Analyses of single nucleotide polymorphisms in selected nutrient-sensitive genes in weight-regain prevention: the DIOGENES study.


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BACKGROUND: Differences in the interindividual response to dietary intervention could be modified by genetic variation in nutrient-sensitive genes.

OBJECTIVE: This study examined single nucleotide polymorphisms (SNPs) in presumed nutrient-sensitive candidate genes for obesity and obesity-related diseases for main and dietary interaction effects on weight, waist circumference, and fat mass regain over 6 mo.

DESIGN: In total, 742 participants who had lost ≥8% of their initial body weight were randomly assigned to follow 1 of 5 different ad libitum diets with different glycemic indexes and contents of dietary protein. The SNP main and SNP-diet interaction effects were analyzed by using linear regression models, corrected for multiple testing by using Bonferroni correction and evaluated by using quantile-quantile (Q-Q) plots.

RESULTS: After correction for multiple testing, none of the SNPs were significantly associated with weight, waist circumference, or fat mass regain. Q-Q plots showed that ALOX5AP rs4769873 showed a higher observed than predicted P value for the association with less waist circumference regain over 6 mo (-3.1 cm/allele; 95% CI: -4.6, -1.6; P/Bonferroni-corrected P = 0.000039/0.076), independently of diet. Additional associations were identified by using Q-Q plots for SNPs in ALOX5AP, TNF, and KCNJ11 for main effects; in LPL and TUB for glycemic index interaction effects on waist circumference regain; in GHRL, CCK, MLXIPL, and LEPR on weight; in PPARC1A, PCK2, ALOX5AP, PYY, and ADRB3 on waist circumference; and in PPARD, FABP1, PLAUR, and LPIN1 on fat mass regain for dietary protein interaction.

CONCLUSION: The observed effects of SNP-diet interactions on weight, waist, and fat mass regain suggest that genetic variation in nutrient-sensitive genes can modify the response to diet. This trial was registered at clinicaltrials.gov as NCT00390637.

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