

Exercise Rehabilitation of the Core and Spine

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Spinal Health and Core Training
An Interdisciplinary Approach for Health, Fitness, Rehabilitation and Performance

By Rick Kaselj, MS

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My Story

Rick Kaselj

- Exercises and injuries
- BSc – 1997
- MS – 2008 / RC
- Work – physio, studio, gym, rec centre, rehab
- Courses – live, webinars, video presentations
- Writing – books, manuals
- Blog – ExercisesForInjuries.com



Rick Hiking 4300 km / 5 months from Mexico to Canada

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How I See This Fitness/Exercise Thing?

- **It's a Continuum:**
 - Rehabilitation
 - Health
 - Fitness
 - Performance

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Building on Good

- **“Does the exercise make it better, worse or the same?”**
 - We want to build on “better”

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How to Approach This Session?

- **You have a back flare up or if you have a client with a back flare up, what would you do?**

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My Focus

- **Rehabilitation**
 - I do not diagnose
 - Focus on movement
 - Medical clearance to start an exercise program
 - Debilitating
 - Neurological signs
 - No improvement

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Components of a Back Pain Program

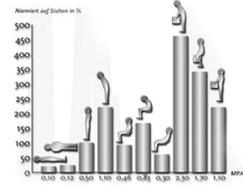
1. Positional Load
2. Breathing
3. Mindset
4. Visualization
5. Core Stability
6. Self Massage
7. Stretching
8. Mobility
9. Hip/Back Separation
10. Movement
11. The Wall

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#1 - Loads and Back Pain

- **Key Things:**
 - Supine
 - least
 - Compression
 - minimal change
 - Trunk forward
 - Increase
 - This is posture stuff



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#1 - Low Spinal Load Position

- **Crook Lying Position**
 - Calves resting on something
 - Ankle-knee-hips at 90
 - Arms to the side
 - Palms up
 - 5-minutes

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#2 - Breathing

- **4-Way Belly Breathing**
 - Belly up
 - Hand on stomach and chest
 - Belly to the side
 - Hand on side of stomach and on chest
 - Belly back
 - Hand under back and on chest
 - Bring it all together

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#2 - Breathing

- **Cueing**
 - Blowing the tension out
 - Blowing the pain out
 - Blowing in the injury out
 - Brining in good energy
 - Brining in strength
 - Brining in the rejuvenation

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#2 - Why Breathing?

- *“Patients with chronic low back pain appear to have both abnormal position and a steeper slope of the diaphragm, which may contribute to the etiology (study of causes) of the disorder.” - Kolar 2011*
- *“Unlike obesity and physical activity, disorders of continence and respiration were strongly related to frequent back pain.” - Smith 2006*
- *“Relaxation training gave better results in reducing EMG and pain, and in increasing relaxation and activity than either EMG biofeedback alone or a placebo condition.” - Stuckey 1986*

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#3 - Mindset

- ***Negative Mindset***
 - What have I done?
 - How bad is it?
 - Is this going to affect my....?
 - Is this pain ever going to go away?
 - How long am I going to be like this?

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#3 - Mindset

- ***Positive Mindset***
 - It will get better
 - This will pass
 - This has been a good sign and lesson
 - This is an opportunity

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#3 - What, Mindset?

– “Core stabilization has been advocated as preventative, but offered no such benefit when compared to traditional lumbar exercise in this trial. Instead, a brief psychosocial education program that reduced fear and threat of low back pain decreased incidence of low back pain resulting in the seeking of health care. Since this trial was conducted in a military setting, future studies are necessary to determine if these findings can be translated into civilian populations.” - George 2011

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#4 - Visualization

- You are improving
- You are getting better
- It is almost behind you
- The movements you are working
- The muscles you are working on
- How you are performing the movement

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#4 - Visualization

- *“These results suggest that the virtual LBP stimuli caused memory retrieval of unpleasant experiences and therefore may be associated with prolonged chronic LBP conditions.”* - Shimo 2011

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Exercise Mastery

- See It
- Hear How it is Done
- You Need to Do it
- You Need to Teach It
- (Write it out)

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Exercise Mastery

- **Lets Do It**
 - Low Load Position – 5 minutes
 - Breathing
 - Mindset
 - Visualization
- **Go Teach Someone**

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#5 – Core Stability

- **Focus on the Inner Unit**

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3 Components of Joint Stability:

- **Passive System → bones, joints, ligaments**
- **Active System → muscle, fascia**
- **Control System → neural (controls the active & passive systems)**

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Which is the System we Can Influence the Most Using Exercise?

- **Active System**

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More Than Just Strength

- **Activation**
- **Endurance**
- **Strength**
 - Resisting movement
 - Force production
 - Fighting Gravity

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Muscular Stability of the Lower Back & Pelvis Can be Broken Down into 2 Components:

- **Inner Unit – Core muscles – “THE CYLINDER”**
 - Transversus Abdominis
 - Diaphragm
 - Pelvic Floor muscles
 - Multifidus

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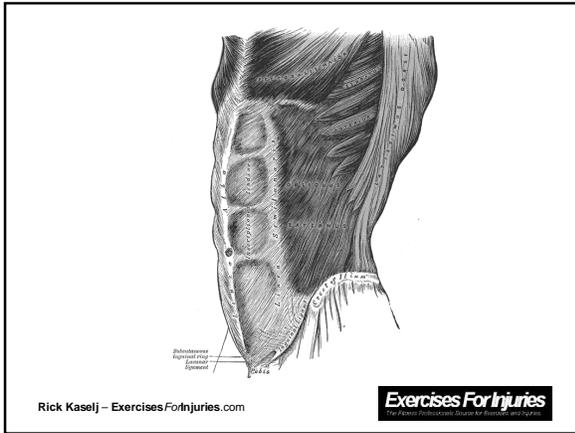
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Muscular Stability of the Lower Back & Pelvis Can be Broken Down into 2 Components:

- **Outer Unit – muscle groups that provide secondary stability to the pelvis**
 - **Anterior Oblique System** – oblique abdominals & contralateral adductors – single leg standing
 - **Posterior Oblique System** – gluteus maximus & contralateral latissimus dorsi with the thoraco-dorsal fascia – single leg reverse plank
 - **Longitudinal System** – hamstrings & erector spinae – reverse plank
 - **Lateral System** – gluteus medius, gluteus minimus & contralateral adductors – single leg lateral raise
- **Core Stability of the Hip**

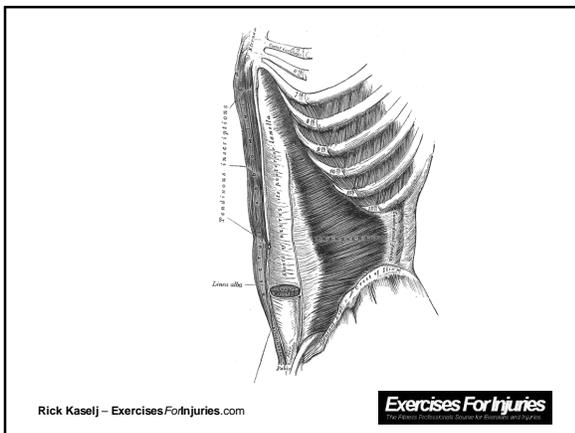
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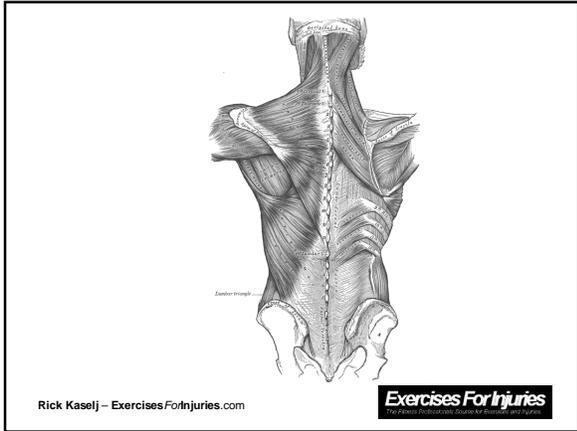


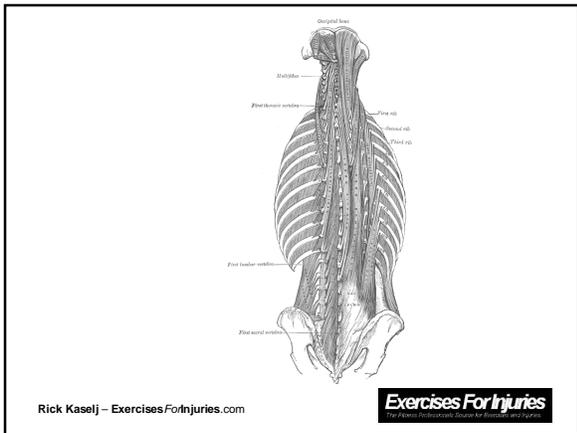


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Principles of Training Inner Unit Core Stability:

- **Locate** and **isolate** the core muscles.
- Train the core to emphasize the **endurance** component.
- Once control of the core muscles has been established **train the outer muscles**.
- Progress movements (*static to dynamic*).

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Isolation is Bad!

- **Isolation**
- **Integrate**
- **Movement**

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How to Establish Control of the Core Muscles:

- Perform in a controlled manor, no fast or ballistic movements.
- Begin with a low load (stable position).
- Gradually increase the load (moving to less stable position).
- Hold 10 seconds - 1x10 (gradually increase sets).
- May take ~ 3 weeks to develop.

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Inner Unit – Core Muscles

- **Transversus Abdominis (TrA)**
 - aka. “The Human Belt”
 - deepest abdominal layer
 - wraps around the torso like a belt
 - contracts prior to any arm and leg motion

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Isolation in a 4-point Kneeling Position

- Lower back is moved into a neutral spin
- Shoulder/hips centered over hands/knees.
- Inhale and let stomach hang out
- Before you take another breath draw belly button towards spine

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Isolation in Supine Lying

- Lower back is moved into a neutral spine.
- Knees are bent with feet on the floor.
- Find ASIS (front of pelvis) with fingers.
- Move fingers to the mid-line about an inch and a half.
- Instruct client to draw pelvic bones (ASIS) closer together by "**tightening the human belt**".
- Ensure no movement occurs in the pelvis.

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Note:

- ~ If someone is too **lordotic**, a rolled towel can be placed in the small of the back for comfort or feedback.
- ~ If someone has a **flat back** posture, the pelvis can be anteriorly tilted slightly to help engage transverse abdominus.

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Pelvic Floor Muscles aka. "bathroom muscles"

- Located on the floor of the pelvis from the coccyx to the pubic symphysis
- Instruct to shorten the distance between the coccyx and pubic symphysis (stop yourself from going #1 & #2).
- Shorten the distance between tail bone and private part.
- When done properly the deep transverses abdominis co-contracts above the pubic symphysis, and the buttocks is relaxed.
- Other Cueing Ideas:
 - Like you are clamping onto a tampon
 - Like you are pulling your testicles up

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Multifidus

- segmental stabilizer; produces segmental rotation when contracted concentrically
 - Primary Function: rotation
 - Secondary Function: lateral flexion, extension & hyperextension of the spine
- Let manual therapist do this.
- Pulling belly button through.

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Core Exercises in a Supine Lying Position

- setting
- setting with 50 percent of weight of foot lifted
- setting and one foot a hand width off mat
- contract the inner unit and move single knee to 90
- contract the inner unit and move double knee to 90 - one at a time

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Core Exercises in a Supine Lying Position

- contract the inner unit and move double knee to 90 – both at a time
- contract the inner unit and slide heel on floor to a straight leg position
- contract the inner unit and let knee fallout about 30 laterally
- setting and knee over hip and fall knee out

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Basic Stability Exercises using an Exercise Ball

- requires an ideal sitting posture and good balance
 - A larger ball puts the lower back into more of a stable position compared to a small ball
 - Maintain optimal head carriage (cheek bone over collar bone)
 - Place tongue on roof of mouth just behind the teeth
 - Don't hold your breath
 - Relax head and neck muscles
 - Relax upper body
 - Keep chest up towards the ceiling to minimize thoracic curvature (Headlights up)
 - Neutral spine
 - Maintain lordosis (curve in lower back)
 - Reduce over-recruitment of lumbar erectors by drawing belly button towards spine
 - Place fingers 1.5 inches in from the hips for feedback

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Stability Ball

- contract the inner unit in sitting
- contract the inner unit and move forward/back or side-to-side while sitting on the ball
- contract the inner unit and move from a sitting to standing position

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Exercises Involving the Anterior Oblique System

Inner Unit, Oblique Abdominals, contralateral Adductors

- floor bridge with resisted rotation of the pelvis
- floor bridge with rotation of the pelvis (drop hips gently from side to side)
- bridging on the ball with resisted rotation of the pelvis
- bridging on the ball with rotation of the pelvis (drop hips gently from side to side)

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Exercises Involving the Posterior Oblique System

Inner Unit, Gluteus Maximus, contralateral Latissimus Dorsi

- prone on the ball hip extension with opposite arm pressing into the floor
- move from a sitting to standing position
- Stepping onto a step with left leg and shoulder extension with right

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Exercises Involving the Longitudinal System

Inner Unit, Hamstrings, Erector Spinae

- bilateral ball squat against a wall
- unilateral ball squat against a wall

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Exercises Involving the Lateral System

Inner Unit, Gluteus Medius, Gluteus Minimus, contralateral Adductors (Core Stability of the Hip)

- side lying clams (place outside hand on buttock to limit rotation of the torso, slowly lift knee up and out)
- side lying clams with leg suspended
- side lying clam with leg straight
- Side lying clam with leg straight and circles

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What, Core Exercises?

- *“Lumbar stabilizing exercises appear to have a similar effect on pain and disability for patients with recurrent low back pain as a daily walking program.” - Smeets 2009*
- *“Motor control exercise was better than manual therapy for pain, disability, and quality-of-life outcomes at intermediate follow-up and better than other forms of exercise in reducing disability at short-term follow-up” - Macedo 2009*

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What, Core Exercises?

- *“For acute low back pain, segmental stabilizing exercises are equally effective in reducing short-term disability and pain and more effective in reducing long-term recurrence of low back pain than treatment by GP. For chronic low back pain, segmental stabilizing exercises are, in the short and long-term, more effective than GP treatment and may be as effective as other physiotherapy treatments in reducing disability and pain.” – Rackwitz 2006*
- *“ADIM (abdominal drawing-in maneuver) effectively increased activation of knee flexors (hamstrings), decreased activation of back extensors, and reduced the pelvic motions and low back pain during prone knee flexion in patients with lumbar extension rotation syndrome.” – Park 2011*

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#6 – Self Massage

- Everything tightens up around the back
 - *Decrease the tension*
- Key Things to Remember:
 - *You are in the movement*
 - *No guarding*
 - *Visualizing the muscle relaxing*

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#6 - Self Massage

- What works good?
 - Foam roller
 - Hard medicine ball
 - 2L soda/pop bottle (un-opened)
 - PVC piping
 - Commercial tools

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#6 - Areas to Hit

- *Calf – supine, sitting*
- *Hamstring – supine, sitting*
- *Gluteus Medius – supine, wall*
- *Piriformis – floor, sitting*
- *Erector Spinae – supine, wall*
- *Quadratus Lumborum – supine, wall*

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#6 – What, Foam Rolling?

– *“In conclusion an acute bout of SMR of the quadriceps was an effective treatment to acutely enhance knee joint range of motion without a concomitant deficit in muscle performance.” McDonald 2012*

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#6 – What, Massage?

– *“Massage might be beneficial for patients with subacute and chronic non-specific low-back pain, especially when combined with exercises and education.” Furlan 2008*

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#7 – Stretch

- Calf
- Soleus
- Hamstring
- Piriformis
- Psoas – side bend
- Iliacus - traditional
- Latissimus Dorsi

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#7 – Stretch

– “Yoga classes were more effective than a self-care book, but not more effective than stretching classes, in improving function and reducing symptoms due to chronic low back pain, with benefits lasting at least several months.” - Sherman 2011

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#8 – Mobility

- Thoracic spine mobility
- Different Movements to hit:
 - Foam roll on back (anterior) – supine / wall
 - Extension – foam roller / sitting
 - Thread the Needle – 4 pt / wall
 - Side flexion – seated / foam roller
 - Rotation – seated / foam roller

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#8 – Mobility

- Different Movements to Hit:
 - Rotation with Side Bending – foam roller in sitting
 - Rotation with Opposite Side Bending – seated / foam roller

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#8 – Mobility

- Looking at the Hip
- Different Movements to Hit:
 - Standing and pelvis rotating
 - Side to side rocking
 - Knees to chest – wall
 - Dog on a Fire Hydrant – wall
 - Knee circle – wall clockwise / counter clockwise
 - Leg drag

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#8 – Mobility

- *“One hundred office workers with non-specific subacute lower back pain. Intervention: The 50 intervention group subjects were educated daily about sitting correctly and asked to perform exercises shown by video demonstrations on the university website. The exercise routines included strengthening, mobility and stretching exercises focused on the postural stability muscles.” – Del Pozo-Cruz 2012*
- *“The intervention showed clinical improvements in quality of life and selected lower back pain outcomes in the experimental group compared to the control group.” – Del Pozo-Cruz 2012*

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#8 – Mobility

- *“This case series suggests that an impairment-based approach (manual and exercise based hip mobilization) directed at the hip joints may lead to improvements in pain, function, and disability in patients with CLBP.” – Burns 2011*

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#9 – Separating Hip and Back Movements

- *Knee to chest in supine*
- *Hip Extension in prone*
- *Prone IR/ER*
- *Feet Wide Knees Side to Side*
- *Supine IR/ER legs straight with Hip Abduction*
- *Supine with Legs on Wall IR/ER – flexion + abduction*

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#10 – Movement

• Transition is the Most Important Part:

- Supine
- Side Lying
- 4-point
- Kneeling
- Standing
- Squatting
 - Hands down thigh
 - Hands to knees

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#11 – Outer Unit on the Wall

• Transition is the Most Important Part:

- Front Plank
 - Bilateral
 - Inside Leg
 - Outside Leg
- Side Plank
- Back Plank
- Front to Side Plank
- Front to Side to Back Plank

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#11 – Outer Unit on the Wall

- ***Transition is the Most Important Part:***
 - Push-up
 - Bilateral
 - Inside Leg
 - Outside Leg
 - One Arm Push-up
 - Decrease Speed
 - Decrease Range of Motion
 - Push-up to Side Push-up

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#11 – Outer Unit on the Wall

- ***Transition is the Most Important Part:***
 - Corner Retractions – Elbows High
 - Bilateral
 - Unilateral Leg
 - Unilateral Arm
 - Corner Retractions – Hands to the Side
 - Bilateral
 - Unilateral Leg
 - Unilateral Arm

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Home Stretch - Core and Hip ROM

– “The group receiving core endurance and motor control exercises with no stretching also demonstrated a moderate increase in ROM but only significantly so in rotation.” – Moreside 2012

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Home Stretch - Core and Lower Body Injuries

– *“The shift in hip ROM towards internal rotation combined with the hip abductor imbalance may be associated with a position of ACL risk with internally rotated hips and valgus knees in female soccer players. Limitations in hip and core strength and range of motion may play a role in the disparity between the male and female rate of ACL injury.” – Brophy 2009*

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Check Out MIR



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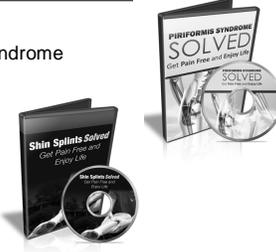
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Injury Workouts

- Shin Splints
- Patellofemoral Pain Syndrome
- Sacroiliac Pain
- Plantar Fasciitis
- Piriformis Syndrome
- Lumbar Fusion
- Achilles Tendinitis
- Jumper's Knee
- Tennis Elbow



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Thank You

- **Send me your questions!**
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