

# Associations between diet-related diseases and impaired physiological mechanisms: a holistic approach based on meta-analyses to identify targets for preventive nutrition

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*In nutrition research, analyzing the relationship between a diet-related chronic disease and impaired metabolism is a common reductionist approach. Meta-analyses have enabled quantification of these relationships. There is, however, a need for more holistic approaches to determine the sequence of connections between diseases and associated physiological mechanisms. The objective of this exhaustive review was to collect scientific evidence – with priority given to quantitative reviews – published between 1950 and 2011 to assess the relationships between major diet-related chronic diseases and deregulated mechanisms. The results revealed that diabetes and obesity are the key diseases that lead to all other diet-related chronic diseases, while cancer, cardiovascular disease, skeletal disease, and sarcopenia are endpoint diseases. Liver disease, kidney disease, digestive disease, and mental illness are consequences as well as causes of other diet-related chronic diseases. All diseases have multifactorial causes, and most result from decreased antioxidant status, acid-base imbalance, increased inflammatory status, impaired carbohydrate/lipid/one-carbon metabolism, impaired functioning of neurons and DNA transcription, hypertension, and/or modified digestive microflora. Nutritional strategies that focus on the prevention of obesity and diabetes should be prioritized in order to reduce the prevalence of other major chronic diseases.*

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## INTRODUCTION

In 2008, approximately 65% of all deaths in France were attributed to the following diseases: cancer (29.6%), cardiovascular disease (CVD) (27.5%), diseases of the digestive tract (4.4%), or metabolic diseases (3.7%).<sup>1</sup> All of these disease types may potentially be triggered by chronically consuming an imbalanced diet, especially an energy-dense diet. Therefore, an unhealthy diet may be considered one of the leading causes of death in France and, more generally, in Western countries.

In many countries worldwide, diet-related chronic diseases are noncommunicable diseases that result from

the sustained deregulation of physiological mechanisms in response to malnutrition, mainly overnutrition. The Western lifestyle is characterized by excess energy consumption and underconsumption of plant-based foods that are rich in healthy, bioactive, protective compounds (i.e., a diet that includes too many snacks and refined products) as well as a sedentary way of life (television viewing, computing, low levels of physical exercise, etc.). In recent decades, this way of life has led to a rapidly expanding epidemic of diabetes and obesity, and the World Health Organization has estimated that approximately two-thirds of all deaths worldwide in 2010–2011 were caused by noncommunicable diseases.<sup>2</sup>

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