

International Conference on **Emerging Cell Therapies**

October 1-3, 2012 DoubleTree by Hilton Chicago-North Shore, USA

EGFR antibody conjugated mesoporous silica nanoparticles for cytosolic phospholipase A2 targeted nonsmall lung cancer therapy

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We developed a targeted anticancer drug delivery system based on epidermal growth factor receptor-conjugated mesoporous silica spheres combining receptor-mediated targeting moieties. Mesoporous silica nanoparticles functionalized by surface hyper branching polymerization of poly(ethylene imine), PEI, were further modified by introducing both fluorescent and EGFR (EGFR) ligands, with the aim of specifically targeting cancer cells. The internalization of the particles in cell lines expressing different levels of epidermal growth factor receptor was studied. Flow cytometry was used to quantify the mean number of nanoparticles internalized per cell. Four times more particles were internalized by cancer cells expressing epidermal growth factor receptor as compared to the normal cells expressing low levels of the receptor. Pyrrolidine-2, an anticancer drug, was introduced into MSNs. The release of Pyrrolidine-2 from MSN-EGFR had a sustained release pattern, and the Pyrrolidine-2 loaded MSN-EGFR exhibited greater cytotoxicity, apoptosis and cPLA2 activity than free Pyrrolidine- 2 and Pyrrolidine-2 loaded MSNs due to the increase of cell uptake of anticancer drug delivery vehicles mediated by the EGFR receptor. In vivo toxicity assessment showed that both nanocarrier of mesoporous silica spheres (40 mg/kg, single dose) and Pyrrolidine-2-MSN-EGFR (20 mg/kg) had low systematic toxicity in healthy BALB-c mice. The Pyrrolidine-2-MSNEGFR (20 mg/kg, intravenously) showed greater antitumor activity with about 18% enhanced tumor inhibition rate compared with Pyrrolidine-2 and Pyrrolidine-2-MSN on the lung cancer subcutaneous model. Therefore, we conclude that epidermal growth factor receptor-conjugated mesoporous spheres have potential for targeted anticancer drug delivery for cancer therapy.

Biography

S.Sundarraj has completed his Ph.D from Bharathiar University. He is Senior Research Fellow in DST Nanomission project at Bharathiar University. He has published eight research papers in reputed journals and serving as an editorial board member of repute. He has written one book chapter. He has attended varies national and international conference.

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