

Nanoparticles as Pharmaceutical Agents

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EDITORIAL

Nanoparticles are advanced pharmaceutical agents [1]. Nanoparticles add an emerging new technologies for pharmaceutical science. They developed customized solutions for drug delivery. Nanoparticles positively impact the rate of absorption, distribution, metabolism, and excretion (ADME) of the drug in the body. The optimum nanomaterial should be compatible, easy to bind with the target drug, and able to be metabolized or driven out the body via normal excretory routes. Material-based technologies in the area of drug delivery include inorganic nanoparticles, metal organic frameworks (MOFs), solid lipid nanoparticles, liposomes, polysaccharides, polyesters, micelles, etc. These nanoparticles are applied for different therapy include chemotherapy, gene and vaccine delivery. Nanomaterials solve most of the limitations of traditional drugs such as solubility [2]. They advances the drug delivery and offers excellent controlled drug delivery systems (DDS) [3]. So far, there are more than 51 FDA-approved nanomedicines and 77 products in clinical trials (clinicaltrials.gov) [4].

There are several drawbacks that limit the nanoparticles to serve as pharmaceutical agents. First, nanoparticles suffer from the intrinsic cytotoxicity. Thus, a few number of nanoparticles can work as biocompatible system for drug delivery. Second, the drug's efficiency requires further improvements such as selectivity. The selectivity of conventional drug can be increased by surface engineering of the nanoparticles. The large surface area of nanoparticles enable surface modification with targeting biomolecules that can reach the infected cells. Third, nanoparticles suffer from the body sequestration. The nanoparticles with small size are highly preferred. Fourth, the inorganic based nanoparticles are not degradable compared to the organic based nanoparticles such as solid lipid nanoparticles, liposomes, polysaccharides, polyesters, micelles, etc.

Fifth, the release of the investigated drug varies and depends on its chemistry and the available function groups on the surface of the nanoparticles. Further studies are highly required to circumvent these drawbacks and advance the nanoparticles applications as pharmaceutical agents.

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