Accepted Manuscript

Research paper

Effective delivery of hydrophobic drugs to breast (MCF-7) and Liver (HepG2) cancer cells: A detailed investigation using Cytotoxicity assays, fluorescence imaging and flow cytometry

Danushika C. Manatunga, Rohini M. de Silva, K.M. Nalin de Silva, Gathsaurie Neelika Malavige, Dulharie T. Wijeratne, Gareth R. Williams, Chanika D. Jayasinghe, Preethi V. Udagama

PII: S0939-6411(17)31346-2
DOI: https://doi.org/10.1016/j.ejpb.2018.04.001
Reference: EJPB 12731

To appear in: *European Journal of Pharmaceutics and Biopharmaceutics*

Received Date: 22 November 2017
Revised Date: 30 March 2018
Accepted Date: 2 April 2018

Please cite this article as: D.C. Manatunga, R.M. de Silva, K.M. Nalin de Silva, G. Neelika Malavige, D.T. Wijeratne, G.R. Williams, C.D. Jayasinghe, P.V. Udagama, Effective delivery of hydrophobic drugs to breast (MCF-7) and Liver (HepG2) cancer cells: A detailed investigation using Cytotoxicity assays, fluorescence imaging and flow cytometry, *European Journal of Pharmaceutics and Biopharmaceutics* (2018), doi: https://doi.org/10.1016/j.ejpb.2018.04.001

Effective delivery of hydrophobic drugs to breast (MCF-7) and Liver (HepG2) cancer cells: A detailed investigation using Cytotoxicity assays, fluorescence imaging and flow cytometry

Danushika C. Manatunga[a], Rohini M. de Silva[a*], K. M. Nalin de Silva[a,b], Gathsaurie Neelika Malavige[c], Dulharie T. Wijeratne[c], Gareth R. Williams[d], Chanika D. Jayasinghe[e], Preethi V. Udagama[e]

a. Department of Chemistry, University of Colombo, Colombo 00300, Sri Lanka. Email:rohini@chem.cmb.ac.lk

b. Sri Lanka Institute of Nanotechnology (SLINTEC), Nanotechnology & Science Park, Mahenwatte, Pitipana, Homagama 10206, Sri Lanka

c. Center for Dengue Research, Department of Microbiology, Faculty of Medical Sciences, University of Sri Jayewardenepura, 10250, Sri Lanka

d. UCL School of Pharmacy, University College London, 29−39 Brunswick Square, London WC1N 1AX, United Kingdom

e. Department of Zoology, University of Colombo, Colombo 00300, Sri Lanka.

Abstract

This study aimed to develop a drug carrier system consisting of a polymer containing hydroxyapatite (HAp) shell and a magnetic core of iron oxide nanoparticles. Doxorubicin and/or curcumin were loaded into the carrier via a simple diffusion deposition approach, with encapsulation efficiencies (EE) for curcumin and doxorubicin of 93.03 ± 0.3% and 97.37 ± 0.12% respectively. The co-loading of curcumin and doxorubicin led to a total EE of 76.02 ± 0.48%. Release studies were carried out at pH 7.4 and 5.3, and revealed higher release was at pH 5.3 expressing the potential application in tumor microenvironments. Cytotoxicity assays, fluorescence imaging and flow cytometry showed the formulations could effectively inhibit the growth of MCF-7 and HEpG2 cancer cells, being more potent than the free drug molecules both in dose and time dependent manner. Additionally, hemolysis tests and cytotoxicity evaluations determined the drug-loaded carriers to be non-toxic towards non-cancerous cells. These formulations thus have great potential in the development of new cancer therapeutics.

Key words: Doxorubicin, curcumin, Hydroxyapatite, Iron oxide, MCF7, HEpG2