SYNTHESIS OF NEW NANOCARRIERS SUITABLE FOR LOADING BIOACTIVE PHYTOCHEMICALS AND EXTRACTS

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ABSTRACT

The clinical use of plants' secondary metabolites are overwhelmed by many difficulties due to many factors such as poor water solubility, instability and their severe toxic effects on healthy tissues. Variable approaches were introduced to overcome these difficulties including encapsulation of active phytochemicals with suitable nanocarriers such as liposomes. Recently, new nanocarrier formulations composed of inexpensive and less toxic lipids are being investigated for their possible application in drug delivery systems, as an alternative for phospholipid liposomes. In the current investigation, new nanocarriers' formulations composed of safe and inexpensive constituents (polymers and lipids) were successfully formulated and their ability to incorporate phytochemicals was investigated. These new formulations included coconut oil-polyethylene glycol-polyethyleneimine (**coconut-PEI-PEG**) liposomes, and cholesterol-monoalkyleated amphiphiles (**chol-myristic**; **Chol-SA, Chol-STA**) liposomes. These new formulation were used for encapsulating some selected phytochemicals including quercetin, thymoquinone, rutin and two flavones isolated from *Salvia dominica*, namely, salvigenine and pectolinangenin and their encpausaltion capacity was investigated by HPLC. The unloaded and loaded formulated nanocarriers were characterized by their thermal behavior, zeta potential and particles size using dynamic light scattering, their morphology using scanning electron microscopy and transmission electron microscopy. Moreover, the antiproliferative activity of both loaded and unloaded formulations was assayed against MCF-7, T47D and fibroblast cell lines. The results obtained indicated similar physichochemical properties between these introduced formulations and phospholipid liposomes. In addition, quercetin and thymoquinone were the most successfully encapsulated ingredients. The entrapment efficiency for quercetin –coconut oil liposome was (92-99%), diameters (524-585 nm) and zeta potential (29.72- 49.7 mV) at pH 6.8. The entrapment efficiency for thymoquinone-coconut oil liposomes were (90-94%), diameters (148-204nm) and zeta potential (78mV) at

pH 7.6. The obtained antiproliferative activity for both quercetin –coconut oil liposome and thymoquinone- coconut oil liposomes was high (more than 85%) with moderate kinetic release (after 48 hr).