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Diffusion-Weighted MR Imaging of the Brain

T. Moritani, S. Ekholm, and P.-L. Westesson, eds. Springer; 2009, 402 pages, 700 illustrations, \$189.00.

In an expanded second edition of their clinically important book *Diffusion-Weighted MR Imaging of the Brain*, Drs. Moritani, Ekholm, and Westesson, along with other contributors, have presented the radiologist with a highly readable and well-illustrated book. This 402-page volume is nearly double in size compared with the first edition, which was published 5 years ago. This has allowed the inclusion of more recent developments, such as tensor imaging of the normal brain with color tractography and diffusion imaging of scalp and skull lesions, along with additional material (written and illustrated) in nearly every chapter. The chapters include “Basics of Diffusion Measurements By MR Imaging,” “DWI [Diffusion-Weighted] and Tensor Imaging of the Normal Brain,” “Pitfalls and Artifacts of DWI,” “Brain Edema,” “Infarction,” “Intracranial Hemorrhage,” “Vasculopathy and Vasculitis,” “Epilepsy,” “Demyelinating and Degenerative Disease,” “Toxic and Metabolic Disease,” “Infectious Diseases,” “Trauma,” “Brain Neoplasms,” “Pediatrics,” “Scalp and Skull Lesions,” and “How To Use This Book.” This last chapter is 24 pages and basically sets out an atlas-like format of different combinations of DWI/apparent diffusion coefficient (ADC)/T2 signal intensity abnormalities associated with a litany of abnormalities that are extracted from previous chapters.

All practicing neuroradiologists are well aware of the value of DWI in stroke and neurovascular imaging and in the evaluation of infectious processes. However, for anyone reading through this book, the applicability of DWI and its derivatives to a wide range of abnormalities becomes apparent.

Several things are appealing about this book; for instance, each chapter does not start out describing and showing various DWI/ADC images but, rather, introduces the reader to the subject by a brief summary of the topic and its pathophysiology. Take the chapter on vasculopathy and vasculitis. Here,

the reader gets an overview of the disease in this category including the pathology (with diagrams showing what size vessels are affected in which diseases), histopathology, and high-quality images. Shown within this chapter are the routine MR and DWI images of the following diseases:

- Primary angiitis
- Temporal arteritis
- Takayasu arteritis
- Polyarteritis nodosa
- Wegener granulomatosis

- Neuro-Behçet disease
- Infectious vasculitis
- Drug-induced vasculitis
- Systemic lupus erythematosus
- Moyamoya syndrome
- Sickle-cell disease
- Posterior reversible encephalopathy syndrome (PRES)
- Hypertensive encephalopathy
- Eclampsia
- Immunosuppressive disease
- Drug-induced encephalopathy
- Uremic encephalopathy
- Thrombotic thrombocytopenic purpura
- Amyloid angiopathy
- Susac syndrome
- Hypereosinophilic syndrome

This book has a few shortcomings regarding some of the images. For example, the authors could have expanded one of the legends in the primary angiitis images to explain why they are calling the enhancement *leptomeningeal* and not *parenchymal*, and in another case, they could have emphasized the different stages of brain ischemia or infarct on the basis of 2 different patterns of DWI/ADC findings. Unfortunately, the authors do not always show the companion ADC with the DWI, so in some cases (eg, giant cell arteritis), the reader will not know if this represents an infarct or shuntthrough. Also glaringly missing is an illustration of PRES, though this entity is described. In addition, the authors could have done a better job of describing some of the findings. For example, in a case of infectious vasculitis secondary to aspergillosis, an intraparenchymal lesion is said to show no enhancement “within this lesion,” but the authors do not describe enhancement around the periphery of the lesion. Also, in the legend below the description of the DWI, they do not mention the reason for the marked signal intensity dropout in a large portion of the hyperintense area (it is because of the hemorrhagic component).

The chapter on infarction is (naturally) the most important clinical part of the book because DWI in practical terms has its greatest impact. The chapter emphasizes and illustrates the time course and changes in DWI, along with routine T2 images, in hyperacute, acute, subacute, and chronic infarctions. Information on and demonstration of reversible ischemia, watershed infarctions, and the additional information supplied by perfusion imaging are brief but well described.

The other chapters contain excellent images, and they serve to not only show diffusion abnormalities but also to briefly survey the major points of each disease. It is hoped that any future editions of this book would contain DWI of the neck and spine, along with a critical analysis of their value, because DWI of the brain is already well established as is well demonstrated in this book. The authors would then have a publication they could call *Diffusion Weighted MR Imaging of the Brain, Spine, and Neck*. In any event, this book can be confidently recommended to all neuroradiologists, either as part of their personal library or as part of a departmental library.

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