Matsumoto M, Fujimura Y, et al. MRI of cervical intervertebral discs in asymptomatic subjects. J Bone Joint Surg Br 1998;80-B: 19-24.

Design: convenience sample observational study

Population/sample size/setting:

- 497 volunteers (262 men, 235 women, stratified by age into 6 age groups one decade apart)
- Volunteers were all known to the investigators and consisted of office workers, doctors, nurses, medical coworkers, manual workers, students, and others (housewives, retired, etc)
- Selection was based upon absence of any current symptoms related to the cervical spine such as neck or arm pain, and the absence of previous history of trauma or cervical spine disease needing medical treatment

Main outcome measures:

- MRI was done on all subjects; 134 were done with a 1.5 T scanner and 363 with a 0.5 T scanner
- A grading system was developed prior to studying any of the MRI images for disc degeneration, posterior disc protrusion, anterior protrusion, narrowing of the disc space, and foraminal stenosis
    - Posterior disc protrusions had three grades: 0=no protrusion; 1=disc material protruding beyond the vertebral body without cord compression; 2=beyond the vertebral body with cord compression
- The assessments were made blind by the first author
    - Two of the other authors evaluated 103 images blindly and separately to assess interrater reliability; the kappa statistics for the rating of MRI findings were moderate to good (0.51 to 0.6)
- Positive MRI changes increased with age, disc degeneration being the most frequent
    - IN the age group in their twenties, disc degeneration was seen in 17% of men and 12% of women; in the age group over 60, these findings were seen in 86% and 89% of men and women
- A total of 2480 discs were evaluated, but most of the frequency data were displayed graphically and unaccompanied by any tabular display of results
    - The only tabular display of MRI findings (Table IV) shows that posterior disc protrusions at one or more levels were present in 354 of the 497 (71%) of subjects

        - Of these 354 subjects with posterior protrusions, 80% (n=284) were counted as bulges and 20% (n=70) as disc prolapse
    - 38 subjects (50 discs), mostly over 40 years old, had grade 2 posterior disc protrusion with spinal cord compression
    - 19 prolapsed discs and 31 bulging discs were Grade 2 in severity
    - Foraminal stenosis was seen in 5.9% of all disc levels, and was more frequently seen in men than in women

Authors' conclusions:

- Asymptomatic degenerative findings in Cervical spine MRI are probably normal age-related changes
- Posterior disc protrusion and even compression of the spinal cord are not rare in asymptomatic persons over the age of 40
- The use of two different MRI scanners probably did not cause significant bias in the study, since different MRI sequences in the lumbar spine have found no significant differences in ranking normal and degenerative disc signals
- The age-related frequency of disc degenerative changes should be considered when these images are interpreted

Comments:

- Several quantitative findings are reported as graphs without tables, reducing the precision of the reporting of the prevalence of some MRI findings
- This is a 1998 study with some nomenclature which is no longer in general use; "prolapse" of the disc probably represents some degree of contained disc herniation
- The finding of "spinal cord compression" is not characterized clearly, and may represent signal change in the cord or may represent an indentation in the profile of the cord
- Foraminal stenosis does not appear to be common in asymptomatic subjects
- Even though there is imprecision in the reporting of the frequency of MRI findings, the age-related associations of disc degeneration are strong and likely to be robust
- The study was done on a convenience sample of participants, and not on a random sample of adults in the general population
    - However, the sample consisted of a very large proportion of working adults, which is likely to be healthier than a random sample of the general population; a consequence of this is that the prevalence of disc degeneration is not likely to biased upwards

Assessment: Adequate for evidence that in the cervical spine, MRI evidence of disc degeneration in asymptomatic subjects is strongly related to age, and is present in more than 80% of persons over 60