

Fruit Carotenoids affect the bioaccessibility and cellular uptake of β -carotene from orange fleshed sweet potato.

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Context and motivation of the work: To fight against vitamin A deficiency in developing countries, consumption of orange fleshed sweet potato (OFSP) which contains high concentrations of beta-carotene (provitamin A) is currently promoted. Indeed, clinical studies show that the vitamin A status was increased in children fed with OFSP (1). However, information on how well provitamin A was absorbed by intestinal cells is unclear and depends of bioaccessibility.

Bioaccessibility of carotenoids depends on various factors included food matrix, food preparation method, presence of fiber and dietary fat or other microconstituants in the food (2). This last point and especially the interaction between carotenoids could be well documented. Moreover, few studies reports informations about the interaction through food matrix. The objective of this study is to assess the effect of carotenoids from fruits juices on the bioaccessibility and cellular uptake of BC from OFSP by using the *in vitro* digestion coupled with Caco-2 cell culture model.

Materiel and methods: To simulate gastric and small intestinal phases of digestion, boiled OFSP (5g) mixed with fruit juice samples (30 ml) in saline solution were incubated at 37 °C (pH 4, pepsin, 30 minutes). Then, the pH was adjusted 6 and bile extract and pancreatin were added for 30 minutes. Micelles were collected in aqueous fraction after centrifugation and filtration (0.22 μ m). A micellarisation test without food matrix was also investigated (equimolar quantity of carotenoids, 5 ml of 100 mg/ml bile, 17h, 37 °C). Digestat from *in vitro* digestion were incubated (1h30) on Caco-2 TC7 cells cultivated 21 days on wells in order to study the intestinal absorption. Extraction and HPLC analysis of carotenoids from micelles and from OFSP food products were carried out according previous study (3).

Results: Effect of fruit juice on the micellarization of beta-carotene from OFSP showed that addition of Pink grapefruit reduces BC micellarization whereas kiwi juice and Clementine increased *all-trans* BC, but decreased *13-cis* BC. Lycopene, beta-cryptoxanthine and lutein carotenoids as standard carotenoids were added to OFSP instead of fruit juices during *in vitro* digestion and confirmed some carotenoid interactions particularly for lycopene. Micellarization test showed that lycopene decreased and BCX increased. Cellular uptake of *all-trans* BC from digested OFSP (36%) and *13-cis* BC (13 %) significantly decreased in presence of fruit juices.

Conclusion: This study shows that carotenoids from fruit juice modify the bioaccessibility and cellular uptake of BC from OFSP. However, further investigations are needed to identify other components responsible of interactions in order to show efficacy of OFSP for maintaining adequate vitamin A status in a meal.

References

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