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EDITORIALS

Obesity treatment—are personalised approaches missing the point?

The causes of the obesity epidemic may have little to do with gene profiles

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Many companies offer personalised weight loss plans tailored to our DNA, selling the idea that the effectiveness of dieting is predetermined. There is a degree of plausibility behind this, as numerous genes have been associated with increased body weight.[1] In reality, the extent to which genes determine the ability to lose weight remains unclear. The study by Livingstone et al (doi:10.1136/bmj.i4707)[2] represents a substantial step towards answering this, at least for the FTO gene, the allele currently associated with the largest variance in body mass index.[3] The authors conducted a systematic review and meta-analysis using data from almost 10 000 participants from randomised control trials to test the relation between the FTO gene and weight loss interventions. They found no relation between the FTO gene and the ability to lose weight. This contradicts a previous meta-analysis, not based on data from individuals, which found a small but significant increased responsiveness to weight management interventions (of 0.7 kg) in people homozygous for the FTO allele.[4]

The authors acknowledge several limitations in their analysis. Primarily it was only based on source data from eight randomised controlled trials, which were heterogeneous in terms of broad intervention type (diet, exercise and/or drugs) and the specifics of the diet, exercise, and drug interventions themselves. They also acknowledge that several factors limited the generalisabilty of their findings—for example, the poor representation of non-white people. Despite this, the strength and clarity of the findings of Livingstone et al mean that, at least for FTO, genes do not appear to affect our ability to lose weight. Interactions of multiple obesity related genes might prove to have a bigger influence on weight loss.[5]

Was it ever plausible that the FTO gene would have a noticeable influence on energy imbalance, and hence weight gain, compared with the influence of environmental factors such as food price, availability, and marketing?

The FTO allele's major effect on body weight is thought to be through a lessening of appetite control,[1] making it harder to stay in energy balance and hence maintain a healthy body weight.

Evidence suggests that people who are homozygous for the FTO allele are on average 3 kg heavier than those not carrying the gene.[6] In the analysis by Livingstone et al, the difference between participants with the FTO allele and those without was smaller, 0.89 kg at baseline. These weight differences are minor compared with the degree of excess weight gain seen across populations. Each kilogram of excess weight represents 3500 kcal of excess energy consumption,[7] which, assuming 3 kg of weight gain has happened over a 20 year period, for example, is equal to 525 kcal per year—very small amounts. It is therefore hard to see the over-consumption driven by the FTO gene as a serious problem for public health.

Public Health England estimates that in reality, energy imbalances causing modern obesity are much larger. Women and men consume on average 200-300 kcals/day more than they require to maintain a healthy bodyweight (calculated as the difference between the estimated energy requirements at current mean body mass index, based on weight and height data in England and the population estimated average requirement values for energy, which were calculated using a body mass index of 22.5). This, and the level of excess weight seen across populations implies much bigger effects are at play than those so far linked to the FTO gene. The 2014 health survey for England found that 23% of adults were obese and 62% were either overweight or obese.[8] For a man of average height (176 cm) this equates to an excess weight across the overweight and obese body mass index ranges of up to 16 kg and 47 kg, respectively compared with a body mass index of 24.9.

The causes of obesity are multiple and complex,[9] but the study by Livingstone et al adds to the evidence suggesting that environmental factors might dominate over at least common obesity linked genes. Recently several organisations have summarised the evidence on environmental factors and excess weight and made the case for multiple cross sectorial interventions.[10-12] National policy has recently moved towards this with the announcement of a levy on producers of sugary drinks and the plan to reduce the sugar content of everyday foods by 20%.[13] Some have called for tougher measures[14] and Public Health England's own sugar evidence review outlined several other policy interventions that could be introduced.[12]

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However, it is a long journey and an important first step has been taken.

If we are to turn back the tide of obesity, an understanding of how diet and lifestyle interact with the genome might help some people, particularly those with rare conditions that cause devastating levels of weight gain in early life.[1] It is increasingly evident, however, that the idea that personalised interventions based on the genome will yield population benefit, may not pay off, at least in the short term. Given that obesity and poor diet are leading causes of morbidity in Britain,[15] a rebalancing of research towards whole systems approaches including environmental drivers may be of greater benefit to the population in the long term. The solutions to the obesity crisis must be societal, as well as individual.

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