

DIAGNOSTIC ACCURACY OF WHOLE-BODY MRI VS FDG PET-CT IN MULTIPLE MYELOMA STAGING AND RESPONSE ASSESSMENT: A HEAD-TO-HEAD SYSTEMATIC REVIEW AND META-ANALYSIS

Basil Joy¹, Ashil Mullath², Hira Javed³, Ajina Joy¹
1 Government Medical College Kozhikode, Kozhikode, India
2 Petre Shotadze Tbilisi Medical Academy, Tbilisi, Georgia
3 Dow University of Health Sciences, Karachi, Pakistan



INTRODUCTION

MM management relies critically on accurate imaging for staging and treatment response assessment. The IMWG recommends both whole-body MRI and FDG PET-CT without establishing superiority. No meta-analysis has formally compared their diagnostic accuracy head-to-head across both clinical contexts

AIM

This systematic review and meta-analysis aims to conduct a head-to-head comparison of the diagnostic accuracy of whole-body MRI versus FDG PET-CT for staging and response assessment in patients with multiple myeloma

METHOD

We conducted a systematic review and meta-analysis following PRISMA-DTA guidelines. Four databases (MED LINE, Embase, Cochrane CENTRAL, Web of Science) were searched from 2005 to May 2026. Eligible studies were prospective or retrospective observational cohorts reporting sensitivity and/or specificity of whole-body MRI and/or FDG PET-CT in adults with confirmed MM or high-risk smoldering MM, using bone marrow biopsy, next-generation flow cytometry MRD, or IMWG clinical composite as the reference standard. Pooled sensitivity and specificity were estimated using a bivariate random-effects model. SROC curves and diagnostic odds ratios were generated. Head-to-head comparisons in paired-design studies used paired t tests on logit-transformed accuracy estimates. MRD concordance was quantified by pooled κ using inverse-variance weighting. Risk of bias was assessed with QUADAS-2 and certainty of evidence graded using GRADE.

CONCLUSIONS

Whole-body MRI is superior for detecting bone marrow involvement at staging, while FDG PET-CT offers higher specificity for confirming remission posttreatment. The complementary trade-off in diagnostic performance supports context-differentiated use of both modalities rather than substitution, with dual imaging MRD negativity defining the most favorable prognostic subgroup. These findings provide the first pooled quantitative basis for refining IMWG imaging recommendations. AUC: area under the curve; CI: confidence interval; FDG PET-CT: fluorodeoxyglucose positron emission tomography–computed tomography; GRADE: Grading of Recommendations, Assessment, Development, and Evaluation; IMWG: International Myeloma Working Group; MM: multiple myeloma; MRD: minimal residual disease; MRI: magnetic resonance imaging; PRISMA-DTA: Preferred Reporting Items for Systematic Reviews and Meta Analyses Diagnostic Test Accuracy; QUADAS-2: Quality Assessment of Diagnostic Accuracy Studies-2; rDOR: relative diagnostic odds ratio; SROC: summary receiver operating characteristic

RESULTS

Thirty-three studies (48 modality arms; approximately 2800 patients) were included: 18 staging and 15 response assessment studies. At staging, whole-body MRI demonstrated significantly higher sensitivity than FDG PET-CT (93.5% [95% CI, 91.1%–95.3%] vs 74.8% [95% CI, 68.0%–80.6%]; Δ, +16.6 percentage points; P <0.001), with comparable specificity (55.8% vs 60.2%; P =0.63). At response assessment, whole-body MRI retained higher sensitivity (90.5% vs 67.7%; P <0.001), while FDG PET-CT demonstrated significantly higher specificity (84.8% [95% CI, 79.3%–89.0%] vs 62.5% [95% CI, 49.6%–73.7%]; P =0.0003). Overall SROC AUC favored whole-body MRI (0.806 vs 0.717; rDOR, 2.68 [95% CI, 1.40–5.14]). Neither modality showed adequate concordance with MRD status (pooled κ , 0.44 [95% CI, 0.39–0.49]).

ACKNOWLEDGEMENTS

Nil

CONTACT INFORMATION

Email: docbasiljoy@gmail.com