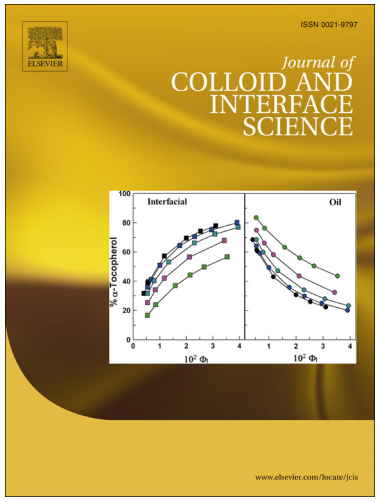

Enhancing delivery and cytotoxicity of resveratrol through a dual nanoencapsulation approach

Ernest Soo, Sachin Thakur, Zhi Qu, Siddharth Jambhrunkar, Harendra S. Parekh, Amirali Popat

PII: S0021-9797(15)30267-8
DOI: http://dx.doi.org/10.1016/j.jcis.2015.10.022
Reference: YJCIS 20808

To appear in: *Journal of Colloid and Interface Science*

Received Date: 28 July 2015
Revised Date: 7 October 2015
Accepted Date: 8 October 2015

Please cite this article as: E. Soo, S. Thakur, Z. Qu, S. Jambhrunkar, H.S. Parekh, A. Popat, Enhancing delivery and cytotoxicity of resveratrol through a dual nanoencapsulation approach, *Journal of Colloid and Interface Science* (2015), doi: http://dx.doi.org/10.1016/j.jcis.2015.10.022

Enhancing delivery and cytotoxicity of resveratrol through a dual nanoencapsulation approach

Ernest Soo[a§], Sachin Thakur[a§], Zhi Qu[a], Siddharth Jambhrunkar[b], Harendra S. Parekh[a] and Amirali Popat*[a,b]

[a]*School of Pharmacy, the University of Queensland,20 Cornwall St, Brisbane , Australia. Fax:+617 3346 1999; Tel: +617 3346 1870*
[b]*Mucosal Diseases Group, Mater Research Institute – The University of Queensland, Translational Research Institute, 37 Kent St, Woolloongabba, QLD 4102, Australia.*

[§]*These authors contributed equally to the preparation of the manuscript.*

**Correspondence: Dr. Amirali Popat, School of Pharmacy, the University of Queensland, 20 Cornwall St, Brisbane, QLD, 4102, Australia; Email: a.popat@uq.edu.au*

Abstract

Despite the known anticancer potential of resveratrol, its clinical applications are often hindered by physicochemical limitations such as poor solubility and stability. The encapsulation of resveratrol in formulations such as polymeric nanoparticles and liposomes has shown limited success. This study aimed to develop and optimize a novel drug carrier by co-encapsulating pristine resveratrol alongside cyclodextrin-resveratrol inclusion complexes in the lipophilic and hydrophilic compartments of liposomes, respectively by using a novel dual carrier approach. The particle size, polydispersity index and zeta potential of the final formulation were 131 ± 1.30 nm, 0.089 ± 0.005 and -2.64 ± 0.51 mV, respectively. Compared to free resveratrol and conventional liposomal formulations with drug release profile of 40-60%, our novel nanoformulations showed complete (100%) drug release in 24 hours. The formulation was stable for 14 days at 4°C. Moreover, we also studied the *in vitro* cytotoxicity of resveratrol encapsulated liposomes in HT-29 colon cancer cell lines. The cytotoxicity profile of our liposomes was observed to be dose dependent and enhanced in comparison to free resveratrol (in DMSO). Our study demonstrates that co-encapsulation of pristine resveratrol along with its cyclodextrin complex in liposomal formulations is a plausible option for the enhanced delivery of the hydrophobic chemotherapeutic agent.

Keywords: resveratrol, cyclodextrin, liposome, anticancer, nanoparticles, colorectal cancer