Poster 50 Structural approach to design high carotene emulsions from exotic fruits Pitanga (*Eugenia uniflora)* and Buriti (*Mauritia flexuosa*)

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This research seeks to better understand the food matrix microstructure that impacts on carotenoid bioaccessibility of two Brazilian native fruits Pitanga and Buriti while developing emulsioned oral delivery systems of its compounds. Buriti is a fruit produced by an Amazonia palm tree. Its pulp is very rich in β-carotene which is approximately 400 µg/g fresh weight[1]. Pitanga originates from Atlantic forest and has high amounts of lycopene (approx. 71 µg/g in ripened fruit)[1]. These hydrophobic plant pigments have antioxidant, anti-inflammatory, and anticancer activity. However, these desired health benefits are limited by bioaccessibility aspects, mainly their physical location and structure in fresh fruits and its products[2]. Emulsions have been largely studied as oral delivery systems for hydrophobic bioactives compounds such as β-carotene. Also, the concept of excipient foods is an innovation in food science and technology research[2]. Buriti and Pitanga freeze dried pulps were submitted to the following experiments: 1) experimental design testing ultraturrax and ultrasound for carotene release; 2) emulsion formation by Tween 80 or Whey Protein Isolate at 1 % and 2 % surfactant concentration; 3) microstructure study of fresh pulps and emulsions. For carotene determination, it was applied a microscale extraction and HPLC-PDA analysis based on Porcu and Rodriguez-Amaya (2008)[3]. Processed pulp and fruit emulsions microstructure was assessed by microscopy (brightfield, fluorescence and confocal), rheology and turbidity. Main results showed that ultrasound processing have more impact on tissue fragmentation, cell disruption and carotene release than ultraturrax ($p<0.05$) and is indispensable for fruit emulsion formation. Microscopy study clearly elucidate that most carotenes are entrapped inside cell walls and must be released for incorporation into lipid micelles. Ultraturrax (15000 rpm) and ultrasound (20 kHz, 40 % amplitude) treatment released up to 50 % of initial carotenoid. After emulsion formation, surfactant do not link only to the internal oil and external water, it also interacts with the carbohydrate from cell walls mainly cellulose that are in suspension – forming a gel-like structure – that was demonstrated by confocal microscopy. The obtained Buriti and Pitanga emulsions have high potential for the development new products with more bioaccessible β-carotene and lycopene.

References:

1 Rodriguez-Amaya, D. B., Kimura, M., Amaya-Farfán, J. (2008) Tabela Brasileira de Composição de Carotenoides em Alimentos: Fontes brasileiras de carotenoides. Brasília, DF: Ministério do Meio Ambiente, Secretaria de Biodiversidade e Floresta, 100p

2 McClements, D. J., Xiao, H. (2014) Excipient foods: designing food matrices that improve the oral bioavailability of pharmaceuticals and nutraceuticals. *Food Funct.*, 5,1320–1333

3 Porcu, O. M., Rodriguez-Amaya, D. B. (2008) Variation in the Carotenoid Composition of the Lycopene-Rich Brazilian Fruit *Eugenia uniflora* L.. *Plant Foods Hum Nutr*, 63, 195–199