

Comparison of the Growth-Promoting Effects of Insulin-Like Growth Factor 1 and Growth Hormone in the Early Years of Life

The authors report that administration of rhGH to 4 young children with isolated GH deficiency (IGHD) due to deletion of *GH-1* increased linear growth rate to a greater extent than did administration of recombinant human insulin-like growth factor 1 (rhIGF-1) to 3 children with GH insensitivity (GHI). The mean birth length (Table) in the 4 children with IGHD was 46.5 cm (-3.5 SDS); in 5 GHI neonates, mean birth length was 46.8 cm (-3.3 SDS). During the first 2 years of life, length of untreated IGHD infants declined to -5.7 SDS, that of GHI infants from -3.5 to -6.5 SDS.

Treatment was initiated in all 4 IGHD patients and 3 of the 5 GHI patients between 1 and 4 years of age. With replacement rhGH treatment, the heights of IGHD children increased between 1.2 and 2.4 SDS over 3 years. In the 3 GHI children treated with rhIGF-1, height increased between 0.5 and 1.4 SDS over 3 years. The patient treated at the earliest age grew the least. By 2 years of age, head circumferences of all subjects were < -2.5 SDS; during administration of rhGH or rhIGF-1, head circumferences increased. The authors conclude that the linear growth response to rhGH is greater in young children with IGHD than the linear growth response to rhIGF-1 in subjects with GHI. This implies that both GH and IGF-1 are necessary for optimal linear growth during early childhood.

Laron Z, Klinger B. *Acta Paediatr* 2000;89:38-41.

Editor's comment: Normal cartilage growth requires both GH and IGF-1. GH is thought to cause chondrocyte progenitor cells to differentiate and to increase local production of IGF-1; this growth factor then stimulates clonal expansion of proliferating and hypertrophic chondrocytes. Although rhIGF-1 markedly increases linear growth rates in prepubertal children with GHI, current observations suggest that both GH and IGF-1

are necessary for maximal growth in height, particularly in young children.

Allen W. Root, MD

2nd Editor's comment: The authors have presented data on only 7 patients receiving rhGH or, alternatively, rhIGF-1. There were 2 additional patients (GHI) who did not receive treatment. The study was worth doing, but possibly the results were overinterpreted, as the number of patients in each group was small (4 vs 3 vs 2 patients in each group), the doses of rhGH and IGF-1 were not proven to be biochemically equivalent, and patient ages at treatment were not paired for the group. The value of the article to me is the confirmation that birth weights and lengths are pathologically small in all patients reported, as were head sizes; that growth rates increase significantly in IGHD patients receiving rhGH and in GHI patients receiving rhIGF-1; and that individual variation of response, as exemplified by the observation that the poorest response to rhIGF-1 occurred in the youngest patient to receive the hormone at the largest dose, makes comparison of response between groups of such limited number difficult.

As an incidental comment, the head circumferences of IGHD and GHI patients are significantly small. While head circumference does increase with treatment, there are no data to my knowledge suggesting that the increase in head size (presumably brain size) affects intellectual capability. Also of great interest to me is that the heights of the parents, who undoubtedly are heterozygotes for IGHD or GHI, are in the negative SDS range (Table). The question of heterozygosity for certain genes affecting stature is addressed in the previous abstract.

Robert M. Blizzard, MD

Table

Pertinent Clinical Data at Referral of 4 Patients With Congenital Isolated Growth Hormone Deficiency (IGHD) and 5 Patients With Laron Syndrome (LS)

No.	Sex	Diagnosis	CA (y)	BA (y)	Birth Length		Parents' Height (SDS)	
					(cm)	SDS [†]	Mother	Father
1	F	IGHD	3.9	2.5	46	-3.5	-1.45	-1.13
2	F	IGHD	3.2	0.7	45	-4.0	-1.61	-1.53
3*	M	IGHD	1.2		46	-4.0	-3.45	-2.66
4* Siblings	M	IGHD	0.9	0.2	49	-2.5	-3.45	-2.66
5	F	LS	3.6	2.5	48	-2.5	-0.30	-0.59
6	M	LS	0.6	0.2	45	-4.5	-0.65	-1.16
7 Siblings	M	LS	3.4	1.5	45	-4.5	-0.65	-1.16
8	F	LS	2.8	1.0	49	-2.0	-0.70	-1.61
9 Siblings	M	LS	1.0	0.5	47	-3.0	-0.70	-1.61

*Mother also is IGHD. [†]According to Tanner et al. CA, chronologic age; BA, bone (skeletal) age.

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