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Study suggests genes and environment interact to increase risk of obesity

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New research presented at this year's European Association for the Study of Diabetes (EASD) meeting in Munich, Germany (12-16 September) shows that environmental and lifestyle factors have greatest effects on obesity in those who also carry the most obesity genes.

People at high risk of gaining weight due to their environment and their genes will find it particularly hard to maintain a normal weight in the modern world. The work suggests that no one aspect of the environment, such as fried food or sugary drink consumption, is especially to blame and contrasts with the conclusions from previous studies. The study is by Professor Timothy Frayling and Dr Jess Tyrrell, University of Exeter, UK, and colleagues.

Susceptibility to obesity and type 2 diabetes in today's environment has a strong genetic component. However, little is known about how genetic variation interacts with the modern environment to predispose some individuals to obesity and type 2 diabetes whilst others remain slim.

Most previous studies have studied one aspect of environment at a time and concluded, for example, that sugary drink consumption or TV watching are especially important. In this new study, the authors used data from 120,000 individuals from the UK Biobank and tested multiple aspects of the environment. The hypothesis was that high risk obesogenic environments and lifestyles amplify the effects of genes.

The study tested body mass index (BMI) and genetics and measures of

the obesogenic environment including lifestyle factors. The authors used 69 obesity related genetic variants and 12 measures of the environment. These were hours per day spent watching TV, total sedentary time, self-reported total physical activity, self-reported vigorous activity, westernised diet consumption, protein in the diet, fat in the diet, fried food consumption, fizzy drink consumption and a composite of these factors. In addition, the authors looked at a measure of socioeconomic status. The authors will also present data from a subset of 20,000 individuals who wore an accelerometer device for 7 days to capture their exact levels of movement.

The key new finding is that obesity genes appear to interact with the modern environment, and that this modern environment is best captured by a measure of socioeconomic status. This meant that people of below average socioeconomic status and high genetic risk were overweight to a greater extent than would be expected by simply adding up the two risk factors. This adverse "interaction" between obesity genes and relative poverty has not been described before. The differences do not push people from normal weight to obesity but add a few kilograms of weight—and are enough to make a big difference to health care systems.

The authors found that, within the 50% of most deprived individuals, carrying 10 additional BMI-raising alleles was associated with approximately 3.8 kg extra weight in someone 1.73m tall. In contrast, within the 50% of least deprived individuals carrying 10 additional BMI-raising alleles was associated with approximately 2.9 kg extra weight.

The authors conclude: "Our findings suggest that there is no particular aspect of the environment or behaviour that if altered would have a preferential benefit over others. It is premature to suggest public health measures should be targeted specifically at fried food reduction, fizzy drink consumption and diet in those genetically predisposed to obesity. Instead, public health measures aiming to alter all aspects of the

obesogenic environment in small ways may have more impact in lowering the prevalence of obesity and type 2 diabetes than targeting a single or few aspects."

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