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Tobias Penzkofer earned his medical degree from the University of Würzburg (Germany) after attending medical school in Jena and Würzburg, and Lille (France). He was a Radiology Resident at the Department of Diagnostic and Interventional Radiology in Aachen (Germany) before joining the Interventional MRI Research Group as a research fellow at Brigham and Women's Hospital (MA, USA). His research interests are the various aspects of image-guided interventions for oncologic applications, such as interventional MRI in prostate and gynecological cancer, intervention planning and assessment, and navigated soft-tissue and vascular interventions, as well as the development of the point-of-care system for imaging information interaction for radiological interventions.

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Ferenc A Jolesz is the B Leonard Holman Professor of Radiology in the Department of Radiology at Brigham and Women's Hospital and Harvard Medical School (MA, USA). As the Director of Advanced MRI at the Harvard Neurodiscovery Center and the Director of the Magnetic Resonance Imaging Division and the Image-Guided Therapy Program at Brigham and Women's Hospital, he both oversees and participates in clinical practice and translational research. He has achieved international recognition as one of the great innovators and leaders in radiological research. Indeed, he continues to distinguish himself with ongoing, cutting edge research in MRI and image-guided therapy. The related translational research involves extensive interdisciplinary collaborations and the development and clinical implementation of several novel, minimally invasive methods such as intraoperative MRI, MRI-guided laser and cryoablation, and MRI-guided focused ultrasound surgery.

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Foreword

Interventional radiology

Tobias Penzkofer & Ferenc A Jolesz

Image-guided therapy (IGT) and interventional radiology (IR) use imaging to improve localization, targeting, and to monitor and control treatments. IGT has changed and transformed into a complex set of image-guided and computer-assisted applications in surgery and IR. More refined computer-assisted therapy devices are integrated with advanced imaging systems that achieve perfect control of interventions.

Interventional/intraoperative suites today are equipped with state-of-the-art technology and sophisticated instrumentation including various therapy delivery systems, such as catheters and thermal ablation probes, and more complex therapy delivery technologies, such as various radiation therapies, MRI-guided focused-ultrasound surgery systems and robots.

The result is improved surgeries and interventions, and more flexibility in minimally invasive surgery or IR, as well as steadily improving diagnostic, multimodal imaging systems that more accurately detect and represent diseases. Integrating these technologies into multimodality therapy delivery systems improves the outcome of many interventions and surgical procedures.

All imaging modalities have limitations and advantages, and all have unique and characteristic artifacts. Combining multiple modalities by image fusion is a powerful tool to underscore advantages and exclude disadvantages of each applied individual modality.

IGT technologies have combined imaging with various novel therapeutic methods; however, the full utilization of advanced imaging technology in therapy has not yet been accomplished.

The field is one of the most dynamic and changing in modern medicine, and many new and experimental techniques are developed that mature into clinical routine applications. This book gives an overview of a number of such emerging IGT methods.

In **Chapter 1**, Dondelinger and colleagues summarize the use of transcatheter technologies to access and treat neuroendocrine liver tumors, which are an ideal candidate for interventional therapies due to a peculiarity in their blood supply. **Chapter 2** describes the integration of multiple image-guided therapy modalities into one comprehensive installation, uniquely enabling research and development of novel IGT technologies. Another ‘hot’ topic in IR, sympathetic renal denervation permitting minimally invasive definite cure for medication-resistant hypertension, is discussed in **Chapter 3** by Stuart and Patel. The interventional management of another frequent pathology, the pelvic congestion syndrome, is the topic of **Chapter 4** by Ahuja and Kaufman. The extension from traditional target sites, such as the liver and brain, for laser ablation towards pulmonary malignancies is reviewed by Vogl *et al.* in **Chapter 5**. Ultimately, a nonradiologist’s view on the field is presented by Goldenthal and Goldberg in **Chapter 6** on the role of IR in women’s health, giving interesting insights into uterine fibroid treatment through different minimally invasive techniques.

The editors are pleased to present this bouquet of IR image-guided therapy approaches. The goal of the book is to provide a snapshot of currently developed ‘hot’ topics in IR, and it is hoped that readers will find it to be comprehensive and encouraging reading on image-guided therapy.

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