

Reproducibility of 24-Hour Growth Hormone Profiles in Children

The rate of growth hormone (GH) secretion and the pattern of GH peaks were compared in a group of 9 children during their prepubertal period in repeated 24-hour GH profiles. At investigation, the children were 6 to 13 years old (at first profile, 6 to 11 years old) and of normal height (± 2 standard deviations [SD]). Two profiles were obtained per child, with a mean time interval of 1.5 years (range, 0.7 to 3.5 years). The calculated GH secretions of the first and second profiles were compared. As a group, no significant differences were obtained in secreted amount of GH, when the data from second profile was expressed as a percentage of data from the first profile ($93\% \pm 8\%$), number of peaks ($95\% \pm 7\%$), or mean peak amplitudes ($92\% \pm 11\%$). Between the repeated curves of an individual child, maximal difference in secretion, number of peaks, and mean peak amplitudes ranged around $\pm 30\%$, with a mean intraindividual coefficient of variation of 12%. The reproducibility in the peak distribution for all profiles was also analyzed. Reproducibility of the temporal pattern of profiles was analyzed using time-series analysis (Fourier analysis) and showed no difference in rhythmicity between the different occasions.

In conclusion, a high reproducibility of both GH secretion and GH pattern was found for the whole group of prepubertal children. The high degree of reproducibility of the 24-hour GH profiles of the entire group indicated that the information from these curves, in terms of both pattern and total secretion, can be used for clinical as well as for physiologic purposes. The intraindividual reproducibility was less pronounced, however, leading to a sound skepticism when relating biologic phenomena to a single profile of an individual child.

Albertsson-Wikland K, Rosberg S. *Acta Endocrinol* 1992; 126:109-112.

Editor's comment: *The reproducibility of measurements of GH secretion has been studied and questioned in many previous papers. This study deserves exceptional consideration since it uses extremely accurate methodology and gives all the technical data, including variability of the results of plasma GH radioimmunoassays. The authors conclude that there is a contrast between the excellent overall reproducibility in recording of 24-hour GH secretion in groups of subjects, and these data can be used for clinical and physiologic purposes. However, the extent*

of individual variations prompts skepticism about interpreting a single profile in an individual child.

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2nd Editor's comment: *Martha et al did a similar extensive study that was presented at the American Endocrine Society Meeting in San Antonio in June 1992, under the title "Physiological GH Release is Regulated Over Time Within Characteristic, Individually Determined Limits Which Vary Predictably, But Reciprocally, With Body Mass Index." These authors performed 44 integrated studies in 9 prepubertal, normal-statured boys over 9- to 35-month periods. Among the group data, mean 24-hour integrated concentrations of GH for the individual profiles spanned a 6-fold range (1.1 to 7.0 ng/mL) with an intersubject CV of 46%. In contrast, values of individual subjects exhibited much less variability (mean CV, $26\% \pm 4\%$). Therefore, each individual was consistent in having low, medium, or high integrated GH concentrations, and the mean ICGH level in each of these normal boys correlated strongly and inversely with body mass index (BMI) SD scores.*

The authors conclude that during late prepuberty (9 to 12 years of age, Tanner stage I): (1) individual boys regulate daily GH secretion within relatively confined limits, which are characteristic for that individual and much narrower than the broad range present in the larger population; (2) differences in BMI help determine the GH secretion range which characterizes, and is therefore "normal" for, each individual; (3) differences in mean 24-hour GH levels among normally growing boys arise primarily from differences in GH pulse size; and (4) there is no consistent progressive change in mean 24-hour GH release in prepubertal boys before puberty occurs.

In correlation with the paper by Albertsson-Wikland and Rosberg, there is a variation in GH secretion within an individual in respect to quantity, which may vary as much as 75% to 100% between 2 profiles. However, the mean data for the group between profiles is much less variable. In addition to the data presented from Sweden, Martha et al determined that children have significantly different GH secretion from each other on the basis of BMI. GH secretion and BMI vary inversely.

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