Polymer Mediated Trangene Delivery of TRAIL Protein: Comparison of Aminoglycoside Polymers and Lipopolymers for Transgene Delivery of TRAIL Protein into UMUC-3 Bladder Cancer Cells

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Polymers that form polymer-DNA complexes (polyplexes) have been established to be safer and more effective -without causing death to harmless cells- than Chemotherapy and viral-mediated transgene delivery. This project investigates three Aminoglycoside polymers: Paromomycin Glycerol diglycidyl ether (PG), Apramycin glycerol diglycidyl ether (AG), and Neomycin glycerol diglycidyl ether (NG), and their lipid conjugates or Lipopolymers (aminoglycoside polymers with two 18-carbon chains): PG-C 18, AG-C 18, NG-C 18, for in-vitro transfection efficiency (delivery and effectiveness) of plasmid-DNA that encodes for a promising anti-cancer protein: Tumor-Necrosis-Factor-(TNF)-Related-Apoptosis-Inducing-Ligand (TRAIL). Efficiency is compared with a plasmid-DNA encoding for Green Fluorescent Protein (GFP) which is harmless to cancer cells. The gene encoding for GFP in the plasmid-DNA is replaced with gene encoding for TRAIL to make for controlled comparisons. Efficiency of each polymer was tested at two polyplex ratios (25:1, 50:1) on UMUC-3 Bladder cancer cells. An ideal polymer would show high GFP count or transfection (delivery level) via fluorescence, baseline of high cell viability with GFP which indicates low polymer toxicity, and effective TRAIL-induced death (shown by drop in cell viability for TRAIL vs GFP). According to data collected, NG-C 18 (at both ratios) showed highest efficiency, and is an ideal candidate for future research.

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