

# Chapter 4

## Evolving Dietetics Education to Respond to Emerging Technologies in Nutritional Genomics

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### **ABSTRACT**

*Nutritional genomics is a fast-growing area of precision medicine. It is expected that dietitians will be key players in this area. This chapter discusses the current state of industry, from research to the availability of commercial products, their regulation, and consumer perceptions. Current issues and controversies surrounding the readiness, availability, and delivery of this technology to consumers are examined, and finally, an education framework describing core competencies is presented. The framework aims to provide dietitians with the necessary tools to evaluate and make decisions on the potential for translation of this technology to clinical practice for disease prevention and management.*

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## **INTRODUCTION**

This chapter will examine emerging technologies in the field of nutritional genomics, the study of interaction between diet, the genome and health, and discuss the importance of evolving dietetics education in the context of dietitians being key players in the delivery of this technology to consumers. Although it has been argued that the evidence base for translating the outcomes of nutritional genomics research into personalized nutritional advice is immature, nutritional genomics tests are now available to the public and are being used in health care. Dietitians are well placed as leaders in the nutrition field to further the understanding of translation of the science into practice, and to provide guidance for the development and delivery of this technology in an evidence based way due to their expertise in nutrition and biomedical science. It is clear that in order for this to occur, dietetics education needs to evolve to enable dietitians to be competent and confident in all aspects of genetic driven nutrition care including accessing digital databases, ethical and legal considerations, interpreting complex genetic information contextualized within the nutrition care process, determining the clinical utility of various nutritional genetics tests for different clients, and effectively educating clients about the information that the data reveals.

## **BACKGROUND**

### **Nutritional Genomics**

Nutritional genomics is a term used to describe the bi-directional interaction between dietary components, the genome and health outcomes. It includes nutrigenomics which describes the effect of dietary components on the genome (via transcription, protein expression, epigenetic alterations, genomic stability) and nutrigenetics, which describes how individual genetic variation impacts the metabolic response to diet, potentially influencing health status and disease risk (Ferguson et al., 2016). It should be noted that the term nutrigenomics is sometimes used as an interchangeable inclusive term to describe nutritional genomics (Muller & Kersten, 2003).

The nutrigenomic effects of dietary components such as bioactive compounds, macronutrients and micronutrients have been confirmed in many human, animal and cell studies as have the effects of altering dietary energy content. For example, bioactive compounds such as flavonoids have been shown to alter the expression of genes in metabolic and other signalling pathways related to glucose homeostasis (Babu, Liu, & Gilbert, 2013). In animals, a high fat diet induces the adaptive response of hyperlipidemia and atherogenesis through the PPAR group of nuclear receptors,

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