Familiality in brain tumors

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Background: Familiality in brain tumors is not definitively substantiated.

Methods: We used the Utah Population Data Base (UPDB), a genealogy representing the Utah pioneers and their descendants, record-linked to statewide cancer records, to describe the familial nature of primary brain cancer. We examined the familial clustering of primary brain tumors, including subgroups defined by histologic type and age at diagnosis. The UPDB includes 1,401 primary brain tumor cases defined as astrocytoma or glioblastoma, all with at least three generations of genealogy data. We tested the hypothesis of excess relatedness of brain tumor cases using the Genealogical Index of Familiality method. We estimated relative risks for brain tumors in relatives using rates of brain tumors estimated internally.

Results: Significant excess relatedness was observed for astrocytomas and glioblastomas considered as a group (n = 1,401), for astrocytomas considered separately (n = 744), but not for glioblastomas considered separately (n = 658). Significantly increased risks to first- and second-degree relatives for astrocytomas were identified for relatives of astrocytomas considered separately. Significantly increased risks to first-degree relatives, but not second degree, were observed for astrocytoma and glioblastoma cases considered together, and for glioblastoma cases considered separately.

Conclusions: This study provides strong evidence for a familial contribution to primary brain cancer risk. There is evidence that this familial aspect includes not only shared environment, but also a heritable component. Extended high-risk brain tumor pedigrees identified in the UPDB may provide the opportunity to identify predisposition genes responsible for familial brain tumors.

Abbreviations: GBM = glioblastoma; GIF = Genealogical Index of Familiality; HGG = high-grade gliomas; ICD-O = International Classification of Disease–Oncology; LGG = low-grade gliomas; RR = relative risks; SEER = Surveillance, Epidemiology, and End Results; SIR = standardized incidence
ratios; **UCR** = Utah Cancer Registry; **UPDB** = Utah Population Data Base.

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