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Perspective

Association between FTO Genotype and Macronutrients

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ABOUT THE STUDY

Prevalence of obesity dramatically increased worldwide in developed and underdeveloped countries and today obesity is a global health-related problem. More than 34.9% of adult's population of the United States are obese. Obesity is associated with other diseases such as cancer, hypertension, dyslipidemia cardiovascular disease, type 2 diabetes, and psychological disorders. Obesity is a multifactorial disorder caused by genetics, lifestyle and environmental factors and recent studies reported that genetics may exert its effects by changing lifestyle. An important role of some genes in obesity has been reported in many studies. One of the most important gene is fat mass and obesity gene (FTO) that is found to be strongly associated with obesity. The FTO gene is located on the chromosome region 16q12.2, and it is widely expressed in several tissues such as brain, visceral fat, liver and hypothalamus. FTO genotype had a strong association with body mass index (BMI) and obesity.

This association remained significant for calorie and macronutrients' intake after adjustments for sex, age, physical activity, LDL, HDL, and FBS. In AA carriers, dietary carbohydrate, fat, and calorie intake were higher than TT carriers. However, the results of recent studies about association between dietary macronutrients and FTO polymorphism were inconsistent. Higher energy intake and fat intake among rs9939609 AA genotype carriers. They suggest that FTO polymorphism may influence on appetite and food intake. Some studies reported that carriers of risk allele FTO received higher energy intake. The AA carriers were reported to intake higher fat then TT genotype.

Fat intake may modify the effect of the FTO rs9939609 polymorphism on adiposity. It was observed that carriers of the A risk allele FTO rs9939609 had no significant influence on adiposity in subjects whose dietary fat intake was below 30% of total energy but fat intake higher than 30% increased central and total adipose tissues. Another study found that a high-fat diet in comparison with a high carbohydrate diet in rats did not change the FTO gene expression. Inconsistent with this study indicated that a high-fat diet could increase FTO genes expression in white adipose cells. The association between fat intake, the FTO expression and the IRX3 expression in rats.

The FTO variants were associated with intake of energy-dense foods such as fat-rich foods. FTO gene variants played important roles in appetite regulation, food intake, and tendency to choose energy-dense food (high fat and high carbohydrate diet). The carriers of an allele FTO rs9939609 had Energy-dense food choices, higher body weight, and overeating behaviors.

FTO gene rs9939609 polymorphism is associated with dietary intake. The intake of calorie, carbohydrate, and fat intake were associated with FTO gene polymorphisms and this association remained significant for calorie and macronutrient intake after adjustments for sex, age, physical activity, LDL, HDL, and FBS. In AA carriers, dietary carbohydrate, fat, calorie was higher than TT carriers. Further studies are needed to increase our understanding of the underlying mechanisms of the association between FTO gene and dietary intake.

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