Stephen Loughran, Pharm Anal Acta 2016, 7:1 (Suppl)
http://dx.doi.org/10.4172/2153-2435.C1.027

OMICS International
conferenceseries.com

8th International Conference and Exhibition on

Pharmaceutics & Novel Drug Delivery Systems

March 07-09, 2016 Madrid, Spain

Development of a peptide-based, multifunctional gene delivery vector for metastatic prostate cancer

Stephen Loughran
Queens University Belfast, UK

RALA is a 30mer, arginine-rich, amphipathic peptides with both cell-penetrating and endosomolytic properties. When mixed with plasmid DNA it condenses to form small, serum-stable nanoparticles which, when administered *in-vivo*, are capable of transfecting cells. However, bioavailability *in-vivo* was limited to the lungs and liver of treated mice. In order to improve nanoparticle pharmacokinetics, polyethylene glycol (PEG) 5K was conjugated to the C-terminus of the *RALA* peptide and the resulting conjugate (RALA-P) was characterized *in-vitro*. Disappointingly, activity *in-vitro* was nullified following addition of PEG which lead us to adopt an alternative strategy that involved mixing of RALA-P with native *RALA* at various w/w ratios in an attempt to restore cellular level activity without compromising pharmacokinetic benefits instilled through the addition of PEG. The resulting nanoparticle exhibited improved salt stability at physiological concentrations of NaCL and was also capable of transfecting cells *in-vitro*. To test biodistribution of the modified nanoparticles, various w/w ratios of *RALA*/RALA-P containing plasmid fire-fly luciferase were administered to tumour-bearing mice in order to determine whether introduction of PEG in this way could enable transfection *in-vivo*, augment accumulation in the tumour by EPR and reduce accumulation in off-target organs. The results demonstrated a significant reduction in accumulation in the liver and lungs of treated mice and an increase in tumour expression for *RALA*/RALA-P nanoparticles as compared to *RALA* only.

Biography

Stephen Loughran was awarded a First Class Master's in Pharmacy Hons. by Queen's University Belfast in 2011. He is currently in his final year of a PhD research project which focuses on the design of multifunctional peptide vectors capable of delivering plasmid microRNA to metastatic prostate cancer. He has two publications to date.

sloughran07@qub.ac.uk

Notes: