

# Functional Imaging of the degenerative spine with open, upright, weight-bearing, kinetic MRI

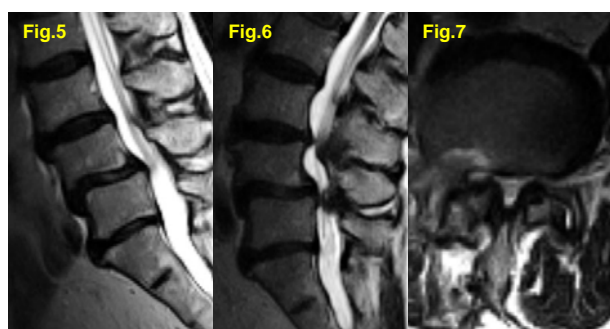
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The real-time imaging of the human spine upright (sitting and standing) in variable positions (routinely flexion-extension) with an open 0.6 Tesla „functional“ MR (fMRI, Fig.1-2) allows to detect dynamic stenosis not seen on recumbent position. Based on the experience since May 2005, illustrative cases with position and motion dependent disc protusion, stenosis of the cervical and lumbar central canal and of the intervertebral foramen are shown.



**Left (Fig.3):** Recumbent cervical MRI showing a bulging disc C5/C6 in a patient with neck pain sometimes irradiating to the arms

**Right (Fig.4):** Upright MRI showing an increasing C5/C6 disc protrusion with segmental kyphosis, and in addition a descensus of the cerebellar tonsils behind the lamina of C1. This position-related downward herniation (Arnold-Chiari I malformation) correlates with the additional complaints of dizziness and occasional drop attacks while bending forward. This MRI discloses a double pathology in a patient referred for suspected degenerative cervical disc disease



**Fig.5:** Upright flexion T2W MRI showing a L4/L5 anterolisthesis.

**Fig.6:** Upright extension study showing a dynamic L4/L5 stenosis and a L3/L4 spinal canal narrowing.

**Fig.7:** Axial view of the extension study at L4/L5 showing the marked narrowing of the central spinal canal and both lateral recesses.

## Conclusions

With fMRI the need for dynamic myelograms in cases of suspected spinal instability should decrease. The choice of the adequate surgical technique in patients with pain and neurologic dysfunction resisting to conservative treatment is facilitated by this adequate imaging modality, which is a welcome alternative for claustrophobic patients and a radiation free alternative for children.