SACROILIAC JOINT PAIN

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OUTLINE

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- BACKGROUND
- PREVELANCE
- PRESENTATION
- RISK FACTORS
- ANATOMY
- BIOMECHANIC
- DIFFERENTIAL DIAGNOSIS
- SIJ STABILITY
- MYOFASCIAL SLINGS
- EXAMINATION
- MANAGEMENT

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BIO & QUALIFICATIONS

- 1984 Graduate of Life Chiropractic College – Atlanta
- Currently practicing in the Metro St Louis area
- Diplomate International Academy of Neuromusculoskeletal Medicine (DIANM), Board Certified Chiropractic Orthopedist
- Adjunct Logan University School of Chiropractic
- Certified Chiropractic Insurance Consultant – Licensed in Missouri
  - Peer Review Certification, *Identifying causality, proper diagnosis coding, effects of co-morbidities, appropriate treatment protocols and documentation along with the determination of maximum medical improvement or static and stationary.* Texas Chiropractic College

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BIO & QUALIFICATIONS

- Independent Medical Examination Certification, *documenting the essentials of causal relation, apportionment and permanent impairment, appropriate physical examination techniques, documentation and report writing.* Texas Chiropractic College
- Chiropractic Sports Physician Program - Los Angeles Chiropractic College
  - Post doctorate program in sports injury and physical fitness
- 100 hour DOT Physical Examination
- 100 Hour Acupuncture Course

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BACKGROUND

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Background (1,2,3)

- The sacroiliac joint connects the spine to the pelvis and serves as a critical load-transfer interface between the lumbar spine and the lower extremities
- It is a diarthrodial (synovial) joint containing synovial fluid and enclosed by a capsule reinforced by strong ligaments
- The SIJ ensures continuity and stability of the pelvic ring, allowing the weight of the upper body to be transmitted through the S1 endplate to the sacrum and pelvis

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Historical Overview of Sacroiliac Joint (SIJ) Research (13)

"Over many centuries scientists have shown an interest in the structure and function of the SIJ in relation to movement and pain. These historical studies include many important facts as well as various misconceptions. One of the most contentious issues in SIJ research has been the mobility of the joint."

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Historical Overview of Sacroiliac Joint (SIJ) Research (13)

Ancient to Early Modern Views on SIJ Mobility

- From Hippocrates through Vesalius and Paré, the SIJ was largely considered mobile **only during pregnancy**, reflecting limited anatomical understanding and cultural/observational biases.
- By the late 17th century (Diemerbroeck, 1689), evidence emerged showing the SIJ is mobile in both sexes, challenging pregnancy-only assumptions.
- Albinus confirmed the presence of a synovial membrane, supporting the joint's diarthrodial (mobile) nature.

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Historical Overview of Sacroiliac Joint (SIJ) Research (13)

Key Anatomical and Kinematic Discoveries (18th–19th Century)

- Movement occurs primarily around a **transverse axis** at the level of the second sacral vertebra (Zaglas).
- **Nutation** (forward sacral nodding) and **counternutation** (backward nodding) were defined as primary iliac rotations relative to the sacrum.
- Pivot point often localized near the **iliac tuberosity** (dorsal to the auricular surface) — Duncan (1854) and Meyer (1878).
- Von Luschka (1864) described the SIJ as a true diarthrosis with a joint cavity.
- Histological confirmation of synovial characteristics reinforced mobility (Albee 1909, Sashin 1930).

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Historical Overview of Sacroiliac Joint (SIJ) Research (13)

Quantifying Movement and Pelvic Mechanics

- Studies on living subjects and cadavers showed small but measurable changes in pelvic diameters (conjugata vera reduced 0.5–1.3 cm with extension/nutation), widening the pelvic outlet — relevant to childbirth mechanics (Walcher, Fothergill, Pinzani, Jarcho, Von Schubert).
- X-ray studies in the early 20th century documented increased SIJ mobility and symphyseal widening in pregnancy.
- Clinical signs associated with SIJ dysfunction in pregnancy included **caudal pelvic pain**, localized SIJ tenderness, **waddling gait**, and positive **Trendelenburg sign** (Abramson et al., 1934).

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Historical Overview of Sacroiliac Joint (SIJ) Research (13)

Classification Debates and Functional Implications

- Recognition of strong ligaments and irregular articular surfaces led to descriptions as an **amphiarthrosis** (minimal movement) or intermediate joint (Gray 1938, Kopsch 1940).
- Testut & Latarjet (1949) proposed "**diarthro-amphiarthrosis**" — ventral portion more mobile, dorsal more stable/ossified.
- Pain mechanisms proposed included minor movements causing ridge-groove collisions (Gray) and ligamentous laxity from hormonal changes leading to lesions (Chamberlain 1930).

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Historical Overview of Sacroiliac Joint (SIJ) Research (13)

SIJ in Low Back Pain (LBP) and Pelvic Girdle Pain (PGP) Context

- Early 20th century: SIJ was a major focus for LBP/PGP research, especially linked to pregnancy and childbirth trauma.
- Post-1934 (Mixter & Barr disc herniation paper): Dramatic shift in medical attention toward the lumbar disc as the primary source of ischialgia and radiating pain; SIJ largely fell out of favor.
- Solonen (1957): Only 2–4% of LBP patients had "true" SIJ pathology; emphasized strong ligaments and limited mobility (except in pregnancy). However, he cautioned against underestimating traumatic/structural SIJ lesions.
- Contrasting view: Gardner (1950) noted movement is necessary for joint development and maintenance.

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Historical Overview of Sacroiliac Joint (SIJ) Research (13)

Myths, Misconceptions, and Critical Lessons

- **Ankylosis myth**: Older adults (especially men) were thought to have fused SIJs; archaeological evidence (Smith & Jones, 1910) showed ankylosis was rare.
- Over-reliance on simplified models (e.g., Weisl's sellar/saddle joint) led to viewing surfaces as "nodular and pitted" or pathological, while congruence is actually rare.
- Historical research shows significant discrepancies — always interpret with caution due to evolving methods, small samples, and biases.
- SIJ has **all elements of a true articulation** and can be a source of symptoms despite small motion amplitude.

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Historical Overview of Sacroiliac Joint (SIJ) Research (13)

Clinical Takeaways for Chiropractors

- SIJ mobility is small but clinically relevant, especially in pregnancy, trauma, and lumbopelvic dysfunction.
- Historical pendulum swings (SIJ overemphasis → disc dominance → renewed interest) highlight the importance of evidence-based, multimodal assessment.
- Modern chiropractic practice benefits from understanding this evolution to better differentiate SIJ contributions to pain versus disc or other sources.
- Respect the joint's unique anatomy (strong ligaments, irregular surfaces, nutation/counternutation) when applying manipulation, stabilization, or exercise interventions.

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•Typical symptom patterns
•Limitations of diagnostic tests
•Available treatment options

Relevance to Diagnosis and Management (1,2,3)

- SIJ pain is a prevalent yet underappreciated contributor to chronic low back pain
- Due to the joint's complex anatomy, size, and diverse pain presentations, diagnosis can be challenging
- A solid understanding of SIJ anatomy, symptom patterns, diagnostic limitations, and treatment options is essential to improve diagnostic accuracy and optimize patient outcomes

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PREVALENCE

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Prevalence (2,4)

- The International Association for the Study of Pain (IASP) criteria for the diagnosis of SI joint pain
- SI joint pain is defined as:
  - Pain localized in the anatomical region of the SI joint
  - Reproducible by performing specific SI joint provocation tests
  - or reliably relieved by selective injection of the symptomatic SI joint with a local anesthetic.
  - The reported prevalence of SI joint pain among patients with axial low back pain varies between 15% and 30%.
  - Other studies reported prevalences of SIJD in individuals with lumbar pain of 13%-48%, and that the condition is more common in females

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PRESENTATION

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Presentation (4)

- Primary Pain Location
- SIJ pain is most commonly localized to the gluteal region below L5, corresponding to the posterior SIJ structures (~94% of cases)
- Maximal pain and tenderness are frequently near the posterior superior iliac spine (PSIS)

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Presentation (4)

- Referred Pain Patterns (Intra-articular SIJ)
- Pain may refer beyond the buttock to:
  - Lower lumbar region: ~72%
  - Groin: ~14%
  - Upper lumbar region: ~6%
  - Abdomen: ~2%
- Lower extremity referral occurs in ~28% of patients, with foot pain reported in ~12%.

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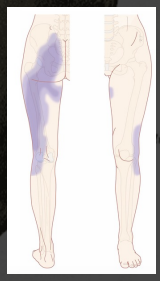
Presentation (4)

- Extra-articular (Ligamentous) SIJ Pain
- Posterior SI ligaments can refer pain to the lumbar region, groin, and lower extremity.
- 10–20% of extra-articular SIJ pain refers into the lower limb.
- 5–10% may extend below the knee.



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Presentation (4)

- Regional patterns:
  - Upper extra-articular pathology: more likely to refer to the groin.
  - Middle and lower ligamentous pathology: more likely to radiate into the lower leg.
- Groin and anterior thigh pain may occur with anterior and occasionally posterior, SI ligament involvement.

Pain Patterns That are less Consistent with SIJ

- Pain centered over the ischial tuberosity makes SIJ pain less likely.

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Presentation (4)

Predictive clinical findings include:

- Pain localized near the PSIS
- Unilateral symptoms, particularly in younger patients with traumatic or extra-articular SIJ involvement
- Worsening pain when rising from sitting
- Three or more positive SIJ pain provocation tests

Key Takeaway

- SIJ pain most often presents as buttock pain below L5, but can mimic lumbar, hip, or lower-extremity pathology.
- Recognizing characteristic referred pain patterns and clinical behaviors is critical for accurate diagnosis and appropriate management.

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Risk Factors (2)

Potential risk factors of the SIJP

- Female
- Gender related different biomechanical behaviors in the SIJ
- Pregnancy-induced changes such as weak pelvic blood circulation and muscle endurance
- SI joint hemorrhage occurring during birth and hormonal induced joint laxity
- A history of recurrent lumbar pain
- Heavy workload
- Reported older age

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Risk Factors (2)

- SI Joint Ankylosis and Lumbar Pain
- Lumbar pain from SI joint ankylosis appears more often in men than women.
- Epidemiologic studies show significant sex differences in SI joint degeneration.
- SI joint ankylosis is extremely uncommon among women, even in older age groups.

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Risk Factors (2)

- Men with ankylosis and degeneration are more prone to articular surface compromise.
- These degenerative changes in men tend to emerge after approximately 35 years of age.
- **Clinical Pearl:**
  When evaluating lumbar pain with suspected SI joint involvement, patient sex and age are important contextual factors, as ankylotic changes of the SI joint are far more common in middle-aged and older men.

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Risk Factors (1,5,11)

SIJ pain/degeneration post lumbar fusion

- SIJ Pain and Degeneration After Lumbar Fusion
- Reports of SIJ pain have increased significantly following lumbar and lumbosacral fusion over the past 20 years.
- Degeneration is more common when fusion extends to the sacrum.
- Ha et al. found that 75% of lumbo-sacral fusion patients experienced SIJ pain five years post-surgery, versus 38% of controls.
- Lumbar fusion to the sacrum transfers greater force to the pelvis, increasing stress on the adjacent SIJ.

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Risk Factors (1,5,11)

- SIJ pain/degeneration post lumbar fusion
- Failure to restore normal lumbosacral lordosis from L4 to S1 increases stress on the spine.
- Reduced lordosis is linked to junctional kyphosis or fusion failure at the ends of spinal fusions.
- Research shows spinal fusion can negatively affect the SIJs by eliminating adaptive movement at L5-S1, shifting stress to these joints.
- Unoki et al. found that fusing three or more segments raises the risk of SIJP after lumbar or lumbosacral fusion.

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EITIOLOGY

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ETIOLOGY (3)

- SIJ injury most commonly results from a combination of axial loading and rotational forces.
- These forces place stress on both intra-articular and extra-articular structures, predisposing the joint to pain and dysfunction.
- Pain Generators
  - Nociceptors are distributed throughout:
    - The joint capsule
    - Ligaments
    - To a lesser extent, subchondral bone
- Injury to any surrounding SIJ structure can generate pain.

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ETIOLOGY (3)

Causes of SIJ Pain

- Intra-articular (IA) causes:
  - Degenerative or inflammatory arthritis
  - Spondyloarthropathies (which may also involve extra-articular structures)
- Extra-articular (EA) causes:
  - Ligamentous injury
  - Muscular injury
  - Enthesopathy
- EA pathology is likely the most common source of SIJ-related pain.

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ETIOLOGY (3)

Predisposing Factors

- Structural and biomechanical contributors:
  - True and functional leg length discrepancies
  - Transitional lumbosacral anatomy
  - Gait abnormalities and altered biomechanics
  - Scoliosis
- Load and stress-related factors:
  - Persistent strain or low-grade repetitive trauma (e.g., jogging)
- Physiological and iatrogenic factors:
  - Pregnancy (increased ligamentous laxity and altered load transfer)
  - Prior spine surgery

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ETIOLOGY (3)

Leg Length Discrepancy and SIJ Pain

- True and apparent leg length discrepancies increase asymmetric loading and abnormal force vectors across the SIJ, especially the shorter leg side
- Individuals with chronic low back pain are significantly more likely to have a leg length discrepancy ≥5 mm compared with asymptomatic controls (~75% vs ~43%).
- The increased stress typically affects the ipsilateral SIJ and lower extremity

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ETIOLOGY (3)

- A study by Kiapour et al. demonstrated that LLDs of 1, 2, and 3 cm increase peak loads and stresses, especially on the longer-leg side, compared to normal alignment.
- As the discrepancy increases, the stresses across the SIJ also rise, highlighting the importance of addressing LLD in clinical practice.

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ETIOLOGY (3)

Key Takeaway

- SIJ pain arises from complex interactions between loading, rotation, and anatomy, with multiple potential pain generators.
- Recognition of mechanical risk factors, particularly leg length discrepancy and repetitive loading, is essential for accurate diagnosis and effective management.

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ANATOMY

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ANATOMY (6)

- The sacroiliac joint (SIJ) is a diarthrodial (synovial) joint connecting the sacrum and ilium.
- It contains synovial fluid and is enclosed within a fibrous joint capsule.
- The capsule is short, compact, and strongly reinforced by ligaments, contributing to joint stability.
- A unique feature of the SIJ is the presence of both hyaline cartilage and fibrocartilage:
  - Deep layer: hyaline cartilage – sacral side
  - Superficial layer: fibrocartilage – ilium side
- The joint surfaces are irregular, with ridges and depressions rather than being smooth.
- These irregular, undulating surfaces interlock, and together with fibrocartilage, enhance SIJ stability and limit excessive motion

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- **ANATOMY (5,6)**
- Ligaments
- The sacroiliac joint (SIJ) has limited intrinsic stability against shear forces and therefore relies heavily on passive ligamentous support.
- Stability against shear is primarily provided by the wedge-shaped position of the sacrum between the innominate bones, combined with a dense network of surrounding ligaments.
- Key ligaments contributing to SIJ stability include:
  - Interosseous sacroiliac ligament (axial ligament)
  - Posterior and anterior sacroiliac ligaments
  - Sacrotuberous ligament
  - Sacrospinous ligament
  - Iliolumbar ligaments

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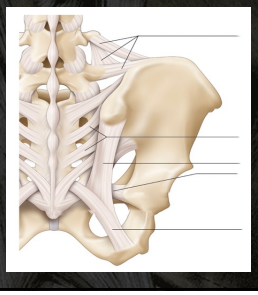
ANATOMY (6)



Iliolumbar ligaments

Interosseous sacroiliac ligament
Posterior sacroiliac ligaments
Sacrospinous ligament
Sacrotuberous ligament

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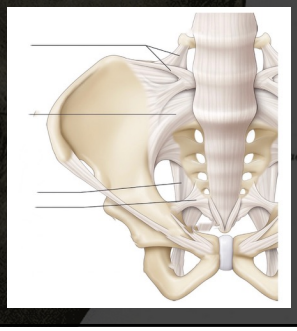
ANATOMY (6)

Iliolumbar ligaments

anterior sacroiliac ligaments

Sacrotuberous ligament
Sacrospinous ligament



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ANATOMY (6)
Muscles

- The SIJ has no muscles that produce active, voluntary movement.
- Despite this, it is surrounded by some of the body's largest and most powerful muscle
- Key muscle groups include the erector spinae, psoas, quadratus lumborum, piriformis, abdominal obliques, gluteals, hamstrings, and pelvic floor muscles.
- These muscles do not act directly on the SIJ; instead, they influence the hip and lumbar spine.
- SIJ motion occurs indirectly, driven by gravity and muscle forces acting on the trunk and lower limbs, rather than by active movement of the sacrum.

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BIOMECHANICS

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BIOMECHANICS (1,6)

Sacroiliac Joint (SIJ) Biomechanics and Stability

- The SIJ's flat surfaces and strong ligaments efficiently transfer compression and bending loads,
- However, they have limited resistance to shear forces.
- Self-bracing occurs when muscles and ligaments apply perpendicular forces
- This increases joint compression and shear resistance.

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BIOMECHANICS (1)

- **Motion**
- The sacrum exhibits minimal movement relative to the ilium across six degrees of freedom.
- Greatest range is in flexion–extension (nutation/counternutation): about 3–4°.
- SIJ motion is roughly 40% lower in males (~1.3°) compared to females (~2.9°).
- The main axis for nutation/counternutation passes horizontally through the interosseous ligament, posterior to the SIJ.

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BIOMECHANICS (1,6)

Load Transfer and Stability

- During bipedal stance, body weight is conveyed from the sacrum through both sacroiliac joints (SIJs) to the femoral heads.
- The sacrum exhibits a tendency to move inferiorly and anteriorly, resulting in a self-locking mechanism that augments SIJ stability.

Load transfer is not equal:

- Owing to an approximate 12° coronal angulation of the auricular surfaces,
- Approximately 80% of the load is transferred transversely to the acetabula,
- While around 20% is transmitted vertically.
- Consequently, the SIJs serve to fragment and redirect body weight, rather than merely transmitting force directly downward.

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BIOMECHANICS (1,6)

Load, Stiffness, and Position Effects

- SIJ function is tightly linked to global spinal–pelvic alignment
- ↑ Ligament/cartilage stiffness → ↓ SIJ motion and stress
- ↓ Ligament stiffness → ↑ SIJ motion and stress
  - Pregnancy (hormonal effects)
  - Advanced age
  - Hypermobility spectrum
  - Ligament strain/sprain: standing > sitting
- Left–right SIJ stiffness asymmetry → potential low back/pelvic pain

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DIFFERENTIAL DIAGNOSIS

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- **DIFFERENTIAL DIAGNOSIS (4)**
- **Axial spondyloarthritis (spondyloarthropathy**
- **Endometriosis**
- **Myofascial pain syndrome**
- **Piriformis syndrome**
- **Cluneal nerve entrapment syndrome**
- **Hip joint pathology**
- **Lumbar disc**
- **Lumbar facets**

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DIFFERENTIAL DIAGNOSIS (4)

Axial spondyloarthritis (spondyloarthropathy):

- Ankylosing spondylitis, psoriatic arthritis
- Inflammatory spinal disorder typically presenting as chronic low back pain before age 45.
- Often involves other joints showing inflammatory changes on imaging.
- Systemic features may include uveitis, psoriasis, and inflammatory bowel disease.
- Many are HLA-B27 positive, active disease is commonly accompanied by elevated inflammatory markers such as ESR and C Reactive Protein.

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DIFFERENTIAL DIAGNOSIS (4)

Endometriosis

- Endometriosis is a common cause of pelvic, abdominal, and low back pain
- Result of implantation of normal uterine endometrial mucosa in abnormal locations including the bowel, diaphragm, and pleural cavity.
- The pain in endometriosis can be associated with other symptoms such as dysmenorrhea, dyspareunia, and dysuria.

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DIFFERENTIAL DIAGNOSIS (4)

Myofascial Pain Syndromes

- Myofascial pain is a relatively common source of chronic pain
- It is a musculoskeletal disorder involving regional pain in muscles, fascia, or nearby soft tissues
- Caused by the presence of trigger points, spasm or even atrophy within muscles.
- Also it is associated with restricted active movement in the affected area.
- Diagnosis is mainly clinical, focusing on identifying trigger points, characteristic pain referral patterns, and local twitch responses

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DIFFERENTIAL DIAGNOSIS (4)

Piriformis syndrome

- Piriformis syndrome is a neuromuscular condition in which the piriformis muscle irritates or compresses the sciatic nerve.
- Pain in the buttock, hip, and lower limb.
- May produce sciatic-like symptoms (radiating posterior thigh/leg pain).
- Symptoms often worsen with sitting, hip flexion, or prolonged activity.

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DIFFERENTIAL DIAGNOSIS (4)

- **Piriformis Syndrome**
- In ~20% of individuals, the sciatic nerve passes through or immediately adjacent to the piriformis muscle rather than below it.
  - This variation increases susceptibility to nerve irritation.
- Excessive strain, spasm, or trauma to the buttock can lead to piriformis hypertrophy or tightness.
- Resultant entrapment/irritation of the sciatic nerve produces neuropathic symptoms.
- NOTE: Due the attachment on the sacrum, can be involved with SIJ issues

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DIFFERENTIAL DIAGNOSIS

Piriformis Provocation Test

- FAIR Test (Flexion, Adduction, Internal Rotation)
- Freiberg Maneuver
- Active Piriformis Test
- Beatty Maneuver

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DIFFERENTIAL DIAGNOSIS

Piriformis Provocation Test

- FAIR Test
- Side-lying: Patient lies on the unaffected side; the affected hip is flexed to 90 degrees, knee flexed, then the examiner pushes the knee down and externally rotates the foot (adduction/internal rotation) to stretch the piriformis
- Positive with familiar pain

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DIFFERENTIAL DIAGNOSIS

Piriformis Provocation Test

Freiberg Maneuver

Patient lies supine (on back); examiner forcefully internally rotates the extended thigh to stretch the piriformis

Positive with familiar pain

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DIFFERENTIAL DIAGNOSIS

Piriformis Provocation Test

- **Active Piriformis Test**
- Patient lies on unaffected side with affected leg's knee bent, foot on table
- they push their heel into the table (initiating abduction/external rotation) against resistance.
- Positive test: familiar pain

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DIFFERENTIAL DIAGNOSIS

Piriformis Provocation Test

Beatty Maneuver

- Patient lies on their unaffected side.
- Both hips and knees are bent, often with the hip flexed to 90
- The patient lifts their upper thigh away from the table (hip abduction) against a downward force or resistance

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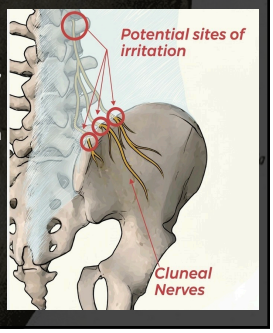
DIFFERENTIAL DIAGNOSIS (4)

Cluneal nerve entrapment syndrome:

- Caused by compression of the superior, middle, or inferior cluneal nerves, typically over the iliac crest.
- Patients report low back or buttock pain with sensory disturbances such as numbness or paresthesia.
- Sometimes mimics sciatica
- Symptoms worsen with lumbar motion or postural changes, and focal pressure over the entrapment site reproduces pain.



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DIFFERENTIAL DIAGNOSIS (4)

Hip joint pathology (hip arthritis):

- Hip pain is most commonly due to degenerative or inflammatory arthritis.
- Pain is classically felt in the groin but frequently refers to the buttock and lateral hip, sometimes radiating below the knee.
- Symptoms worsen with activity and may disrupt sleep.
- Plain radiography is an appropriate initial imaging study.

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DIFFERENTIAL DIAGNOSIS

Hip Pathology

- FABER
- Resisted active SLR - Stinchfield test
- FADIR
- SCOUR

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DIFFERENTIAL DIAGNOSIS

- FABER (Flexion, Abduction, External Rotation) Test
- Patient supine, the patient's hip is *F*lexed, *AB*ducted and *E*xternally *R*otated the heel resting on the opposite kneecap.
- Pain in the inguinal region, suggests hip joint pathology. Pain in the back or SIJ, suggests SIJ dysfunction.
- Also known as the figure-4 test and Patrick's maneuver.

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DIFFERENTIAL DIAGNOSIS

- Resisted active SLR Stinchfield test
- Patient is in supine lying position
- The leg on the affected side is in full extension and placed in external rotation
- Then the patient is asked to lift the leg off the table against the examiner's resistance.
- Pubic or groin pain indicates a positive test.

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DIFFERENTIAL DIAGNOSIS

- Log Roll - Freiberg test
- Patient lies supine, with the hip and knee extended
- Examiner places one hand on the thigh and the other on the calf
- The examiner passively rotates the entire leg, moving it through its full range of internal and external rotation, like a log rolling.
- Note any pain, clicking, popping (crepitus), or differences in motion compared to the unaffected hip.

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DIFFERENTIAL DIAGNOSIS

- FADIR
- The patient supine
- Examiner passively lifts the patient's knee, flexing the hip to maximum range
- The knee is moved towards the opposite shoulder, adducting the hip
- Maintain flexion and adduction, then move the foot/ankle outward, internally rotating the femur within the hip socket
- The test is positive if this maneuver induces pain

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DIFFERENTIAL DIAGNOSIS

- SCOUR
- The patient is supine.
- Flex the hip and knee, apply downward pressure through the femur, and "scour" the joint in a circular arc.
- Positive test is reproduction of pain, apprehension, clicking, or catching, often in the groin.
- The test is highly sensitive but lacks specificity, meaning it is good for ruling out hip pathology but not necessarily diagnosing the *specific* cause

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DIFFERENTIAL DIAGNOSIS

- SCOUR

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DIFFERENTIAL DIAGNOSIS (12)

The more common musculoskeletal conditions resulting in back and pelvic pain:

- Disc
- Facets
- Sacroiliac joints

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DIFFERENTIAL DIAGNOSIS (12)

The more common musculoskeletal conditions resulting in back and pelvic pain:

- Disc = 40%
- Facets = 30%
- SIJ = 20%
  - The characteristics of the pain can help identify the cause

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DIFFERENTIAL DIAGNOSIS

Lumbar Disc

- Typically, under 50 years of age
- Pain is axial
- Pain is worse with sitting and getting up from sitting,
- Pain is worse with increased intrathecal pressure,
- Pain centralizes with movement
- Pain tends to be minimal to superficial structures on palpation
- May have neurological signs: DTR, sensory, muscle weakness

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DIFFERENTIAL DIAGNOSIS

Facet Joints

- Typically, over 50 years of age,
- Pain located lateral to the spine
- Pain does get better with sitting and walking
- Pain does not centralize with movement
- Pain increased with lateral compression: Kemps test
- Sensitization of spinous process and overlying skin due to common innervation of the dorsal ramus of the spinal nerve

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DIFFERENTIAL DIAGNOSIS

Facet Joints

- Kemps Test (9), AKA extension-rotation test, or quadrant test
- Test is considered positive with pain on lumbar extension and rotation
- Suggested method: patient runs palm of hand down the back of their leg
- Note: test has low specificity, approximately 22%
- Meaning, disc and SI pain are aggravated by this motion
- The value of this test is in its sensitivity for facet joint pain, reported to be 100%
- Meaning: if Kemps Test is negative, very high chance facet joints are not the cause of pain

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DIFFERENTIAL DIAGNOSIS

Facet Joints

- Sensitization of spinous process and overlying skin due to common innervation of the dorsal ramus of the spinal nerve
- a branch of a spinal nerve that emerges from the intervertebral foramen and travels backward. Along with facet joints, it innervates the deep muscles of the back, and the skin of the back

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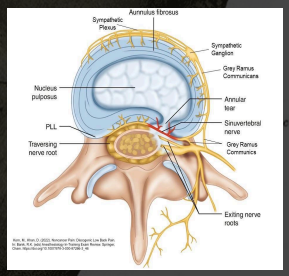
DIFFERENTIAL DIAGNOSIS

Facet Joints Vs Disc

- disc - Pain tends to be minimal superficial structures on palpation
- The posterior aspects of the discs and the posterior longitudinal ligament are innervated by the sinuvertebral nerves. The posterolateral aspects of the discs receive branches from adjacent ventral primary rami and from the grey rami communicantes near their junction with the ventral primary rami. The lateral aspects of the discs receive other branches from the rami communicantes.



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DIFFERENTIAL DIAGNOSIS

Sacroiliac Joints

- Pain is usually unilateral, below L5
  - **Fortin Finger Sign**
    - a clinical test involves the patient pointing to the area of pain with one finger, and a positive sign is when the point is within 1 cm of the posterior superior iliac spine (PSIS).
- Pain aggravated by static standing and walking
- Pain provoked when standing up from sitting

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SIJ STABILITY

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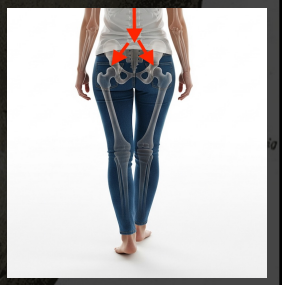
SIJ STABILITY

Functional Role of the Sacroiliac Joint

- The SI joint transfers force between the upper body and legs during walking
- Walking creates alternating side-to-side forces that stress the SI joint
- The SI joint must stay stable while still allowing controlled movement with efficient force transmission



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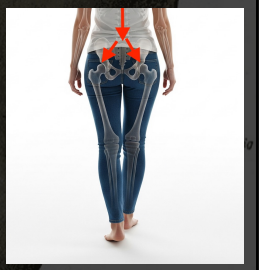
SIJ STABILITY

Concept of Dynamic Stability

- SIJ stability is not static or rigid
- Stability must be modulated in response to changing load demands
- Constant compression would severely limit necessary motion
- Dynamic stability allows:
  - Shock absorption
  - Energy-efficient gait
  - Adaptation to variable loads and positions



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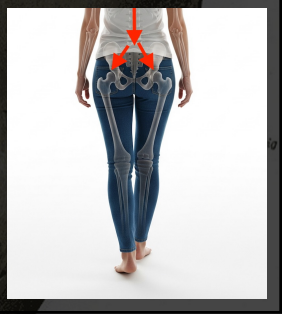
SIJ STABILITY

Mechanisms of SIJ Stability

- Two complementary stabilization systems:
  - Form closure
  - Force closure
- Optimal SIJ function depends on the interaction between both mechanisms



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SIJ STABILITY

Form Closure (Context for Force Closure)

- Stability derived from pelvic anatomy
- Interlocking ridges and depressions of sacral and iliac articular surfaces
- High friction surfaces reduce shear forces
- Keystone configuration of the sacrum:
  - Wider superior sacrum wedged between the ilia
- Form closure provides passive, inherent stability
- Alone, form closure is insufficient during vertical and asymmetrical loading

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•Stability of the sacroiliac joint is form closure, which provides passive and inherent stability to the joint.

SIJ STABILITY

Form Closure (Context for Force Closure)

- Stability of the sacroiliac joint is primarily derived from pelvic anatomy.
- The sacral and iliac articular surfaces feature interlocking ridges and depressions that enhance stability.
- These high-friction surfaces effectively reduce shear forces across the joint.
- A key feature is the keystone configuration of the sacrum, where the wider superior portion of the sacrum is firmly wedged between the two ilia.
- This anatomical arrangement creates form closure, which provides passive and inherent stability to the joint

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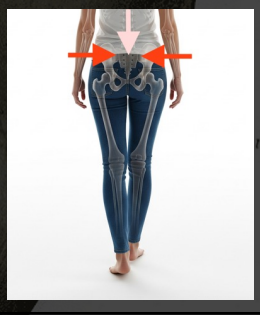
SIJ STABILITY

Definition of Force Closure

- Force closure refers to additional compressive forces applied across the SIJ
- Forces act perpendicular to the joint surfaces
- Compression is adjustable and load-dependent
- Allows the joint to remain stable while still permitting motion



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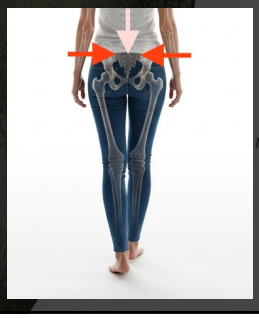
SIJ STABILITY

Contributors to Force Closure

- Active muscular forces
- Passive ligamentous tension
- Coordinated neuromuscular control
- Key concept: musculature modulates joint compression as needed



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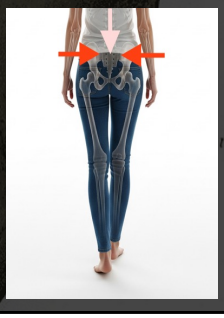
SIJ STABILITY

Functional Role of Force Closure During Movement

- Critical during unilateral stance phases of gait
- Counters shear forces created by body weight and ground reaction forces
- Enhances friction at the joint surfaces
- Amplifies form closure through increased compression
- Facilitates a self-bracing mechanism of the pelvis



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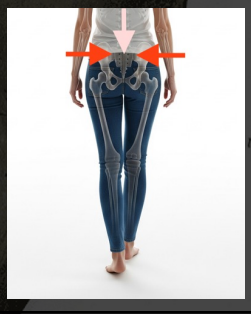
SIJ STABILITY

Force Closure as a Modifiable System

- Force closure can increase or decrease depending on task demands
- Examples:
  - Walking vs. running
  - Single-leg stance vs. double-leg stance
  - Load carrying vs. unloaded activities
- Allows efficient movement without excessive joint stiffness



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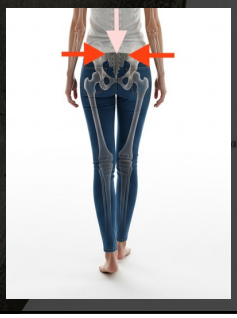
SIJ STABILITY

- Many SIJ dysfunctions result from insufficient force closure.
- When muscles and ligaments fail to provide adequate support, joint stability decreases.
- This leads to excessive shear, irritation, and pain.
- Therefore, it is essential to assess the force closure mechanisms.



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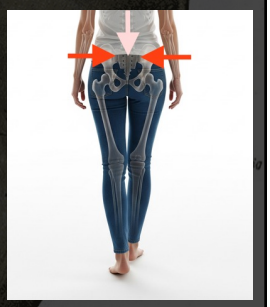
SIJ STABILITY

- SIJ stability is dynamic, not rigid
- Force closure is essential for functional movement
- Muscles actively regulate compressive forces across the SIJ
- Effective force closure enhances form closure and protects against shear
- Insufficient force closure is a common contributor to SIJ-related pain and dysfunction



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MYOFASCIAL SLINGS

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MYOFASCIAL SLINGS

- Myofascial slings , AKA Anatomy slings were first described by Andry Vleeming.
- They are integrated systems made up of:
  - Muscles
  - Fascia
  - Ligaments
- They function collectively to create stability and mobility.
- They coordinate movement across multiple body regions
- They link upper and lower extremities through the trunk enabling force transfer

- Vleeming, A., Pool-Goudzwaard, A. L., Stoeckart, R., van Wingerden, J. P., & Snijders, C. J. (1995). The posterior layer of the thoracolumbar fascia. Spine, 20(7), 753-758.

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MYOFASCIAL SLINGS

Clinical Implication

- Slings assist:
  - Load transfer through the pelvis
  - Dynamic stability of the pelvis and spine
  - Lumbar spine control
  - Coordinate force transfer between limbs
- Slings overlap and interact depending on movement demands.

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MYOFASCIAL SLINGS

Relationship to Lumbopelvic Stability

- Dysfunction in slings can contribute to
- Low back pain
- Sacroiliac joint dysfunction
- Altered gait mechanics
- Reduced force closure of the pelvis

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MYOFASCIAL SLINGS

Balanced vs Imbalanced Force Vectors

- Balanced vectors → optimal joint alignment and efficient movement/stability.
- Imbalanced vectors (altered tension or weakness) →
  - Malalignment
  - Reduced stability
  - Compensatory patterns
  - Increased injury risk

Clinical Error to Avoid

- Treating isolated muscles rather than the sling system.
- Dysfunction often results from a “weak link” within a sling, not a single muscle failure.

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MYOFASCIAL SLINGS

- There are 4 major slings surrounding the lumbo-pelvic area
- Will look at in more detail in a minute
- Transfers forces between upper and lower body.
- Protects neural and visceral structures.
- Supports respiration.
- Adapts to constantly changing external demands

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MYOFASCIAL SLINGS

- When it comes to providing this stabilization there are 4 primary anatomical or myofascial slings.

- Anterior Oblique Sling (AOS)
- Posterior Oblique Sling (POS)
- Deep Longitudinal Sling (DLS)
- Lateral Sling (LS)

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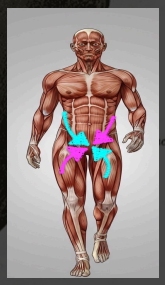
MYOFASCIAL SLINGS

Anterior Oblique Sling (AOS)

Components

- External oblique
- Internal oblique
- Contralateral adductors
- Connected via the adductor–abdominal fascia
- Acts like an abdominal binder
- Compresses the pelvic girdle
- Creates force closure at the symphysis pubis
- Works in coordination with the opposite AOS and other sling systems



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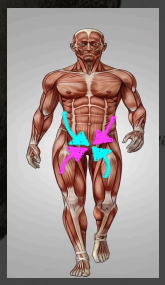
MYOFASCIAL SLINGS

Anterior Oblique Sling (AOS)

- Primary Role of the AOS
- The AOS provides:
  - Stabilizes pelvis during transitional movements
  - Controls trunk rotation
  - Efficient force transfer between trunk and lower extremity
  - Dynamic load management
- It is both a stabilizer and a rotator.



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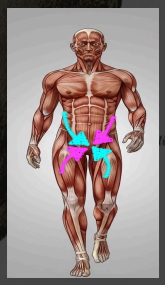
MYOFASCIAL SLINGS

Anterior Oblique Sling (AOS)

During walking

- During stance phase:
  - Adductors + internal oblique + opposite external oblique co-contract
  - Stabilize the body over the stance leg
  - Rotate the pelvis forward
  - Prepare the hip for heel strike



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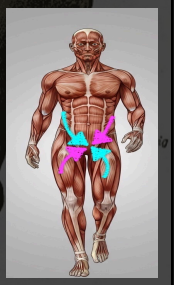
MYOFASCIAL SLINGS

Anterior Oblique Sling (AOS)

During walking

- Oblique muscles are active at initiation of stance phase
- AOS contributes to:
  - Pelvic stability
  - Pelvic rotation
  - Swing phase control
- Activation increases from walking → running
- Reciprocal Function
- One AOS shortens while the opposite lengthens
- Allows controlled hip extension during gait



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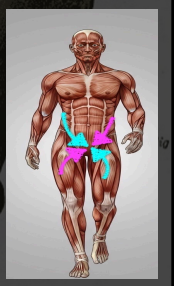
MYOFASCIAL SLINGS

Anterior Oblique Sling (AOS)

In Sports

- High demand in multi-directional sports:
- Tennis
- Soccer
- Football
- Basketball
- Rugby
- Hockey



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MYOFASCIAL SLINGS

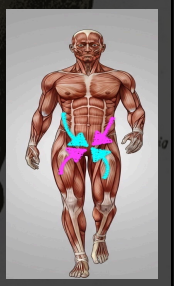
Anterior Oblique Sling (AOS)

In Sports

- Functions include:
- Acceleration
- Deceleration
- Rotational force production
- Change-of-direction control

Clinical insight:

- Groin strains and abdominal tears often occur during these tasks
- Suggests strong functional linkage within the AOS



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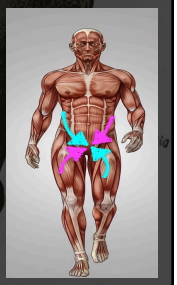
MYOFASCIAL SLINGS

Anterior Oblique Sling (AOS)

- **Clinical Takeaways**
- The AOS is critical for pelvic force closure and rotational control.
- It plays a major role in gait and running mechanics.
- It is heavily loaded in change-of-direction sports.
- Injury patterns (groin + abdominal strain) often reflect AOS dysfunction.
- Rehabilitation should progress from isolated strengthening → dynamic sling integration.
- Always assess load transfer, not just muscle strength.



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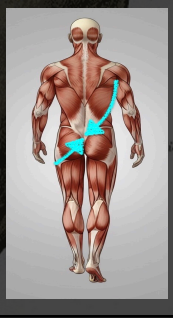
MYOFASCIAL SLINGS

Posterior Oblique Sling (AOS)

Components:

- Latissimus dorsi (LD)
- Contralateral gluteus maximus (GM)
- Thoracolumbar fascia (TLF)

- This sling crosses at the sacro-lumbar junction.
- The GM also connects into the iliotibial tract, linking the POS with the lateral sling.



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MYOFASCIAL SLINGS

Primary Function

- Stabilizes the sacroiliac joint (SIJ)
- Stabilizes the lumbar spine
- Controls trunk rotation
- Transfers force between upper and lower body
- Supports efficient gait
- The POS assists movement **while stabilizing** the spine.

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MYOFASCIAL SLINGS

During Walking

- **Before Heel Strike:**
- Hamstring prepares the limb for weight bearing.
- Helps control anterior pelvic rotation.

After Heel Strike:

- Hamstring activity decreases.
- Gluteus maximus takes over pelvic control.
- Contralateral latissimus dorsi controls arm swing (eccentric contraction).

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MYOFASCIAL SLINGS

During Walking

- **During Propulsion:**
- GM + opposite LD contract together.
- This increases tension in the TLF.
- Results in SIJ compression and lumbar stability.

Clinical insight

- If the gluteus maximus is weak:
- Hamstrings compensate.
- May contribute to hamstring overuse or strain.
- Pelvic control becomes inefficient.

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MYOFASCIAL SLINGS

The POS works in coordination with the **Anterior Oblique Sling (AOS)**.

- They function like:
  - Agonist and antagonist systems.
  - **Example: Tennis Swing**
  - AOS → produces rotation and acceleration.
  - POS → controls and decelerates movement (eccentric control).
  - Together they:
    - Maintain balance
    - Protect the lumbo-pelvic region
    - Stabilize during high-speed rotation

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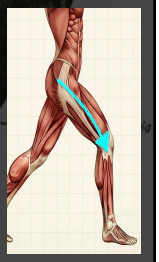
MYOFASCIAL SLINGS

Lateral Sling (LS)

- LS made up of the gluteus medias & minimus, tensor fascia latae (TFL), iliotibial band (ITB)
- Starts at origin of gluteus medius ends at insertion of the ITB on the tibia
- Covers the lateral aspect of the hip and knee joint
- The LS is used in side-to-side stability
- Works to hold the pelvis level in single leg movements
- Pelvo-femoral stability in dynamic movements like gait lunges, stair climbing



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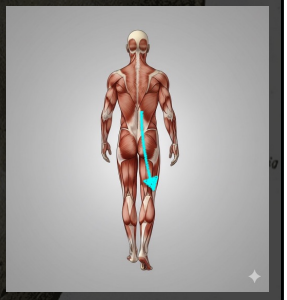
MYOFASCIAL SLINGS

Deep Longitudinal Sling (DLS)

Primary Components

- Erector spinae
- Multifidus
- Thoracolumbar fascia
- Sacrotuberous ligament
- Biceps femoris



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MYOFASCIAL SLINGS

Deep Longitudinal Sling (DLS)

Primary Function

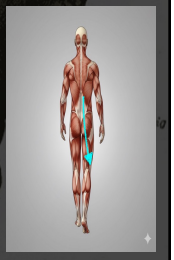
- Assists shock absorption during gait
- Controls forward trunk flexion
- Provides longitudinal stability during locomotion

Sacral Mechanics

- Contributes to **sacral nutation**
- Nutation increases ligament tension and SI joint stability

Postural Function

- Active continuously during upright posture
- Adjusts stability based on load demands



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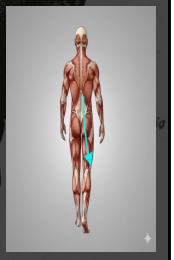
MYOFASCIAL SLINGS

Integration of Sling Systems

All slings work together, not independently

Example:

- POS & AOS coordinate rotational movement
- LS stabilizes pelvis while other slings generate movement
- DLS manages load absorption



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MYOFASCIAL SLINGS

Sling Dysfunction & Back Pain

Prevalence

- Up to 84% of individuals experience low back pain during their lifetime.

Key Clinical Question

- Instead of asking:
- "Which structure causes pain?"
- Clinicians should ask:
- "Why has the load transfer system failed?"

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MYOFASCIAL SLINGS

Effects of Dysfunctional Load Transfer

Effects on Passive Structures

- Repetitive Microtrauma
  - Dysfunctional slings can lead to:
  - Facet joint synovitis
  - Annular tears
  - Ligament strain

Long-Term Structural Changes

- Disc degeneration
- Osteophyte formation
- Reduced disc height

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EXAMINATION

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EXAMINATION

- When it comes to evaluating the SIJ research has shown that there is not one gold standard provocation test to make the diagnosis.
- Gold standard is considered to be compared to fluoroscopically guided anesthetic SIJ block that relives pain
- It is recommended a group of test be performed
- There are 2 researched clusters of provocation test that have been shown to be reliable
  - Laslett's & Van der Wurff

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EXAMINATION

- Laslett (7)
- Laslett's evidence demonstrates that a cluster of SIJ provocation tests improves diagnostic accuracy.
- Key diagnostic threshold:
- 3 or more positive provocation tests → highest accuracy
- Sensitivity up to 91% and specificity up to 78% when compared with fluoroscopically guided anesthetic SIJ block.

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EXAMINATION

- Laslett (7)
- Gaenslen's
- Distraction
- Compression
- Sacral Thrust
- Thigh thrust - AKA Posterior Pelvic Pain Provocation Test (P4) will see in some literature regarding testing in pregnancy

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EXAMINATION

Laslett (7)

- Gaenslen's
- Stresses SIJ by producing torsion—anterior rotation on one side and posterior on the other
- Patient supine at table edge (classic) OR Side-lying modification
- Patient lies with one leg hanging off table; opposite hip flexed to chest.
- Doctor applies:
  - Maximal hip flexion to upper leg
  - Downward pressure to the hanging leg
  - Maintain simultaneous counter-rotation.
- Positive: Familiar SIJ pain on the side being stressed.

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EXAMINATION

Laslett (7)

- Gaenslen's

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EXAMINATION

Laslett (7)

- Distraction
  - Provokes anterior SIJ structures
  - Patient supine.
  - Doctor stand at patient's side.
  - Place palms over ASIS bilaterally.
  - Apply posterolateral pressure
  - Hold at end-range for **30 seconds**.
  - **Positive Test**
  - Familiar unilateral SIJ pain reported in the gluteal/pelvic region

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EXAMINATION

- Distraction

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EXAMINATION

Laslett (7)

- Compression
  - Stresses posterior SI ligaments and compresses posterior pelvic ring.
  - Patient: side-lying with painful side up (preferred).
  - Doctor stand behind patient.
  - Place hands over the lateral aspect of the iliac crest.
  - Apply downward, medial-directed pressure toward the table. Maintain pressure for 30 seconds.
  - Positive Test
  - Reproduction of the patient's familiar unilateral SIJ pain.

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EXAMINATION

- Compression

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EXAMINATION

Laslett (7)

Sacral Thrust

- Direct provocation of the sacrum—shearing the SIJ posterior to anterior
  - Patient is prone
  - Doctor stand over patient.
  - Place heel of hand at midline of sacrum (S2 level).
  - Apply **anterior-directed force** vertically.
  - Use oscillatory pressure or single firm thrust.
  - Positive: Reproduction of **familiar SIJ pain**.

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EXAMINATION

- Sacral Thrust

143

EXAMINATION

Laslett (7)

- Thigh thrust
- AKA Posterior Pelvic Pain Provocation Test (P4) in literature RE testing in pregnancy
- Produces a shear force across the SIJ—one of the **most sensitive** tests.
- Patient supine; hip flexed to 90°.
- Doctor stand on the side being tested.
- Hand wraps around the patient's flexed knee.
- Apply a **posterior shearing force** through the femur.
- Use graded oscillations then sustained pressure at end range.

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EXAMINATION

- Laslett (10)
- Thigh thrust
- Positive if reproduces familiar SIJ pain (not hip or lumbar pain).
- Sensitivity: Highest of all tests in Laslett's cluster

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EXAMINATION

Van der Wurff (8)

- Van der Wurff and colleagues demonstrated that when multiple tests are positive, the likelihood that the SIJ is the primary pain generator increases.

- Distraction
- Compression
- Thigh Thrust
- Gaenslen's
- FABER Test

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EXAMINATION

Van der Wurff (8)

FABER (Flexion, Abduction, External Rotation) Test

- Patient supine, the patient's hip is *F*lexed, *AB*ducted and *E*xternally *R*otated so that the heel rests on the opposite kneecap.
- Pain may be experienced in the inguinal region, which suggests hip joint pathology. Pain may also be experienced in the back or SIJ, suggesting SIJ dysfunction.
- Also known as the figure-4 test and Patrick's maneuver.

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EXAMINATION

- FABER

149

EXAMINATION

Van der Wurff (18)

- According to Van der Wurff's recommendations:
- Three or more positive tests → High likelihood of SIJ dysfunction as the primary pain generator.
- Pain must be familiar, meaning it reproduces the patient's typical symptomatic experience rather than causing generalized discomfort.
- This threshold has been shown to provide better sensitivity and specificity than any single test alone.
- Importantly, negative results across the cluster make SIJ-mediated pain less probable
- Guiding toward alternative sources such as lumbar facet joints or hip pathology.

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EXAMINATION
Myofascial Slings

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EXAMINATION

Myofascial Slings - AOS

- Supine Adduction + Contralateral Trunk Flexion Test
- Patient supine
- Knee bent, foot on table
- Patient simultaneously performs a slight trunk curl with rotation while adducting the knee against resistance

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EXAMINATION

Myofascial Slings - AOS

- Positive Findings:
  - Muscle weakness
  - Inability to coordinate movement
  - Delayed activation
  - Reproduction of groin or lower abdominal pain

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EXAMINATION

Myofascial Slings- POS

Prone Hip Extension Test (Glute–Lat Coupling)

- Patient prone
- Patient lifts one leg into extension along with the opposite arm for the lats

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EXAMINATION

Myofascial Slings- POS

Prone Hip Extension Test (Glute–Lat Coupling)

- Positive Findings:
  - Weakness
  - Hamstring or lumbar dominance before glute activation
  - Delayed or absent contralateral lat engagement
  - Pelvic rotation or lumbar extension substitution

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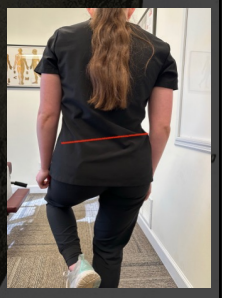
EXAMINATION

Myofascial Slings - LS

Single-Leg Stance (Trendelenburg Test)

- Screen for lateral sling stability
- Patient stands on one leg for 20–30 seconds
- Observe: Pelvic position, Trunk lean, Balance strategy
- Positive Findings:
  - Contralateral pelvic drop → glute med insufficiency
  - Trunk lean over stance leg → compensation
  - Wobbling or inability to maintain position



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EXAMINATION

Myofascial Slings – DL

Single-leg bridge or glute bridge march

- Lie supine, lifting the hips into a bridge
- Alternatingly lifting one knee toward the chest while keeping the hips level

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EXAMINATION

Myofascial Slings – DL

Single-leg bridge or glute bridge march

Positive Findings

- Pelvic Drop: Inability to keep the pelvis level, indicating weak gluteus maximus/hamstrings on the supported side.
- Rotation: Hips twist, showing poor stabilization within the DLS.
- Cramping: Specifically in the hamstring, indicating poor firing patterns.
- Reduced Duration: A "positive test" side often cannot hold the bridge as long or as high as the other.

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OTHER SIJ TESTING

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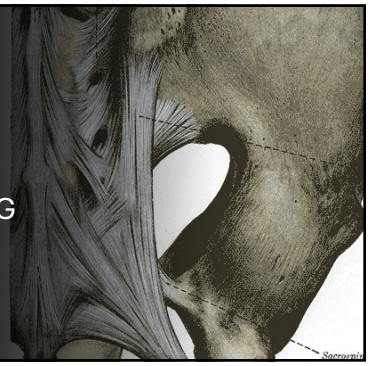

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EXAMINATION

Active Straight Leg Rasing Test ASLR (2)

- Patient supine with both legs extended on the table
- The patient raises one leg at a time to 30° of hip flexion without flexing the knee.
- Positive with pain in the back with the leg raised, or describes a heaviness or difficulty in performing
- Second part of test, compression is applied and the patient is then asked to actively perform a straight leg raise
- If there is less pain upon compression or greater ease in motion this is considered a positive provocative test.

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EXAMINATION

- Active Straight Leg Rasing Test ASLR (2)
  - Challenges pelvic stability – force closure deficit
  - Compensations include twisting the trunk, holding breath, pressing down on opposite leg
  - AKA - Assisted straight leg raise – deficit in forced closure

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EXAMINATION

Trendelenburg Sign

- The patient stands on the affected leg in a single-leg stance for up to 30 seconds.
- The provider stands behind the patient at the hip level and places their hands on the iliac crests on either side of the pelvis, observing if it stays level during the single-leg stance.
- Repeat the test on the opposite side.
- Positive sign is when the pelvis drops on the unaffected side or contralateral side
- Weakness gluteus medius & minimus

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MANAGEMENT

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MANAGEMENT (9)

Effectiveness of Spinal Manipulation for SIJ Pain

- Study Objective
- To compare the effects of:
  - SIJ high-velocity low-amplitude (HVLA) manipulation alone
  - Combined SIJ and lumbar HVLA manipulation
- Participants: 32 women with SIJ syndrome.
- Design: Randomized clinical trial with two equal groups.
- In patients diagnosed with sacroiliac joint syndrome

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MANAGEMENT

- Interventions:
  - Group 1: HVLA manipulation to the SIJ only.
  - Group 2: HVLA manipulation to both the SIJ and lumbar spine in a single treatment session.
- Outcome Measures:
  - Pain: Visual Analogue Scale (VAS)
  - Disability: Oswestry Disability Index (ODI)
- Assessment Timeline: Baseline, immediately post-treatment, 48 hours, and 1 month.

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MANAGEMENT

Pain Outcomes (VAS)

- Both groups showed statistically significant pain reduction:
  - Immediately post-treatment
  - At 48 hours, At 1 month
- No significant difference between groups in pain reduction at any time point.

Functional Disability Outcomes (ODI)

- Both groups demonstrated significant improvements in functional disability at:
  - 48 hours
  - 1 month post-treatment

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MANAGEMENT

- Combined SIJ + lumbar manipulation produced greater improvement in disability compared to SIJ manipulation alone.
- Within-group analyses confirmed meaningful clinical change over time in both VAS and ODI.
- HVLA spinal manipulation is effective for SIJ pain, producing rapid and sustained reductions in pain.
- Adding lumbar manipulation enhances functional outcomes, even when pain relief is similar.

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MANAGEMENT (10)

- A randomized controlled trial evaluated whether sacroiliac joint (SIJ) manual therapy (manipulation), exercise therapy, or their combination is most effective for treating sacroiliac joint dysfunction syndrome.
- 69 women diagnosed with SIJ dysfunction using clinical SIJ tests
  - SIJ manual therapy (manipulation) + SIJ-specific home exercises
  - SIJ manual therapy (manipulation) + lumbar home exercises
  - Lumbar home exercises only

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MANAGEMENT (10)

- **Outcomes assessed:** Pain (VAS), SIJ clinical tests, function and quality of life (SF-36, Modified Oswestry), and neuropathic pain (DN4)
- **Follow-up:** Baseline, 28 days, and 90 days
- All groups showed significant reductions in SIJ-related pain over time.
- Significant improvement (more negative tests) across all groups, indicating reduced SIJ dysfunction.

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MANAGEMENT

- Significant improvements in disability, health status, and neuropathic pain measures in all groups.
- Comparative Effect:
  - Manual therapy (manipulation) demonstrated long-term effectiveness for SIJ dysfunction.
  - Greatest improvements occurred when SIJ manipulation was combined with SIJ-specific exercises, compared to manipulation plus lumbar exercises or lumbar exercises alone.

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MANAGEMENT

Key Points

- SIJ manipulation is an effective treatment for SIJ pain and dysfunction
- Exercise alone can improve symptoms, but manipulation enhances outcomes, particularly over the long term
- Targeted SIJ exercises added to manipulation provide superior clinical benefit compared to more generalized lumbar exercise programs

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MANAGEMENT

Exercises from the article:

- "SIJ exercises included sacroiliac joint self mobilization, piriformis stretch, gluteus medius and minimus stretch, gluteus maximus stretch, stretching the gluteal and piriformis muscles together, and hip muscle isometric strengthening exercises (pushing legs against each other on the pillow and pushing the legs out towards your hand)."
- "Lumbar exercises included knee to the same shoulder stretch, quadriceps stretch, hamstring stretch, posterior pelvic tilt, conventional back-bridge, conventional back-bridge with elevated one leg, and sit-up."

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SUMMARY

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SUMMARY

Takeaway: Sacroiliac Joint (SIJ)

- Load Transfer Function
  The SIJ is a ligament-reinforced synovial joint that links the spine to the pelvis and transfers load from the lumbar spine to the lower extremities.
- Underrecognized Pain Source
  SIJ pain accounts for roughly 15–30% of low back pain but is frequently overlooked, especially when neurological signs are absent.

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SUMMARY

Takeaway: Sacroiliac Joint (SIJ)

- **Variable Pain Presentation**
  Pain is typically unilateral in the buttock below L5 near the PSIS, but may refer to the low back, groin, or leg, often mimicking other conditions.

- **Stability Over Mobility**
  SIJ motion is minimal and stability depends on joint geometry, ligament integrity, and muscular compression rather than active movement.

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SUMMARY

Takeaway: Sacroiliac Joint (SIJ)

- **Multifactorial Etiology**
  SIJ pain arises from axial loading and rotation with contributions from intra- and extra-articular structures; risk factors include pregnancy, leg length discrepancy, abnormal gait, trauma, heavy load, and lumbar fusion.
- **Manipulation Is Effective**
  HVLA manipulation reliably reduces SIJ pain and improves function, with greater disability improvement when combined with lumbar manipulation and SIJ-specific exercises.

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Sacroiliac Joint Pain Resources

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EDUCATION

Diplomate International Academy of Neuromusculoskeletal Medicine (DIANM)

- **Board Certified Chiropractic Orthopedics**

Certified Chiropractic Insurance Consultant – Licensed in Missouri

- Peer Review Certification, *Identifying causality, proper diagnosis coding, effects of co-morbidities, appropriate treatment protocols and documentation along with the determination of maximum medical improvement or static and stationary.* Texas Chiropractic College
- Independent Medical Examination Certification, *documenting the essentials of causal relation, apportionment and permanent impairment, appropriate physical examination techniques, documentation and report writing*. Texas Chiropractic College

100 Hour Traditional Acupuncture Program – National University Of Health Sciences

DOT Medical Examiner Training - New York Chiropractic College
Completed post doctorate program in DOT Certified Medical Examiner Training

Chiropractic Sports Physician Program - Los Angeles Chiropractic College
Post doctorate program in sports injury and physical fitness

Certified DISC Consultant – DISC is a personality assessment tool used by more than one million people every year to help improve teamwork, communication, and productivity in the workplace

100 Hour Physiotherapy Certification - Brenau University (Atlanta GA)

Erhardt X-ray Seminars, Leading to Certification 100 Hours in X-ray reading/interpretation - Dr. Russell Erhardt, DCBAR

Life Chiropractic College
Graduated 1984, Cum Laude with Doctor of Chiropractic degree

RELATED PROFESSIONAL EXPERIENCE

September 2025 – Present — Crosby Chiropractic entre — St Peters MO
Associate Doctor

September 2025 – Present — Logan Chiropractic College — Chesterfield MO
Clinic Adjunct

May 2013 – September 2025 — Dr. Martin Schmaltz, DC, LLC — Hazelwood MO
Owner

August 2023 – Present — Spinal Rehabilitation Center — St Louis MO
St Louis Division Director (contractor)

- Worked with owners to open 2 personal injury clinics in the St Louis area
- Trained staff and doctors
- Development of attorney relations

March 2021 – Present — DC Power Hours — Moberly MO
Continuing Education Instructor

As Scheduled — Northeastern College of Health Sciences — Seneca NY
Continuing Education Instructor

November 2017 – 2021 — Auto Injury Solutions — Nationwide
Personal Injury Utilization Reviews

October 2011 – May 2013 — Crosby Chiropractic Centre — St Peters MO
Associate Doctor

RELEVANT TRAINING & QUALIFICATIONS

Dizziness, Balance & Posture, *An in-depth study of the neurology of balance and postural control, including the vestibular system and proprioceptive capacity of the cervical spine. Including examination and diagnosis of associated dysfunction*

resulting in sensorimotor disturbances. Advanced Clinical Training and Post-doctrinal program in Chiropractic Orthopedics and Neuromuscular Medicine. University of Bridgeport, Health Sciences Postgraduate Education Department.

Pain In The Frame, *Understand the latest concepts in pain science including nociceptive inputs impact on the central pain neuromatrix, peripheral sensitization, and central sensitization resulting in chronic pain syndromes.* Advanced Clinical Training and Post-doctrinal program in Chiropractic Orthopedics and Neuromuscular Medicine. University of Bridgeport, Health Sciences Postgraduate Education Department.

Neurodiagnostics, Imaging Protocols and Pathology of the Trauma Patient, *An in-depth understanding of the protocols in triaging and reporting the clinical findings of the trauma patient. Maintaining ethical relationships with the medical-legal community*. Texas Chiropractic College or PACE Recognized by The Federation of Chiropractic Licensing Boards, Academy of Chiropractic Post-Doctoral Division, Long Island, NY, 2017

Diagnostics, Risk Factors, Clinical Presentation and Triaging the Trauma Patient*, An extensive understanding of the injured with clinically coordinating the history, physical findings and when to integrate neurodiagnostics. An understanding on how to utilize emergency room records in creating an accurate diagnosis and the significance of "risk factors" in spinal injury.* Cleveland University - Kansas City, Academy of Chiropractic Post-Doctoral Division, Long Island, NY, 2020

Crash Dynamics and Its Relationship to Causality, *An extensive understanding of the physics involved in the transference of energy from the bullet car to the target car. This includes G's of force, newtons, gravity, energy, skid marks, crumple zones, spring factors, event data recorder and the graphing of the movement of the vehicle before, during and after the crash. Determining the clinical correlation of forces and bodily injury.* Cleveland University - Kansas City, Academy of Chiropractic Post-Doctoral Division, Long Island, NY, 2020

MRI, Bone Scan and X-Ray Protocols, Physiology and Indications for the Trauma Patient, *MRI interpretation, physiology, history and clinical indications, bone scan interpretation, physiology and clinical indications, x-ray clinical indications for the trauma patient.* Cleveland University - Kansas City, Academy of Chiropractic Post-Doctoral Division,

Neurodiagnostic Testing Protocols, Physiology and Indications for the Trauma Patient, *Electromyography (EMG), Nerve Conduction Velocity (NCV), Somato Sensory Evoked Potential (SSEP), Visual Evoked Potential (VEP), Brain Stem Auditory Evoked Potential (BAER) and Visual-Electronystagmosgraphy (V-ENG) interpretation, protocols and clinical indications for the trauma patient.* Cleveland University - Kansas City, Academy of Chiropractic Post-Doctoral Division, Long Island, NY, 2020

Documentation and Reporting for the Trauma Victim*, Understanding the necessity for accurate documentation and diagnosis utilizing the ICD-9 and the CPT to accurately describe the injury through diagnosis. Understanding and utilizing state regulations on reimbursement issues pertaining to healthcare.* Cleveland University - Kansas City, Academy of Chiropractic Post-Doctoral Division, Long Island, NY, 2020

Documenting Clinically Correlated Bodily Injury to Causality, *Understanding the necessity for accurate documentation, diagnosis and clinical correlation to the injury when reporting injuries in the medical-legal community. Documenting the kinesiopathology, myopathology, neuropathology, and pathophysiology in both a functional and structural paradigm.* Cleveland University - Kansas City, Academy of Chiropractic Post-Doctoral Division, Long Island, NY,

Personal Injury Documentation, Coding, and Case Management, *Understanding the importance of personal injury documentation, correct coding of injuries and co-morbidities as well as proper case management and rehabilitation.* Logan University, St Louis MO. 2020