

Top Ten Things to Know Nutrigenomics, the Microbiome, and Gene-Environment Interactions

1. Nutrients and genes may impact cardiometabolic health through a variety of related mechanisms that can be studied through omics technologies, including RNA expression, epigenetic modifications, metabolites, lipids, proteins, and resident microbial communities.
2. While nutrition is a critical component in the prevention of cardiometabolic disease, studies are limited by difficulties in the accurate assessment of nutritional intake and day-to-day variations in diet.
3. The study of gene-diet interactions is crucial for garnering information that will allow clinical applications of early genetic diagnoses.
4. It's hypothesized that many of the effects of diet on cardiovascular disease (CVD) risk and outcomes are mediated by changes in gene expression; because of this, the use of global transcriptional profiling is an important tool in nutrigenomic studies.
5. Although it's known that many of the effects of diet on gene expression are mediated through epigenetic mechanisms and that dysregulation of epigenetic states plays a major role in diseases including CVD, details of these relationships have yet to be elucidated.
6. Metabolomics has significant potential as a tool to better understand how different dietary patterns affect metabolic pathways and, in addition, has the potential to soon be used to assess biomarkers of dietary intake in a way that could overcome some of the shortcomings of traditional nutritional assessment methods.
7. While the measurement of intermediate biomarkers, such as metabolites, lipids, and proteins, is a powerful approach to estimate CVD risk, dissecting causal and bystander effects is challenging and current measurement approaches may be misleading.
8. The microbiome has been identified as a potential risk factor for susceptibility to several chronic metabolic diseases; increased understanding of how microbial diversity and specific microbial species affect clinical phenotypes will be beneficial as interest in personalized approaches to nutrition and medicine continues to increase.
9. Precision medicine via dietary intervention has great potential. While examples are not yet available for complex CVD, some examples of routine genetics-based dietary modification currently used in practice include approaches for phenylketonuria and mutations leading to celiac disease.
10. Integrated omics approaches, combined with nutritional information, will improve the ability to identify relationships between diet and health. This will aid in the development of new therapeutic approaches, such as targeted modification of dietary intake, for the prevention and treatment of cardiometabolic disease.

Ferguson JF, Allayee H, Gerszten RE, Ideraabdullah F, Kris-Etherton PM, Ordovas JM, et al; on behalf of the American Heart Association Council on Functional Genomics and Translational Biology, Council on Epidemiology and Prevention, and Stroke Council. [Nutrigenomics, the microbiome, and gene-environment interactions: new directions in cardiovascular disease research, prevention, and treatment: a scientific statement from the American Heart Association](#) [published online ahead of print April 19, 2016]. *Circ Cardiovasc Genet*. doi: 10.1161/HCG.0000000000000030.