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Theragnostic Nanoparticles for Drug Delivery Systems

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Recently, nanoparticles have received a great interest an application for diagnosis and therapy. Since nanoparticles possess intrinsic features that are often required for drug delivery system and diagnosis, they have potential as platforms for integrating imaging and therapeutic functions, simultaneously. Especially, molecular imaging with theragnostic nanoparticles makes it possible not only to provide useful information for monitoring drug delivery, drug release, and therapeutic efficacy of drug, but also to determine whether the patients are likely to respond to a therapy. To achieve these goals, a variety of imaging techniques have been used, including near-infrared fluorescent (NIRF) imaging, magnetic resonance imaging (MRI) and nuclear imaging (SPECT and PET). Imaging and monitoring of nanoparticles after systemically administered in living systems play key roles in the development of theragnostic nanoparticles to optimize their physicochemical properties. It has become clear that imaging drug delivery can assist in analyzing the drug delivery and in predicting the therapeutic efficacy of cancer-targeted nanoparticles. This presentation will highlight our recent advances that have been made in the development of multifunctional nanoparticles and the applications of these nanoparticles into theragnostic nanomedicine..