

# Development and Characterization of Polysaccharide Based Controlled Drug Delivery Platforms

## *PhD Seminar*

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2:00 – 3:00 p.m.  
Beaupre Room 105

A large portion of therapeutics prescribed to patients are poorly water soluble, not bioavailable, and have high clearance rate in the body. One way to address these concerns is through the formulation of polymeric drug delivery platforms (DDP). DDP increases drug loading and facilitates controlled drug delivery to specific sites, circumventing clearance mechanisms, therefore, increasing the concentration at the desired site. Nanocomposite microparticles (nCmP) and composite electrospun fibers target specific regions and can be modified to provide the desired loading and release. Quercetin nCmP (Que-nCmP) were formulated with acetalated dextran (Ac-Dex) to enhance the quercetin concentration delivered to inflamed lung tissue while maintaining their antioxidant properties. nCmP enhances the therapeutic effect by combining the aerodynamic properties of microparticles and the drug delivery capabilities of nanoparticles. Additionally, with Ac-Dex as the encapsulating polymer the quercetin has a rapid degradation profile in acidic environments, commonly observed with infected or diseased tissue. Ac-Dex can also be used in electrospun fibers to provide controlled drug delivery. The release of curcumin, a model drug, was controlled through creating electrospun fibers with different weight percentages of Ac-Dex and polycaprolactone (PCL). Increasing the weight percentage of Ac-Dex was found to increase the sustained delivery of curcumin by several days and provided pH responsive release when compared to PCL fibers. Another application of sustained delivery electrospun fibers is with cyclodextrin, an amphiphilic compound that increases the solubility of hydrophobic therapeutics through the creation of inclusion complexes. When loaded into PCL and polyvinyl alcohol (PVA) composite electrospun fibers the inclusion complexes increased the sustained release of anastrozole, a hydrophobic chemotherapeutic, compared to anastrozole loaded fibers. nCmP and composite electrospun fibers expand upon the DPP that can provide sustained release, allowing for a wide range of applications to improve patient treatments.