Body mass index negatively correlates with growth hormone response to GH provocation testing.


1 Pediatric Endocrinology and Diabetology Unit, Pediatric Department, Hospital for Children and Adolescents, University of Leipzig, Leipzig, Germany
2 Institute for Laboratory Medicine Clinical Chemistry and Molecular Diagnostics, University of Leipzig, Leipzig, Germany
3 CrescNet, University of Leipzig, Leipzig, Germany

Disclosure statement: Nothing to disclose

Background
In adults it has been shown, that GHpeak values after provocation testing are negatively correlated to BMI. Preliminary studies in children have found a similar correlation. Consequently children with elevated BMI would be overdiagnosed with GH deficiency (GHD). However, studies so far were too small to define this correlation exactly. This would be a condition to judge whether and to what extend adjustments of GH cut-off levels should be considered also in children with elevated BMIs.

Objective
To study the correlation between BMI-SDS and the maximal GH serum levels reached in GH provocation tests in a larger cohort of children.

Patients and methods
We investigated children whose anthropometric data, pubertal status and laboratory findings had been documented in the Crescnet database. Of overall 1109 GH stimulation tests we retrospectively could analyze 524 children and adolescents aged between 1 and 18 years with short-stature (height SDS<2), who between 2004 and 2014 underwent a total of 735 GH provocation tests (540 with arginine as a primary, and 195 with glucagon as a confirmatory test). Children with known syndromes (i.e. UTS), severe chronic illness or under antipsychotic or sex steroid medication were excluded from study. We applied a linear regression model to assess the correlation between BMI-SDS and the maximal GH serum value (GHpeak) reached during each test in the overall study group and then according to gender. To account for possible effects of puberty on GH secretion and BMI-SDS correlation we also studied the data according to pubertal status (prepubertal Boys: TVS3m, Girls: Tanner B<1), in prepubertal children we analyzed the data for correlations of GHpeak to BMI-SDS in the group of children without GHD (idiopathic, SGA, familial short stature and constitutional delay) and with GHD (including neurosecretory dysfunction). Cut-off level for GHD was 7.09 ng/ml. GH measurements were made with non-radioactive, chemiluminescent immunoassays.

Results
There was a significant (negative) correlation of the BMI-SDS of the patient and the GHpeak (p=0.001) reached in the test (Fig 2a). This correlation was not different when studied according to gender (Fig 2b). The GHpeak in tests were not statistically different between test substances (Fig 3).

Conclusion
- We found that the BMI significantly and negatively correlates with GHpeak values in both arginine and glucagon GH stimulation tests.
- As the effect BMI on GHpeak is age dependent and only weakly present in children aged 4-9 years, an adaption of cut-off levels for GHD according to BMI seems not appropriate in this age group.
- On the other hand, the influence of BMI on GHpeak increases significantly even before clinical signs of puberty are observed.
- The age from which BMI should be considered for making the diagnosis remains to be discussed.

References