Osteopenia in Growth Hormone (GH) Deficient Children: Effect of Growth Hormone Treatment

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Introduction

Children with growth hormone (GH) deficiency have osteopenia partly because of delayed bone maturation (1). Studies on GH treated patients have given contrasting results on the recovery of bone mineralization (1-3). We investigated bone density before and during recombinant human (rh) GH treatment in GH deficient children.

Patients and Methods

Twenty-six prepubertal children (14 M, 12 F; age 6.5-10.7 years, bone age 5.6 ± 1.7 years, height-SD score (SDS) -3.0 ± 0.5 , growth velocity 2.7 ± 0.8 cm/y) with isolated idiopathic GH deficiency were studied. We evaluated bone mineral density (BMD, g/cm³) by single photon absorptiometry (Norland Corp., mod. 2783) at the distal one-third of the nondominant radius before and at 12 and 24 months of rhGH administration (0.6 IU/kg/weekly, sc). Results were expressed as SDS (mean $\pm$ SD) in comparison with our gender-and age-matched reference values for chronologic and bone ages (4).

Results

Before rhGH, all patients had a significant reduction of BMD for both chronologic age and bone age (Table). During treatment, growth velocity (12 months: 7.5 ± 1.7 cm/y; 24 months: 5.2 ± 1.8 cm/y, $P < 0.001$ vs. pretreatment values) and BMD (Table) significantly increased in all patients. After 12 months, about 50 % of children had normal BMD for BA. After 24 months, normal BMD for CA and BA was found in 8 out of 9 children (89 %).

Table Bone mineral density before and during rhGH therapy

	0	12 mon	24 mon ^o
BMD-CA, SDS	$-1.2 \pm 0.6^*$	$-0.5 \pm 0.3^{\wedge}$	$0.2 \pm 0.2^{\wedge}$
BMD-BA, SDS	$-0.7 \pm 0.3^{**}$	$-0.2 \pm 0.02^{\#}$	$-0.1 \pm 0.02^{\#}$

CA: chronologic age; BA: bone age; * $P < 0.01$, ** $P < 0.02$ vs reference values.

^o n=9; [^] $P < 0.01$, [#] $P < 0.02$ vs pretreatment values.

Discussion

We demonstrated that GH deficient children have reduced BMD. Delayed bone maturation does not completely account for the reduced BMD. Thus, GH deficient children are really osteopenic. Therapy with rhGH was able to improve BMD which reached the normal range in 89 % of the patients after 24 months of therapy. The reduced BMD in GH deficient adults results more likely from a deficient build-up of the bone mass than from

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a premature bone loss (5). So, the beneficial effect of rhGH therapy on BMD in GH deficient children suggests that this treatment might lead to the attainment of the peak of bone mass, which is one of the most important factor in preventing adult osteoporosis (6).

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