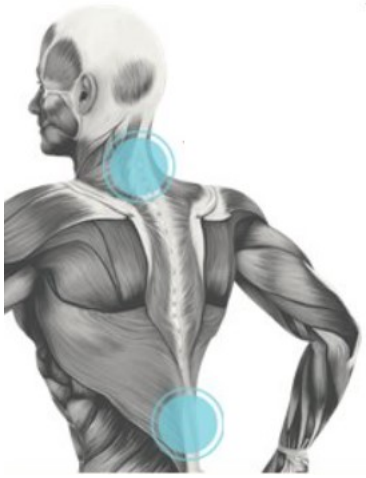


Total Spinal Fitness

# Muscle Pattern Re-Organization

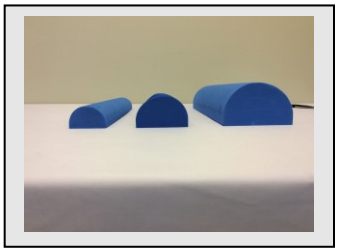
# Core Board Set up and Exercise Guidelines

# The Proprio-Core Board Clinic System Includes:

Propio Core Board

Harness

Lumbar Harness Extension Strap

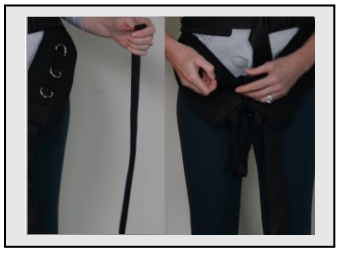


3 Priopio Pads

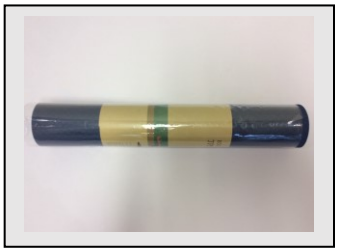
Large Resistance Band

4 Carabiners

4 Core Strengthening Bands



Accessory Strap for use without unloading band



Floor Protector/Anti-skid Pad

Wall Mount, Load Cell, Cinch Strap

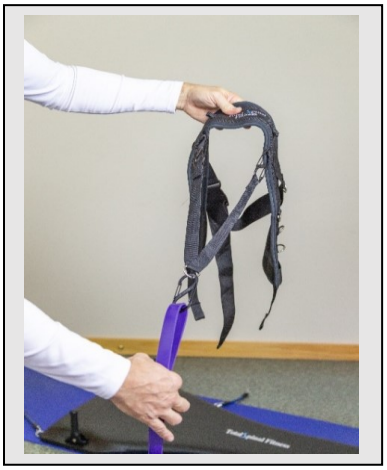
# How to Set up and Use the Proprio-Core Board System

## Setting up Harness for Clinic Unit Priopio-Core Board.

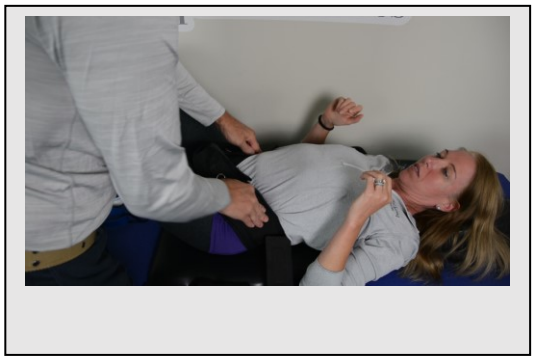
1. Install the wall mount so that the bottom of the mount is level with top of treatment table. Place the core board on the treatment table and leave plenty of room at the base of the board for the patients legs. Place the harness across the top of the core board over the top of the handles.

2. Use the nylon V strap with carabiners

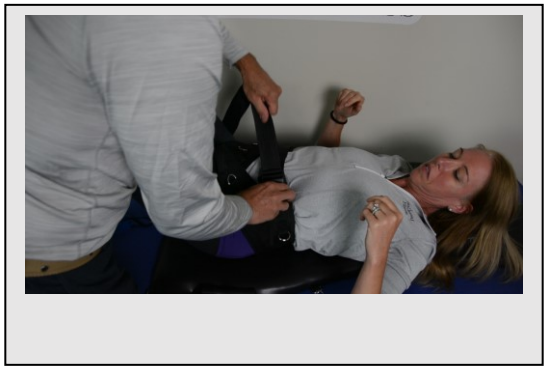
3. Attach V strap by hooking carabiners to the nylon loops at bottom of harness



4. Place one end of large resistance band strap to V strap

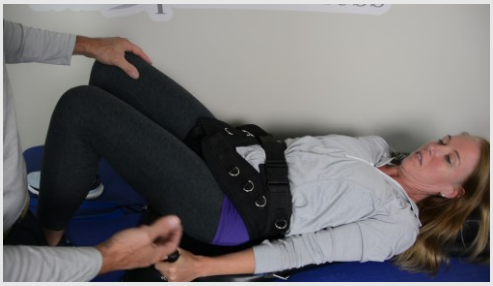


5. Have patient lay on core board with harness under the waistline so that the harness crosses over the ASIS.



6. Attach the harness with the belt.

Setting up Harness for Clinic Unit Priopio-Core Board.

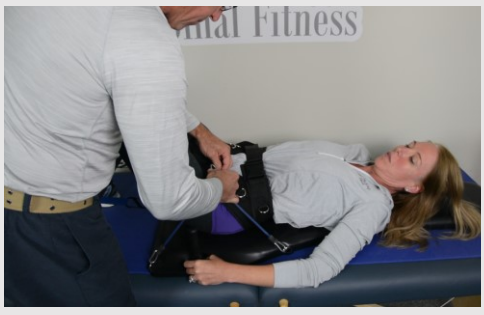


7. To properly position the patient fold up handles and have patient grasp them with arms extended.

8. Attach upper end of unloading band to nylon extensions on harness.

9. Adjust the angle of the unloading band approximately level of abdominals. Please refer to Shealy study above for reference.

10. To use the unloading band, grasp the band and pull with one hand and then take up the slack with the other hand. * When detaching the unloading band always have the patient slide toward the band and pull band to take out tension before detaching from cinch strap.

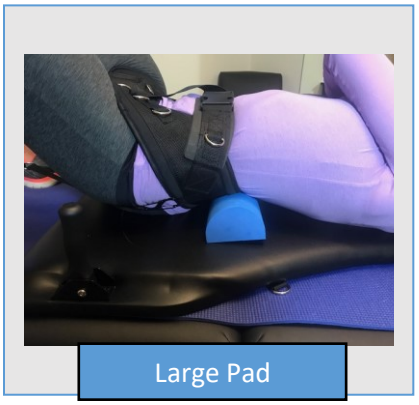


11. The last step is to attach the core bands from the board to the harness. There are several placements for the core bands. Use these different placements to adjust the tension and the angle of pull desired.

During the Functional Muscle Therapy Seminar, you will be introduced to our Core Board System and the exercises are illustrated in the manual utilizing the Core Board. You will be able to perform this Muscle Pattern Re-Organization sequence with your patients without the use of the Core Board.

## Use and Placement of the Extension Pad

The first principle to follow when instructing your patients in the use of our system is to **always** start with small movements.




Restoring segmental flexibility/mobility is a process. It was most likely a long process that led to the immobility and decreased flexibility of the lumbar segments seen in our clients and it will be a process to improve and restore spinal flexibility/mobility. The lumbar extension pad used in our system are designed to specifically improve segmental flexibility/mobility.

We recommend starting with the small extension progressing to the larger pads to increase the movement and increase the muscle activity.

The size and placement for the mobilization pads is based on your clinical assessment, the specific spinal dysfunction, and the goals intended to achieve.

Examples:

For clients that have stenosis or spondylolisthesis or when performing flexion bias treatments, we recommend having your clients perform the exercises first without any extension pad. You can progress to the small extension pad placing the apex of the small pad at the lower sacrum having the patients spine drop into slight flexion.

For Extension Oriented Treatment Approaches again begin with the small extension pad placing the apex of the pad at the L2 L3 level helps to normalize the mobility of the lumbar spine as many patients tend to already hinge from the lower segments. Progressing to the larger pad as indicated.

(See protocol chart for more specific guidelines)

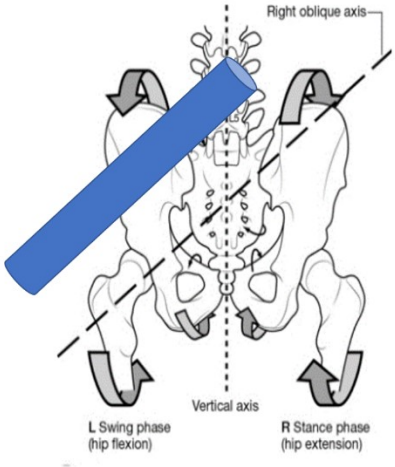
*Total Spinal Fitness System* is centered around restoring optimal spinal biomechanics.

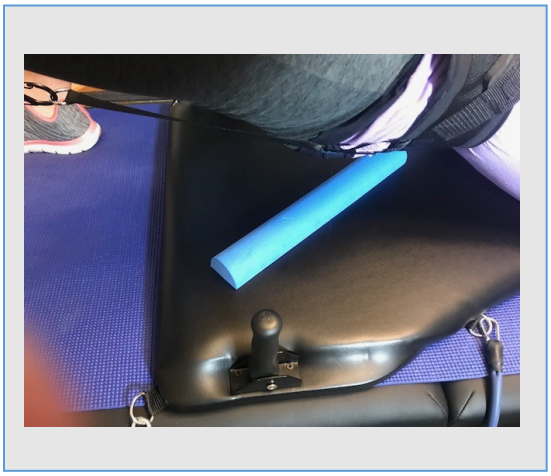
Most patients are told that walking is greatly beneficial for the back. We agree but walking with faulty lumbar biomechanics will lead to continued dysfunction and facilitate improper muscle activity and poor motor control.

If we can restore the proper Pelvic/Lumbar biomechanics of gait, then walking becomes a functional exercise to restore and maintain lumbar function.

Using the mobilization pads at an oblique axis on the pelvis and performing our specialized core exercises will help to restore these natural biomechanics of the pelvic rotation/de-rotation movements of gait.

Placement of the pads for the Pelvic/Lumbar Rotation exercise will be parallel to the R and L Oblique sacral axis. Always start with the small pad progressing to the larger pad as indicated and place the end of the pad in the center of the lumbar spine to promote optimal rotation.



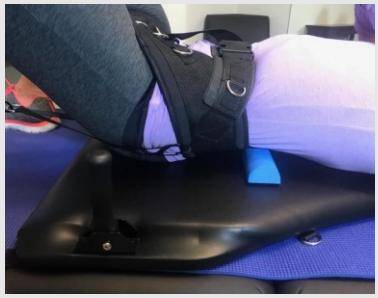
When having your client perform R pelvic rotation/de-rotation the cue will be to have the client push the L hip into extension pad, maintain L leg static, and lift the R ASIS straight up until the pelvis is level. Opposite cueing for L pelvic rotation/de-rotation.

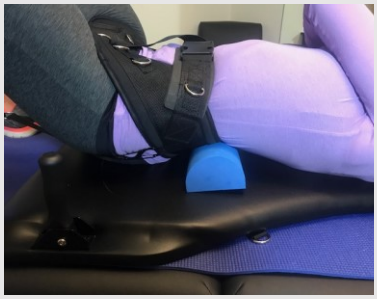
**When having the client perform mobilization make sure they are pushing back on the core board handles and initiating the movement by pushing through the legs*.

# Choosing the Pad Size and Placement for Core Strengthening

The most important aspect of our Active Decompression System is to provide optimal spinal biomechanics through sequential activation of the core spinal musculature.

The first principle to follow with instructing your patients in the use of our system is start with small movements. Using the small pads first will help to ensure the movements a small helping to facilitate active segmental movement. Progress to the larger pads to increase the movement and increase the muscle activity.

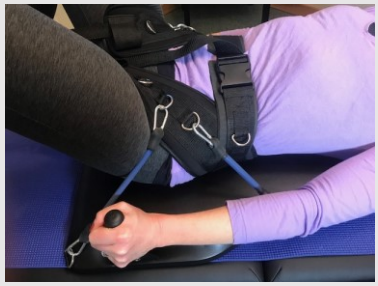




**When performing the tail bone raise and the pelvic/lumbar rotation make sure they are pushing back on the core board handles and initiating the movement with the trunk muscles not by pushing through the legs.*

## Choosing the Position of the Core Strengthening Bands

Placement of the core bands from the board to the harness with provide specialized resistance to the deep core and outer core musculature.



Always have the patient grasp the handles and extend their arms before placing the core bands.

There are four placements to accommodate different size patients and different levels of resistance. Place the bands on the D rings so that the bands are under slight tension while lying with back flat on board.

Example: Placing the front band in a front position on the harness is optimal for the pelvic/trunk rotation exercise. While placing the front band on the back D ring position is better for the hula exercise.

Core bands can be moved according at the discretion of the clinician to provide increased resistance or more isolated resistance for a specific movement.

# Gently Initiating Lumbar Extension

***The first step when beginning any corrective exercise routine is to re-establish proper movements***.

Muscle Pattern Re-Organization is a process which will optimize motor control of the lumbar spine. Which means the muscles must work in a coordinated and integrated order to ensure that they fire in proper sequence and proper degree so that the action is executed accurately. But the muscles must have sufficient strength and endurance to satisfy the demands of **segmental** spinal motor control. Therefore, we must begin by restoring segmental movement.

This maneuver will initiate segmental lumbar extension in the most noninvasive manner. While unloaded we can gently re-establish segmental lumbar extension.

1. With knees bend clasp hands and reach overhead. Repeat up to 15 times.
2. Straighten knees and repeat this maneuver.

Utilizing the proprio-core pads you will be able to provide proprioceptive feedback to the patient ensuring the corrected movement patterns can be repeated in the same manner.

# Restoring Segmental Sidebending Motor Control

This exercise is called the “Hula” because it is like the hip movements in the Hawaiian Hula dance.

Have the patient push back extending their arms until they feel a gentle stretch in the low back. Cure them to keep their back flat against the core board gently pull up the right hip, followed by pulling up on the left hip. They are gently side bending at the low back engaging the deep core muscles on the side of the spinal segments.

**Avoid** having the patient push through pain or discomfort. For example, if the patient can move the left fully without discomfort have them do so, but if pulling up on the R hip causes discomfort, their movement on the right will be much less than the left. As you continue to perform this exercise you will notice that eventually the patient will be able to move the R hip fully.

This exercise is usually the first. We are working small segmental movements, so have the patient perform small hip hikes alternating sides. With this exercise keep knees bent and back flat if the patient has any facet arthropathy or stenosis performing this exercise in extension may aggravate these joints. Have patient move through a pain free range and watch closely for compensatory shoulder movement.

Notes:

# Restoring Segmental Extension/Flexion Motor Control

Place the proprio-pad under the back a few segments above the hypermobile segments.

To perform the tailbone, raise, first have the patient push back gently using the core board handles until they feel a gentle stretch in the low back or find a pain free position. Cue the patient to keep their back against the proprio-pad slowly lift their tailbone until their spine is straight or even with the proprio-pad.

Cue patients to push through the heels to begin the exercise providing the natural motion of lumbar flexion and extension and help to facilitate the gentle movement of the lumbar discs and joints providing increased hydration and nutrition.

Cue the patient to progress this exercise by avoiding pushing with their feet and isolate the abdominals to raise their tailbone.

Although our program is designed to restore optimal segmental motor control you can see that we are also providing a self-mobilization technique which is also a great exercise to begin to restore segmental movement.

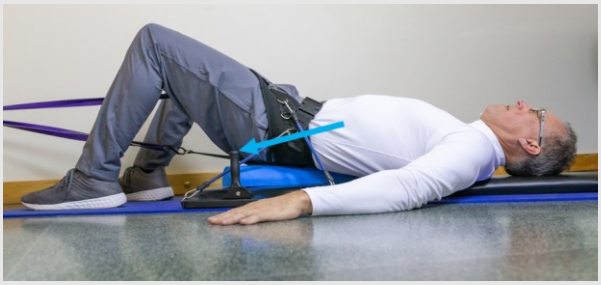
Once you have evaluated the patient begin with the small proprio-pad perpendicular to the segments above the hyper-mobile segments. The proprio-pad will give the patient proprioceptive awareness of the segmental movement. Cue the patient to push down into the proprio-pad while lifting the tailbone to the level of the pad. **Avoid** pushing through pain or discomfort. Only move through a range that is comfortable.

This exercise is extremely important as this movement performed while unloaded not only provides mobilization to the vertebrae it will safely initiate segmental extension. Restoring these natural segmental movements in a safe unloaded position helps to facilitate the disc pump mechanism which is the body's natural mechanism for providing the discs with nutrition through mechanical fluid exchange.

The different size proprio-pads and resistance bands will provide your clients with a fulcrum and the proprioceptive feedback to ensure correct and repeatable movement patterns. This exercise can be progressed to isolated resisted Rectus Abdominus strengthening while the spine remains in a decompressed position.

# Restoring Lumbo-Pelvic Rotation and Motor Control

# (Unilateral Multifidus)



Place the proprio-pad at an angle from center of back and under the left hip. One end of the back pad will be at the center of the low back (approx. L3) and the other end will cross the hip as if over the back pocket of their pants. This will establish the L oblique axis of the sacrum.

The right leg should be more extended than the L.

Cue patient to push back using the core board handles until they feel a gentle stretch in the low back. Then cue the patient to push down into the proprio-pad with and then gently raise the right hip straight up toward ceiling until your spine is level.

Have the patient push through their heels to begin the exercise providing the natural motion of lumbar/pelvic rotation to provide gentle movement of the lumbar discs and joints facilitating increased hydration and nutrition.

Progress this exercise by cueing the patient to avoid pushing with their feet and isolate their abdominals to raise and de rotate the hip.

Repeat this exercise with the back roll under the right hip and raise the left hip. Avoid pushing through pain or discomfort. Only move through a range that is comfortable.

This exercise is a great exercise to restore the natural movement of gait. This exercise is also a great exercise to begin to re-establish the Multifidus. When the patient is pushing down against the proprio-pad they are engaging the Multifidus to de-rotate the lumbar spine. This gentle segmental rotation will also improve collagen healing by placing tensile load in line with the fibers of the annulus.

Progressing the patient to use the Obliques, and TA will really help re-establish optimal motor control between the inner core (Multifidus, Rotatores) and outer core (Obliques and TA)

Avoid pushing through pain or discomfort. Only move through a range that is comfortable.

# The Clinical Significance of Restoring Lumbo-Pelvic Rotational Synergy.

## 1. Re-establishing and optimizing the mechanics of the gait cycle.

This exercise is a very powerful and important exercise as this movement pattern re-establishes the functional rotational movements associated with the oblique axis's of the sacrum. Our lumbar spine was designed to move segmentally in synergy with the sacrum and pelvis. We utilized the most functional movement of the lumbo-pelvic region and re-pattern, or re-establish, the natural biomechanics that occur during the gait cycle. This is the only system that provides resisted unilateral isolated Multifidus strengthening. With the use of the proprio-pads and resistance bands your clients will get the proprioceptive feedback to isolate these muscles. This exercise is initiated with isolated unilateral Multifidus strengthening and progressed through Muscle Pattern Re-Organization restoring the synergy of the Oblique's and TA with the deep core while performing functional rotation/de-rotation of the pelvis.

## 2. Reducing the loads on the lumbar discs.

Clinical studies reveal that a rhythm with high pelvic rotation and low lumbar flexion involved more global muscles and increases the role of the disc in resisting spinal loads while its counterpart, with low pelvic rotation, recruits more local muscles and engages the ligaments to lower the disc loads. On the other hand, restoring a **normal rhythm** that has balanced pelvic and lumbar rotations yields almost **equal** disc and ligament load-sharing and results in more balanced synergy between global and local muscles. This demonstrates that the spinal response during movements that involve loading the discs is highly dependent on the lumbo-pelvic rhythm.

**Tao Liu, Kinda Khalaf, Samer Adeeb, Marwan El-Rich: Effects of lumbo-pelvic rhythm on trunk muscle forces and disc loads during forward flexion: A combined musculoskeletal and finite element simulation study: Journal of Biomechanics 2019 Jan 3;82:116-123**

Notes:

# Isolated Lumbar Extension (Multifidus)

**Isolated lumbar extension will engage the Multifidus muscles which are particularly important muscles they help to take pressure off the vertebral discs so that our body weight can be well distributed along the spine**.

Without the proprio-pad under the patients back cue them to use the handles and push back until they feel a gentle stretch in the low back, then cue them to push their sacrum and tailbone down into the core board, they may feel the tail bone slide up the core board slightly creating a slight arch in your low back. Have them hold an isometric contraction in this position for 5 seconds then relax.

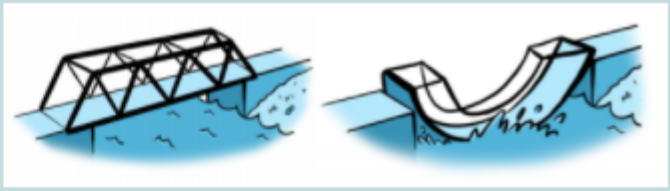
You will be surprised at the difficulty patients have performing this exercise. Watch them closely as you will see the chest rise to compensate for poor segmental lumbar motor control. Have the patient push isometrically initially with only 25% max effort and increase force slowly. Be cautious with stenotic patients and with facet arthropathy.

Avoid pushing through pain or discomfort. Only move through a range that is comfortable.

Notes:

The oblique orientation of the Multifidus muscles provide deep core stability as they act as cross struts. Without this segmental cross strut stabilization we will not have true core stability.

I use the analogy of a bridge fabricated from metal beams. Without the cross struts the bridge would collapse when any stress placed on it. When it comes to the importance of the Multifidus in stabilizing the spine this is a perfect example of their structural importance.



Strengthening the Erector Spinae and Rectus Femoris and the other outer core muscles without the structural support of active Multifidus muscles would be like building a bridge without cross struts. Although the TA and Oblique's can also act as cross struts for the trunk they have no direct control over the segmental stability therefore do not help restore optimal spinal biomechanics leading to continued dysfunction.

# Improving Motor Control of the Outer Core Muscles

## Bridging

**The Gluteal Muscles Back Extensors are powerful outer movement muscles and not only help to functionally extend the spine with lifting they also provide stabilization when bending and squatting.**

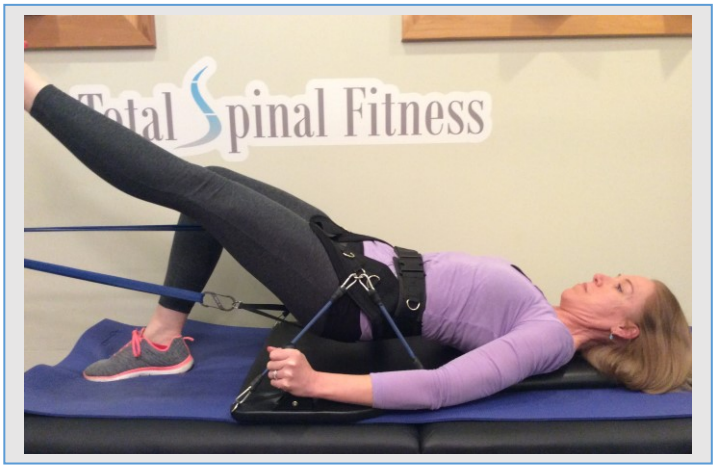
Without the proprio-pad under the patient cue them to push back with the handles until they feel a gentle stretch in the low back, then have them lift hips up performing a bridge. Good to cue the patient to perform pelvic tilt first to avoid too much lumbar extension.

Avoid pushing through pain or discomfort. Only move through a range that is comfortable.

Notes:

# Improving Motor Control of the Outer Core Muscles

## Single Leg Bridge




**The Gluteal Muscles are powerful outer movement muscles and not only help to functionally extend the spine with lifting they also provide stabilization when bending and squatting. This exercise is an advanced strengthening exercise and will really improve functional Gluteal and Back Extensor Strength.**

Without the proprio-pad under the patients back have them use the handles and push back until they feel a gentle stretch in the low back, then have them straighten their L leg and lift your hips up performing a bridge with their right leg only. Cue them to keep hips level with the floor.

Avoid pushing through pain or discomfort. Only move through a range that is comfortable.

Notes:

## Combining Motor Control of the Deep, Intermediate, and Outer Functional Core Muscles

### Bridging Combined with Pelvic Rotation

**This exercise combines bridging with pelvic rotation, combining all functional core levels.**

Without the back pad under the patients back have them use the handles and push back until they feel a gentle stretch in the low back, then lift their hips up performing a bridge. While holding the bridge positions cue the patient to alternate rotating hips.

**Advanced: Perform this exercise while maintain a single leg bridge**

Avoid pushing through pain or discomfort. Only move through a range that is comfortable.

Notes:

# The following exercises are examples of advanced core strengthening and sports specific training.

It is the ability of the muscle system to **rapidly** fire an antagonist or synergistic muscle that will protect the underlying joints and soft tissue structures from injury. When it comes to protecting against injury we must incorporate proprioceptive specific **rapid transitional movements**. The following exercises are a few of the many advanced exercises focusing on re-establishing and optimizing rapid transitional movements of the deep core and trunk musculature.

## Advanced Pelvic Rotation

## Initiating Rapid Transitional Movements

This is the same as the pelvic rotation to the right. Proprio-pad is under the left oblique sacral axis.

This exercise is initiated with a rapid movement into de-rotation followed by further rotation while raising off the proprio-pad.

Avoid pushing through pain or discomfort. Only move through a range that is comfortable.

# Advanced TA

With proprio-pad on the left sacral oblique axis, begin with arms extended, rotate to the left raising the shoulder blade and right hip.

Repeat on opposite side.

Avoid pushing through pain or discomfort. Only move through a range that is comfortable.

Notes:

# Combined Pelvic De-Rotation with UE Rotation

With proprio-pad on the left oblique axis, begin with arms extended and upper trunk rotated left, rotate arms and upper trunk to the right at the same time de-rotating right hip.

Repeat on other side.

Further resistance can be added by placing weights in the hands.

Avoid pushing through pain or discomfort. Only move through a range that is comfortable.

Notes:

# Combined Pelvic De-Rotation with UE Rotation utilizing Plyometrics

With proprio-pad on the right oblique axis, begin with arms extended and upper trunk rotated right, toss a small weighted plyo-ball and as the patient catches the ball, they will quickly rotate arms and upper trunk to the left at the same time de-rotating left hip.

Repeat on other side.

Avoid pushing through pain or discomfort. Only move through a range that is comfortable.

Notes:

# Advanced Functional Intermediate Core Strengthening

This is closed kinetic chain external rotation of the hip. While standing on right leg with resistance band attached to left hip, rotate to the left until facing forward. Always maintain belt line parallel to the floor and rotate until your trunk is facing forward.

**Do not rotate beyond this position to avoid twisting right knee.**

Top picture demonstrates how to initiate this exercise utilizing support.

Middle picture advances the exercise without support.

Bottom picture advanced the exercise utilizing a weight in the upper extremities.

Avoid pushing through pain or discomfort. Only move through a range that is comfortable.

# Protocol Suggestions

These are important guidelines to follow when beginning to use the Total Spinal Fitness System. Total Spinal Fitness highly recommends following these guidelines. Progressing your clients through the phases may be accelerated as determined by the practitioner but we highly recommend carefully assessing your client's response before accelerating the progression.

Initially begin by introducing the movements and exercises without the use of the Core Board. It is important to make sure your clients learn to perform the movements correctly before initiating the resistance bands. Muscle Pattern Re-Organization is based on normalizing the sequential firing patterns of the muscles involved in spinal biomechanics. Initial instructions are to perform the prescribed exercises in 5-10-minute sessions and perform 3-4 sessions a day. It is the repetitive input of these new/correct movement patterns that will build the foundation for the CNS to reestablish proper muscle pattern re-organization.

The following chart is a suggested protocol for extension-oriented treatment approach.

| **(EOTA) Extension Oriented Treatment Approach** | **Phase 1 (week 1) If patient can perform all movements correctly without discomfort move to phase 2** | **Phase 2 (week 2-3) If patient can perform all movements correctly without discomfort move to phase 3** | **Phase 3 (week 3-6)** |
|---|---|---|---|
| Mobilization Pad | Small | Can progress to medium pad | Can progress to large pad |
| Large Resistance Band | none | 35 lbs. max stretch | 45 lbs. max stretch |
| Small Core Board Resistance Bands | none | Yes, use core bands on harness to provide resistance. See Manual | Yes, use core bands on harness to provide resistance |
| **Tailbone Raise** | 3 sets of 30 | 3 sets of 15 | 3 sets of 20 |
| **Hula** | 3 sets of 30 | 3 sets of 15 | 3 sets of 20 |
| **Pelvic Rotation** | 3 sets of 30 | 3 sets of 15 | 3 sets of 20 |
| **Multifidus Exercise** | none | 3 sets of 15 | 3 sets of 20 |
| **Bridging** | none | 2 sets of 15 | 3 sets of 15 |
| **Single leg bridging** | none | 2 sets of 15 | 3 sets of 15 |
| **Combined Bridging/Pelvic Rotation** | none | 2 sets of 15 | 3 sets of 15 |
| | | | |

In phase 2 you can have your patients begin to perform functional standing core strengthening such as the resisted sidestepping and standing trunk rotation.

# Protocols

For disorders such as spondylolisthesis and stenosis we recommend a flexion-oriented treatment approach.

| **(FOTA) Flexion Oriented Treatment Approach** | **Phase 1 (week 1) If patient can perform all movements correctly without discomfort move to phase 2** | **Phase 2 (week 2-3) If patient can perform all movements correctly without discomfort move to phase 3** | **Phase 3 (week 3-6)** |
|---|---|---|---|
| Extension Pad | none | Can progress to small pad under lower sacrum | Continue with small extension pad under lower sacrum |
| Large Resistance Band | none | 35 lbs. max stretch | 45 lbs. max stretch |
| Small Core Board Resistance Bands | none | Core board resistance bands can be used on harness to provide resistance. See Manual | Core board resistance bands can be used on harness to provide resistance. See Manual |
| **Tailbone Raise** | 3 sets of 30 | 3 sets of 15 | 3 sets of 20 |
| **Hula** | Do not perform | Do not perform | Do not perform |
| **Pelvic Rotation** Unilateral Multifidus | 3 sets of 30 | 3 sets of 15 | 3 sets of 20 |
| **Segmental Extension** Bilateral Multifidus | 3 sets of 10 isometrics | 3 sets of 15 isometrics | 3 sets of 20 isometrics |
| **Bridging** | none | 2 sets of 15 | 3 sets of 15 |
| **Single leg bridging** | none | 2 sets of 15 | 3 sets of 15 |
| **Combined Bridging/Pelvic Rotation** | none | 2 sets of 15 | 3 sets of 15 |
| | | | |

In phase 2 you can have your patients begin to perform functional standing core strengthening such as the resisted sidestepping and standing trunk rotation.

# Disc Protocol

The disc / deep stabilization protocol will initiate gentle movement and begin with isometric strengthening of the deep core while protecting the injured disc.

Initiate segmental movement.

With proprio-pad under the injured disc maintaining an extension position of the lumbar spine have the patient gently push back “rocking” back and forth over the pad. Pad placement should be directly under the injured disc.

Deep Lumbar Extensor Isometrics.

Have the patient perform an isometric contraction of the deep spinal extensors. With the back in a safe position of extension, begin by having the patient push the sacrum into the table at 25% maximal effort. Have the patient hold for over 90 seconds for up to 8 sets. Never have the patient push through any pain.

Notes:

Unilateral Multifidus Isometrics.

With the proprio-pad on the right sacral oblique axis, have the patient roll to the left side maintaining a stable lumbar spine. This is accomplished by having the patient rotate from the thoracic spine by rotating both knees to the left. Then help the patient to de-rotate the pelvis from the thoracic spine by raising the left hip by rotating both knees at the same time the left hip raises.

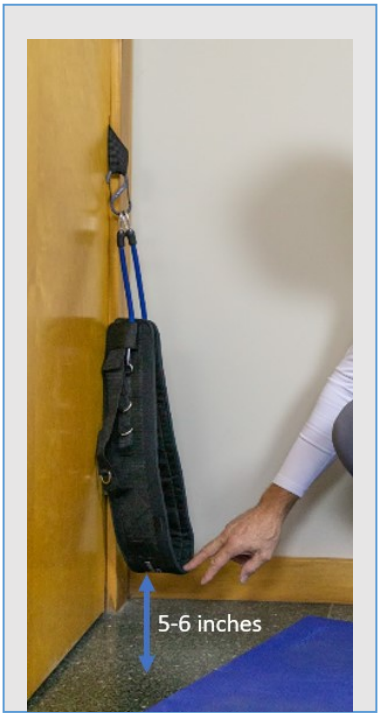
Unilateral Multifidus Isometrics.

Now have the patient isometrically hold this position.

This exercise can be advanced by utilizing the core resistance bands or if not utilizing the core board the therapist can provide resistance by pushing down on the right hip. Have the patient hold this isometric contraction beginning at 25% max for 8 sets of 90 seconds. Never have the patient push through any pain.

Notes:

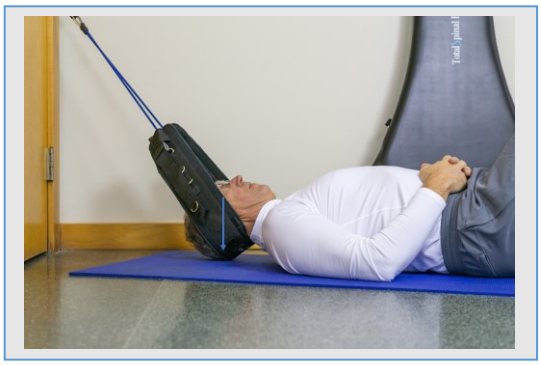
## Cervical Exercises




When identifying the height of the cervical harness place the harness at a height so that the bottom of the harness hangs about 5-6 inches from the floor or treatment table. This can be moved higher as tolerated by the patient.

Several years ago, a Physical Therapists developed what he called the Cervical Hammock. The Cervical Hammock was virtually the same mechanism we use for our cervical exercises. The difference is we have the patients perform exercises while in the harness to promote fluid exchange to the cervical discs and promote deep cervical core strength.

## Axial Extension



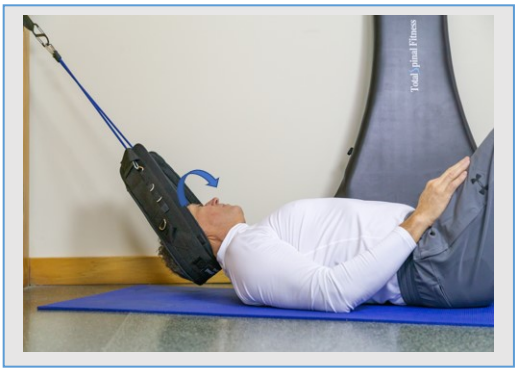
This exercise with increase the core strength of the cervical spine as well as improve segmental axial extension.

Have patient gently pull cervical harness over their head so that it covers their ears. Cue the patient to move to a position so that their head is supported, and they feel a gentle neck stretch.

Then tuck your chin as if your head is going straight down toward the floor. Repeat 10-15 times

Avoid pushing through pain or discomfort. Only move through a range that is comfortable.

# Restoring Cervical Rotational Motor Control



This exercise will gently improve segmental muscle control.

Have patient gently pull cervical harness over their head so that it covers their ears. Cue the patient to move to a position so that their head is supported, and they feel a gentle neck stretch.

Cue patient to turn their head to the right until you feel a little resistance. Repeat 10-15 times turning each direction.

Avoid pushing through pain or discomfort. Only move through a range that is comfortable.

Notes: