Translational nanoparticle imaging

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Abstract

Most available cancer chemotherapies are based on systemically administered small organic molecules, and only a small fraction of the drug reaches the disease site causing side effects that prevents the optimal usage of the drug for therapy. Nanoparticles can solve this targeting and release problem. Small animal imaging can be used to analyse the improvement in fast and efficient manner. This speeds up the development. As an example a new approach is presented in this talk to address this challenge. I am presenting a nanoparticle that is using two fundamentally different mechanisms to trigger the release from the carrier. In this system, an endogenous disease marker, an enzyme protein, is used in combination with an externally applied magnetic field to open the delivery system at the correct time only in the disease site. This site-activated drug release system is a novel two-switch nano machine that can simultaneously be regulated by an apoptotic cell stress-induced enzyme, sphingomyelinase, at the cellular level and be remotely controlled using an applied magnetic field. This novel system enables theranostic drug delivery in which the release is controlled based on imaging input data.