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An Analysis of the "Effect of Olibra: A 12-Week Randomized Control Trial and a Review of Earlier Studies"

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Abstract

Nutrients affect hunger and satiety. However, food structure, in particular that of emulsions, may also affect the body's satiety mechanisms. Olibra™ is a fat emulsion, a mixture of fractionated palm oil and fractionated oat oil manufactured by Lipid Technologies Provider AB, Sweden, which affects hunger sensation. However, up to now, no data have shown convincingly that reduced appetite or hunger sensations induced by Olibra lead, in the long run, to a significant and clinically relevant reduction in body mass. To clearly demonstrate a cause-and-effect relationship of Olibra to weight loss, it seems that longer studies with strict control of energy intake and nutrient composition, as well as control of energy expenditure by exercise, are needed.

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In this issue of *Journal of Diabetes Science and Technology*, Rebello and colleagues[1] hypothesized that the lipid emulsion Olibra™, in combination with exercise and reduced caloric intake (1500 kcal/day) over 12 weeks, would lead to a more pronounced body mass loss compared with an exercising control group that was also on a weight-reducing diet (1500 kcal/day). Olibra is a mixture of fractionated palm oil and fractionated oat oil manufactured by Lipid Technologies Provider AB, Sweden.

The gastrointestinal tract is one of the main systems regulating hunger, food intake, and satiety.[2] Satiety is induced by bowel distension, presence of nutrients, or change in pH. The entry of nutrients into the small intestine activates a negative feedback mechanism that, more distal in the gastrointestinal tract, may result in inhibition of proximal gastrointestinal motility and secretion and is the so-called "ileal brake."[3,4] Therefore, after consumption of a meal, nutrients entering the small intestine affect (among other functions) the ileal brake and lead to decreased hunger and increased satiety sensations.

With obesity having reached epidemic proportions globally—according to the International Obesity Taskforce, in 2010, approximately 1.0 billion adults were overweight and a further 475 million were obese[5]—we need to be creative in finding solutions to reverse that development, as all the efforts to increase energy expenditure by exercising and to educate children to have a moderate energy intake matching their requirements are not as successful as they could be.

Developing products of high palatability and concomitant effects on increasing satiety and decreasing hunger sensation does not seem to be *the* optimal solution but

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seems to be an acceptable first step in a concerted effort to decrease hunger sensations and potentially reduce caloric intake to allow development of "normal" weight in children and adults.

Nutrients do affect hunger and satiety. However, food structure, in particular that of emulsions, may also affect the body's satiety mechanisms.[6] The physiological response to food may therefore depend not only on the macronutrient composition, but also on the way the food components are assembled so that food structure can play a role in dictating how food is digested.[7,8] According to Keogh and associates,[9] "fat droplet size controls available surface area for lipase activity and thus has an impact on the rate of lipolysis during digestion." Slowing down fat digestion by changing the design of an emulsion might extend satiety sensations by prolonging the increase in satiety hormones—although at a lower concentration—and thus might be a complementary measure to regulate dietary caloric intake.

As reviewed in the article by Rebello and colleagues,[1] contrasting results have been obtained for the effect of Olibra on appetite, hunger, satiety, and food intake. However, results from published literature, including an article by Chan and coworkers,[10] seem to show more conclusively that Olibra, after several hours of application without any dietary restrictions, does not affect appetite and food intake.[11,12]

Similar results of no effect on food intake and no consistent effect on appetite rating have also been shown in a medium-term study by Logan and associates[13] of 3-weeks' duration.

A study of longer duration (26 weeks) included a period of 6 weeks when participants started with a diet with very low energy intake of approximately 500 kcal/day.[14] During the subsequent weight-maintaining period of 18 weeks, one-half of the subjects added two 250 g servings of yogurt per day, each serving containing 3 g milk fat and 2 g Olibra emulsion. The other half of the subjects received the identical amount of yogurt with 5 g of milk fat instead of Olibra. In the study by Rebello and colleagues[1], which had a duration of 12 weeks, Olibra was applied together with a low caloric intake (1500 kcal/day) and an exercise program. However, the only study of reasonable timeframe to demonstrate any effect of Olibra on body mass was the 26-week study by Diepvens and coworkers.[14] They showed that the group receiving Olibra almost maintained their body mass (+1.2 kg) while the control group increased their body mass (+3.0 kg) by week 25/26. As the difference of 1.8 kg (approximately 12,600 kcal) would equal on average 100 kcal/day over a period of 18 weeks and might not have clinical significance, one might wonder whether this is really attributable to the consumption of Olibra. A negative energy balance of 100 kcal/day can easily be achieved by reducing fat intake by approximately 10–15 g or by bicycling for approximately 30 min each day. The latter action (that is, a higher activity level) may also lead, over the chosen period of time, to higher resting energy expenditure, which was also shown in the test group.[14] On the other hand, a decrease in hunger rating was also obtained in studies of shorter duration as well as in the study by Rebello and colleagues[1] (this issue). The finding of decreased hunger sensation is supported by the 16% increase, relative to the placebo group, in the concentration of glucagon-like peptide-1 in the subjects who received yogurt with Olibra 180 min after they ingested the yogurt.[14]

In summary, it seems that Olibra might decrease appetite and hunger; however, whether this might lead to decreases in body fat mass in the long run is still an open question. As the effect of Olibra seems to be moderate in long-duration studies, strict control of caloric intake and energy expenditure during exercise is needed for conclusions to be drawn about this effect. It would still be worthwhile to answer the interesting question of whether the increase in glucagon-like peptide-1 after Olibra consumption—which could not be demonstrated in the study by Ellis and associates[15] in overweight volunteers who ingested different percentages of fat and carbohydrate in respective meals—would be sufficient to improve blood glucose control in subjects with impaired glucose tolerance.

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