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Aptamer modified PLGA nanoparticles for the site specific tumor targeting of Sorafenib

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Targeting ErbB receptors has become a popular tool for drug delivery to overcome the downstream cytoplasmic signaling mechanisms. The cascade of these reactions, RAS-MAPK and PI3K-Akt are responsible for cell proliferation and anti-apoptotic ways of cell growth and resistance to already approved antibody and drug therapies against these receptors. Among other approaches of cell targeting, use of aptamers has become one of the major choices because of their selective targeting and low immunogenicity. Aptamer can easily be synthesized chemically. The current project involved the use of Sorafenib loaded biodegradable PLGA nanoparticles prepared by solvent evaporation method. The surface of these particles was coupled with aptamer (aH3) against ErbB3 using EDC/NHS. For physico-chemical characterization, particles size, zeta potential and shape was determined before and after the surface modification. Antiproliferation assay was conducted using ErbB3 positive MDA-MB-231 and ErbB3 negative SKOV-3 cell lines. Cell migration and displacement was checked by scratch test and agarose gel method, using EGFR and NRG1 as positive control. Cellular uptake studies were evaluated using confocal laser scanning microscopy (CLSM). A decrease in cell viability was observed after incubation with aptamer modified nanoparticles in case of MDA-MB-231 cells. The opposite was observed in SK-OV-3 cells due to the absence of ErbB3 receptors. Scratch tests performed with modified nanoparticles revealed a change in the migration pattern of the cells depending upon the presence or absence of the ErbB3 receptors. CLSM results showed the receptor mediated intracellular uptake of nanoparticles. It was thus obvious from the results that the specificity of aptamer can be used for targeted drug delivery.

Biography

Muhammad Yasir Ali has done masters in Pharmaceutics from The Islamia University of Bahawalpur, Pakistan and was working in GC University Faisalabad, Pakistan in Faculty of Pharmaceutical Sciences. Currently, he is doing his PhD at the Philipps University Marburg, Germany.

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