Contribution ID: **108** Type: **Oral presentations**

Bicosomes as skin delivery systems: A study based on Fourier-transform infrared microspectroscopy using synchrotron radiation

Wednesday, 17 June 2015 15:40 (20 minutes)

Skin delivery is a challenge due to the strong barrier function of this tissue. Bicosomes are phospholipid systems formed by spherical vesicles and discoidal structures able to modulate skin barrier [1]. In this work the penetration into skin of a model molecule incorporated in bicosomes via Fourier-transform infrared spectroscopy (FTIR) using synchrotron radiation was studied.
This technique was previously used to evaluated skin composition and location of different substances in this tissue [2]. The coupling of a synchrotron radiation source and an IR microscope allows monitoring at higher spatial resolutions, rending possible the spatially resolved measurements of the superficial layer of skin, the stratum corneum (SC).

The model molecule used was a rhenium tris-carbonyl tag coupled to a C12 aliphatic chain (C12Re(CO)3). This lipophilic molecule can penetrate cells and target organelles for IR imaging and exhibits a specific IR signature with absorption bands between 1920 and 2020 cm-1, which not interfere with the skin vibrations [3]. Additionally, skin delivery of the C12Re(CO)3 dissolved in dimethylsulfoxide (DMSO), a well-known penetration enhancer, was also studied. Hence, the capacity of bicosomes to promote the penetration of this molecule could be evaluated and compared with a usual enhancer.

The FTIR results showed that the C12Re(CO)3 penetrated deeper in the skin when incorporated in bicosomes than when dissolved in DMSO (Fig. 1). The application of this molecule using bicosomes resulted in 60% retained in the SC and 40% in the epidermis (Epi), deeper than the SC. When the C12Re(CO)3 was applied by means of DMSO 95% was retained in the SC and 5% reached the Epi [4].

Therefore, synchrotron FTIR microspectroscopy allows monitoring the skin permeation of bicosomes containing C12Re(CO)3 into skin. The distribution of C12Re(CO)3 may be representative of the distribution of molecules with similar physicochemical characteristics when applied in bicosomes. The C12Re(CO)3 is a good tag for skin permeation studies due to it can be differentiated from skin vibrations. Our results demonstrate that bicosomes are promising vehicles incorporating lipophilic molecules with dermatological interest into skin.

References

[1] Biophysical Journal, 99, (2010), 480-488.
[2] Journal of Controlled Release, 97, (2004), 269-281.
[3] Chemical Communications, 48, (2012), 7729-7731.
[4] Colloid and Surfaces B: Biointerfaces, doi: 10.1016/j.colsurfb.2015.04.045.

Caption (s) - Add figures as attached files (2 fig. max)

Fig. 1 IR maps obtained from skin samples treated with C12Re(CO)3 derivative incorporated in bicosomes (A) and dissolved in DMSO (B). The C12Re(CO)3 scale goes from blue to red, indicating no amount in blue colour and high amount in red colour. The concentration of C12 Re(CO)3 is 1% w/v in both vehicles.

Primary author: Ms FERNANDEZ, Estibalitz (IQAC-CSIC)

Co-authors: Prof. DE LA MAZA, Alfonso (IQAC-CSIC); Dr SANDT, Christophe (Synchrotron Soleil); Dr POLICAR, Clotilde (Ecole Normale Supérieure); Dr LAMBERT, François (Ecole Normale Supérieure); Dr RODRÍGUEZ, Gelen (Bicosome S.L.); Dr CÓCERA, Mercedes (Bicosome S.L.); Dr LOPEZ, Olga (IQAC-CSIC); Ms HOSTACHY, Sarah (Ecole Normale Supérieure); Dr CLÈDE, Sylvain (Ecole Normale Supérieure)

Presenter: Ms FERNANDEZ, Estibalitz (IQAC-CSIC)

Session Classification: Session 4 - VII AUSE Congress 2015

Track Classification: VII AUSE Congress