Obesity research in adolescence: moving object—hard to target

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In this issue of the Journal, Sysko et al (1) compare the eating behavior and release of peptide hormones in response to a single-item breakfast in obese adolescents before and after laparoscopic gastric banding with normal, nonoverweight controls. The meal consisted of chilled Optifast (474 mL, 320 kcal, 50% of energy from carbohydrates, 35% of energy from protein, 15% of energy from fat; Novartis). Plasma samples for analysis of leptin, ghrelin, and peptide YY (PYY) were obtained before the onset of the meal and at 15, 30, 60, and 90 min after food intake. Simultaneously, visual analog scale (VAS) ratings were obtained for hunger, fullness, desire to eat, and nausea. Thereafter, participants were engaged in quiet post-meal activities until a buffet lunch was served 4 h later. All food items were carefully weighed, and the caloric intake of solid food as well as beverages was calculated. The gastric banding device was adjustable to achieve a progressive weight loss with 1–6 mL (mean: 4 mL) of fill in their bands. At onset, the obese individuals’ weight was twice as high as that of controls, and BMI (in kg/m\(^2\)) decreased after surgery by 3.5 (14%) after 12 mo.

The effect of the gastric banding was a significantly reduced intake of the test meal as well as a smaller number of foods selected. The psychological ratings of eating behavior were not changed by surgery. The fasting hormone analyses showed higher leptin and lower ghrelin concentrations in the obese individuals than in the controls. PYY concentrations did not differ between groups. The decrease in ghrelin after a meal was less marked in obese individuals. After surgery, fasting PYY decreased, but other analytes did not change. There was no correlation with the VAS rating for hunger and desire to eat, which, surprisingly, showed higher ratings for controls than for obese individuals, whereas fullness and nausea did not differ. Also, there were no correlations between changes in different hormone concentrations and change in BMI.

The liking of food items provided in the second meal did not differ between controls and obese individuals before or after surgery, although fewer food items were consumed after surgery. However, not surprisingly, there was a clear correlation between high food consumption and BMI. More surprisingly, the number of band adjustments and total band fill were not correlated with the total energy consumed.

Taken together, data in obese and normal adolescents show that food intake decreases after gastric banding. However, analyses of food choice behavior and appetite show that no conclusions are to be reached in this subgroup of obese subjects.

Obesity is a serious problem in society, and we expect this situation to worsen in industrialized as well as in developing countries, although at different rates. One approach to preventing this situation would be to interact with the maturing individual to mitigate the risk of obesity. The question raised in this study concerns a mapping of eating behavior, eating perception, and meal-related hormonal changes in obese adolescents and healthy controls. The study approaches a sensitive problem in the growing adolescent for whom corrective interaction would be available. Even though many estimates are made in the study, hard data are limited.

Studies like this are very difficult to carry out. This is clearly shown by the fact that out of 114 identified obese adolescents, 21 were studied under preoperative conditions but only 12 completed the study. This high dropout rate indicates a strong selection of the study population, which may bias the study with regard to all estimates. Furthermore, adolescents are in a very sensitive part of their life, with continuous budding growth and development, on an emotional as well as somatic level. This would indicate that the test subjects in this study are not in a true steady state but rather in a marked process of maturing into adulthood. This lack of consistency in the study group may jeopardize estimates and results of different interventions. The ratings of appetite and psychological scoring suggest the involvement of such factors because the results are scattered and do not seem to follow logical trends, especially for hunger and desire to eat in the controls compared with those in the obese subjects.

The intervention with gastric banding as a means to decrease BMI is a restrictive surgical procedure and may not change food intake habits and hormonal concentrations to the extent seen with gastric bypass (2). The reason is obvious. With a restrictive surgical procedure, less food enters the small bowel, with less pronounced changes in plasma hormone concentrations. This is clear from the present data on ghrelin and PYY. Especially interesting is the flat ghrelin curve postmeal, where data in the obese subjects after surgery indicate that the hunger-signaling hormone ghrelin is not shut off after food intake. Furthermore,
gut peptide hormone analyses have to be carefully performed. Experience from our laboratory indicates that immediate peptide breakdown is a reality, which is why we advocate the use of dipeptidyl peptidase-IV and protease inhibitors in the sampling tubes, storage on ice, rapid centrifugation, and long-term storage at \(-80^\circ\text{C}\) (DL Webb, unpublished observations, 2013). All of these measures were followed by Sysko et al (1). The obvious reason for studying hormone excursions in the bloodstream is to find a pharmacokinetic-pharmacodynamic relation of some hormone, which would then be possible to use as a surrogate marker for appetite sensation. In addition to this, a specific hormone of that character may be used for development of an antiobesity drug. Today, it seems that the glucagon-like peptide 1 analog liraglutide is the closest to that principle (3). Further research along that line will continue, with hunger sensations from the stomach as a primary focus for intervention with glucagon-like peptide 1 analogs and incretin mimetics.

As a final remark, we all take aim at different biomarkers that seem to be reliable as an early signal for monitoring the risk of development of obesity and its related complications. The most obvious storage tissues in the body are the striated muscle and adipose tissue. We now also have brown adipose tissue (4) and even bright adipose tissue (5), which are regulated in a way in which we know little.

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REFERENCES