

## Growth Hormone Treatment Enhances Bone Mineralisation in Children with Chronic Renal Failure (CRF)

Van Dyck et al report on bone mineralisation as determined by Dual Energy X-ray Absorptiometry (DEXA), of the whole body and lumbar spine prior, to and one-year after, the initiation of rhGH therapy in 10 pre-pubertal children with stable CRF. Inclusion criteria for the study included: (1) a height SDS of  $< -2$  SD or a height velocity of  $< 25^{\text{th}}$  percentile for age, (2) absence of growth hormone deficiency, (3) normal thyroid function, and (4) normal PTH levels. DEXA was used to measure total body mineral content (TBMC), lumbar spine bone mineral content (LBMC), total body mineral density (TBMD), and lumbar spine bone mineral density (LBMD), in patients and in a control group of 20 healthy children of similar age. DEXA was performed twice in the CRF patients and in the healthy controls. Body height was measured with a stadiometer and bone age was determined by TW2 method at the start and after one-year of treatment. Data were analyzed using Wilcoxon matched pairs.

Growth hormone treatment (1 unit or 0.3 mg/kg/week given in daily divided doses) was associated with an increase in median height velocity from 5.1 cm/year (3.0-8.8 cm/year) to 10.6 cm/year (8.2-12.7 cm/year). Median creatinine clearance remained unchanged as did calcium, phosphorous, and intact PTH levels. There was, however, a marked change in serum alkaline phosphatase. This is a well-known phenomenon in different groups of patients treated with hGH and reflects osteoblastic activity. At the beginning of the study, the median bone age was delayed 1.9 years and increased 0.8 years over the duration of treatment. The patients' TBMC, TBMD, LBMC, and LBMD increased significantly after one-year of rhGH treatment ( $p < 0.05$  for each – see Table). When compared with height/age match controls, these values were not different at the start of treatment, nor at the end of treatment. Yet BMD, TBMD, and LBMD, significantly improved in patients over one year ( $P < 0.05$ ). When compared with age- matched controls, patients had lower TBMC and LBMC at the

start of treatment and experienced a catch-up of LBMC to values similar to controls over the course of the year.

The authors note that there has been discrepancy in results from previous studies of various parameters of BMD in children with CRF treated with rhGH. They speculate that this might be explained by 2 factors - small sample size and selection bias. In the current study, findings demonstrate significantly improved BMD in children with CRF who are growth retarded. All subjects in the current study were on calcium supplements and their bone mineralisation was adequate for their height at baseline. The authors state that homogeneity of their results is most likely due to the homogeneity of the patients studied, that is pre-pubertal with severe renal disease from early years of life without signs of osteodystrophy. They conclude that rhGH treatment has a beneficial effect on BMC and BMD in pre-pubertal children with CRF. This was the finding of Lanes et al (*Horm Res* 1996;46:263-268).

Van Dyck M, et al. *Eur J Pediatr* 2001;160:359-363.

**Editor's Comment:** *At first glance, the results of this short paper might not be appreciated as adding significantly to the information with regard to the effects of rhGH on children with renal disease. It is well known that BMC and BMD prior to puberty are important factors of similar measures in adults. Thus, any improvement which might be gained in the pre-pubertal years, could potentially be realized later in adult life. Indeed, the subjects in the Van Dyck study had indices of bone density comparable to those of height matched children at entry into the study and at the one-year follow up. What is significant is the increased BMC and BMD observed. These studies underline the importance of initiating rhGH therapy in children with CRF even when their absolute height deficiency is modest.*

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Table

Mineralisation parameter	Baseline	After 1 year rhGH	P
TBMC (g)	521 (144-944)	589 (225-1139)	$< 0.01$
TBMD (g/cm <sup>2</sup> )	0.750 (0.672-0.888)	0.775 (0.681-0.995)	$< 0.05$
LBMC (g)	7.5 (3.8-15.7)	10.9 (5.9-18.0)	0.005
LBMD (g/cm <sup>2</sup> )	0.475 (0.281-0.660)	0.525 (0.333-0.660)	$< 0.01$

Adapted from Van Dyck M, et al. *Eur J Pediatr* 2001;160:359-363.