Washington University in St. Louis
Office of Technology Management

PRO-DRUG NANOPARTICLE TECHNOLOGY (USED TO BE: RATIONAL DESIGN AND SYNTHESIS OF PHOTO CHEMICALLY STABLE FUMAGILLIN CONJUGATES)

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T-007663

Background: Targeted nanoparticles have been shown to have high potential in the detection and characterization of various pathologies based on unique profiles of cell surface markers, as well as the delivery of therapeutic compounds. Liposomes, micelles, emulsions and other lipid-based particles have shown to be highly effective theranostics, due to their high biocompatibility, compliant 3D morphology, and the relative ease of lipid functionalization. However, passage through the cellular endosomal compartment can greatly diminish the drug effectiveness, and attempts to bypass the endosomal pathway through enhanced cellular internalization of the nanoparticle have shown payloads to be lost to endocytosis shortly after internalization. Therefore, an alternative drug delivery method is needed in order to effectively target and deliver nanoparticle based theranostics to cells of interest.

Technology Description: Researchers at Washington University have developed a lipid nanoparticle-based platform technology to create prodrugs within nanoparticles with outer lipid membranes for direct drug delivery to the site of action. The prodrug is created by coupling the active pharmaceutical ingredient to a fatty acid to form a stable membrane complex. Transfer to the target cell membrane via a patented technique termed contact facilitated drug delivery allows highly efficient enzymatic release of the drug within the cell membrane, allowing it to diffuse into the cell cytosol and or the nucleus. The mechanism of delivery ensures that drugs are delivered only after selective binding at the target site and specific release by enzyme cleavage.