

Beta-carotene loaded oleogels' texture and disintegration behaviour during *in-vitro* digestion

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Food products are digested in different ways; rigidity and different textures are characteristics that will influence how digestion will occur. Absorption of lipids and lipid-soluble components from food is quite complex and factors like lipid composition, breakdown of food matrices, emulsion droplet size and lipid solubilization within mixed micelles of bile salts will influence the digestive process (Dickinson, 2014). In this work, two types of edible oleogels loaded with beta-carotene (0.01 % w/w) have been developed. The oleogels were produced through the gelling process of long chain triglycerides (oil phase) with a sterol-mix (formed by gamma-oryzanol and beta-sitosterol) or beeswax as the two oil gelators. We report on the morphological and textural characteristics, as well as on the cytotoxicity and digestive behaviour of the oleogels during a digestion simulation (i.e. mouth, stomach and small intestine) using a static harmonized *in-vitro* digestion method (Minekus et al., 2014). Textural results showed that sterol-based oleogels have an average hardness of 0.6 N, which is approximately 4 times higher than the values recorded for beeswax oleogels. Both gels presented adhesiveness values without significative differences. *In-vitro* digestion allowed concluding that both types of oleogels showed structural disintegration, namely during the final two steps that correspond to gastric and intestinal phase (as evaluated by visual inspection and fluorescence microscopy analysis). In addition, beeswax oleogels' structure was less resilient than oryzanol oleogels. Cytotoxicity tests, using a human epithelial cell line (Caco-2) with PrestoBlue assay, showed that both undigested sterol- and beeswax-based oleogels

(without beta-carotene) were not cytotoxic, up to 48 hours of contact . Beeswax-based oleogels loaded with beta-carotene showed the same non-toxic behaviour under the same conditions.

Future work will be performed aiming at establishing the relationship between gels' disintegration and beta-carotene bioavailability.

References

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