In recent years, we learned from excellent experimental models that a complex machinery exists, which tightly controls the regulation of gene expression and the function of genes and their products.

Reprinted with permission from: Ann Nutr Metab 2012;60(suppl 3):38–43

Why Are Genetics Important for Nutrition? Lessons from Epigenetic Research
by Frank M. Ruemmele and Hélène Garnier-Lengliné

**Key insights**

This article summarizes the molecular mechanisms behind nutritional imprinting, i.e. where specific and early nutritional modifications may impact the regulation of gene expression either in the short or long term.

**Current knowledge**

Targeted nutritional intervention can modify gene expression on a permanent manner, as evidenced by epigenetic histone modifications or targeted DNA methylation. In addition, a very complex and rather new epigenetic regulatory mechanism by the way of non-coding microRNAs exists, meaning that the regulation is on a post-DNA level or ‘epigenetic’. Epidemiological data, such as the Dutch famine studies, suggest that targeted nutritional intervention might be causative for long-term effects on health, such as the increased risk of cardiovascular diseases and metabolic syndrome in this cohort. To date, the potential of positive nutritional modification on phenotype has been demonstrated solely through experimental animal models.

**Practical implications**

Based on the current understanding of the epigenetic regulation of gene expression, a new concept has emerged, indicating that specific early nutritional interventions during a short time frame might set the initial insult for the development of chronic disease decades later.

**Recommended reading**