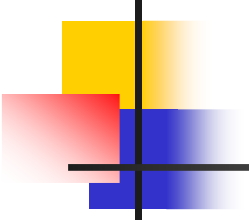




# Diagnostic Test Accuracy

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*A Review of the Literature*



*Cervical Discogenic Pain. Prospective Correlation of MRI and Discography in Asymptomatic Subjects and Pain Sufferers.* Schellhas, Smith, Gundry, and Pollei, Spine 1996 Feb. 1;21(3):300-11; Discussion by James Zucherman, 311-12.

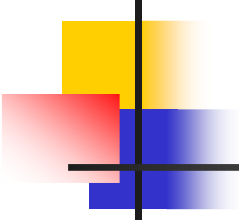
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### **Methods:**

- Ten lifelong asymptomatic subjects and 10 nonlitigious chronic neck/head pain patients underwent discography at C3-C4 and C6-C7 after magnetic resonance imaging. Disc morphology and provoked responses were recorded at each level studied.

### **Results:**

- In the pain patients, 11 discs appeared normal at MRI and 10 of these proved to have anular tears discographically.
- Discographically normal discs were never painful in either groups.

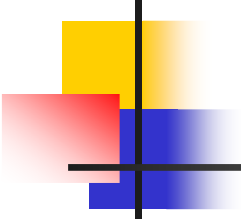


*Cervical Discogenic Pain.* Spine 1996 Feb. 1;21(3):300-11; Discussion by  
James Zucherman, 311-12.  
(cont'd)

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**Conclusion:**

- **Significant cervical disc annular tears often escape magnetic resonance imaging detection, and MRI cannot reliably identify the source(s) of cervical discogenic pain.**



**Jensen, et al. Magnetic resonance imaging of the lumbar spine in people without back pain. NEJM 1994;331(2)July 14:69-73**

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- 98 people: only 36% had a normal disc at all levels.
- 52% bulge at least one level
- 27% protrusion
- 1% extrusion
- 38% had abnormality at more than one level

Summary: Finding may be frequently coincidental

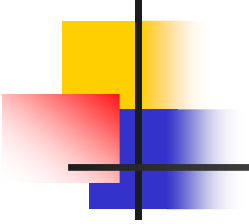


“But the x-ray is negative! How can there be an injury?”

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Question: Are diagnostic tests such as x-ray, MRI, EEG, EMG, etc, reliable indicators for the potential for injury?

Answer: NO



**Haldeman, DC, PhD, MD. Spine  
1990;15(7):718-723.**

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*The pathology model cannot explain back pain or disability. It is not possible to look at pathology and determine the symptoms a patient may be suffering. It also is not possible to look at a patient with back pain with no neurologic deficits and determine the nature of the pathology. About 30% of asymptomatic subjects show abnormalities in the lumbar spine by myelogram, CT and MRI. There is a large percent of symptomatic patients with severe complaints in whom testing fails to reveal any structural lesion.*



## Wickstrom et al....

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- Experiments produced tears of the ALL so severe that they were often seen in conjunction with avulsions of the disc of vertebrae (rim lesions).
- *Yet, they were not seen on radiographs*
- MRI...(1) Goldberg et al. (2) Davis et al. Visualization of ALL



Jonsson MD. Journal of Spinal Disorders 1991;4(3):251-263.

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*Study of cervical spine of 22 patients who died of fatal skull fractures in MVAs. X-rays were evaluated by an expert orthopedic radiologist. Only 1 of 10 gross ligamentous disruptions were even suspected on X-rays. 198 lesions were missed. Multilevel soft-tissue injuries were common. Very few injuries were detected or even suspected on radiograms. The vast majority was not recognized. Plain radiograms cannot detect soft-tissue lesions unless they are associated with vertebral body malalignment. Conclusions: the majority of lesions are soft-tissue injuries. Plain radiograms show virtually no soft-tissue lesions.*

**Side note:**

As a result of these types of studies, it has become apparent that a thorough physical examination is more important, in combination with functional assessments, than traditional diagnostic evaluations to determine the presence or absence of soft-tissue injuries.





Liebenson, DC, Oslance. Rehabilitation of the Spine. Williams and Wilkins, Baltimore. 1996:73.

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*“80% of patients have no identifiable structural pathology and require treatment based on evaluation of functional deficits. In the majority of cases, patients have soft tissue injuries and functional changes are the only objective findings on which to base treatment and judge progress. Outcomes assessments including objective functional tests give the third party payers, patients and doctors a way to measure progress over time, and evaluate the prescribed treatment. **Overemphasis on treatment of structural pathology results in a failure to identify or focus on functional losses and work demands.** [Emphasis added.]”*



Mooney, MD. J. Musculoskeletal Medicine 1995; Oct:33-39.

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*“Common acute back pain is due to chemical abnormalities created by soft tissue tear. The tear represents a mechanical disruption, which is usually microscopic. X-rays demonstrate no changes before and after an acute back injury.”*

Again, function is more important in the evaluation and treatment of back pain than structural pathology. A "negative" x-ray has limited value in the determination of medical necessity since one cannot evaluate "function" from an x-ray. Similar findings concerning other imaging findings was also demonstrated in a paper by **Davis, DC. JNMS 1996;4(3):102-115.**

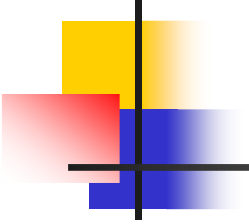
In general, imaging studies are not useful in determining the origin of pain. However, they are a useful diagnostic tool used in the detection of structural deformities or pathology, which may prevent the application of appropriate manipulative procedures.



**Jarvik et al. Rapid Magnetic Resonance Imaging vs Radiographs for Patients with Low Back Pain. JAMA 2003;289:2810-2818.**

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**Conclusion:** Rapid MRIs and radiographs resulted in nearly identical outcomes for primary care patients with low back pain. Although physicians and patients preferred the rapid MRI, substituting rapid MRI for radiographic evaluations in the primary care setting may offer little additional benefit to patients and may increase the costs of care because of the increased number of spine operations that patients are likely to undergo.

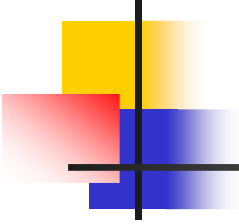


Association between pain in the hip region and radiographic changes for osteoarthritis: results from a population-based study.

Birrell et al. Rheumatology 2005 44(3):337-341.

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- Objectives: The relationship between hip pain and radiographic change in the population is unclear due to lack of agreed definition for hip pain and difficulties in obtaining radiographs from asymptomatic random samples.
- Our objective was to assess the relationship between hip pain and radiographic changes in OA in a population sample aged over 45.



Association between pain in the hip region and radiographic changes for osteoarthritis: results from a population-based study.

Cont'd

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- **Conclusion:** Hip pain is relatively infrequent in the general population compared with the published reports of other regional pain syndromes.
- Mild/moderate radiographic change is very frequent and not related to pain, whereas severe change is rare but strongly related.
- In younger males, severe radiographic change is much less likely to be associated with pain.

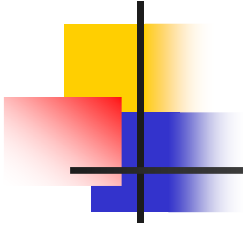


# Symptoms vs. Function

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As a result of these and other studies there has been a shift in thinking away from the traditional "symptom" approach, towards contemporary thinking of "function".

For many patients with recurrent back pain, staying functional is a "process" more so than a "result" based on a predictable healing time or average.



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