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EDITORIAL

Microneedle technologies

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The 6th International Conference on Microneedles (Microneedles 2020) was originally planned to be held in Seoul, Korea. Although the conference was switched to be a virtual meeting due to the COVID-19 pandemic, Microneedles 2020 successfully accommodated approximately 100 oral and poster presentations and provided a unique international forum for academia and industry involved in the design, development, application, and clinical translation of microneedle technology. In addition to academia and industry, we had the opportunity to hear valuable opinions from regulatory authorities and global health organizations, including WHO, IVI, FDA, PATH, CDC, and Bill & Melinda Gates Foundation, during the conference.

This Special Issue of Drug Delivery and Translational Research aims to provide the latest scientific and technology advances in microneedle research. The presenters were invited to participate in this special issue to capture the wealth of information presented during the conference and disseminate new findings to the public. Many of the leading groups in the field, including Georgia Institute of Technology, North Carolina State University, PATH, Cardiff University, University of Tokyo, National Institute of Health Sciences, Beijing University of Chemical Technology, Zhejiang University, Institute for Stem Cell Science and Regenerative Medicine, Kookmin University, and Chungnam National University, have contributed papers to this special issue. This special issue will show the range of microneedle research being conducted around the world, particularly in Korea, Japan, China, India, the UK, and the USA.

The topics presented in this special issue cover a broad aspect of microneedle technology, including modeling, fabrication, formulation, drug delivery, sensing, and mass manufacturing. Several articles present fabrication, formulation, and characterization of microneedles. Azizoglu et al. describe dissolving microneedles made of pure drug, montelukast sodium, for the treatment of asthma and allergic rhinitis. Zhang et al. describe a dissolving microneedle roller device that can be used for rapid drug delivery on a large surface area without patch attachment. Badnikar et al. describe the design and optimization of hollow microneedle tips through analytical models and validate the piercing performance of the optimized tip profile. Papich et al. describe distinct pharmacokinetic profiles of two opioid antagonists, naloxone and nalmefene, delivered by hollow microneedles compared to a standard intramuscular injection. Takeuchi et al. describe porous microneedle arrays integrated with a microfluidic chip for continuous sampling of interstitial fluids, which can be used for long-term health care monitoring. Jin et al. describe rapidly disintegrating coating formulation that can reduce the application time of coated microneedles. Another group of articles proposes experimental methods suitable for microneedles. Dalaty et al. propose models and methods for investigating the dermal release characteristics of contraceptives administered by microneedles. Ando et al. describe a quality evaluation method that can determine the spatial distribution pattern of drugs in dissolving microneedle arrays. Mhohizin et al. describe the impact of specific dermal interfaces on the dispersion characteristics of a pressurized fluid injection system such as hollow microneedles. Lastly, several articles give an overview of current microneedle technologies and challenges. Bao et al. describe current porous microneedle technology for various applications, including transdermal drug delivery, interstitial fluid extraction, and biosensing, along with future perspectives and challenges. Zhou et al. describe microneedle strategies for the treatment of cardiovascular diseases, mainly focusing on hypertension, atherosclerosis, thrombus, and myocardial disease. Creelman et al. provide valuable information on the status of microneedle manufacturing, general barriers to manufacturing scale-up, and potential approaches for mitigating current manufacturing issues.

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We would like to personally thank all the contributing authors to this special issue for their hard work and excellent submissions, which provide a fabulous collection of microneedle research occurring around the world. We also thank DDTR for the opportunity to present recent microneedle research outcomes in a special issue. We hope that this special issue provides valuable information not only for microneedle researchers but also for the general readers of DDTR.