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In Vivo Fluorescence Imaging

Methods and Protocols

Edited by

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Preface

Fluorescence imaging is widely used for biomedical research due to its high sensitivity and resolution, as well as low instrument cost. Although conventionally used to study biology at cellular and tissue levels, fluorescence imaging is emerging as a valuable tool for investigating physiological and pathophysiological processes in living systems. In the clinical setting, fluorescence imaging techniques, particularly those utilizing light in the near infrared (NIR) spectroscopic region where deep tissue penetration and low interference by tissue autofluorescence are offered, have been successfully used to provide real-time guidance in oncologic surgery. Undoubtedly, *in vivo* fluorescence imaging will continue to significantly impact biological research, drug discovery, and clinical practice.

The fast-growing field of *in vivo* fluorescence imaging has attracted new researchers, who often express the desire and need for detailed procedures, methods, and troubleshooting guides. This book was prepared to meet this need, which includes a rich variety of applications using various instrumentations (fluorescence reflectance imaging, fluorescence lifetime imaging, fluorescence molecular tomography, diffuse optical tomography, two-photon microscopy, and goggle system for intraoperative imaging), probes (fluorescent dyes, proteins, targeted and activatable probes, and nanoparticles), disease models (cancer, inflammation, and aplastic anemia), and targets (cancer cells, tumor microenvironment, and intracellular metals) to account for the multidisciplinary nature of the field. We have also included chapters on the emerging fields of cell tracking, image-guided treatment, and fluorescence imaging in the second NIR window. In addition, protocols for evaluation methods before and after *in vivo* imaging are also presented. Furthermore, this book includes reviews on bioconjugation and biostatistical analysis methods to provide guidance on fluorescent probe development and imaging data analysis. All procedures are described in a practical manner, and we very much hope that researchers from different fields will find this book valuable for them to become familiar with *in vivo* fluorescence imaging.

Pittsburgh, PA, USA

Mingfeng Bai

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