

Annotated Bibliography

Elahi, R., Taremi, S., Najafi, A., Karimi, H., Asadollahzadeh, E., Sajedi, S. A., Rad, A. S., & Sahraian, M. A. (2025). Advanced MRI methods for diagnosis and monitoring of multiple sclerosis (MS). *Journal of Magnetic Resonance Imaging*, 62(6), 1546-1578. <https://doi.org/10.1002/jmri.29817>

This review examines advanced MRI techniques used in diagnosing and monitoring multiple sclerosis. It describes standard MRI sequences as well as newer imaging methods and quantitative biomarkers that improve lesion detection and disease tracking. The article also discusses emerging technologies such as machine learning tools and highlights future directions for research and clinical applications.

Strengths of this article include its comprehensive scope and strong clinical focus, which directly supports the understanding of MRI's role in MS. Another strength is the discussion of both current and emerging technologies. Weaknesses include limited statistics between techniques and discussion of methods not being widely available. This source is relevant because it explains modern MRI tools used for diagnosis and follow-up.

Filippi, M., Preziosa, P., Arnold, D. L., Barkhof, F., Harrison, D. M., Maggi, P., Mainero, C., Montalban, X., Sechi, E., Weinshenker, B. G., & Rocca, M. A. (2023). Present and future of the diagnostic work-up of multiple sclerosis: The imaging perspective. *Journal of Neurology*, 270, 1286-1299. <https://doi.org/10.1007/s00415-022-11488-y>

This article reviews MRI's role in diagnosing multiple sclerosis. It describes current diagnostic guidelines and shows how imaging confirms disease activity. It also discusses possible future imaging tools that could improve diagnosis accuracy.

A strength of this article is that it is written by experts in MS. Another strength is its clear explanation of how MRI helps with diagnosis. One weakness is that it focuses mostly on diagnosis and less on follow-up imaging. Another weakness is that some of these technical terms are difficult to understand. This article is useful because it explains MRI's role in the diagnostic process.

McGinley, M. P., Goldschmidt, C. H., & Rae-Grant, A. D. (2021). Diagnosis and treatment of multiple sclerosis: A review. *JAMA*, 325(8), 765-779.

<https://doi.org/10.1001/jama.2020.26858>

This review gives an overview of multiple sclerosis, including symptoms, diagnosis, and treatment options. It also explains how doctors diagnose MS using clinical exams and tests such as MRI. It also summarizes medications and treatments used to slow disease progression and manage symptoms.

One strength is that it is published in a medical journal. Another strength is that it clearly explains MS care. One weakness is that it does not discuss MRI techniques in depth. Another weakness is that imaging is only a small part of the article. This source is helpful because it shows how MRI fits into overall MS diagnosis and treatment.

Mendelsohn, Z., Pemberton, H. G., Gray, J., Goodkin, O., Carrasco, F. P., Schneel, M., Nawabi, J., & Barkhof, F. (2023). Commercial volumetric MRI reporting tools in multiple sclerosis: A systematic review of the evidence. *Neuroradiology*, 65, 5-24.

<https://doi.org/10.1007/s00234-022-03074-w>

This article reviews software programs that measure brain volume and lesion size on MRI scans for MS patients. These tools help doctors track disease progression more

accurately. The authors analyze research studies to see how reliable and useful these programs are.

One strength is that it focuses on objective measurements instead of visual estimates.

Another strength is that it reviews many studies instead of just one. One weakness is that not all software tools are available in every clinic. Another is that results depend on the quality of the studies reviewed. This article is important because it shows how MRI can measure disease changes over time.

Ramli, N., Rahmat, K., Azmi, K., & Chong, H. T. (2009). The past, present and future of imaging in multiple sclerosis. *Journal of Clinical Neuroscience*, 17(4), 422-427.
<https://doi.org/10.1016/j.jocn.2009.09.014>

This article explains how imaging for MS has changed over time. It describes early imaging methods and how MRI became the main tool used today. It also discusses future imaging possibilities.

One strength is that it provides helpful historic background information. Another strength is that it explains imaging progress clearly. One weakness is that it is older and does not include recent advances. Another is that some predictions are now outdated. This article is helpful because it explains how MRI became important in MS diagnosis.

Rocca, M. A., Margoni, M., Battaglini, M., Eshaghi, A., Iliff, J., Pagani, E., Preziosa, P., Storelli, L., Taoka, T., Valsasina, P., & Filippi, M. (2023). Emerging perspectives on MRI applications in multiple sclerosis: Moving from pathophysiology to clinical practice. *Radiology*, 307, 5. <https://doi.org/10.1148/radiol.221512>

This article discusses new MRI methods and how they relate to what happens in the body during MS. It explains how imaging findings connect to disease processes and how MRI may help guide treatment decisions in the future.

One strength is that it connects imaging results with disease biology. Another strength is that it discusses future clinical uses. One weakness is that it uses advanced scientific language. Another is that it does not present original patient data. This article is relevant because it explains why MRI findings matter medically.

Rocca, M. A., Preziosa, P., Barkhof, F., Brownlee, W., Calabrese, M., Stefano, N. D., Graziera, C., Ropele, S., Toosy, A. T., Vidal-Jordana, A., Flippo, M. D., & Filippi, M. (2024).

Current and future role of MRI in the diagnosis and prognosis of multiple sclerosis. *The Lancet Regional Health*, 44, 100978. <https://doi.org/10.1016/j.lanepe.2024.100978>

This article explains how MRI is used to diagnose and monitor MS. The authors also describe how newer MRI methods may improve early diagnosis and prediction of MS progression. Future tools like artificial intelligence and automated quantification may make MRI analysis more accurate and efficient.

One strength is that this article is clearly written by experts. Another strength is that it explains how MRI is used in MS and includes future advancements. One weakness is that it does not include original patient data. Another weakness is that some of the information is not very detailed.

Rollins, J. H., Long, B. W., & Curtis, T. (2022). *Merrill's atlas of radiographic positioning and procedures* (15th ed., Vol. 2). Mosby.

This textbook explains imaging procedures and positioning techniques used in radiology. It describes safety practices and step-by-step imaging instructions.

One strength is that it provides clear technical guidance. Another strength is that it is widely used in radiology education. One weakness is that it does not focus specifically on MS. Another is that it is instructional rather than research-based. This source is useful because it explains how MRI scans are actually performed.

Wang, L. Y., Wang, W. F., Hui, S. Y., Yang, L., Liu, Y. X., & Li, H. J. (2025). Emerging epidemiological trends of multiple sclerosis among adults aged 20-54 years, 1990-2021, with projections to 2035: A systematic analysis for the global burden of disease study 2021. *Frontiers in Neurology, 16*, Article 1616245.

<https://doi.org/10.3389/fneur.2025.1616245>

This study analyzes global MS data from 1990 to 2021 and predicts future trends. It reports rates of cases, death, and disability across regions and age groups. The study shows that MS burden has increased over time.

One strength is that it uses a very large dataset. Another strength is that it compares trends over many years. One weakness is that it does not discuss MRI. Another is that future predictions may change. This source is helpful because it provides statistics showing why early diagnosis and monitoring are important.