# Lumbar spine magnetic resonance imaging indications

- Magnetic Resonance Imaging-Generated Synthetic Computed Tomography in Pediatric Spine Patients
- Implementing appropriateness criteria for use of imaging technology (Project ACUITY) in magnetic resonance imaging of the lumbar spine: a Singapore experience
- Rate of Spinal Osteochondromas Diagnosed in Pediatric Patients With Hereditary Multiple Osteochondromas: A Systematic Review and Meta-Analysis
- Incidental diagnosis and reporting rate of abdominal aortic aneurysms on lumbar spine magnetic resonance imaging
- The treatment of continuous double-level lumbar degenerated disease with PE-TLIF: A case report
- Appropriateness of lumbar spine imaging in patients presenting to the emergency department with low back pain in a Western Australian tertiary hospital
- Multicenter External Validation of the Accuracy of Computed Tomography Criteria for Detecting Thoracolumbar Posterior Ligamentous Complex Injury
- Deep learning reconstructed T2-weighted Dixon imaging of the spine: Impact on acquisition time and image quality

Lumbar spine magnetic resonance imaging (LSMRI) is recommended for low back pain LBP patients with “red flags” for systemic diseases, and when surgery is considered for patients presenting signs and symptoms of radicular compression. The latter applies when cauda equina syndrome is suspected, and in cases of radicular pain caused by disc herniation (when conservative treatment has failed for ≥6 weeks) or spinal stenosis (when conservative treatment has failed for ≥12 weeks) [1) 2) 3) 4) 5)].

LSMRI is not recommended when there are no signs suggesting that the pain is caused by systemic diseases or radicular compression. In these cases, any potential findings on LSMRI have shown to be irrelevant, and do not help to refine the diagnosis, improve the outcome, or predict patient evolution [6) 7) 8) 9)].

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For patients undergoing surgery for lumbar spinal stenosis, repeated MRI within the year before planned surgery showed few significant changes in common radiological parameters. The benefit for the surgeon of repeat MRI is therefore limited [10)]

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LSMRI performed prospectively on 602 patients in 12 Radiology Services across 6 regions in Spain, were classified as “appropriate”, “uncertain” or “inappropriate” based on the indication criteria established by the National Institute for Clinical Excellence, the American College of Physicians and Radiology, and current evidence-based clinical guidelines. Studies on patients reporting at least one “red flag” were classified as “appropriate”. A logistic regression model was developed to identify factors associated with a higher likelihood of inappropriate LSMRI, including gender, reporting of referred pain, health care setting (private/public), and specialty of the prescribing physician. Before performing the LSMRI, the radiologists also assessed the appropriateness of the prescription.

Eighty-eight percent of LSMRI were appropriate, 1.3% uncertain and 10.6% inappropriate. The agreement of radiologists' assessment with this classification was substantial (k=0.62). The odds that LSMRI prescriptions were inappropriate were higher for patients without referred pain [OR (CI 95%): 13.75 (6.72; 28.16)], seen in private practice [2.25 (1.20; 4.22)], by orthopedic surgeons, neurosurgeons or primary care physicians [2.50 (1.15; 5.56)].

The efficiency of LSMRI could be improved in routine practice, without worsening clinical outcomes [11].

Lumbar nerve root entrapment syndromes cause radicular signs and symptoms in the affected leg. The applicability of diffusion-weighted imaging (DWI) for the assessment of lower lumbar nerves (L4-S1) has been demonstrated.

In human lumbosacral spinal nerves (L1-S1), using diffusion-weighted magnetic resonance imaging techniques. 3 T ADC maps have a higher signal to noise ratio, thus offering better image quality. Results from this study suggest that DWI has added value as new diagnostic tools for patients with symptomatic lumbar nerve root entrapment syndromes as well [12].

1)
Airaksinen O, Brox JI, Cedraschi C, et al. European guidelines for the management of chronic nonspecific low back pain. European Spine Journal 2006;15(Suppl. 2):S192–300 [chapter 4].
2)
National Collaborating Centre for primary care low back pain: early management of persistent non-specific low back pain. Full guideline May 2009 http://www.nice.org.uk/cg88 [accessed 14.07.12].
3)
Chou R, Qaseem A, Owens DK, et al. Clinical Guidelines Committee of the American College of Physicians. Diagnostic imaging for low back pain: advice for high-value health care from the American College of Physicians. Annals of Internal Medicine 2011;154:181–9.
4)
Davis PC, Wippold II, Brunberg FJ, et al. ACR Appropriateness Criteria© on low back pain. Journal of the American College of Radiology 2009;6:401–7.
5)
Kovacs FM, Urrútia G, Alarcón JD. Surgery versus conservative treatment for symptomatic lumbar spinal stenosis. A systematic review of randomized controlled trials. Spine 2011;36:E1335–51.
6)
Deyo RA, Mirza SK, Turner JA, et al. Overtreating chronic back pain: time to back off? Journal of the American Board of Family Medicine 2009;22: 62–8.
7)
Lehnert BE, Bree RL. Analysis of appropriateness of outpatient CT and MRI referred from primary care clinics at an academic medical center: how critical is the need for improved decision support? Journal of the American College of Radiology 2010;7:192–7.
8)
RodríguezRecioF,SanzJC,PeiróS,etal.Utilizacióninapropiadadelaresonancia magnética lumbar en un área de salud. Radiología 1999;41:553–6.
9)
Guiral Eslava J, Gracia Gutiérrez N, Vigil Escribano D. Adecuación de la solicitud de la resonancia magnética en el Servicio de Cirugía Ortopédica y Traumatología del Hospital General de Segovia, durante el an˜o 2000. Revista de Ortopedia y Traumatología 2003;47:170–4.
10)
Dybvik V, Hermansen E, Banitalebi H, Myklebust TÅ, Indrekvam K. Is Repeated Preoperative Magnetic Resonance Imaging Necessary Before Planned Decompressive Surgery for Lumbar Spinal Stenosis? Int J Spine Surg. 2023 Mar 24:8469. doi: 10.14444/8469. Epub ahead of print. PMID: 36963810.
11)

Kovacs FM, Arana E, Royuela A, Cabrera A, Casillas C, Piñero P, Vega M, Asenjo B, Estremera A, Amengual G, Sarasíbar H, Ferrer P, Manjarrés A, Zamarro J, Bravo-Rodríguez F, Paniagua JC, Mota J, Sánchez-Sagrado T, Abraira V, Martínez C. Appropriateness of lumbar spine magnetic resonance imaging in Spain. Eur J Radiol. 2013 Jun;82(6):1008-14. doi: 10.1016/j.ejrad.2013.01.017. Epub 2013 Feb 16. PubMed PMID: 23422282.

12)

Reinhold M, Ederer C, Henninger B, Eberwein A, Kremser C. Diffusion-weighted magnetic resonance imaging for the diagnosis of patients with lumbar nerve root entrapment syndromes: results from a pilot study. Eur Spine J. 2014 Oct 9. [Epub ahead of print] PubMed PMID: 25297703.