First-year growth response to growth hormone as a predictor of poor final height outcome in children with idiopathic growth hormone deficiency

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1. Background / Aim

Several definitions of poor growth response to first-year growth hormone (GH) treatment have been proposed based on the observed response in large patient groups. Since a complete compensation of the height deficit is expected in children with idiopathic GH deficiency (iGHD) treated with GH, we have evaluated the different parameters for the first-year growth response as a predictor of the adult height gain in children with iGHD.

2. Subjects and methods

Height data at start, after one year of GH treatment, and at near final adult height* (nFAH) of 142 children (93 boys) with iGHD were retrieved from the National Database of the Belgian Study Group for Pediatric Endocrinology. All included patients had been treated with GH for at least 4 consecutive years with at least one year before pubertal onset. First-year change in height (∆Ht) SDS, first-year height velocity (HV) SDS and total height SDS gain from start of GH treatment to nFAH (total ∆Ht SDS) were calculated. A poor final growth outcome was defined as total ∆Ht <1SDS. ROC-curve analysis was used to identify the optimal cut-off of probability of first-year ∆Ht SDS and HV SDS with regard to the sensitivity and specificity.

3. Results

3.1 First-year growth response

ROC-curve analysis:

- First-year HV SDS <0.70, and first-year ∆Ht SDS <0.3 have a high specificity (97%) to predict a total gain in height SDS <1
- Corresponding sensitivities: 20%, and 30%, and resp.
- Area’s under the curve (AUC): 77% and 79% resp.
- Accuracies of the tests: 80.7% and 83.8% resp.

Regression models for nFAH<2SD and nFAH-MPH<1.3 SD in relation to first-year growth responses are weak (AUC 54-62%), implicating a low discriminatory power.

4. Conclusion

Our results show that show a first-year change in height SDS <0.3 and first-year HV SDS <0.7 will detect almost all subjects with poor final height outcome (total ∆Ht SDS <1), but due to the low sensitivity of these limits relatively “good” first-year responders (∆Ht SDS >0.3 and HV SDS >0.7) can also have a poor final height outcome. Depending on the chosen sensitivity or specificity, a cut-off for poor first-year response can be determined by ROC analysis.