AAPS PharmSciTech, Vol. 16, No. 1, February 2015 (© 2014)
DOI: 10.1208/s12249-014-0270-0

Editorial

Theme: Translational Application of Nano Delivery Systems: Emerging Cancer Therapy
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Translational Application of Nano Delivery Systems: Emerging Cancer Therapy

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Received 1 December 2014; accepted 8 December 2014; published online 31 December 2014

The nanotechnology-based therapies have demonstrated great promise in revolutionizing cancer medicine by improving efficacy while reducing the adverse effects. Despite recent progress in newer nanotechnologies, the bench-to-bedside translation of nanotechnology-based therapies is very poor. This theme issue of AAPS PharmSciTech provides a broad overview of the critical steps and approaches in the development of various nanosystems for the delivery of small-molecule drugs and nucleic acids for cancer therapy.

This theme issue of AAPS PharmSciTech offers nine review articles. Babu et al. reviewed broadly various nanoparticle-based delivery systems for their applications in cancer therapy and the critical issues relating to the clinical translation of nanotechnology-based therapies (1). Narvekar et al. summarized the delivery systems suitable for anticancer drugs with low aqueous solubility (2). Zhang et al. focused on a specific type of nanocarriers, polymeric micelles, and discussed the design and strategies for improved drug loading (3). Ganta et al. reviewed the production and physiocochemical characterization of nanoemulsion as well as the potential applications in cancer therapy (4). Roggers et al. summarized the use of mesoporous silica nanoparticles for systemic anticancer drug delivery (5). Singhana et al. reviewed the co-delivery of chemotherapeutic drugs and DNA/siRNA via gold nanoshells (6). Duskey et al. reviewed the targeting ligands commonly employed to decorate nanoparticles to achieve active targeting of solid tumors (7). Carboni et al. examined the physics of margination and discussed how the design of nanoparticles affect the movement of nanoparticles in the blood vessels (8). Finally, Paliwal et al. reviewed the methods of production of nanoparticles and discussed challenges in scale-up production of nanomedicine (9).

This theme issue also contains five original research articles. Khatri et al. investigated the complexation, transfection efficiency, and toxicity of siRNA lipoplexes with varying composition of the cationic lipid, fusogenic lipid, and other negatively charged and neutral lipids (10). Sadhukha et al. examined the delivery of carboplatin in poly (D,L-lactide-co-glycolide) (PLGA) nanoparticles, showing enhanced intracellular uptake and cytotoxicity of carboplatin in tumor cells, in comparison with the free drug (11). Patel et al. evaluated 5-fluorouracil-loaded solid nanoparticles consisting of glyceryl monostearate, in terms of the physicochemical and biological properties (12). Coated by thermosensitive copolymer poly-(NIPAM-stat-AAm)-b-PEI, Dani et al. explored iron oxide nanoparticles for the delivery of doxorubicin and found that the release and cytotoxicity of doxorubicin could be triggered by raising the temperature (13). Grover et al. studied docetaxel-loaded glutathione-coated PEG-PLGA nanoparticles, which exerted significantly more potent cytotoxicity than free docetaxel against glioma cells (14).

The various aspects of formulation development, characterization, biocompatibility, preclinical evaluation, and clinical application of nanomedicine are all essential to the realization of the full potential of nanotechnology-based therapies. Concerted efforts among scientists in different disciplines are required to bridge the information between the basic and clinical research to expedite the translational application of nano delivery systems for effective cancer therapy.

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