

Hippocampal avoidance whole brain radiation

Among patients with brain metastases, hippocampal avoidance whole brain radiation (HA-WBRT) preserves neurocognitive function relative to conventional WBRT but the feasibility of hippocampal sparing in patients with metastases in/near the hippocampus is unknown. We identified the incidence of hippocampal/perihippocampal metastases and evaluated the feasibility of HA-WBRT in such patients.

Materials/methods: Dosimetric data from 34 patients randomized to HA-WBRT (30 Gy/10 fractions) in a phase III trial (NCT03075072) comparing HA-WBRT to stereotactic radiation in patients with 5 to 20 brain metastases were analyzed. Patients with metastases in/near the hippocampi received HA-WBRT with prioritization of tumor coverage over hippocampal avoidance. Target coverage and hippocampal sparing metrics were compared between patients with targets in/near the hippocampus versus not.

Results: In total, 9 of 34 (26%) patients had targets in the hippocampus and an additional 5 of 34 (15%) patients had targets in the hippocampal avoidance zone (HAZ, hippocampus plus 5 mm expansion) but outside the hippocampus. Patients with targets within the hippocampus and those with targets in the HAZ but outside the hippocampus were spared 34% and 73% of the ipsilateral mean biologically equivalent prescription dose, respectively. Of the latter cohort, 88% and 25% met conventional hippocampal sparing metrics of $D_{min} \leq 9$ Gy and $D_{max} \leq 16$ Gy, respectively. Among 11 patients with unilateral hippocampal/perihippocampal involvement, the uninvolved/contralateral hippocampus was limited to $D_{min} \leq 9$ Gy and $D_{max} \leq 17$ Gy in all cases.

Conclusions: In this study, a substantial percentage of patients with 5 to 20 brain metastases harbored metastases in/near the hippocampus. In such cases, minimizing hippocampal dose while providing tumor coverage was feasible and may translate to neurocognitive protection ¹⁾.

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Lee G, Besse L, Lamba N, Hancox C, Usta I, Hacker F, Catalano P, Brown PD, Tanguturi S, Pashtan I, Phillips J, Haas-Kogan D, Alexander B, Cagney D, Aizer A. Feasibility of hippocampal avoidance whole brain radiation in patients with hippocampal involvement: Data from a prospective study. *Med Dosim*. 2020 Aug 7;S0958-3947(20)30105-9. doi: 10.1016/j.meddos.2020.06.004. Epub ahead of print. PMID: 32778521.

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