

Fast food and sedentary lifestyle: a combination that leads to obesity^{1,2}

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Bes-Rastrollo et al (1) report in this issue of the Journal that the consumption of sugar-sweetened soft drinks and fast-food intake—and, to a lesser extent the consumption of sweetened fruit drinks and red meat—predicts a weight gain of ≈ 0.4 kg/y independent of energy intake, physical activity, and television viewing. Their study was conducted over 28.5 mo in a cohort of Spanish men and women with a mean age of 41 y. For soft drinks, but not for the other foods, the differential weight gain was most obvious in the subjects who had gained weight in the 5 y before baseline. Although the authors spend considerable effort showing this interaction, I suspect it is a chance finding, perhaps associated with regression to the mean; the subjects who gained weight in the 5 y before baseline gained less during the follow-up than did those who had not gained weight. Thus, the authors showed the first 28 mo of a trend similar to that recently reported (2) over 15 y from the Coronary Artery Risk Development in Young Adults (CARDIA) study: frequent fast-food consumption (soft drinks could not be distinguished from other foods that are typical in fast-food restaurants) was associated with a differential weight gain of 0.3 kg/y and a worsening in insulin sensitivity compared with infrequent fast-food consumption.

Bes-Rastrollo et al (1) opine that the energy obtained from soft drinks does not fully displace that consumed from solid sources and may encourage an increase in the consumption of other foods. However, they concluded that higher total energy intake from other sources was not the sole mechanism of weight gain after overconsumption of soft drinks. They point out that soft drinks and other fast foods are low in fiber, which, in their words, may exert adverse effects “on satiety, glucose metabolism, energy density, and the rate of ingestion and gastric emptying.” The use of fructose rather than glucose may have similar adverse metabolic implications (3). They also point to the displacement of dairy products as one way in which soft drinks and other fast foods could increase weight. Pereira et al (2) pointed out that some fast-food meals approach the total daily energy intake requirements and that the food is energy dense. They found that increased fast-food intake led to insulin resistance.

Astrup (4), commenting on Pereira’s CARDIA study finding, asked what makes fast food fattening. Considering the convenience, low price, and high-energy format of fast food, he said, “Human beings have only a weak innate ability to recognize foods with high energy density and to down-regulate the bulk eaten to meet energy requirements appropriately.” Animals gain

weight if energy intake is greater than energy expenditure, and they lose weight if energy intake is less than energy expenditure. Cupples (5) stated that body weight is closely regulated under most conditions; a failure in energy balance can have severe consequences for the organism. In the long run, energy consumption must be matched to energy expenditure. The situation is remarkably subtle, however; the mean excess of 4.5 kg gained over 15 y by fast-food eaters constituted only ≈ 10 kcal/d, assuming that 1 kg fat corresponds to 7700 kcal. Clearly, it would not take much disturbance in satiety and sensing of energy intake to throw energy balance off by only a few kcal/d. Besides portion size, energy density, and consequent changes in insulin action, small differences in taste or rates of stomach emptying could make this a large difference.


Individual susceptibility to weight gain varies (6); I suspect that a sedentary lifestyle is important in this respect. Energy intake may be determined, in part, by energy expenditure. The late Henry L Taylor favored a model that linked energy intake to energy expenditure in a J-shaped curve (personal communication, late 1970s). The first part of his concept was that energy intake is in exact homeostasis with energy expenditure under conditions of high energy expenditure. The second part was that there is a failure of homeostasis in a sedentary lifestyle because of its accompanying low energy expenditure. He postulated that body signals go awry in sedentary lifestyles; when a person does no physical work, the body will not recognize that it is being overfed. Sedentary persons may lose the innate ability to compensate for inactivity by reducing their eating. Neither Bes-Rastrollo et al (1) nor Pereira et al (2) addressed whether the weight gain associated with fast-food intake was enhanced by a sedentary lifestyle.

Although this model is difficult to test, Stubbs et al have embarked on a program to discover the conditions and timing under which humans compensate for an energy deficit or surfeit. They asked whether dietary intake is responsive to energy expenditure by studying the effect of different levels of physical activity on ad libitum dietary energy intake over a 7-d period. They found no compensatory increase over this short

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time in lean men (7) and only a partial compensation in lean women (8). In a follow-up study, they did detect some degree of compensation of ad libitum intake both to a higher fat diet and to an exercise program in men in a 7-d period (9); they projected that energy balance would have been achieved over 2.4–4 wk. They felt that the subjects compensated more readily to an increased energy deficit (ie, more exercise) than to an energy surfeit (ie, offering more and higher energy foods).

Many causes of the obesity epidemic exist. Fast food likely contributes to overconsumption, and a sedentary lifestyle reduces energy expenditure. Under the Taylor hypothesis (*see above*), a sedentary lifestyle interacts with overconsumption to produce obesity. Taylor believed that energy intake falls out of homeostasis with energy expenditure when physical activity falls into the sedentary range. Even if homeostasis could be maintained in sedentary people, however, the low energy intake that may prevent obesity may at the same time deplete micronutrient intake to such an extent that some metabolic systems would not operate properly. Indeed, many of the foods, including soft drinks and refined-wheat breads, are low in micronutrients. Bes-Rastrollo et al (1) remind us of the need for societal changes in diet; however, attention to physical activity is also required. 

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