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Solid lipid nanoparticles carrying chemotherapeutic drug across the blood-brain barrier through insulin receptor-mediated pathway

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Carmustine (BCNU)-loaded solid lipid nanoparticles (SLNs) were grafted with 83-14 monoclonal antibody (MAb) (83-14 MAb/BCNU-SLNs) and applied to the brain-targeting delivery. Human brain-microvascular endothelial cells (HBMECs) incubated with 83-14 MAb/BCNU-SLNs were stained to demonstrate the interaction between the nanocarriers and expressed insulin receptors (IRs). The results revealed that the particle size of 83-14 MAb/BCNU-SLNs decreased with an increasing weight percentage of Dynasan 114 (DYN). Storage at 4°C for 6 weeks slightly deformed the colloidal morphology. In addition, poloxamer 407 on 83-14 MAb/BCNU-SLNs induced cytotoxicity to RAW264.7 cells and inhibited phagocytosis by RAW264.7 cells. An increase in the weight percentage of DYN from 0% to 67% slightly reduced the viability of RAW264.7 cells and promoted phagocytosis. Moreover, the transport ability of 83-14 MAb/BCNU-SLNs across the blood-brain barrier (BBB) enhanced with an increasing weight percentage of polysorbate 80. 83-14 MAb on MAb/BCNU-SLNs stimulated endocytosis by HBMECs via IRs and enhanced the permeability of BCNU across the BBB. 83-14 MAb/BCNU-SLNs can be a promising antitumor drug delivery system for transporting BCNU to the brain.

Biography

Chun-Yuan Shih-Huang is a researcher at the Department of Chemical Engineering, National Chung Cheng University. His current research is focused on using solid lipid nanoparticles entrap chemotherapeutic drug to across blood-brain-barrier.

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