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Arterial spin labeling and amide proton transfer imaging can differentiate glioblastoma from brain metastasis: a systematic review and meta-analysis

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Abstract

Background: Currently, arterial spin labeling (ASL) and amide proton transfer (APT) imaging have shown potential for distinguishing glioblastoma (GBM) from brain metastases. Thus, a meta-analysis was conducted to investigate this further.

Methods: An extensive and comprehensive search was conducted in six English and Chinese databases according to predefined inclusion and exclusion criteria, encompassing data up to July 2023. Data from eligible literature were extracted, and bivariate models were employed to calculate pooled sensitivities, specificity, positive likelihood ratio (PLR), negative likelihood ratio (NLR), diagnostic odds ratio (DOR), and area under the curve (AUC) of the summary receiver operating characteristic curve.

Results: The meta-analysis included eleven articles. For ASL, the pooled sensitivity was 0.77 (95% CI 0.63-0.87), and the pooled specificity was 0.87 (95% CI 0.77-0.93). The pooled PLR was 5.89 (95% CI 2.97-11.69), the pooled NLR was 0.26 (95% CI 0.15-0.47), the pooled DOR was 22.33 (95% CI 6.89-72.34), and AUC was 0.90 (95% CI 0.87-0.92). For APT imaging, the pooled sensitivity was 0.78 (95% CI 0.70-0.85), and the pooled specificity was 0.86 (95% CI 0.77-0.92). The pooled PLR was 5.51 (95% CI 3.24-9.37), the pooled NLR was 0.25 (95% CI 0.17-0.37), the pooled DOR was 21.99 (95% CI 10.28-47.03), and the AUC was 0.90 (95% CI 0.87-0.92).

Conclusions: This meta-analysis suggest that both ASL and APT imaging exhibit high accuracy in distinguishing between GBM and brain metastasis.

Keywords: Amide proton transfer; Arterial spin labeling; Brain metastases; Glioblastoma; Meta-analysis.