

Long-term Outcomes Among Survivors of Childhood Central Nervous System Tumors: A Report From the Childhood Cancer Survivor Study

Gregory T. Armstrong, MD, MSCE¹, Kirsten K. Ness, PhD¹, John Whitton², Wendy Leisenring PhD², Qi Liu³, Yutaka Yasui, PhD³, Lonnie Zeltzer⁴, MD, Sarah S. Donaldson, MD⁵, Melissa Hudson, MD, Leslie L. Robison, PhD¹, Roger Packer⁶, MD

¹St. Jude Children's Research Hospital, Memphis, TN; ²Fred Hutchinson Cancer Research Center, Seattle, WA; ³University of Alberta, Edmonton, AB Canada; David Geffen School of Medicine at UCLA, Los Angeles, California CA; ⁵Stanford University School of Medicine, Stanford CA; ⁶Children's National Medical Center, Washington, D.C.

Corresponding Author: Gregory T. Armstrong, Department of Epidemiology and Cancer Control, St. Jude Children's Research Hospital, 332 N. Lauderdale Street, Mail Stop 735, Memphis, TN; Phone: 901-495-5892, Fax: 901-495-5845, Email: greg.armstrong@stjude.org

ABSTRACT

Purpose

To improve survival in childhood CNS tumors aggressive surgical intervention, radiotherapy, and chemotherapy have been employed. Long-term survivors are at risk for a broad array of late-effects secondary to tumor location and/or therapeutic interventions.

Patients and Methods

Analysis included 1,538 5-yr survivors of childhood CNS tumors (including 1,035 with Astrocytoma [AST], 306 Medulloblastoma/PNET [M/PNET], 115 Ependymoma [EP], and 82 Others). Patients, diagnosed 1970-86, had a median follow-up of 22.1 yrs (range 16.1-34.6). Outcomes of mortality, second malignant neoplasm (SMN), health status, education, employment, insurance, and marital status were assessed to determine risk associated with tumor type and treatment modality including region-specific cumulative radiation (RT) dose to the CNS.

Results

307 deaths >5 yrs after diagnosis resulted in a cumulative late mortality rate of 18.2% (95% confidence interval [CI] 16.1-20.3) at 25 yrs (EP 23.3%; M/PNET 19.0%; AST 17.3%). Standardized mortality ratios were 13.5 (95% CI 9.2-19.1) for EP; 13.1 (95% CI 10.2-16.6) for M/PNET; and 9.8 (95% CI 8.5-11.3) for AST. Late disease recurrence (n=188) and SMN (n=37) represented the most common causes of death. Cumulative incidence of SMN was 2.7% (95% CI 1.9-3.4) at 20 yrs. RT was associated with a two-fold risk of SMN (odds ratio [OR]=2.0, 95% CI 0.95-4.3). Adverse health status was reported by 57%. Treatment with RT or chemotherapy (vs Surgery only) was associated with an increased risk of severe impairment in general health (OR=2.8, p<0.001), functional status (OR=2.2, p<0.001), and activity level (OR=2.1, p<0.001). Exposure of >30Gy to any CNS region was associated with statistically significant (P<0.01) lower rates for educational attainment, marriage, employment, and personal income while exposure to <30Gy resulted in similar rates to non-irradiated patients for all outcomes.

Conclusion

Survivors of childhood CNS experience substantial long-term adverse effects of therapy and are a high priority group for intervention strategies.

Preferred Format: Presentation
Abstract Category: Other