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N-myc and C-myc targeted siRNA gene silencing in neuroblastoma and carcinoma cell lines using hollow PLGA nanoparticles

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Inhibition of human neuroblastoma and carcinoma cells proliferation by suppression of proto-oncogene by small interfering RNA (siRNA) was studied. The proto-oncogene, MYC family participates in control of cell proliferation, differentiation and tumorigenesis. The viral and non-viral techniques are two types of approaches in Gene delivery. Delivery approaches using non-viral agents like metal nanoparticles, magnetic nanoparticles, polymeric nanoparticles, liposomes are widely used for gene knockdown in RNA interference. However the key challenge of complete delivery, biodegradability and toxicity still exists. Here, hollow; nearly mono-dispersed and FDA approved (polymer; poly lactide-co-glycolic acid. 50:50) PLGA nanoparticles is used as carriers for siRNA delivery. The cell penetrating peptides-PLGA HNPs-siRNA nanoparticles were selectively taken up into cells via endocytosis resulting in enhanced gene silencing compared to naked siRNA (72 nMol siRNA was used). Silencing studies were conducted using RT-Real time PCR and apoptosis studies were carried on using flow cytometry. PLGA-HNPs were characterized using Scanning and Transmission Electron Microscopy, Dynamic Light Scattering and Zeta potential analysis. The cell proliferation and viability assays confirmed that there is 97% of reduction in cell dividing activity. Confocal analysis confirms the delivery and uptake of HNPs inside the nucleus of the cancer cells. The usage of PLGA HNPs using cell-penetrating peptides could delivery almost 100% of siRNA safely inside the nucleus resulting in site targeted gene silencing in cancer cells.

Biography

Archana Raichur currently is pursuing her Doctoral course, final year in Toyo University, Japan under Prof. D Sakthikumar. She has completed Master's in Philosophy with Distinction from University of Pune, India in Medical Sciences and currently working on gene therapy research using nanotechnology.

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