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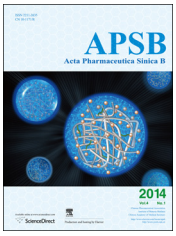

Editorial

The research process for new drug is complicated, time-consuming, and costly. Thousands of chemical compounds must be made and tested in an effort to find one that can achieve a desirable result. It may take approximately ten years to study and test a new drug before it can be approved for the general public. However, in today's pharmaceutical industry drug delivery has become keys in drug product development. New innovative pharmaceutical technologies allow for increased performance of new and existing pharmaceutical compounds. Patients will benefit from the enhanced efficacy of pharmaceutical products and from reduction of side-effects. The research on drug delivery and pharmaceutical technologies can highly facilitate drug product development by improving drug solubility, bioavailability, stability, and compliance.

In this special issue on drug delivery and pharmaceutical technology, several review articles presented hot topics of drug development such as solid dispersion for poorly water-soluble drugs, kidney-targeted drug delivery, and applications of formulation and drug delivery to improve the drugability. The scientists from the United States, Canada, England, and China contributed valuable research works on novel drug delivery and pharmaceutical technologies. We hope that this special issue could provide benefits to readers in the field of pharmaceutical research and development.

Cover story

Crosslinked hydrogels are a promising class of water-insoluble carriers for amorphous solid dispersions to enhance the delivery of poorly soluble drugs. During dissolution from hydrogel-based solid molecular dispersions (*e.g.*, as hydrogel beads shown in the cover image) under nonsink conditions as normally encountered in the GI track, the entrapped amorphous drug is first converted into highly supersaturated solution by the imbibed water and then diffuses out of the hydrogel network. The resulting buildup of drug supersaturation in the external dissolution medium reduces the diffusional driving force for the drug to be further released from the hydrogel matrix (*i.e.*, a feedback-controlled diffusion mechanism). This prevents a surge of supersaturation in the dissolution medium thus avoiding the critical supersaturation window and the undesirable nucleation and crystallization events leading to a sharp decrease in drug concentration normally associated with conventional solid dispersions in soluble polymers. Any subsequent reduction in external drug concentration due to nucleation and crystallization events will promote additional drug release from the hydrogel matrix to maintain supersaturation. Such a coupled feedback-controlled balancing scheme will continue until no drug can be further released from the hydrogel matrix thus achieving a more sustained level of supersaturation than that based on water-soluble polymers.

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