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Habitual physical activity and insulin resistance after pediatric cancer treatment

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Pediatric cancer survivors (PCS) are at high risk for metabolic late effects of cancer treatment, including metabolic syndrome, obesity, insulin resistance, and cardiovascular disease. Acute lymphocytic leukemia (ALL) and lymphoma survivors are at the greatest risk for metabolic disease due in part to side effects of therapy. In healthy populations, metabolic disease risk can be reduced with increased habitual physical activity. PCS are at lifelong risk for the development of endocrine dysfunction and physical activity is a risk-reduction strategy that can be utilized. However, the amount and type of physical activity that is effective in improving insulin sensitivity in this patient population is not fully understood. In our cross-sectional study, we examined the association between habitual physical activity and insulin sensitivity during the first year after stopping treatment due to cancer remission in a population of PCS ALL patients. Our study recruited PCS ALL and lymphoma survivors (ages 5-18) within 1-13 months post-treatment completion and here we report a descriptive analysis of the baseline metabolic status of the study participants. Study participants wore a hip accelerometer during all waking hours for 7 consecutive days to assess habitual physical activity and calculate average minutes of moderate-to-vigorous physical activity per day (MVPA). Homeostatic Model Assessment of Insulin Resistance (HOMA-IR (fasting glucose (mmol/L)*fasting insulin (μU/ml)/22.5) and Waist-to-Height Ratio (WtHR; (waist (cm)/height (cm)) were calculated as estimates of insulin resistance. Thirty-eight PCS have enrolled in the study to date. Younger children (≤10) were more active than children >10 in the months after therapy, and with visual assessment, we did not see an association between insulin sensitivity and MVPA in either group. However, both groups had individuals with elevated HOMA-IR, with most children >10 having HOMA-IR levels at or above the diagnostic criteria for metabolic syndrome. Children >10 had an association between WtHR and fasting insulin, which is also indicative of insulin resistance. In our preliminary analysis of baseline metabolic status of the study participants, we did not see an association between habitual physical activity and insulin resistance. We did observe insulin resistance in children >10 and a general trend toward less activity in this population. Further investigation is needed to fully understand the implications of habitual physical activity on insulin resistance in this patient population.