Can you reduce your risk of diabetes with lifestyle changes?

Glucose homeostasis deficiency may lead to chronic increase in blood glucose levels and could affect a large number of tissues and organs. The shift from early metabolic abnormalities that forego diabetes, such as impaired fasting glucose and impaired glucose tolerance, to diabetes, is not direct. However, current evidence indicate that most individuals with pre-diabetic states finally develop diabetes. Cardiovascular disease risk is modestly increased during the pre-diabetic state, but with the development of diabetes the risk is increasing, in combination with long – term complications including eyes, kidneys and nervous system.

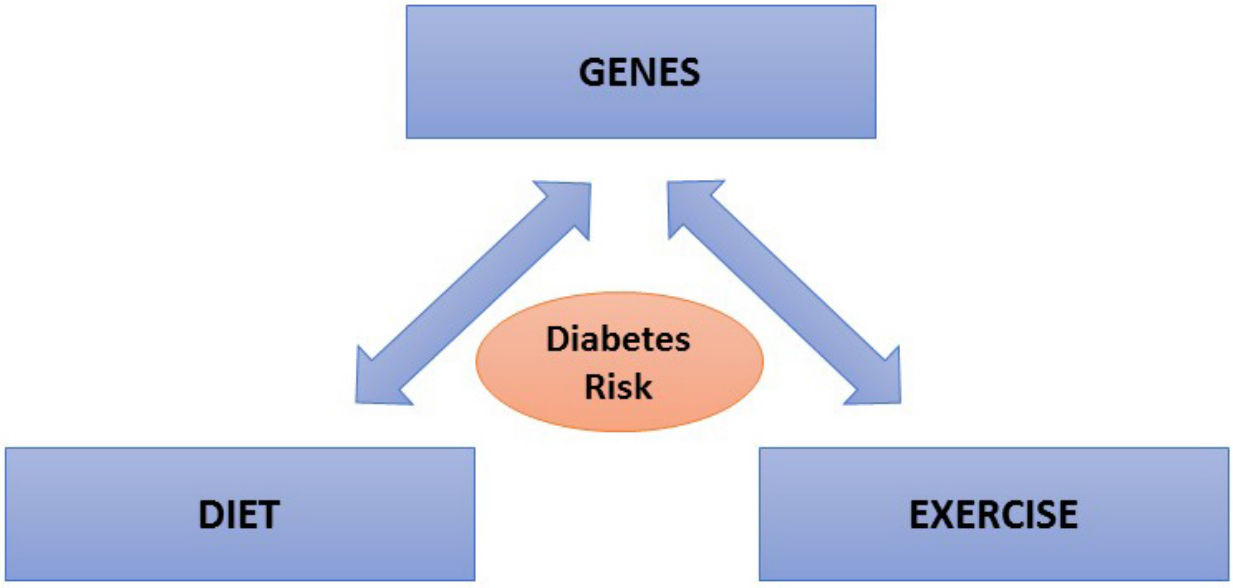

Fig. 1. Lifestyle may modify the glucose-raising effect of genes.

A combination of genetic and environmental factors contribute to impaired glucose homeostasis. A large number genetic variants associated with glycemic traits and type 2 diabetes development have been recently identified. In addition to genetic factors involved in impaired glucose homeostasis, lifestyle patterns, including dietary intake play a significant role in the pathogenic process. Glycemic control strategies include weight management as the primary nutritional strategy, accompanied by moderate physical activity. Evaluation of a dietary pattern (rather than single nutrients) and exercise status could provide a direct approach to the quantification of disease prevention. Information on personal genetic profile and lifestyle components are touted for potential contribution to personalized medicine.

In the present study we sought to evaluate the association of a healthy lifestyle pattern in the Greek population, by means of a preventive score, with glycaemic and adiposity traits and evaluate whether this lifestyle pattern modifies the association of known glucose-raising genetic variants on glycaemic traits.

According to our results there are favourable associations between adherence to a healthy lifestyle and lower glucose levels and adiposity indices. We found that fruits, juice consumption and vegetables consumption were significantly associated with lower glucose levels. Physical activity parameters showed a glucose-decreasing trend, while soft drinks and beverages were associated with increased glucose levels. Our results support the lowering impact of work and home-related physical activity on blood glucose levels. These findings could be useful for promoting healthy eating patterns physical activity, also aiming at a glucose homeostasis control.

We tested the hypothesis that a healthy lifestyle could modify the cumulative impact of the genetic background. Our results indicate a significant gene - lifestyle interaction on glucose levels in diabetes-free individuals. These findings strongly support the idea of lifestyle intervention in individuals with a genetic predisposition for increasing glucose levels.

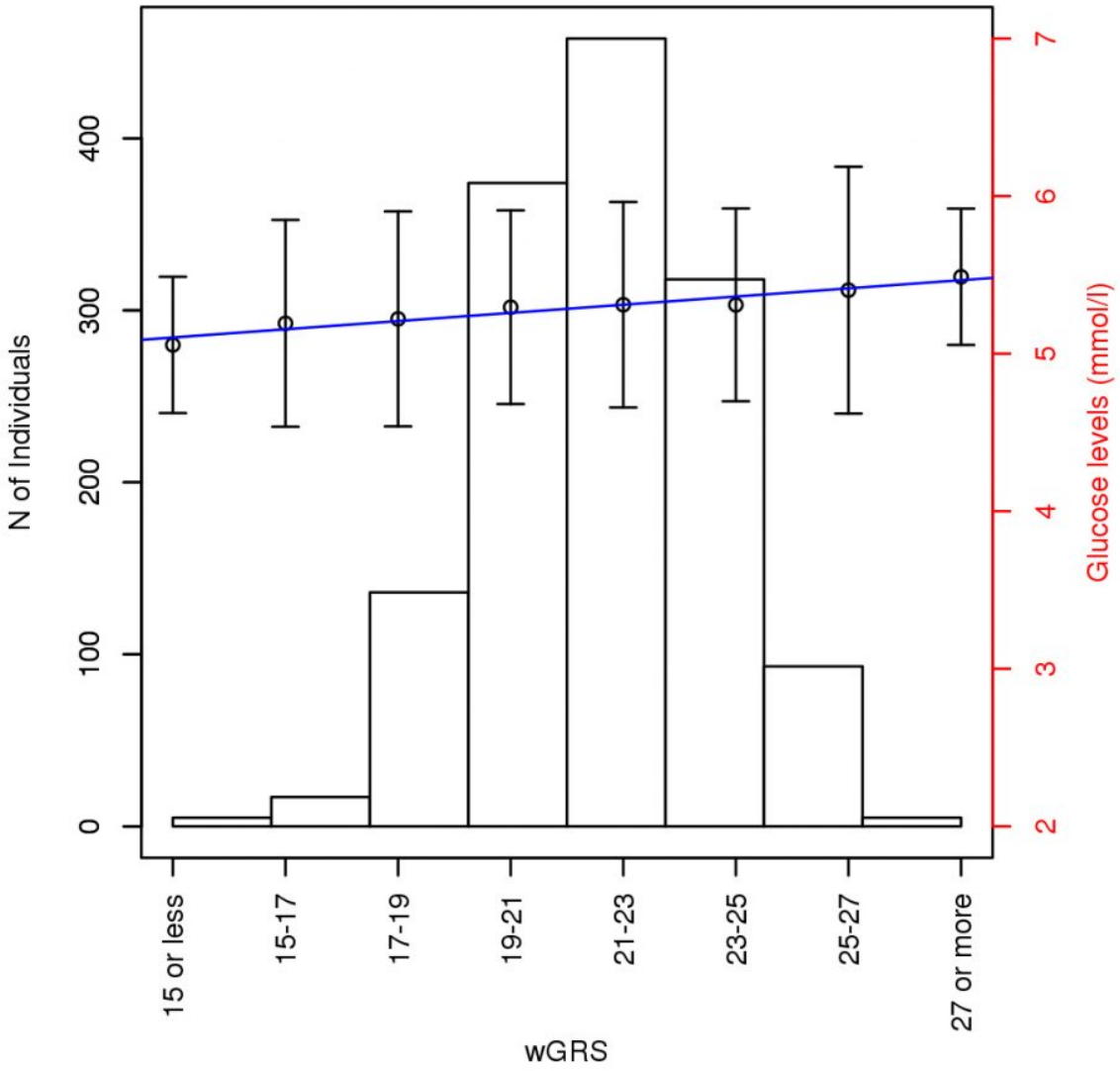

Fig. 2. Glucose levels increment by increasing number of known glucose-increasing loci, weighted by the published effect size. The bar plots show the average and standard error of glucose in mmol/L for each genotype score group (Right Y axis). The histogram denotes the distribution of individuals in every genotype score group (left Y axis).

The interaction studying is of great importance for the improvement of the accuracy in the assessment of both environmental and genetic impact and serve in prediction and customised recommendations for disease prevention. There is an immerse need for prevention strategies for diabetes to be focused on intensive lifestyle changes which could be cost effective. Lifestyle modification via physical activity and dietary intake could improve glycemic control and it is the most preferable first-line measure for the management of glucose levels.

In summary, screening of predisposing genes, associated with glycaemic traits, that demonstrate an attenuated impact under the influence of protective lifestyle behaviour, could contribute to better recommendations for glucose homeostasis control. Further research in this direction could contribute to a better comprehension of how dietary intake and physical activity recommendations could be customized to the individual's genetic background. Combination of these tools would be useful for the evaluation of gene-environment interaction and serve in prognosis, prevention and monitoring of glucose homeostasis.

Eirini Marouli
Department of Nutrition and Dietetics, School of Health Science and Education, Harokopio University, Athens, Greece
National and Kapodistrian University of Athens, Faculty of Biology, Athens, Greece

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