

**Weishaupt D, Zanetti M, Hodler J, and Boos N. MR Imaging of the Lumbar Spine: Prevalence of Intervertebral Disk Extrusion and Sequestration, Nerve Root Compression, End Plate Abnormalities, and Osteoarthritis of the Facet Joints in Asymptomatic Volunteers. Radiology 1998; 209:661-666.**

**Critique author:** Linda Metzger

**Design:** Observational Study

**Objective:** To identify the magnetic resonance (MR) abnormalities of the lumbar spine that have a low prevalence in asymptomatic patients and thus determine the findings that are predictive of low back pain in symptomatic patients.

**Population /sample size/setting/interventions:**

- 60 adult volunteers (30 males, 30 females) 20 to 50 years of age (mean age = 35 years, 10 males and 10 females per decade). Volunteers were recruited from patients referred for non-spinal imaging or from the hospital staff.
- Subjects were included only if they had never experienced relevant low back pain and had never seen a physician, physiotherapist, chiropractor, or other health care professional due to low back pain, and had never been absent from work because of low back pain.
- MR imaging of the lumbar spine was performed on all subjects. The imaging studies were analyzed independently by two experienced musculoskeletal radiologists.
- The MR images were evaluated for intervertebral disk abnormalities (degeneration and herniation), end plate abnormalities, nerve root compression, and osteoarthritis of the facet joints. Disk degeneration was grouped into 5 grades, 5 being the most advanced degeneration. Disk herniation was further classified as normal, bulging, protrusion, extrusion, and sequestration. High-signal-intensity zones were described and probably correspond to anular tears.

**Main outcome measures:**

- The prevalence of the various lumbar spine abnormalities was calculated by each radiologist.
- Interobserver reliability/variability was measured by using weighted “k” kappa statistics. The “k” values varied from moderate to excellent (0.50 to 0.91) for the various abnormalities.
- Intervertebral disk degeneration was very common and found on average in 60 (20%) of all 300 lumbar disks examined and on at least one level in 43 (72%) of the 60 subjects.
- Disk bulging was found in an average of 15 (25%) subjects. Disk bulging was found on average in 16 (5.4%) of 300 intervertebral disk spaces for all 60 subjects combined.
- Disk protrusions were found in an average of 24 (40%) subjects. Disk protrusions were found on average in 29 (9.7%) of 300 intervertebral disk spaces for all 60 subjects combined.
- Disk extrusions were uncommon and were found in only 11 (18%) subjects. Disk extrusions were found in 11 (3.7%) of 300 intervertebral disk spaces for all 60 subjects combined.

- There were no disk sequestrations.
- Thecal sac impressions caused by either protruded or extruded disks were found in an average of 12 (4%) of the intervertebral spaces in 11 subjects (11%).
- High-signal-intensity zones were found in an average of 24 (8%) of the intervertebral spaces in 20 (33%) subjects.

#### **Authors' conclusions:**

- Disk bulging, protrusions, and high-signal-intensity zones are common MRI findings of the lumbar spine in asymptomatic individuals younger than 50 years of age. Disk extrusions, sequestrations, nerve root compression, end plate abnormalities, and severe osteoarthritis of the facet joints are rare, and therefore appear to be predictive of low back pain in symptomatic patients.

#### **Comments:**

- Interobserver reliability/variability between the two radiologists was acceptable.
- The authors did not provide information on the numbers of hospital staff versus patients referred for non-spinal imaging who were subjects in this study. Nor did they provide information on the health conditions of the patients selected. If a greater number of the subjects selected for the study were patients referred for non-spinal imaging than healthy hospital staff, or if their illnesses were related to spinal conditions, selection bias could have been introduced. It is unknown whether or not this type of bias would have influenced the conclusions.
- No information was provided on whether or not the 2 radiologists were blinded to the fact that all subjects were asymptomatic for low back pain. If the radiologists were not blinded and were aware that the subjects were not symptomatic with respect to low back pain, they may tend to underestimate the number of disk abnormalities found.
- The study did not give separate results for males and females, which would have helped its interpretability. Perhaps the conclusions apply more strongly to one gender than the other.
- Because the sample size of the study is too small to adequately identify rare occurrences of abnormalities in the lumbar spine, it is questionable to conclude that disk extrusions, sequestrations, nerve root compression, end plate abnormalities, and severe osteoarthritis of the facet joints may be predictive of low back pain in symptomatic patients.

#### **Assessment:**

- This study is adequate for some evidence that disk bulging, disk protrusions, and high-signal-intensity zones are common MRI findings of the lumbar spine in asymptomatic (past and current) individuals younger than 50 years of age.