BICOSOMES INCLUDING CAROTENES: CHARACTERIZATION AND ANTIOXIDANT EFFICACY

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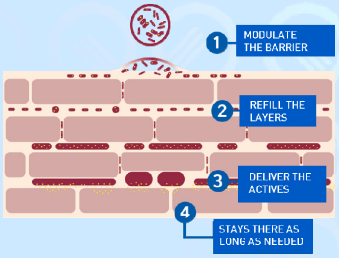
INTRODUCTION:

Bicosome® is a new skin delivery system that has powerful properties of repairing the harming effects of aggressive treatments, reinforcing the skin barrier function, and improving elasticity and firmness of the skin, with long-lasting activity Bicosomes protect and deliver active ingredients in targeted layers of the skin[1]. The figure at right illustrates how the **Bicosome®** works. Carotenes are antioxidant (AO) compounds that improve the skin defense against the free radicals induced by solar radiation[2,3]. However, AOs are inherently unstable, and if they are not properly formulated, their effects are quickly lost. The development of a new Bicosome® cosmetic ingredient including carotenes would protect the molecules and potentiate their effects, boosting their capacity to prevent the formation of free radicals and reducing photodamage.
The **AIM** of this work is to characterize the new **Bicosome system including carotenes** and to evaluate its antioxidant and **protective** properties against infrared (IR) and ultraviolet (UV) radiation.



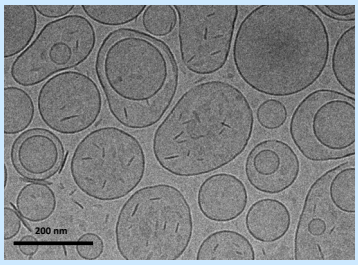
EXPERIMENTAL SECTION:

Bicosomes were formulated with 0.25-5% carrot oil. The systems were characterized by electron microscopy (Cryo-TEM) and dynamic light scattering (DLS). Dermatomed skin 500 µm thickness was incubated with Bicosome including carotenes overnight. Electron paramagnetic resonance (EPR) using spin trap 5,5-Dimethyl-1-Pyrroline-N-Oxide (DMPO) probe was applied to evaluate the formation of free radicals in the skin produced by UV light. Collagen of skin irradiated with a IR lamp was evaluated by small angle X-ray scattering (SAXS) at ALBA synchrotron.

RESULTS

CHARACTERIZATION of BICOSOMES INCLUDING CAROTENES

Cryo-TEM and DLS techniques showed that the *Bicosomes including carotenes* contains disc-shaped and vesicle aggregates with mean diameters around 25 nm for discs and 250 nm for vesicles.



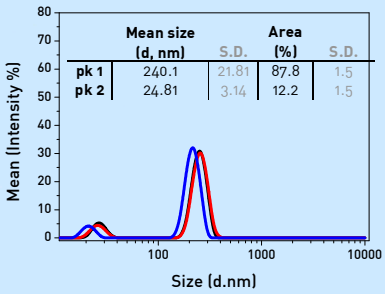


Fig. 1: Cryo-TEM picture (left) and size distribution (right) calculated by DLS

PROTECTIVE PROPERTIES of BICOSOMES INCLUDING CAROTENES against IR and UV RADIATION

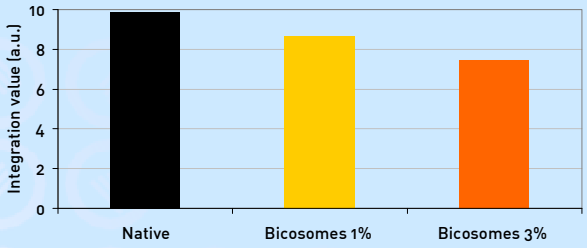


Fig. 2: EPR results for native skin and skin treated with Bicosomes containing 1 and 3% carrot oil.

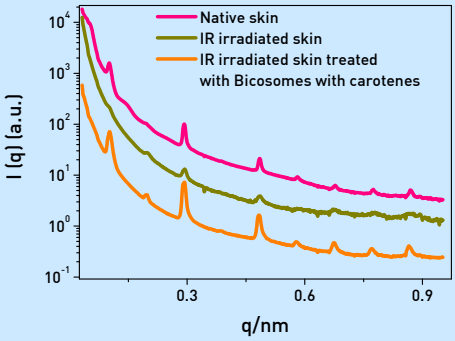
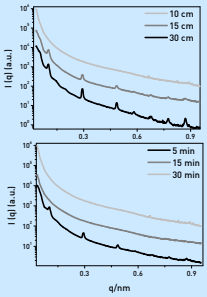


Fig. 3: SAXS patterns of skin irradiated with IR lamp at several conditions (right)

Fig. 4: SAXS patterns of native skin, IR irradiated skin and skin IR irradiated previously treated with Bicosomes containing carotenes (10 cm, 10 min)(left)



EPR using the spin trap DMPO showed that after **UV irradiation**, the formation of **free radicals is reduced** in skin samples treated with Bicosomes including carotenes. This effect is concentration dependent: the higher the concentration of carotenes in Bicosomes, the greater the antioxidant effect on the skin.

The skin collagen presents a SAXS pattern with characteristic peaks. Degradation of collagen is viewed as a loss of peaks because of a disorganization of the molecule. **IR radiation** damages the skin[4] showing a disorganization of skin collagen. Bicosomes including carotenes have proven to **protect skin collagen** against harmful effects of IR radiation as shows Fig. 4 (orange curve).

IN CONCLUSION, the results obtained with Bicosomes including carotenes show that this system reduces the formation of free radicals promoted by UV radiation in the skin and protects skin collagen from the degradation induced by IR radiation. Therefore, it could be useful to prevent the signs of photoaging providing protection against UV and IR radiation in new solar cosmetic formulations .

References:

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