

Modifiable Lifestyle Factors and Risk for Subsequent Neoplasms in Survivors of Childhood Cancer: A Report From the Childhood Cancer Survivor Study

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Purpose: High body mass index (BMI) and low physical activity (PA) levels are risk factors for adult-onset cancers. Limited data exist on whether these factors increase subsequent neoplasm (SN) risk among survivors of childhood cancer.

Methods: Associations between time-varying self-reported BMI / maximum self-reported PA (metabolic task hours per week [MET-h/wk]) and SN risk were evaluated among five-year survivors, diagnosed 1970-1999 at <21 years old, enrolled in the Childhood Cancer Survivor Study. BMI/PA were assessed prior to SN development, first at cohort entry and up to six times thereafter. Cumulative incidence and relative risks (RRs), adjusted for demographic and clinical variables, were calculated for any, subtype (hematologic, solid organ, central nervous system [CNS], skin), and specific (breast, thyroid, colorectal, meningioma) SNs.

Results: Among 22,716 survivors, we identified 2,554 SNs among 2,156 individuals (57% female, median age at SN diagnosis: 37.35 years [range 13.7-63.3]). Survivors with lower PA had a higher 30-year SN cumulative incidence: 18.6% (95%CI 17.0-20.3) for 0 MET-h/wk versus 10.9% (95%CI 9.9-12.1) for 15-21 MET-h/wk. Obese BMI (≥ 30 kg/m²) was associated with increased risk for solid organ (RR, 1.22, 95%CI, 1.01-1.46), CNS (RR, 1.47, 95%CI 1.12-1.95), and skin (RR, 1.30, 95%CI 1.13-1.50) SNs, along with meningiomas (RR, 1.48, 95%CI 1.09-2.00) and thyroid carcinomas (RR, 1.64, 95%CI 1.15-2.34). Increased PA (15-21 MET-h/wk) was protective for any (RR, 0.61, 95%CI 0.53-0.71), solid organ (RR, 0.65, 95%CI 0.52-0.83), CNS (RR, 0.50, 95%CI 0.35-0.70), and skin (RR, 0.72, 95%CI 0.60-0.86) SNs, along with meningiomas (RR, 0.51, 95%CI 0.35-0.75) and thyroid carcinomas (RR, 0.53, 95%CI 0.34-0.83). BMI/PA were not associated with subsequent hematologic, breast, or colorectal cancers.

Conclusions: Childhood cancer survivors with high BMI are at increased risk for multiple types of SNs, while vigorous PA is protective for SN development. Modifiable lifestyle factor interventions should be included in future subsequent cancer investigations.