

Exclusive reductionism, chronic diseases and nutritional confusion: the degree of processing as a lever for improving public health

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ABSTRACT

Exclusive reductionism in nutritional science consists of viewing foods as only the sum of nutrients. This position paper argues that the extreme application of this paradigm since 1950 has greatly contributed to confusion about a healthy diet among consumers and to the development of chronic diseases worldwide. First, history of nutritional sciences in Western countries shows that by approximately 1850, laboratory research had mainly been conducted by reducing foods to nutrients that were interchangeable from one food to another. Second, descriptive and experimental studies show that the increased prevalence of chronic diseases mainly derive from ultra-processed foods. With such foods being representative of a final output in the degree of food processing, the relevance of reformulating food versus developing less unstructured processed foods is discussed. Third, the reductionist validation of food additives, randomized controlled trials, and food scoring is also questioned. Additionally, epidemiological studies that associate dietary patterns with the risk of chronic diseases and that aggregate approaches in nutrition, technology, food science and food scoring appear to be more adapted for nutritional recommendations in society. It is concluded that a complementary holistic perspective is needed to communicate to society about diet/food health potential and to efficiently prevent populations from chronic diseases.

KEYWORDS

Chronic diseases; confusion; food matrix; food scores; holism; nutrient interactions; reductionism; research; ultra-processed foods

Introduction: the thesis defended

Nutrition is undoubtedly a discipline of great public interest, as demonstrated by the multiplicity of websites, magazine articles, recommended diets, marketed books about nutrition, different smartphone applications, food scoring methods and recommendations by research scientists, nutritionists and other experts in nutrition. However, this level of interest has led to confusion and strong contrasting views on recommendations, public narratives and scientific consensus, and the prevalence of chronic diseases continues to increase worldwide (Fardet and Rock 2014b, 2018; Fardet et al. 2015).

Confusion about food, food groups and dietary recommendations

Theoretically, based on the same corpus of scientific studies, recommendations are expected to be similar within and across countries and to have strong adherence of consumers. Instead, whether in food groups or diets, consumers can be advised differently, notably depending on the sources, whether academic or from private sector.

Concerning the national dietary guidelines of various countries, recommendations regarding the number of servings by food group and the presence or absence of a

particular food group may vary. For example, in 2019, there were no specific recommendations in Canada regarding dairy products (Santé Canada 2019) *versus* two dairy products/day in France (Ministère des Solidarités et de la Santé 2019). Otherwise, concerning the group of legumes, nuts and seeds, they have not been incorporated at the same time into national recommendations (Ministère des Solidarités et de la Santé 2019; Ministry of Health of Brazil 2014; Santé Canada 2019; U. S. Departments of Health and Human Services and Agriculture 2015). The same holds true for the inclusion of environmental considerations and sustainability criteria, which differ from one country to another (Fischer and Garnett 2016).

Regarding particular diets, advice generally comes from single scientific studies or from certain nutritionists, and it is not recommended at the country level. Such diets range from the Paleolithic diet (Eaton, Konner, and Cordain 2010), which involves avoiding cereal-, domestic meat- and dairy-based products, to raw foodism (Foster 2013), which involves avoiding cooked foods. To combat overweight and to deal with intolerances, the recommendations are large enough, ranging from avoiding all industrial foods to favoring a protein-rich diet (Dukan 2015; Joo et al. 2011), a ketogenic diet (*i.e.*, a high-fat, low-carbohydrate diet) (Correa and Cardoso 2019; Murphy and Jenkins 2019), gluten/lactose-free diets (El Khoury, Balfour-Ducharme, and Joye