exercise leg press and bicycle when appropriate.

3. (A, B) Hip Abduction (Manual):

The subject assumes a supine position with a rolled towel or other small support placed under the knees. The assistant places the near hand on the lateral thigh above the knee to provide resistance. The distal hand will help guide the leg and prevent external rotation of the hip (leg). Maintain the exercising leg quite close to the table. The proximal hand provides resistance as the assistant shifts their weight



3A

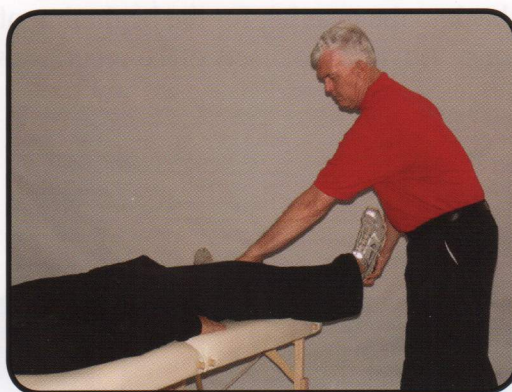


3B

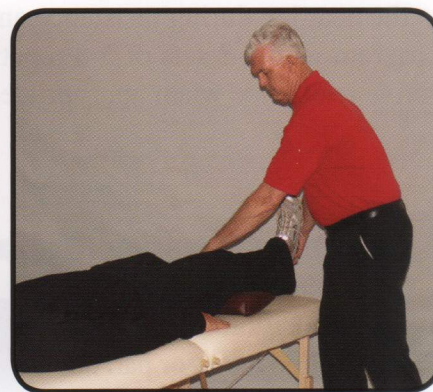
from the far leg to the near leg. The purpose of the hip abduction exercise is to strengthen the gluteus medius, gluteus minimus, sartorius and tensor fascia latae muscles and to stretch the adductor magnus, adductor longus, adductor brevis, pectinius and gracilis muscles. Begin the program with 2-3 sets of 5-10 repetitions and progress to 3-4 sets of 10 repetitions. Progress to active abduction on the side when capable. See the Active Hip Abduction Exercise in the following section.

4. (A, B) Hip Adduction (Manual):

The subject assumes a supine position with a rolled towel or small support under the knees. The assistant places the resistance hand just above the knee on the inside of the thigh. The distal hand helps guide the leg and prevent medial or lateral hip rotation. Maintain the leg position close to the table. Begin the exercise from the



4A

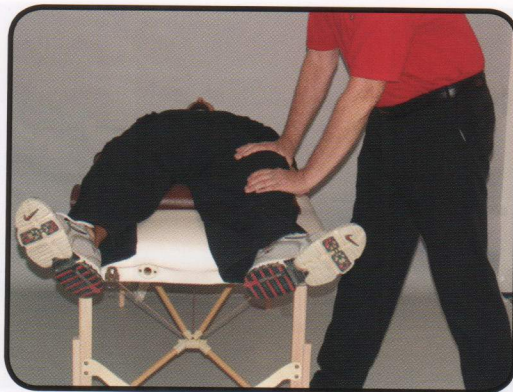


4B

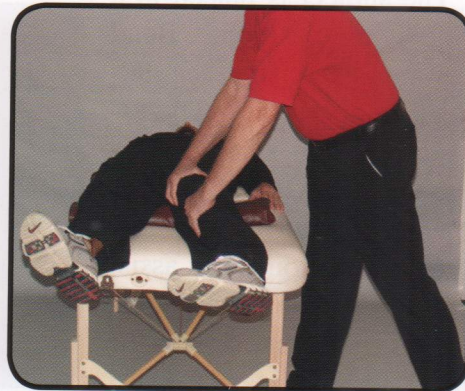
abduction (spread) position with the assistant's body weight mostly on the outside leg. Provide manual resistance with steady hand pressure on the inside of the thigh. The assistant is transferring his or her body weight to the opposite leg during the resistance. Help the subject move the leg to the starting position and repeat the exercise. The purpose of the hip adduction exercise is to strengthen the adductor magnus, adductor longus, adductor brevis, and pectinius and gracilis muscles and to stretch the gluteus medius, gluteus minimus, sartorius and tensor fascia latae muscles. Begin the program with 2-3 sets of 5-10 repetitions and progress to 3-4 sets of 10 repetitions. As capable, progress to active resistance on the side if not contraindicated. See Active Hip Exercises in the following section.

5. (A, B) Hip Medial Rotation (Manual):

Subject is in a supine position on the back. Place a rolled towel or pad under the knees. The assistant places both hands as the resistance above and below the knee. Begin the program by assisting the subject in turning the exercising leg outward. Both hands offer resistance as the subject turns the leg inward.



5A

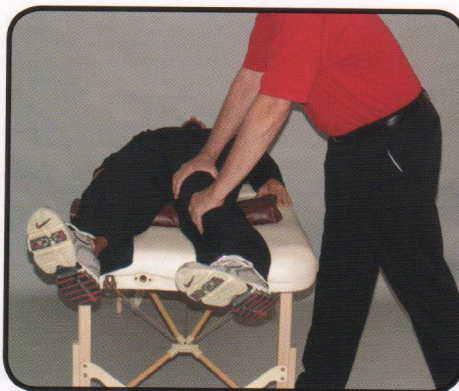


5B

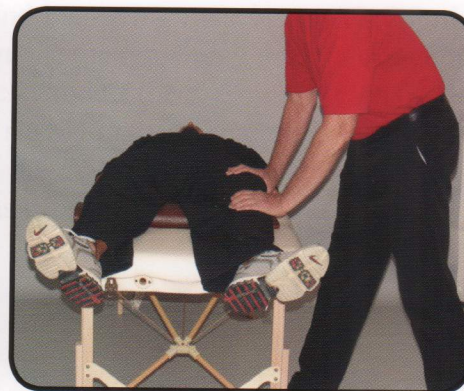
The subject and the assistant return the leg outward as far as possible and repeat the movement. The medial rotation exercise will primarily strengthen the gluteus minimus, gluteus medius and also strengthen the hamstrings and adductor muscles. The gluteus maximus, sartorius and six deep external rotators (piriformis, obturator internus, obturator externus, quadratus femoris, gemellus superior, gemellus inferior) are stretched by the medial rotation effort. Begin with 2-3 sets of 5-8 repetitions and progress to 3-4 sets of 10 repetitions. Progress to active seated or side lying resistance when appropriate. See the Active Medial Hip Rotation Exercise in the following section.

6. (A, B) Hip Lateral Rotation (Manual):

The subject is exercising in the supine position on the back. Place a towel or pad under the knees. The assistant places one hand above and one hand below the knee. Begin the exercise from complete internal rotation. The assistant will assist the subject to the starting position. Both hands offer resistance as the patient turns the leg outward, also providing mild stretch at the end of active movement.



6A

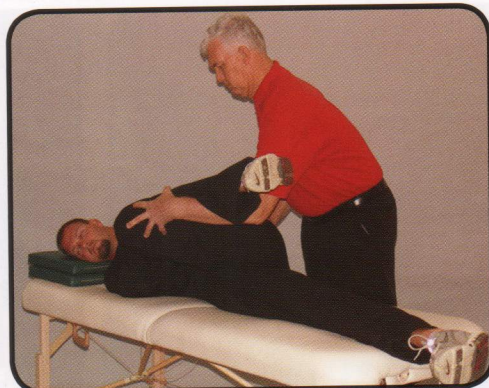


6B

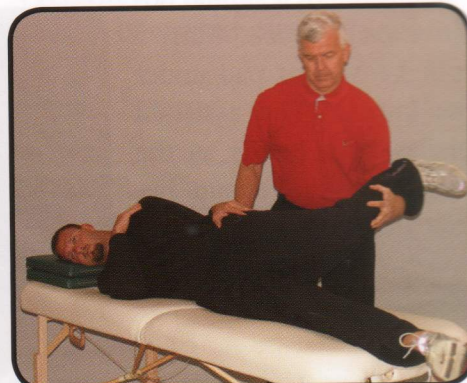
The subject and the assistant return the leg inward as far as possible and repeat the movement. The lateral hip rotation exercise will strengthen the gluteus maximus, sartorius, piriformis, obturator internus, obturator externus, quadratus femoris, gemellus superior and gemellus inferior. The gluteus minimus, gluteus medius and tensor fascia latae are stretched by the effort. Begin the program with 2-3 sets of 5-8 repetitions and progress to 3-4 sets of 10. Progress to active seated or side lying resistance when appropriate. See the Active Lateral Hip Rotation Exercises in the following section.

7 (A, B) Hip Hyperextension (Manual):

The subject is placed in a side lying position. Bend the non-exercising leg 90-degrees at the hip. The assistant should stand behind the subject. Assist the movement of the top hip to 90-degrees of flexion. The assistant cradles the upper leg on top of the forearm with the hand surrounding the knee. Place the free hand behind



7A



7B

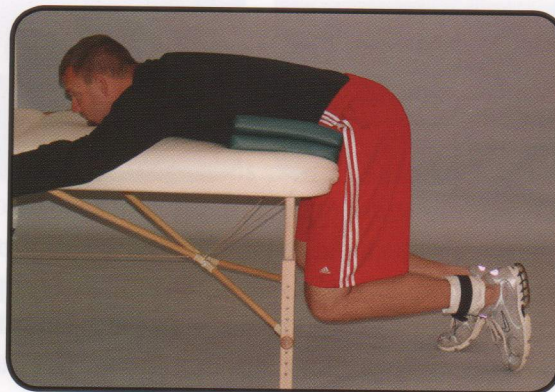
the top hip to help stabilize the pelvis. The subject will move the top thigh horizontally backwards as the assistant resists effort with the hand. Assist the leg to the starting position and repeat the movement. The muscles that are strengthened are the gluteus maximus, upper hamstrings and lower back muscles. The muscles reciprocally lengthened are the psoas, iliacus, rectus femoris and lower abdominals. Begin the program with 3-4 sets of 5-8 repetitions. Advance to 3-5 sets of 10 repetitions. Progress to active resistive bent knee and straight leg hip hyperextension in a prone position as capable. See the Active Hip Hyperextension Exercises in the following section.

Hip Exercises

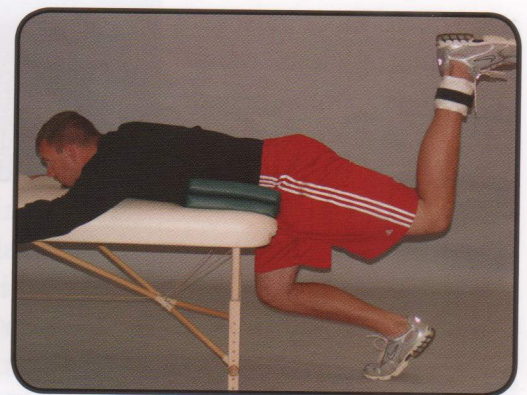
The hip joint is the center of movement. Strength, flexibility and power are important factors in sports training and performance. The purpose of the Active Hip Exercise Program is to provide a specific exercise program for each muscle in the hip region. The following exercises are intended to condition the hip for greater movement potential and prevent numerous problems involving the hip. Equally important is that rehabilitation needs to follow an injury, fracture or surgery. The suggested exercise program is 3-5 sets of 10 repetitions. Progressive resistance may vary from ankle weight to other forms of overload.

1. (A, B) Hip Hyperextension:

To strengthen the buttocks (gluteus maximus), hamstring muscles and stretch the hip flexor muscles, including the psoas and iliacus. Remove all weight from the legs and rest the trunk upon the table. The non-ex-



1A



1B

ercising leg should be flexed to 90-degrees. Contract the buttock and hamstring muscles, extending the flexed leg toward the ceiling. Keep the exercising leg adducted (in against the remaining thigh) throughout the entire range. In order to isolate and strengthen the piriformis muscle, abduct the exercising thigh 60-degrees away from the midline, hyperextend the hip smoothly and lower slowly in a movement the same as the gluteus maximus exercise, however, abducted 60 degrees away from the midline. Execute a smooth non-bouncing stretch at the terminal point of movement. Add resistance as capable. Perform 3-5 sets of 10.

2. (A, B) Straight Leg Hip Hyperextension:

A specific exercise to strengthen the proximal hamstring and gluteus maximus muscles. This is also a program to help condition the muscles when joint range of motion is contraindicated because of knee chondromalacia or severe arthritis. The pelvis and upper body are supported on a table. Do not allow the exercising side of the pelvis to lift off the surface. Both legs are extended; prevent weight bearing on the uninvolved leg. Straight leg hyperextension in a neutral position exercises the middle gluteus maximus and upper hamstrings. The leg turned inward will isolate the proximal semitendinosus and semimembranosus muscles and medial gluteus maximus muscles. Rotating the leg maximally outward isolates the proximal biceps femoris muscle tissues and lateral gluteus maximus. If the leg remains externally rotated and abducted 60-degrees from the



2A



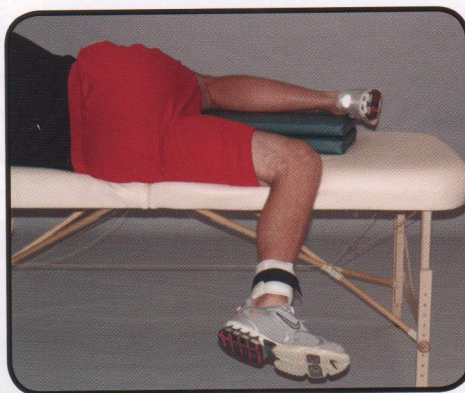
2B

midline, the piriformis becomes involved. Lift the leg with the knee extended to a position level with the upper body and then lower the leg slowly. Advanced exercise may involve the use of a pulley or surgical

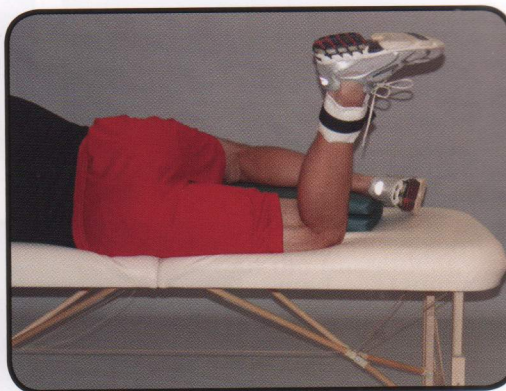
tubing. The addition of rapid movement will help to develop hamstring and gluteus maximus power. This exercise would be excellent for athletes who need to develop greater hip explosion. Perform 3-5 sets of 10 repetitions.

3. (A, B) Side Lying External Hip Rotation:

To strengthen the six deep external rotators including the quadratus femoris, obturator externus, inferior gemellus, obturator internus, superior gemellus, and piriformis muscles. The outer gluteus maximus is also strengthened. From a side lying posture, keep the top hip in a vertical position, maintain the exercising leg at a 90-degree angle. Position the leg at the side edge of the table in order to lower the leg full range below the outer surface of the table. If the top (non-exercising) leg is supported on a thick pad level with the top of the pelvis, the exercise is most exacting. Contracting the external rotators, move the lower leg off the surface and upward as far as possible while maintaining a proper vertical pelvic posture. Lower the limb slowly under control. The muscles stretched are the internal rotators including the gluteus medius, gluteus minimus and tensor fascia latae. Add weight resistance as capable. Perform 3-5 sets of 10 repetitions.



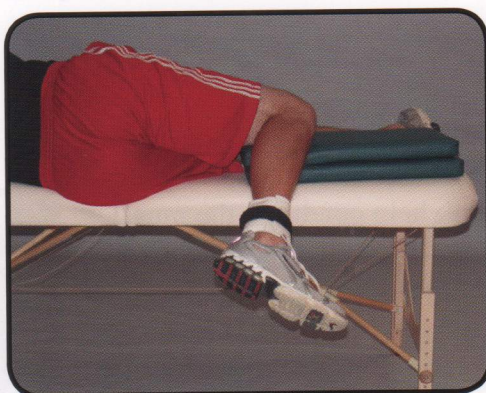
3A



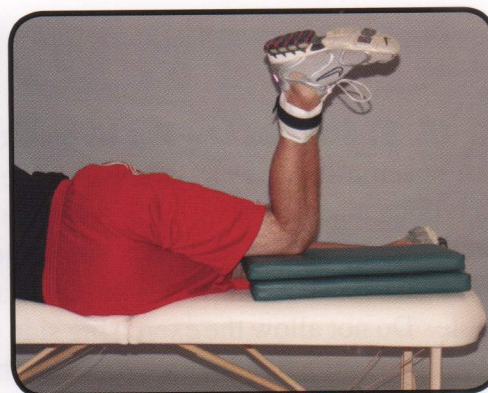
3B

4. (A, B) Side Lying Internal (Medial) Hip Rotation:

Outstanding exercise to strengthen the internal hip rotators including the gluteus medius, tensor fascia latae and gluteus minimus and stretch the deep external hip rotators and outer gluteus maximus. From a side laying posture, position the body at the edge of the table supported by a thick pad to keep the top thigh level with the pelvis and enable the exercising leg to move through a full range of motion downward, well below the level of the table. Keep the hip in a vertical position, maintaining the exercising leg at a 90-degree angle. Contract the internal hip muscles and move the lower leg upward as far as possible. Slowly return lower leg to starting position and repeat. Prevent the pelvis from moving forward or backward during the exercise. Add resistance as capable. Perform 3-5 sets of 10 repetitions.



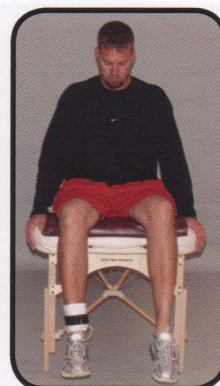
4A



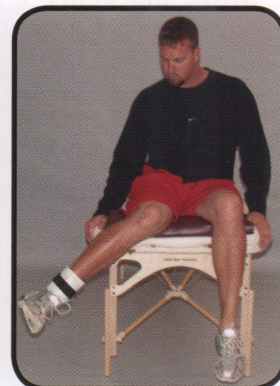
4B

5. (A, B) Internal (Medial) Rotation-Seated:

The purpose of internal hip rotation is to strengthen the internal hip rotators including the gluteus medius, gluteus minimus and tensor fascia latae and stretch six deep external rotators. Place a pad or rolled towel under the knees to help maintain a level hip and level knee position. Stabilize the same side buttock on a surface to prevent compensation. Rotate the hip from extreme external rotation by moving the leg away from the opposite leg (midline). Move through a full range of motion slowly and repeat. Add ankle weight resistance as capable. Perform 3-5 sets of 10 repetitions.



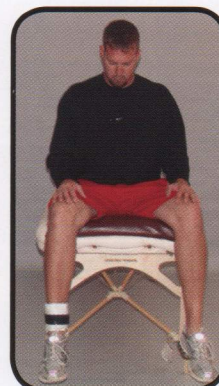
5A



5B

6. (A, B) External (Lateral) Hip Rotation-Seated:

To strengthen the six deep rotators (quadratus femoris, obturator externus, inferior gemellus, obturator internus, superior gemellus and piriformis muscles) and external gluteus maximus muscle and stretch the internal hip rotators including the gluteus medius, gluteus minimus and tensor fascia latae. Place a pad under the knees to maintain level hip and knee position. Move the opposite leg away from the midline 30-45 degrees for better balance and less compensation. Maintain the opposite side buttock on the surface to prevent compensation. Rotate the hip from extreme internal rotation by crossing the leg across the midline and moving the lower leg toward the opposite leg. Contract the muscles through the entire range slowly and repeat the effort. Lower the leg slowly and repeat. Add resistance as capable. Perform 3-5 sets of 10 repetitions.



6A



6B

7. (A, B) Hip Abduction:

Lift the top hip away from the midline and lower the leg under control. Keep both hips vertical (shoulder, hip and knee in a straight line). Do not allow the top hip to move forward of the frontal plane or rotate outward during the movement. Maintain the foot in a horizontal position. Dorsal flex foot (toes back) for greater hip muscle action. This is an exercise to strengthen the gluteus medius, gluteus minimus and tensor fascia latae and sartorius muscles. The muscles lengthened include the adductor magnus, adductor longus, adductor brevis, pectiniis and gracilis muscles. Progressively add resistance as capable. Perform 3-5 sets of 10 repetitions.



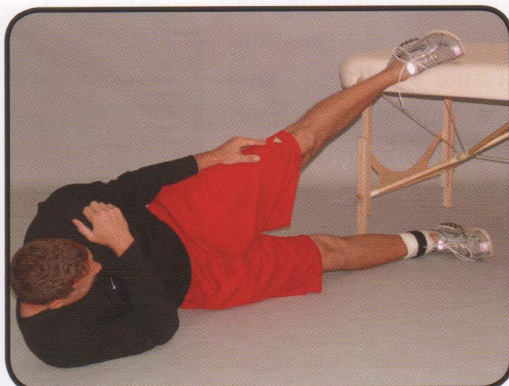
7A



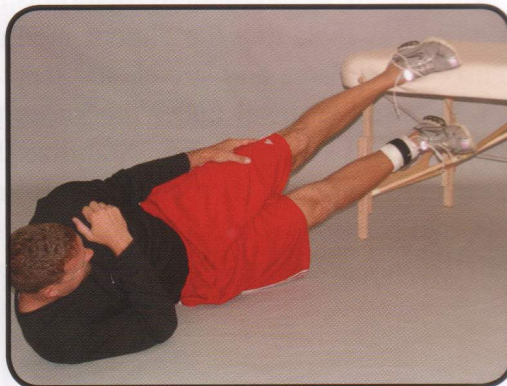
7B

8. (A, B) Hip Adduction:

Move the upper leg away from the mid-line and rest the leg on a supportive surface such as a chair, desk or table. Lift the lower leg toward the upper leg with the foot-ankle pulled back (dorsal flexed). The top hip must remain vertical to prevent being out of



8A

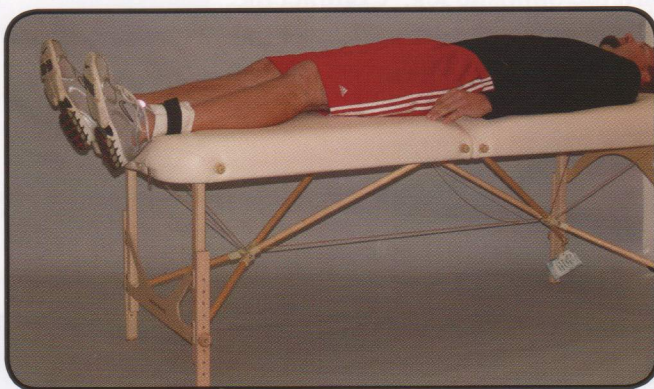


8B

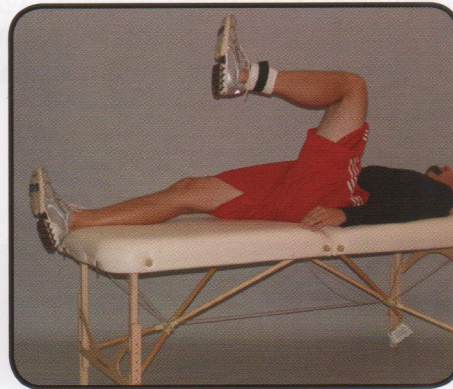
the desired plane of movement. Keep the lower knee locked and the foot in a horizontal position as lifting upward. Compensation is prevented by not pulling down with the resting leg. Slow, precise exercise will help to strengthen the adductor magnus, adductor longus, adductor brevis, pectinius and gracilis muscles and stretch the hip abductors, specifically the gluteus medius, gluteus minimus, tensor fascia latae and sartorius muscles. The hip adductors may be exercised with greater overload by use of a pulley or surgical tubing. The use of speed in the movement will help develop muscle power. Add resistance as capable. Perform 3-5 sets of 10 repetitions.

9. (A, B) Hip Flexion-Supine:

From a position of lying on the back, bend the non-involved leg 60-90 degrees. While exercising do not push with the free leg. Flex the exercising leg placing a weight



9A



9B

around the ankle, moving the knee towards the chest. Hip flexion will strengthen the psoas major, iliacus, pectinius and rectus femoris while stretching the hamstrings and gluteus maximus. Lower the leg slowly under control. Repeat 10 repetitions. When ready for advancement, employing a cable or rubber tube is appropriate. The use of speed in performing the exercise will develop muscle power. (See Hip Flexion-Advanced 11A-11B). Perform 3-5 sets of 10 repetitions.

10. (A, B) Hip Flexion-Standing:

From the standing position, balance against the end of a table. Contracting the psoas major, iliacus, pectinius and rectus femoris stretching the gluteus maximus and hamstrings. Move the hip from full extension upward toward the chest as far as possible. Place a weight around the ankle. Lower the leg slowly under control. Repeat 10 repetitions. Perform 3-5 sets of 10 repetitions.



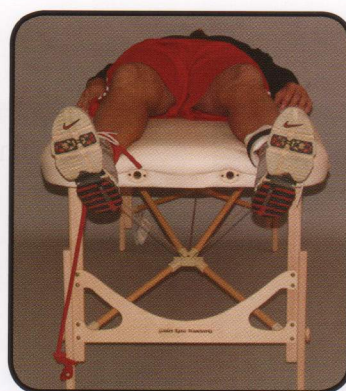
10A



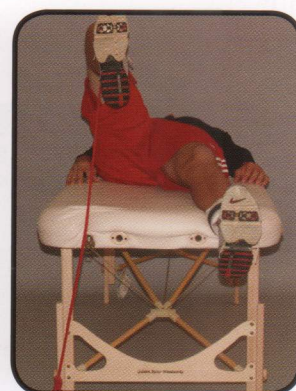
10B

11. (A, B) Hip Flexion-Advanced:

For conditioning and athletic training exercise in a supine position bend non-involved leg 60-90 degrees. Contracting the psoas major, iliacus, pectinius and rectus femoris. Against the resistance of a pulley, rubber band or tubing, flex the knee toward the chest and lower slowly. When ready to develop power, performing sets of rapid movement may be desirable. Repeat 10 repetitions. Perform 3-5 sets of 10 repetitions.



11A



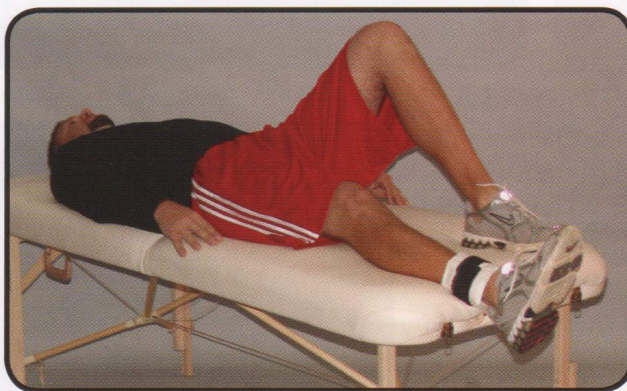
11B

Knee Exercises

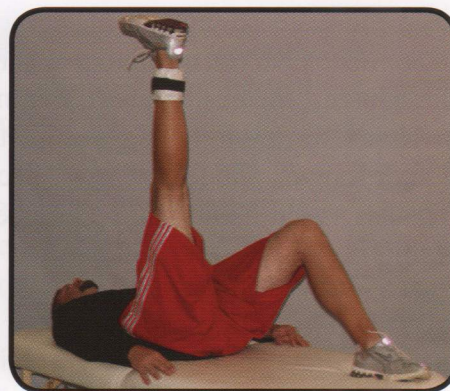
The knee is a multifaceted rotary hinge joint. The knee is a transition joint between the hip and ankle-foot joints. Weakness, inflexibility and pain of the surrounding joints places greater stress upon the knee. The ability to glide, rotate, extend and bend make it an important strength and power joint which allows us to climb, descend, run-walk, stop, start and squat. Injuries to ligaments, shock absorbing meniscus and other infrastructure results in swelling, pain and joint limitation. Limited flexibility and strength lead to injuries and poor joint performance. The well-developed knee joint allows maximum performance in work and play. Injuries and post surgical situations seldom receive a sound recovery program that will allow full movement without continued knee liability. The following exercises are intended to help develop the knee strength and functional potential improved power. This coupled with Active Isolated Stretching: The Mattes Method will help prevent knee problems.

1. (A, B) Straight Leg Raise:

Contract the anterior thigh muscles keeping the knee fully extended throughout the movement. This exercise develops local strength and endurance for the quadricep muscles and may increase flexibility in the hamstring muscles.



1A

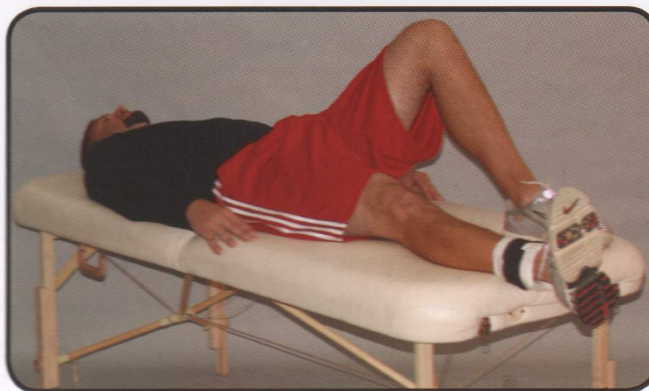


1B

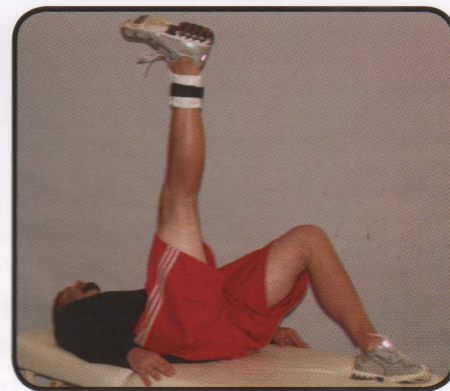
The muscles strengthened are primarily the rectus femoris, and also include the vastus lateralis, vastus medialis, vastus intermedius, psoas and iliacus. Raise the leg 75-80 degrees above the surface and lower the leg slowly under careful control keeping the uninvolved leg bent, while also contracting the abdominals to keep stress off of the lower back. Perform 3-5 sets of 10 repetitions allowing 15-30 seconds of rest between sets.

2. (2A, B) Straight Leg Raise 45 Degrees External:

Contract the anterior muscles of the leg focusing on rotating the leg outward 45 degrees. This concentrates the effort primarily on the vastus medialis and vastus interme-



2A



2B

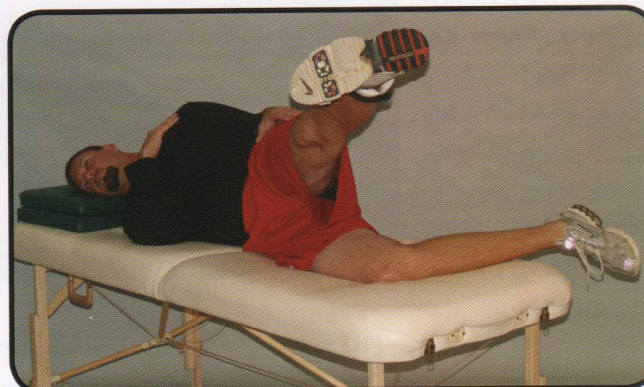
dius (quadricep) muscles. Hamstring flexibility may be increased during the exercise. Raise the leg 75-80 degrees above the surface and lower the leg slowly, maintaining a fully extended knee. Keep the uninvolved leg bent and tighten the abdominal muscles to keep stress off of the lower back. Perform 3-5 sets of 10 repetitions allowing 15-30 seconds of rest between sets.

3. (A, B) Hip Abduction:

Lift the top leg 45-60 degrees away from the midline and lower under control. Maintain the top hip in a vertical position and move the top leg 15-20 degrees forward of the lower leg (shoulder, hip and knee in a straight line). Do not allow the thigh to move forward of the frontal plane or rotate outward during the movement. Keep the foot level in a horizontal position. This is an exercise to strengthen the tensor fascia latae, vastus lateralis, and to a lesser degree, the gluteus medius, gluteus minimus and sartorius while stretching the adductor magnus, adductor longus, adductor brevis, pectinius and gracilis muscles. Add additional resistance as capable. Perform 3-5 sets of 10 repetitions.

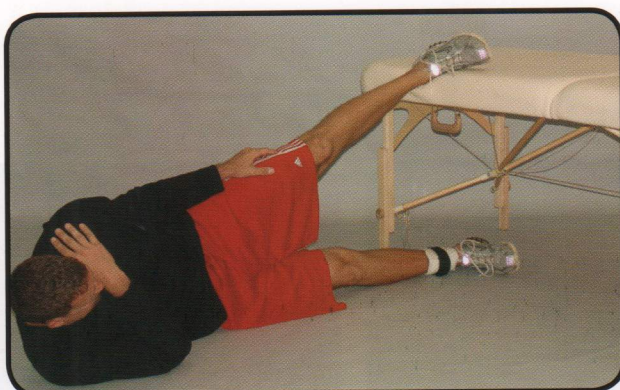


3A

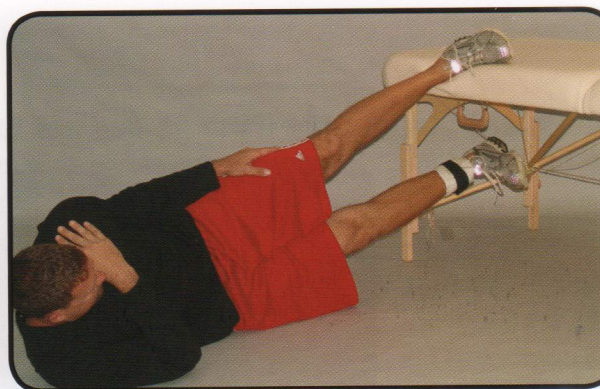


3B

4. (A, B) Hip Adduction:



4A



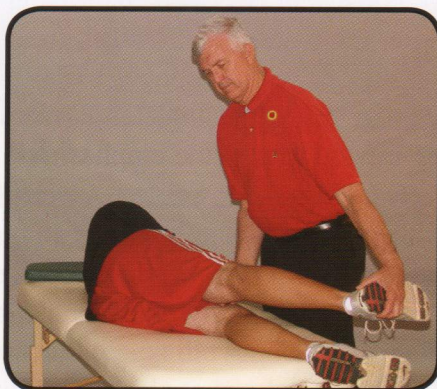
4B

Move the upper leg away from the midline and rest on a supportive surface such as a desk or table. Lift the lower leg toward the upper leg with the foot-ankle pulled back (dorsal flexed). The top hip must remain forward in a vertical position to prevent being out of the desired plane of movement. Maintain the lower leg in an extended position with the foot level and the toes pulled back as lifting upward. This exercise is

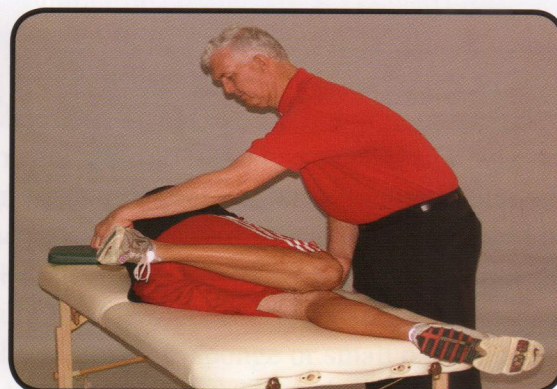
to strengthen the adductor magnus, adductor longus, adductor brevis, pectinius and gracilis muscles and stretch the hip abductors, specifically the gluteus medius, gluteus minimus, tensor fascia latae and sartorius muscles. The adductors may also be exercised in a horizontal position by use of a pulley or tubing. Add additional resistance as capable. Perform 3-5 sets of 10 repetitions.

5. (A, B) Knee Flexion – Manual:

Knee Flexion – Manual is a hands on approach to strengthen the semi tendosus, semi membranosus, and biceps femoris (hamstrings), and stretch the vastus medialis, vastus lateralis, vastus intermedius and biceps femoris (quadriceps). Manual knee flexion is employed for post surgery, including



5A



5B

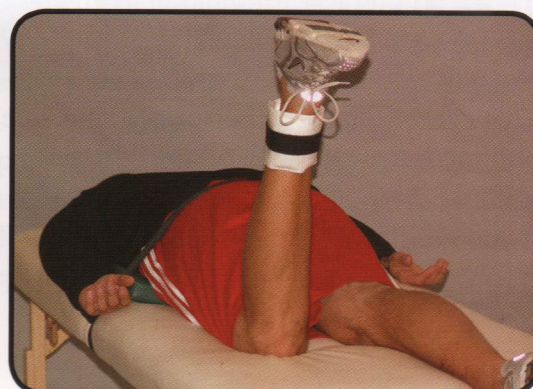
total knee surgery, post fracture, painful knee conditions or weakened individuals suffering from a stroke, muscle diseases or prolonged illness. Under those conditions, knee flexion, range of motion and muscle strength may be limited. For greater comfort, place a pad or pillow between the knees. The assistant will place one hand around the heel and the free hand on the lower anterior thigh above the knee. Provide mild resistance to the heel through full range and manually assist the stretch as the subject continues a consistent effort to move the joint. At the end of current range, return to the starting position and repeat the movement. This is an excellent exercise for painful, swollen, range limited knee joints. When joint range is near complete, advance to the Knee Flexion-Prone Program. Perform 5-8 sets of 10 repetitions.

6. (A, B) Knee Flexion-Prone:

Purpose is to strengthen the hamstrings which include muscles that affect the knee including the semitendinosus, semimembranosus, biceps femoris, and also in-



6A



6B

clude the sartorius, popliteus, gracilis, gastrocnemius, plantaris and tensor fascia latae (in 45 to 145 degrees of flexion), while lengthening the quadriceps when flexing the knee. Stabilize the pelvis with a seatbelt or strap while bending the knee to prevent compensatory hip flexor action. Place an ankle weight around the ankle. Flex the knee to a 90-degree angle and lower the weight slowly. To best isolate the semitendinosus and semimembranosus, rotate the lower leg inward (medial) during both concentric (bend) and eccentric

(return lengthen) movements. To isolate the biceps femoris, rotate the lower leg outward (lateral) through the full motion up and down. Maintain the upper body on the surface to prevent back strain. A cable or knee flexion machine may be substituted when stronger. Perform 3-5 sets of 10 repetitions.

7. (A, B) Knee Flexion-Standing:

When flexion of the knee is initiated from a standing position, the stress on the kneecap (patella) is decreased, providing more consistent overload than using an ankle weight in a prone position. Stand on a 2-inch board to allow full freedom of movement. Stabilize the thigh in a straight line with the upper body to prevent action to the hip flexors. Bend the knee to a 90-degree angle and lower slowly. For greater isolation, turn the lower leg inward to provide emphasis on the semitendinosus and semimembranosus muscles. Turn the lower leg outward to best isolate the biceps femoris muscle. A cable or knee flexion machine may be substituted when stronger. Perform 3-5 sets of 10 repetitions.



7A

7B

8. (A, B) Straight Leg Hip Hyperextension:

The purpose of straight leg hip hyperextension is to provide a means of overloading the upper (proximal) hamstrings or when knee flexion (bending) is contraindicated or painful. Leg curls primarily overload the middle (belly) to distal end (insertion) of the hamstrings. The straight leg hip hyperextension exercise will isolate the proximal (origin) hamstrings. Laying prone across the end of a table or from a four point kneeling stance on the floor, extend the leg completely, pointing the toes downward. The free leg is in the same posture without major weight bearing. From a full inward rotation of the thigh, lift the leg up to a level with the upper body. The emphasis is on the proximal semimembranosus muscle. Alternating, lift the leg in the neutral position for emphasis on the proximal semitendinosus muscle. Alternating, lift the leg in full outward rotation to greater isolate the outer proximal biceps femoris muscle. Repeat this sequence for a combined total of 12 repetitions. Perform 3-5 series of 12 repetitions total. Alternate legs and perform 12 repetitions. Employing ankle weights, provide additional increments of resistance as capable. This exercise may be performed in a side lying position with surgical tubing as resistance or on the back pulling downward with tubing or a pulley system as resistance, alternating the three straight leg positions.



8A

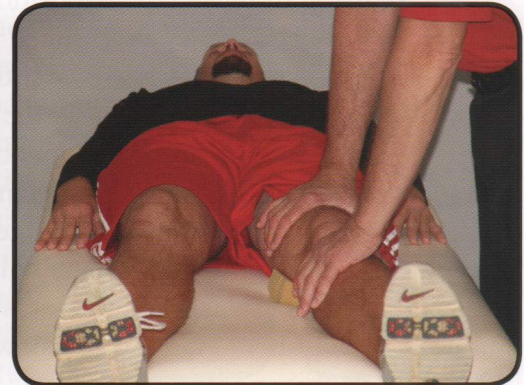
8B

9. (A, B) Quad Setting – Assisted:

When the knee is unable to fully extend, or if the joint is quite swollen, the joint may contain adhesions or surrounding muscle and fascial tissues may be shortened. The subject will be in a sitting or laying position. Place a small piece of sponge or thin pad under the knee.



9A



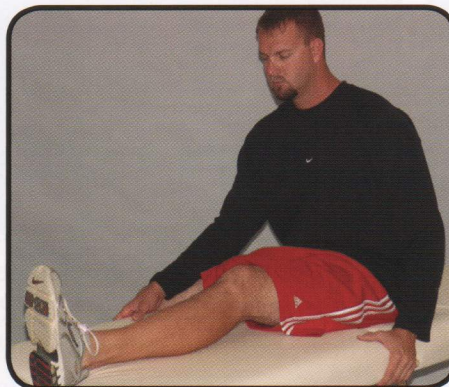
9B

Teach the subject to contract the anterior thigh muscles (quadriceps). The assistant will place one hand above the knee and the other hand below the kneecap on the upper shin. The subject will contract the quadriceps and pull the knee down towards the surface while simultaneously the assistant will push directly downward with both hands using a few ounces of pressure for 1-2 seconds. Release the assistance, return to the starting position and repeat the sequence. Gradually remove the sponge or small pad from underneath the knee. Once the knee is able to touch the surface the subject (patient) should be able to continue the exercise unassisted. (See Quad Setting). Perform 5 sets of 10 repetitions.

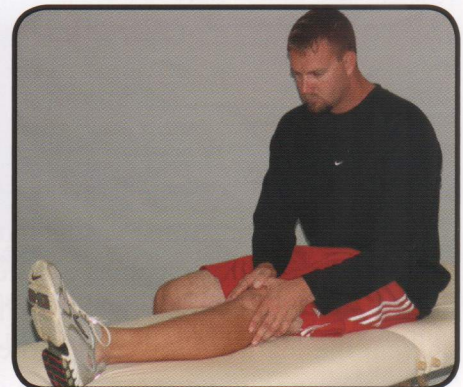


10. (A, B) Quad Setting:

The purpose of Quad Setting is to initiate quadriceps action (vastus lateralis, vastus medialis, vastus intermedius and rectus femoris) and help restore a full range of knee extension motion. Have the subject (patient) assume a sitting position or a supine position on the back. The assistant will place a small folded towel or piece of foam padding under the knee and request



10A

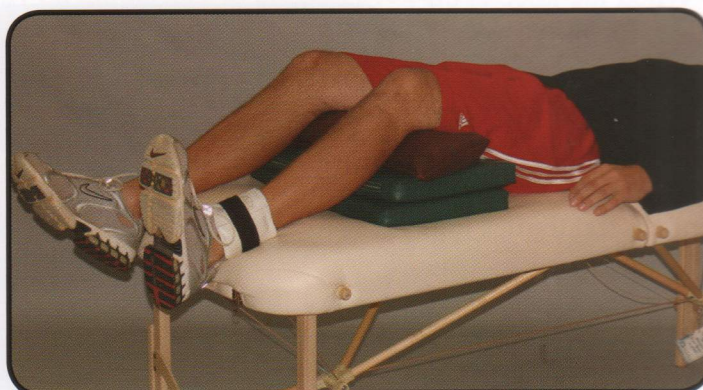


10B

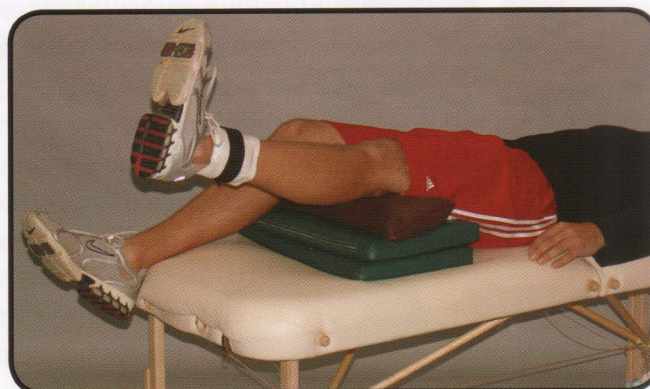
that the subject tense the muscles in the front of the thigh. Tapping or lightly squeezing those quadriceps muscles will help the subject to send stronger contraction signals to the front of the thigh. Have the subject tighten the front thigh muscles and simultaneously pull the knee down toward the surface. Hold the contraction for 5 seconds and repeat 10 times. Perform 3-5 sets of 10 repetitions.

11. (A, B) Knee Extension-Supine:

Knee Extension from the supine position is suggested when the body is weak, balance is affected or when back pain may make a sitting position difficult. Place a firm roll under the patient's legs. Instruct the subject to lift the foot backward to stimulate greater quadriceps involvement, then extend the knee completely, holding the full extension position for 5 seconds which will best insure maximal development of the vastus medialis muscle. The leg should be lowered slowly under control. The purpose of the exercise is to strengthen the quadriceps including the vastus lateralis, vastus intermedius, vastus medialis and rectus femoris muscles. The hamstring muscles are lengthened. Repeat 3-5 sets of 10 repetitions.



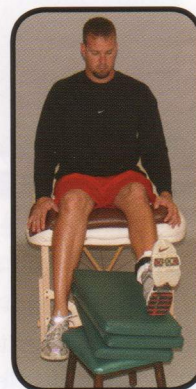
11A



11B

12. (A, B) Knee Extension-Short Arc:

This exercise is for conditions such as patella subluxation, chondromalacia, arthritis and other problems where minimal pressure on the kneecap and bone surfaces is desirable. Pull the foot backward during the exercise to stimulate greater involvement of the quadriceps including the vastus medialis, vastus lateralis, vastus intermedius and rectus femoris muscles. Place a firm padding such as a rolled up towel under the knee to elevate the thigh slightly higher than the hips. Place support under the foot to prevent the leg from lowering more than 20 degrees from full extension. The total range is no more than 5 or 6 inches of movement using ankle weights. Extend the knee for 5 seconds with the foot pulled back (dorsi-flexed). Holding the contraction 5 seconds is especially good for development of the vastus medialis muscle which will help to keep the patella from moving laterally. Increase the resistance as capable. Perform 5 sets of 10 repetitions.



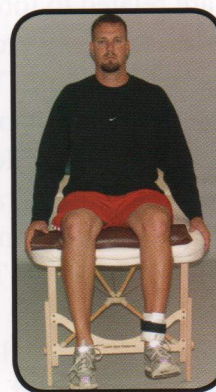
12A



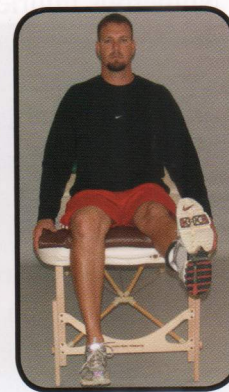
12B

13. (A, B) Knee Extension:

The purpose of knee extension is to develop the quadriceps muscles (vastus medialis, vastus lateralis, vastus intermedius and rectus femoris). The hamstring muscles are being lengthened during the process. Place a firm pad under the knees so that knee is slightly higher than the hip. The upper body should not incline backwards more than 10-15 degrees. Straighten the knee slowly until extended. Hold the contraction 5 seconds with the foot pulled backwards. Holding the contraction 5 seconds will best develop the vastus medialis muscle, which is the major key to a sound knee. If the lower leg is turned outward there is greater involvement of the vastus medialis. If the lower leg is turned inward there is greater emphasis on the vastus lateralis. Lower the ankle weight slowly under good control. Rest 15-30 seconds between sets. Increase the resistance as capable. Perform 5 sets of 10 repetitions. The subject may later use a knee extension machine, when capable, using the same principles. Perform 3-5 sets of 10 repetitions.



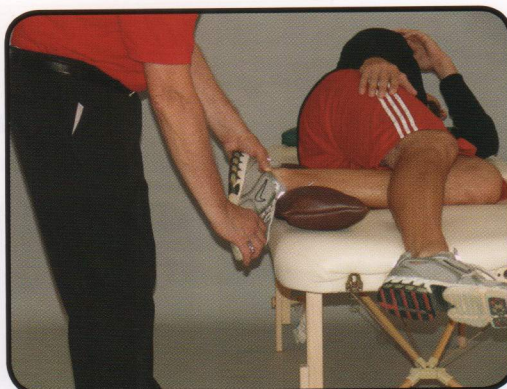
13A



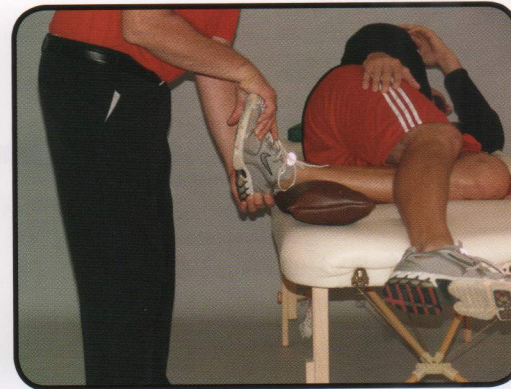
13B

14. (A, B) Knee Rotation Medial-Manual:

The purpose of knee rotations is to provide greater knee stability and help prevent rotary knee injuries, or as part of rehabilitation following surgery, especially involvement of the anterior or posterior cruciate ligaments. Medial knee rotation will strengthen the rotational aspect of the semitendinosus, semimembranosus, sartorius, popliteus and gracilis muscles. The subject is lying on the side with the knee bent at a 90-degree angle. The inside of the foot-ankle is positioned pointing downward.



14A



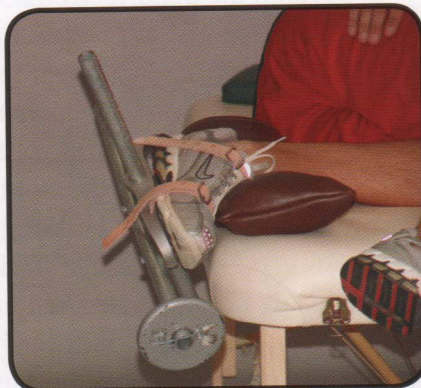
14B

A). Assistant places hand pressure on the inside of the foot with the remaining free hand on the heel.

B). Beginning with the foot pointing downward and the rotated tibia in full external rotation; apply resistance through complete internal rotation. Lower the foot to the starting position and repeat the exercise. Perform 5 sets of 10 repetitions.

15. (A, B) Knee Medial Rotation – Active Resisted:

Numerous injuries are related to torque rotation of the knee. Most knee exercise programs do not include rotation. The semitendinosus and semimembranosus (medial hamstrings) are isolated along with the popliteus, sartorius and gracilis muscles. Fasten the “Mattes Ankle Exerciser” boot to the ankle-foot. The subject will lie on the outside of the hip and bend the knee 90-degrees. Place a weight plate on the front pole of the “Mattes Ankle Boot.” (See Mattes Ankle



15A

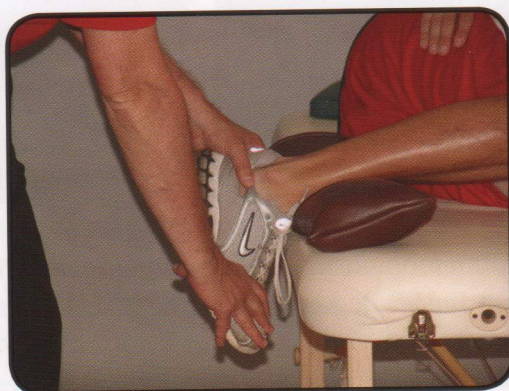


15B

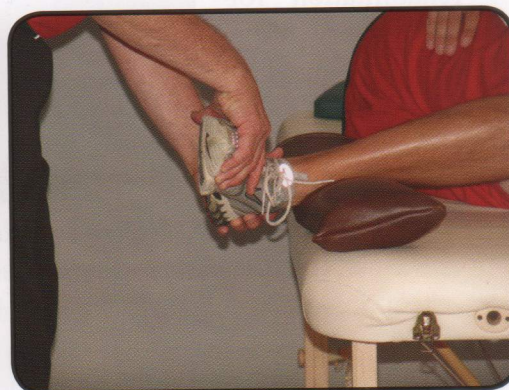
Exerciser Program). Begin by moving the front pole toward the floor and then rotate the knee (tibia) inward moving the front pole toward the ceiling. **DO NOT** allow the upper leg (hip) muscles to assist the movement. Lower the front pole slowly and repeat the movement. This exercise will help to correct the external rotation posture of the lower leg prevalent in a majority of people. Medial knee rotation should be included in anterior-posterior cruciate problems, including post surgery, or be an important part of training to help prevent such injuries. If unable to obtain the “Mattes Ankle Exerciser,” tie surgical tubing around the front of the foot and fasten the tubing to a solid anchor. Perform 5-8 sets of 10 repetitions. Add additional resistance as capable.

16. (A, B) Knee Rotation Lateral- Manual:

This exercise is specific to develop greater rotary knee stability. The lateral knee rotation exercise will help prevent rotary knee injuries or be part of the rehabilitation program following knee surgery, especially those involving anterior and posterior cruciate injuries.



16A

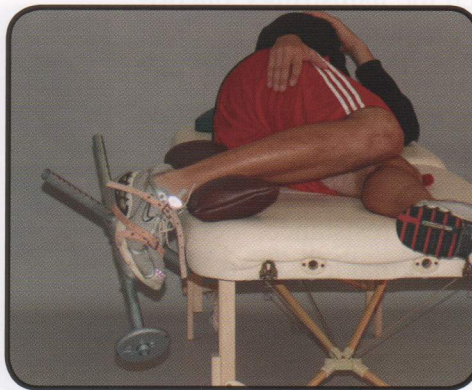


16B

This is an outstanding exercise to develop rotary strength of the biceps femoris muscle. The subject will lie on their side with the knee bent at a 90-degree angle. Place 16-20 inches of padding under the exercising top leg to make it near level with the hip. The outside of the foot-ankle is positioned pointing downward. (A) The assistant places hand pressure on the outside of the foot with the free hand on the heel. (B) From full internal rotation, foot pointed downward, provide resistance through full outward rotation (foot pointed upward). Lower the foot to the starting position and repeat. Gradually add greater hand resistance to increase the strength. Perform 5 sets of 10 repetitions.

17. (A, B) Knee Lateral Rotation – Active Resisted:

In attempting to prevent injuries, improve performance, help correct lower leg internal rotation (pigeon toed) more completely and rehabilitate anterior and posterior cruciate injuries, knee rotation exercises are important. Lateral knee rotation range is 50 degrees from full internal rotation to complete external rotation. The biceps femoris



17A

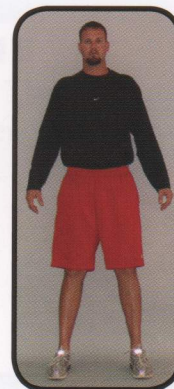


17B

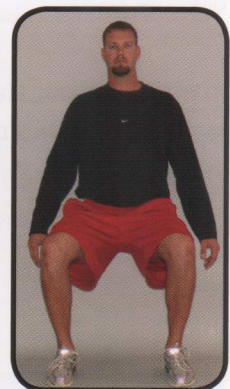
is the primary muscle responsible for external rotation of the tibia. This is accomplished using the “Mattes Ankle Exerciser” boot. (See Mattes Ankle Exerciser Program). Lying on the opposite side of the exercising leg, place 16-20 inches of padding under the exercising top leg to make it near level with the hip. Place a weight on the end of the front pipe and secure the weight. Begin the exercise from extreme internal rotation (down) and complete with a full external rotation (up). Lower the weight slowly. Do not allow the upper leg to assist the exercise. If unable to obtain the “Mattes Ankle Exerciser,” tie surgical tubing around the front of the foot and fasten the tubing to a solid anchor. Perform 5-8 sets of 10 repetitions.

18. (A, B) Wall Squats:

Wall Squats are for exercising the quadriceps (anterior thigh), hamstrings (posterior thigh) and many of the hip-knee muscles such as the sartorius, gracilis and tensor fascia latae. Place the back of the upper body against the wall with the feet positioned straight ahead about 18-24 inches from the wall. Squatting a few inches from vertical, remain squatted for 3-5 seconds and push the body up to full knee extension. Gradually work to squat of 70 to 90 degrees. Perform 2 to 5 sets of 5-10 repetitions. Advanced exercise would be progression to regular squats or leg presses.



18A



18B

19. (A, B) Step Up Exercise:

This is an excellent exercise to exercise the knee and hip muscles including the quadriceps, hamstrings, gluteals and hip flexors. Place one foot on a 6-12 inch stool. Move the body weight forward and extend the knee until the body is above the knee and lower the opposite leg back down to the floor. The same leg may repeat the exercise or one may alternate legs. This may be used as part of a knee rehabilitation program, especially following anterior-posterior cruciate ligament surgery. A very good leg and cardiovascular conditioning exercise. Perform 3-5 sets of 10 repetitions. Gradually add more sets or repetitions if desirable.



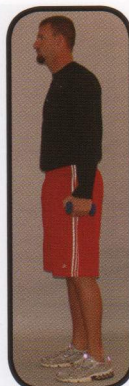
19A



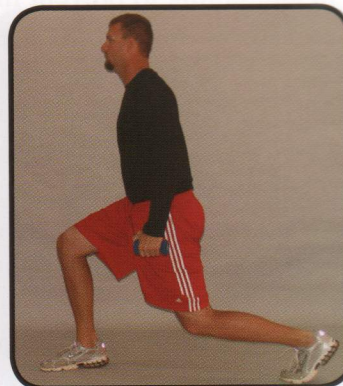
19B

20. (A, B) Step-Squat Lunges:

A more advanced exercise to strengthen the hamstrings, quadriceps and gluteus maximus muscles. Step with one foot 3 to 4 feet of distance directly in front of the exercising hip. At the same time as the step, squat until the hips are parallel with the knees. Resume a vertical position and step-squat with the opposite leg. Repeat 10-15 repetitions. When better conditioned, place a weight in either hand or use a weight vest to provide a greater resistance. Perform 3-5 sets of 10-15 repetitions. Wall squats, normal leg squats or leg presses may be used as applicable.



20A



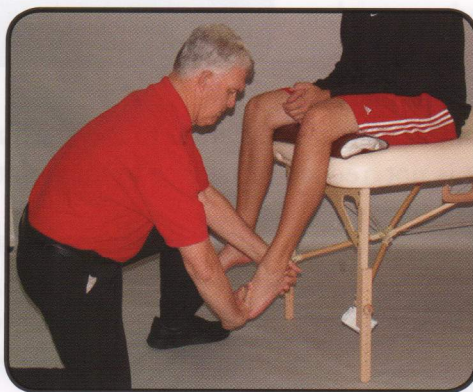
20B

Ankle Routine (Manual)

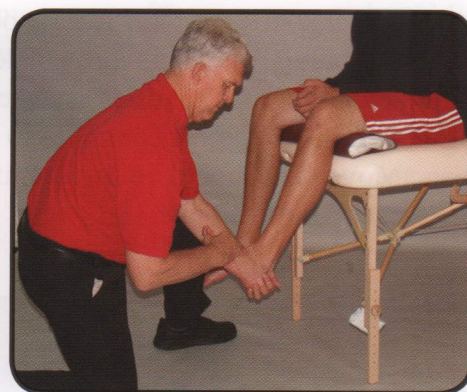
The purpose of the manual ankle routine is to increase ankle joint and subtalar joint strength, endurance and range of motion. The advantage of manual exercise is the ability of the hand to feel the tissue's capability and respond appropriately. It may be used for conditions such as post fractures, sprains of the ankle or foot and shin splints. Following sprains use motions with mild resistance for first 24-48 hours or until the doctor, trainer or therapist feels progressive resistance exercise is advisable. An exercise program of 5-8 sets of 10 repetitions is advisable until the ankle returns to near normal strength and range of motion. Increase resistance as tolerable. Proceed to Mattes Ankle Exerciser apparatus (if available) as pain and swelling decrease and full range of motion is attained.

1 (A, B) Dorsal Flexion:

Muscles to be strengthened include the tibialis anterior, extensor hallucis longus, extensor digitorum longus and peroneus tertius. The soleus and plantaris muscles are being stretched. The therapist places one hand around the heel to assist control of the exercise. Place the free hand on top of the foot slightly back from the metatarsal arch



1A

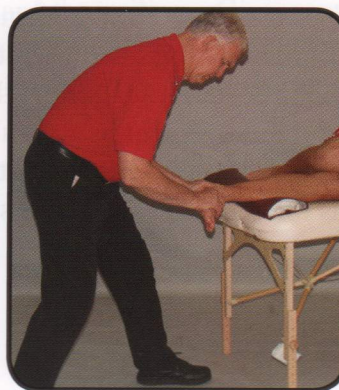


1B

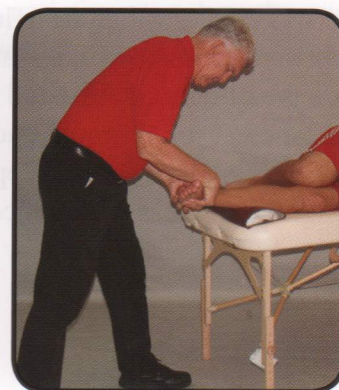
(toes). Allow subject to lower the foot towards the floor un-resisted. (1A) Then offer resistance at the top of the foot throughout full range of motion, according to the individual's strength at the moment. (1B). Lower the foot as far as possible and repeat the exercise. Perform 5-8 sets of 10.

2 (A, B) Inversion:

The muscles to be strengthened include the tibialis anterior and tibialis posterior while stretching the extensor digitorum longus, peroneus tertius, peroneus longus and peroneus brevis. The subject will lie on the side. The inner border of the foot is facing the ceiling. Place one hand on the heel. Grasp firmly, placing the thumb along the Achilles tendon. With the other hand, grasp the foot. Place the thumb under the long arch as close to the ankle joint as possible. Keep the foot at a right angle to the lower leg. Do not allow the foot to plantar flex (keep L-shape). Subject moves ankle to full eversion (downward) motion (2A) without resistance. Then assistant offers accommodating resistance with both hands as the subject turns the subtalar joint inward toward the ceiling (2B), moving with consistent effort throughout the range of motion. Slight assistive stretch is applied at terminal end of range as subject



2A

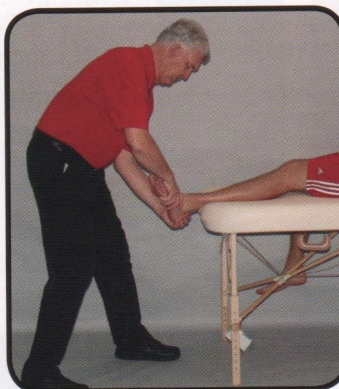


2B

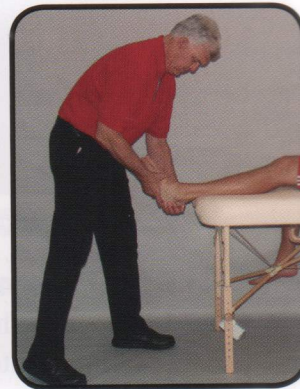
continues to attempt movement. Lower the foot as far as possible and repeat the exercise. Repeat 5-8 sets of 10.

3 (A, B) Ankle Inversion: Supine:

When subject has trouble laying on the side, the muscles may be exercised horizontally placing the subject on their back (supine). In order to strengthen the inside (inverter) muscles, resistance is applied equally at the heel (calcaneus) and around the inner portion of the mid-foot. Begin the exercise with the foot-ankle turned out. Resist with both hands as the sub-talar (anterior tibialis, posterior tibialis) muscles turn the structure inward as far as possible. The primary muscles stretched include the peroneus longus, peroneus brevis, peroneus tertius and extensor digitorum longus. Offer gentle assistance at terminal end of movement as subject continues to contract muscles. Return to the starting position and repeat the exercise. Movement should be smooth; if it is not, reduce resistance to the point where it is tolerable. Perform 5-8 sets of 10 repetitions.



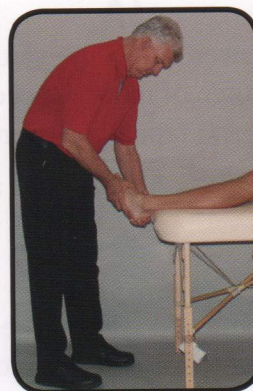
3A



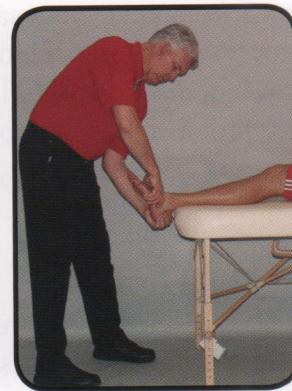
3B

4 (A, B) Ankle Eversion: Supine:

The exercise is performed with the subject lying on the back. Maintain the foot at a right angle throughout the duration of the exercise (L-Shape). When the subject is having difficulty laying on the side, the muscles may be worked horizontally with the subject on the back. To strengthen the outside (everter) muscles, resistance is applied equally at the heel (Calcaneus) and around the outer portion of the midfoot. Begin the exercise with the foot-ankle turned in and resist as the subtalar (peroneus longus, peroneus brevis, peroneus tertius extensor digitorum longus muscles. Turn the structure outward far as possible. The primary muscles being stretched are the tibialis anterior and tibialis posterior. Offer gentle assistance at the terminal end of the movement as the subject continues to contract the muscles. Return to the starting position and repeat the exercise. Movement should be smooth; if it is not, reduce the resistance slightly. Increase resistance as tolerable. Perform 5-8 sets of 10 repetitions.



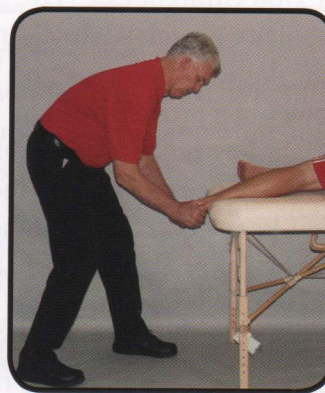
4A



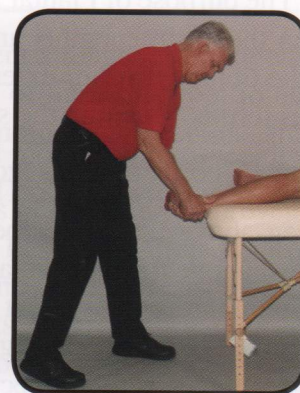
4B

5 (A, B) Eversion (Side Lying):

Eversion is a primary manual exercise that will strengthen the peroneus tertius, peroneus longus, peroneus brevis and extensor digitorum longus while stretching the tibialis anterior and tibialis posterior muscles. Position the subject so that the outside of the subtalar joint is facing the ceiling. Maintain the foot at a right angle to the lower leg throughout the duration of the exercise (L-shaped). The subject grasps the heel firmly, placing the thumb along the Achilles. The remaining hand is placed around the long arch (thumb under arch) as close to the ankle joint as possible. The subject will lower the foot toward the floor without resistance (5A). The subject then lifts the foot upward as the assistant provides resistance with both hands equally (5B). Offer gentle assistive stretch at terminal end of movement as the subject continues to contract the muscles. Lower the foot to the starting position and repeat the movement. The movement should be smooth, if it is not, reduce the resistance slightly. Increase the resistance as tolerable. Perform 5-8 sets of 10 repetitions.



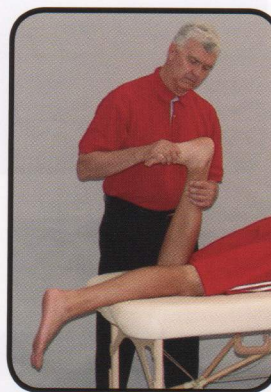
5A



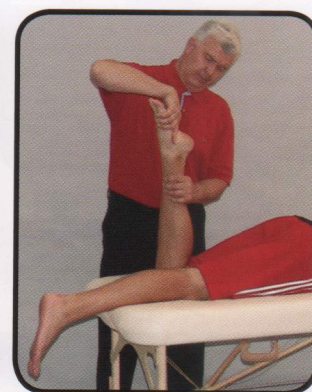
5B

6 (A, B) Plantar Flexion-Bent Knee:

This is primarily a soleus exercise as the effectiveness of the gastrocnemius is greatly diminished by flexing the knee at 90-degrees. The soleus is the primary muscle of plantar flexion when the knee is bent. It is called the second heart in Chinese Medicine because of the ability to increase blood circulation to the leg. The tibialis anterior, extensor digitorum longus and peroneus tertius muscles are stretched. Position the subject in a prone position and flex the knee to a 90-degree angle. The assistant will grasp the lower leg above the ankle. Place the other hand around the longitudinal arch of the foot. Allow the patient to dorsal flex the foot toward the table without resistance.



6A

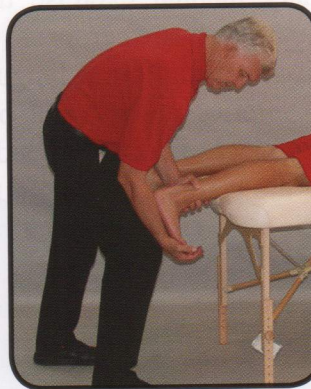


6B

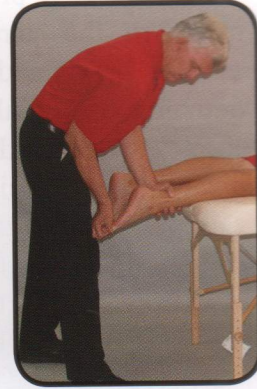
Offer resistance as the subject pushes upward toward the ceiling. Give gentle assistive stretch at the end of the movement as the muscles continue to contract. Lower the foot-ankle toward the table and repeat the exercise. Increase the resistance as capable. Repeat 5-8 sets of 10 repetitions.

7 (A, B) Plantar Flexion-Straight Leg:

The purpose of Plantar Flexion-Straight Leg is to strengthen the gastrocnemius and soleus muscles while stretching the tibialis anterior extensor digitorum longus and peroneus tertius. Position the subject in a prone position. Ask the subject to pull the foot forward as much as possible without resistance (7A). The assistant then grasps the lower leg above the ankle (below knee). Place the other hand just above the metatarsal arch. Offer as much resistance as tolerable as the subject pushes backward through the full range (7B). Provide slight assistive stretch at the end of the movement as the subject continues to contract the muscles. Have the subject move the foot forward and repeat the exercise. When pain free, the subject will progress to heel raises (up on toes as high as possible using a 2" board, employing weights in the hands or sandbags around the shoulders as tolerable). Perform 5-8 sets of 10 repetitions.



7A



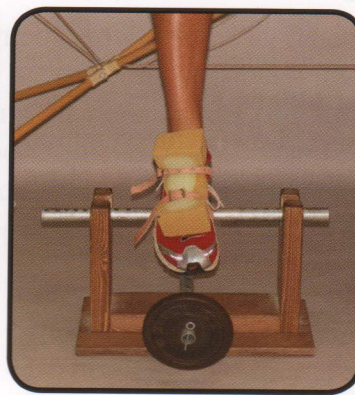
7B

Mattes Ankle Exerciser Routine

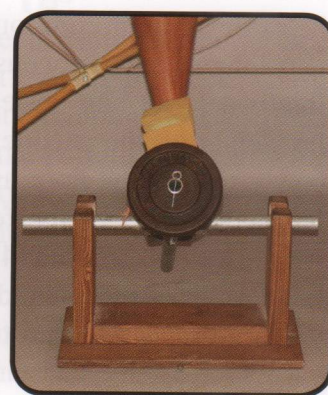
The ankle exerciser program is specific for post fracture or sprain conditions where strength and range is sufficient to begin progressive resistance. It is a method to help prevent sprains of the ankle-foot joints and lower leg muscle strains. It is intended for conditions such as compartment syndrome, shin splints and is excellent to help develop alternate blood flow routes in areas of poor circulation. This is an outstanding method, combined with foot strengthening exercises, for developing the arches of the feet. To prevent compensation, keep the knee and hip joints stable, moving only the ankle and foot. Fasten the straps tightly to prevent the foot from moving in the boot. Perform 5-8 sets of 10 repetitions. Increase the resistance as the muscles become stronger. The resistance may vary on each of the movements. The Ankle Exerciser conditions the ankle, subtalar and mid tarsal joints. A rope or strap may be used to provide greater stretch at the end of natural movement.

1 (A, B) Dorsal Flexion:

The muscles to be strengthened include the tibialis anterior, extensor digitorum longus, extensor hallucis longus and peroneus tertius while primarily stretching the soleus muscle. Place weight(s) on the front pole, lift the ankle-foot upward as high as possible with assistive stretch at the end of active movement. Lower slowly to full plantar flexion and repeat the movement. Increase resistance as capable. Perform 5-8 sets of 10 repetitions.



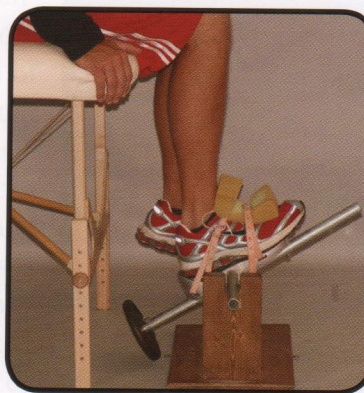
1A



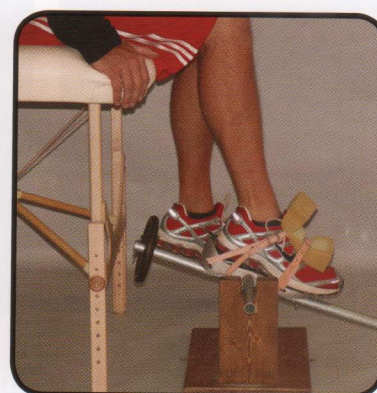
1B

2 (A, B) Plantar Flexion – Bent Knee:

This is an excellent soleus exercise. It is very helpful for people with limited circulation or poor lymph drainage. Muscles also strengthened include the plantaris, tibialis posterior, flexor digitorum longus, flexor hallucis longus, peroneus longus and peroneus brevis. Place weight on the back pole. Begin with the foot-ankle pointed upward (2A). Contract the posterior leg muscles and flex the ankle and foot toward the floor (2B). Repeat 10 times. Gradually increase the resistance as capable. Exercise 5-8 sets of 10 repetitions.



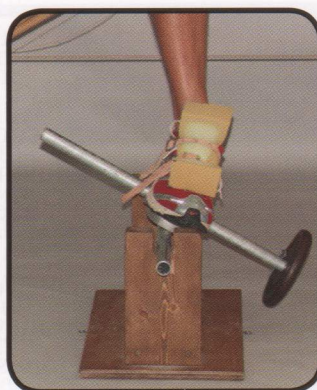
2A



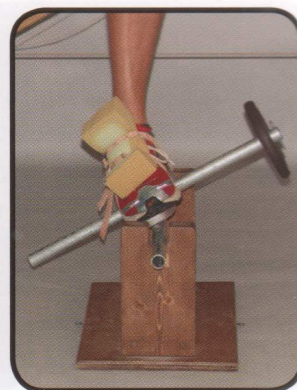
2B

3 (A, B) Inversion:

This is a specific exercise to strengthen the posterior tibialis, anterior tibialis, flexor digitorum longus, flexor hallucis longus and extensor hallucis longus muscles and stretch the extensor digitorum longus, peroneus, tertius and peroneus brevis. Place weight(s) on the inside pole. Turn the foot and subtalar joints inward as far as possible. Be careful not to involve the muscles of the hip and thigh. Lower the weight(s) slowly under control of the contracting muscles. Increase the resistance as the muscle become stronger. Repeat 10 times. Perform 5-8 sets of 10 repetitions.



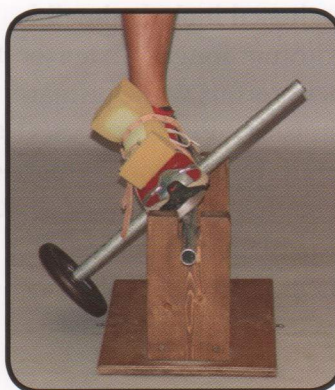
3A



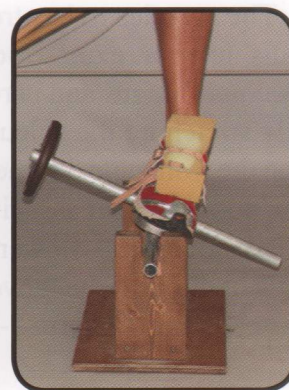
3B

4 (A, B) Eversion:

The Eversion strengthening exercise will strengthen the extensor digitorum longus, peroneus tertius, peroneus longus, and peroneus brevis while stretching the tibialis anterior and posterior tibialis muscles. Place the weight on the outside pole. Lower the weight(s) slowly toward the floor as far as possible (4A). Turn the outer border of the foot and sub-talar joints upward toward the ceiling (4B). Be careful not to involve the muscles of the hip and thigh. Repeat lowering the weight downward, then turning the outer border upward. Increase the resistance as capable. Perform 5-8 sets of 10 repetitions.



4A



4B

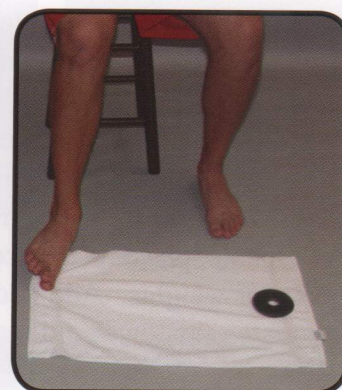
Foot Exercises

1. (A, B) Foot Pronation:

This exercise is designed to help build arch strength, rehabilitate postoperative or post injury foot and ankle problems, shin splints, ankle sprains or develop alternative blood flow potential involving lower leg circulation problems. Sitting on a chair, face the end of a towel lengthened on the wood, tile or linoleum floor. The purpose is to strengthen the intrinsic muscles of the plantar portion of the foot and the peroneus longus, peroneus brevis and peroneus tertius muscles. You may have to stretch the top muscles (extensors) of the toes in order to perform this towel exercise. The heel is resting on the surface and the foot moving as far inward from the end of the towel as possible without moving the heel. Clasp the towel with the toes, move the foot outward lifting the outer border of the foot attempting to sweep the big toe under the little toe. Return to the starting position and repeat. Dampen the bottom of the foot for greater grip of the towel. As capable, add weight such as books or weights on the opposite end of the towel. Add additional weight as capable. After using the entire length of towel, straighten the towel and repeat. Perform full towel movement 10-15 series.



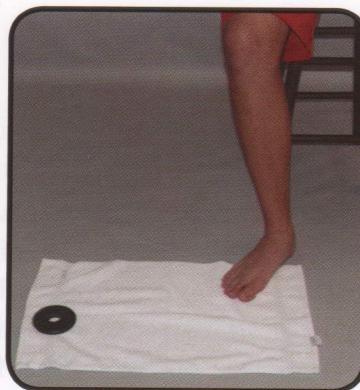
1A



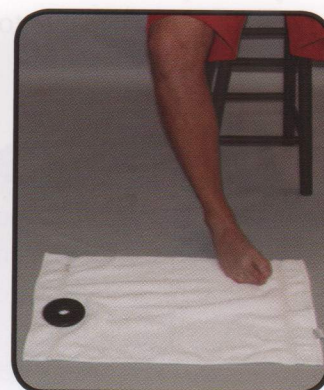
1B

2. (A, B) Foot Supination:

This exercise is a specific movement to help build arch strength, rehabilitate post operative or post injury foot-ankle problems, shin splints, ankle sprains or help develop alternative blood flow for circulatory problems. Sit and face the end of a towel lengthened on the wood, tile or linoleum floor. The purpose is to strengthen the intrinsic muscles of the foot and the flexor digitorum longus, flexor hallucis longus, tibialis anterior and tibialis posterior muscles. The posterior tibialis is the most important muscle of the arch. You may have to stretch the top muscles of the toes in order to perform this towel exercise effectively. Place the heel on the floor. Move the front foot forward toward the towel as far as possible without moving the heel. Clasp the towel with the toes, moving the foot inward as far as possible, attempting to sweep the little toe under the big toe. Return to the starting position and repeat. Dampen the bottom of the foot for a greater grip of the towel. As capable, add weight such as books or weights on the end of the towel. Add additional weight as capable. After using the entire length of the towel, straighten the towel and repeat the exercise sequence. Perform the full towel movement 10-15 series.



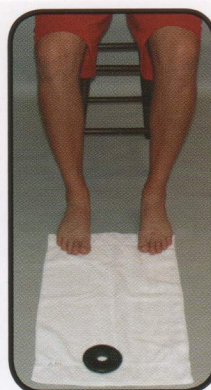
2A



2B

3. (A, B) Foot Flexion:

This exercise is designed to help build arch strength, rehabilitate post operative or post injury foot-ankle problems, shin splints, ankle sprains or circulatory problems. Exercise from a seated position with a towel lengthened on the floor. The purpose is to strengthen the intrinsic muscles of the feet including the flexor digitorum longus, flexor digitorum brevis, flexor digiti minimi, flexor hallucis longus and flexor hallucis brevis muscles. You may have to stretch the top muscles (extensors) of the toes in order to perform this towel exercise. The heel is resting firmly on the surface. Flex the foot on the front end of the towel pulling the toes under the foot as far as possible. Dampen the bottom of the foot for greater grip of the towel. As capable, place resistance on the opposite end of the towel such as books or weights. Add additional weight as strength improves. After using the entire length of the towel, straighten the towel and repeat the exercise. Perform the full towel movement 10-15 series.



3A



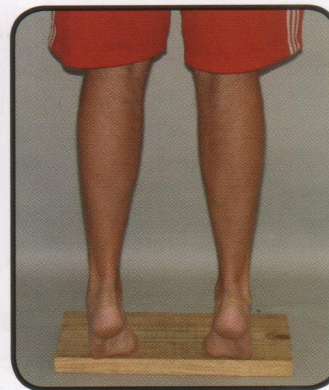
3B

4. (A, B) Heel Raises – Neutral:

The purpose of the heel raise exercise is to strengthen the gastrocnemius, soleus and plantaris muscles. When working barefoot or in stocking feet, the intrinsic muscles of the bottom (plantar section) of the foot are also strengthened. Using a 2-inch board place the toes and balls of the feet on the board with the heels on the floor. Balance the body with the hand(s) holding a stabilizing surface. Subject will raise the heels vertical onto the toes as high as possible and lower the body slowly. Perform 3 sets of 10 repetitions. Gradually advance as capable to 3 sets of 20 repetitions.



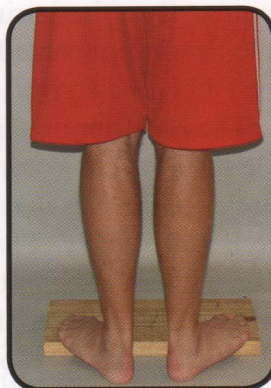
4A



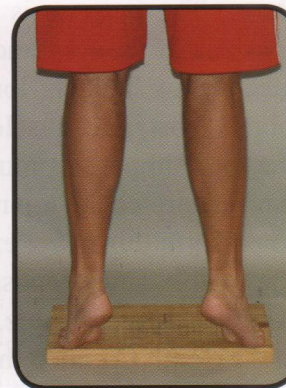
4B

5. (A, B) Heel Raises – Pronated:

The purpose of the heel raise-pronated is to provide greater isolation of the medial belly of the gastrocnemius and soleus muscles. The peroneus longus, peroneus brevis and peroneus tertius are also strengthened especially if barefoot or stocking feet. From the maximal duck-foot position (heels together, toes away), raise up on the toes and at the end of the movement pronate (turn out) the feet. Perform 3 sets of 10 repetitions. Gradually increase to 3 sets of 20 repetitions.



5A



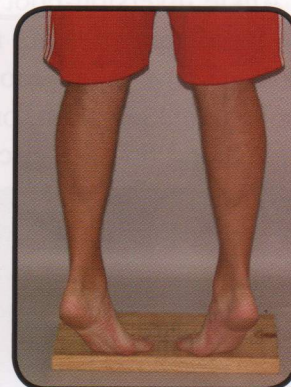
5B

6A. (A, B) Heel Raises – Supinated:

The purpose of the heel raise-supinated is to provide greater isolation of the lateral belly of the gastrocnemius and soleus muscles. The posterior tibialis is also strengthened, especially if barefoot or stocking feet. From a maximal pigeon-toed position (toes together, heels away), raise up on the toes and at the end of the movement supinate (turn in) the feet. Perform 3 sets of 10 repetitions. Gradually increasing to 3 sets of 20 repetitions.



6A



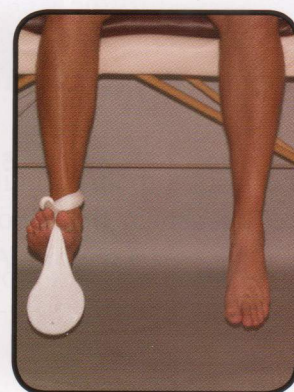
6B

7. (A, B) Ankle Dorsal Flexion:

This exercise is a movement that will help build arch strength, rehabilitate post surgical or post injury, foot problems, shin splints, ankle sprains or circulation problems. From a sitting position place a weight in a long stocking. Place the stocking between the big toe and first toe and draw the weight up close to the foot. Tie the stocking around the ankle. Lift the ankle-foot upward (dorsi flexion) by contracting the anterior tibialis, extensor digitorum longus, extensor digitorum brevis, peroneus tertius and extensor hallucis longus while lengthening the foot flexor muscles. Lift the weight as high as possible and slowly lower the foot down to full plantar flexion. Repeat 10-20 times. Exercise 3-5 sets. Gradually advance to 3 sets of 20 repetitions. Increase the weight in the stocking as capable. Add additional weight when stronger.



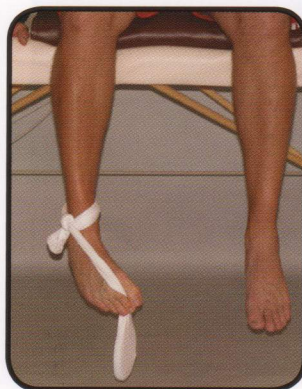
7A



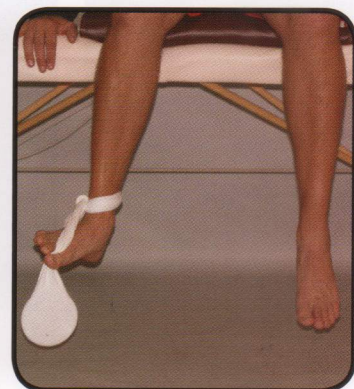
7B

8. (A, B) Ankle Eversion – Foot Pronation:

This exercise is to help build foot strength, rehabilitate post surgical or post injury foot problems, shin splints, ankle sprains or circulation problems. In a sitting position, place a weight in a long stocking. Center the stocking between the big toe and the first toe and draw the weight up close to the foot. Tie the stocking around the ankle. Lift the ankle-foot upward (dorsi flexion) and at the same time, turn the subtalar joint outward (evert), while turning the metatarsal-phalangeal joints outward and upward (pronation). Do not allow the hip muscles to assist. Contract the anterior tibialis, extensor digitorum longus, extensor digitorum brevis, peroneus longus, peroneus brevis and peroneus tertius. Lift the weight as high as possible and lower the foot slowly downward toward the floor. Perform 3 sets 10-15 times. Gradually work up to 3 sets of 20 repetitions. Add weight as the muscles become stronger.



8A

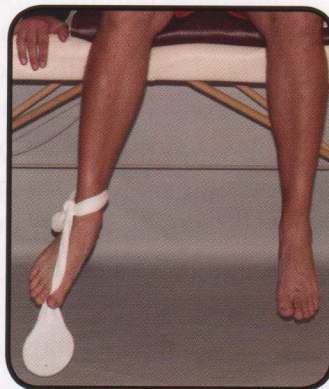


8B

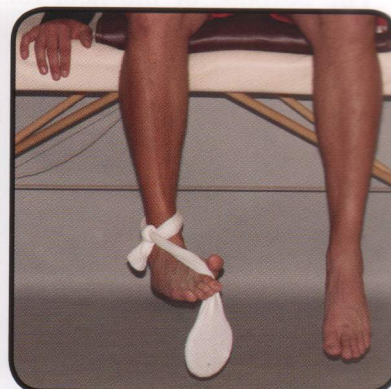
9. (A, B) Ankle Inversion – Foot Supination:

Ankle Inversion-Foot Supination is designed to build arch strength, rehabilitate post operative or post injury foot-ankle problems, shin splints, ankle sprain, or help develop alternative blood flow for circulation problems. In a sitting position, place a weight in a long stocking. Place the stocking between the big toe and the first toe and draw the weight up close to the foot. Tie the stocking around the ankle. Lift the subtalar-foot joints inward and upward. (Supination is a combination of upward and inward). Do not allow the hip muscles to

assist. Contract the anterior tibialis, flexor digitorum longus, flexor hallucis longus, and posterior tibialis muscles. Lift the weight as high as possible and slowly lower the weight downward toward full plantar flexion. Repeat 10-15 repetitions. Gradually work up to 3 sets of 20 repetitions. Add additional weight as the muscles become stronger.



9A

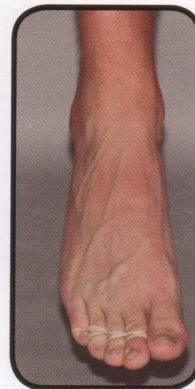


9B

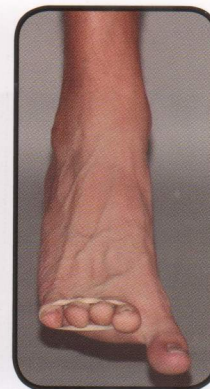
Toe Exercises

1. (A, B) Toe Abduction:

This exercise will help strengthen the toe abductors, specifically the abductor hallucis, abductor digiti minimi and dorsal interossei. This exercise is to help alleviate hammer toes, overlapped and twisted toes and to help establish proper spaces between the toes. After the muscles and fascia between each toe have been slowly stretched, place a rubber band around the outside of the big toe, wrap 1st, 2nd and 3rd toe with a rubber band and place the band around the little toe. Spread each toe as far as possible. The exercise may be performed with speed when strength and good control are present. Exercise 3-5 sets of 10.



1A



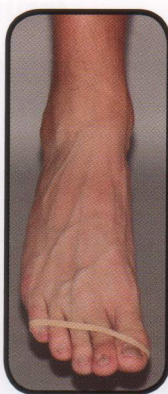
1B

2. Big (Great) Toe Abduction:

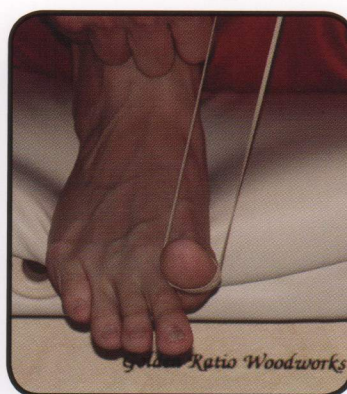
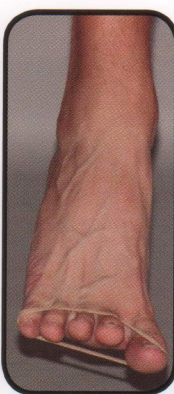
These exercises are intended to help correct bunions, hallux valgus (inward angling of the big toe) and lapped big toes and to strengthen the abductor hallucis. Stretch the big (great) toe in all planes before strengthening the outer big toe muscle. Perform the following strength exercises (A through E).

A. Move the big toe sideways with one hand stabilizing the foot below the biggest joint.

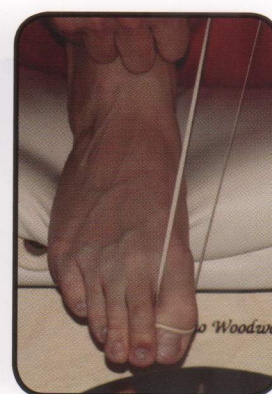
B. Flex the big toe downward, assisting with the thumbs or a hand.



2A



2B



C. Lift big toe upward and use the hand to stretch.



2C



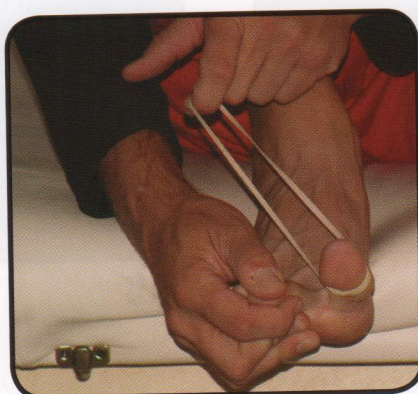
D. Lift the big toe upward at a 45-degree angle holding the rest of the toes with the opposite hand to stabilize.



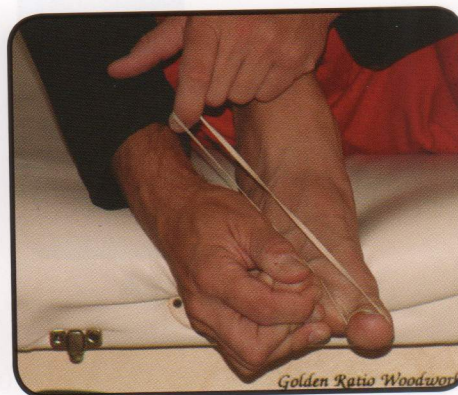
2D



E. Flex the big toe downward and outward at a 45 degree angle



2E



All of these strength exercises will help straighten the big toes and alleviate the bunion.

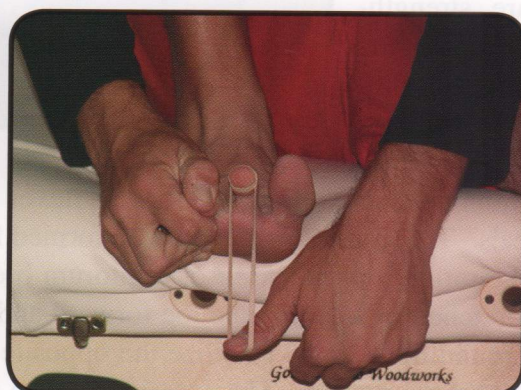
To strengthen the abduction movement of the big toe practice spreading the big toe without resistance until a good movement pattern has been established. When capable wrap a rubber band around the big toe and fasten the other end around the opposite side of the foot. Perform with greater speed when capable. Perform 3-5 sets of 10 repetitions.

3. (A, B) Toe Extension:

This exercise will help to strengthen the extensor digitorum longus, extensor hallucis longus, extensor digitorum brevis and lumbricals. Before strengthening, stretch the toe flexor muscles by lifting the toe upward with the hand assisting a



3A



3B

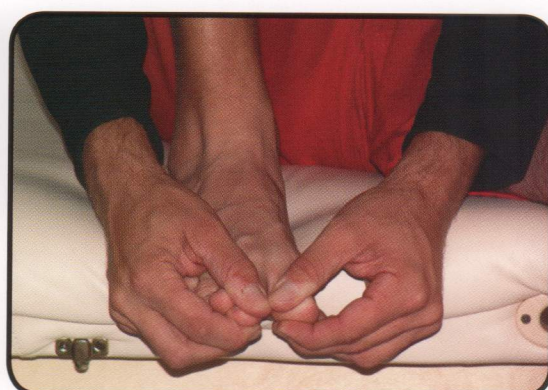
number of times. Exercise one toe, performing one repetition and move to the next toe, exercising only one repetition per series to prevent cracking of the bottom tissue of the toe. Perform 3 or 4 series of the stretching. To strengthen, wrap the rubber band around the toe and stabilize the rest of the toes. Lift the toe upward against the resistance of the band. Toe extension may also be resisted by the thumb and index finger of one hand and stabilized by the thumb and index finger of the opposite hand. Isolate with each distal and proximal joint worked separately. Perform with greater speed when capable. Exercise each toe joint 3-5 sets of 10 repetitions.

4. (A, B) Toe Adduction:

This exercise is to strengthen the adductor hallucis and plantar interossei. Stretch the tissues between each toe gently before performing toe adduction. Using both hands,



4A



4B

spread two toes and resist as the two toes attempt to pull together. Do the same stretch between exercises for each of the toes. The adduction exercise may be performed with speed when capable. Exercise 3-5 sets of 10 repetitions.

5. (A, B) Toe Flexion:

This exercise is designed to strengthen the flexor muscles of each toe. The muscles that are strengthened are the flexor digitorum longus, flexor digito-



5A



5B

rum brevis, flexor hallucis longus, flexor hallucis brevis, interossei, flexor digiti minimi brevis and lumbricals. This exercise should be performed following stretching of the toe extensors, specifically the extensor digitorum longus, extensor digitorum brevis, extensor hallucis longus and lumbricals. The extensors are stretched by bending the toe forward and assisted in gentle stretch by both thumbs. Wrap the rubber band around the toe and stabilize the opposite end of the band. Bend the toe downward as far as possible and repeat the motion. The exercise may be performed with greater speed when stronger. The movement can be maximally isolated by placing the thumb and index finger below each joint to be exercised. Resistance is applied by the opposite thumb and index finger to isolate one of the two specific joints. Perform exercise of the second joint by using the same stabilization and exercise overload. Perform 3-5 sets of 10 repetitions.

About Author

Aaron L. Mattes - Kinesiologist

Aaron Mattes received his Bachelor of Science Degree from Wisconsin State University – Superior, 1970 majoring in Physical Education. He received his Master of Science Degree from the University of Illinois, Urbana-Champaign, 1972, with special emphasis in Kinesiology and Kinesiotherapy. Aaron served as pitching coach for the University of Illinois baseball team. Mattes directed Kinesiotherapy Clinics at the University of Illinois (1972-1976) and the University of Toledo (1976-1979). His experience encompasses over 200,000 hours in instruction, rehabilitation, athletic training, adapted physical education, sports medicine, training and preventive programs. He is a registered Kinesiotherapist #449 and certified member of the American Kinesiotherapy Association. He is a licensed Massage Therapist \$3864 and a member of the Florida State Massage Therapy Association and the American Massage Therapy Association. Mattes is a member of the Association of Medical Rehabilitation Administrators, and the National Rehabilitation Association #039204. Mattes lectures internationally at sports medicine clinics, medical seminars, massage therapy conventions, and continuing education to personal trainers, nurses, strength trainers, athletic trainers, physical therapists, massage therapists, coaches and athletes. Mattes serves as a consultant to sports clubs, high school, college and professional athletes and teams. He has rehabilitated thousands of subjects including famous politicians, entertainers, and hundreds of Olympic and professional athletes. Mattes is currently Owner/Director of Aaron Mattes Therapy.

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