Disc Pressure Measurements Prove That the Pressure on the Disc is 11 Times Greater When the Patient is Erect:  
Therefore, the FONAR Upright” MRI Is the ONLY Appropriate Technology For Evaluating Low Back Pain and For Choosing the Best Surgical Repair  
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Direct measurements of disc pressure (1,2) establish quantitatively that the forces on the recumbent intervertebral disc are only a fraction of what they are on the upright disc. Indeed, on the basis of these direct in vivo measurements of disc pressure it would appear that an examination of the patient lying down is not a relevant examination for the patient experiencing back pain when he is upright(3). Indeed the data strongly suggests that the recumbent-only MRI carries the very real prospect of either grossly underestimating the patient’s spinal pathology because the forces causing it have been removed, or not seeing the pathology at all for the same reason.

The data prove unequivocally that for the approximately 9,000,000 patients scanned annually in the MRI for upright back pain (3), the FONAR Upright” MRI examination is the relevant examination.

In 1999, H. J. Wilke et al.(1)at the Institute for Orthopedic Research and Biomechanics, University of Ulm, Germany reported direct in vivo measurements of pressures in the intervertebral disc in 28 body positions (Table 1) utilizing a pressure transducer implanted directly in the nucleus pulposus of a healthy non-degenerated L4-L5 disc of a male volunteer.

The direct measurements of disc pressure by Wilke et al.(1) show unequivocally that the recumbent disc is subject to a pressure that is only a tiny fraction of the pressure exerted on that same disc when the patient is standing and bending forward. Indeed, the pressure exerted on the disc when the patient is standing erect and bending forward is 11 times what the pressure is on the disc when the patient is recumbent.

Additionally, the data corroborates the original intradiscal pressure measurements made by Nachemson et al.(2)on the L3-L4 disc of volunteers (Fig. 2 from Nachemson et al.).

Except for the fact that Nachemson found that the maximal disc pressure occurred in the partially flexed erect sitting position, while Wilke et al. found it occurred standing and partially flexed (a variation which could be attributable to the fact that Wilke et al. measured the L4-L5 disc while Nachemson measured the L3-L4 disc), the general result was the same. The upright disc pressure was more than 10 times greater than the recumbent disc pressure. Indeed, the pressure exerted on the upright L3-L4 disc in the seated partially flexed position is also 11 times the pressure the recumbent L3-L4 disc experiences when recumbent, and is the same pressure multiple that Wilke et al. measured.

These direct intradiscal measurements of disc pressure make it clear that the MR imaging evaluation of the patient upright
is the relevant examination, and that the MRI examination of the patient recumbent is not.

According to the Center for Disease Control and Prevention, U.S. Department of Health and Human Services there are 916,000 surgeries of the spine performed each year in the U.S. The number is comparable in magnitude to the 950,000 cardio-vascular operations performed annually in the U.S., the total of stent placements, coronary bypass surgeries, angioplasties, heart transplants, valve replacements and congenital heart repairs.

Additionally, there are approximately 9,000,000 MRI examinations of the spine performed annually in the U.S.

Given that the burden of the spine is to carry weight and that the purpose of these 9,000,000 annual spine MRI examinations is to determine the origin of back pain in these patients, examining the spine with the weight removed in a recumbent-only MRI does not address the patient's need. Indeed, the inadequacy of the weightless MRI for assessing spinal pathology is self-evident. Direct measurements of intervertebral disc pressure in various body positions prove this fact quantitatively.

Moreover, the recumbent-only MRI examination possesses the risk to the patient of providing the wrong diagnosis and thereby causing the wrong surgery. This outcome carries with it the unfortunate prospect of adding the patient to the ranks of those who make up the high number of "multiply operated surgical cripples" that comprise the Failed Back Surgery Syndrome (FBSS) (2,6,9,10,11).

It is thus clear, that for the 916,000 patients who undergo spine surgery each year and for the approximately 9,000,000 patients who receive MRI scans of the spine annually for back pain, that these patients should all be receiving vertical MRI examinations to achieve proper diagnosis of their problems. INDEED THE DATA FROM THE DIRECT IN VIVO MEASUREMENTS OF DISC PRESSURE MAKE IT SELF-EVIDENT THAT IT IS IMPOSSIBLE TO ACHIEVE A CORRECT DIAGNOSIS OF A PATIENT'S BACK PAIN WHEN THE COMPRESSIVE FORCES CAUSING THAT BACK PAIN HAVE BEEN REMOVED.

(2) A. L. Nachemson, Spine 1, #1, pp. 59-71, 1976
(3) The great majority of back pain patients
(5) A. L. Nachemson, Spine 1, #1, p. 65, 1976
(6) The acronym set aside to identify patients whose symptoms have their origin in prior unsuccessful surgery.
(7) M. Szpalski, R. Gunzburg, Eds., The Failed Spine, Lippincott Williams & Wilkins, 2005

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