



CADTH Reference List

Low-Field Magnetic Resonance Imaging for Musculoskeletal Imaging

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Key Messages

- We found no studies about the clinical utility of low-field MRI systems for adults requiring musculoskeletal imaging.
- We found no studies about the cost-effectiveness of low-field MRI systems for adults requiring musculoskeletal imaging.
- We found no evidence-based guidelines for the use of low-field MRI systems for adults requiring musculoskeletal imaging.
- We identified other references on this topic that may be of interest, which are listed in the appendix.

Research Questions

1. What is the clinical utility of low-field MRI systems for the adults requiring musculoskeletal imaging?
2. What is the cost-effectiveness of low-field MRI systems for adults requiring musculoskeletal imaging?
3. What are the evidence-based guidelines for the use of low-field MRI systems for adults requiring musculoskeletal imaging?

Methods

Literature Search Methods

An information specialist conducted a literature search on key resources including MEDLINE, the Cochrane Database of Systematic Reviews, the International HTA Database, the websites of Canadian and major international health technology agencies, as well as a focused internet search. The search approach was customized to retrieve a limited set of results, balancing comprehensiveness with relevancy. The search strategy comprised both controlled vocabulary, such as the National Library of Medicine's MeSH (Medical Subject Headings), and keywords. Search concepts were developed based on the elements of the research questions and selection criteria. The main search concept was low-field MRI systems. Comments, newspaper articles, editorials, and letters were excluded. The search was completed on March 21, 2023, and limited to English-language documents published since January 1, 2018. Internet links were provided, where available.

Selection Criteria and Summary Methods

One reviewer screened literature search results (titles and abstracts) and selected publications according to the inclusion criteria presented in [Table 1](#). Full texts of study publications were not reviewed. The Overall Summary of Findings was based on information available in the abstracts of selected publications. Open access full-text versions of evidence-based guidelines were reviewed when available, and relevant recommendations were summarized.



Table I: Selection Criteria

Criteria	Description
Population	Adults (any age) requiring MRI for musculoskeletal extremity imaging
Intervention	Low-field MRI (< 1.0 T)
Comparator	Q1 and Q2: High field MRI (> 1.0 T), X-ray systems Q3: Not applicable
Outcomes	Q1: Clinical utility (e.g., time to treatment, diagnostic accuracy, morbidity, incidence of disease, mortality, quality of life) Q2: Cost-effectiveness (e.g., cost per quality-adjusted life-year gained, incremental cost-effectiveness ratio) Q3: Recommendations regarding best practices for the use of low-field MRI systems for musculoskeletal imaging (e.g., appropriate use, patient populations)
Study designs	Health technology assessments, systematic reviews, randomized controlled trials, nonrandomized studies, economic evaluations, evidence-based guidelines

Results

No relevant health technology assessments, systematic reviews, randomized controlled trials, nonrandomized studies, or economic evaluations were identified regarding the clinical utility and cost-effectiveness of low-field MRI systems for adults requiring musculoskeletal imaging. Additionally, no evidence-based guidelines for the use of low-field MRI systems for adults requiring musculoskeletal imaging were identified.

References of potential interest that did not meet the inclusion criteria are provided in [Appendix 1](#).

Overall Summary of Findings

No relevant literature was found regarding the clinical utility and cost-effectiveness of low-field MRIs for adults requiring musculoskeletal imaging. Additionally, no relevant evidence-based guidelines for the use of low-field MRI systems for adults requiring musculoskeletal imaging were found; therefore, no summary can be provided.



References

Health Technology Assessments

No literature identified.

Systematic Reviews

No literature identified.

Randomized Controlled Trials

No literature identified.

Non-Randomized Studies

No literature identified.

Economic Evaluations

No literature identified.

Guidelines and Recommendations

No literature identified.



Appendix 1: References of Potential Interest

Systematic Reviews

Unclear Population Age

Liu F, Dong J, Shen WJ, Kang Q, Zhou D, Xiong F. Detecting rotator cuff tears: A network meta-analysis of 144 diagnostic studies. *Orthop J Sports Med.* 2020;8(2):2325967119900356. [PubMed](#)

Non-Randomized Studies

Alternative Outcomes

Rusche T, Vosschenrich J, Winkel DJ, et al. More space, less noise-new-generation low-field magnetic resonance imaging systems can improve patient comfort: A prospective 0.55T-1.5T-scanner comparison. *J Clin Med.* 2022;11(22):6705. [PubMed](#)

Schmidt AM, Stockton DJ, Hunt MA, Yung A, Masri BA, Wilson DR. Reliability of tibiofemoral contact area and centroid location in upright, open MRI. *BMC Musculoskelet Disord.* 2020;21(1):795. [PubMed](#)

Alternative Population

Breit HC, Vosschenrich J, Hofmann V, et al. Image quality of lumbar spine imaging at 0.55T low-field MRI is comparable to conventional 1.5T MRI - initial observations in healthy volunteers. *Acad Radiol.* 2023;23:23. [PubMed](#)

Lopez Schmidt I, Haag N, Shahzadi I, et al. Diagnostic image quality of a low-field (0.55T) knee MRI protocol using deep learning image reconstruction compared with a standard (1.5T) knee MRI protocol. *J Clin Med.* 2023;12(5):1916. [PubMed](#)

Yin Q, Manoliu RA, Kichari JR, Ritt M. Using an office-based, dedicated extremity MRI scanner for depicting important structures in common wrist pathologies: A pilot comparison with a conventional MRI scanner. *J Wrist Surg.* 2021;10(1):84-92. [PubMed](#)

Alternative Comparator

Schroder FF, Post CE, van Raak SM, et al. The diagnostic potential of low-field MRI in problematic total knee arthroplasties - a feasibility study. *J Exp Orthop.* 2020;7(1):59. [PubMed](#)

Leigheb M, Guzzardi G, Barini M, et al. Role of low field MRI in detecting knee lesions. *Acta Biomed.* 2018;90(1-S):116-122. [PubMed](#)

Review Articles

Fritz J, Runge VM. Scientific advances and technical innovations in musculoskeletal radiology. *Invest Radiol.* 2023;58(1):1-2. [PubMed](#)

Khodarahmi I, Keerthivasan MB, Brinkmann IM, Grodzki D, Fritz J. Modern low-field MRI of the musculoskeletal system: Practice considerations, opportunities, and challenges. *Invest Radiol.* 2023;58(1):76-87. [PubMed](#)

Kijowski R, Fritz J. Emerging technology in musculoskeletal MRI and CT. *Radiology.* 2023;306(1):6-19. [PubMed](#)

Additional References

Clinical Policy Bulletin

Aetna. Medical clinical policy bulletins: Open air, low field strength, and positional magnetic resonance imaging (MRI) units. 2023; https://www.aetna.com/cpb/medical/data/1_99/0093.html. Accessed 2023 Mar 23.