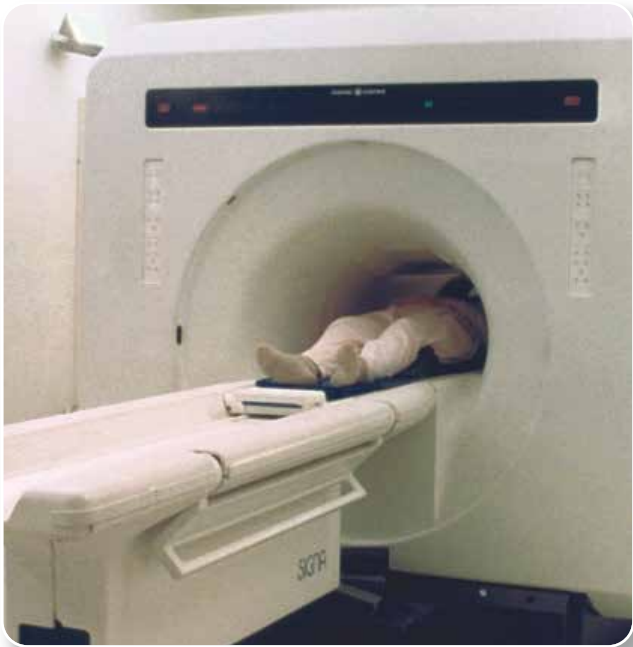


FONAR

FONAR UPRIGHT® MULTI-POSITION™ WEIGHT-BEARING MRI (THE STAND-UP® MRI)

Which MRI Do You Think Patients Prefer?



A Typical High-Field "Closed" MRI

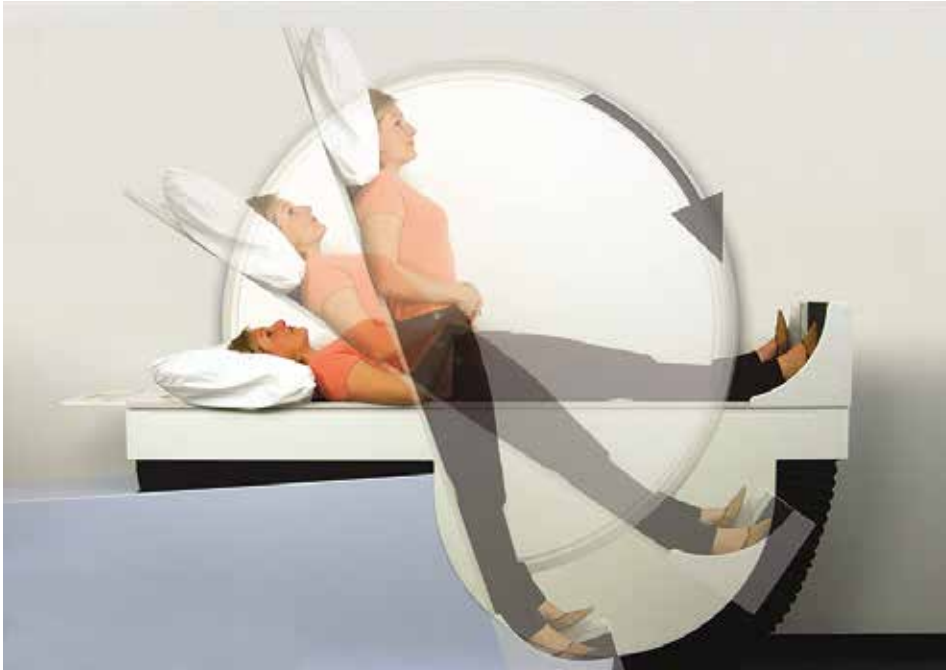
OR



FONAR UPRIGHT® Multi-Position™ MRI
(The Stand-Up® MRI)



- The "Non-Claustrophobic MRI"
- No "Tube," No "Tunnel"
- Nothing in Front of the Patient's Face
- Accommodates Very Large Patients
- Scans Patients Who Can't Lie Down



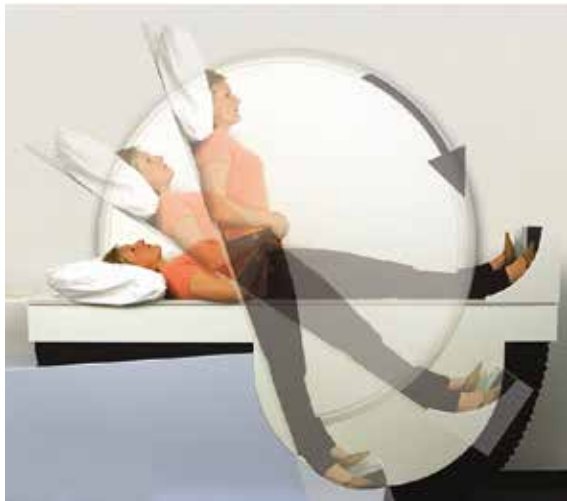
The patient bed can rotate from recumbent to upright.
(cutaway view)

Here are the facts:

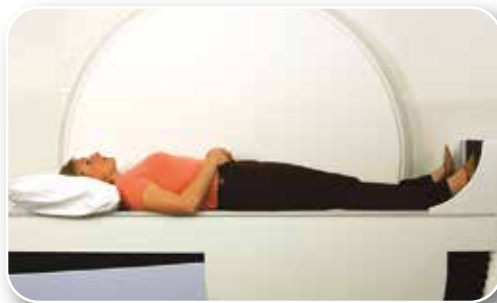
- There is considerable evidence that UPRIGHT®, Weight-Bearing MRI provides important medical benefits.
- Patient positioning plays a critical role in detecting clinically significant pathology.
- Recumbent-only MRI can underestimate the maximum degree of pathology.
- It is the only Multi-Position™ MRI.
- It is the only MRI scanner that can provide comparisons based upon patient positioning: flexion, extension, sitting, standing, lateral bending AND recumbent.

This MRI offers significant clinical value that cannot be duplicated on a High-Field MRI.

The Only Multi-Position™ MRI



The patient bed can rotate from recumbent to upright.
(cutaway view)





Why Positional MRI is Important...



Nachemson Alf L.: The lumbar spine an orthopaedic challenge. *Spine* 1976; Volume 1, Number 1: 59-71. [Department of Orthopaedic Surgery, Sahlgren Hospital, Gothenburg, Sweden]

A. Nachemson, M.D., made measurements of lumbar disc pressure in various positions. Note the significant increase in disc pressure when the patient is **not** lying down.

The UPRIGHT® MRI can acquire images in all of the positions shown, leading to more accurate diagnoses and better treatment plans.



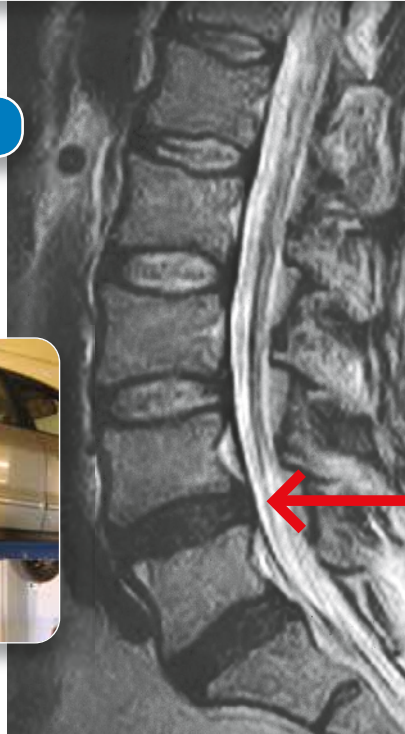
Recumbent

When the spine is not supporting the weight of the body, can you see all the pathology?

When the tires are not supporting the weight of the car, can you tell which tire is "flat"?



Non-Weight-Bearing



Upright

The right position gives you the right diagnosis.



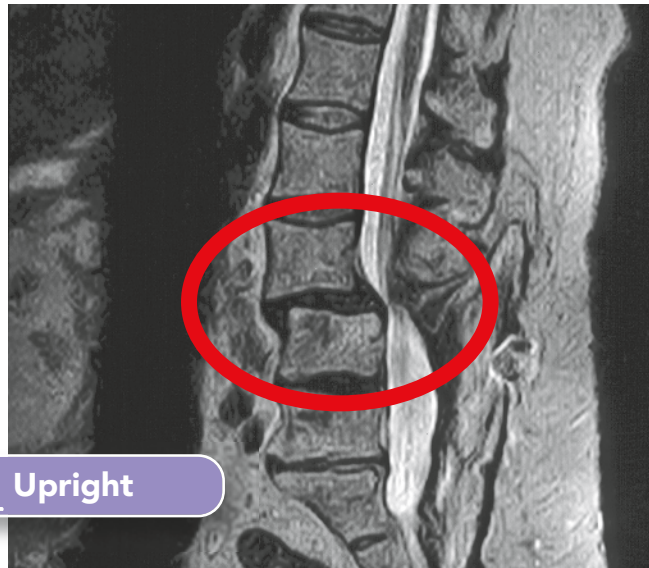
Weight-Bearing

Clinical Case Studies

Patient Positioning plays a critical role in detecting clinically significant pathology.



 Recumbent



 Upright

Case Courtesy of M. Rose, M.D., Rose Radiology Centers, Florida

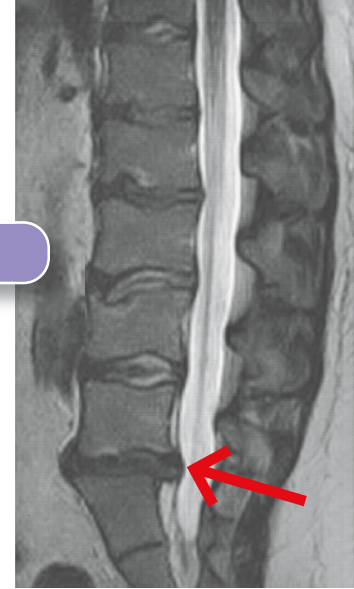
Same Patient... Same Scanner... Same Day

Position-Dependent Disc Herniation Not Visible by Recumbent MRI or by Upright X-Ray

 Recumbent



 Upright



Case Courtesy of Stand-Up MRI of Orlando, Orlando, Florida

Unsuspected Disc Herniation on Extension

11



Upright Neutral

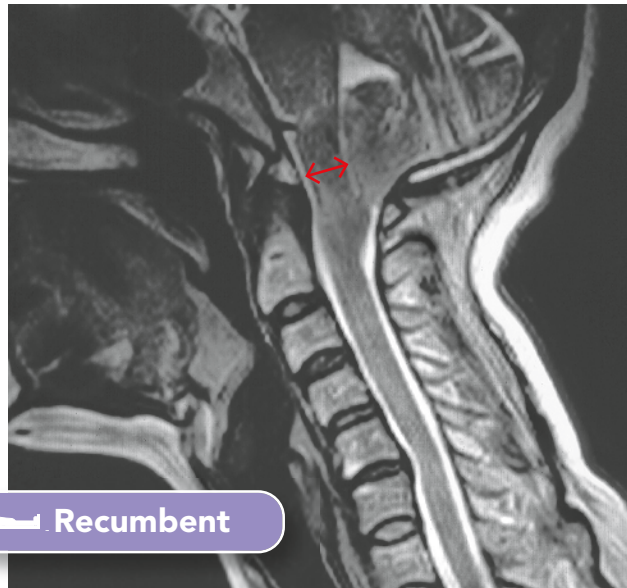


Upright Extension

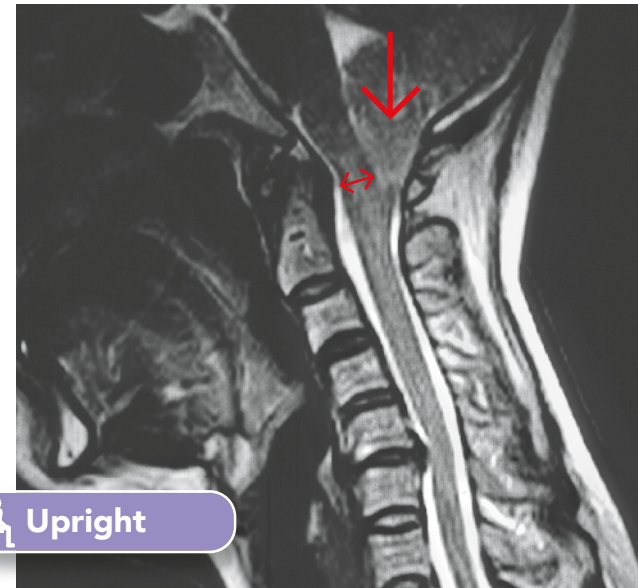
Case Courtesy of Richard Marks, M.D., Board-Certified Orthopedic Surgeon, Up and Open Imaging, Dallas, Texas

Chiari Malformation Diagnosis When Upright

A Note to Attorneys: As you know, if the full extent of an injury cannot be established, accident victims may be denied appropriate settlement amounts and necessary medical care as well. The UPRIGHT® MRI can see position-dependent pathology that would be underestimated or even missed if the patient were scanned on **any other** MRI system. Our MRI scanner enables you to achieve the very best medical-legal outcomes for your clients.



Recumbent



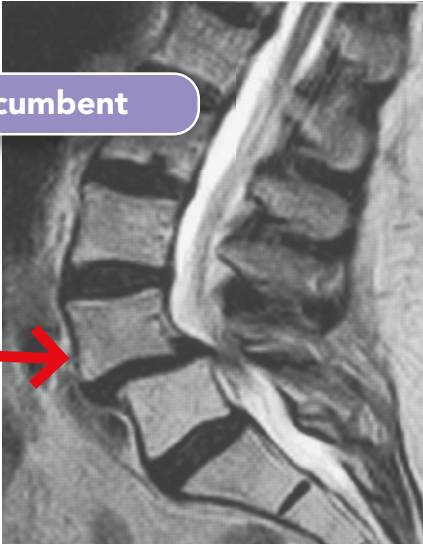
Upright

Case Courtesy of J.P. Elsig, M.D., Orthopedic Surgeon, fmri Zentrum-Zurich, Switzerland

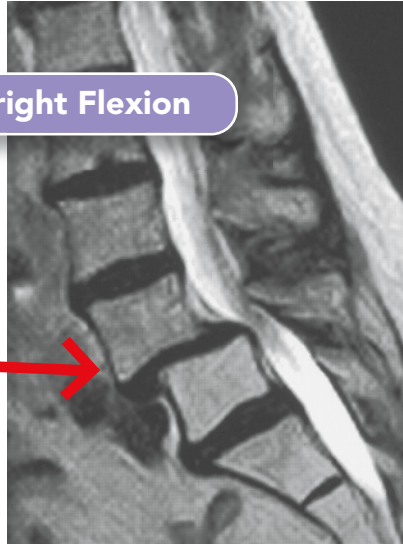
Recumbent-Only (*Single Position*) Imaging Underestimates the Maximum Degree of Pathology and Misses its Dynamic Nature

13

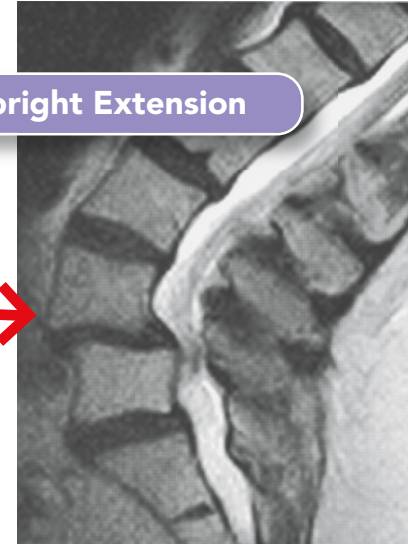
 Recumbent



 Upright Flexion



 Upright Extension



Case Courtesy of Stand-Up MRI of Melville, P.C., Melville, NY

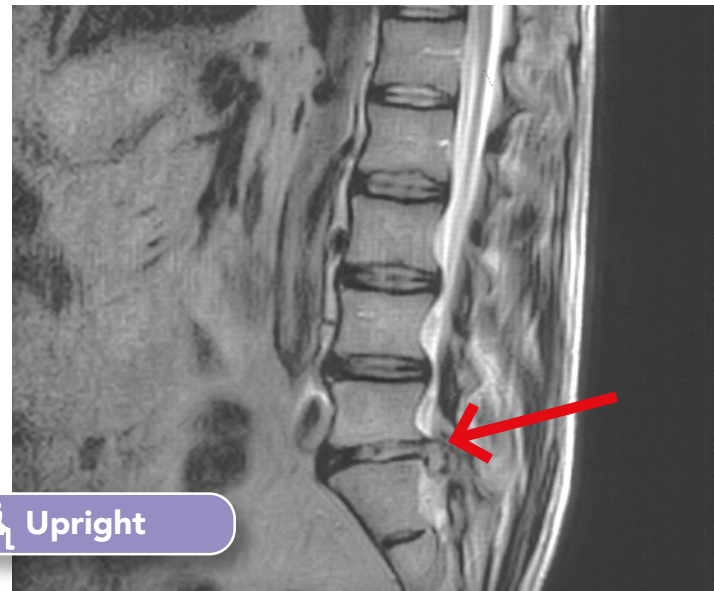
Upright Weight-Bearing Visualization of Nuclear Extrusion



 Recumbent

Case Courtesy of F.W. Smith, M.D., University of Aberdeen, Scotland

A

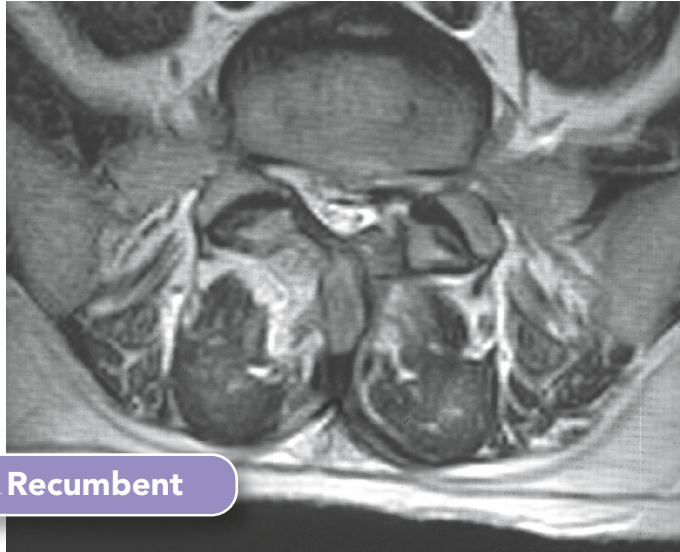


 Upright

B

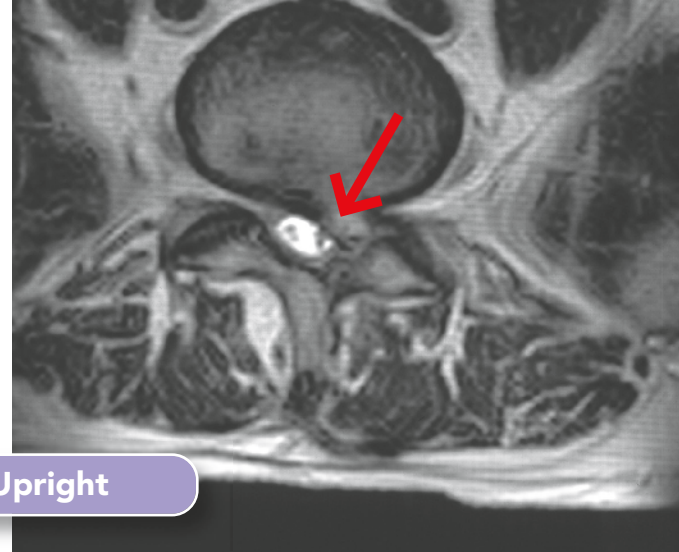
Recumbent-Only (*Single Position*) Imaging Underestimates the Maximum Degree of Pathology and Misses its Dynamic Nature

15



 Recumbent

C



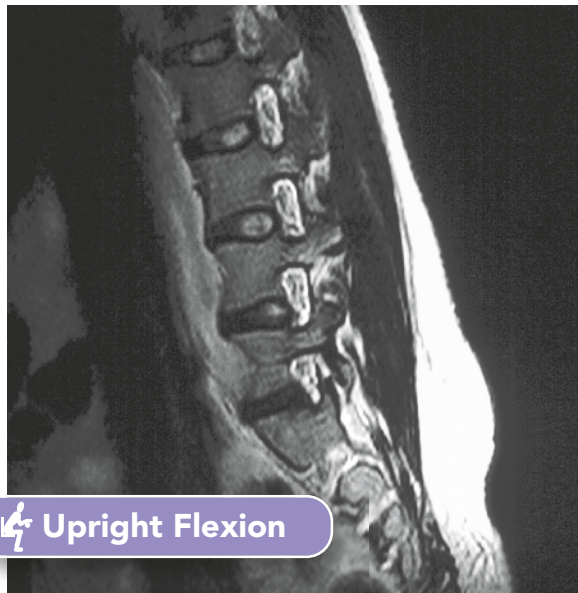
 Upright

D

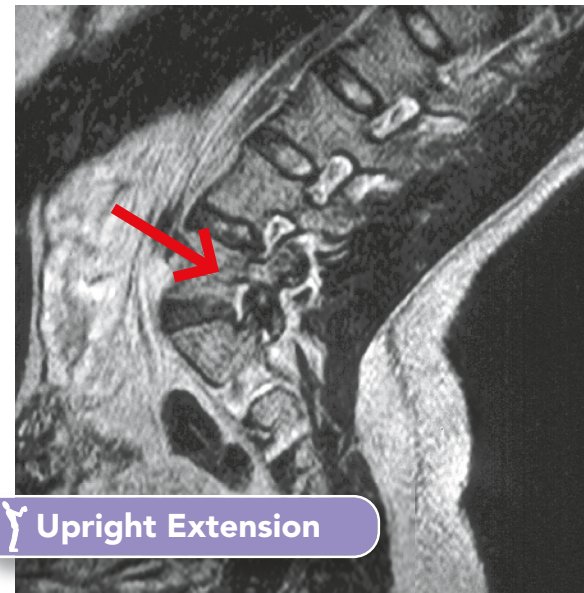
Dynamic Fluctuation of Neural Foramen Stenosis



 Recumbent



 Upright Flexion



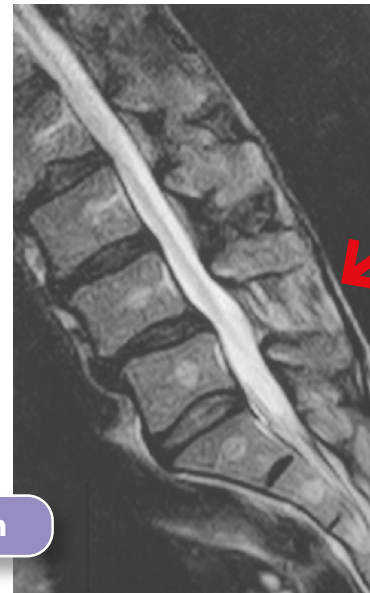
 Upright Extension

Case Courtesy of Stand-Up MRI of Melville, P.C., Melville, NY

Interspinous Ligament Rupture Visualized in Upright Flexion



 Recumbent



 Upright Flexion

Case Courtesy of F.W. Smith, M.D., University of Aberdeen, Scotland

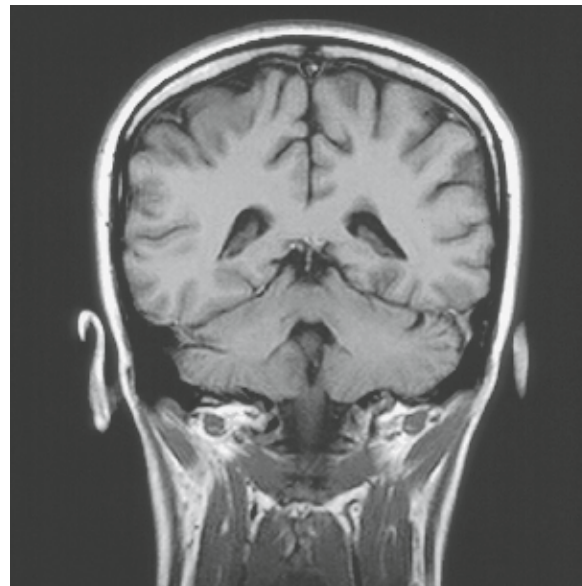
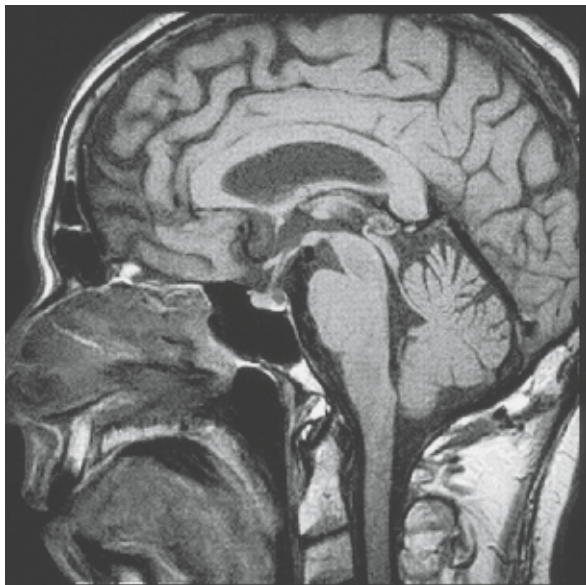
Image Quality

Brightness

Resolution

CONTRAST

Detail







How We Provide Excellent Image Quality...

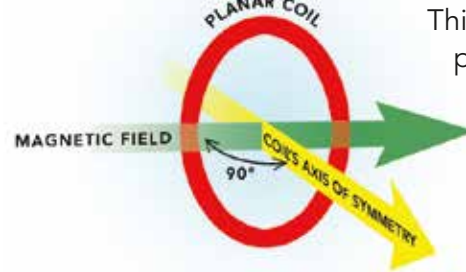


The red circle represents a flat planar coil.

A fundamental principle of MRI:

The RF receiver coil achieves maximum sensitivity when its axis of symmetry (yellow arrow) is perpendicular (90°) to the direction of the magnetic field (green arrows).

The UPRIGHT® MRI has a unique magnet design, which allows it to employ this principle in more than one way. The patient is positioned between two vertical poles so that the magnetic field traverses the body in the left-right direction (green arrows).



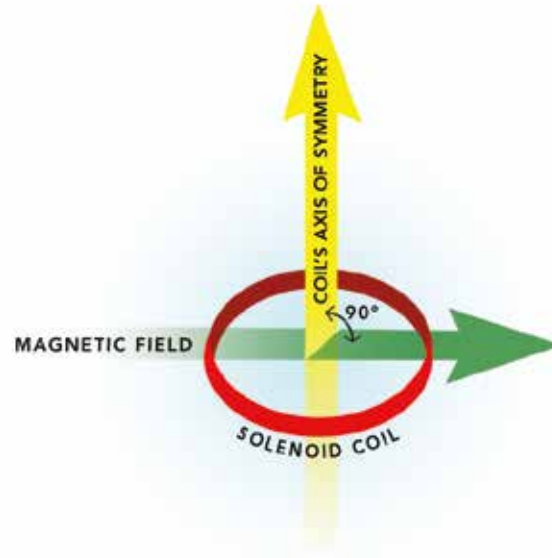
This unique design allows **both** flat planar and solenoid ("wrap-around") coils to be used separately or in combination (in quadrature).



A flat planar coil is used for a lumbar spine scan.



A solenoid ("wrap-around") coil is used for a cervical spine scan.



Which RF Receiver Coils are Compatible with Which MRI Scanners?

	High-Field MRI	Open MRI	UPRIGHT® MRI
Flat Planar Coils	✓	NO	✓
Solenoid ("Wrap-Around") Coils	NO	✓	✓

Magnetic field strength is not the sole determinant of image quality. The ability to utilize both solenoid and planar RF receiver coils gives the UPRIGHT® MRI a significant advantage over all other types of MRIs, and accounts to a large degree for the fact that 0.6 Tesla UPRIGHT® MRI images are very competitive with 1.5 Tesla High-Field MRI images.

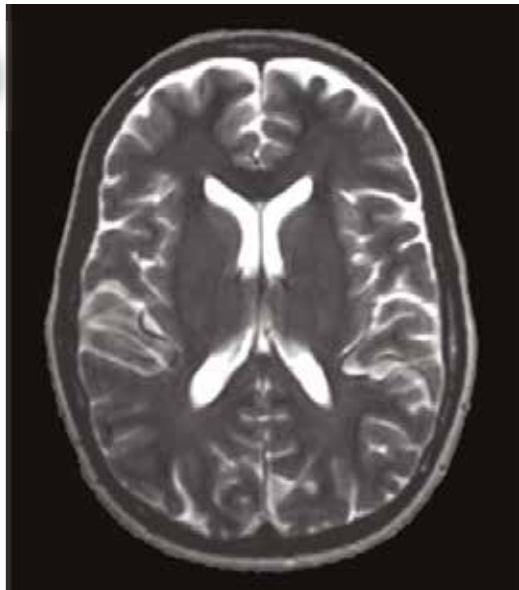
Advanced RF Receiver Coil Technology



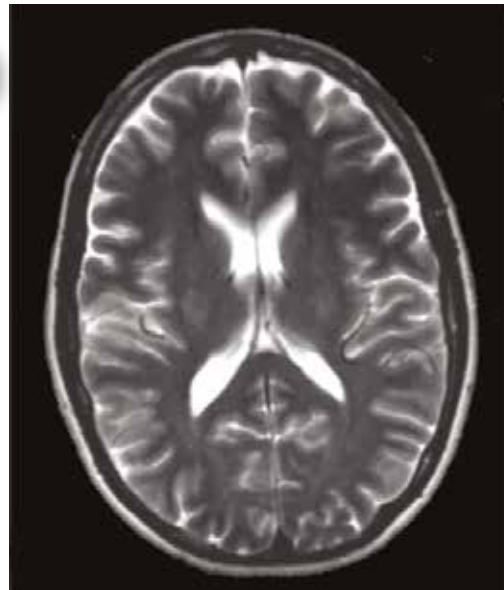
Can you tell which image was acquired on a High-Field MRI (1.5 Tesla) and which was acquired on the UPRIGHT® MRI (0.6 Tesla)?

(Answer on next page)

A



B



The images above were obtained using similar acquisition parameters and scan times.

Clinical MRI

Vol. 15, Issue 3 (2006)

"Positional Upright Imaging of the Lumbar Spine Modifies the Management of Low Back Pain and Sciatica"

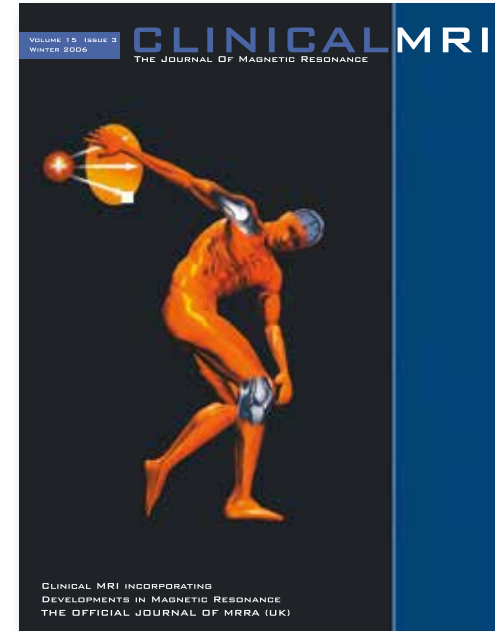
F.W. Smith, M.D. et al., University of Aberdeen, U.K.

Paper presented at the ESSR (2005), Oxford, England

In a study of 25 patients with low back pain and sciatica referred to the Upright MRI for lumbar spine MRIs following at least one prior "normal" recumbent MRI within six months of referral:

Thirteen patients [52%] demonstrated "abnormalities in one or more of the seated postures that were not evident in the conventional spinal examination."

"Each of the thirteen patients has undergone appropriate surgery and six months after surgery remain symptom free."



The Spine Journal

Volume 7 Number 5S (2007), page 69S

"Missed Spondylolisthesis in Static MRIs But Found in Dynamic MRIs in Patients with Low Back Pain"

S.W. Hong, M.D., et al., UCLA School of Medicine, Albert Einstein College of Medicine & Hacettepe University

"In the [510] patients with back pain, missed spondylolisthesis in neutral MRIs but found in flexion MRIs is 18% for all levels in the condition that spondylolisthesis is considered as more than 3 mm translation."

Volume 7 Number 5S (2007), page 39S

"Positional MRI: A Valuable Tool in the Assessment of Cervical Disc Bulge"

P. Moazzaz, M.D., et al., UCLA School of Medicine

In a study of 163 patients with radicular cervical spine symptoms:
 "Using 2.0 mm of disc bulge as a cutoff value, the false negative ratio for the neutral position alone compared to flexion and extension was 25.08%."



SPINE

Volume 33, Number 5 (2008) E140-E144

"Missed Lumbar Disc Herniations Diagnosed with Kinetic Magnetic Resonance Imaging"

J. Zou, M.D. et al., Department of Orthopedic Surgery, UCLA & Department of Orthopedic Surgery, Soochow University

In a study of 553 patients with symptomatic back pain: "A significant increase in the degree of lumbar disc herniation was found by examining flexion and extension views when compared with neutral views alone."

"For patients with normal or <3 mm bulge in neutral, 19.46% demonstrated an increase in herniation to >3 mm in extension." Further, 15.29% demonstrated an increase in herniation to greater than 3 mm in flexion.



Clinical Radiology (2008) 63, 1035-1048

"Upright Positional MRI of the Lumbar Spine"

F. Alyas, D. Connell, A. Siafuddin, London Upright MRI Centre, London, UK
Department of Radiology, The Royal National Orthopaedic Hospital NHS Trust,
Stanmore, Middlesex, UK

"There is no doubt that clinically relevant spinal canal stenosis can be uncovered by imaging in the erect position."

"In cases where conventional MRI shows no evidence of cauda equina or lumbar nerve root compression in the setting of convincing clinical symptoms that warrant surgical intervention, re-imaging in the upright position, with the addition of flexion and extension, is recommended."



ECR 2009

Vienna, Austria, March 6-10

“Upright Positional MRI Improves Diagnosis and Treatment of Patients with Back Pain and Sciatica, When Compared to Conventional Supine MRI Examination”

F.W. Smith, M.D., Department of Radiology, University of Aberdeen, Woodend Hospital
Aberdeen, Scotland, UK

In a study of 63 patients with back pain or sciatica, “Thirty-Four (54%) demonstrated abnormalities in one or more of the erect or seated positions, which correlated with their symptoms and were not evident in the conventional supine scan.”



Southern Medical Journal (2004)

"Dynamic Weight-Bearing Cervical Magnetic Resonance Imaging: Technical Review and Preliminary Results"

Vitaz, M.D. et al., Department of Neurological Surgery

University of Louisville School of Medicine

Twenty patients with neck pain and symptoms consistent with radiculopathy or myelopathy were scanned upright on a GE 0.5T Signa SP vertical gap MRI.

"When only static supine MRI scanning is performed on these patients, the true abnormality may be overlooked and inappropriate surgical plans instituted because of a lack of illustration of the changes that occur with movement."

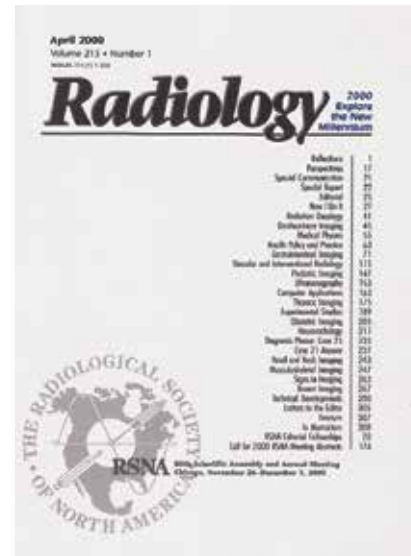


Radiology (2000) 215: 247-253

"Positional MR Imaging of the Lumbar Spine: Does It Demonstrate Nerve Root Compromise Not Visible at Conventional MR Imaging?"

D. Weishaupt, M.D. et al., Institute of Diagnostic Radiology, University Hospital, Zurich

Thirty patients with chronic low back pain who were unresponsive to non-surgical treatment were scanned on a GE 0.5T Signa SP vertical gap MRI. The study showed that positional MRI more frequently demonstrates neural compromise than does conventional MRI. Further, the study showed that "positional pain differences are related to position-dependent changes in foraminal size."



Pelvic Floor Dysfunction (PFD)

www.WomensImagingOnline.arrs.org August 2008

H. Pannu, M.D., Associate Professor of Radiology, Johns Hopkins University

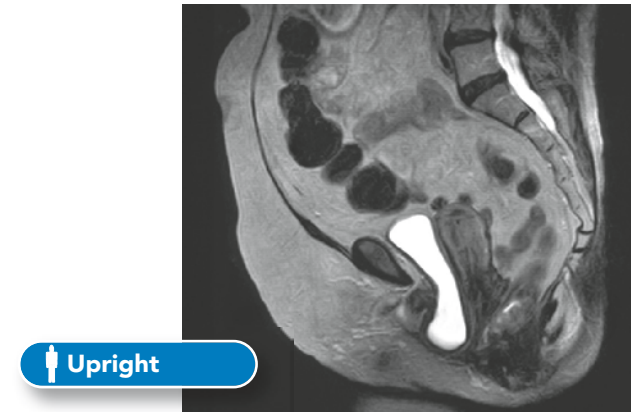
"The role of imaging is to help explain the anatomic basis for the patient's symptoms... The main drawback of MRI is supine imaging that can limit the dynamic component of the examination ...[Upright MRI imaging] may ultimately lead to MRI being the one imaging test for PFD."

WomensImagingOnline

Position-Dependent Changes in the Pelvis



 Recumbent



 Upright

This example of PFD courtesy of Stand-Up MRI of East Setauket, East Setauket, NY



FONAR • 110 Marcus Drive • Melville, NY 11747 • (631) 694-2929 • www.fonar.com