Risk factors of neurocognitive impairment, disordered mood and reduced quality of life in survivors of pediatric rhabdomyosarcoma: A report from the Childhood Cancer Survivor Study (CCSS)

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Background
Survival rates for rhabdomyosarcoma have improved; however, risk factor characterization of poor functional outcomes is lacking.

Methods
This retrospective cohort included 713 rhabdomyosarcoma survivors (42.5% female; mean age 30.5 years) and 897 siblings (55.2% female; mean age 34.5 years) who completed measures of neurocognitive function (CCSS-Neurocognitive Questionnaire), mood (Brief Symptom Inventory-18), and health-related quality of life (HRQOL; Medical Outcomes Study Short Form-36) outcomes. Multivariable logistic regression models were used to identify if treatment factors, health behaviors, and chronic conditions were associated with impairment.

Results
Relative to siblings, greater proportions of rhabdomyosarcoma survivors reported impaired task efficiency (20.5% vs. 13.8%), emotion regulation (15.5% vs. 9.8%), and working memory (19.3% vs. 14.2%). Elevated somatic distress (13.0% vs. 4.4%), anxiety (11.4% vs. 5.3%) and depression (22.2% vs. 16.9%) were also identified. Likewise, rhabdomyosarcoma survivors reported poorer HRQOL in areas of physical functioning (12.8% vs. 3.0%), role limitations due to physical problems (16.8% vs. 7.6%), pain (17.5% vs. 9.0%), vitality (22.0% vs. 13.5%), social- (14.7% vs. 7.5%) and emotional functioning (16.6% vs. 9.7%).

Cranial radiation increased risk of impaired task efficiency (OR=2.30, 95%CI=1.14-4.63), while chest and pelvic radiation predicted impaired physical functioning (OR=2.68, 95%CI=1.16-6.21 and OR=3.44, 95%CI=1.70-6.95, respectively). Smoking increased risk of impaired task efficiency (OR=2.06, 95%CI=1.14-3.70), working memory (OR=2.23; 95%CI=1.26-3.95), anxiety (OR=2.71, 95%CI=1.36-5.41) and depression (OR=1.77, 95%CI=1.01-3.11). Neurologic conditions increased risk of anxiety (OR=2.30, 95%CI=1.04-5.10), and hearing conditions increased risk of depression (OR=1.79, 95%CI=1.05-3.03). Neurologic and hearing conditions, respectively, were associated with impaired working memory (OR=2.44, 95%CI=1.20-4.95 and OR=1.87, 95%CI=1.05:3.35) and poor health perception (OR=2.62, 95%CI=1.62-1.28 and OR=2.33, 95%CI=1.34-4.06). Impairment associated with gastrointestinal and/or cardiovascular conditions were clustered in HRQOL outcomes.

Conclusions
Minimizing radiation exposure, encouraging smoking cessation, and/or monitoring/treating chronic conditions may mitigate rhabdomyosarcoma survivors' increased risk of poor functional outcomes and prevent long-term late effects of treatment.