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Plasticity in the Visual System from Genes to Circuits

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space devoted to axonal pathology, even though in the chapter entitled "The Neuron and Axon in EAE," it is noted that during the last 10 years references to "MS and axon" have increased 300% compared with references to "MS and myelin" at 30%. There is a chapter dealing with the axon in the corona virus section of the book, and in the TMEV section, the axon-related information appears in the histopathology chapter. Still, this limited coverage is probably representative of the field at large.

The manner in which the book is laid out facilitates an efficient general introduction to the field, with the opportunity to read further in areas of interest. The scope of the book seems to preclude exhaustive treatment in some areas that might be of interest to individuals beginning a research program using a single model. Each chapter is provided with an abstract and key word summary. Extensive and current reference lists follow individual chapters, though the format of the references is not consistent across chapters. Twelve pages of index are included. Many chapters include informative tables and graphics. A number of cartoons postulating cellular roles and disease processes are presented. Of particular potential utility are tables that summarize many literature studies, such as "Quantitative Trait Loci Identified for Susceptibility to EAE" in both the rat and the mouse. Another table provides a concise summary (without references) of EAE disease factors in primate and rodent models compared with (human) multiple sclerosis. A third table (of many more) provides a concise layout of major CNS myelin proteins.

There are relatively few images for a book of this size, and only 16 color images are presented in a central section of the book (away from the references in the individual chapters). Some of the images presented in gray-scale, including images of histopathology, would have been more effective in color. In more than 1 case, a figure description indicates staining with green and counterstaining with red agents, but the figure has no color. Other images appear too small in the book, clearly the result of an effort to keep the book at a manageable size.

The chapters are, in general, well written, and the editors attempted to maintain consistency across chapters. There are a few annoying problems related to copy editing. Some chapters have large blank areas that contribute to the size of the book, and some figure captions run unnecessarily onto the succeeding pages. A large-print subheading misspells "induced." Also, some figure captions appear in text boxes instead of in a traditional format. There are sentence fragments and errors of English grammar and construction in some chapters, but they do not, in general, impede understanding.

The construction of the book appears fragile. As a result perhaps of the size of the book, the paper is thin, some of the text is in a small font, and the binding is not the best quality. This is a reasonable compromise to keep both weight and cost reasonable. However, the book, listed on-line for $195.00, will need to be handled with care.

The editors have provided a comprehensive reference text that serves a valuable purpose and may well further research in neuroscience generally and multiple sclerosis specifically. This will be a valuable resource for any scientists engaged in work with the types of animal models described and should serve to stimulate thoughts on alternative models for specific processes. It may also enhance understanding of the underlying animal pathology that is targeted by new therapeutic agents and help in extrapolation of results of drug testing.

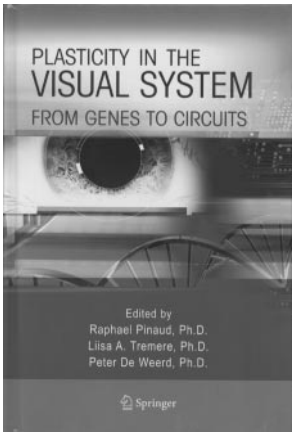
BOOK REVIEW

Plasticity in the Visual System from Genes to Circuits

R. Pinaud, L.A. Tremere, and P. De Weerd, eds. New York: Springer: 2006. 364 pages, $129.

The discoveries of David Hubel and Thorsten Wiesel in the 1960s have had an enormous impact in neuroscience. Their studies revealed that the visual cortex of mammals has a high degree of plasticity in the early postnatal period. If during this period 1 eye is sutured even for a few days, the visual cortex undergoes a dramatic reorganization and vision may be permanently impaired. The central nervous system retains a considerable degree of plasticity even during the adult stage. Understanding the mechanisms of brain plasticity after sensory experience, during learning and memory, and remodeling after lesions or degeneration may have huge clinical and social relevance.

Plasticity in the Visual System from Genes to Circuits, by Raphael Pinaud, Liisa Tremere, and Peter De Weerd (eds), gives an update of recent developments trying to integrate the molecular basis of visual plasticity with changes in neuronal activity and morphology. The book is divided in 3 parts. In "Part I," 5 chapters are devoted to retinal and thalamic plasticity. This is an important issue because subcortical plasticity is less often studied and may explain some of the changes occurring at the cortical level. Three chapters treat structural neurochemical and functional aspects of retinal plasticity induced by degeneration and retinal detachment/reattachment. Two chapters deal with experience-dependent expression of immediate early genes at the retina and thalamic level. In "Part II," 8 chapters are dedicated to visual cortical plasticity. Two chapters discuss the effects of neuromodulatory transmitters and inhibition on normal sensory processing and during experience-induced plasticity. Two chapters focus on the molecular, biochemical, and cellular mechanisms that participate in the control of plasticity. Three chapters are dedicated to plastic rearrangements occurring after retinal lesion, after perceptual learning, and after cognitive functions. One chapter combines molecular approaches and systems neuroscience to deal with changes induced by associative learning. In "Part III," 2 chapters try to provide a theoretic framework for neuronal plasticity by using computational modeling or molecular approaches.



The book appears to be primarily written for graduate students and visual neuroscientists, including perceptual psychologists and computational modelers, who use different approaches to tackle the problem of brain plasticity, using the visual system as a model. The book tries to provide a coherent picture of visual system plasticity, and several important laboratories contributed to this goal. Giving a comprehensive picture, however, adds a further challenge because the field of cortical plasticity is very large. "Part I," which deals with the retina, seems more inclusive than "Part II," which deals with visual cortex. In "Part II," one would expect to find some contribution of several major laboratories that are very active in the field. In particular, techniques such as long-term potentiation/depression have been virtually ignored, and the role of molecules such as neurotrophic factors in modulating brain plasticity has not been given adequate weight.

The "Preface" promises suggestions on "future application of research findings from neural plasticity in the visual system with an emphasis on potential clinical uses and engineering within the biomedical sciences." This would have increased the relevance of this book for the neuroradiology audience, in particular if these topics were associated with neuroimaging of restorative plasticity. Unfortunately, these topics are not covered. Additional information linking plasticity to neuroimaging can be found in *Plasticity in the Human Nervous System: Investigations with Transcranial Magnetic Stimulation,* by Simon J Boniface and Ulf Ziemann (eds) (Cambridge University Press, 2003). Suggestions on the link between genes and possible neurotherapies can be found in *Plasticity in the Adult Brain: From Genes to Neurotherapy* (*Progress in Brain Research*), by M.A. Hofman, G.J. Boer, A.J.G.D. Holtmaat, et al (eds) (Elsevier, 2001).

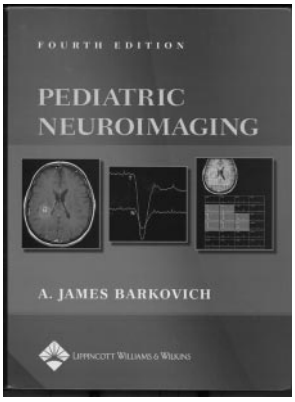
Overall, *Plasticity in the Visual System from Genes to Circuits*, despite its intrinsic limitations, is a useful complement for the neuroradiology audience because it provides insight on molecular mechanisms that underlie plasticity at different levels of the visual pathway.

BOOK REVIEW

Pediatric Neuroimaging, 4th ed.

A. James Barkovich, ed. Philadelphia: Lippincott Williams & Wilkins: 2005. 976 pages, 2561 illustrations, $199.

The newest edition of Jim Barkovich's classic textbook *Pediatric Neuroimaging* represents an important update of his prior text, which was published in 2000. Not only is this edition longer by nearly 100 pages (now 976 pages), but it contains valuable information on state-of-the-art imaging, only a limited amount of which was present in prior editions. Looking back at the 3rd edition, one realizes that Dr. Barkovich recognized the need to include new and/or expanded areas such as spectroscopy and diffusion tensor imaging (DTI) because increasingly one uses more of these applications in daily neuroradiology practice. These additions, along with integration of genetics (when it is germane to the subject), make the book the most useful text in pediatric neuroimaging.



The text is divided into 12 chapters, all written by Barkovich (with some help in the endovascular area from Drs. Meyers and Halbach). A basically solo-authored book such as this is an increasing rarity these days when chapters in many other texts are farmed out. By writing this book himself, Barkovich has maintained a uniformity of style and writing, with duplication of information being present only when it was important to reiterate or re-emphasize certain details. The chapter titles are exactly as they were in the 3rd edition: "Techniques and Methods in Pediatric Neuroimaging," "Normal Development of the Neonatal and Infant Brain, Skull, and Spine," "Toxic and Metabolic Brain Disorders," "Brain and Spine Injuries in Infancy and Childhood," "Congenital Malformations of the Brain and Skull," "The Phakomatoses," "Intracranial, Orbital, and Neck Mass of Childhood," "Hydrocephalus," "Congenital Anomalies of the Spine," "Neoplasms of the Spine," "Infections of the Nervous System," and "Anomalies of the Cerebral Vasculature: Diagnostic and Endovascular Considerations."

Retained (fortunately) is a "List of Disorders" in the very front of the book. With it, one can quickly search for a specific disease within a given category of disorders. This functions differently from an index (which also is present in its customary spot at the end of the book) because with this list, one can quickly find a disease of interest and the list is laid out in nearly a differential diagnosis format. So, for example, to glimpse at those "metabolic disorders that primarily affect gray matter," one has a list of 19 diseases that fall into this category. Another way one could use this list is to look at the name of a disorder and then think of the imaging findings. This would work for unusual disorders (eg, Salla disease or Wolfram syndrome) or more common diseases (eg, Kernicterus or hypoxic-ischemic encephalopathy).

Where has there been an expansion of information? Using the chapter "Toxic and Metabolic Brain Disorders" as an example, one notes some similar but not identical narratives and the use of prior and new figures (all incidentally of excellent quality). More important, there are improved and easier-to-read new case material often with MR spectroscopy, longer descriptions of some of the disorders, and inclusion of disorders not previously covered in the earlier edition. As an example of the text improvement, in the subheading "White Matter Disease with Non-Specific Patterns," nonketotic hyperglycinemia includes a new and previously unpublished case of a neonate in which not only are the standard MR images shown but also MR spectroscopy, showing the high glycine peak at 2.6 ppm. This case supplements another case of a 7-month-old boy with nonketotic hyperglycinemia that did appear in the 3rd edition. Another example is in maple syrup urine disease (acute phase), in which now is shown the spectra (abnormal peaks for branched chain amino acids and lactate) and restricted diffusion on diffusion-weighted imaging in the brain