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Preface

Special issue on "Formulation strategies and manufacturing technologies to enhance non-invasive drug delivery"

Oral dosage forms including tablets and capsules are the most commonly used drug products. For some poorly water-soluble and poorly permeable drugs injectable dosage forms can be used to circumvent the challenges of poor bioavailability. However, injectable dosage forms are not always preferred and may in the worst case exert limitations on patient compliance for example needle pain, needle fear, or needle stick injuries. Furthermore, they often require health care professionals for the administration. Development of non-invasive drug delivery systems such as pulmonary, ocular, and transdermal delivery have been an intensive research area in the field of pharmaceutical sciences, which can exert both topical and systemic pharmacological effects. In addition, novel formulation technologies are continuously evolved to enhance the oral bioavailability of drugs with poor physicochemical properties.

The contributions in this special issue reflect the wide interest in enhancing non-invasive drug delivery by using various formulation strategies and manufacturing technologies. The special issue consists of one review and nine research articles. It starts with a review article focusing on the research and development of alternative delivery strategies for apomorphine, aiming to highlight the potential of non-invasive apomorphine delivery for the treatment of Parkinson's disease for instance *via* the sublingual and transdermal administration routes [1]. The first two research papers in the special issue focus on transdermal delivery and ocular delivery, respectively. Lu et al. used nanocrystal technology to improve transdermal delivery of meloxicam, where the preparation, *in vitro* and *in vivo* evaluation of the formulations were reported [2]. To improve the corneal permeability of the poorly water-soluble drug, disulfiram, for the treatment of cataract, Jiang et al. formulated the drug into a thermosensitive *in-situ* gel based on a solid dispersion [3]. The subsequent three research articles in the special issue report on the feasibility of a self-nanoemulsifiying drug delivery system [4], amorphous solid dispersions [5], and a pro-drug strategy [6] to enhance oral bioavailability of a lipophilic drug, a hydrophobic drug, and a polar drug, respectively. Continuing with oral dosage forms, the sixth research paper showcases a matrix tablet formulation strategy for sustained-release of a highly water-soluble drug [7]. The seventh and eighth research papers report on the transfer of formulation strategies into manufacturing. Bohr et al. reported critical effects of solvent composition on the quality attributes of electrosprayed polymeric microparticles [8], and the study by Rantanen et al. demonstrated that 3D printing could be used for prototyping of both parts of production line and PAT interfacing solution [9]. In the last research paper of this special issue, Rosenholm et al. present that surface-modified mesoporous silica nanoparticles could be considered as prospective vectors for therapeutic siRNA delivery [10].

The guest editors wish to take this opportunity to thank the reviewers for their valuable comments and constructive suggestions. We are also grateful to all the authors for the excellent contributions and great support, making this special issue possible. We hope this special issue will be of interest to many readers.

Korbinian Löbmann
Adam Bohr
Mingshi Yang

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