

## Letter to the Editors

### *Sugar as a slimming agent*

We have read with interest the commentary in the *British Journal of Nutrition* by Arne Astrup and Anne Raben (Astrup & Raben, 2000) on our article in the *British Journal of Nutrition* (Lammert *et al.* 2000).

Astrup & Raben (2000) argue that *de novo* lipogenesis from carbohydrates is a very costly process energetically and will therefore necessarily result in at least a 21 % lower fat deposition than overfeeding with an isoenergetic amount of fat. This may be the case, but in fact the actual stoichiometry of the lipogenic process in the living organism is not known (Flatt, 1978; Livesey & Elia, 1988). One central question in this context is whether the heat formation in the process of transformation of glucose to palmitate is compensated for fully or in part by a reduction of other exothermic processes of the body.

In our study (Lammert *et al.* 2000) we found no statistically significant differences in weight gain or change in fat mass between the group overfed a carbohydrate-rich diet (C-group) and the group overfed a fat-rich diet (F-group). Astrup & Raben (2000) suggest that this may be due to a type 2 error, and they recalculate our results by assuming that our mean values are true sample means. Calculations based on such an assumption is, of course, not valid and does by no means justify the implication of a type 2 error.

Furthermore, Astrup and Raben imply in their calculation that the surplus energy intake of the two groups are different. This is clearly not the case, since there was no difference in energy intake between the two groups before the overfeeding, and since the individuals were randomly assigned to either of the two overfeeding diets. Thus, this assumption by Astrup and Raben would, if taken at face value, amount to a type 1 error.

Astrup and Raben also suggest that power calculations should have been carried out when the study was planned. In our opinion, this was not possible, since at that time no information was available on the variation or size of fat deposition with the overfeeding protocol used.

Astrup & Raben (2000) claim that our results show that a 68 % higher surplus energy intake is required for the deposition of 1 kg fat from carbohydrate than from fat ingestion. We disagree strongly with this conclusion for the reasons mentioned earlier. The surplus energy required for fat deposition was calculated as the ratio of surplus energy intake:increase in fat mass. Our results show that the surplus energy intake required for deposition of 1 kg fat ranged from -186 to 2760 MJ/kg in the C-group and from 1 to 1937 MJ/kg in the F-group (CV 212 and 206 % respectively). The central question here is how to explain the large individual differences, as also pointed out by Bouchard *et al.* (1990) and Levine *et al.* (1999).

Astrup & Raben (2000) disagree with our conclusion that

we find no hard evidence for carbohydrate-induced thermogenesis. They calculate that about 50 % of the surplus energy intake is unaccounted for by deposition and excretion in the C-group, and about 38 % in the F-group. Again, for the reasons stated earlier, we find it meaningless to carry out the calculations using mean values. Based on individual values, the surplus energy intake not accounted for ranges from negative values to 112 % of total surplus energy intake in the C-group and from negative values to 141 % in the F-group. Thus, the actual figures do not provide evidence for a larger 'luxus konsumption' during carbohydrate overeating. On the other hand, we do not claim, that some 'luxus konsumption' could not have occurred.

As stated by Astrup and Raben, we observed a greater loss of energy (30 %) in faeces in the C-group than in the F-group. However, it should be noted that this difference makes up only 1.9 % of the total energy intake.

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