ISSN: 2952-8100

Membrane Engineered Mesenchymal Stem Cells: A Biomimetic Paradigm against Notorious Cancers

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Abstract

Photodynamic therapy (PDT) has emerged as a promising, inexpensive and non-invasive treatment paradigm for delivering photosensitizer to tumour cells. A photochemical process can produce reactive oxygen species (ROS) upon light stimulation, causing permanent annihilation of tumor cells.

Methodology & Theoretical Orientation:

The stem cell-based biomimetic systems was developed for an influential theranostic paradigm for the transport of photosensitizer loaded nanoparticles to tumour cells. In vitro characterization, tumor migration, tumor penetration, photo induced cytotoxicity under dark and irradiated conditions were investigated in 3D tumor model.

Findings:

The indocyanine green nanocarrier loaded mesenchymal stem cells displayed a significant tumor-taxis, infiltration into the tumor cells and a substantial tumour destruction after photodynamic stimulation.

Conclusion and Significance: These findings suggest that this biomimetic technology might be valuable option not just for cancer treatment but also for the variety of other biomedical applications. However, in vivo investigation may further strengthen the applicability of this novel system.

Biography

Dr. Imran Tariq has completed his Ph.D. and Postdoc in the field of Pharmaceutical Nanotechnology and Gene delivery at the Department of Pharmaceutics and Biopharmaceuticals, University of Marburg, Germany, under the supervision of Prof. Dr. Udo. Bakowsky.

Currently, he is working as Assistant Professor at the Punjab University College of Pharmacy, University of the Punjab, Lahore, Pakistan since January 1, 2013.

His area of research includes the; Development of colloidal drug formulations based on polymeric carrier systems; Development of modern biodegradable Nanoparticles and Liposome-based systems; Optimization and characterization of non-viral nano-carriers for therapeutic gene delivery; Surface modification of particulate system for drug targeting using aptamers and ADAM8 antibody ligand-based systems; Photodynamic therapy, ultrasound triggered chemotherapy and their combination; Development of stem cell-based photodynamic and Gene therapy approaches; 3D tumor modeling and bioprinting of tumor cells; Biodistribution and acute in vivo toxicity studies in rodents.

Received: July 31, 2022; **Accepted:** August 05, 2022; **Published:** November 11, 2022