

- 7 Laxminarayan R, Mills A, Breman JG, et al. Advancement of global health: key messages from the Disease Control Priorities Project. *Lancet* 2006; **367**: 1193–208.
- 8 Molyneux DH. Neglected tropical diseases—beyond the tipping point? *Lancet* 2010; **375**: 3–4.

## Diet composition and obesity

Boyd Swinburn and colleagues (Aug 27, p 804)<sup>1</sup> report that, over the first half of the 20th century, increased mechanisation and motorisation were accompanied by a declining food intake and that this kept the prevalence of obesity low. They attribute the epidemic of obesity since the 1960s largely to excessive food production.

The evidence, however, is that it is the excessive consumption of specific elements of the modern diet that is propelling this epidemic. When the diet and weight of 120 000 individuals was monitored over 4 years, consumption of specific items such as French fries and sugar-sweetened beverages (soft drinks) was associated with weight gain whereas consumption of other items such as vegetables and whole-grain foods was associated with relative weight loss.<sup>2</sup> Per capita consumption of French fries and soft drinks increased by about 400% after 1960 in the USA.

Although the use of sugars as palatability enhancers in manufactured foods in general is potentially obesogenic,<sup>3</sup> the evidence linking soft drink consumption to obesity and obesity-related illness is the most comprehensive.<sup>4,5</sup>

A 10% increase in the price of soft drinks has been shown to decrease consumption by 10%.<sup>5</sup> A 50% sales tax on soft drinks alone could raise as much as US\$50 billion in the USA per year. This is a third of the annual medical costs of overweight and obesity to that country—ie, \$147 billion.<sup>5</sup> More importantly, such a tax would diminish one important propellant of this epidemic. Thus a

tax on the nutritionally valueless soft drinks should be a priority of the war against obesity.

I declare that I have no conflicts of interest.

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- 1 Swinburn BA, Sacks G, Hall KD, et al. The global obesity pandemic: shaped by global drivers and local environments. *Lancet* 2011; **378**: 804–14.
- 2 Mozaffarian D, Hao T, Rimm EB, Willett WC, Hu FB. Changes in diet and lifestyle and long-term weight gain in women and men. *N Engl J Med* 2011; **364**: 2392–404.
- 3 Bradley PJ. Pathophysiology of obesity. *Lancet* 1993; **341**: 641.
- 4 Vartanian LR, Schartz MB, Brownell K. Effects of soft drink consumption on nutrition and health: a systematic review and meta-analysis. *Am J Public Health* 2007; **97**: 667–75.
- 5 Brownell KD, Farley T, Willett WC, et al. The public health and economic benefits of taxing sugar-sweetened beverages. *N Engl J Med* 2009; **361**: 1599–605.

We thank Boyd Swinburn and colleagues for their informative articles on obesity.<sup>1,2</sup> However, we challenge their conclusion that diet composition does not matter. If one accepts that “junk” food, characterised by high energy density and refined carbohydrates, is obesity-promoting, one must also accept that diet composition has a role.

Kevin Hall and colleagues<sup>2</sup> acknowledge that some diets can lead to reduced hunger and improved satiety, but also state that the reported energy and macronutrient intakes in diet trials are “almost certainly erroneous” and make their interpretation difficult. Hall and colleagues overlook large-scale studies that have used biological markers to track compliance to pre-defined intakes of specific nutrients. The Diogenes trial<sup>3,4</sup> clearly showed that a diet with modestly higher protein content and lower glycaemic index (GI) prevents weight regain after a major weight loss in adults, with lower drop-out rate and spontaneous fall of 18% in the prevalence of overweight in their children, without any restrictions on energy intake. This finding shows that a small change in diet composition can reduce spontaneous energy intake and hence be important for obesity.

Swinburn and colleagues state that high protein or low GI diets are not suitable because of their “detrimental effect on the environment”.<sup>1</sup> However, the 23% energy from protein in the Diogenes trial can be achieved by increasing plant proteins such as nuts and legumes. Low GI varieties of rice are eaten throughout south Asia, and the low GI of sushi<sup>5</sup> might help explain the lower obesity incidence in Japan.

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- 1 Swinburn BA, Sacks G, Hall KD, et al. The global obesity pandemic: shaped by global drivers and local environments. *Lancet* 2011; **378**: 804–14.
- 2 Hall KD, Sacks G, Chandramohan D, et al. Quantification of the effect of energy imbalance on bodyweight. *Lancet* 2011; **378**: 826–37.
- 3 Larsen TM, Dalskov S-M, van Baak M, et al. Diets with high or low protein content and glycemic index for weight-loss maintenance. *N Engl J Med* 2010; **363**: 2102–13.
- 4 Papadaki A, Linardakis M, Larsen TM, et al. The effect of protein and glycemic index on children's body composition: the DiOGenes randomized study. *Pediatrics* 2010; **126**: e1143–52.
- 5 Atkinson FS, Foster-Powell K, Brand-Miller JC. International tables of glycemic index and glycemic load values: 2008. *Diabetes Care* 2008; **31**: 2281–83.

### Authors' reply

Both letters raise important questions about the types of foods implicated in global obesity. In relation to determinants, we agree with Patrick Bradley that higher intakes of high-fat, high-sugar foods and beverages