Apiterapi ve Doğa Dergisi
Journal of Apitherapy and Nature
www.dergipark.gov.tr/jan

Direct Visualization of Artepillin C into Fibroblast Cells via CARS Microscopy

Wallance M. PAZIN[1,2*], Vita SOLOVYEVA[1], Tibebe LEMMA[2], Bjarke JØRGENSEN[3], Carlos José L. CONSTANTINO[2], Jonathan BREWER[1]

[1] Department of Biochemistry and Molecular Biology (BMB), University of Southern Denmark, Odense, Denmark
[2] Department of Physics, School of Sciences and Technology, São Paulo State University, Presidente Prudente – SP, Brazil
[3] NewTec Engineering A/S, Odense, Denmark

Received/Geliş Tarihi: 08/10/2018, **Accepted**/ Kabul Tarihi: 19/10/2018
***Corresponding author** /Yazışılan yazar

Abstract

Artepillin C, the major component of the Brazilian green propolis, has become the subject of great biological interest among all the secondary metabolites found in that propolis, especially due to its anticancer property. Biophysical studies have shown that the presence of two prenylated groups in the molecular structure of Artepillin C enhances its affinity for lipophilic environment[1], which is in agreement with biological assays reported in the literature, suggesting that Artepillin C is absorbed through cell membranes[2]. The purpose of this study was to obtain for the first time a direct visualization of Artepillin C internalization into fibroblast cells by means of Coherence Anti-Stokes Raman Scattering (CARS), a powerful microscopy technique with a combination of two pulsed laser beams which induces a vibrational motion of a specific compound, generating an intrinsic image[3]. A detailed vibrational characterization of Artepillin C has been carried out using Raman microspectroscopy and surface-enhanced Raman scattering (SERS) in combination with quantum chemical calculation based on LANL2DZ/B3LYP level of theory. The success use of CARS microscopy was confirmed by collecting Artepillin C images from dry and hydrated films of the compound, while the intrinsic images of Artepillin C internalized into the cells was compared to confocal fluorescence microscopy images by using a cell-membrane staining compound. With effect, this study shows for the first time a direct visualization of the major compound of green propolis into the cells by means of CARS microscopy.

Acknowledgements: *FAPESP (2017/23426-4) and DaMBIC (University of Southern Denmark).*

References:

1. Pazin, W. M. et al. (2017) Interaction of Artepillin C with model membranes. Eur. Biophys. J. 46: 383–393.
2. Paulino, N. et al. 2008 Anti-inflammatory effects of a bioavailable compound, Artepillin C, in Brazilian propolis. Eur. J. Pharmacol. 587: 296–301.
3. Evans, C. L. & Xie, X. S. (2008) Coherent Anti-Stokes Raman Scattering Microscopy: Chemical Imaging for Biology and Medicine. Annu. Rev. Anal. Chem. 1: 883–909.