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Electrospun amphiphilic nanofibers for stigmasterol-loaded delivery systems

Khan Viet Nguyen[1,2], Ivo Laidmäe[2], Karin Kogermann[2], Andres Meos[2], Duc Viet Ho[1], Ain Raal[2], Hoai Thi Nguyen[1], Jyrki Heinämäki[2]

[1]Faculty of Pharmacy, Hue University of Medicine and Pharmacy, Hue University, Hue City, Vietnam
[2]Institute of Pharmacy, Faculty of Medicine, University of Tartu, Tartu, Estonia

Stigmasterol (STIG) among the most plentiful plant sterols has been demonstrated to possess a wide range of biological activities. However, the therapeutic use and efficacy of this plant sterol are limited due to its poorly water-soluble characteristics. To overcome these challenges, the present study was undertaken to formulate novel amphiphilic electrospun nanofibers (NFs) loaded with STIG, phosphatidylcholine and polyvinylpyrrolidone. The chemical structure of STIG, surface morphology, physical solid state, and drug–polymer interactions of NFs were characterized using nuclear magnetic resonance (NMR) spectroscopy, scanning electron microscopy (SEM), Fourier transform infrared (FTIR) spectroscopy, X-ray powder diffraction (XRPD), and differential scanning calorimetry (DSC), respectively. The drug release of NFs was investigated *in vitro* using an in-house dialysis-based dissolution method. The STIG-loaded NFs presented a nano-scale size of 297 ± 56 nm. The liposomes with a diameter of 436 ± 64 nm were spontaneously formed as the NFs were exposed to water. The entrapment efficiency of liposomes was 57%. In conclusion, the present amphiphilic NFs loaded with STIG enable a promising alternative approach for drug delivery of the present poorly water-soluble plant sterol.

Supervisors: Prof. Ain Raal, Prof. Hoai Thi Nguyen, Prof. Jyrki Heinämäki