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Nota di contenuto Quantitative MRI of the Kidney: Rationale and Challenges -- Biophysical and Physiological Principles of T1 and T2 -- T1 and T2 Mapping of the Kidney -- T2* mapping – Blood Oxygenation Level Detection (BOLD) MRI of the Kidneys -- T1 Mapping and its Applications for Assessment of Renal Allograft Fibrosis -- Metabolic Imaging: Measuring Fat in the Kidney -- MR Angiography and Phase-contrast MRI: Measuring Blood Flow in the Kidney -- Contrast Agent Safety with Focus on Kidney MRI -- Functional Imaging: MR Urography -- Arterial Spin Labeling: Non-contrast Perfusion MRI of the Kidney -- MR Fingerprinting of the Kidney -- Quantitative Susceptibility Mapping of Kidney -- Measuring Microstructural Features of the Kidney using Diffusion MRI -- Diffusion Tensor MRI and Fiber Tractography of the Kidney -- MR Elastography for Evaluation of Kidney Fibrosis -- Magnetic Transfer Imaging -- Simultaneous quantification methods -- CEST and Na-23 MRI for Assessing Renal Function -- Elastin-based Molecular MRI of Kidney Fibrosis -- Putting it all together: Multi-parametric MRI of the Kidney -- 7T MRI of the Kidney: Challenges and Promises.

Sommario/riassunto This book offers the concepts of quantitative MRI for kidney imaging. Kidney MRI holds incredible promise for making a quantum leap in improving diagnosis and care of patients with a multitude of diseases, by moving beyond the limitations and restrictions of current routine clinical practice. Clinical kidney MRI is advancing with ever increasing

rapidity, and yet, it is still not good enough. Several roadblocks still slow the pace of progress, particularly inefficient education of renal MR researchers, and lack of harmonization of approaches that limits the sharing of results among multiple research groups. With the help of this book, we aim to address these limitations, by providing a comprehensive collection of more chapters on MRI methods that serve as a foundational resource for clinical kidney MRI studies. This includes chapters describing the fundamental principles underlying a variety of kidney MRI methods, step-by-step protocols for executing kidney MRI studies, and detailed guides for post-processing and data analysis. This collection serves as a crucial part of a roadmap towards conducting kidney MRI studies in a robust and reproducible way, that promotes the standardization and sharing of data, and ultimately, clinical translation. Chapters are divided into three parts: MRI physics and acquisition protocols, post-processing and data analysis methods, and clinical applications. The first section includes MRI physics background and describe a detailed step by step MRI acquisition protocol. If a clinician would like to perform a renal MRI – this would include the parameters to set up the acquisition on the scanner. By this section, the reader should have the details to be able to successfully collect human renal MR images. In the second section, expert authors describe methods on how to post-process and analyze the data. By this section, the reader should have the details to be able to successfully generate quantitative data from the human renal MR images. In the final section, chapters show clinical examples of various methods. Authors share examples of multi-parametric renal MRI that are being used in clinical practice. This is an ideal guide for clinicians from radiology, nephrology, physiology, clinical scientists, and as well as basic scientists and experts in imaging sciences and physics of kidney MRI. It also provides an opportunity to students, trainees, and post-doctoral fellows to learn about these kidney MRI techniques.