

## **Citrus juice concentrate obtained by coupling enzymatic liquefaction with microfiltration: carotenoid bioaccessibility**

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Citrus juices represent a significant dietary source of carotenoids which could contribute with vitamins and polyphenols to their beneficial health effects. These effects could be enhanced by concentrating carotenoids at room temperature thanks to crossflow microfiltration (CMF)<sup>1</sup>. Often associated with enzymatic treatment, this innovating process allowed to increase carotenoid content at low temperature. Nevertheless, it modifies the juice characteristics and so, probably the bioaccessibility of carotenoids. In that context, our aim was to investigate the effect of enzymatic liquefaction coupled to CMF on carotenoid bioaccessibility. In order to obtain an optimal  $\beta$ -carotene/ $\beta$ -cryptoxanthin/lycopene profile, a formulation consisting of a mix of 60/40 *Citrus clementina* and *C. paradisi* juices was chosen. Carotenoids in the juice and the concentrate obtained were analyzed by HPLC. Their individual bioaccessibility was assessed using an *in vitro* digestion model. In order to better understand the process impact on bioaccessibility, granulometry, viscosity and pectin content were chosen as structural indicators.

Enzymatic liquefaction improved the bioaccessibility of carotenoids. The enzymatic degradation of cell walls led to a decrease of particle size, viscosity and pectin content that contributed to increase carotenoid bioaccessibility. CMF allowed also to decrease the average diameter of insoluble particles but at the same time increased considerably the viscosity and pectin content of the concentrate. These antagonistic effects explained the slight negative impact of CMF on carotenoid bioaccessibility. However, CMF was particularly relevant because it allowed to multiply by 9 the carotenoid content in the concentrate. The results obtained clearly proved the interest to combine enzymatic liquefaction with CMF not only to increase the performance of the process but also to improve the nutritional quality of the product, combining carotenoid content and bioaccessibility. This study contributed to a better understanding of the relationships between carotenoid bioaccessibility and structural characteristics of this type of product.

<sup>1</sup> Polidori, J., Dhuique-Mayer, C., & Dornier, M. (2018). Crossflow microfiltration coupled with diafiltration to concentrate and purify carotenoids and flavonoids from citrus juices. *Innovative Food Science and Emerging Technologies*, 45, 320-329.