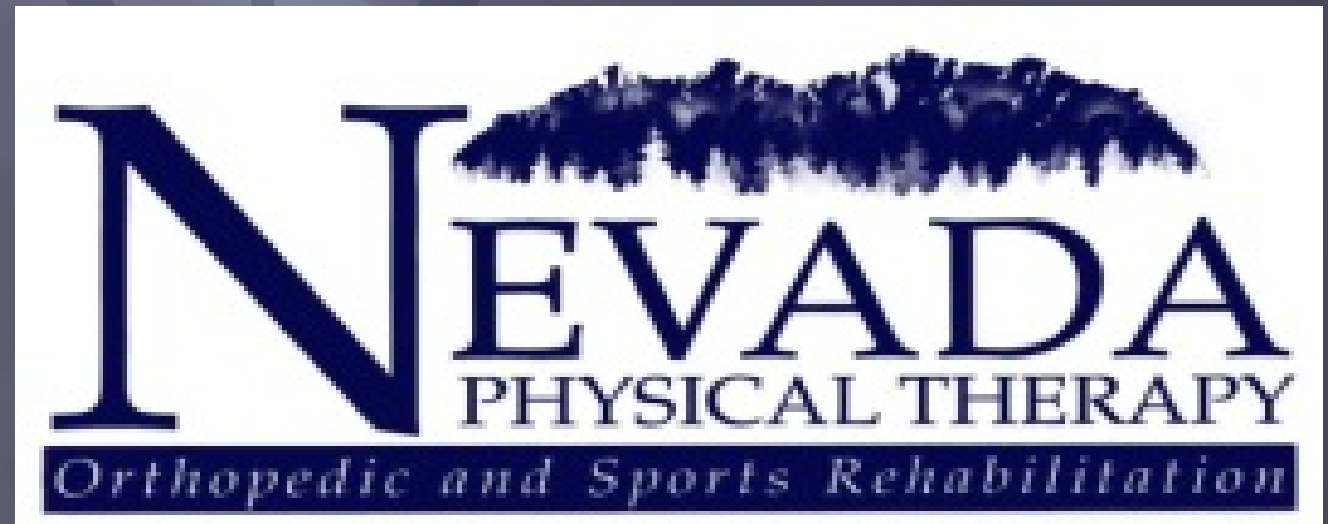


SACROILIAC JOINT DYSFUNCTION AND PIRIFORMIS SYNDROME

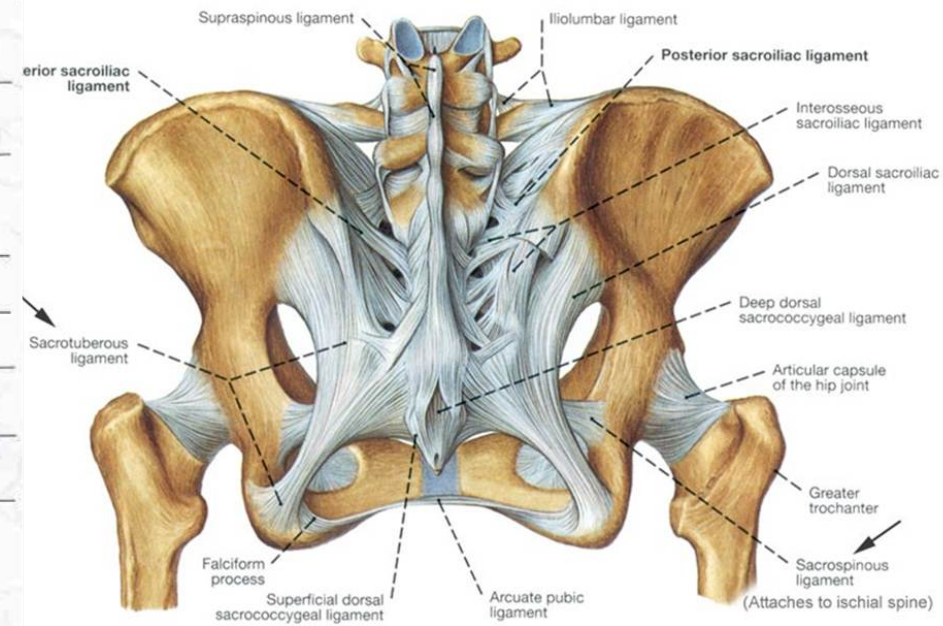
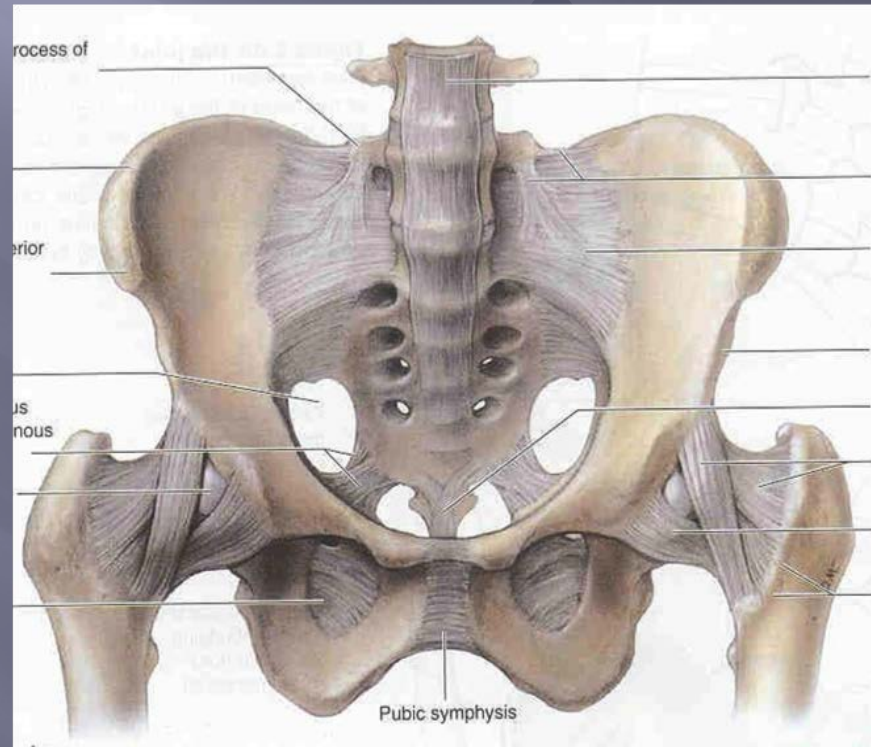
Classic vs. Functional Movement Approach in Physical Therapy Setting

Crista Jacobe-Mann, PT
Nevada Physical Therapy
UNR Sports Medicine Center
Reno, NV
775-784-1999
Cristaann@yahoo.com



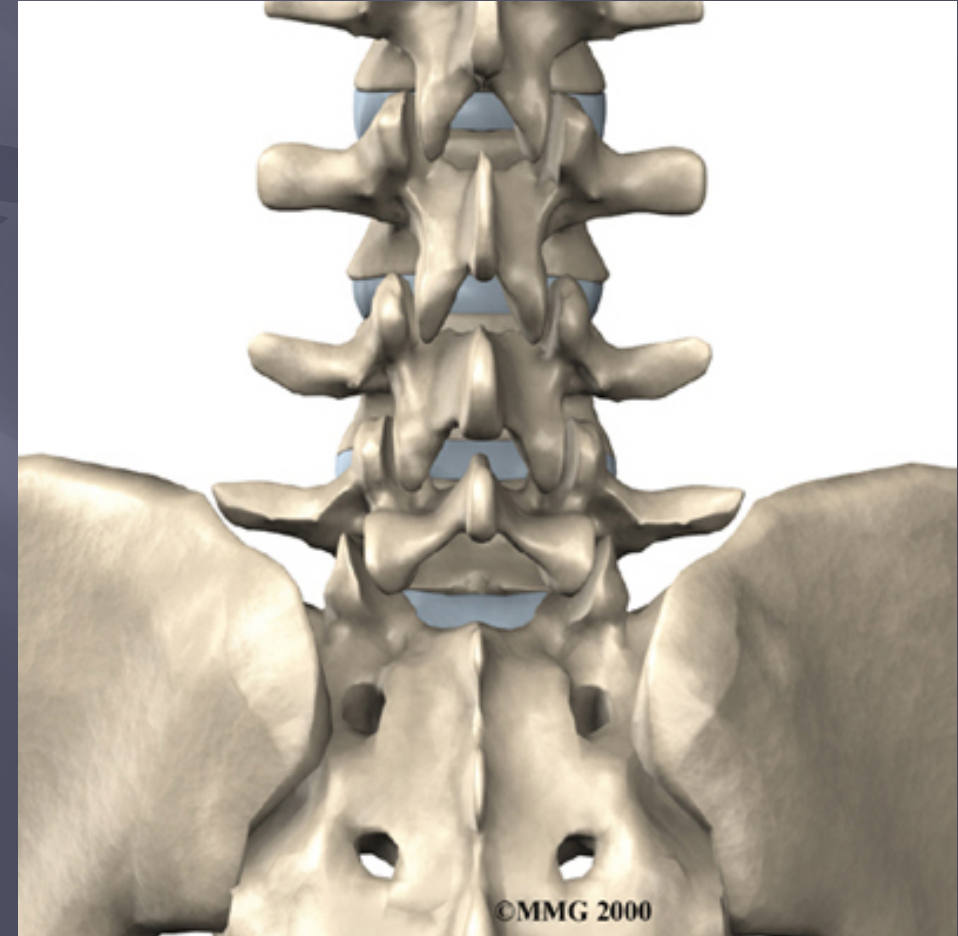
Lumbar/Sacroiliac/Hip Anatomy

- Lumbar Spine
 - Intervertebral joints
 - Facet joints
- Sacroiliac joint
 - Anterior ligaments
 - Posterior ligaments
- Pelvis
 - Pubic symphysis
 - Obturator foramen
 - Greater sciatic foramen
 - Sacrospinous ligament
 - Lesser sciatic foramen
 - Sacrotuberous ligament
- Hip
 - Capsule
 - Labrum



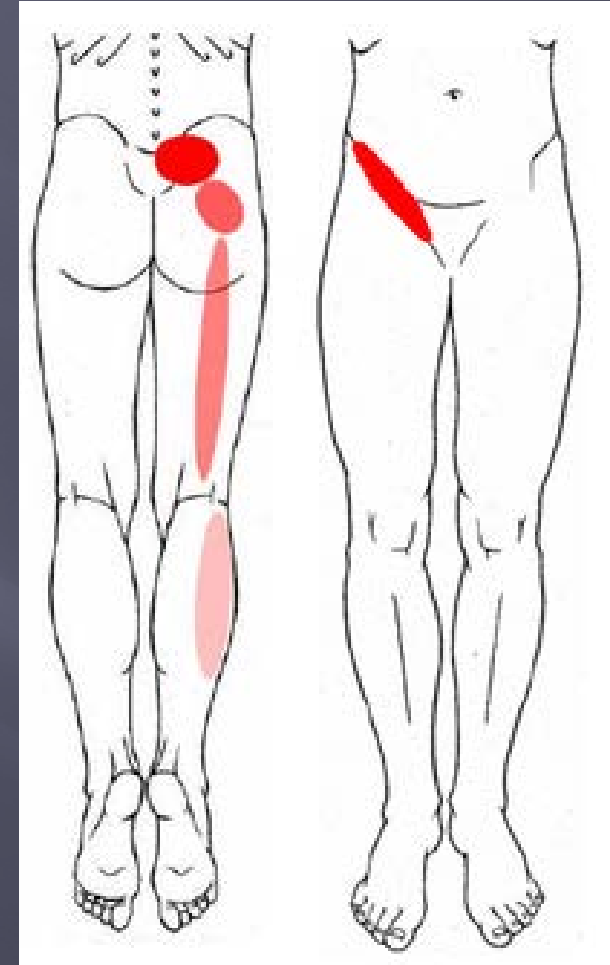
Biomechanics

- ▣ Lumbar spine: **flexion and extension**
 - ▣ ~30 total degrees of rotation L1-L5
 - ▣ Facet joints aligned in vertical/sagittal plane
- ▣ SI joints
 - ▣ 2-5 mm in all directions, passive movement, not caused by muscle activation
 - ▣ Shock absorption/accepting load with initial contact during walking
- ▣ Hip Joints
 - ▣ Extension 0-15 degrees



SI Joint dysfunction

- ▣ 15% SI joint pain noted in chronic LBP patients
- ▣ Innervation: L2-S3
- ▣ Classic signs and symptoms
 - Lower back pain generally not above L5 transverse process
 - Pain can radiate down posterior thigh to posterior knee joint, glutes, sacrum, iliac crest sciatic distribution
 - Pain with static standing, bending forward, donning shoes/socks, crossing leg, rising from chair, rolling in bed
 - Relief with continuous change in position



SI Joint Dysfunction Differential Diagnosis

- ▣ Trochanteric Bursitis
- ▣ **Piriformis Syndrome**
- ▣ Myofascial Pain
- ▣ Lumbosacral Disc Herniation and Bulge
- ▣ Lumbosacral Facet Syndrome

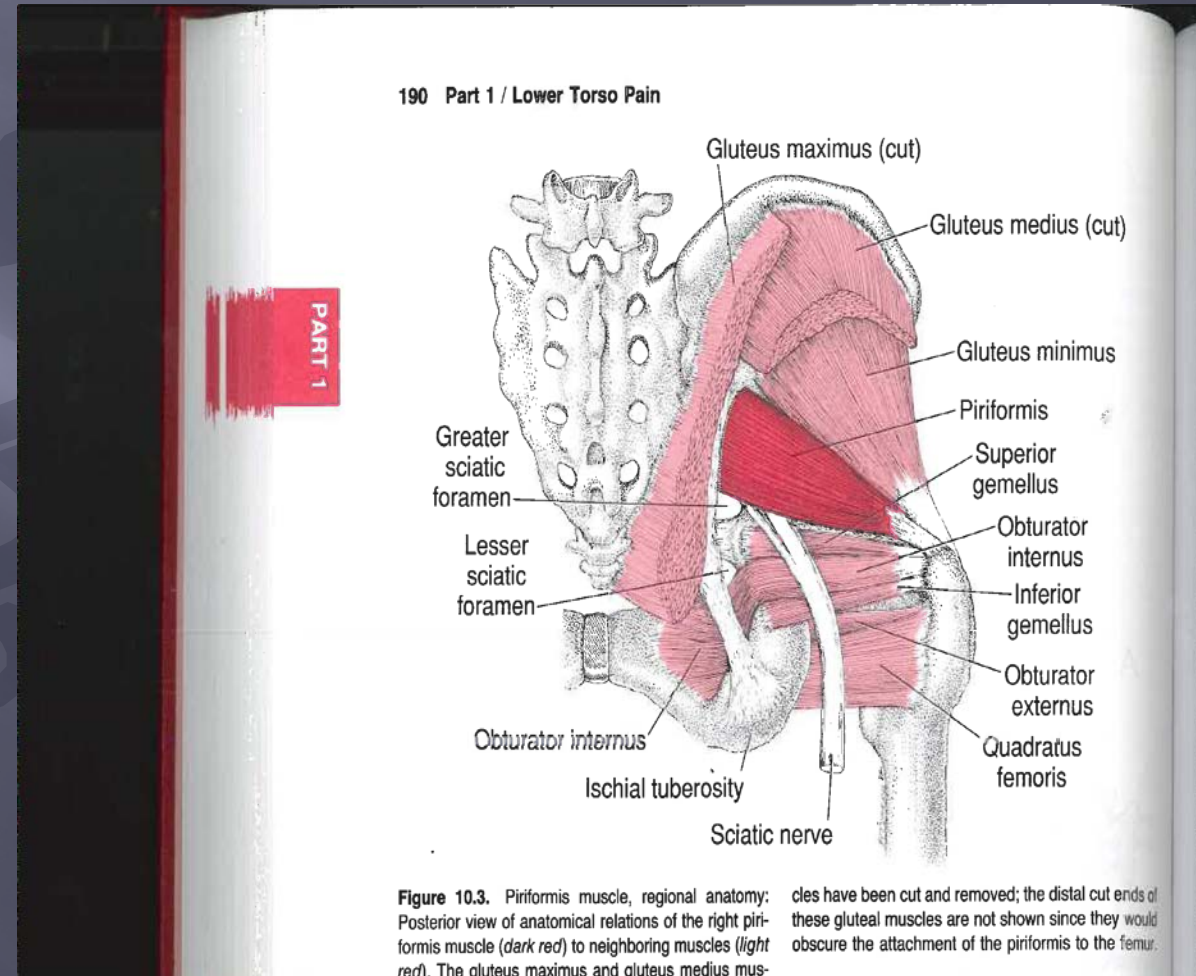
J. Travell suspects Si joint pain may causes piriformis guarding and lead to Piriformis syndrome...

SI Joint Examination

- ▣ Tenderness to palpation of PSIS, lower erector spinae, quadratus lumborum and gluteal muscles
- ▣ Sometimes positive SLR
- ▣ Limited hip mobility on affected side
 - FABER test, knee to chest
- ▣ Multiple tests to assess hypomobile/affected side
 - Squish test, stork test, forward flexion test
 - Controversy on if manual therapists can detect at difference in 2-4mm of motion (50:50 interrater reliability)...future research project in our clinic???
 - ▣ All manual techniques create a change in ROM (www.clinicalathlete.com)

Piriformis Syndrome

- ▣ Piriformis: “pear shaped”, innervation S1S1
 - Origin: anterior sacrum (sometimes to margin of sciatic foramen and capsule of SIJ)
 - Insertion: superior medial greater trochanter
 - Other Lateral Rotators “GOGO’s” are distal to piriformis and lie anterior to sciatic nerve and attach to medial greater trochanter
 - Obturator internus: partly intrapelvic muscle and partly hip muscle (can contribute to pelvic floor dysfunction) exits through lesser sciatic foramen
- ▣ Nerves from greater sciatic foramen
 - Superior gluteal nerve and vessels, sciatic nerve, pudendal nerve and vessels, inferior gluteal nerve, posterior femoral cutaneous nerve, nerves to obturator internus, gemelli and quadratus femoris
 - Obturator externus branch of obturator nerve
 - Therefore pain referral can be in buttock, inguinal and posterior thigh as well as down lower limb.



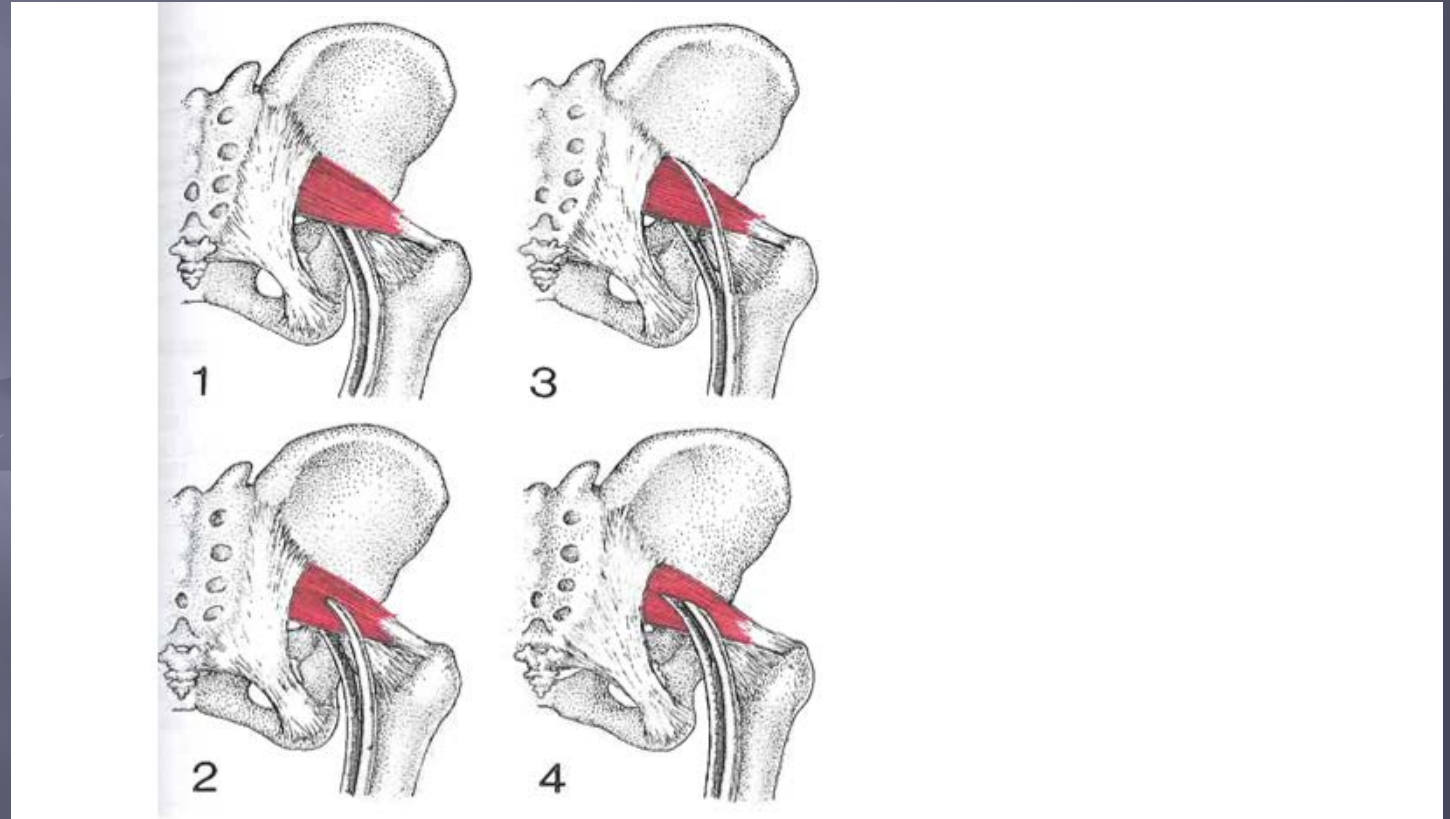
Sciatic Nerve Variations

1: Tibial and Peroneal nerve pass anterior to piriformis (85%)

2: Peroneal portion passes through the piriformis and tibial anterior (10%)

3: Peroneal portion loops above, then posterior to piriformis and tibial anterior (2-3%)

4: Undivided sciatic penetrates piriformis (<1%)



Piriformis Syndrome Symptoms

- ▣ Symptoms may be caused from trigger point referral of muscle, nerve entrapment/vascular compromise from compression of piriformis against the rim of the greater sciatic foramen and by SI joint dysfunction
- ▣ Symptoms- patient can't sit still, worse with sitting, flexion abduction and MR or activity, sexual dysfunction
- ▣ Pain: lower back, groin, perineum, buttock, hip, posterior thigh, leg, foot and rectum during defecation.
- ▣ Differential Diagnosis
 - HNP
 - Nerve entrapment (neoplasm, tumors, infection)
 - Episacroiliac lipoma
 - Facet syndrome with LBP and sciatica
 - Spinal stenosis- bilateral

Lumbar Radiculopathy

- Netter
- L4L5 HNP
 - L5 nerve root
 - Weakness in ant tib.
- L5S1 HNP
 - S1 nerve root
 - Weakness in gastroc
 - Diminished reflex

Clinical features of herniated lumbar nucleus pulposus

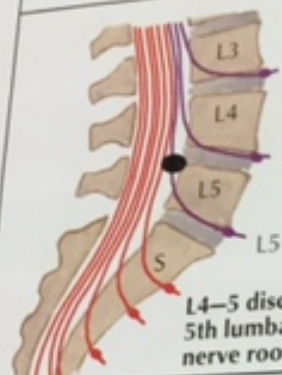



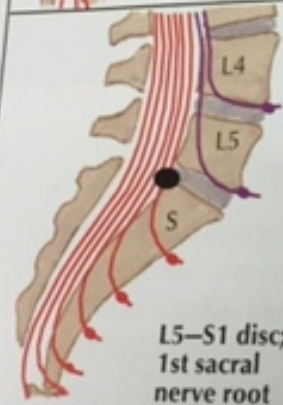
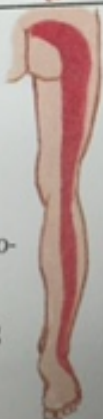

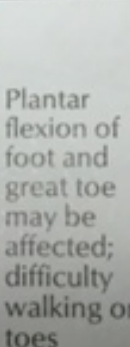


Level of herniation	Pain	Numbness	Weakness	Atrophy	Reflexes
 <p>L4-5 disc; 5th lumbar nerve root</p>	 <p>Over sacroiliac joint, hip, lateral thigh and leg</p>	 <p>Lateral leg, first 3 toes</p>	 <p>Dorsiflexion of great toe and foot; difficulty walking on heels; foot drop may occur</p>	Minor	Changes uncommon in knee and ankle jerks, but internal hamstring reflex diminished or absent
 <p>L5-S1 disc; 1st sacral nerve root</p>	 <p>Over sacroiliac joint, hip, postero-lateral thigh and leg to heel</p>	 <p>Back of calf, lateral heel, foot to toe</p>	 <p>Plantar flexion of foot and great toe may be affected; difficulty walking on toes</p>	 <p>Gastrocnemius and soleus</p>	 <p>Ankle jerk diminished or absent</p>

PLATE 156

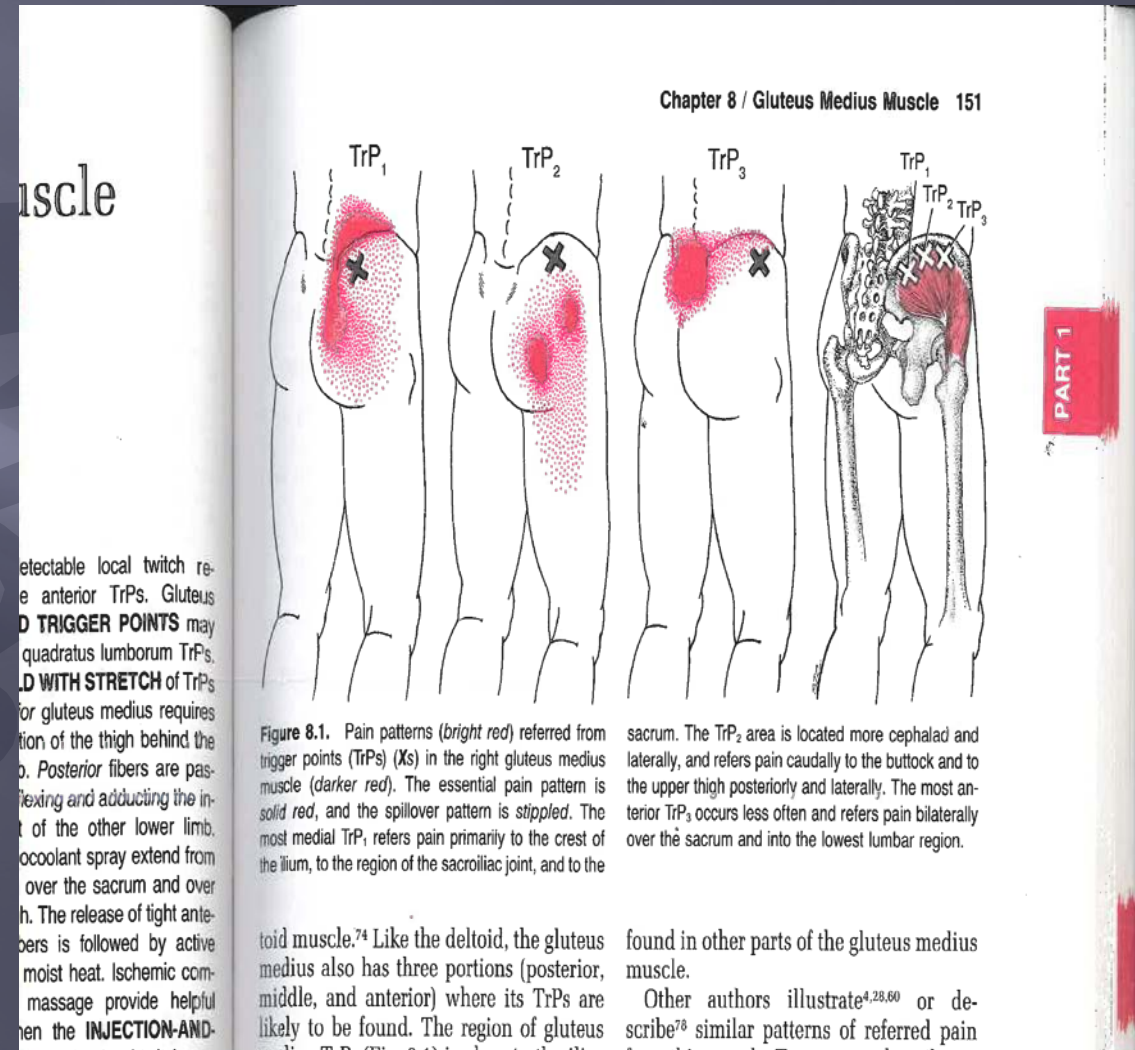
BACK AND SPINAL CORD

Myofascial Trigger Points

- ▣ Janet Travell: Myofascial Pain and Dysfunction: The Trigger Point Manual
 - Myofascial Trigger Point: “A hyperirritable spot, usually within a taught band of skeletal muscle or in the muscle’s fascia. The spot is painful on compression and can give rise to characteristic referred pain, tenderness, and autonomic phenomena.
 - Specific pain referral pattern from muscle and fascia

Gluteus Medius

- ▣ “Lumbago Muscle”
- ▣ Differential Diagnosis
 - SIJ dysfunction
 - Facet joint
 - Sub gluteusmedius bursitis
 - Chronic pain following low back surgery
 - Arachnoiditis
 - Intermittent claudication



Gluteus Minimus

- ▣ “Pseudo Sciatica”
- ▣ Differential Diagnosis
 - L4, L5, S1 Radiculopathy
 - Trochanteric bursitis
 - SI joint dysfunction

Muscle

is palpated for spot tenderness or fasciae latae muscle. To locate posterior fibers, the line corresponding to the lower border of the gluteus minimus and the region above this line is palpated for deep tenderness. The clinician should consider **ASSOCIATED TRIGGER POINTS** in the quadratus lumborum as perpetuating factors in gluteus minimus TrPs. To apply **COLD WITH STRETCH** to this muscle, the patient is positioned on the side with the hip adducted over the side or over a table and the intermittent stretching applied over the muscle fibers and their attachments. Added extension emphasizes the anterior fibers, and flexion emphasizes the posterior fibers.

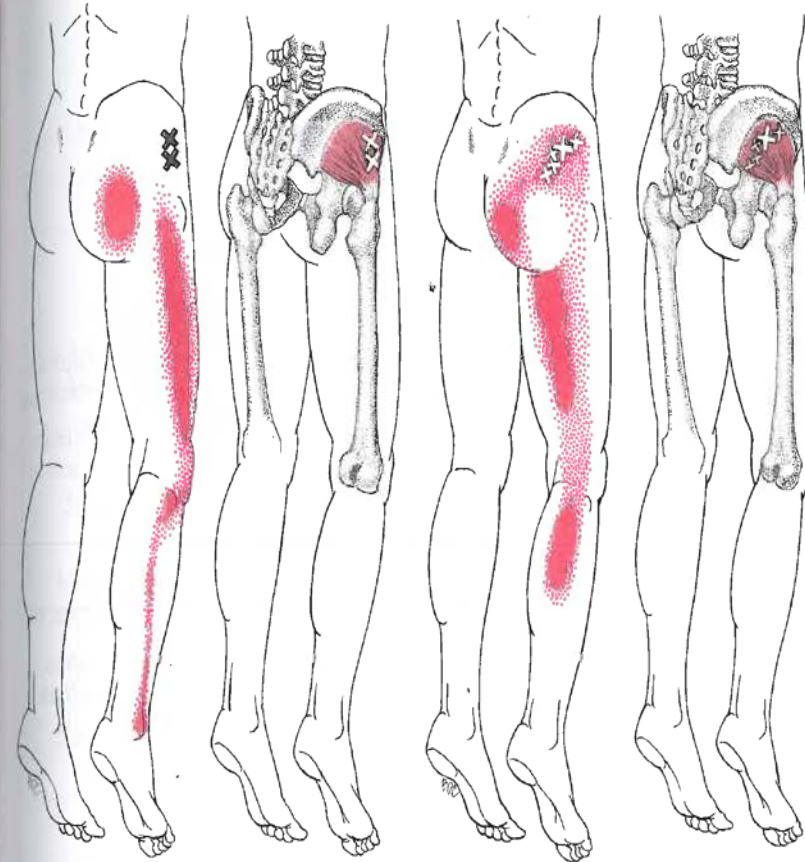
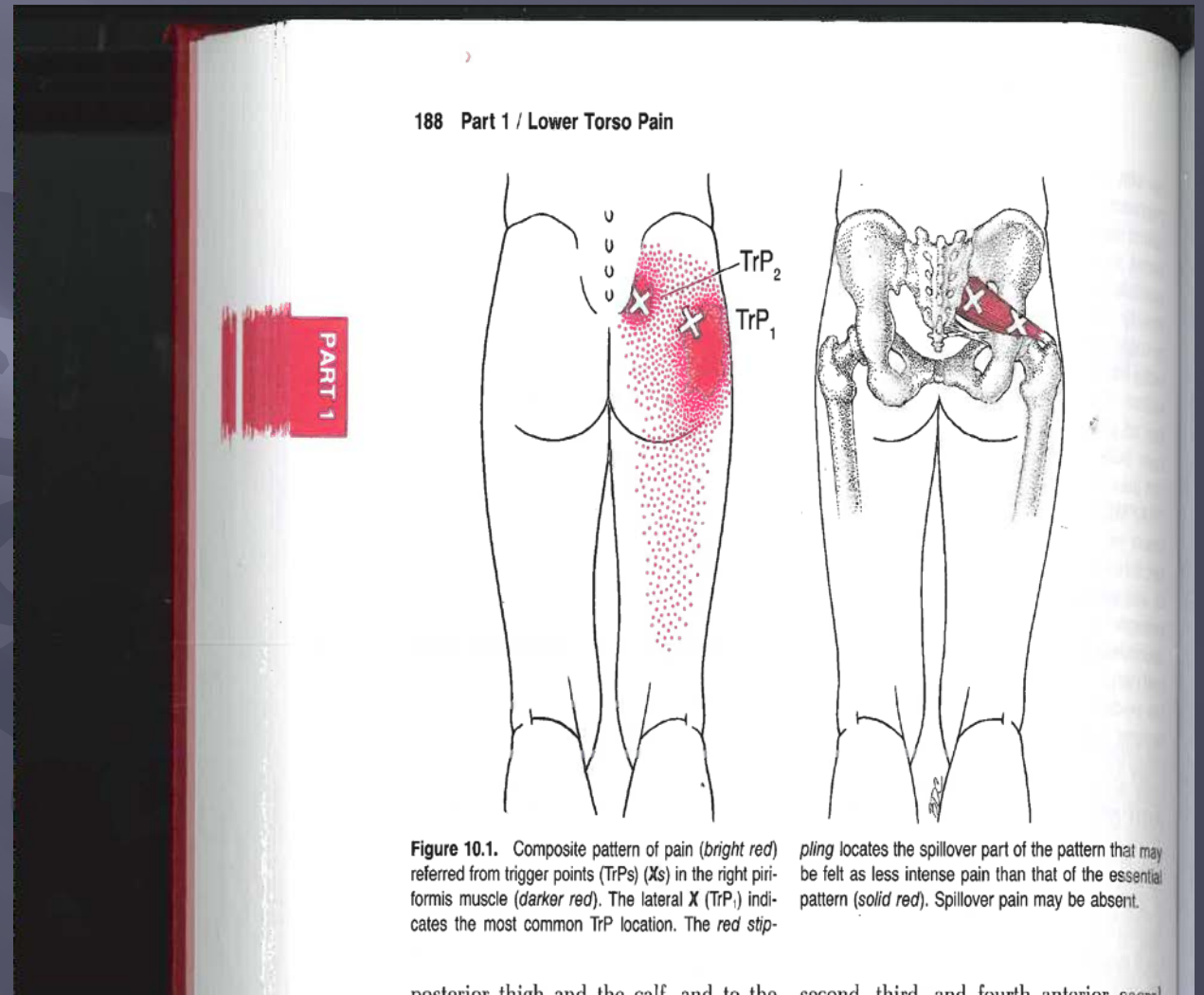


Figure 9.1. Pattern of referred pain from trigger points (TrPs) (Xs) in the anterior portion of the right

Figure 9.2. Composite pain pattern (bright red) referred from TrPs (Xs) in the posterior part of the right

Piriformis

- ▣ “Double Devil”
 - Causes as much pain from nerve entrapment as it does from trigger points
- ▣ Differential Diagnosis
 - HNP
 - SI joint dysfunction
 - Post spine surgery pain
 - Coccygodynia
 - Nerve entrapments, neoplasms



posterior thigh and the calf, and to the second, third, and fourth anterior sacral

Common PT Treatment

- ▣ Manual Therapy to balance or align pelvis, sacrum, and lumbar asymmetries
 - Muscle Energy, joint mobilization, trigger point release, myofascial release, strain counter strain, soft tissue mobilization, trigger point dry needling, etc.
- ▣ **Patient Education:** avoiding postures that irritate condition, sleeping techniques, body mechanics, encouraging patient movement to **prevent fear-avoidance and progression to chronic pain syndromes**
- ▣ Self Treatment techniques
 - Myofascial Release/Trigger Point Release
 - ▣ Foam Rollers, Mobility Sticks
 - ▣ Lacrosse Balls, Tennis Balls
 - Stretches
 - Lumbar/Core stabilization

Foam Roller Techniques



yes

Stretches

PIRIFORMIS



SINGLE KNEE TO CHEST



- note opposite leg in extension to stabilize spine/pelvis

Common Treatment Approaches

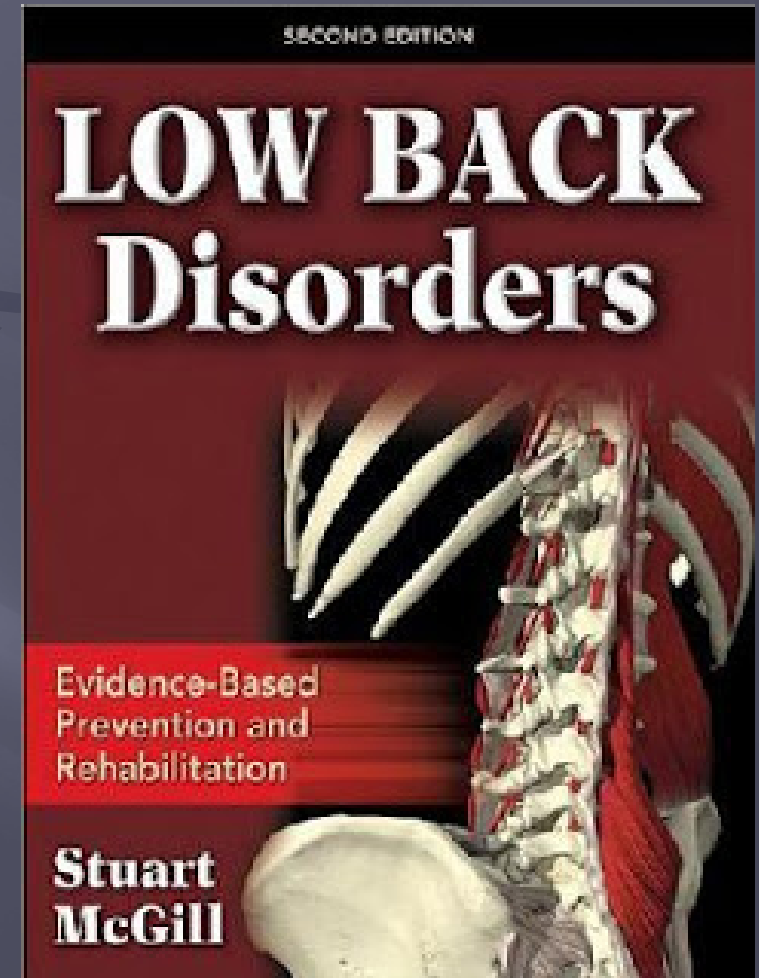
- ▣ McKenzie Exercises: all extension biased
 - Philosophy: extension cycles of spine will push nucleus into to the center of the disc
 - Works well for disc patients
 - probably not so good for facet joint pain or the patient who has very limited capsular mobility into hip extension
 - remember the body moves in the path of least resistance, they could become hypermobile in lumbar spine

- ▣ William's Flexion Exercises: all flexion biased
 - Philosophy: opening up/distraction will take pressure of compressed nerves
 - Works well for spinal stenosis patients
 - Probably not so good for the disc. Stewart McGill, MD wrote an entire textbook on why our lumbar spines should never be loaded under flexion.
 - Philosophy: "We are one sit-up or crunch away from a disc herniation"



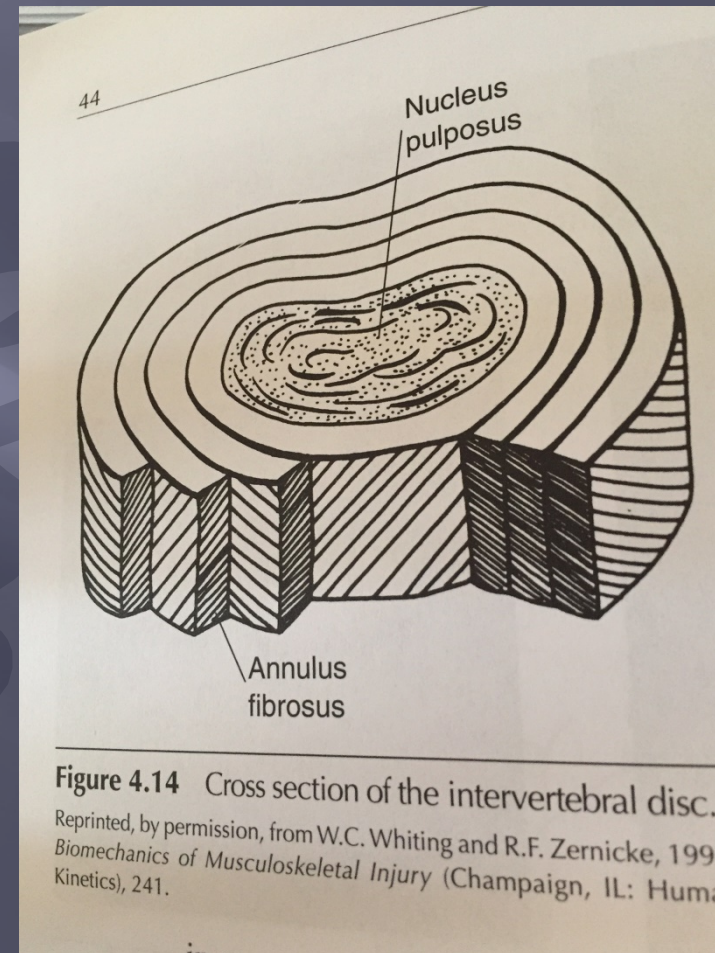
McGill

- ▣ Moved Cadaveric and Virtual Spines through load and repetitive cycles to determine disc failure
 - Predict risk of tissue damage:
 - ▣ Applied load > tissue strength= tissue failure (injury)
- ▣ Pig spines:
 - No failure with 260 N over 85,000 flexion cycles
 - 867 Newtons over 22-28,000 cycles
- ▣ Sit-up/crunch= 3300 newtons
 - ▣ Close to compression level of NIOSH action limit
- ▣ Push-up= 1838N, 1-arm push up=5848N!



Disc failure

- Damage to annulus appears to be associated with fully flexing the spine
 - Herniation over repetitive cycles of flexion
 - Caution with seated back extension machine, sit-ups, crunch, seated ab machine, single leg pistol squats !!!
- Repeated twisting causes annulus to delaminate
 - (McGill has not done research on
- Spine health is about endurance not strength



These look cool but are they safe???



Flexed Spine under Load

Myoelectric silence in figure A = 1900 N of shear load!!! (think stretch weakness)

B: neutral spine posture: activates spinal stabilizers decreased shear to ~200N

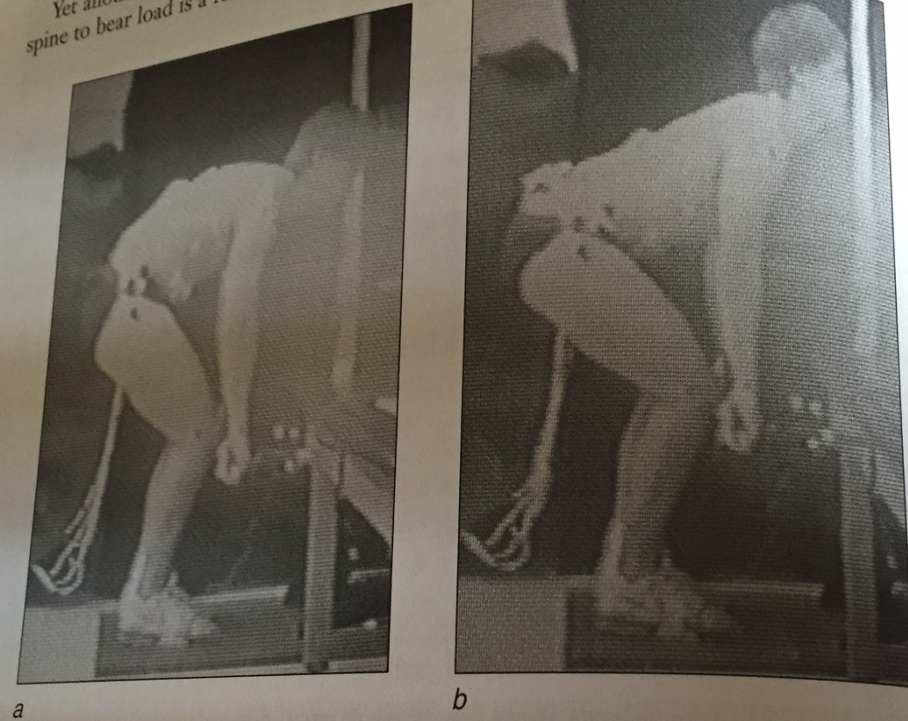
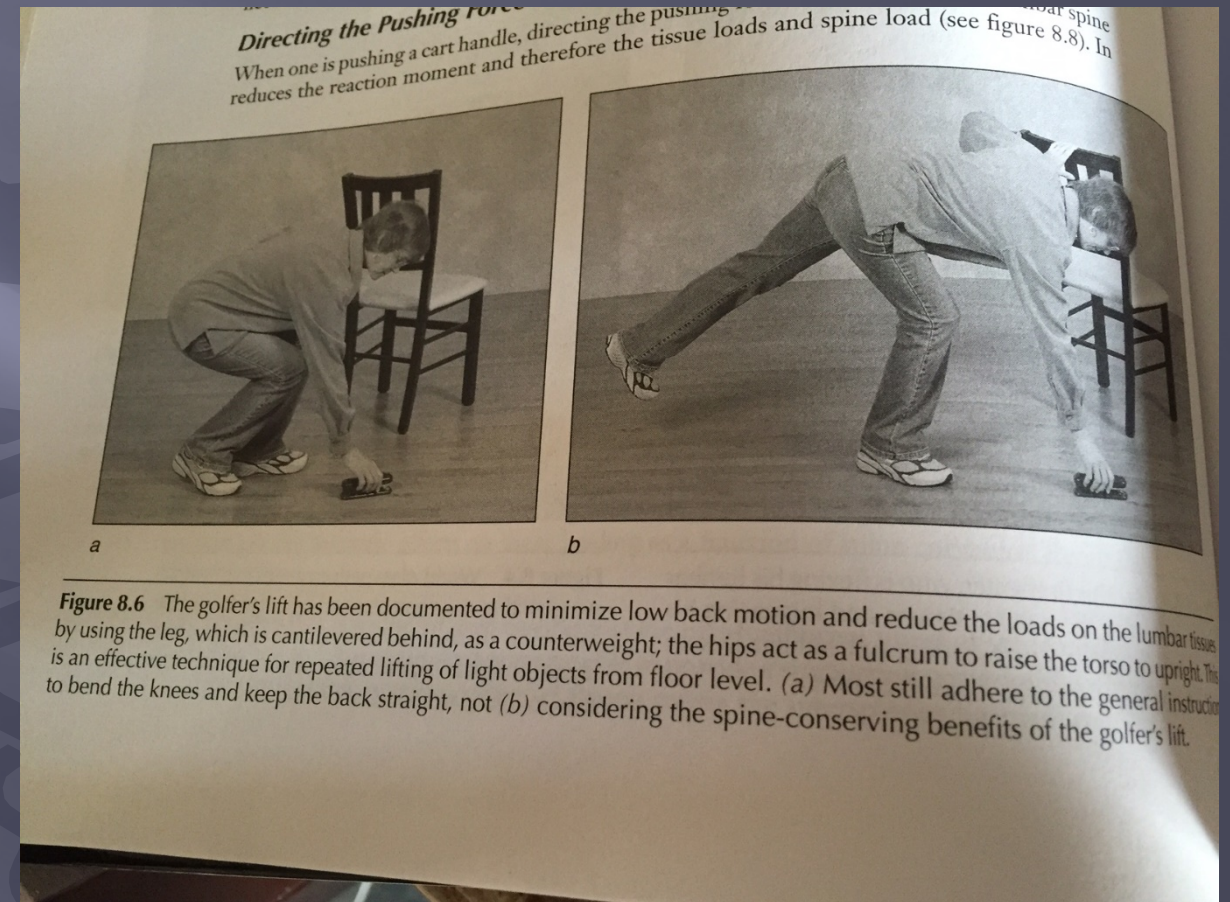


Figure 5.14 These original computer image bitmaps from the experiment conducted around 1987 illustrate (a) the fully flexed spine that is associated with myoelectric silence in the back extensors and strained posterior passive tissues and high shearing forces on the lumbar spine (from both reaction shear on the upper body and interspinous ligament strain). (b) A more neutral spine posture recruits the pars lumborum muscle groups and aligns the fibers to support the shear forces (see figure 4.27). In this example, posture a resulted in 1900N of shear load on the lumbar spine while posture b reduced the shear load to about 200N!

Reprinted from *Journal of Biomechanics*, 30(5), S.M. McGill, Invited paper: Biomechanics of low back injury: Implications on current practice and the clinic, 465-475, 1997, with permission from Elsevier Science.

McGill's Spine Exercises

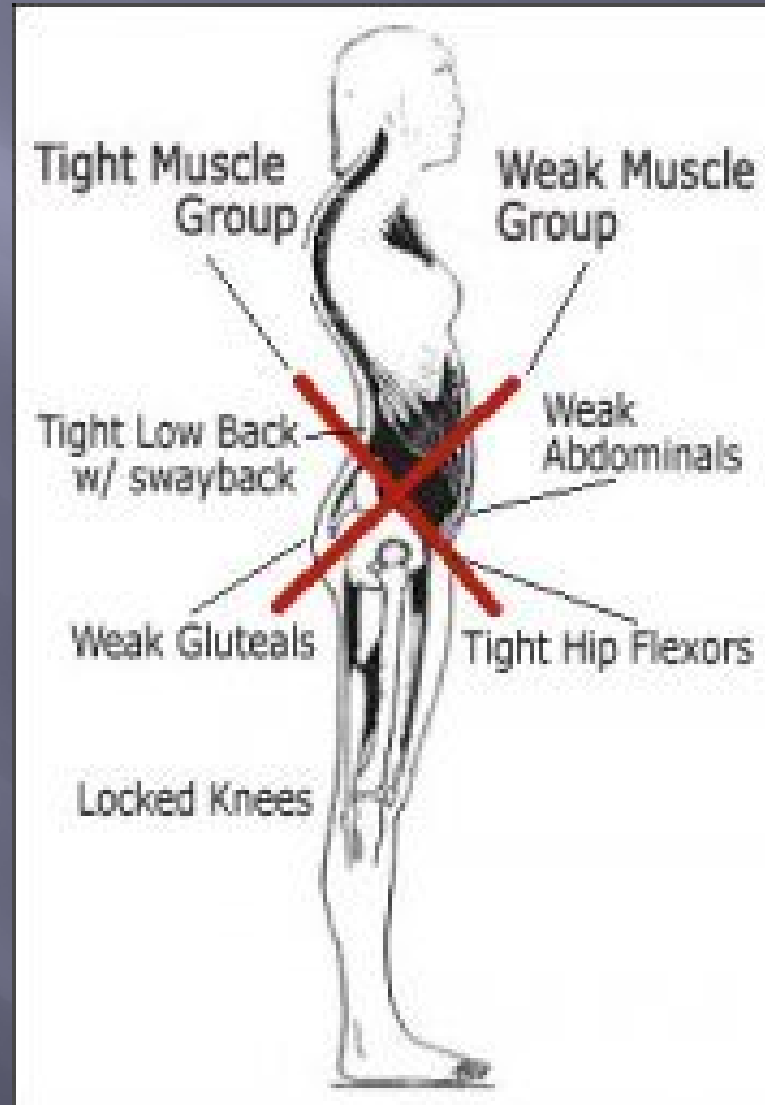
- ❑ Choose exercises that create least amount of compression but most amount of muscle activation
- ❑ All in neutral spine curve
 - Planks
 - Side Planks
 - Bird Dogs
 - Bridges
- ❑ Educate how to move better to spare the back
 - Golfers lift
 - Potty squat
 - Build bridges



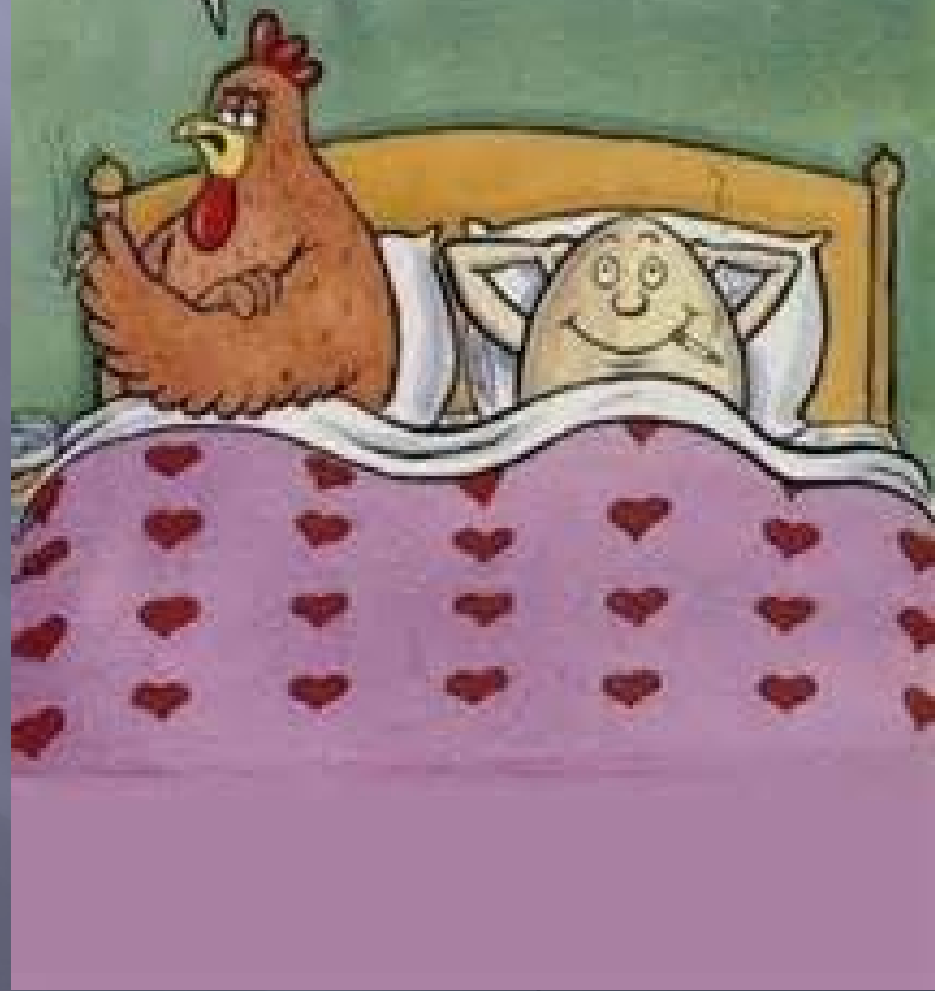
Look Familiar???



Lower Crossed Syndrome



WELL I GUESS THAT SETTLES
THAT OLD ARGUMENT.



My Approach to treating LBP and what I often see in patients

- ▣ I think that the ENTIRE spine should be able to move well into flexion and extension with good segmental mobility and motor control
 - Screen AROM and just look at where curves and flat areas are
 - Cervical Spine: a little of everything
 - Thoracic Spine: primarily rotation
 - ▣ **Limited Thoracic rotation in all patients is very common probably because we live in flexion and our thoracic spines are rarely exposed to unilateral extension which is what creates rotation
 - Lumbar spine: primarily flexion and extension
- ▣ Lack of hip joint extension and rotation mobility is very common
 - FABER test
- ▣ Hip external rotator and abductor (posterior lateral chain) weakness is very common
 - Quick MMT
- ▣ Most of my patients have left sided symptoms and right sided mobility restrictions
 - Classic: Hypomobile right SI joint with compensatory irritation of left L5S1 facet joint, tight tender palpation of left piriformis
 - ▣ Hypotheses: right dominant world, driving with right foot??

Selective Functional Movement Assessment

- ▣ Movement based approach to guide treatment
- ▣ Screen full body movement first before looking at painful area
 - Determine where mobility and motor control issues are
 - Trying to get to the source of the dysfunction, not chase the pain
 - Treating movement patterns not specific muscles
- ▣ Treatment Guidelines: 3 R's
 - Calm down the painful area
 - Treat mobility dysfunctions first
 - Then address motor control: Reset, Reinforce, Reload
 - ▣ Neuromuscular re-education @ 20% MVIC, breathing should be natural with these exercises

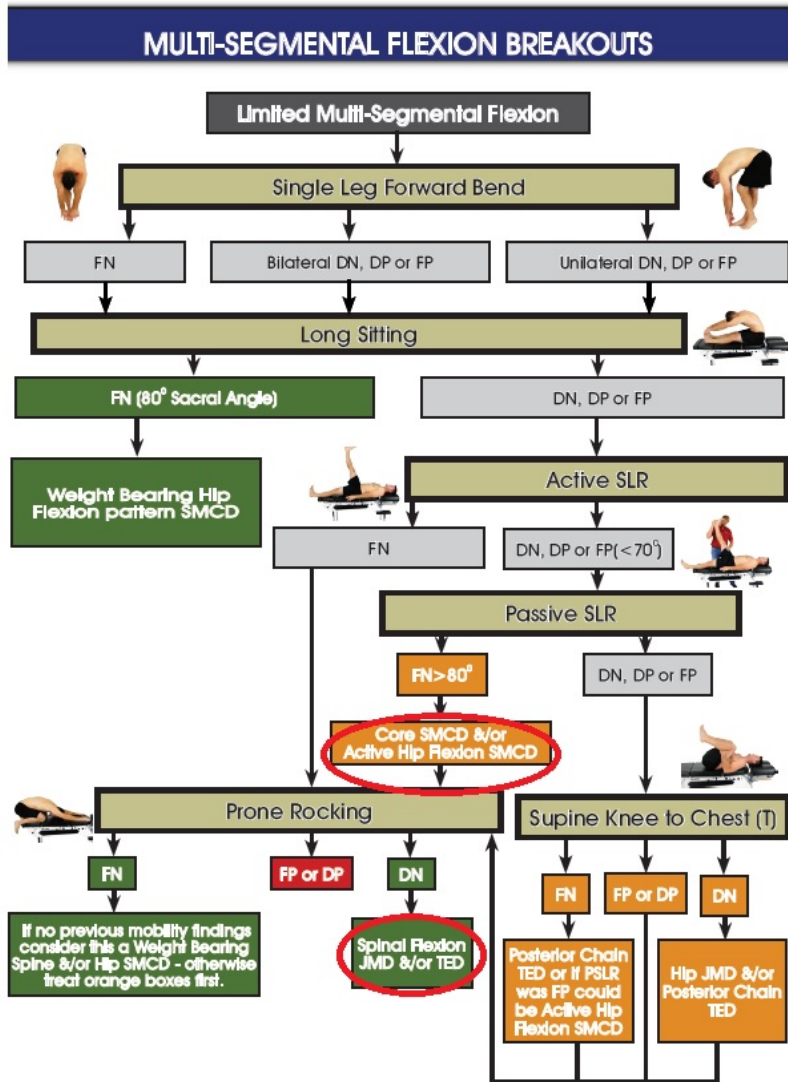


Example Applying SFMA Approach

- Patient complains of chronic neck stiffness, lower back pain on the left side, worse with sitting, sometimes goes into buttocks, denies pain with coughing or sneezing. Mother of two, works from home in computer programming.
- SFMA: dysfunctional non-painful multisegmental flexion (can't touch her toes)
 - Breakout of flexion pattern:
 - left hip flexion selective motor control dysfunction (SMCD)
 - spinal flexion joint mobility dysfunction (JMD) and/or tissue extensibility dysfunction (TED)



f DN Multisegmental Flexion



Reset, Reinforce, Reload

- ▣ **Reset Left Hip Flexion**
 - Manual techniques to hip capsule, posterior chain mobility if needed
 - Self foam roller techniques, LAX balls to posterior hip if needed
- ▣ **Reinforce Left Hip Flexion Pattern**
 - Taping techniques to lumbar spine to give 24 hour feedback to reinforce initiating hip hinge patterns and neutral spine with sitting, bending, transitions from sit to stand and stand to sit movements
 - ▣ Kinesiotape/Rocktape, McConnell taping/Leukotape
- ▣ **Reload Left Hip Flexion Pattern (4x4 Matrix)**
 - 4 Positions: NWB (1), Quadruped (2), Kneeling (3), Standing (4)
 - 4 Types of Resistance: No resistance/Pattern Assistance (1), No resistance (2), Resistance/Pattern Assistance (3), Resistance (4)

4x4 Exercise Matrix

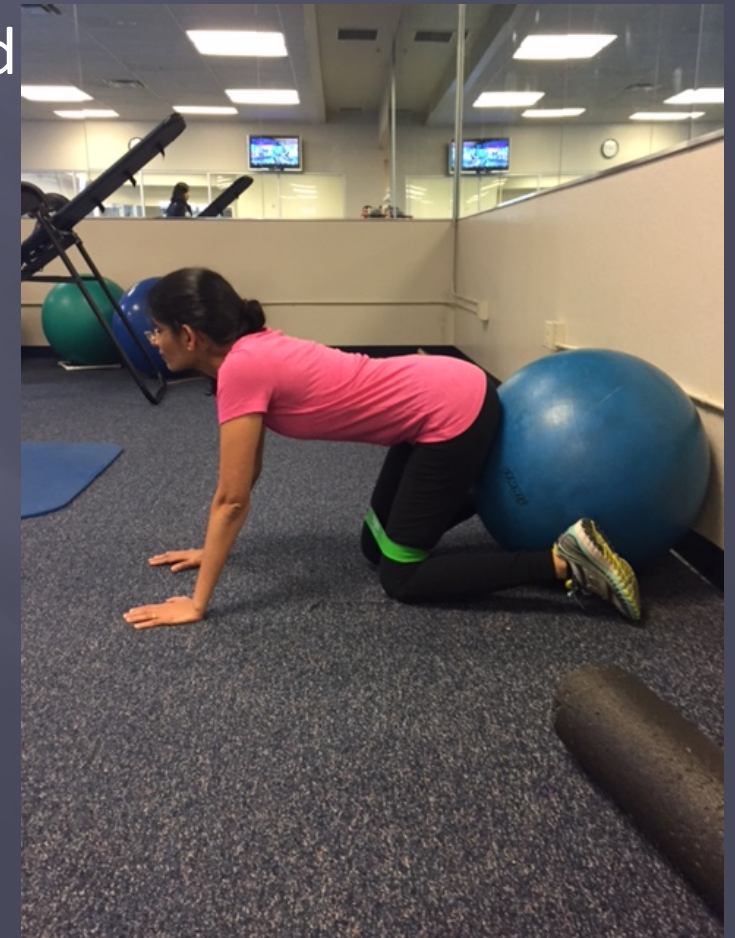
	Non-Resisted/PA	Non-Resisted	Resisted	Resisted/PA
Supine	1x1	1x2	1x3	1x4
Quadruped	2x1	2x2	2x3	2x4
Kneeling	3x1	3x2	3x3	3x4
Standing	4x1	4x2	4x3	4x4

Reloading Hip Flexion Examples

- ▣ 1x1: Supine Assisted Left Active Straight Leg Raise



- ▣ 2x3: Quadruped Resisted Hip flexion against Swiss Ball with mini band around



Reloading Hip Flexion Examples

- 3x3: Tall Kneel assisted hip hinge with mini band around knees



- 4x1: Toe Touch Progression with toes up on half roller and mini band



Conclusion

PT is the BEST initial angle of attack for any LBP (except red flags)

We need a specific treatment approach for our specific movement dysfunction.

Mobilize the hypomobile segments/regions and stabilize the hypermobile ones

We all need a little of both

Find Exercises that are Efficient and Effective!! More bang for your buck

Look for PTs that have good communication skills, up to date manual skills and exercise knowledge



Conclusion

- ▣ SI joint dysfunction is common with all forms of LBP
 - Generally needs manual work from PT/chiro, difficult to mobilize yourself
- ▣ Piriformis Syndrome looks a lot like lumbar radiculopathy
 - Responds well to direct/aggressive myofascial release: ROLL IT

SI joint Dysfunction

- Can't stand still
- Can radiate down posterior leg

Piriformis Syndrome

- Difficulty Sitting
- Mimics "sciatica"

Lumbar Disc/Radiculopathy

- Morning pain
- Pain with coughing/sneezing
- Changes in reflexes, dermatomes, myotomes

References

- ▣ Netter, F. Atlas of Human Anatomy, Third Edition 2002.
- ▣ McGill, S. Low Back Disorders: Evidence-Based Prevention and Rehabilitation. Second Edition 2007.
- ▣ Selective Functional Movement Assessment; Advanced Clinical Integration Course Manual 2013.
- ▣ Travell, J. and Simons, D. Myofascial Pain and Dysfunction The Trigger Point Manual. Volume 2. 1983.