Journal of Nuclear Medicine, published on January 8, 2015 as doi:10.2967/jnumed.114.153353

Molecular Imaging: Fundamentals and Applications

Tian J, ed. 699 pages.

New York, NY: Springer, 2013, 714 pages, $279

This book is included in the book series of *Advanced Topics in Science and Technology in China*, aimed to present the up-to-date and most cutting-edge theories, techniques, and methodologies in various research fields in China. The series are jointly published by Springer and Zhejiang University Press. The editor of this book and his co-authors are Chinese professors and scholars with various backgrounds, which including automation, electronic engineering, medical physics, chemistry, medicine and life science.

I started my review of this book with great anticipation, and found it particularly interesting to me because it focuses more on effective information acquisition and processing methodology for biomedical studies. The contents consist of three parts with 20 chapters. The first part (Chapter 1-11) presents molecular imaging theoretical fundamentals and different imaging modality systems, including diffuse optical tomography (DOT), fluorescence molecular tomography (FMT), bioluminescence tomography (BLT), positron emission tomography (PET), single photon emission computed tomography (SPECT), magnetic resonance imaging (MRI) and some other imaging technologies. The introduction presents the development of molecular imaging, and summarizes basic principles, advantages and disadvantages of each imaging modality. Chapter 2 focuses on the molecular optical simulation environment (MOSE), which is presented for the simulation of light propagation both in tissues with complicated shapes and in free-space based on the Monte Carlo method. The chapters on diffuse optical tomography, positron emission tomography, and medical imaging processing and analysis (Chapter 3, 6 and 11, respectively) contributed more detailed theories and methodologies compared to the other chapters on fluorescence, bioluminescence, SPECT, MRI and the other modalities. The second part (Chapter 12-15) covers opportunities and challenges of radiolabeled probes, oligonucleotide probes, quantum dots, etc.. The last part (Chapter 16-20) mainly illustrates the basics of molecular biology, molecular imaging applications in preclinical and clinical research, for instance, clinical practice for tumors, protein-protein interactions, transgenic animals and diabetes-related studies. Overall, through discussing the problems and challenges in details, illustrating recent progress and future directions, this book describes novel theories and algorithms,

latest molecular probes, cutting-edge imaging systems and typical experiments, preclinical and clinical applications in recent years.

Over the past few years, molecular imaging has become a rapidly developing and promising multi-disciplinary research area, which has attracted significant attention in preclinical research of cancer theranostics and drug development. This book is best suited for researchers and postgraduate students in the fields of radiology, nuclear medicine, imaging physics, computer science and others who are interested to work on in vivo molecular imaging.

Mei Tian
Department of Nuclear Medicine and PET Center
The Second Hospital of Zhejiang University School of Medicine
88 Jiefang Road, Hangzhou, Zhejiang 310009, China
E-mail: meitian@gmail.com