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# The degree of processing of foods which are most widely consumed by the French elderly population is associated with satiety and glycemic potentials and nutrient profiles†

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Food processing impacts both food structure and nutritional density. The effect of food structure on satiety and glycemic potentials is well recognized. However, the association between processing, satiety and glycemic potentials and nutrient profiles has not been much studied, especially in the diets of the elderly. Therefore, this study aimed at exploring relations between the level of food processing, consumption and nutrient profiles and satiety and glycemic potentials among 6686 French elderly people (≥65 years). Dietary assessment was realized through a web-based 24 h dietary record tool. Among a total of 2688 foods, 280 generic foods were aggregated based on a consumption threshold of at least 5% by the population. The satiety potential was calculated using the Fullness Factor equation, and the glycemic potential using the glycemic index and the glucose glycemic equivalent. Foods and dishes were ranked according to an adapted international NOVA classification as raw/minimally-processed (G1), processed (G2) and ultra-processed (G3). ANOVA and correlation analyses showed that the more food is processed, the lower its satiety potential and nutrient density and the higher its glycemic impact, especially when comparing G1 and G3. Besides, the foods consumed in the greatest quantity daily tend to be the most satiating, and ultra-processed foods were among the less frequently consumed both in terms of percentage and daily quantity (around two-fold difference between minimally- and ultra-processed foods). In conclusion, because it is partly related to health food potential, the degree of processing, especially for ultra-processed products, should be taken into consideration more when evaluating consumption profiles of different populations.

## Introduction

Today, the supply of ultra-processed foods is dramatically increasing worldwide in developed and developing countries to the detriment of raw unprocessed and/or minimally processed foods.[1,2] The degree of food processing is crucial because it plays an important role in both food structure and nutritional composition.[3] Food structure parameters would

probably play a more important role than nutritional composition in defining food health potential, notably to fight against diet-related chronic diseases.[3] To say it differently, two foods with identical nutritional composition but that differ in terms of matrix structure may not have the same nutritional and physiological effects. Thus, it is likely that processed food can modulate food intake through modulation of satiety potential, notably because highly processed foods generally contain less fiber, an ingredient known for its satiating effect on humans.[4] Indeed, in a first preliminary study based on 98 ready-to-eat foods, it was shown that the more foods are processed, the higher their glycemic impact and the lower their satiety potential.[5] Food structure also controls nutrient bioavailability within the human organism with subsequent differential metabolic effects on the long term,[6] notably with regards to glycemic impact.[7] More generally, there is an increasing number of original studies describing associations between the degree of food processing and health and nutritional status, including excess weight and obesity,[8] a supply in

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