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A targeted drug delivery nanosystem to hepatocellular carcinoma

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Hepatocellular Carcinoma (HCC) is one of the most frequent cause of cancer-related mortality worldwide. Combination of different chemotherapeutics drugs may offer advantages for the treatment of HCC. Nanotechnology has made exceptional headway, emerging as a revolutionary platform to treat a wide variety of tumors, mainly due to prolonged drug release, as well as increased cell internalization. In this work, we have developed a drug delivery system, a hybrid nanoparticle formulation, which allows the specific delivery into HCC cells. The hybrid nanoparticle comprises a core of PLGA coated by a lipidic envelope constituted by 1-palmitoyl-2-oleoyl-sn-glycero-3-phosphocholine; cholesterol and 1,2-distearoyl-sn-glycero-3-phosphoethanolamine-N-[methoxy(polyethylene glycol)-2000] (PEG) with a specific ligand (GalNac) covalently attached. The obtained nanosystems were characterized by transmission electron microscopy, dynamic light scattering, zeta potential analysis and differential scanning calorimetry, showing a mean diameter (150 nm) and a surface charge (-25 mv) suitable for *in vivo* applications. The hybrid nanoparticle enables the release of two drugs demonstrated through release studies of fluorescent probes and drugs in dialysis. The presence of GalNac (a specific ligand to the asialoglycoprotein receptor that is overexpressed in HCC) allowed the internalization of the nanosystems and the release of the drugs preferentially in HCC cells, as demonstrated by flow cytometry and confocal microscopy. This new nanosystem represents an added value in the fight against the global scourge of hepatocellular carcinoma.

Biography

Henrique Faneca is principal investigator at Centre for Neuroscience and Cell Biology, and invited assistant professor at University of Coimbra. He received is PhD degree in Biochemistry from Coimbra University in 2005. The main focus of his research are the development of lipid- and polymer-based nanosystems for gene and drug delivery into target cells and the generation of new antitumor strategies, involving different gene therapy approaches either per se or in combination with chemotherapeutic agents. Henrique Faneca is author of more than 45 scientific papers corresponding to over 1500 citations and to an h-index of 19.

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