

Prevalence and severity of chronic diseases in adult survivors of childhood cancer: A report from the Childhood Cancer Survivor Study

K. Oeffinger, A. Mertens, C. Sklar, T. Kawashima, M. Hudson, A. Meadows, N. Marina, N. Kadan-Lottick, W. Leisenring, L. Robison

Affiliations: University of Texas Southwestern Medical Center, Dallas, TX; University of Minnesota, Minneapolis, MN; Memorial Sloan Kettering Cancer Center, New York, NY; Fred Hutchinson Cancer Research Center, Seattle, WA; St. Jude Children's Research Hospital, Memphis, TN; University of Pennsylvania School of Medicine, Philadelphia, PA; Stanford University Medical Center, Palo Alto, CA; Yale University, New Haven, CT.

Background: Survivors of childhood cancer experience a variety of chronic diseases, defined as physical late effects with a potential for serious disability. This analysis was conducted to (a) determine the incidence of chronic diseases in adult survivors of childhood cancer and determine the relative risk compared to sibling controls.

Methods: The Childhood Cancer Survivor Study is a retrospective cohort study tracking health outcomes of long-term survivors (> 5 years) who were diagnosed 1970-1986 and a comparison group of siblings. The incidence of chronic diseases occurring in adult (\geq 18 years of age) survivors (N=10397) and siblings (N=3034) were calculated. A severity score, using the Common Terminology Criteria for Adverse Events, v3.0 (grades 1-4), were assigned to each chronic disease. For example, grade 4 diseases included: second malignant neoplasm (excluding non-melanoma skin and thyroid cancer), myocardial infarction or coronary artery bypass surgery, heart transplant, dialysis or kidney transplant, mental retardation requiring special education, and paralysis of an extremity. Cox proportional hazards models were used to estimate hazard ratios, reported as relative risks (RR) and 95% confidence interval (95% CI) of developing a chronic disease between survivors and siblings.

Results: Survivors were a mean age of 9.7 years at diagnosis and 26.7 (range, 18-48 years) at evaluation; siblings were 29.2 (range, 18-56 years) at evaluation. Eighty-five percent (8828/10397) of survivors had at least one chronic disease. The cumulative incidence of chronic disease at age 45 in survivors was: 57.1% grade 3 and 37.4% grade 4. In contrast, the cumulative incidence at age 45 in siblings was: 18.2% grade 3 and 4.6% grade 4. The relative risk of a survivor having a grade 3 or 4 chronic disease, adjusted for age at study and gender, was 4.5 (95% CI, 4.2-4.8) compared with siblings.

Conclusions: Chronic diseases are common following childhood cancer, with over one-third having a life-threatening illness or chronic disease by age 45. Interventions are needed to reduce the morbidity and mortality associated with long-term survivorship.