Yung-Chih Kuo et al., Drug Des 2015, 4:2
http://dx.doi.org/10.4172/2169-0138.S1.007

OMICS International
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International Conference and Expo on
Drug Discovery & Designing
August 11-13, 2015 Frankfurt, Germany

Targeting delivery of etoposide to inhibit the growth of human glioblastoma multiforme using lactoferrin- and folic acid-grafted poly(lactide-*co*-glycolide) nanoparticles

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Lactoferrin (Lf) and folic acid (FA) were crosslinked on poly(lactide-co-glycolide) (PLGA) nanoparticles (NPs) for transporting etoposide across the blood–brain barrier (BBB) and treating human brain malignant glioblastoma. Lf- and FA-grafted PLGA NPs (Lf/FA/PLGA NPs) were employed to permeate the monolayer of human brain-microvascular endothelial cells (HBMECs) regulated by human astrocytes and to inhibit the multiplication of U87MG cells. Lf/FA/PLGA NPs showed a satisfactory entrapment efficiency of etoposide and characteristics of sustained drug release. When compared with PLGA NPs, the permeability coefficient for etoposide across the BBB using Lf/FA/PLGA NPs increased about twofold. The antiproliferative efficacy against the growth of U87MG cells was in the following order: Lf/FA/PLGA NPs > FA/PLGA NPs > PLGA NPs > free etoposide solution. In addition, the targeting ability of Lf/FA/PLGA NPs was evidenced by immunostaining of Lf receptor on HBMECs and folate receptor on U87MG cells during endocytosis. Lf/FA/PLGA NPs with loaded etoposide can be a promising anticancer pharmacotherapy to enhance the delivery of etoposide to malignant brain tumors for preclinical trials.

Biography

Yung-Chih Kuo is a professor at the Department of Department of Chemical Engineering, National Chung Cheng University. His research interests are focused on biomaterials, drug delivery system, tissue engineering, blood–brain barrier, stem cell differentiation, nerve regeneration, cancer therapy, Alzheimer's disease treatment, biophysics, and colloid and interface science. In these fields, he has authored or coauthored over 100 SCI journal papers. He won Young Scholar Award in 2003 and Outstanding Research Award in 2010-13. He is also an associate editor of J. Taiwan Inst. Chem. Eng. (Impact factor 2.637) and an editorial board member in 11 international journals.

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