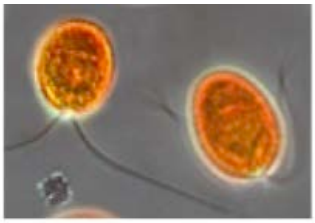

Project title:

Formulation of delivery systems for carotenoid-rich extracts from microalgae

Aim

The investigation will aim at developing and preparing different delivery systems for carotenoid-rich extracts from the microalga *Dunaliella Salina.* Delivery systems to be investigated will include o/w nanoemulsions, solid lipid nanoparticles and loading in (meso)porous carrier materials. Target prototype formulations will include nutraceutical drink formulations or other oral delivery formulations. This work will take place within the framework of the EC funded project D-Factory (https://www.d-factoryalgae.eu/2-eng-the-project.html).

Background

Dunaliella salina is one of only a few microalgae that are currently cultivated commercially and sold as a lyophilised or spray-dried algal food additive. It produces a range of compounds of great interest in pharmaceutical, cosmetic, nutraceutical and other applications. Among these compounds are different carotenoids which are found at concentrations as high as 14% w/w in *D. Salina*. Alpha-carotene, β-carotene, lycopene, lutein and zeaxanthin are some of the most well-known carotenoids. High interest in dietary carotenoids stems from their antioxidant properties and ability to alleviate chronic diseases. However, carotenoids are very prone to oxidative degradation by a number of factors. Ingredients and processing conditions used for the production of carotenoid-containing formulated products (e.g. beverages, fortified foods, soft-gel capsules tablets) have a major influence on the chemical stability and well as bioavailability of carotenoids. Further, the choice of delivery system used to incorporate hydrophobic carotenoids in formulations, e.g. oil in water (o/w) nanoemulsions, solid lipid nanoparticle dispersions or dispersions of porous carrier materials will also influence the chemical stability, release profile and eventual bioavailability if the active carotenoids. Numerous studies in the open literature report on the effect of different parameters on the chemical stability of single, pure carotenoids in different type of delivery formulations. However, those results are difficult, if not impossible in some cases, to extrapolate to complex mixtures of carotenoids, such as those being produced during biorefinery separation processes. These are the aspects to be addressed in the present study were carotenoid-rich hydrophobic extracts from *D. Salina* being produced by scCO2 extraction will be incorporated into different prototype delivery systems, in which chemical stability and release profile of carotenoids will be assessed.

Project plan

The work to be carried out will involve the following activities:

- Investigation of the solubility/dispersability properties of carotenoid-rich extracts in different suitable carrier oils/solvents.

- Preparation of nanoemulsion delivery systems for carotenoid-rich extracts via microfluidisation methods.
- Design and preparation of solid-lipid nanoparticles delivery systems for carotenoid-rich extracts via emulsification routes (microfluidisation).
- Development of protocols for loading of carotenoid-rich extracts into (meso) porous carrier materials.
- Modification/revision of the use of analytical methods such as UV-spectroscopy, colorimetry and/or HPLC for preliminary assessment of carotenoids stability upon storage as well as their release profile from the different prototype delivery systems produced.

Time plan

The project is estimated to start in early January and be finalized before June 31.

Location:

Department of Chemistry Materials and Surfaces, Stockholm facilities (KTH campus)

Remuneration: 20 000 SEK

Applications and Contact Persons at SP:

Interested candidates should send their CV and grade certificates to:

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About SP Technical Research Institute of Sweden:

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