Fasting and post-meal levels of appetite regulating hormones, before and following growth hormone treatment, in children with idiopathic short stature

Michal Yackobovitch-Gavan[1], Galia Gat-Yablonski [1,2,3], Biana Shtaif [2,3], Yael Lebenthal [1,2], Moshe Phillip [1,2], Liora Lazar [1,2]

[1]The Jesse Z and Sara Lea Shafer Institute for Endocrinology and Diabetes, National Center for Childhood Diabetes, Schneider Children's Medical Center of Israel, Petah Tikva; [2]Sackler Faculty of Medicine, Tel Aviv University, Tel Aviv; [3]Felsenstein Medical Research Center, Petah Tikva, Israel

P3-1026

Disclosure Statement: All authors have nothing to declare

BACKGROUND

Poor appetite is common in children with idiopathic short stature (ISS), and is usually improved with growth hormone (GH) therapy.

OBJECTIVE

To investigate the effect of GH therapy on appetite regulating hormones following a standard meal test (SMT) and to examine the association between these changes and growth response, body composition and resting energy expenditure (REE).

STUDY DESIGN, PATIENTS & METHODS

Study design Prospective observational preliminary study.

Setting Endocrinology Department of a tertiary Pediatric Medical Center.

Patients Nine ISS pre-pubertal healthy children at the initiation of GH treatment.

Methods

Participants underwent a standard meal test (SMT) before and 4 months following initiation of GH treatment. Fasting and post SMT levels of leptin, ghrelin, GLP-1 and insulin were measured; area under the curve (AUC) was calculated. Height, weight, body composition and REE were recorded at baseline and after 4 and 12 months.

Height, weight, and BMI were expressed as SDS according to the recommendations of the Center for Disease Control and Prevention (CDC 2000).

Standard meal test (SMT) Pediasure® Plus, a complete and balanced nutritional supplement, was given in the morning following an overnight fast. The volume of Pediasure® Plus was calculated for each participant to contain 25% of the estimated energy requirements (EER) according to the dietary reference intakes (DRI) equations (DRI 2002/2005). Blood samples were taken at baseline and 10, 30, 60, 90 and 120 minutes after the SMT.

REE assessment was performed by indirect calorimetry, with the use of a metabolic monitor ventilated hood (Deltatrac II, Datex-Ohemeda Instrumentation Corp., Helsinki, Finland) measuring oxygen consumption and carbon dioxide emission at rest. measurements were made for 30 min.

Body composition was measured using a single-frequency 50 KHz leg-to-leg bioimpedance analysis system combined with a digital-scale body composition analyzer (TBF-300, Tanita Corporation America Inc, Illinois)

Dietary intake assessment After brief training by a dietician, the parents were asked to record in a diary, all food and beverages, including portion sizes, consumed over a 3-day period of one week (2 weekdays and 1 weekend) over the week before each clinical visit.

RESULTS

Nine ISS prepubertal children (7 boys) participated in the SMT study.
Before initiation of GH treatment mean age was 10.9±1.9, mean height-SDS -2.46±0.34, weight-SDS -2.65±1.02, BMI-SDS -1.44±1.31 and mean REE 1033±115 Kcal/day.

Following 4 months of GH therapy, an improvement in appetite was reported in all children and significant increases in height-SDS (*P*=0.011), weight-SDS (*P*=0.021) and REE (*P*=0.025) were observed.

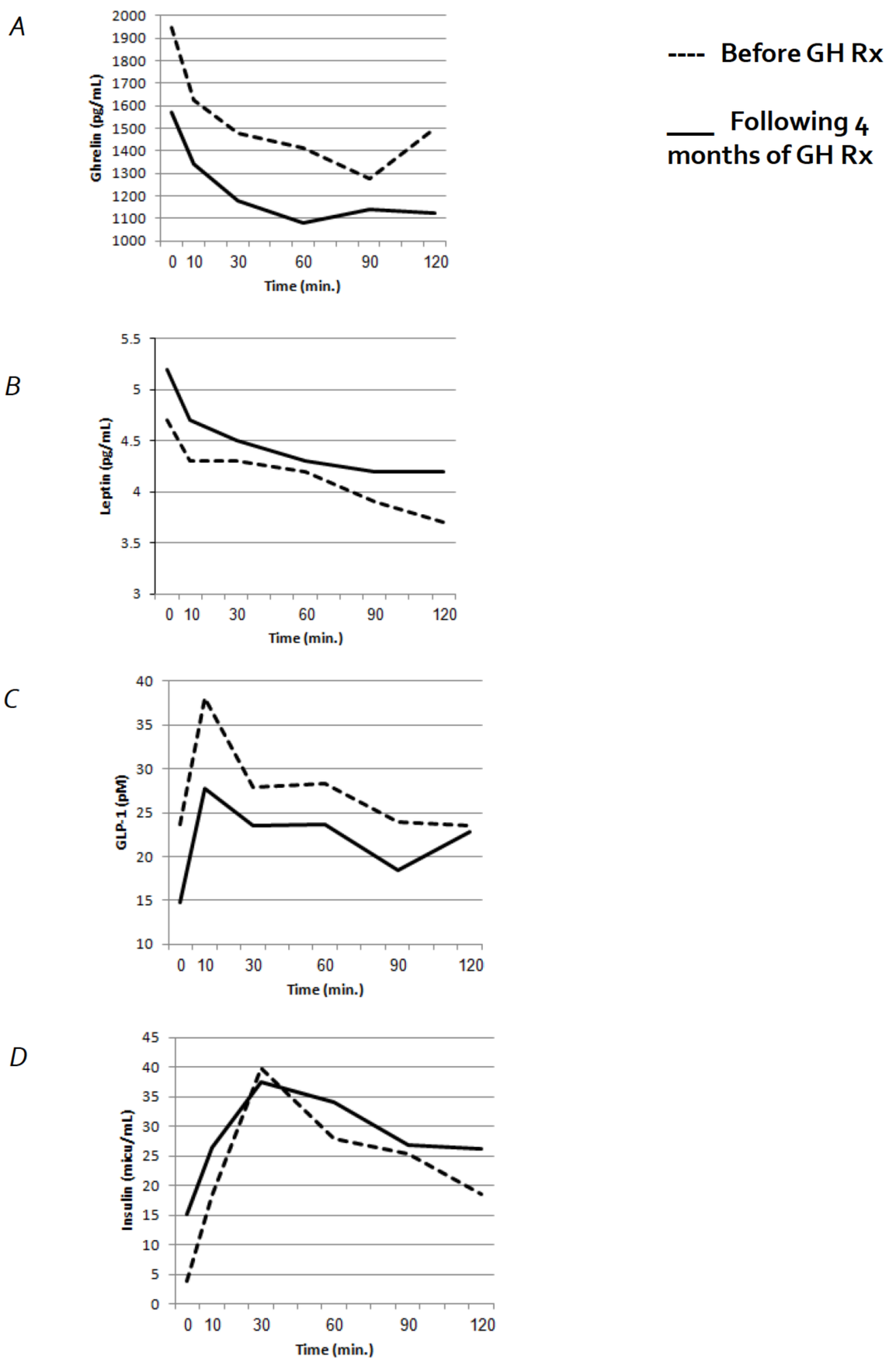
At 4 months, an increase in fasting insulin levels (*P*=0.043), a decrease in fasting GLP-1 levels (*P*=0.038) and a decrease in meal's AUC ghrelin levels (*P*=0.045) were demonstrated, while no significant change occurred in leptin levels (see fig. 1).

The incremental response of ghrelin and GLP-1 to SMT (ghrelin- continuous decrease, GLP-1 – initial rise and subsequent fall), were similar before and during GH treatment (see fig. 1).

Ghrelin levels (fasting and AUC) before GH treatment were positively correlated with the changes in weight-SDS (fasting: r=0.667, *P*=0.05 and AUC: r=0.788, *P*=0.012) and REE (fasting: r=0.866, *P*=0.005, and AUC: r=0.847, *P*=0.008). following 4 months of GH therapy.

Ghrelin AUC levels at 4 months, were positively correlated with the changes in Ht-SDS (r=0.741, *P*=0.022) and free-fat-mass (r=0.890, *P*=0.001) at 12 months of GH treatment.

Figure 1: Hormone levels: Ghrelin (A), Leptin (B), GLP-1 (C) and Insulin (D) during meal test before and after 4 months of GH treatment (n=9).



CONCLUSIONS

The significant reduction in ghrelin and GLP-1 following GH treatment suggests a possible role for GH in appetite regulation.
Fasting and meal-AUC levels of ghrelin may serve as biomarkers for predicting growth response to GH treatment.
The mechanisms linking GH with changes in appetite regulating hormones remain to be elucidated

DOI: 10.3252/pso.eu.54espe.2015