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Complete resection of high-grade brain cancer yields better survival in children—especially girls

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For children with aggressive brain cancers called high-grade gliomas (HGG), the chances of survival are improved when surgery is successful in eliminating all visible cancer, reports a study in the September issue of *Neurosurgery*, official journal of the Congress of Neurological Surgeons.

In addition to showing better survival with gross total resection (GTR) for children with HGG, the results suggest that this survival benefit is greater in girls compared to boys with HGG. The study provides "compelling evidence that GTR is even more critical in female patients," write Jeffrey P. Greenfield, Associate Professor of Neurological Surgery at Weill Cornell Medical College, New York, and colleagues.

Completeness of Surgery Affects Survival in Children with High-Grade Glioma

The researchers analyzed 97 children, median age 11 years, treated for HGG between 1988 and 2010. High-grade pediatric gliomas are serious but uncommon brain tumors, occurring at a rate of less than 1 in 100,000 children and adolescents.

Reflecting the poor prognosis of these aggressive brain cancers, the children had high rates of recurrent or progressive cancer and a substantial mortality rate. The two-year survival rate was 45 percent, while the rate of survival with no cancer progression was 25 percent.

Gross total resection—complete removal of all visible tumor tissue—was achieved for one-third of the children. Children with GTR had significantly better overall survival: median 3.4 years, compared to 1.6 years for those with partial (subtotal) resection.

In addition, the improvement in survival with complete resection differed by sex. Median overall survival was 8.1 years for girls versus 2.4 years for boys with GTR. When GTR wasn't achieved, median survival was 1.4 years for both boys and girls.

Survival was also affected by the tumor's location in the brain, but was similar for patients with different cellular types of HGG. Gross total resection improved the chances of survival free of recurrent or progressive cancer only in children with one specific subtype (glioblastoma multiforme).

High-grade gliomas make up about 30 percent of brain tumors in adults, compared with eight to 12 percent in children. Neurosurgeons previously believed that the factors affecting outcomes were similar for all age groups. But recent genetic studies have shown "clear distinctions" between pediatric and adult HGG—highlighting the need for research to see how differences in glioma-related mutations affect the clinical behavior of the disease.

While GTR is already the standard of care, the study re-emphasizes the importance of removing all visible tumor to improve survival for children with HGG. "In addition," Dr. Greenfield and coauthors write, "we found that the benefit of a GTR appears to be much greater for female patients than for male patients."

Based on this finding, "*t may be even more critical to achieve GTR in female patients and that there may be differences between the biology of tumors in male and* female patients*," the researchers add. Emphasis is*

currently directed towards studies exploring the impact of different genetic and molecular subtypes, particularly with respect to understanding the potential impact of sex-chromosome, or gender-related gene expression patterns—differences that may help clarify this discrepancy in survival rates for boys and girls with HGG.

More information: "Sex, Age, Anatomic Location, and Extent of Resection Influence Outcomes in Children With High-grade Glioma" DOI: 10.1227/NEU.0000000000000845

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