

Preface

The purpose of this edited volume is to prompt quantitative sciences to the fast emerging field of nanomedicine.

Nanomedicine currently faces two challenges. The first is to quantitatively describe drug effects at the micro-/nano-scale, particularly, by taking into consideration dynamic interactions of drugs with biological systems at the molecular level. The second is to precisely control the drug effects, especially the coupled effects of drugs with the complex biological system.

Systems engineering approach can help address the above challenges. Dynamics modeling, control and optimization are important components of system engineering. They have been applied successfully in many engineering disciplinary. Unfortunately, applications of systems engineering approach to nanomedicine has just started.

This book puts together case studies of systems engineering to the field of nanomedicine. It contains eight chapters ranging from introduction to nanomedicine, fundamentals of mathematical modeling, to applications in signal pathway, tumor therapy, multi-scale biological system modeling and controlled drug delivery.

It is challenging to edit such a highly interdisciplinary book. We are lucky to have a dedicated team of outstanding contributors, and a visionary editorial team. We would like to take this opportunity to thank all the contributors for their excellent contributions, Mr. Stanford Chong and Mr. Rhaimie Wahap for their outstanding support. They are the direct contributors to the success of this book.

Down to the road, we firmly believe personalized and quantitative aspects of medicine are two fundamental challenges to nanomedicine. Systems engineering approach will play an important role in the endeavor.

We welcome any comments and suggestions from the readers.

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