

# Directing Small, Organic Nanoparticles to the Kidney for Drug Delivery

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Natural, physiological processes in the body can act as barriers for effective nanoparticle delivery. Here, I will discuss the unique advantages of small, organic micelles and their ability to harness such barriers for targeted delivery of therapeutics for chronic kidney disease. While small molecule drugs have been proposed as a therapy to manage disease progression, repeated, high dosages are often required to achieve therapeutic efficacy, generating off-target side effects, some of which are lethal. To address these limitations, our lab has designed a kidney-targeting micelle (KM) platform. Specifically, KMs are found to cross the glomerular filtration barrier and bind to specific surface markers present on renal cells. In vivo, KMs show biocompatibility and high accumulation in the kidneys. We provide proof-of-concept studies for their utility in autosomal dominant polycystic kidney disease nanotherapy and their application using various routes of administration including oral and transdermal administration. We discuss the promise of nanomedicine, the tailored design necessary to match such promise, and their potential as next generation platforms for personalized medicine.