

Relationship Between Urinary and Serum Growth Hormone and Pubertal Status

This study of correlations involved 31 prepubertal and 29 pubertal subjects. Three different groups were studied: (1) 21 patients, aged 6.9 to 18.2 years (7 prepubertal, 14 pubertal) who had received cranial irradiation of 18 to 24 Gy for acute lymphoblastic leukemia; (2) 18 subjects aged 3.8 to 18.9 years, among whom 10 were normal siblings of the irradiated patients and 8 were normal subjects with genetic short stature (10 prepubertal and 8 pubertal); and (3) 12 boys investigated once or twice for constitutional delay of growth and puberty (CDGP) for a total of 21 studies, among which 14 had 4- to 6-mL testes and 7 had testes with a volume of 8 to 12 mL.

Growth hormone (GH) secretion was evaluated as a 24-hour profile, with sampling every 20 minutes in groups 1 and 2, and as an overnight 12-hour profile in group 3. Urine was collected concurrently with blood sampling. Serum GH was assayed by the immunoradiometric assay (IRMA) technique. Urine concentration of GH was measured by a 2-step IRMA on dialyzed urine, with a sensitivity of 0.8 pg/mL and interassay coefficients of variation of 6.6% to 8.4%. The results were expressed as nanograms of GH per gram of creatinine. Renal function was checked and considered normal in all study subjects, although some of those with a history of leukemia had at times received short courses of 1 or 2 aminoglycosides.

The results in prepubertal children ($n=17$) showed a close correlation between mean serum GH (integrated concentration) and urinary GH: $r=0.88$ in group 1, 0.84 in group 2, and 0.82 in group 1+2 with $P<0.001$. There also were significant correlations in prepubertal children between nanograms of urinary GH per grams of creatinine and both the maximal peak ($r=0.86$) and the mean pulse amplitude ($r=0.71$) of the serum GH profile.

In the pubertal children of groups 1 and 2, considered together ($n=22$) or separately, there was no such relationship: $r=-0.26$ (NS) for the mean GH; $r=-0.29$ (NS) for the peak; and $r=-0.34$ (NS) for the mean amplitude of GH peaks on the profile.

In the early pubertal boys (stage 2) investigated for CDGP, the correlation was highly significant between urinary GH and mean serum GH ($r=0.74$, $P<0.001$), but less significant with the mean amplitude of pulses ($r=0.4$, $P<0.05$) and not significant with the peak serum GH value.

The authors point out that although GH excreted in urine represents less than 0.002% of cumulative serum GH, the correlations found are very close in prepubertal children and rather good

at early puberty. This is in contrast with the lack of correlation in late pubertal subjects. They conclude that measuring urinary GH may be a test for screening GH secretion in children, but it is inappropriate from mid to late puberty. They also stress that the impact of physiologic and pathologic changes of renal function upon filtration and excretion of GH by kidneys needs further investigation before considering urinary GH measurements as a reliable tool.

Crowne EC, Wallace WHB, Shalet SM, et al. *Arch Dis Child* 1992;67:91-95.

Editor's comment: *There is some contrast between the good correlations between urinary and serum GH found by the authors up to early puberty and their rather negative conclusions. Their discussion is extensive, including many previous studies on urinary GH, done with more or less similar methodologies, and possibly this is the main reason for concluding in this sense. Whatever the reasons for this contrast, my opinion is that after more than 5 years of extensive work and a great number of clinical studies, measurement of GH in urine has never been proven to be a reliable means for appreciating somatotrophic secretion in clinical situations or for longitudinal studies in physiology of growth.*

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2nd Editor's comment: *The answer to the question, "Can measurement of urinary GH be used to diagnose growth hormone deficiency?" remains elusive after 30 years of investigation. In 1963, Geller and Loh (J Clin Endocrinol Metab 1963;23:1107) first attempted to do this, as have many others. Confirmation that GH deficiency can be diagnosed by the reported techniques has been elusive. Interpretation of the data in the abstract above is similarly guarded. Fortunately, Dr. Margaret MacGillivray, who has had a long-term interest in this question, will be writing an article for GGH after reviewing the literature and conferring with the investigators currently working in this field. We look forward to her review and summary. Hopefully, Dr. MacGillivray will give us a broad perspective and a definitive answer to our question.*

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