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An angiogenesis driven peptide loaded drug delivery nanoparticle for ischemic heart disease targeting therapy

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Ischemic heart diseases (IHD), an inflammatory disease, is the leading cause mortality and morbidity all over the world. Currently, treatments of cardiovascular diseases are lowing blood lipid and lowing blood pressure to prevent heart attack or stroke, lack an efficiency targeting treatment drug for IHD. This study produced a self-assemble theranostic nanoparticles for IHD-targeted treatment by targeting P-selectin located on endothelial cells at inflammatory IHD. In this study, a biocompatibility of protamine/fucoidan based peptide-loaded drug delivery system average 130nm in-diameter of nanoparticles was developed. Fluorescence microscopy demonstrated that protamine/fucoidan nanoparticle could target P-selectin on PMA-induced inflammatory HUVEC. Furthermore, nanoparticle loaded with angiogenesis enhance peptide could accurately target to inflammatory HUVEC and then stimulating the angiogenesis of targeted HUVEC. FTIR, circular dichroism (CD) and isothermal titration calorimetry (ITC) was used to characterize the nanoparticles. Negative zeta potential (-34mV) indicated that fucoidan explosion on the surface of nanoparticles, therefore enable it target to P-selectin. As well as, the targeting nanoparticles was pH-sensitive, which can be utilized to selective drug release at the acidic inflammatory microenvironment. Embedding gadolinium to nanoparticle would enable nanoparticle to be imaged for magnetic resonance imaging (MRI) of inflammatory HUVEC. In conclusion, protamine/fucoidan self-assembling nanoparticle have a promising future to be developed into a theranostic drug loaded targeting nanoparticle, which can be targeting therapeutic application for IHD.

Biography

Tsai-Mu Cheng has completed his PhD from National Chiao Tung University, and Postdoctoral studies from National Chiao Tung University, and Visiting Research Fellow of National research council, Canada. Currently, he is an Assistant Professor at Graduate Institute of Translational Medicine, College of Medicine and Technology, Taipei Medical University, Taiwan. He has published more than 18 papers in SCI journals and has been serving as an Editorial Board Member of several journals.

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