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Magnetic Resonance of Myelination and Myelin Disorders, 3rd ed

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All in all, the atlas provides a creative and efficient way to navigate anatomic structures on multiplanar MR images and to improve understanding of functional correlates. However, there are several features that significantly detract from the navigational interface. First, transformation of Talairach coordinates to the MR images is not precise, even with additional customized warping. Consequently, pointing to several locations within the brain can result in a misidentification of structures in the anatomic index. This limitation is acknowledged by the authors, who describe the atlas as an approximation of anatomic structures and Brodmann's areas on the MR images that is meant to be qualitative in presentation. This limitation significantly hinders the objective of the program. For example, in the "Explore" mode, portions of the middle frontal gyrus are designated as superior frontal gyrus in the anatomic index. Some portions of the precentral gyrus are designated as postcentral gyrus. Likewise, portions of the precuneus are identified as cuneus. The sizes of some Brodmann's areas on sections are below the margin of error of the Talairach transformation. This degree of error, if present in clinical imaging, could create catastrophic results. Consequently, the role of the electronic atlas in training neuroradiologists de novo is brought into question.

Also, the overall strategy used by the interactive interface for training users in brain anatomy relies on a one-section-at-a-time presentation of labeled structures. This provides no overall 3D framework by which a user may understand anatomic structures and functional networks within the brain. This is crucial to understanding brain functional associations and their implication to neurologic deficits. Such a 3D perspective is not only important for understanding functional brain anatomy in any plane and at any angle (including those not corresponding to the anterior commissure-posterior commissure line), but is also essential in communicating results to clinicians. The atlas requires exiting the "Label Image" function to enter the "Triplanar" feature, where identification of a structure in 3 planes can be designated by corresponding crosshairs. Consequently, a 3D appreciation of anatomical or Brodmann's areas is cumbersome. A major failing of the atlas is that it does not take advantage of sulcal landmarks in identifying cortical structures or Brodmann's areas. Identification of key sulcal landmarks is the hallmark of identifying functional anatomic regions within the brain on a case-by-case basis in clinical neuroradiology, particularly in the presence of underlying lesions that may distort anatomic relationships. For beginners, the electronic atlas fosters rote memorization of a 2D presentation of cortical gyri, subcortical structures, and Brodmann's areas without providing the basis for an understanding of 3D structures and networks that underlie the functional anatomy observed with MRI.

In summary, the *Cerefy Atlas of Brain Anatomy* is an electronic interface that is extremely clever and efficient in promoting a qualitative understanding of functional anatomic areas identified on multiplanar MR images. Imprecision of the Talairach transformation produces a margin of error that must be considered in the training of clinical neuroradiologists. The atlas is useful in training the beginning student in general anatomic and functional brain relationships and for reinforcing such relationships for the more experienced individual. For the training of functional anatomy is optimal. In this sense, the Cerefy atlas can serve as an effective review for neuroradiologists.

BOOK REVIEW

Magnetic Resonance of Myelination and Myelin Disorders, 3rd ed

Marjo S. van der Knaap and Jaap Valk, eds. New York: Springer; 2005, 1084 pages, 3873 illustrations, \$499.

n recent years there has been immense progress in the knowledge of genetic defects, biochemical abnormalities, and cellular processes underlying myelin disorders. This progress prompted the editors of *Magnetic Resonance of My-elination* to create the third edition of this book. The editors have tried to cover most white matter disorders and to present a collection of images illustrating the field in an extensive fashion. The editors, one a neurologist and the other a neuroradiologist, have invited 13 contributors in specialized fields to write or co-write selected chapters.

The book is divided into 109 chapters. The first 4 chapters are introductory and deal with the anatomy and function of myelin disorders, selective vulnerability, and normal as well as retarded myelination. Chapter 1 has exquisite diagrams detailing the anatomy of myelin. Chapter 2 describes several classification schemes, which are a bit superfluous for most readers. The classification of leukoencephalopathies proposed by the authors would suffice as the most functional one. It divides leukoencephalopathies into hereditary disorders and acquired disorders. The hereditary demyelinating disorders are then classified according to the subcellular localization of the underlying metabolic defect, which stresses the clinical, biochemical, and neuropathologic similarities and differences between categories. The acquired demyelinating disorders are classified according to their underlying causes into noninfectious-inflammatory, infectious-inflammatory, toxic-metabolic, hypoxic-ischemic, and traumatic. The chapter on selective vulnerability (chapter 3) provides nice examples of areas predominantly involved in particular disorders. The recognition of patterns of selective vulnerability is of practical value and contributes to the diagnostic specificity of MRI interpretation. The concept of MRI pattern recognition is based on the concept of selective vulnerability. Specific brain regions may be more vulnerable to particular injuries than others. Chapter 4 deals with normal as well as retarded myelination. The chapter describes myelination and gyration patterns. It also dis-



cusses the use of diffusionweighted imaging (DWI) and diffusion tensor imaging (DTI) to determine maturation. The images are generally good, although some of them could be larger because there are quite large blank spaces in many of the pages.

Chapters 5 through 105 describe particular leukoencephalopathies following the authors' classification scheme. The format followed in these chapters is as follows: clinical features, pathology, therapy, and MRI. In total, there are 647 figures in this book, providing excellent examples of many leukoencephalopathies. T1-weighted and T2-weighted images, as well as FLAIR images in multiple planes, are shown. Tables are provided in many of the chapters. For example, in the chapter on multiple sclerosis (MS), a table is included on the criteria for diagnosis of MS. Another table is provided that depicts MR sequences that may be included in a protocol, including an indication of the MS features in which they are effective.

The next 3 chapters deal with imaging techniques such as diffusion-weighted imaging, magnetization transfer (MT) imaging, and MR spectroscopy (MRS). The chapters not only explain the techniques in very understandable language, but they also show multiple examples of technical applications in particular leukoencephalopathies. For example, DWI and DTI have been applied extensively in MS. Fractional anisotropy and apparent diffusion coefficient values are used to compare different tissue components of MS such as plaques, white matter, and enhancing versus nonenhancing lesions. The authors demonstrate that background reduction as produced by MT pulses can be applied to improve the effect of contrast enhancement in the search for the number of enhancing MS lesions, including a second application of MT, which gives a quantitative impression of the structural integrity of the brain tissue. Also described are the 2 types of spectroscopic abnormalities seen in white matter disorders: process-specific spectroscopic abnormalities related to delayed maturation and tissue damage, and disease-specific spectroscopic changes directly related to the particular disorder under investigation.

Finally, the last chapter deals with pattern recognition in white matter disorders. This chapter provides 13 examples of leukoencephalopathies, including those linked to chromosomal abnormalities. This is a very good chapter for review and for practical tips.

The reference section made up of 168 pages is the most extensive I have seen in any textbook. References are grouped into their respective chapter. Any reader wanting further reading on any of the leukoencephalopathies has plenty of sources to investigate. Overall, this book is well written and covers an important area of neuroradiology in a very extensive fashion. The book is extremely well referenced and well illustrated. It is highly recommended.

BOOKS BRIEFLY NOTED

Fundamentals of Neurology: An Illustrated Guide

Mark Mumenthaler, Henrich Mattle, Ethan Taub, eds. New York: Thieme; 2006, 304 pages, 396 illustrations, \$59.95.

n a 304-page softcover book, Drs. Mumenthaler, Mattle, and Taub describe key topics in neurology. The first 80 pages of the book deal with the fundamentals of neurology, neurologic examination, ancillary tests, and differential diagnosis in neurologic syndromes. The remainder of the book is devoted to specific diseases according to location and/or disease entity. Although this book is said to be aimed at the medical student, those in radiology who deal daily with their neurology colleagues may find this to be a useful reference. Presented in a highly readable format, the essentials of neurology are supplemented with extensive tabular material, highlighted fundamentals, appropriate imaging, and pictures of pertinent patients.

What would appeal most to trainees in neuroradiology and to those engaged in a large-volume neuroradiology practice are the sections on diseases of the cranial nerves, particularly where there are reviews of oculomotor disturbances, diagrams of the segmental lesions of the facial nerve, and abnormalities of hearing and balance. The descriptions of epilepsy, where there is a brief overview of seizure types and electroencephalogram findings, and sections of the book where there are descriptions of motor and sensory dysfunctions are good reviews. The various eye findings and descriptions of disturbance in oculomotor function, papillary mobility, and supranuclear abnormalities are particularly well done.

The format of the book is very pleasing with excellent drawings, crisp charts, and easy-to-read summary charts. Although clearly not intended to be a challenge to formidable multivolume texts such as *Neurology in Clinical Practice* by Bradley, Daroff, Fenichel, and Jarkovic, this short text provides an excellent synopsis for those wanting a review of neurology.

Pediatric Ophthalmology, Neuro-Ophthalmology, Genetics Series: Essentials in Ophthalmology

B. Loren and A.T. Moore, eds. New York: Springer; 2006, 240 pages, 89 illustrations, \$119.

his monograph, which is part of a series in *Essentials in* Ophthalmology, is edited by Drs. Bright Lorenz and Anthony Moore, both of whom are well-known pediatric ophthalmologists. This 240-page book has a number of chapters that may be of general interest to neuroradiologists, particularly for those in children's hospitals who are involved in pediatric head-and-neck imaging. One section with the greatest applicability to imaging involves pediatric ocular oncology. This 20-page chapter has excellent color plates of children and infants with a wide range of tumors, including eyelid, conjunctival, intra-ocular, and orbital tumors. For those who would like to know what the optic discs look like in various diseases such as retinoblastomas, capillary hemangiomas, and melanocytomas, this book provides such images. Although this is not a publication that neuroradiologists would purchase, it may be a volume to recommend to a hospital or medical school library for ready reference.

Spine Surgery Tricks of the Trade

Alexander R. Vaccaro and Todd J. Albert, eds. New York: Thieme Medical Publishers; 2003, 212 pages, 302 illustrations, \$149.95.

This book is divided into sections and chapters that are organized by region according to spinal level and procedure type. There are 13 sections and 86 chapters in total. Each chapter consists of a description of a separate operative procedure in spinal surgery. The authors of each chapter are experts in their respective fields of spine surgery and consist of orthope-