OC30 - 25014 - IN-VITRO BIOACCESSIBILITY OF BETA-CAROTENE IN LIPIDIC SYSTEMS

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Abstract

β-carotene's bioactivity is usually compromised by low and highly variable bioaccessibility. This can be dependent of the matrix structure that will be responsible for its delivery. Different systems have been developed and proposed as carriers of lipophilic bioactive compounds but their performance and behavior under gastrointestinal conditions has been scarcely studied. In the present study four different optimized lipidic systems were loaded with the same amount of β-carotene and its *in-vitro* bioaccessibility was studied using static model simulation. Two bio-based nanoemulsions, produced using high-energy homogenization followed by ultrasound-assisted emulsification, one was stabilized with 15 % (w/w) of tween-20 in a 15:85 (O/W) ratio and the other with 3 % (w/w) of whey protein isolate (WPI) dissolved in water in a 5:95 (O/W) ratio. One oleogel (OG) and one hibrid gel were also produced. The first was produced using 6% w/w beeswax as gelator for the sunflower oil and the second was developed under mechanical mixing, combining the OG and a hydrogel (2% w/w aqueous solution of sodium alginate) in a 20:80 ratio.

In-vitro digestion of lipidic systems was performed following the INFOGEST standard protocol. Visual inspection, confocal microscopy and free fatty acids quantification of the digested samples were performed. The amount of β-carotene in the micellar phase, after digestion, was quantified by HPLC, after solvent extraction. The bioaccessibility varied from high in the WPI nanoemulsion > tween nanoemulsion > hybrid gel > oleogel. The degree of lipolysis was higher for oleogel and hybrid gel and lower for the nanoemulsions, irrespective of the surfactant used. Digested samples were visualized under confocal microscopy showing β-carotene (auto- fluorescent) incorporated into mixed micelles (nilered stain). The type of lipidic system proved to be determinant regarding β-carotene bioaccessibility.