Factors That Affect Final Height and Change in Height SDS in Survivors of Childhood Cancer Treated with Growth Hormone (GH): A Report from the Childhood Cancer Survivor Study (CCSS)

Carrie M. Brownstein, Ann C. Mertens, Pauline A. Mitby, Marilyn Stovall, Jing Qin, Glenn Heller, Leslie L. Robison, Charles A. Sklar

Pediatrics, Memorial Sloan Kettering Cancer Center, New York, NY; Pediatrics, University of Minnesota School of Medicine, Minneapolis, MN; Pediatrics, MD Anderson Cancer Center, Houston, TX; Biostatistics and Epidemiology, Memorial Sloan Kettering Cancer Center, New York, NY.

BACKGROUND: Growth hormone deficiency (GHD) is a common late sequela in survivors of pediatric malignancies. Nonetheless, there have been few reports looking at the final height outcomes in survivors treated with GH. OBJECTIVE: In the present study we investigated which patient and treatment variables correlate with final height and change in height SDS in a large cohort of cancer survivors treated wtih GH.
DESIGN/METHODS: We previously identified 361 participants in the CCSS, a cohort of 5-year survivors of childhood cancer, who were treated with GH (Sklar et al JCEM 2002: 87;3136). Final height data were available in 193 survivors.
RESULTS: Of the 193 patients evaluated, there were 130 males and 63 females. Diagnoses included: CNS tumors (n=91), acute leukemia (n=71), soft tissue sarcomas (n=23), miscellaneous (n=8). The median age at diagnosis of the primary cancer was 4.5 years (range of 0-13.9 years), and the median age at start of GH treatment was 11.3 years (range of 3.1-18.6 years). Mean height SDS at start of GH therapy was -2.02 (-4.61 to +0.50), and the mean final height SDS was -1.4 (-5.12 to +2.29). The overall change in height SDS from start of GH to final height was significant (p0.001). The following factors were independently associated with final height SDS: target height, presence of concomitant endocrinopathies, dose of GH (0.25 mg/kg/wk v. 0.25mg/kg/wk), and dose of spinal RT(20 Gy v. 20 Gy). Increase in height SDS (start GH to final) was independently associated with male gender, younger bone age at start of GH, absence of concomitant endocrinopathies, higher dose of GH and lower dose of spinal RT. Duration of GH therapy, treatment with chemotherapy or a GnRH agonist, and dose of pituitary RT (30 Gy v. 30 Gy) were not found to independently influence change in height SDS.
CONCLUSIONS: This study identified patient and treatment factors that contribute to the final height and change in height SDS in survivors of childhood cancer treated with GH. In order to maximize the final height, we emphasize the importance of beginning GH therapy at the youngest bone age possible, treating with conventional higher doses of GH, and when possible, minimizing the dose of spinal RT.