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Neuroprotection against apoptosis of SK-N-MC cells using RMP-7- and lactoferrin-grafted liposomes carrying quercetin

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A drug delivery system of quercetin (QU)-encapsulated liposomes (LS) grafted with RMP-7, a bradykinin analogue, and lactoferrin (Lf) was developed for permeating the blood–brain barrier (BBB) and rescuing degenerated neurons as an Alzheimer's disease (AD) pharmacotherapy. This colloidal formulation of RMP-7-Lf-QU-LS was employed to traverse human brain-microvascular endothelial cells (HBMECs) regulated by human astrocytes (HAs) and to treat SK-N-MC cells after an insult with cytotoxic β-amyloid (Aβ) fibrils. We found that surface RMP-7 and Lf enhanced the permeability for QU across the BBB without inducing strong toxicity and damaging the tight junction. In addition, RMP-7-Lf-QU-LS significantly reduced Aβ-induced neurotoxicity and improved the viability of SK-N-MC cells. Compared with free QU, RMP-7-Lf-QU-LS could also significantly inhibit the expression of phosphorylated p38 and phosphorylated tau protein at serine 202 by SK-N-MC cells, indicating an important role of RMP-7, Lf and LS in protecting neurons against apoptosis. RMP-7-Lf-QU-LS are promising carriers in targeting the BBB to prevent Aβ-insulted neurodegeneration and can be potential for managing AD in future clinical application.

Biography

Yung Chih Kuo is a Professor at National Chung Cheng University. His research interests are focused on biomaterials, nanomedicine, tissue engineering, blood–brain barrier, cancer therapy, nerve regeneration, spinal cord injury and stroke treatment, and Alzheimer's and Parkinson's disease therapy. He has authored over 140 SCI journal papers. He is a Fellow of Royal Society of Chemistry (UK) and an Honor Member of Phi Tau Phi Society. He has won Best Paper Award in 2016 and 2008, Tsai-Teh Lai Award in 2015, Special and Talented Scholar Award in 2013-15, Outstanding Research Award in 2013, and Young Scholar Award in 2003.

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