PainWeek

Back Pain: It's All About the Diagnosis

David M Glick, DC, DAIPM, CPE, FASPE

Conflict of Interest and Disclosures

- Nothing to Disclose

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Learning Objectives

- Identify primary and secondary pain generators that contribute to back pain
- Describe the clinical utility and limitations of key imaging studies for the differential diagnosis of back pain
- Review strategies to enhance routine examinations and use of imaging studies to develop a more patient centered approach to treating back pain

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Misconceptions of Back Pain

- Back pain is symptom not a pathology
- All pain is not caused by disc herniations or "pinched nerves"
- There is no single treatment to address back pain
- Chronic back pain often occurs from failure to adequately diagnose and treat

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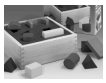
Adapted from Glick, D. Unraveling the Complexities of Back Pain, The Pain Practitioner, Vol 15, No 3 Fall 2005.

What About the Clinician?



- Highly skilled, well rounded, just not familiar with the particular problem
- Not every clinician can treat every problem

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Adapted from Glick, D. Unraveling the Complexities of Back Pain, The Pain Practitioner, Vol 15, No 3 Fall 2005.

Most Important Tools for Differential Diagnosis…

- History
- Clinical examination
- Experience of clinician

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Adverse Factors Affecting Physical Diagnosis

- Limitations of time
  - *Volume of patients may limit face-to-face time with clinician*
  - *Reimbursements tend to devalue clinical component*
- Reliance upon technology
  - *MRI shows disc herniations so that must be the cause of the patient's neck pain.*
- Clinical experience
  - *Has the clinician evaluated patients with similar symptoms before*

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MRI of the Lumber Spine in People without Back Pain

On MRI examination of the lumbar spine, many people without back pain have disc bulges or protrusions but not extrusions. Given the high prevalence of these findings and of back pain, the discovery by MRI of bulges or protrusions in people with low back pain may frequently be coincidental.

…. 36% of the 98 asymptomatic subjects had normal discs at all levels. With the results of the two readings averaged, 52% of the subjects had a bulge at least one level, 27% had a protrusion, and 1% had an extrusion. 38% had an abnormality of more than one intervertebral disc.

- Jensen MC, Brant-Zawadzki MN, Obuchowski N, Modic MT, et al. Magnetic resonance imaging of the lumbar spine in people without back pain. N Engl J Med. 1994 Jul 14;331(2):69-73. (PMID: 8208267)

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MRI of the Lumbar Spine in People without Back Pain

- 148 asymptomatic subjects: 69 (46%) had never experienced low back pain
- 123 subjects (83%) with moderate to severe desiccation of one or more discs
- 83 (56%) with loss of disc height
- 48 subjects (32%) had at least one disc protrusion
- 9 (6%) had one or more disc extrusions[1]

Armed with an interesting application of the Jarvik data, when including the epidemiolocal information with the MR imaging reports McCullough's group cited a slightly lowered incidence of opioid prescriptions, physical therapy, and repeat injections.[2] Clearly utilization may have been affected, there was however no information concerning treatment outcomes.

1. Jarvik JJ, Hollingworth W, Heagerty P, Haynor DR, Deyo RA. The Longitudinal Assessment of Imaging and Disability of the Back (LAIDBack) Study: baseline data. Spine (Phila Pa 1976) 2001;26(10):1158–1166.
2. McCullough BJ, Johnson GR, Martin BI, Jarvik JG. Lumbar MR imaging and reporting epidemiology: do epidemiologic data in reports affect clinical management? *Radiology*. 2012;263(3):841-6.

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The Use of Lumbar Spine Magnetic Resonance Imaging in Eastern China: Appropriateness and Related Factors

We retrospectively studied 3107 lumbar spine MRIs in Eastern China to investigate the appropriateness of lumbar spine MR use (From January 1st to January 31st of 2013: 1369 male and 1738 female patients, age 52.73±16.14 years, range 3 to 100 years) underwent lumbar MR imaging at the included 10 hospitals

Only 41.3% of all lumbar spine MR studies were considered as potentially clinically positive diagnosis. Findings of the remaining 58.3% lumbar spine MRIs were regarded as clinically negative. Normal lumbar spine is the most common diagnosis (32.7%) on lumbar spine MRIs, followed by lumbar disc bulging (26.2%) and lumbar disc herniation (15.0%)

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MRI – Prediction of Future Low Back Pain

"MRIs were not predictive of the development or duration of low-back pain. Individuals with the longest duration of low-back pain did not have the greatest degree of anatomical abnormality on prior scans. Clinical correlation is essential to determine the importance of abnormalities on magnetic resonance images."

… 77 asymptomatic individuals with no history of back pain underwent magnetic resonance imaging of the lumbar spine. 21 subjects (31%) had an identifiable abnormality of a disc or of the spinal canal. In the current study, we investigated whether the findings on the scans of the lumbar spine that had been made in 1980 predicted the development of low-back pain in these asymptomatic subjects.

Boden SD, Davis DO, Dina TS, Patronas NJ, Wiesel SW. Abnormal magnetic-resonance scans of the lumbar spine in asymptomatic subjects. A prospective investigation. J Bone Joint Surg Am. 1990 Jun;72(3):403-8. PMID: 2312537.

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- On a T2-weighted scan, water- and fluid-containing tissues are bright and fat-containing tissues are dark, the reverse is true for T1
- Damaged tissue tends to develop edema, which makes a T2-weighted sequence sensitive for pathology

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Which patient is suffering from severe chronic low back pain?

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Which patient is suffering from severe chronic low back pain?

Inflammation of a nerve root is quite painful and does not show up on an MRI or other imaging studies

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Imaging Studies

While providing valuable structural, they do not necessarily reflect whether a pathology is clinically relevant

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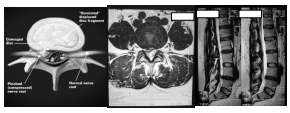
Disc Herniation With Nerve Root Compression



Presenting complaints: low back pain, radiating to the right lower extremity (posterior thigh, medial anterior leg, great toe), muscle spams, stiffness, limited range of motion

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Putting Knowledge to the Test…

Surgical or nonsurgical?
Axial back pain without radicular symptoms

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Presurgery Case Study

Pt complaint:
pain, numbness tingling right anterolateral thigh

Radiologist impression:
multiple levels of DJD with significant canal and foraminal stenosis bilaterally L3/L4, L4/L5, L5/S1

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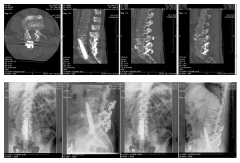
Postsurgery

Pt complaint: severe constant back and bilateral leg pain, dramatically increased with any weight bearing (described as 1000 on 1-10 pain score)



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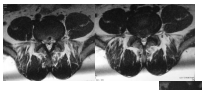
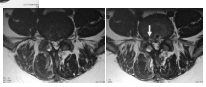
L4/L5 Disc Osteophyte Complex with L5 Root Compromise



Pt complaint: low back and radiating right LE pain, increased with weight-bearing, inability to ambulate without assistance of crutches, unchanged postsurgically



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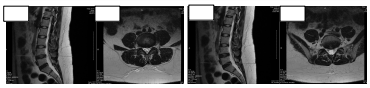
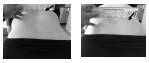
Typical Back Pain Presentation



Pt complaint: right sided back (constant) and leg pain, (intermittent, sciatic type distribution), both varying in intensity



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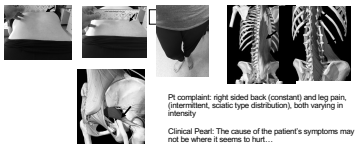

Pt complaint: right sided back (constant) and leg pain, (intermittent, sciatic type distribution), both varying in intensity

Clinical Pearl: The cause of the patient's symptoms may not be where it seems to hurt…

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Back Pain Causes

- Mechanical/musculoskeletal — *discogenic, ligamentous, muscular, stenotic, facet mediated, degenerative, osteogenic*
- Inflammatory — *arthritic, spondylitic*
- Infectious — *osteomyelitis, epidural abscess, discitis*
- Metabolic — *osteoporosis, Padget's*
- Neoplastic — *multiple myeloma, cord-canal tumors*
- Referred — *abdominal aortic aneurysm, cancer (pancreatic, genitourinary)*

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Adapted from Kirkaldy-Willis W. Managing Low Back Pain, Churchill Livingstone, New York 1999; 4rd Ed.

Eliminate Red Flags

- Neoplasm or infection: unexplained weight loss, fever, increased nocturnal pain, history of cancer
- Cauda equina syndrome: recent onset of bladder dysfunction, saddle anesthesia, progressive neurological deficit including motor weakness (eg, foot drop)

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Kirkaldy-Willis W. Managing Low Back Pain, Churchill Livingstone, New York 1999; 4rd Ed.

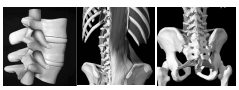
Mechanical/Musculoskeletal Causes of Back Pain

- Disc
- Facet
- Ligamentous
- Muscular

- Neurogenic
- Joint related

Clinical Pearl & Teaching Tip

- What are the chances that a patient has a single pain generator?



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Importance of Clinical History

- Onset (injury/insidious/unknown)
- Was there an injury
- Temporal factors
- Prior history, including surgery
- Frequency
- Duration
- Exacerbating or improving factors

Clinical Pearl: Listen to the patient and ask the right questions

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Are there Temporal Factors?

- No relief with bed rest or worse at night may raise the flag for cancer or profound root compression
- Morning stiffness suggests and inflammatory problem such as a facet syndrome

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Exacerbating or Improving Factors

- May provide insight as to the origin of the pain
- Forward flexion relieving the pain may indicate spinal stenosis or disc herniation as etiology of the pain
- Coughing, sneezing, or Valsalva maneuvers eliciting the pain may indicate a herniated disc as the problem
- Increased pain on flexion may indicate facet or sacroiliac
- Increased pain on extension is common with nerve root compression as well as facet pathologies

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Considerations in Performing an Efficient Effective Examination

- There is no single way to perform a complete physical
  - *Develop a method or routine that works for you*
- Structure the examination so that you have a reasonable chance of identifying or defining a problem
  - *Problem oriented or problem focused*
- Be consistent performing the examination
  - *Helps maintain repeatability, and reduce inadvertent omissions*
- Be efficient
  - *Economy of movement patient and clinician*

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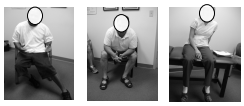
Name the Pathology….



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Nerve root compression or **spinal stenosis**

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Right L5/S1 facet inflammation w/ mild radiculitis

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Sacroiliitis or thoracolumbar junction syndrome

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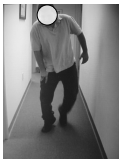

Psoas muscle contracture

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Putting Knowledge to the Test

- What would be the predicted antalgic behavior?

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Visual Examination

- Presence of scars
- Lumps (abscess or tumor)
- General symmetry
- Kyphosis/lordosis/gibbus
- **Presence of muscle spasms** (nonvoluntary)

Photographs of the back as a means of objectively documenting back pain is offered as a result of clinical observations by the presenter

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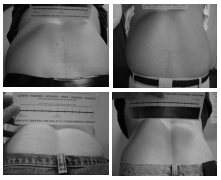

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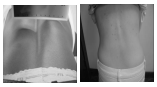
Clinical Pearl

- *"A picture is worth a thousand words"*
  - The presence of nonvoluntary muscle spasm helps support the veracity of patient complaints, and is often the first indicator of a problem



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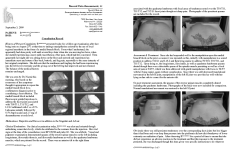
…they also help demonstrate the effectiveness of treatment



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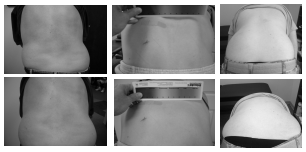
Pretreatment



Posttreatment

Photographs are offered as a means of documenting changes posttreatment based upon the clinical observations by this presenter

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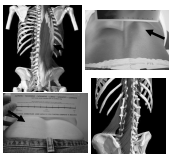
Correlate Palpatory Findings With Underlying Structures



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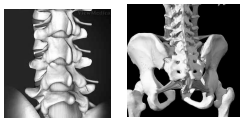
Palpation Bony Structures



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Clinical Pearl

Remember to visualize the underlying structures while palpating

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Visual & Palpatory Examination

1) Flexion/Weight Bearing 2) Non-WB Lying Prone

- Muscle spasms
- Bony structures (facets, spinous processes, PISIS, Ilium)
- Ligaments, tendons
- Paravertebral & extraspinal
- Localize pain generators

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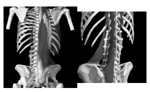
Adapted from Glick, D. Unraveling the Complexities of Back Pain. The Pain Practitioner, Vol 15, No 3 Fall 2005.

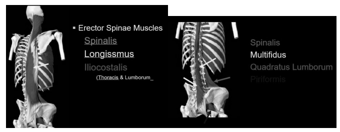
Primary vs Secondary Muscle Spasms



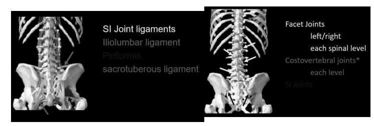
Clinical Pearls:

- Look for changes between weight bearing and nonweight bearing
- Think muscle guarding vs direct neuronal control

Lumbar Anatomy



Lumbar Anatomy



Range of Motion

- Degree of motion in each plain
- Assess behavior during active ROM
- Presence of pain
- Characteristics of pain
  - *Pulling, catching, sharp, dull…*

Adapted from Glick, D, Unraveling the Complexities of Back Pain, The Pain Practitioner, Vol 15, No 3 Fall 2005.

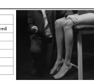
Routine Physical Assessment

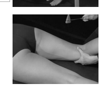
- Deep tendon reflexes
- Sensory examination
- Motor function

Hoppenfeld S, Hutton R, [redacted]
Prentice Hall, June 1999 (ISBN-13: 97[redacted]
Hoppenfeld S, Orthopaedic Neurology[redacted] Levels, Lippincott Williams & Wilkins, June 1977. (ISBN-13: 9780397503681)

Deep Tendon Reflexes

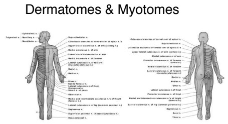
Deep Tendon Reflexes	
Reflex	Main Spinal Nerve Roots Involved
Biceps	C5, C6
Brachioradialis	C6
Triceps	C7
Patellar	L4
Achilles Tendon	S1





Sensory Examination

Dermatomes & Myotomes



Adapted from Kirkaldy-Willis W. Managing Low Back Pain, Churchill Livingstone, New York 1999; 4rd Ed.

Muscle Strength

Rate each muscle or muscle group according to the following five point grading scale

Score	Muscle Response
0	No Movement
1	Muscle belly moves but the joint does not move
2	Joint moves with gravity eliminated
3	Joint moves against gravity
4	Joint moves against gravity and some resistance
5	Full strength

Adapted from Hoppenfeld S, Hutton R, [redacted] Prentice Hall, June 1999

Common Lower Extremity Muscles Tested

Iliopsoas	L2-L4	Flex hip
Quadriceps		Extend knee
Hamstrings	L5-S2	Flex knee
Gluteus maximus		Extend hip
Tibialis anterior	L4-L5	Dorsiflex foot
Tibialis posterior		invert foot
Peronei	L5-S1	Evert foot
Extensor hallucis longus		Extend (dorsiflex) great toe
Gastrocnemius	S1-S2	Plantar flex foot

Adapted from Hoppenfeld S, Hutton R, [redacted] Prentice Hall, June 1999

Provocative Examination *(Orthopedic Examination)*

- Minor's
- Bechterew's
- FABER Patrick
- Piriformis Stretch
- SLR (aka Lasegue's)
- Goldwaith's, Braggard's, Sicard's, Bowstring
- Leg Lowering, Milgram's
- Double SLR (Bilateral LR)

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Adapted from Glick, D. Unraveling the Complexities of Back Pain, The Pain Practitioner, Vol 15, No 3 Fall 2005.

Provocative Examination (cont'd)

- Hibb's
- Nachlas
- Yeoman's
- Belt Test (aka Supported Adams)
- Glick's Test
- SI Range of Motion

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Adapted from Glick, D. Unraveling the Complexities of Back Pain, The Pain Practitioner, Vol 15, No 3 Fall 2005.

Suggested References

- Illustrated manual of part I, neurological reflexes/signs/tests, part II, orthopedic signs/tests/maneuvers for office procedure. J.M. Mazion; 2nd ed edition, 1980.
- Photographic Manual of Regional Orthopaedic and Neurological Tests, Cipriano, Jahn & White, Lippincott Williams & Wilkins; 3rd edition, 1997.
- Physical Diagnosis of Pain, Waldman, Elsevier Saunders, 2006.

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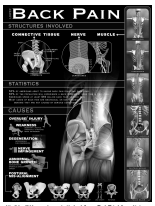

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http://drwaldblog.com/wp-content/uploads/Lower-Back-Pain-Infographic.jpg

Other Common Causes of Low Back Pain
…pain when the low back is not involved

- Thoracolumbar junction syndrome
  - Several variations w/ and w/o nerve involvement
- Piriformis syndrome
  - Entrapment vs anomaly
  - Primary vs secondary
- Sacroiliac joint problems
  - Inflamed (sacroiliitis) vs arthropathy
- Hip pathologies

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Adapted from Maigne R, Diagnosis and Treatmetn of Back Pain of Vertibral Origin, CRC Press, NY, 2006.

Thoracolumbar Junction Syndrome

- Mainge R, Semiologie des derangements interveretbraux mineurs. Ann Med Phys 1972 277-289

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Formulating Clinical Impression

- Does this particular clinical situation seem familiar, on the basis of the HISTORY?
- Is there a single answer that explains even a multitude of complaints/symptoms?
  - (remember Occam's Razor — *simplest possible explanation*)
- *What are the other explanations?*
  - *Remember common things occur most commonly. Therefore considerations are considered from most likely to least*
  - *Do pay attention to conditions that can result in increased morbidity/mortality if not identified promptly*

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Formulating an Impression

- Does distribution of pain correlate with clinical impression?
- Do the imaging and other test results account for the clinical findings?
- Is the overall clinical picture explained?
- If questions exist, it may be necessary to revisit parts of the clinical examination
- Review findings with patient

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There are occasions when then examination may be almost a moot point

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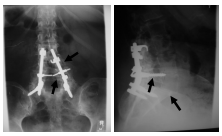
There are occasions when then examination may be almost a moot point (cont'd)



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Further Clinical Assessment

- Structural
  - X-ray
  - MRI
  - CT
  - Bone scan
  - Discography
  - 3D CT
- Functional
  - Electromyography
    - (EMG/NCV)
  - SEP

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Adapted from Glick, D. Unraveling the Complexities of Back Pain, The Pain Practitioner, Vol 15, No 3 Fall 2005.

CT With 3D Reconstruction

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Thinking Outside the Box

- *There is nothing in writing the dictates that each therapy be attempted separately*
  - For example: if an SI joint seem frozen and inflamed on clinical examination why not inject with anesthetic and anti-inflammatory medication, then manipulate immediately following?

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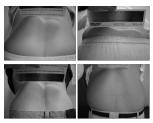
Adapted from Glick, D. Unraveling the Complexities of Back Pain, The Pain Practitioner, Vol 15, No 3 Fall 2005.

Tips to Remember

- A picture is worth a 1000 words.
- The best tools for the treatment of back pain are the history and clinical examination.
- Limited examinations can ultimately be more costly.
- The symptoms are often associated with multiple pain generators that can be unraveled.



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Key Considerations

- Back pain is a symptom not a pathology.
- All pain is not caused by disc herniations or "pinched nerves."
- There is no single treatment to address back pain.
- Successful treatment usually includes addressing the underlying pathology as well as dealing with the biopsychosocial aspects of the problem.
- Chronic back pain often occurs from failure to adequately diagnose and treat.

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Adapted from Glick, D. Unraveling the Complexities of Back Pain, The Pain Practitioner, Vol 15, No 3 Fall 2005.

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