

# Preface

The pace of new research and level of innovation repeatedly introduced into the field of drug delivery to the lung are surprising given its state of maturity since the introduction of the pressurized metered dose inhaler over a half a century ago. It is clear that our understanding of pulmonary drug delivery has now evolved to the point that inhalation aerosols can be controlled both spatially and temporally to optimize their biological effects. These abilities include controlling lung deposition, by adopting formulation strategies or device technologies, and controlling drug uptake and release through sophisticated particle technologies. The large number of contributions to the scientific literature and variety of excellent texts published in recent years are evidence for the continued interest in pulmonary drug delivery research. This reference text endeavors to bring together the fundamental theory and practice of controlled drug delivery to the airways that is unavailable elsewhere. Collating and synthesizing the material in this rapidly evolving field presented a challenge and ultimately a sense of achievement that is hopefully reflected in the content of the volume.

The spatial and temporal control of drug delivery to the airways as a general theme runs through the entire volume from discussions of micro and macro structure of the lung, particle engineering and polymer science, device design, to regulatory perspectives and science. The initial chapter topics were selected to provide a fundamental background to the problems and opportunities for controlled pulmonary drug delivery. In addition to providing an anatomical, physiological, and metabolic overview of the airways, the book provides unique guidance on specific microenvironments that exist in both health and disease within the airways – opening possible avenues to allow for targeted, triggered, or modulated delivery systems based on the physicochemical differences between target and bystander tissues and cells. The latter sections of the book explore technologies and tools available to facilitate controlled drug delivery to the airways, specifically covering topics such as, aerosol delivery technologies, materials and excipients, particle science, gene delivery, in vitro and in vivo tools including imaging. Finally, regulatory approval perspectives and the development of performance specifications complete the “tool box” that is provided by the text as a whole.

The authors who kindly agreed to contribute to *Controlled Pulmonary Drug Delivery* are acknowledged leaders in their respective fields, and many have initiated research programs in new and emerging research areas of relevance to the title of the volume. As a result, we hope that this text will provide a framework for interested researchers to find solutions to their drug delivery questions. The contents of the book should provide bridges between the multiple disciplines needed to successfully achieve controlled pulmonary drug delivery.

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