

## Metabolic Syndrome and Growth Hormone Deficiency in Adult Survivors of Childhood Leukemia

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**Background:** The metabolic syndrome, related to insulin resistance, predisposes to type 2 diabetes and atherosclerotic disease and may be a treatment-related late effect in survivors of childhood cancer. ATP III-R criteria require 3 or more factors for diagnosis: central obesity, glucose intolerance, high triglycerides, low HDL cholesterol, and hypertension.

**Objective:** In a study of young adult survivors of childhood acute lymphoblastic leukemia (ALL), the aims are to: 1) estimate the prevalence of metabolic syndrome; 2) determine whether CNS irradiation increases risk for the metabolic syndrome above that of chemotherapy alone; and, 3) evaluate whether growth hormone insufficiency is associated with CNS irradiation and the metabolic syndrome.

**Design/Methods:** Subjects were recruited from participants in the Childhood Cancer Survivor Study who were treated for childhood ALL at the University of Minnesota (UMN) or Children's Hospitals and Clinics between 1970 and 1986. Laboratory and clinical testing was conducted at UMN.

**Results:** These data represent the first 62 subjects of a projected 78. Median age was 30 years (range 20-46) and median years since diagnosis was 18 (range 16-47). By sampling design, CNS irradiation occurred in 68% of subjects (37% at <24 Gy and 31% at 24+ Gy). Metabolic syndrome was present in 16% of subjects, including 19% with past radiotherapy versus 10% without (age-adjusted odds ratio=2.2). An additional 43% of the irradiated group, compared with 20% of the non-irradiated group, had 2 components of the metabolic syndrome present. Fasting hyperinsulinemia (>20  $\mu$ U/ml) was observed in 12% of the irradiated group and 0% of the non-irradiated; mean insulin levels were 10.4 versus 5.2 among the irradiated and non-irradiated, respectively (p=0.04). Mean peak growth hormone level (arginine stimulation test) was lower in subjects treated with CNS radiation (11 mU/L) versus those not so treated (60 mU/L; p=0.001), and lower in those with metabolic syndrome (10 mU/L) than in those without (31 mU/L; p=0.002).

**Conclusions:** These preliminary data suggest that long term survivors of childhood ALL treated with CNS radiation are at risk for metabolic syndrome and growth hormone insufficiency.