

## Quantitation of Urinary GH in Children With Normal and Abnormal Growth

Albini et al have reevaluated the use of urinary growth hormone (GH) determinations as a screening test for GH deficiency (GHD) in children. Previous studies attempting to quantitate GH in the urine had not been successful because the assays were not sufficiently sensitive, and interfering substances found in the urine led to overestimation of GH excretion. In their study, the authors used a modification of the Hanssen procedure in which after urine is dialyzed and then lyophilized, GH is measured in a double-antibody radioimmunoassay (RIA).

This RIA uses polyclonal antibodies and standards obtained from the National Hormone and Pituitary Program. The intraassay and interassay coefficients of variation for GH antibodies and standards are 2.1 and 4.0, respectively, and the lower threshold of sensitivity of the assay is 0.15 ng/mL. High-pressure liquid chromatography (HPLC) studies confirmed the authenticity of urinary GH, as the elution profile of urinary GH was identical to both biosynthetic and pituitary GH standards. Furthermore, the HPLC fractions were assayed using a double-monoclonal immunoradiometric assay (IRMA) technique that recognizes only intact GH. The immunoreactive GH profiles defined by the two assays RIA and IRMA were identical. Recovery experiments were performed by adding known amounts of standard human GH to 50-mL aliquots of urine from GH-deficient subjects. The recovery of exogenous GH ranged from 80% to 100%.

Clinical studies were then performed to determine GH excretion in 82 children. These children were divided into three groups. Group 1 included 31 healthy children (ages 3-17 years) whose height was between the 5th and 95th percent-

iles. Nineteen were prepubertal and 12 were pubertal. Group 2 was composed of 21 children (ages 5-15 years) with GHD that had been determined by standard stimulation tests. Eleven of these children were prepubertal and ten were pubertal. Group 3 was composed of 30 children (ages 10-18 years) with idiopathic growth failure. Fifteen of these children were prepubertal and 15 were pubertal. Their heights were more than two standard deviations below the mean for age, and their growth rates were less than 4 cm/year. However, their peak GH responses to two or more stimulation tests were greater than 8 ng/mL. Overnight urines (6 P.M.-8 A.M.) were collected and refrigerated prior to GH analysis. GH excretion was standardized for body weight and expressed as ng/kg/12 hours as well as in terms of body surface area (ng/m<sup>2</sup>/12 hours). In addition, GH excretion was standardized in terms of creatinine excretion (ng/g of creatinine).

When urinary GH excretion was expressed in terms of body weight or body surface area, the secretion was significantly greater in group 1 than group 2 or group 3. In addition, children in group 2 excreted significantly lower amounts of GH than those in group 3. However, when the data were expressed in terms of creatinine excretion, the differences in GH excretion between group 2 (GH-deficient subjects) and group 3 (children with idiopathic growth failure) were not significant. Prepubertal and pubertal children in each of the three groups excreted similar amounts of GH regardless of the method of standardization. The authors conclude that measurement of urinary GH may prove to be useful in screening patients with suspected GHD. This clinical methodology is significantly easier for staff and patients and less costly than serial blood sampling over 24 hours in determining GH neurosecretory dysfunction. However, approxi-

mately 50% of the children with idiopathic growth failure had urinary GH values that were similar to those of children with classic GHD, leading the authors to suggest that these children may have GHD.

Albini C, Quattrin T, Vandlen R, et al. *Pediatr Res* 1988;23:89-92.

**Editor's comment**—*The studies reported above were carefully performed and show significantly more precision than previously reported evaluations of urinary GH excretion. The documentation of the authenticity of urinary GH by this very sensitive assay is reassuring. However, the fact that 50% of the children with idiopathic growth failure had urinary GH values similar to those of children with classic GHD suggests that further studies are still required in approximately half of the children who had abnormal urinary GH values prior to the initiation of therapy with exogenous GH. In addition, since there were no differences in the excretion of urinary GH between prepubertal and pubertal children in each of the three groups, the question remains as to whether some of the children with idiopathic growth failure and abnormally low urinary GH values, in fact, had constitutional delay of growth and adolescence. The present study, however, should encourage others to obtain more data utilizing the reported procedure in an attempt to fully define its utility as a screening process for GHD. Clearly, the availability of a noninvasive, low-cost screening procedure for GHD would be welcomed by most pediatric endocrinologists.*

*William L. Clarke, M.D.*

### Address for Correspondence

Please send all correspondence to Robert M. Blizzard, M.D., Department of Pediatrics, University of Virginia School of Medicine, Charlottesville, VA 22908.