

Preface

## MR-Guided Interventions



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*Guest Editor*

This issue of the *Magnetic Resonance Imaging Clinics of North America* is dedicated to the field of interventional MR. With the first insertion of a needle under MR image guidance in the 1980s, the future of MR imaging was irreversibly changed, creating a new frontier in diagnostic and therapeutic intervention. Minimally invasive therapy and image-guided biopsy, aspiration, and drainage had entered a new realm, taking advantage of the unequalled soft tissue contrast, multiplanar capabilities, and other attributes of MR that had previously been confined to noninvasive diagnostic examinations. In this issue, we have assembled a fine ensemble of physicians and scientists with experience in the theory, engineering, and wide range of clinical capabilities of interventional MR. With the accelerating interest in minimally invasive therapy under MR guidance over the last decade, it has become impossible to cover every clinical application in a single issue. However, this current compilation covers the basics of interventional MR hardware, software, interventional devices, and many clinical applications throughout the body.

Much of the debate during the 1990s centered on different concepts of interventional MR magnet and suite designs. In the last several years, it has been recognized that there are many different

magnet designs that are suitable for MR image-guided intervention. In the first article in this issue, Dr. Elmar Merkle and colleagues cover these basic concepts in suite design and describe the most frequently applied equipment configurations. In their overview on pulse sequences for interventional MR imaging, Jamal Derakshan and Dr. Jeffrey Duerk highlight recent advances in pulse sequence design, taking advantage of the newest capabilities of MR imaging systems for interventional applications. Next appears a series of articles that describe the most common or most promising interventional applications throughout the body, written by experts in the development and performance of clinical applications. Lastly, Drs. Walter Hall and Chip Truitt provide a summary of intraoperative MR applications in neurosurgery. As with any developing technology, some of these applications are more mature than others: a few are primarily restricted to animal models, while most are applied routinely in clinical settings.

As you read this issue, it is my hope that you see the many ways in which the unique imaging capabilities of MR can be exploited for unsurpassed guidance and monitoring of interventional procedures. In addition to those benefits of MRI for device placement, several of the articles

describe therapeutic applications in which the unique ability of MRI to accurately image tissue changes during thermal or chemical therapies can be used to great advantage. In particular, the ability to image thermal changes is a fundamental aspect of the use of MR for high intensity focused ultrasound therapy, as described in the article by Ferenc Jolesz, MD, one of the true pioneers of MR image-guided therapy, and colleagues. This capability is also evident in the articles on MR-guided radiofrequency ablation by Dr. Sherif Nour and coauthors, on MR-guided laser ablation by Dr. Martin Mack and colleagues, and on sclerotherapy by Dr. Daniel Boll and coauthors. It is the combination of accurate guidance capabilities and sensitive tissue monitoring that combine to make interventional MR a tremendously potent interventional modality.

By the end of the issue, it is my hope that readers will have gained a deepened understanding of the underlying concepts in interventional MRI, and will also have an appreciation of the wide range of applications in current clinical practice, as well as some of those that are just over the horizon. Yogi Berra once said, “The future ain’t what it used to be.” In fact, with respect to interventional MR, it is brighter than ever.

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