Toward a New Philosophy of Preventive Nutrition: From a Reductionist to a Holistic Paradigm to Improve Nutritional Recommendations[1]

Anthony Fardet* and Edmond Rock

Department of Human Nutrition, INRA, UMR 1019, UNH, CRNH Auvergne, Clermont-Ferrand, France; and Clermont Université, Université d'Auvergne, Unité de Nutrition Humaine, Clermont-Ferrand, France

ABSTRACT

The reductionist approach has been predominant to date in human nutrition research and has unraveled some of the fundamental mechanisms at the basis of food nutrients (e.g., those that involve deficiency diseases). In Western countries, along with progress in medicine and pharmacology, the reductionist approach helped to increase life expectancy. However, despite 40 y of research in nutrition, epidemics of obesity and diabetes are growing each year worldwide, both in developed and developing countries, leading to a decrease in healthy life years. Yet, interactions between nutrition-health relations cannot be modeled on the basis of a linear cause-effect relation between 1 food compound and 1 physiologic effect but rather from multicausal nonlinear relations. In other words, explaining the whole from the specific by a bottom-up reductionist approach has its limits. A top-down approach becomes necessary to investigate complex issues through a holistic view before addressing any specific question to explain the whole. However, it appears that both approaches are necessary and mutually reinforcing. In this review, Eastern and Western research perspectives are first presented, laying out bases for what could be the consequences of applying a reductionist versus holistic approach to research in nutrition vis-à-vis public health, environmental sustainability, breeding, biodiversity, food science and processing, and physiology for improving nutritional recommendations. Therefore, research that replaces reductionism with a more holistic approach will reveal global and efficient solutions to the problems encountered from the field to the plate. Preventive human nutrition can no longer be considered as "pharmacology" or foods as "drugs." *Adv. Nutr. 5: 430–446, 2014.*

Introduction

Research in human nutrition over the past 40 y has led to numerous relevant discoveries and to a comprehensive understanding of how food nutrients and other, nonenergetic, bioactive compounds affect human metabolism and the mechanisms underlying these effects. However, the prevalence of epidemics of diet-related chronic diseases, especially obesity, type 2 diabetes, osteoporosis, cardiovascular diseases, and cancers, dramatically increases worldwide each year (1–3). Why has the increased knowledge about metabolic mechanisms not also precipitated improvements in public health? Is there a link between the way research has been led in preventive nutrition and the failure to halt these epidemics? Should we persevere with reductionist nutritional approaches in the hope that one day we will stabilize and reverse the increasing number of people at risk of metabolic-related pathologies?

The primary objective of preventive nutrition is to help people live a long and healthy life—that is, to die in good health (or at least in the best possible health)—through nutrition. However, there is a problem with the criteria used to evaluate the health status of a population. For example, life expectancy in France is currently at least 85 y for women and ~79 y for men, with annual increases of ~3 mo (4). The same population is increasingly subjected to chronic diseases; thus, life expectancy without drugs or diseases—that is, "healthy life years" (HLYs)—is consistently decreasing or, to rephrase, the number of life years with chronic diseases is continuously increasing (5). From 2008 to 2010, HLYs decreased by ~12 mo in France, from 62.7 to 61.9 y for men and from 64.6 to 63.5 y for women (6). Thus, in the French population, a 1% net loss of healthy life occurred within a 2-y period despite compensating for drug-based longevity gains counteracting disease occurrence.

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* To whom correspondence should be addressed. E-mail: anthony.fardet@clermont.inra.fr.

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