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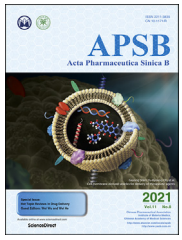

Editorial of Special Issue of Hot Topic Reviews in Drug Delivery

Research in the cross-disciplines of drug delivery is developing at an accelerated speed never seen before, as witnessed by the soaring number of yearly publications. A quick search of the database of Web of Science by utilizing the keyword "drug delivery" gives a total number of 251, 538, 3385, 13484, 48550, 129263 and 338627 publications by the year range of 1900−1960, 1961−1970, 1971−1980, 1981−1990, 1991−2000, 2001−2010 and 2011−2020, respectively. More impressively, there seems to be no sign of deceleration.

In a broad sense, drug delivery refers to the science of delivering or conveying drugs or active pharmaceutical ingredients to targets or sites of action with a general purpose of maximizing therapeutic efficacy while minimizing side effects. In the midst of the last century, the primitive concept of drug delivery stemmed from the science of pharmaceutics that deals with conventional dosage forms such as tablets, capsules, powders, injections, solutions, suspensions, emulsions, ointments, gels, among others, driven by a need for optimization of conventional formulations. The endowment of specific functions to drug delivery systems creates new topics of research across the full length of the cross-discipline of drug delivery including primarily pharmaceutical sciences, chemistry, materials science and biomedical sciences. Centered around groundbreaking drug delivery technologies, as well as innovative drug delivery systems, various research topics rise and fall, but some persist to be hot topics till today. At a definite time of the approximately 70-year history of drug delivery, many research topics emerged, such as sustained or controlled release, solid dispersion, inclusion complexation, targeting drug delivery systems, nanomedicines, etc. In the backdrop of skyrocketing development in biomedical, material and pharmaceutical sciences in the 21st century and unremitting threats from malicious diseases such as cancer, infectious diseases, and versatile neural, vascular and metabolic diseases, drug delivery has been confronted with new challenges and new technologies and topics emerge to combat them. Cancer chemotherapy, tumor targeting, and nanomedicine remains hot topics of research as yet[1]. In recent years, gene delivery, biomimetic, cell-membrane camouflaged and stimuli-responsive delivery systems emerge as new platforms[2]. In the aspects of carrier systems, conventional carriers such as liposomes, microspheres, micelles, lipid and polymeric nanoparticles are still drawing wide attention, while microneedles, extracellular vesicles, ionic liquids are emerging rapidly as novel delivery systems at the forefront of drug delivery.

As the field of drug delivery is vibrant and a colossal amount of knowledge is piling up, it is imperative to make periodical reviews in the hot areas of drug delivery and find ways for future development. By guest-editing this collection of hot topic reviews, we want to set up a platform for prominent scientists and scholars all around the world to communicate and share their thoughts. This special issue has garnered 23 excellent review articles covering the full span of hot topics in drug delivery. Recently, biomimetic vehicles are emerging as promising carrier systems for drug delivery. Three cutting-edge reviews have been included in this special issue. In the cover review, Le et al.[3] gave an overview on the status quo of research and the potential of cell membrane-derived biomimetic vesicles for the delivery of therapeutic agents. Extracellular vesicles or exosomes are nanovehicles that are drawing intense attention across the wide field of biomedical sciences. This edition included one article that reviewed the biological functions and medical applications of exosomes and their analogs[4], and another that reviewed tumor-derived exosomes (TEXs) with emphasis on the mechanisms on how tumor cells harness exosomes to promote metastasis, followed by a discussion on recent progress in targeting TEXs to treat cancer metastasis[5]. In the wake of the recently gained fame of gene-editing, Behr et al.[6] penned an article on recent progress and challenges in the in vivo delivery of CRISPR-Cas[9]. Tumor targeting has been a hot topic for more than fifty years, and it continues to be owing to the recalcitrant malignancy and failure in clinical treatment. This issue has included a total of seven articles that addressed various applications of nanomedicines in cancer chemotherapy. Day et al.[7] provided an overview on magnetic systems for cancer immunotherapy, Zheng et al.[8] reviewed the recent progress in sonophotodynamic cancer therapy, and Li et al.[9] focused on protease-triggered bioresponsive drug delivery for cancer theranostics. Three articles dig into the underlying mechanism and influencing

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factors that may determine the fate and therapeutic efficacy of cancer nanomedicines, namely the reversed intra- and extracellular pH in tumors[10], factors and strategies enhancing the penetration of nanoparticles into solid tumors[11], and the crosstalk between "seed and soil" for cascade inhibition of hematogenous metastasis[12]. Moreover, Han and Jiang[13] review the evolution of brain−blood barriers under diseased conditions and thereby its implication on nano-based drug delivery to the brain. A series of articles addressed recent progresses in versatile carrier systems, including microneedles for transdermal delivery of proteins and peptides[14] and point-of-care diagnosis of infectious disease[15] (back cover review), metal-organic frameworks[16], and long-acting parental formulations[17]. As oral drug delivery remains a challenge, three topics have also been included to discuss on recent advances in oral delivery of proteins and peptides[18], oral lymphatic transport[19], and *in vitro−in vivo* correlation of lipid-based delivery systems[20]. As revolutionary progress in drug delivery is always due to technological innovations, we included several articles on pharmaceutical technologies that have crucial influence on drug delivery and formulation, that is, 3D printing[21], amorphous solid dispersion[22], and pharmaceutical cocrystals[23]. Furthermore, this special issue also includes two other reviews on popular topics of pharmaceutical strategies to extend pulmonary exposure of inhaled medicines[24] and delivery strategies of amphotericin B for invasive fungal infections[25].

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