

Managing Low Back Pain in Primary Care

Primary Care Hawaii 2022: Caring for the Active and Athletic Patient

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- Dr. Macintyre has no conflicts of interest
 - No off-label medications will be discussed
 - Supplementary information and reference slides are included after the slides of the main presentation
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Outline: Low Back Pain

- Epidemiology
 - Overview
 - Prevalence and significance to health
 - Definition, Diagnosis and Etiology
 - History and Physical
 - Classification
 - Axial Back pain (Non-specific, Sacroiliac Joint, Spondylolysis)
 - Back plus leg pain (Radiculopathy, Spinal Stenosis)
 - Investigation
 - Imaging guidelines
 - Treatment
 - Evidence based recommendations for conservative management
-

Low Back Pain

- Has anyone in the audience experienced low back pain?
 - Was it transiently disabling?
 - Does it still bother you day to day?
 - How would you react if you saw your next day's schedule featured 4 low back pain patients?
 - Panic?
 - Resignation?
 - Glee?
 - Sudden urge to take the day off?
 - The fact that I'm the last speaker on the last day suggests how popular back pain is for physicians
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Low Back Pain: Overview

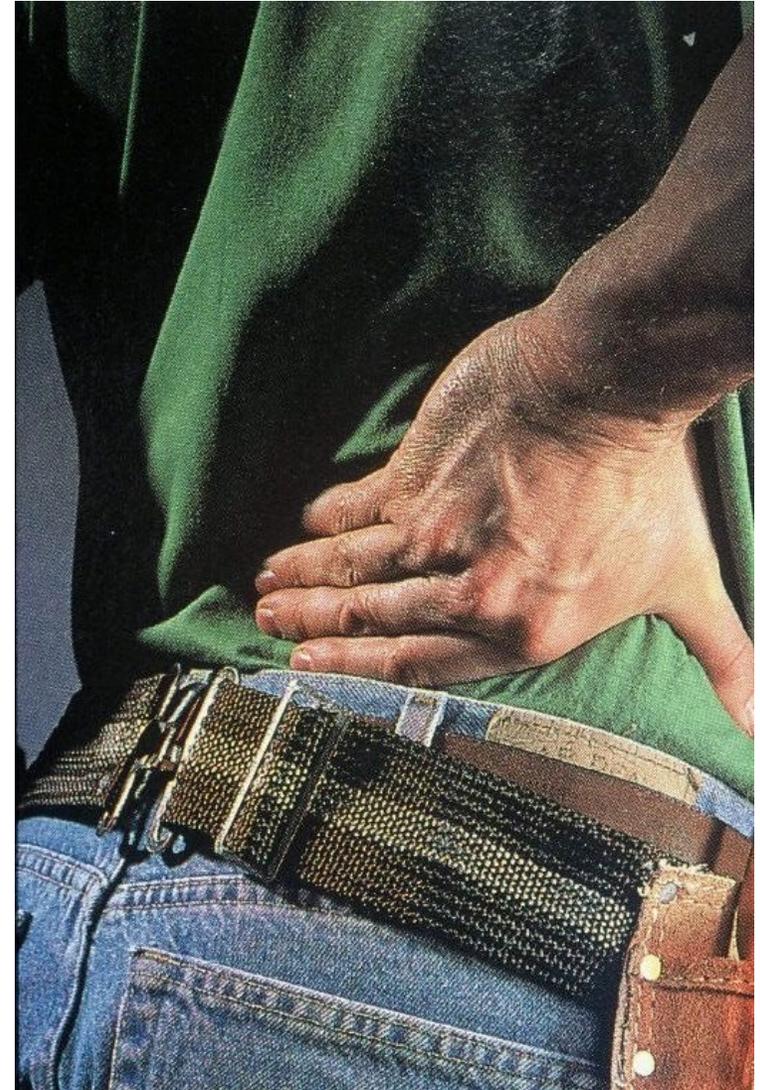
- LBP is a symptom, not a disease and is not an ‘injury’ in need of medical treatment
 - Most low back pain is unrelated to specific identifiable spinal pathology
 - Most people with new episodes of low back pain recover quickly; however, recurrence is common and in a small proportion of people, low back pain becomes persistent and disabling
 - Increased use of ineffective and potentially harmful treatments has wasted limited health care resources and caused harm.
 - Redirecting problem-solving efforts away from seeking cures towards improved adaptation to the pain has yielded beneficial outcomes
- Buchbinder, R., van Tulder, M., et al 2018. Low back pain: a call for action. *The Lancet*, 391(10137), pp.2384-2388.
- Hartvigsen, J, Hancock, MJ et al. 2018. What low back pain is and why we need to pay attention. *The Lancet*, 391(10137):2356-2367.

Low Back Pain: Prevalence and Significance

- Low back pain is the most common cause of pain and disability worldwide
 - Prevalence: Point 7.3%; 1 year 37%; Lifetime ~60%
 - Smoking, obesity, low levels of physical activity, poorer general health and lower socio-economic status are associated with occurrence of low back pain
 - Hugely expensive to diagnose and treat
 - Diagnosis, investigation and treatment often not reflective of “Best Practice Guidelines”
 - Summary of epidemiology, prevalence and significance follows the presentation slides
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Low Back Pain: Definitions

- Low Back Pain is defined as pain of musculoskeletal origin extending from the lowest rib to the gluteal fold that may at times extend as somatic referred pain into the thigh (above the knee)
- Kreiner, D.S., Matz, P. et al. 2020. Guideline summary review: an evidence-based clinical guideline for the diagnosis and treatment of low back pain. *The Spine Journal*, 20(7):998-1024.



Low Back Pain: History

■ History:

- Back vs. leg
- Radicular vs. nonradicular leg pain
- Back vs. buttock
- Hip, groin
- Unilateral vs. bilateral

■ Onset

- Acute
- Insidious
- Relapsing

■ Aggravating factors

- Sitting, standing, lying
- Flexion vs. extension
- Cough, sneeze, valsalva
- Exercise
- Work

■ Neurologic symptoms

- Muscular weakness
- Bowel/bladder dysfunction
- Altered sensation

Low Back Pain: Examination

- **Critical** component
 - Far too many physicians leave out this step and just look at the imaging
 - Need to assess
 - Mobility / ROM (If limited, ask how it compares to pre-pain motion)
 - Strength testing – vigorous within limits of pain
 - Nerve tension
 - Straight Leg Raise (SLR) (**NB:** SLR only positive if it reproduces *leg* NOT *back* pain)
 - Femoral Nerve Stretch for upper roots (L2-4)
 - Reflexes
 - Check hip ROM and scour test as that can reproduce back / buttock pain
 - Be comprehensive and consistent
 - Needs to be repeated at every visit as presentation can evolve
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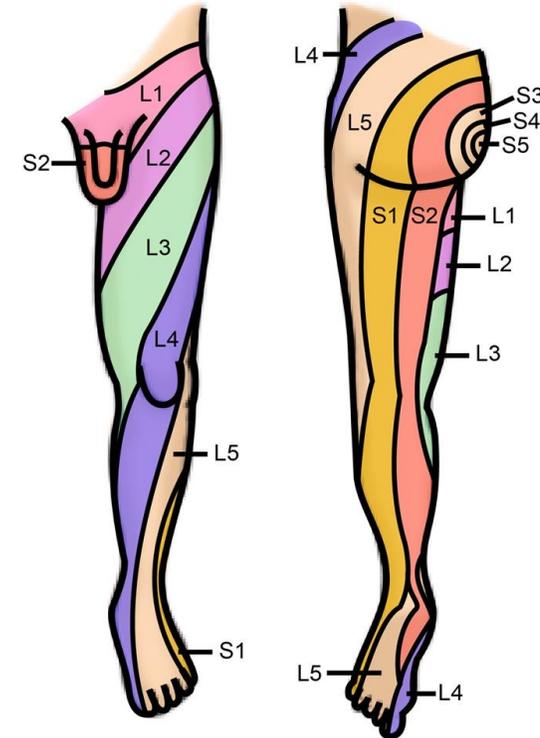
Low Back Pain: Neuro Examination



Nerve Root Patterns: L2 Nerve Root

- Pain and numbness
 - Groin and upper antero-medial aspect of thigh
- Weakness and atrophy
 - Weak hip flexion
- Nerve tension
 - Positive femoral nerve stretch
- Reflex
 - None

Lower Extremity Dermatome



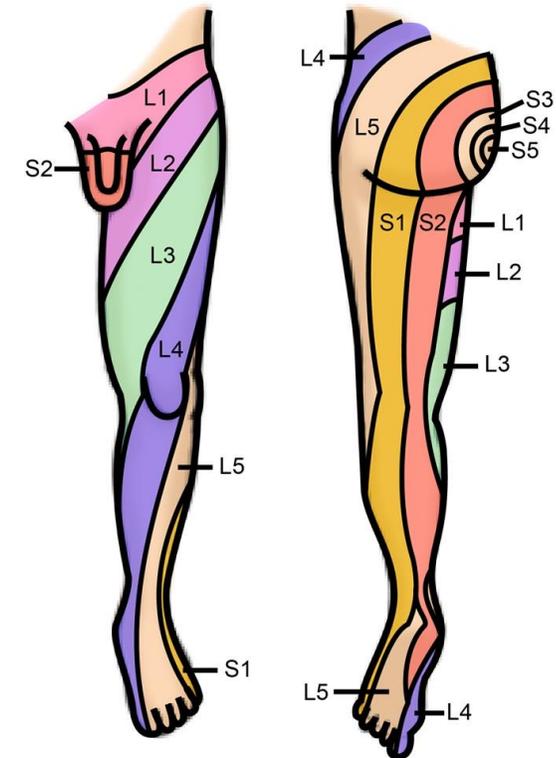
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Nerve Root Patterns: L3 Nerve Root

- Pain and numbness
 - Anterior aspect of thigh to mid- distal medial thigh
- Weakness and atrophy
 - Weak hip flexion
- Nerve tension
 - Positive femoral nerve stretch
- Reflex
 - None

Lower Extremity Dermatome



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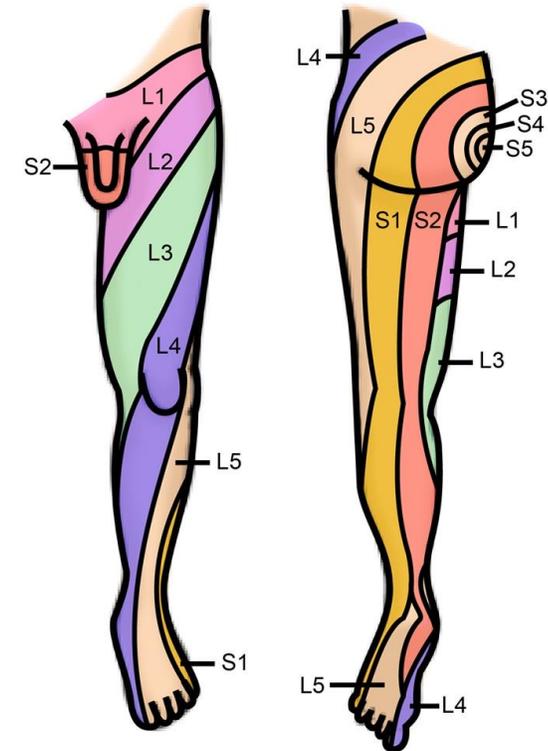
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<https://step1.medbullets.com/neurology/113038/dermatomes>

Nerve Root Patterns: L4 Nerve Root

- Pain and numbness
 - Posteromedial aspect of thigh, across patella, anteromedial aspect of lower leg
- Weakness and atrophy
 - Weak quadriceps, weakness of dorsiflexion, inversion of foot
- Nerve tension
 - Positive SLR
 - Positive Femoral nerve stretch
- Reflex
 - Depression of patellar reflex

Lower Extremity Dermatome



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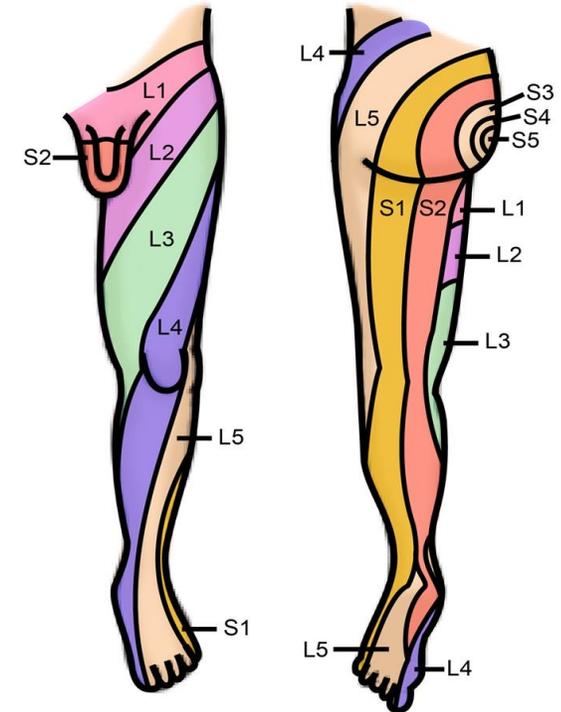
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<https://step1.medbullets.com/neurology/113038/dermatomes>

Nerve Root Patterns: L5 Nerve Root

- Pain and numbness
 - posteromedial aspect of thigh, anterolateral aspect of leg, medial aspect of foot and great toe
- Weakness and atrophy
 - Weak hamstring, dorsiflexion of foot and toes and atrophy of anterior compartment of leg
- Nerve tension
 - Positive SLR
- Reflex
 - None

Lower Extremity Dermatome



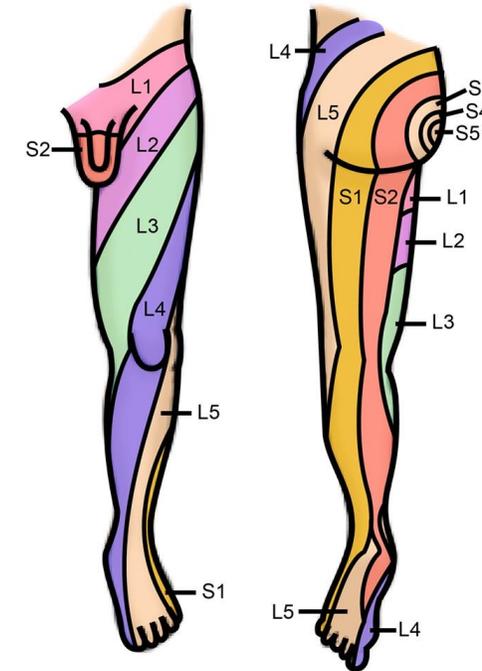
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Nerve Root Patterns: S1 Nerve Root

- Pain and numbness
 - Posterior aspect of thigh, posterior thigh, posterolateral calf, lateral foot and pinky toe
- Weakness and atrophy
 - Weak hamstring, plantar flexion of foot and toes, weakness eversion of foot
 - Weakness / asymmetry performing toe raises!
 - Asymmetry may be subtle – Do 20 each side
- Nerve tension
 - Positive SLR
- Reflex
 - Depression of Achilles reflex

Lower Extremity Dermatome



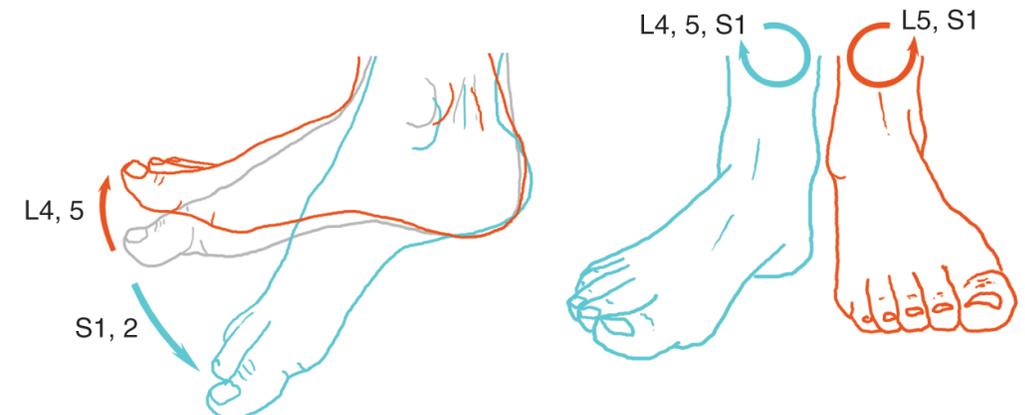
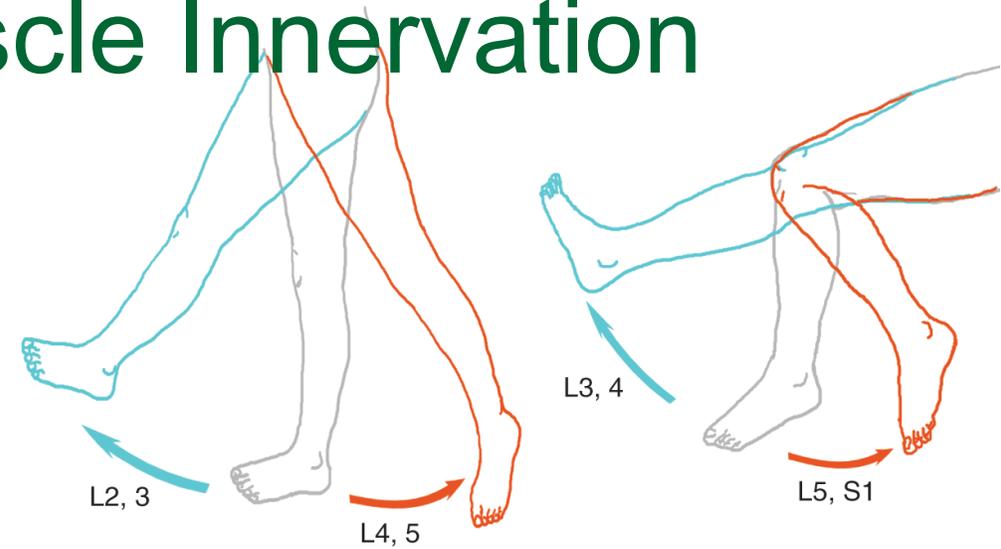
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<https://step1.medbullets.com/neurology/113038/dermatomes>

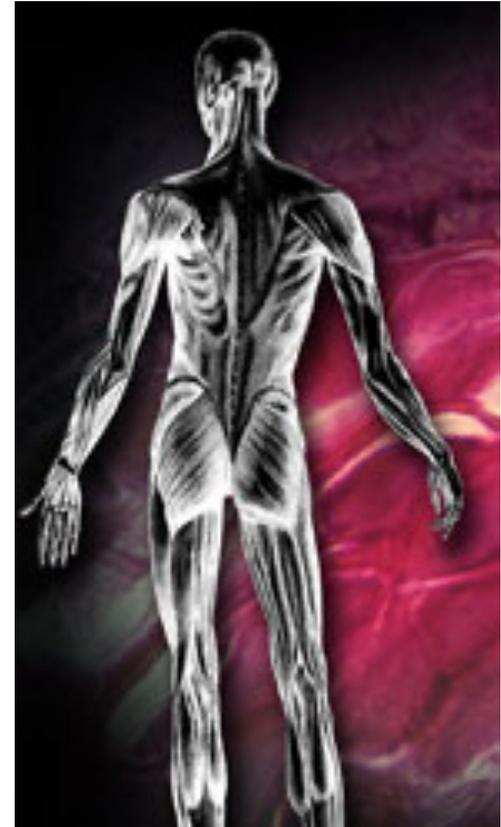
Easy Way to Remember Muscle Innervation

- Usually 2 roots per joint action
 - Anteriorly first 2 roots
 - Posteriorly next 2 roots
- Progress one root level per joint
 - Hip
 - Knee
 - Ankle



LBP Evaluation:

- Classify the low back pain
 - 3 distinct entities
- Low back pain only – Axial (May be into buttock or leg but not below knee)
- Low back pain with Leg Pain and Positive nerve tension +/- motor deficit
- Low back pain with activity related leg pain, relieved with lumbar flexion



Axial Low Back Pain

- Prime Question: What is the pain generator?
 - Answer: Who knows???
 - Most low back pain is difficult to attribute to any specific anatomic structure
 - Vertebral body
 - Intervertebral disc
 - Zygapophyseal (facet) joint
 - Posterior elements / Pars stress fracture
 - Sacroiliac joint
 - Muscle and/or tendon
 - Think of structures loaded with flexion vs extension
 - Kreiner, D.S., Matz, P. et al. 2020. Guideline summary review: an evidence-based clinical guideline for the diagnosis and treatment of low back pain. *The Spine Journal*, 20(7):998-1024.
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Low Back Pain with Specific Diagnosis

- Specific diagnosis apparent in only about 1% of low back pain patients
- Potential causes of low back pain that might require specific treatment include vertebral fractures, inflammatory disorders (eg, axial spondyloarthritis), malignancy, infections, and intra-abdominal causes
- Hartvigsen, J, Hancock, MJ et al. 2018. What low back pain is and why we need to pay attention. *The Lancet*, 391(10137):2356-2367
- Compression fractures are a common Xray finding in older individuals, but their acuity and significance can be difficult to assess on plain Xrays, especially if no history of trauma
- MRI can be helpful to determine their presence and acuity
- Consider DEXA scan and bone health workup



<https://www.clinicaladvisor.com/slideshow/clinical-quiz/ortho-dx-lumbar-compression-fracture/>

Don't miss! Cancer and Infection

- The presence of these symptoms change your differential diagnosis *instantly*
 - Night pain
 - Fevers
 - Chills
 - Night sweats
 - Weight loss
 - Always ask about systemic symptoms!
 - It takes 30 seconds and might save someone's life
-

Things you don't want to miss: Cancer

- **Cancer** risk factors

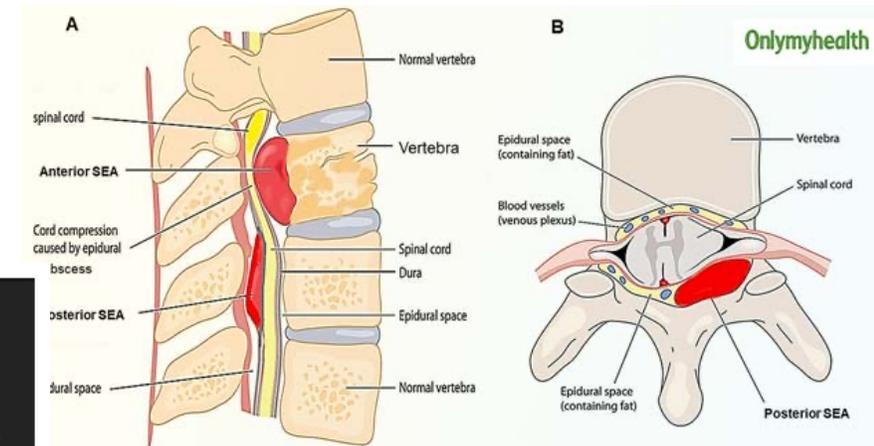
- Age \geq 50 years
- History of cancer
- Unexplained weight loss
- Failure to improve after 4 – 6 weeks of conservative low back pain therapy

*If *all* 4 of the above are absent, then studies suggest cancer can be ruled out with 100 % sensitivity



Things you don't want to miss: Spinal Infection

- Vertebral osteomyelitis / septic discitis
- Risk factors:
 - Concurrent urinary tract infection
 - Diabetes mellitus
 - Malnutrition
 - IV substance abuse
 - HIV infection
 - Malignancy
 - Long-term corticosteroids
 - Renal failure
 - Septicemia
- Unrelenting back pain frequently associated with systemic symptoms



<https://www.onlymyhealth.com/spinal-infections-a-rare-yet-significant-cause-of-spinal-deformities-1601471201>

https://www.researchgate.net/figure/Discitis-osteomyelitis-a-Sagittal-STIR-short-tau-inversion-recovery-with-contiguous_fig5_351825976

- Govender, S. (2005). Spinal infections. *The Journal of Bone and Joint Surgery. British volume*, 87(11), 1454-1458.

Things you don't want to miss: Cauda Equina

- Cauda equina syndrome
 - Occurs in ~ 2% of lumbar disc herniations
 - Severe, suddenly increasing low back pain, saddle anesthesia, unilateral or bilateral sciatica, sensory and/or motor deficits, (+) SLR
 - Urinary retention (60%) and urinary incontinence (55%)
 - Bowel incontinence less common

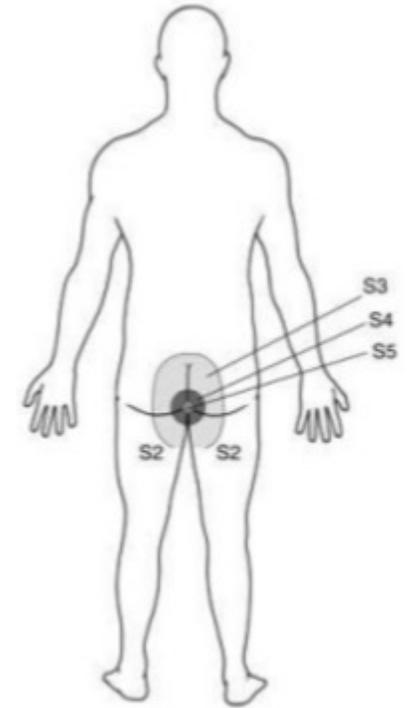
■ Emergency!!

■ Early surgical intervention (24-48 hours) has better outcomes

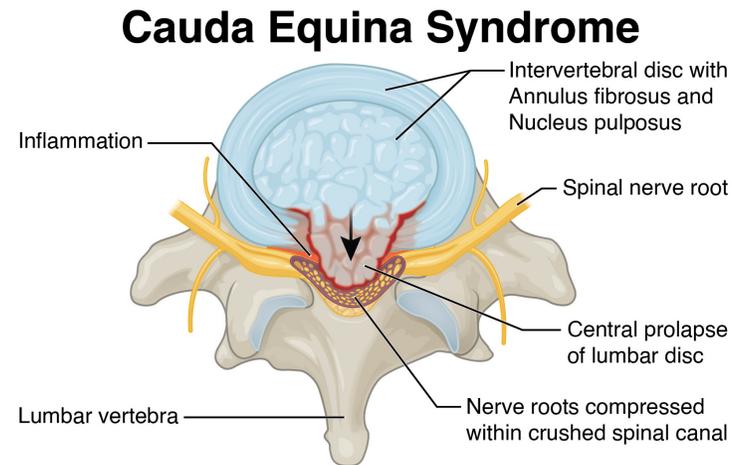
- Gitelman, A., Hishmeh, S., et al (2008). Cauda equina syndrome: a comprehensive review. *Am J Orthop (Belle Mead NJ)*, 37(11), 556-62.



<https://allspinesurgerycenter.com/cauda-equina-syndrome/>



<https://prototype.orthobullets.com/spine/2065/cauda-equina-syndrome>



<https://www.norellehealth.com/conditions/cauda-equina-syndrome/>

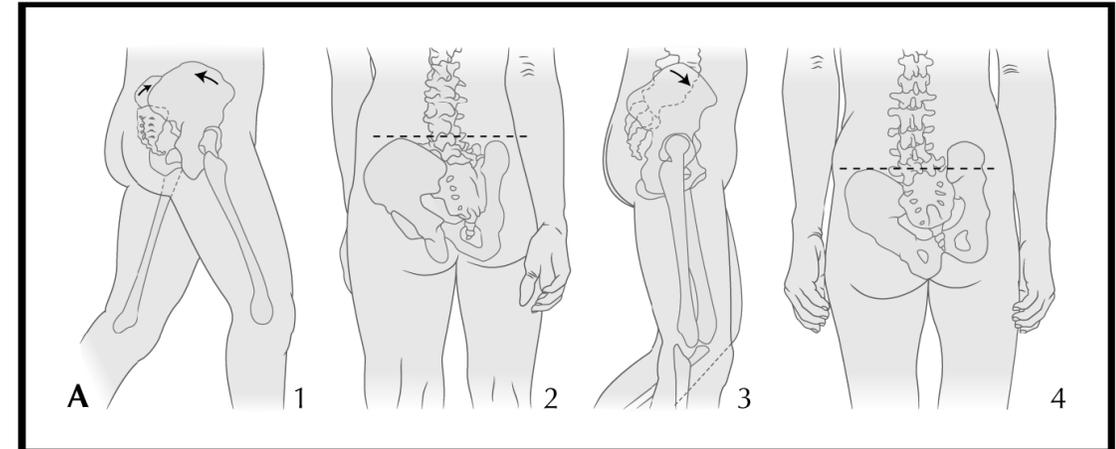
Axial Pain: Sacro Iliac Joint Dysfunction (SIJD)

- Controversial subject
- Leads to rotation and functional asymmetry of pelvis, resulting in relative internal rotation of one hip and relative external rotation of the other



SI Joints: Movement

- The sacrum flexes and extends on the innominate during locomotion
- Sacrum undergoes torsion towards the side of the stance leg with gait
- Sacrum and innominates move independently of each other in dysfunction

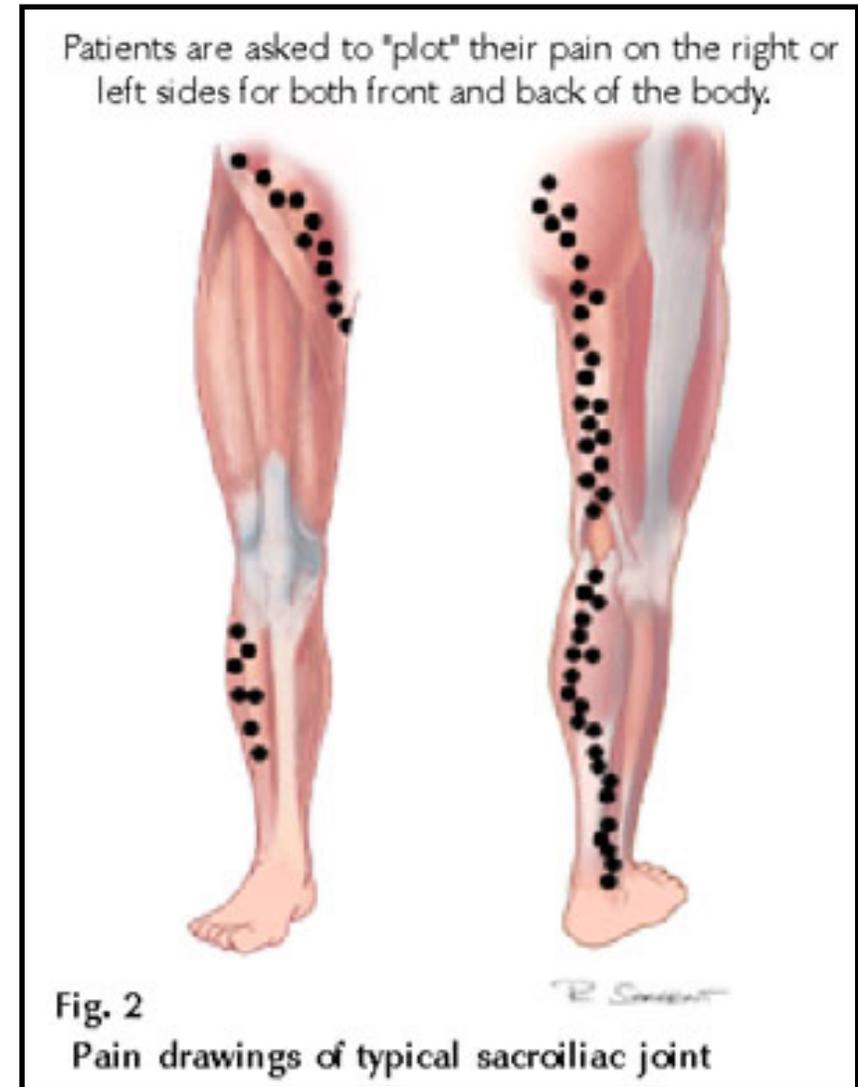


SI Dysfunction: Etiology

- Pain thought to result from abnormal positioning and motion of the SI Joint, which causes abnormal loads on the surrounding soft tissues, as well as on the facet joints and posterior elements of the spine
 - Dysfunction from:
 - Fall onto knee or buttock
 - Mis-step - missing step on stairway with axial load on leg
 - Landing awkwardly from a jump with the load on a single leg
 - MVA with foot firmly on brake
 - Twisting
 - Habitual posturing - occupational, holding infants
-

SIJD: Pain

- Extension usually worse than flexion.
- Worse with prolonged sitting
- Pain with cough or sneeze
 - (Pain abolished if the pelvis stabilized)
- Predominantly in the low back
- May refer to groin, buttock, lateral hip, posterior thigh, posterior calf and plantar surface of the foot
- Often discontinuous and patchy
- Contrast - radicular pain in a continuous band



SIJD: Making the Diagnosis

- SIJD is a clinical diagnosis and a **diagnosis of exclusion**
 - The SI joint is not the cause of pain in all patients with both back pain and SIJD
 - Chicken vs Egg Question
 - To make the diagnosis you must have a completely normal neurologic examination with negative nerve tension and intact motor function
 - If you make the diagnosis of SIJD you must repeat the neuro exam at every visit
 - It is often useful to correct the dysfunction and see what effect it has on pain before proceeding with further investigation
 - If patient improves likely the SI joint
 - If no improvement SIJD likely secondary
-

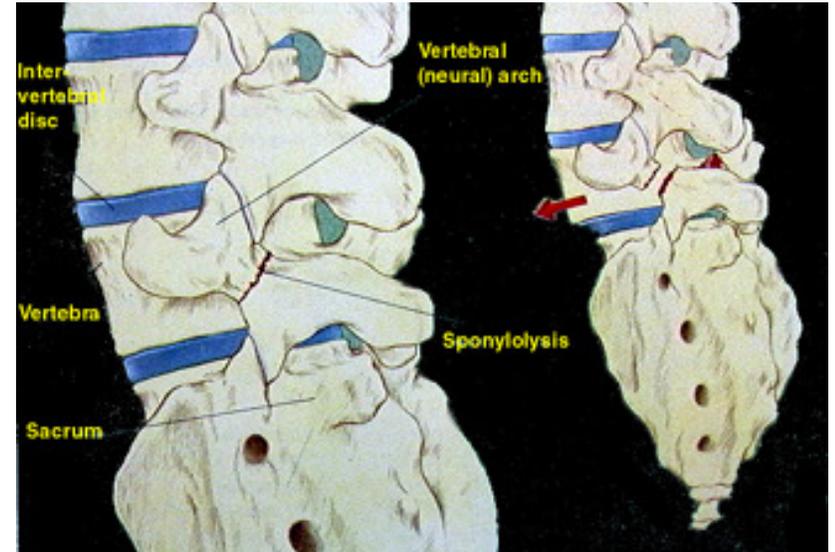
SIJD: Examination Findings

- Hallmark is asymmetry
- Mobility of SI Joint
 - Gillet Test
- Position of Pelvic landmarks –
 - Anterior Superior Iliac Spine (ASIS)
 - Posterior Superior Iliac Spine (PSIS)
- Tilting of sacrum
- Functional asymmetry of:
 - Hip range of motion
 - Increased external rotation on one side and internal rotation on the other
 - Leg lengths supine vs long sitting
 - Hamstring flexibility



Axial Back Pain: Spondylolysis

- Bony stress reaction / defect in the pars interarticularis, most often in the lower lumbar vertebrae
- Accounts for 47% of diagnoses in athletic children presenting with LBP
- Common in high-risk sports associated with repeated lumbar extension (diving, weightlifting, gymnastics, dance / ballet, high jumping, football-lineman)



Spondylolysis: Diagnosis

- History
 - Insidious onset of LBP
 - Worse with extension/hyperextension of the lumbar spine
- Physical examination
 - Hinge theory
 - Hyperlordosis
 - Hip flexor tightness
 - Pain with hyperextension / single leg hyperextension



Spondylolysis: Imaging

- Plain radiographs unreliable as they don't demonstrate acuity
 - 6% of general population and up to 20% of high-risk groups have radiographic evidence of a spondylolytic defect
- MRI: Grading Scheme
 - Grade 0: Normal marrow signal
 - Grade 1: Bone marrow edema with intact pars interarticularis cortex
 - Grade 2a: Active incomplete fracture of pars interarticularis with bone marrow edema
 - Grade 2b: Chronic incomplete fracture of pars interarticularis without bone marrow edema
 - Grade 3: Active complete fracture of pars interarticularis with bone marrow edema
 - Grade 4: Chronic complete fracture of pars interarticularis without bone marrow edema
- Ang, EC, Robertson, AF et al (2016) Diagnostic accuracy of 3-T magnetic resonance imaging with 3D T1 VIBE versus computer tomography in pars stress fracture of the lumbar spine. Skeletal Radiol 45:1533-40



Back Pain with Leg Pain

- Lumbar Radiculopathy
- Symptomatic Spinal Stenosis

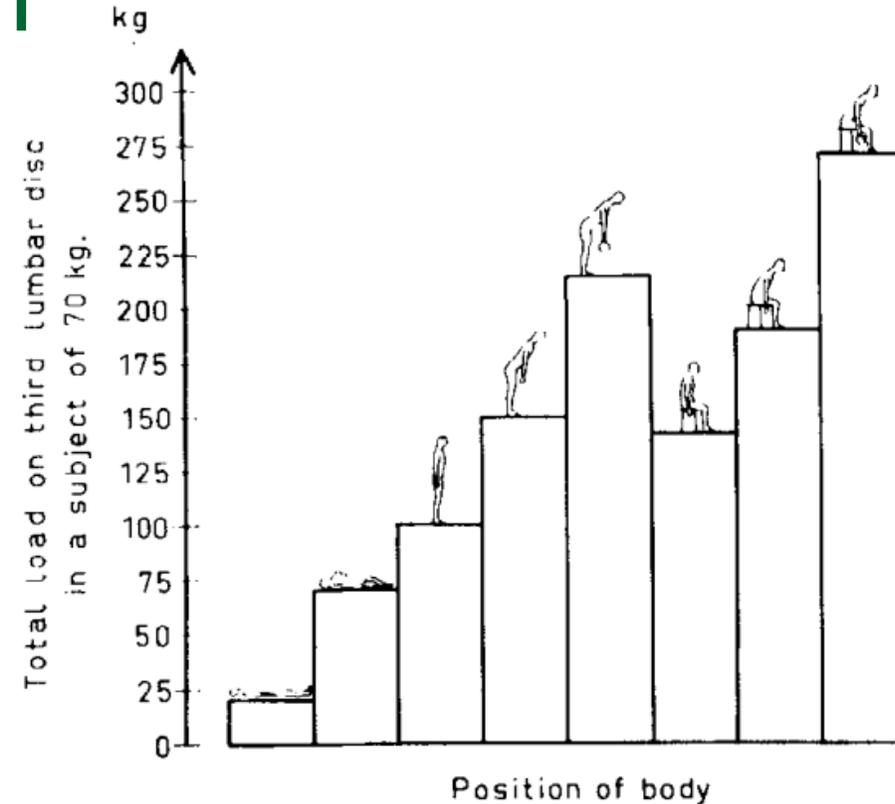


Fig. 5.

Total load on the third lumbar disc in different positions in a subject weighing 70 kg. Positions shown are 1) reclining (relaxed, supine), 2) reclining (lateral decubitus), 3) standing upright, 4) standing + twenty degrees forward leaning without and 5) with 20 kg load in arms, 6) sitting upright, arms and back unsupported, 7) sitting + twenty degrees forward leaning, without and 8) with 20 kg load in arms.

Low Back Pain with Leg Pain: Radicular Pain

- Radicular pain based on clinical findings including
 - history of dermatomal leg pain
 - leg pain worse than back pain
 - worsening of leg pain during coughing, sneezing or straining
 - positive nerve tension (straight leg raise or femoral nerve stretch test)
 - Radiculopathy has weakness, loss of sensation or reflexes (or a combination) associated with a specific nerve root, and can coexist with radicular pain
 - Disc herniation with direct nerve compression or chemical radiculitis from local inflammation is the most common cause of radicular pain and radiculopathy
 - Hartvigsen, J, Hancock, MJ et al. 2018. What low back pain is and why we need to pay attention. *The Lancet*, 391(10137):2356-2367.
-

Low Back Pain with Activity Related Leg Pain: Spinal Stenosis

- Lumbar spinal stenosis produces pain radiating into one or both legs associated with walking or prolonged standing and relieved by rest or lumbar flexion (neurogenic claudication)
- Walking tolerance limited with positive “Shopping Cart Sign”
- Narrowing of the spinal canal or foramina due to a combination of degenerative changes such as facet osteoarthritis, ligamentum flavum hypertrophy, and bulging discs.
- Hartvigsen, J, Hancock, MJ et al. 2018. What low back pain is and why we need to pay attention. *The Lancet*, 391(10137):2356-2367.
- Physical examination **normal** at rest with no nerve tension or motor deficit
- MRI may show narrowing but standing, weight bearing flexion / extension radiographs are often needed to document segmental instability which will increase the extent of the stenosis

Low Back Pain: Imaging

- No evidence exists that imaging improves patient outcomes and guidelines consistently recommend against the routine use of imaging for people with low back pain
 - Hartvigsen, J, Hancock, MJ et al. 2018. What low back pain is and why we need to pay attention. *The Lancet*, 391(10137):2356-2367.
 - Diagnostic imaging is indicated for patients with low back pain only if they have severe progressive neurologic deficits or signs or symptoms that suggest a serious or specific underlying condition.
 - Evidence indicates that routine imaging is not associated with clinically meaningful benefits but can lead to harms
 - More testing does not equate to better care
 - Chou, R, Qaseem, A. et al. / Clinical Guidelines Committee of the American College of Physicians*. (2011). Diagnostic imaging for low back pain: advice for high-value health care from the American College of Physicians. *Annals of internal medicine*, 154(3), 181-189
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Low Back Pain: Imaging

- Inappropriate imaging for low back pain can cause harm in three ways:
 - Misinterpretation of results by clinicians resulting in unhelpful advice, needless subsequent investigations (downstream testing) and invasive interventions, including surgery
 - Misinterpretation of results by patients resulting in catastrophisation, fear and avoidance of movement and activity, and low expectations of recovery
 - Side effects such as exposure to radiation
- Darlow D, Forster BB et al. (2017) Editorial: It is time to stop causing harm with inappropriate imaging for low back pain. *Br J Sports Med* 51(5):414-415
- Insufficient evidence to support specific laboratory or imaging studies in evaluation of non-specific low back pain
 - Kreiner, D.S., Matz, P. et al. 2020. Guideline summary review: an evidence-based clinical guideline for the diagnosis and treatment of low back pain. *The Spine Journal*, 20(7):998-1024.
- Don't forget age related, age-appropriate changes in spinal imaging
- Don't attribute acute pain and clinical changes with the radiographic presence of chronic, age-appropriate degenerative changes

Low Back Pain Treatment

- Treatment choices are endless
 - Many have no evidence to support their use
 - Evidence-based guidelines / recommendations common but not always helpful
 - Remember “Absence of evidence is not evidence of absence”
 - Just because something is not supported by evidence does not mean its not beneficial in some populations
 - Many treatments in common use for low back pain have high quality evidence of their ***lack of benefits and potential harms!***
 - Full summary of consensus, evidence-based guidelines follows the presentation slides
-

Low Back Pain Treatment: What I do

■ Mechanical back pain

- Reassure that most non-specific LBP is self limited and will recover: “Hurt does not Equal Harm!”
 - If SI Dysfunction detected, I treat it and give the patient instructions for home mobilizations
 - Most NB part of SIJD is to identify it and refer to a PT, DO, DC or MD who has expertise in its treatment
 - Short term NSAIDs at anti-inflammatory dosage
 - Longer term pain relief with analgesic dosage of NSAIDs, acetaminophen, rarely Tramadol
 - Stretching hip flexors and hamstrings
 - Hip and Core strengthening
 - Physical Therapy referral
 - Rarely use epidural steroid injection
 - Never recommend surgery!!
 - Back Surgery not effective for back pain
 - Back Surgery very effective for leg pain / radiculopathy when all clinical and imaging findings concordant
-

Low Back Pain Treatment: What I do

■ Spondylolysis

- Conservative
- Rest from aggravating (extension) activity
- Core strength
- Address overload resulting from “Hinging” (Hinge Theory)
 - Hip flexor stretching
 - Anterior shoulder stretching
- Rarely use bracing other than for symptomatic relief when activity modification insufficient
- Evidence for bracing inconclusive
- Clinical recovery generally good but radiographic union does not correlate with clinical recovery and should not be used as a criteria of treatment success
- Consider screening for Female Athlete Triad in thin adolescent females especially if recurrent
- Klein, G., Mehlman, C. T., & McCarty, M. (2009). Nonoperative treatment of spondylolysis and grade I spondylolisthesis in children and young adults: a meta-analysis of observational studies. *Journal of Pediatric Orthopaedics*, 29(2), 146-156.
- Selhorst, M., Fischer, A., et al. (2016). Long-term clinical outcomes and factors that predict poor prognosis in athletes after a diagnosis of acute spondylolysis: a retrospective review with telephone follow-up. *J orthopaed & sports phys ther*, 46(12), 1029-36

Low Back Pain Treatment: What I do

■ Radicular Pain

- Determine presumed level based on pain distribution and weakness pattern
- Avoid ordering MRI unless considering selective nerve root block (SNRB) or surgery
- Encourage activity within pain tolerance
- Pain control
- Disc unloading with McKenzie extensions, inversion table or other forms of traction
- SNRB
- Surgical referral if:
 - Significant disabling pain with no response to conservative Tx
 - Profound or progressive weakness
 - Cauda Equina symptoms

■ Stenosis

- Surgical opinion – strong evidence for better outcomes with surgery than conservative treatment
-

Gabapentinoids in LBP and Radiculopathy

- Prescription of anticonvulsants for back and neck pain and radiculopathy, has increased by 535% in the last 10 years
- Multiple studies and systematic reviews have shown high quality evidence that Gabapentinoids and anticonvulsants are **NOT effective** in the treatment of Low back pain and radiculopathy, and that they have **significant potential for adverse side effects**
- Further information / documentation in slides to follow presentation
 - Enke O, New, HA et al 2018. Anticonvulsants in the treatment of low back pain and lumbar radicular pain: a systematic review and meta-analysis. *CMAJ*, 190(26), pp.E786-E793.
 - Giménez-Campos, MS, Pimenta-Fermisson-Ramos, P et al (2022). A systematic review and meta-analysis of the effectiveness and adverse events of gabapentin and pregabalin for sciatica pain. *Atencion primaria*, 54(1), 102144.
 - Shanthanna, H., Gilron, I., et al (2017). Benefits and safety of gabapentinoids in chronic low back pain: A systematic review and meta-analysis of randomized controlled trials. *PLoS medicine*, 14(8), e1002369

Hot off the Press: Are NSAIDs Concerning?

- Inflammation is an integral component of tissue healing and repair
 - A recent study has shown that NSAID (and corticosteroid) use may impair the healing response, prolong pain, and promote the progression of acute back pain to chronic persistent back pain
 - Parisien, M., Lima, L. V., et al (2022). Acute inflammatory response via neutrophil activation protects against the development of chronic pain. *Science Translational Medicine*, 14(644), eabj9954
 - NSAIDs have analgesic effects at lower doses (IBU 400mg / Naproxen 220mg) and anti-inflammatory effects at higher doses (800/440mg)
 - They may be beneficial in the initial acute inflammatory post-injury state (1-3 days) but may be counterproductive after that, and should probably be used at analgesic and not anti-inflammatory doses
 - Further information / documentation in slides to follow presentation
-

Summary

- Low back pain is a common, complicated, confusing and costly condition and is a significant cause of disability
 - Understanding the different etiologies helps make the appropriate diagnosis
 - Helpful to break down into axial back pain, and back pain with leg pain at rest / with activity
 - Most axial back pain is not associated with a specific anatomic abnormality
 - Ask about systemic symptoms to avoid missing infections and tumors
 - SI Joint Dysfunctions and spondylolysis are common in athletic individuals
 - Comprehensive assessment mandates a careful neurologic examination for nerve tension and motor deficits
 - Imaging is generally un-necessary early, in the absence of trauma, neurologic deficits, and “Red Flags” including systemic symptoms
-

Summary

- Treatment is controversial and often does not conform to “best practice” clinical guidelines
 - Axial back pain should be treated conservatively with re-assurance, modified rest, continued activity within pain tolerance, stretching and core strengthening, physical therapy
 - Good evidence that gabapentinoids are not helpful and associated with significant negative side effects
 - New evidence that long term NSAID use may be deleterious at full anti-inflammatory dosages
 - Opioids should be used sparingly and for short durations only
 - Surgery not appropriate for axial back pain but occasionally needed for radiculopathy or spinal stenosis
-

A wide-angle photograph of a snow-covered canyon. The foreground shows prominent, layered red rock formations, likely sandstone, with snow dusting the ledges and crevices. The canyon extends into the distance, with more snow-covered hills and ridges under a pale, overcast sky. The overall scene is serene and majestic.

Thank You! Any Questions?

Supplementary Information / References

- Epidemiology, Prevalence and Significance of Low Back Pain
 - Consensus, evidence-based treatment guidelines
 - Gabapentinoids in Back Pain
 - NSAIDs and inflammation and healing
-

Low Back Pain: Prevalence and Significance

- Low back pain is the leading cause of disability worldwide and accounts for more lost workdays than any other musculoskeletal condition in the USA
- LBP accounts for 7.6% or 42.5 million years lived with disability worldwide and is the top cause of disability in 126 of 195 countries
- The global point prevalence of activity-limiting low back pain was 7.3%, implying that 540 million people were affected at any one time (1 year prevalence 37%)
- Extremely costly and is the most expensive of 154 conditions studied
- US\$134.5 billion was spent on health care for low back and neck pain, and this had increased by 6.7% annually between 1996 and 2016
- Buchbinder, R., van Tulder, M., et al 2018. Low back pain: a call for action. *The Lancet*, 391(10137), pp.2384-2388.
- Hartvigsen, J, Hancock, MJ et al. 2018. What low back pain is and why we need to pay attention. *The Lancet*, 391(10137):2356-2367
- Buchbinder, R., Underwood, M., et al 2020. The Lancet Series call to action to reduce low value care for low back pain: an update. *Pain*, 161(1), p.S57-64

Low Back Pain: Prevalence and Significance

- Risk factors and triggers for episodes of nonspecific low back pain include:
 - Previous back pain
 - Other chronic medical conditions such as asthma, headache, and diabetes, poor mental health (including psychological distress and depression),
 - Awkward postures, lifting, bending and heavy manual tasks, and being tired or being distracted during an activity
- Smoking, obesity, and low levels of physical activity, and poorer general health are also associated with occurrence of low back pain episodes.
- Socioeconomically disadvantaged people are overrepresented among those with disabling low back pain
- Buchbinder, R., van Tulder, M., et al 2018. Low back pain: a call for action. *The Lancet*, 391(10137), pp.2384-2388.
- Hartvigsen, J, Hancock, MJ et al. 2018. What low back pain is and why we need to pay attention. *The Lancet*, 391(10137):2356-2367
- Buchbinder, R., Underwood, M., et al 2020. The Lancet Series call to action to reduce low value care for low back pain: an update. *Pain*, 161(1), p.S57-64

International Guidelines (6 Nations)

- Guidelines from USA, United Kingdom and Northern Ireland, Australia, Germany, Belgium and Denmark
 - 28% of low back care in Australia and 32% of low back care in the USA was discordant with clinical guidelines (NOT including imaging recommendations)
 - All guidelines released since 2016 prioritized non-medical approaches for LBP
 - Primary-care clinicians would manage uncomplicated cases with advice, education and reassurance
 - A stepped approach to care of LBP, guided by the patient's response to previous care or the results of risk prediction tools. Recommended 4/6
 - Traeger, AC, Buchbinder, R et al, 2019. Care for low back pain: can health systems deliver?. *Bulletin of the World Health Organization*, 97(6), p.423-33
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International Guidelines (6 Nations)

- First step: Provide advice to remain active, education on the benign nature of low back pain and reassurance about the absence of serious pathology. Recommended by all guidelines.
- Second step acute: Include physical therapies (massage, spinal manipulation, heat-wrap therapy), psychological therapies (psychologically informed physiotherapy) or complementary therapies (acupuncture). At least one recommended by all guidelines.
- Second step chronic: Physical therapies (exercise, massage, spinal manipulation), psychological therapies (cognitive behavioral therapy), complementary therapies (mindfulness-based stress reduction, yoga, acupuncture, tai chi). Recommended by 4/6
- Traeger, AC, Buchbinder, R et al, 2019. Care for low back pain: can health systems deliver?. *Bulletin of the World Health Organization*, 97(6), p.423-33

International Guidelines (6 Nations)

- Third step chronic: Multidisciplinary pain management (targets physical, psychological and social aspects of low back pain and involves a team of clinicians). Recommended by 5/6
- Care of low back pain care without medication is preferred. Recommended 6/6
- If pain medication is needed, begin with a nonsteroidal anti-inflammatory drug at the lowest effective dose for the shortest time. Recommended by 6/6
- Avoid prescribing opioid drugs for low back pain where possible. Recommended by 3/6
- Do not offer injectable steroid drugs to patients with chronic, non-specific low back pain. Recommended by 3/6
- Do not offer surgery for patients with non-specific low back pain outside of a randomized trial. Recommended by 3/6

Axial Low Back Pain Treatment: NASS Consensus

- Strong evidence for Aerobic exercise to improve pain, disability, and mental health in patients with nonspecific low back pain at short-term follow-up
 - Patients should remain active within limits of pain when compared to short periods of complete bed rest for 3 to 7 days, all result in similar outcomes in pain and function
 - No evidence to show the Cost effectiveness of any treatment other than acupuncture
 - Kreiner, D.S., Matz, P. et al. 2020. Guideline summary review: an evidence-based clinical guideline for the diagnosis and treatment of low back pain. *The Spine Journal*, 20(7):998-1024.
-

Axial Low Back Pain Treatment: NASS Consensus

May be Helpful

- Heat beneficial for acute, but not chronic LBP
- In chronic LBP acupuncture is recommended for short-term improvement of pain and function compared with usual care alone
- Low level evidence to support spinal manipulation in acute or chronic LBP
- Intradiscal steroid may be helpful in patients with Modic changes on MRI
- Limited evidence for SI Joint injections in patients with suspected SI pain
- Radio-frequency ablation may be beneficial for at least 6 months when stringently applied.

Proven Not Helpful / Harmful

- Laser therapy in isolation
- Dry needling
- Traction for axial back pain
- The addition of massage to an exercise program provides no benefit when compared with an exercise program alone
- Insufficient evidence for the use of trigger point injections in the treatment of low back pain
- Facet injections provide no long-term relief
- Insufficient evidence for outcomes of any surgical treatment

Axial Low Back Pain Treatment: NASS Consensus

May be Helpful

- NSAIDs may be helpful (more to come)
- Limited Opioid pain medications restricted to short duration for acute low back pain
- Topical capsaicin
- Back school is recommended to provide improvements in pain and function
- Kreiner, D.S., Matz, P. et al. 2020. Guideline summary review: an evidence-based clinical guideline for the diagnosis and treatment of low back pain. *The Spine Journal*, 20(7):998-1024.

Proven Not Helpful / Harmful

- Oral or IV steroids
 - Anticonvulsants/ Gabapentinoids
 - Antidepressants are not recommended for the treatment of low back pain

 - Chou, R., & Huffman, L. H. (2007). Medications for acute and chronic low back pain: a review of the evidence for an American Pain Society/American College of Physicians clinical practice guideline. *Annals of internal medicine*, 147(7), 505-14

 - Kreiner, D.S., Matz, P. et al. 2020. Guideline summary review: an evidence-based clinical guideline for the diagnosis and treatment of low back pain. *The Spine Journal*, 20(7):998-1024.
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Gabapentinoids in LBP and Radiculopathy

- Prescription of anticonvulsants for back and neck pain and radiculopathy, has increased by 535% in the last 10 years
- Systematic review of 15 studies on the use of gabapentinoids in low back pain and radiculopathy
- Fourteen of 15 comparisons found anticonvulsants were not effective to reduce pain or disability in low back pain or lumbar radicular pain
- High-quality evidence no effect of gabapentinoids versus placebo on chronic LBP in the short term or for lumbar radicular pain in the immediate term
- There was no beneficial effect of topiramate in pain and disability
- For chronic low back pain and neurogenic claudication, similar recent reviews also did not find any treatment benefit for anticonvulsants
- Enke O, New, HA et al 2018. Anticonvulsants in the treatment of low back pain and lumbar radicular pain: a systematic review and meta-analysis. *CMAJ*, 190(26), pp.E786-E793.
- Giménez-Campos, MS, Pimenta-Fermisson-Ramos, P et al (2022). A systematic review and meta-analysis of the effectiveness and adverse events of gabapentin and pregabalin for sciatica pain. *Atencion primaria*, 54(1), 102144.

Gabapentinoids in LBP and Radiculopathy

- The use of gabapentinoids in CLBP demonstrates significant risk of adverse effects including weight gain, somnolence, dizziness, peripheral oedema, fatigue, visual disturbances, ataxia, non-peripheral oedema, vertigo and euphoria without any demonstrated benefit
 - High level evidence of significantly increased risk of adverse events from gabapentinoids including poisonings and deaths especially combined with opioids
 - Cairns, R., Schaffer, A.L., et al. (2019) Rising pregabalin use and misuse in Australia: trends in utilization and intentional poisonings. *Addiction*, 114(6), pp.1026-1034.
 - Shanthanna, H., Gilron, I., et al (2017). Benefits and safety of gabapentinoids in chronic low back pain: A systematic review and meta-analysis of randomized controlled trials. *PLoS medicine*, 14(8), e1002369.
 - Enke O, New, HA et al 2018. Anticonvulsants in the treatment of low back pain and lumbar radicular pain: a systematic review and meta-analysis. *CMAJ*, 190(26), pp.E786-E793.
 - Onakpoya, I. J., Thomas, E. T et al. (2019). Benefits and harms of pregabalin in the management of neuropathic pain: a rapid review and meta-analysis of randomised clinical trials. *BMJ open*, 9(1), e023600.
 - Gomes, T., Greaves, S. et al (2018) Pregabalin and the risk for opioid-related death: a nested case–control study. *Annals of internal medicine*, 169(10), pp.732-734.
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Gabapentinoids Still Probably Beneficial in Neuropathic Pain

- Pregabalin has beneficial effects on some symptoms of neuropathic pain including diabetic peripheral neuropathy, postherpetic neuralgia, herpes zoster, sciatica (radicular pain), poststroke pain and spinal cord injury-related pain However, risk of side effects high
 - Onakpoya, I. J., Thomas, E. T et al. (2019). Benefits and harms of pregabalin in the management of neuropathic pain: a rapid review and meta-analysis of randomised clinical trials. *BMJ open*, 9(1), e023600.
 - Finnerup, N. B., Attal, N., et al. (2015). Pharmacotherapy for neuropathic pain in adults: a systematic review and meta-analysis. *The Lancet Neurology*, 14(2), 162-173.
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Healing: Are NSAIDs Concerning?

- Inflammation is a critical component of the healing process
- 4 stages
 - Hemostasis (Immediate): Platelet aggregation, inflammatory mediators and histamine released resulting in edema and in-migration of inflammatory cells
 - Inflammatory (1-3 days): Inflammatory cells migrate remove debris, phagocytize pathogens and prevent infection. Increased endothelial permeability, swelling
 - Proliferation(4-21 days): Vascular ingrowth, granulation tissue, re-epithelialization. These processes are impaired in macrophage deficient models.
 - Remodeling and Contraction (21 days-1year): fibroblasts to differentiate into myofibroblasts, which express α -smooth muscle actin (SMA) and contract the wound
- Ellis, S, Lin EJ & Danielle Tartar D.2018 Immunology of Wound Healing Curr Derm Reports 7:350–358
- Lande´NX, Li, D, Stahle, M 2016. Transition from inflammation to proliferation: a critical step during wound healing. Cell. Mol. Life Sci. 73:3861–3885

Healing: Are NSAIDs Concerning?

- Excessive and prolonged inflammation results in delayed healing and increased scar formation
 - Prostaglandins important in the conversion of inflammatory to proliferative macrophages
 - When macrophages are absent in the inflammatory phase, re-epithelialization and granulation tissue formation are reduced – potentially delaying healing
 - Lande NX, Li, D, Stahle, M 2016. Transition from inflammation to proliferation: a critical step during wound healing. *Cell. Mol. Life Sci.* 73:3861–3885
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Are NSAIDs Concerning? Study Summary

- Inflammation is integral to healing and resolution of low back pain
 - Transient neutrophil-driven up-regulation of inflammatory responses was protective against the transition to chronic pain
 - Early treatment with a steroid or nonsteroidal anti-inflammatory drug (NSAID) also led to prolonged pain despite being analgesic in the short term
 - Analysis of pain trajectories of human subjects reporting acute back pain identified elevated risk of pain persistence for subjects taking NSAIDs.
 - Thus, despite analgesic efficacy at early time points, the management of acute inflammation may be counterproductive for long-term outcomes of LBP sufferers
 - Parisien, M., Lima, L. V., et al (2022). Acute inflammatory response via neutrophil activation protects against the development of chronic pain. *Science Translational Medicine*, 14(644), eabj9954
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Are NSAIDs Concerning?

- Study identified the protective effect of acute inflammatory responses against the development of chronic pain
 - The up-regulation of inflammatory response at the acute stage of musculoskeletal pain serves as a protective mechanism against the development of chronic pain
 - Individuals with acute back pain were at 1.76-fold greater risk of developing chronic back pain if they reported NSAID usage than if they were not taking NSAIDs, adjusting for age, sex, ethnicity, and time interval between measurements
 - Parisien, M., Lima, L. V., et al (2022). Acute inflammatory response via neutrophil activation protects against the development of chronic pain. *Science Translational Medicine*, 14(644), eabj9954
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Are NSAIDs Concerning?

- The findings support the observation that the beginning of the inflammatory process programs its resolution, and it is thus the failure to initiate an appropriate inflammatory response that may lead to chronic pain
 - Acute treatment of inflammation with either corticosteroids or NSAIDs effectively reduce pain behavior during their administration— but greatly prolonged the resolution of neuropathic, myofascial, and especially inflammatory pain states
 - Active immune processes confer adaptation at the acute pain stage, and impairment of such inflammatory responses in subjects with acute LBP increases the risk of developing chronic pain
 - Parisien, M., Lima, L. V., et al (2022). Acute inflammatory response via neutrophil activation protects against the development of chronic pain. *Science Translational Medicine*, 14(644), eabj9954
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Are NSAIDs Concerning? Study Summary / Commentary from Science Translational Medicine

- Beneficial inflammation:

- Chronic pain can develop from an acute pain state. The mechanisms mediating the transition from acute to chronic pain remain to be elucidated. Here, Parisien et al. focused on the immune system using samples from patients and animal models. Transcriptomic analysis in immune cells from subjects with low back pain showed that neutrophil activation–dependent inflammatory genes were up-regulated in subjects with resolved pain, whereas no changes were observed in patients with persistent pain. In rodents, anti-inflammatory treatments prolonged pain duration and the effect was abolished by neutrophil administration. Last, clinical data showed that the use of anti-inflammatory drugs was associated with increased risk of persistent pain, suggesting that anti-inflammatory treatments might have negative effects on pain duration

- Parisien, M., Lima, L. V., et al (2022). Acute inflammatory response via neutrophil activation protects against the development of chronic pain. *Science Translational Medicine*, 14(644), eabj9954
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