

# Nutrient bioavailability and kinetics of release is a neglected key issue when comparing complex food versus supplement health potential

## Editorial

Today, in human nutrition, we know that at equal chemical composition, but with different structure, two foods may give very differential health effects, e.g. slow versus rapid carbohydrates. Indeed, health food potential is twice: nutrient density and food structure.<sup>1</sup> And food structure may well be more important than nutrient density.<sup>2</sup> In this way, it is interesting to note that ultra-processed foods are generally characterized by having lost their initial food structure through fractionation-recombination processes and their nutritional density through excessive refining, leading to the marketing of more and more energy-dense and poorly satiating foods. And diet-related chronic diseases epidemics worldwide are associated with a high and regular consumption of ultra-processed foods.<sup>3</sup>

What conditions first food effects on bioavailability are its physico-chemical and physical characteristics at nano-, micro- and macroscopic levels, be nutrient chemical structure, the bound to free compound ratio, interaction with other compounds such as protein and fiber networks, food density and porosity, and/or particle size.<sup>1</sup> Therefore, all comes down to technological processes that transform foods for the 'best' or for the 'worst'.<sup>4</sup> Generally, the more the food is unstructured through processes, the highest the kinetics of release of its macro-, micro- and phyto-nutrients, the extreme application of this being nutritional supplements.

Besides technological processes and their impact on food structure, today, food scientists try - via reverse engineering - to control the digestive fate of foods, mostly modifying food structure.<sup>5</sup> So, one important issue to consider is: Are differential kinetics of nutrient releases associated or correlated with subsequent differential and positive health effects? Concerning starch, the answer is well known as illustrated by the definitions of slow, rapid and resistant fractions; and knowing, for each fraction, its health effects.<sup>1</sup> But, before developing reverse engineering, it seems of the utmost importance to better know how food structure modification impacts health via modifying nutrients kinetics of release, then bioavailability. For example, is the increased bioavailability of polyphenols from 5 to 10% in cereal products accompanied by real health benefits or is it harmful for human organism? What will mean, in return, that the natural bioavailability of polyphenols would be the good one for human health, even if this scientific view is somewhat deterministic?

The issue of bioavailability and kinetics of release is therefore very important because so many functional foods, nutraceuticals and nutritional supplements have been marketed without addressing this question. Indeed, in such products, added micro- or phyto-nutrients are generally largely more bioavailable than in natural foods. And this issue was largely ignored.

This is probably why it is not surprising that the added nutritional

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value of supplements has been so importantly questioned.<sup>6,7</sup> For example, main systematic reviews, meta-analyses and scientific reports about supplements have failed to show convincing protective effects on human health, and sometimes harmful effects.<sup>8-11</sup> In addition to the lost of synergy with other bioactive compounds naturally present in complex foods and the use of supra-nutritional doses, probably that the bioavailability effects of these products have not been sufficiently considered seriously!

Nevertheless, this is not to mean that modifying bioavailability of food compounds is useless. No, but it must be adequately realized, notably after having collected sufficient information about differential health impacts following different bioavailability percentages and different kinetics of release within digestive tract; which has been well studied with starch and the well known concept of slow versus rapid carbohydrate, a useful concept for type 2 diabetic subjects.<sup>12</sup>

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## Conflict of interest

Author declares that there is no conflict of interest.

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