Long-Term Outcomes after Cancer in Infancy: A Report from the Childhood Cancer Survivor Study (CCSS)

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Background: Approximately 12% of pediatric cancer patients are diagnosed during the first year of life. Because of their developmental stage, survivors diagnosed in infancy represent a potentially vulnerable population.

Methods: Prevalence of adverse health status and chronic health conditions in CCSS participants diagnosed with cancer <1 year of age between 1970-86 were compared with the CCSS sibling-cohort (age at questionnaire-matched) and with survivors 1-1.99 years and 2-10 years of age at diagnosis, using univariate methods and multivariable regression models.

Results: 1,006 (7%) survivors were <1 year at diagnosis (mean age 15.7 years at questionnaire, range 5-28). Underlying diagnoses included neuroblastoma (52%), Wilms tumor (18%), leukemia (9%), sarcoma (9%), brain tumor (7%), NHL (1%), bone tumor (<1%). 26% reported $\geq$1 impaired health status domain. 53% reported $\geq$1 chronic condition, and 21% reported a severe or life-threatening condition (grade 3-4). Compared with siblings, survivors were at higher risk for adverse health status (Functional Status: OR 5.0, 95% confidence interval (CI)=3.1-7.9, p<0.0001; Activity Limitation: OR 3.4, 95% CI=2.2-5.2, p<0.0001), and chronic health conditions (severe or life-threatening condition: adjusted OR 16.2, 95% CI=10.1-26.1, p<0.0001). The infant-group was less likely to report $\geq$1 adverse health status domain compared with those diagnosed 1-1.99 years (OR 0.7, 95% CI=0.5-0.8) and 2-10 years (OR 0.7, 95% CI=0.6-0.9). Adjusting for sex, race, diagnosis, and age-at-questionnaire, there was no significant difference in the risk of a grade 3-4 chronic condition compared with survivors diagnosed 2-10 years of age (OR 1.21, CI=0.99-1.48).

Conclusion: Overall, survivors of cancer in infancy are at risk for adverse health status and chronic health conditions, but may not be at significantly greater risk than those diagnosed later in childhood. Newer survivor cohorts may reflect a different distribution of cancers in infancy.

Analyses are underway to address treatment-related factors which may modify risk in the infant-group.