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Diffusion tensor imaging in detecting gliomas sub-regions of infiltration, local and remote recurrences: a systematic review

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Abstract

Given that glioma cells tend to infiltrate and migrate along WM tracts, leading to demyelination and axonal injuries, Diffusion Tensor Imaging (DTI) emerged as a promising tool for identifying major "high-risk areas" of recurrence within the peritumoral brain zone (PBZ) or at a distance throughout the adjacent white matter tracts. Of our systematic review is to answer the following research question: In patients with brain tumor, is DTI able to recognize within the peri-tumoral brain zone (PBZ) areas more prone to local (near the surgical cavity) or remote recurrence compared to the conventional imaging techniques?. We conducted a comprehensive literature search to identify relevant studies in line with the PRISMA-P (Preferred Reporting Items for Systematic Review and Meta-Analysis Protocols) guidelines. 15 papers were deemed compatible with our research question and included. To enhance the paper's readability, we have categorized our findings into two distinct groups: the first delves into the role of DTI in detecting PBZ sub-regions of infiltration and local recurrences (n = 8), while the second group explores the feasibility of DTI in detecting white matter tract infiltration and remote recurrences (n = 7). DTI values and, within a broader framework, radiomics investigations can provide precise, voxel-by-voxel insights into the state of PBZ and recurrences. Better defining the regions at risk for potential recurrence within the PBZ and along WM bundles will allow targeted therapy.

Keywords: DTI; Glioma; Recurrences.

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