

An Overview of Nanoparticles in Gene and Drug Delivery *In Vitro*

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Bio-carriers based on inorganic nanoparticles provide an interesting and novel strategy for the delivery of therapeutic genes or drugs. Several nanoparticles have been synthesized over the years, including lipids, polymers, gold, and inorganic nanoparticles (gold, silver, iron oxide, silica, selenium). Inorganic nanoparticles such as gold and selenium are attractive candidates for both gene and drug delivery, and have the potential to revolutionize the area of nanomedicine and cancer therapy. This talk will cover both these nanoparticles and their use in both anti-cancer drug and gene delivery. To date our lab was able to formulate several gold and selenium based nanoparticles, functionalize them with polymers and introduce ligands for cell specific targeting. We have been able to show that both nanoparticles were able to bind, condense and successfully transport nucleic acids (DNA, mRNA and siRNA) to cells in vitro. In addition we will further address the ability of polymerized gold nanoparticles in anticancer drug (doxorubicin, 5-fluorouracil) delivery for cancer therapy. Studies to date have shown that these nanoparticles are favorable in size, colloiddally stable, relatively non-toxic and amenable to cell-specific cellular uptake.