

International Stroke Conference Abstract (total of 2,250 characters if figure included and including title)

Radiation and modifiable Stroke Risk Factors in adult Survivors of Pediatric Cancer: Results from the Childhood Cancer Survivor Study

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Background: Radiation therapy has vascular sequelae including moyamoya (brain radiation), and accelerated cervical atherosclerosis (neck radiation). However, the impact of cranial radiation therapy (CRT) and modifiable stroke risk factors such as hypertension (HTN) on stroke risk in adulthood remains poorly understood.

Objective: To assess long-term incidence rates and risk factors for stroke in survivors of childhood cancer followed by the Childhood Cancer Survivor Study (CCSS).

Methods: CCSS is a multi-institutional longitudinal cohort study of 14,358 survivors of childhood cancer diagnosed between 1970 and 1986, and 4,023 randomly selected sibling controls. The age-adjusted incidence rates of self-reported late-occurring first-stroke (≥ 5 years after cancer diagnosis) were calculated for survivors compared to siblings. Multivariable Cox Proportional Hazards models were used to identify independent stroke predictors.

Results: During a mean follow-up of 23.3 years, 292 survivors reported a late-occurring stroke of which 125 (42.8%) occurred in CNS tumor survivors who constituted only (13%) of the survivor population. The age-adjusted stroke rate per 100,000 person-years at age 23 was 77 (95% CI 62 - 96) for all pediatric cancer survivors and 292 (95% CI 208-409) for CNS tumor survivors compared to 9.3 (95% CI 4 - 23) for siblings. CRT increased stroke risk in a dose dependent manner and cumulative incidence continues to rise decades after diagnosis (see Figure). Treatment with 30-49 Gy CRT had a relative stroke risk of 5.9 (95% CI 3.5-9.9) compared to 11.0 (95% CI 7.4-16.5) in the 50+ Gy CRT group. The cumulative incidence of stroke 20 years post diagnosis was 0.7% (95% CI 0.5 – 1.0) for no CRT, 2.9% (95% CI 1.4 – 4.4) for 30-49.9 Gy CRT, and 4.9% (95% CI 3.4–6.4) for ≥ 50 Gy CRT. HTN increased stroke risk by 4-fold. If diabetes was present together with HTN in CNS tumor survivors, the RR increased from 2.9 (95% C.I. 1.6–5.3) for HTN alone to 14.4 (95% CI 5.7 – 36.2).

Conclusion: Survivors of pediatric cancer treated with CRT have an increased stroke risk that is dose dependent and increases with age. Modifiable risk factors such as HTN and diabetes further increased this risk and should be monitored and treated aggressively in these survivors to reduce the risk of late-occurring stroke.

Cumulative Incidence of Stroke stratified by Maximum Radiation Dose to the Brain in Pediatric Cancer Survivors (n=14,358)

