Clinical Perfusion MRI: Techniques and Applications

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Many diseases are associated with either increases or decreases in blood flow compared with reference values. The role of tumor and organ-level microvascular flow continues to be of critical importance and increasingly appreciated in the advent of anti-angiogenic therapy. Traditionally, the imaging of flow or perfusion has been performed using either CT with contrast agents or radionuclide techniques. MR methods are completely noninvasive and have the advantage of not involving radiation. Perfusion MR imaging is an area of major research interest and rapid clinical growth. It can be combined with the armamentarium of other structural, vascular, physiologic, functional, and metabolic MR techniques to provide a comprehensive one-stop examination for the patient. Perfusion MR imaging is now part of clinical practice, mostly for evaluation of cerebrovascular diseases and brain tumors. It also has had a major impact on the study of breast, heart, and prostate abnormalities. Because techniques and applications continue to be developed, perfusion MR imaging is likely to become widely used in organs throughout the body.

This book, written by 34 authors, is a concise and comprehensive review of the principles and clinical applications of perfusion MR imaging. It is divided into 2 sections with 16 chapters. The first section, consisting of 7 chapters on techniques, covers the basic principles of imaging flow, dynamic susceptibility contrast MR imaging, arterial spin labeling MR imaging, dynamic contrast-enhanced MR imaging, imaging of brain oxygenation, vascular space occupancy imaging, and perfusion MR imaging in neuroscience. The second section, with 9 chapters, contains a comprehensive review of clinical applications of perfusion MR imaging. It presents perfusion MR studies in neurovascular and neurodegenerative diseases, oncologic applications, especially in breast cancer, body organs (kidney, liver, lung), cardiac disorders, and pediatrics.

This book focuses mainly on perfusion MR imaging in patients, but reference is made on occasion to preclinical studies, although the book is not intended to be a reference for researchers. Other areas that this book does not cover include angiography, perfusion MR using unconventional or unapproved agents, perfusion CT, and PET. The book is written well by authoritative authors and includes high-quality images, useful illustrations, and tables printed on glossy paper. The references are updated, and the index is helpful. Throughout the book, case reports illustrating representative clinical examples are included.

This book provides a comprehensive, yet readable, state-of-the-art evaluation of perfusion MR imaging for clinicians and researchers. It fulfills its intended purpose and meets the needs of its audience. Therefore, I believe it is timely and needed for radiologists, neurologists, oncologists, and cardiologists to improve clinical diagnoses and management decisions, resulting in better outcomes in individual patients.

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