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Risk of developing glioblastoma following non-CNS primary cancer: a SEER analysis between 2000 and 2018

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Abstract

Background: Patients with a prior malignancy are at elevated risk of developing subsequent primary malignancies (SPMs). However, the risk of developing subsequent primary glioblastoma (SPGBM) in patients with a prior cancer history is poorly understood.

Methods: We used the Surveillance, Epidemiology, and End Results (SEER) database and identified patients diagnosed with non-CNS malignancy between 2000 and 2018. We calculated a modified standardized incidence ratio (M-SIR), defined as the ratio of the incidence of SPGBM among patients with initial non-CNS malignancy to the incidence of GBM in the general population, stratified by sex latency, and initial tumor location.

Results: Of the 5,326,172 patients diagnosed with a primary non-CNS malignancy, 3559 patients developed SPGBM (0.07%). Among patients with SPGBM, 2312 (65.0%) were men, compared to 2,706,933 (50.8%) men in the total primary non-CNS malignancy cohort. The median age at diagnosis of SPGBM was 65 years. The mean latency between a prior non-CNS malignancy and developing a SPGBM was 67.3 months (interquartile range [IQR] 27-100). Overall, patients with a primary non-CNS malignancy had a significantly elevated M-SIR (1.13, 95% CI 1.09-1.16), with a 13% increased incidence of SPGBM when compared to the incidence of developing GBM in the age-matched general population. When stratified by non-CNS tumor location, patients diagnosed with primary melanoma, lymphoma, prostate, breast, renal, or endocrine malignancies had a higher M-SIR (M-SIR ranges: 1.09-2.15). Patients with lung cancers (M-SIR 0.82, 95% CI 0.68-0.99), or stomach cancers (M-SIR 0.47, 95% CI 0.24-0.82) demonstrated a lower M-SIR.

Conclusion: Patients with a history of prior non-CNS malignancy are at an overall increased risk of developing SPGBM relative to the incidence of developing GBM in the general population. However, the incidence of SPGBM after prior non-CNS malignancy varies by primary tumor location, with some non-CNS malignancies demonstrating either increased or decreased predisposition for SPGBM depending on tumor origin. These findings merit future investigation into whether these relationships represent treatment effects or a previously unknown shared predisposition for glioblastoma and non-CNS malignancy.

Keywords: CNS; Cancer; Glioblastoma; Malignancy; SEER.