

4th International Conference on **Nanotek & Expo**

December 01-03, 2014 DoubleTree by Hilton Hotel San Francisco Airport, USA

Strategist PLGA nano-capsules to deliver siRNA for inhibition of carcinoma and neuroblastoma cell lines by knockdown of proto-oncogene

Archana M Raichur, Toru Mizuki, Yutaka Nagaoka, Kazunori Kato, Toru Maekawa and D Sakthi Kumar
Toyo University, Japan

Unexpurgated and site targeted delivery of small interfering RNA (siRNA) that can silence the expression of disease related genes is still a great challenge in nano-gene delivery field. siRNA cellular/nuclear uptake, intracellular transport and endosomal release could critically contribute in improvement of delivery methods and development in RNAi therapeutics. Delivery approaches using non-viral agents like metal nanoparticles, magnetic nanoparticles, polymeric nano-particles, liposomes are widely used for gene knockdown in RNA interference. However the key challenge of complete delivery of siRNA, biodegradability of nanoparticles and their toxicity still exists and creates hindrance in gene delivery. Here it was used hollow; nearly mono-dispersed and FDA approved (polymer; poly D,L-lactide-co-glycolic. 50:50) PLGA nanoparticles as carriers for siRNA delivery. Cell penetrating peptides (CPPs) and custom designed peptide nucleic acids (PNAs) were conjugated using layer by layer technique on surface of nanoparticles with complete encapsulation of siRNA for site directed oncogene knockdown in cancer cells (neuroblastoma and carcinoma) resulting in apoptosis induced effect. The CPP-PNA-PLGA nano-capsules-siRNA nanoparticles were selectively uptaken into cells via endocytosis resulting in enhanced gene silencing compared to naked siRNA (72nMol 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. It was found that the usage of PLGA HNPs using CPPs and PNAs could delivery almost 100% of siRNA safely inside the nucleus resulting in site targeted gene silencing in cancer cells.

Biography

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

araichur5@gmail.com