

field. Society is entitled to, and our patients and their parents should demand, nothing less.

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I declare that I have no conflict of interest.

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## Super-sized and diabetic by frequent fast-food consumption?

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Amid the dispute over the realism of the documentary film *Super Size Me*, in which the character, Mr Spurluck, ate McDonald's food three times a day for 30 days and gained 11 kg, the report by Mark Pereira and colleagues in today's *Lancet*, adds some scientific evidence to support the film producer's views. The findings from the prospective US CARDIA population study show that frequent fast-food consumption is associated with weight gain and risk of insulin resistance over 15 years. Individuals who ate meals from fast-food restaurants more than twice a week, at both baseline and follow-up, gained 4.5 kg more weight and had a 104% greater increase in insulin resistance than individuals who ate less than one meal at a fast-food restaurant each week. The study is the first long-term project to show that people who often consume fast foods are at high risk of weight gain over time, and increase their risk of developing type 2 diabetes.

Before the study is embroiled in the dispute between McDonald's and the producer of *Super Size Me*, it is important to note some of its limitations. In the context of a longitudinal observational study, the population size of only 3031 individuals results in modest group sizes for analyses for consistency across sex and ethnic groups. Moreover, the self-reported information about diet, physical activity, and other lifestyle factors has important inherent errors in measurement, although these errors normally underestimate the strength of the identified associations.

Furthermore, an observational study cannot prove that the association between fast-food consumption and weight gain is causal. Frequent fast-food consumption, as assessed by the question "How often do you eat breakfast, lunch or dinner at places such as McDonald's, Burger King, Wendy's, Arby's, Pizza Hut, or Kentucky Fried Chicken?",

could simply be a marker for a generally unhealthy lifestyle (eg, less restrained eating behaviour, preferences for fatty and sweet foods, and a sedentary lifestyle), which is the real culprit in weight gain and increased risk of diabetes. Although Pereira and colleagues made every effort to adjust for several relevant potential confounders, they had no information about factors such as drugs that cause weight gain or mental stress, and unmeasured or unmeasurable lifestyle factors cannot be adjusted for.

Despite these limitations, most of us would accept that the link between fast foods and weight gain is causal because there are several mechanisms whereby fast foods could produce weight gain. The frequent visitors to fast-food restaurants tended to watch more television, drink more alcohol, consume more fat and energy, drink more soft drinks, and consume less whole-grain products, low-fat milk products, fruit, vegetables, and fibre, which are all habits that will favour a positive energy balance and weight gain.<sup>1</sup> Although the association between fast-food consumption and weight gain was clearly attenuated after adjustments were made for these factors, it still remained significant. So what is it that makes fast-food fattening?

At least two important features of fast foods were not addressed by the questionnaire in Pereira's study, namely portion sizes and energy density. It is well established that the bigger the portion size provided, the more we consume.<sup>2</sup> And portion sizes of burgers, fried potatoes, pizzas, and soft drinks at fast-food outlets have all increased 2–5 fold over the past 50 years (table).<sup>3</sup> In addition to large portion sizes, fast food also has high energy density—ie, high kJ per 100 g food. The energy density of the entire menu at fast-food outlets is typically about 1100 kJ per 100 g.<sup>4</sup> This is 65% higher than the average British diet (about 670 kJ per 100 g)

Food/drink	Energy intake (kcal)			Portion size*		
	1977–78	1994–96	increase %	1977–78	1994–96	increase %
Salty snacks	160	249	+56	34	54	+58
Desserts	277	302	+9	111	149	+33
Soft drinks	131	191	+46	322	523	+62
Fruit drinks	147	210	+43	308	455	+48
French fries	171	284	+66	60	94	+57
Hamburgers	419	497	+19	174	206	+18
Cheeseburgers	406	537	+32	169	209	+24
Pizza	538	503	-6	194	186	-4
Mexican food	410	594	+45	171	234	+37

\*Foods in g, drinks in mL. Modified from Nielsen SJ, Popkin BM. Patterns and trends in food portion sizes 1977–1998. *JAMA* 2003; **289**: 450–53.

**Table: Increase in portion sizes at US fast-food restaurants 1977–78 to 1994–96<sup>3</sup>**

and more than twice the energy density of recommended healthy diets (about 525 kJ per 100 g). Human beings have only a weak innate ability to recognise foods with high energy density and to down-regulate the bulk eaten to meet energy requirements appropriately.

Fast-food restaurants may argue that the evidence that customers are being super-sized by their meals is too weak. But should customers not be given the benefit of the doubt? Appropriate action would be to reduce portions to normal sizes, and to sell burgers of lean meat, whole-grain bread or buns, fat-reduced mayonnaise, more vegetables, lower-fat fried potatoes, and reduced-sugar soft drinks. Although the price may be increased,<sup>5</sup> at least such changes in fast-food meals can have no adverse health-effects. Recently, some major fast-food companies have taken positive steps by launching new healthier choices, such as porridge for breakfast, and fruit and vegetables for desert.<sup>6</sup> I hope that this trend continues.

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## Globalisation of Hib vaccination—how far are we?

In Asia, the introduction of *Haemophilus influenzae* type b (Hib) vaccine into routine immunisation programmes has been hampered mainly by the high cost of the vaccine and the scarcity of population-based frequency data to verify the burden of Hib disease.<sup>1</sup> In today's *Lancet*, Bradford Gessner and colleagues examine the contentious issue of using Hib vaccine in Asia. They did a double-blind randomised community trial in Lombok, Indonesia, to assess the vaccine's ability to protect against Hib meningitis and pneumonia. More than 55 000 children less than 2 years of age were enrolled to receive the Hib vaccine or diphtheria, pertussis, and tetanus (DPT) vaccine. The authors found an unexpectedly high absolute reduction of vaccine-preventable Hib meningitis. The rate, up to 158 cases per 100 000 person-years, is one of the highest rates of Hib meningitis ever documented. The researchers recommend adding Hib vaccination to the course of routine infant immunisations

because of the high rate of Hib meningitis and improvements in morbidity and mortality associated with Hib vaccine use. The only statistically significant endpoint the vaccine achieved for pneumonia was the prevention of 1561 cases of clinically defined pneumonia per 100 000 person-years.

The trial's methodology allowed Gessner and colleagues to measure the burden of Hib meningitis more accurately, since it measured the absolute rather than relative reduction of Hib invasive disease, also known as a probe trial. By counting all cases confirmed by microbiology and not just the more sensitive meningitis outcomes, they found the rate of Hib meningitis in Indonesia to be underestimated. This evidence is valuable for addressing future guidelines to assess the burden of Hib disease worldwide. A disappointing finding was the vaccine's inability to reduce the rate of pneumonia as defined by lung alveolar consolidation

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