Pharmaceutica-2013
3rd International Conference and Exhibition on
Pharmaceutics & Novel Drug Delivery Systems
April 8-10, 2013 Hilton Chicago/Northbrook, USA

Peptide labelled liposomes as target selective delivery systems: In Vitro and In Vivo studies

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Abstract

This study addresses novel liposome composition approaches to specifically target tissues overexpressing peptide receptors. New liposomes and other supramolecular aggregate structures are externally decorated with targeting peptides: Bombesin, Neurotensin, Octreotide, CCK, and others. Different approaches to derivatize external surface of liposomes with bioactive peptides are discussed.

Specifically, a new bombesin analog peptide (BN-AA1) is used to decorate the external surface of doxorubicin loaded liposomes. The amphiphilic peptide derivative (*Mon*Y-BN-AA1) containing the bombesin analog peptide BN-AA1, a hydrophobic moiety with two C18 alkyl chains, polyethylenglycole (PEG) spacers, and the chelating agent DTPA, has been synthesized by solid-phase methods. Liposomes have been obtained by co-aggregation of *Mon*Y-BN-AA1 with 1,2-distearoyl-sn-glycero-3-phosphocholine (DSPC). The structural and biological properties of these target selective drug delivery systems are studied.

Liposomes with a DSPC/MonY-BN-AA1 (97/3 molar ratio) composition showed a mean diameter of 136.3 ± 42.4 nm and a polydispersity index of 0.20 ± 0.05. High doxorubicin (Dox) loading was obtained with the remote pH gradient method using citrate as the inner buffer. In vivo studies on the therapeutic efficacy of DSPC/MonY-BN-AA1/Dox targeted liposomes were performed in PC-3 xenograft bearing mice. Treatment with DSPC/MonY-BN-AA1/Dox targeted liposome formulations showed tumour growth inhibition compared to control animals treated with non-targeted DSPC/Dox liposomes or saline solution. For the new studied formulation, DSPC/MonY-BN-AA1/Dox, the maximum effect was observed 19 days after treatment (tumour growth inhibition was 43 % compared to DSPC/Dox liposomes, and 59 % compared to saline group).

Biography

Giancarlo Morelli is full Professor of Chemistry at School of Pharmacy – University of Naples "Federico II", Italy. He completed his PhD in Chemistry at University of Naples in 1980 and was postdoc at ETH Zurich (CH). He was a Basolo Student at Nortwestern University – Evaston, Chicago, in 1987. Presently he is Director of CIRPeB, the Interuniversitary Center for Research on Bioactive Peptides and CEO of a spin-off company devoted to targeted Drug Delivery. He has published more than 150 papers in reputed journals and he is author of several patents.