LONG-TERM PSYCHOLOGICAL OUTCOMES IN SURVIVORS OF NEUROBLASTOMA: A REPORT FROM THE CHILDHOOD CANCER SURVIVOR STUDY

Authors: Daniel J. Zheng, BA[1]; Kevin R. Krull, PhD[2]; Yan Chen, MMath[3]; Lisa Diller, MD[4,5]; Yutaka Yasui, PhD[2]; Pim Brouwers, PhD[6]; Rebecca Howell, PhD[7]; Jin Shei Lai, PhD[8]; Lyn Balsamo, PhD[1,9]; Kevin C. Oeffinger, MD[10]; Leslie L. Robison, PhD[2]; Gregory T. Armstrong, MD MSCE[2]; Nina S. Kadan-Lottick, MD MSPH[1,9]

[1]Yale University School of Medicine, New Haven, CT
[2]St. Jude Children's Research Hospital, Memphis, TN
[3]School of Public Health, University of Alberta, Edmonton, Canada
[4]Dana-Farber/Boston Children's Cancer and Blood Disorders Center, Boston, MA
[5]Harvard Medical School, Boston, MA
[6]National Institute of Mental Health, National Institutes of Health, Bethesda, MD
[7]University of Texas MD Anderson Cancer Center, Houston, TX
[8]Feinberg School of Medicine, Northwestern University, Chicago, IL
[9]Yale Comprehensive Cancer Center, New Haven, CT
[10]Memorial Sloan Kettering Cancer Center, New York, NY

Corresponding Author:
Nina S. Kadan-Lottick, MD MSPH
Section of Pediatric Hematology-Oncology
Yale University School of Medicine, New Haven, CT
Phone: (203) 785-4640
Fax: (203) 737-2228
nina.kadan-lottick@yale.edu

Abstract category: Neuropsychological

Presentation: Oral presentation preferred

Abstract:

Purpose: To characterize long-term psychological outcomes in adolescent survivors of neuroblastoma and identify associated demographic characteristics, treatment exposures, and chronic health outcomes.

Design/Methods: 859 5+year survivors of neuroblastoma (diagnosed 1970-1999), median age at diagnosis 0.8 years (range 0.0–7.3), median follow-up 13.3 years (8.0–17.9) were compared to 872 siblings <18 years old with parental-reported Behavior Problem Index (BPI) for cognitive/behavioral functioning. Multivariable log-binomial regression models, adjusted for age and sex, were used to identify factors associated with impairment on the BPI domains (defined as scores worse than 10th% in sibling

control group) and history of special education. Impact of adolescent impairment on adult educational attainment and employment status was examined among survivors.

Results: Compared to siblings, neuroblastoma survivors had a higher prevalence of impairment on BPI domains of anxiety/depression (19% vs.14%, $p<0.01$), headstrong (19% vs. 13%, $p<0.01$), attention deficit (21% vs. 13%, $p<0.01$), peer conflict/social withdrawal (26% vs. 17%, $p<0.01$), and antisocial (16% vs. 12%, $p<0.01$) behaviors. Among survivors, peripheral neuropathy (motor and/or sensory; any grade) was significantly associated with anxiety/depression (prevalence ratio [PR]=1.89, 95% confidence interval (CI) 1.29–2.61), headstrong (PR=1.69, 95%CI 1.14–2.37), and attention deficit (PR=1.52, 95%CI 1.03–2.12). Treatment exposures (vincristine, cisplatin, retinoic acid) and selected chronic outcomes (i.e. hearing loss, reduced fitness, elevated BMI) were not associated with BPI impairment. BPI scores did not differ by treatment (surgery only vs. surgery/chemotherapy vs. surgery/chemotherapy/radiation). Impairment in all five domains significantly predicted the use of special education services and educational attainment less than college graduation ($p<0.01$); worse headstrong and antisocial behaviors predicted unemployment ($p<0.01$).

Conclusion: Adolescent survivors of neuroblastoma are at elevated risk for cognitive and behavioral impairment, which are in turn associated with special education services, lower educational attainment, and unemployment. Patients who developed peripheral neuropathy were at particular risk of impairment.