Fast foods, energy density and obesity: a possible mechanistic link

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Received 19 May 2003; revised 15 July 2003; accepted 4 August 2003

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Summary

Fast foods are frequently linked to the epidemic of obesity, but there has been very little scientific appraisal of a possible causal role. Here we review a series of studies demonstrating that the energy density of foods is a key determinant of energy intake. These studies show that humans have a weak innate ability to recognise foods with a high energy density and to appropriately down-regulate the bulk of food eaten in order to maintain energy balance. This induces so called ‘passive over-consumption’. Composition data from leading fast food company websites are then used to illustrate that most fast foods have an extremely high energy density. At some typical outlets the average energy density of the entire menus is ~1100 kJ/100 g⁻¹. This is 65% higher than the average British diet (~670 kJ 100 g⁻¹) and more than twice the energy density of recommended healthy diets (~525 kJ 100 g⁻¹). It is 145% higher than traditional African diets (~450 kJ 100 g⁻¹) that probably represent the levels against which human weight regulatory mechanisms have evolved. We conclude that the high energy densities of many fast foods challenge human appetite control systems with conditions for which they were never designed. Among regular consumers they are likely to result in the accidental consumption of excess energy and hence to promote weight gain and obesity.

Keywords: Appetite regulation, energy density, fast food, obesity.

Pandemic obesity – the search for causal factors

It is widely accepted that the rapidly developing pandemic of obesity has multiple origins related to dietary abundance and sedentary lifestyles (1). These have radically altered the ecological niche which mankind now occupies, and have created conditions in which obesity is a predictable biological response to the changed environment rather than an abnormal pathology (2). As obesity is associated with very significant risks of ill health (3), major efforts are underway to identify specific components of the modern environment that might be particularly obesogenic (4,5).

‘Fast foods’ would seem an obvious target for attention in view of the compelling temporal and geographical associations between the origins and globalization of fast food outlets and worldwide trends in obesity (6). However, there has been surprisingly little objective analysis of their potential role in the aetiology of weight gain, or of any specific mechanism that might link the two. Epidemiological research has been restricted to just a few studies using data sets that are far from adequate for the purpose (7,8).

Here we suggest a likely mechanism by which the consumption of foods available in fast food outlets (henceforth termed ‘fast foods’) could contribute to obesity among regular consumers. Our analysis combines publicly available data on the composition of fast foods with experimentally derived evidence about the regulation of human food intake. We propose that energy density⁷ is a key mediator,

⁷Energy density is defined as the energy content per unit weight of foods, meals or diets (expressed here as kJ 100 g⁻¹). Owing to differing effects on satiation and satiety, it is necessary to consider solid foods and drinks separately. This paper concentrates on the solid components of diets.