

A Strategy for Analyzing Gene–Nutrient Interactions in Type 2 Diabetes

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Abstract

Type 2 diabetes mellitus (T2DM), like all chronic diseases, results from interactions between multiple genes and multiple environmental factors. Nevertheless, many research studies focus on either nutrition or genetic factors independently of each other. The challenges of analyzing gene–nutrient interactions in T2DM are the (i) genetic heterogeneity in humans, (ii) complexity of environmental factors, particularly dietary chemicals, and (iii) diverse physiologies that produce the same apparent disease. Many of these variables are not accounted for in the design or study of T2DM or, indeed, most chronic diseases, although exceptions are noteworthy. Establishing experimental paradigms to analyze the complexity of these interactions and physiologies is challenging, but possible. This article provides a strategy to extend nutrigenomic experimental strategies to include early environmental influences that may promote adult-onset disease.

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Abbreviations: (ADP) adenosine diphosphate, (DRI) dietary reference intake, (GWAS) genome-wide association studies, (NAD) nicotinamide adenine dinucleotide, (NHANES) National Health and Nutrition Examination Survey, (QTL) quantitative trait loci, (SNP) single nucleotide polymorphism, (T2DM) type 2 diabetes mellitus

Keywords: gene - nutrient interactions, Metacore, micronutrients, obesity, quantitative trait loci, Type 2 diabetes

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