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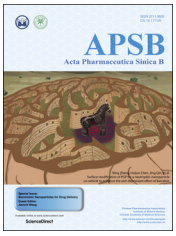

Editorial for biomimetic nanoparticles for drug delivery

The origins of controlled release drug delivery could be dated back to the 1950s. The Spansule technology was developed to deliver a drug for 12 h in 1952. Compared with taking a drug every 6 h or every 8 h, twice-a-day formulation was revolutionary in improving the patients' compliance and convenience[1]. Since then, advances in drug delivery technologies have introduced numerous formulations and devices for enhancing drug efficacy, reducing side effects and improving patient compliance. Over the last two decades, nanotechnology-based delivery systems have been explosively developed to realize the goal of targeted drug delivery, *i.e.*, delivering the given drug to the target sites as much as possible, while minimizing the drug distribution at any non-target organs. Although nanoparticle technology has enabled a significant improvement in the treatment of various diseases, especially cancer, nanoparticle-based targeted drug delivery has not fulfilled its expectations. The clinical application of nanotherapeutics was still hampered by rapid clearance from blood circulation, limited capability of overcoming multiple physiological barriers and low drug concentration in targeted sites. In order to overcome the above-mentioned problems, various biomimetic delivery strategies have been developed recently because of their specific advantages, including high loading capability, favorable biocompatibility, low immunogenicity, prolonged circulation time and instinctive targeting ability. By taking inspiration from nature, the combination of natural materials and synthetic nanoparticles can navigate more effectively and interact with the complex biological systems that exist within the body[2].

Cell-based biomimetic drug delivery systems emerged as an advantageous alternative to the conventional nanocarriers due to their intrinsic characteristics. Various types of cells have been used as carriers. In the present issue, Jun Chen and Jianxin Wang provide updated reviews of leukocyte-derived biomimetic nanoparticulate delivery systems for cancer therapy[3] and cell membrane-based nanoparticles for tumor diagnosis and treatment[4], respectively. Zhiqing Pang presents an overview on inflammation-targeting biomimetic nanoparticles and gives an in-depth look at the design of these nanoparticles to maximize their benefits for disease diagnosis and treatment[5]. An example for the enhanced inflamed brain targeting delivery mediated by the neutrophils in the body is reported by Jing Qin (see a story for the front cover)[6]. By conjugation of *N*-acetyl Pro–Gly–Pro (PGP) peptide, a high-affinity ligand to CXCR2 receptor on neutrophils, to the surfaces of nanoparticle, the *in vivo* phagocytic uptake of the nanoparticles by neutrophils was enhanced selectively by 6- to 7-fold. Then, the PGP-SLNs were carried by the neutrophils as "Trojan Horses" to the lesion sites in the brain.

Materials originating from endogenous substances have been widely used as carriers for biomimetic drug delivery. Among them, natural biomacromolecules have attracted increased attention because of their inherent biochemical and biophysical properties. Chen Jiang introduces the biochemical characters of the widely used biomacromolecule-based carriers such as albumin, lipoproteins and polysaccharides[7]. Xiaoling Gao summarizes comprehensively the biological properties and biomedical applications of rHDL as drug delivery platforms to overcome the biological barriers *in vivo*[8]. Yongzhuo Huang and colleagues demonstrate the biomimetic albumin-modified gold nanorods (AuNRs) incorporating paclitaxel (PTX) can promote cellular uptake *via* the albumin-binding protein pathway and be used for combined photothermo-chemotherapy for yielding synergistic effects to enhance treatment efficiency and reduce side effects[9]. Tao Sun characterizes PTX-loaded human serum albumin (HSA) NPs stabilized with intramolecular disulfide bonds and modified with substance P (SP) peptide as the targeting ligand. The modification of SP peptide improves the cellular uptake into brain capillary endothelial cells and U87 cells, and anti-tumor effect of the NPs[10].

Enhanced targeting delivery or absorption of nanoparticles can be realized by mimicking the *in vivo* process of natural materials and/or conjugating with endogenous ligands. Wei Wu determines the role of two vitamins, thiamine (VB1) and niacin, as ligands to facilitate the oral delivery of insulin-loaded liposomes[11]. Mingfei Zhang and Weiyue Lu link ^{D}A7R and GICP to obtain a multi-receptor targeting molecule for glioma-targeting, and indicate that the coupled Y-shaped peptide ^{D}A7R–GICP could improve tumor and neovasculature targeting ability significantly[12]. Huining He develops a monomeric covalent conjugate of a cell penetrating peptide (LMWP) and siRNA *via* a cytosol-cleavable disulfide linkage and demonstrates *in vitro* that the conjugate exhibited

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successful cellular uptake of the siRNA agents and potent gene silencing effects[13].

We hope that this Special Issue will provide an insight into the research activities and the latest advancement of bio-inspired drug delivery systems, and be valuable for the readers to gain more information in the field. We thank all the contributors for their efforts and time in making this Issue informative and special.

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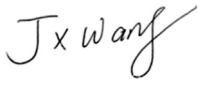

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