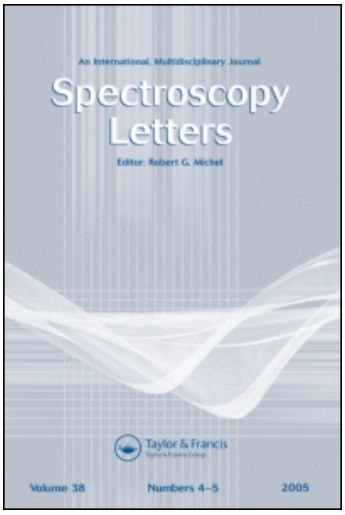

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Review of "Magnetic Resonance Spectroscopy and Imaging in Neurochemistry" (edited by Herman Bachelard), Volume 8 of Advances in Neurochemistry (Series Editors: B. W. Agranoff and K. Suzuki) for *Spectroscopy Letters*

Richard W. Briggs[a]
[a] Associate Professor of Radiology Affiliate Associate Professor of Chemistry and of Biochemistry and Molecular Biology, University of Florida Brain Institute,

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BOOK REVIEW

Review of "Magnetic Resonance Spectroscopy and Imaging in Neurochemistry" (edited by Herman Bachelard), Volume 8 of **Advances in Neurochemistry** (Series Editors: B.W. Agranoff and K. Suzuki) for *Spectroscopy Letters*

Volume 8 of the series **Advances in Neurochemistry** (Series Editors: B.W. Agranoff and K. Suzuki) is "Magnetic Resonance Spectroscopy and Imaging in Neurochemistry", edited by Herman Bachelard. This 413-page book covers the entire spectrum of applications of nuclear magnetic resonance (NMR) to problems in neuroscience, giving a wide overview of the demonstrated and potential uses of this noninvasive technique for revealing the structural, chemical, and functional details of the brain and nervous system. Whether one is studying cultured cells, tissue slices, animal models, or humans, some facet of magnetic resonance can be exploited for what are often unique measurements and characterizations of the system. The ability of NMR to report information from nearly every element in the periodic table contributes to this versatility, and examples of how some of these multinuclear capabilities can be exploited in biomedical research are provided throughout the book. The contributing authors include a number of widely recognized pioneers and innovators in the biomedical magnetic resonance field. They have written twelve informative chapters in an authoritative yet easily readable style. Readers will find this book to be educational and interesting, and neuroscientists and MR scientists will find it especially useful in stimulating ideas for new experiments and applications.

The volume opens with the chapter "^{13}C and ^{1}H MRS of Cultured Neurons and Glia", by Ursula Sonnewald, Arne Schousboe, and Niels Westergaard, which describes the usefulness of ^{13}C label incorporation for studies of the differences and interdependences of metabolism in neurons and glial cells. Herman Bachelard and Ronnitte Badar-Goffer, in their chapter "Measurement of Free Intracellular Cations", next present the methods available for using NMR to study monovalent and divalent cations. Chapter 3, "*In Vivo* Nitrogen MRS Studies of Rat Brain Metabolism", by Keiko Kanamori and Brian D. Ross, details the elegant use of ^{14}N and ^{15}N MR spectroscopy to study the intricacies of amino acid and neurotransmitter biochemistry *in vivo*.

The following two chapters ("Traumatic Brain Injury", by Robert Vink and Tracy K. McIntosh, and "Animal Models of Stroke", by Terri L.C. Luvisotto and Garnette R. Sutherland) describe the application of MR to animal models of important pathologies. Chapter 6, "*In Vivo* Magnetic Resonance Imaging and Spectroscopy: Application to Brain Tumors", by Brian D. Ross, Oded Ben-Yoseph, and Thomas L. Chenevert, discusses studies of both animal and human brain tumors.

Magnetic resonance methods which have arguably caused the biggest stir in the neuroscience community in the past 5-10 years are introduced in Chapters 7-9. These chapters are the most technically oriented portions of the volume, but even neuroscientists relatively unversed in physics will find them manageable. The sensitivity of diffusion-weighted imaging to early ischemic damage in

acute stages of stroke has tremendous clinical and diagnostic implications, as Martin King, Nick van Bruggen, Albert Busza, and Robert Turner explain in "Diffusion-Weighted Magnetic Resonance Imaging". The extreme temporal resolution (as fast as 50 ms per image) of echo-planar imaging (EPI) and its 3D analog echo-volumar imaging (EVI) lead to myriad important applications, as pointed out in the chapter "High-Speed Echo-Planar Imaging and Its Application to Neurology", by Penny Gowland and Peter Mansfield. Included among them are functional MRI, described by Steve C.R. Williams, Andrew Simmons, Chris M. Andrew, Mick J. Brammer, Ed T. Bullmore, and Sophia Rabe-Hesketh in "Brain Activation Studies Using Magnetic Resonance Imaging". This revolutionary new method of imaging localized brain activity depends upon focal changes in cerebral blood oxygenation and flow subsequent to regional metabolism changes. Functional MRI offers several advantages compared to positron emission tomography (PET) imaging: better spatial and temporal resolution, utilization of inherent endogenous contrast rather than administration of a radioactive tracer, and better availability of the technology.

The volume concludes with three chapters ("MRI and Proton MRS in the Evaluation of Multiple Sclerosis", by D.L. Arnold, P.M. Matthews, and N. DeStefano; "Phosphorus and Proton Magnetic Resonance Spectroscopy of the Brain of the Newborn Human Infant", by Ernest B. Cady; "Localized Proton Magnetic Resonance Spectroscopy of Brain Disorders in Childhood", by Jens Frahm and Folker Hanefeld) illustrating the clinical usefulness of magnetic resonance imaging and spectroscopy for the diagnosis and evaluation of pathology and the monitoring of therapy.

This book seems at first glance to be targeted to a rather narrow audience. In fact, it contains information which will be of interest not only to the intended audience of this series ("neuroscientists with a background in biochemistry"), but also to those interested in the various applications of magnetic resonance spectroscopy and imaging to biomedical problems in general.

Richard W. Briggs, Ph.D.
Associate Professor of Radiology
Affiliate Associate Professor of Chemistry
and of Biochemistry and Molecular Biology
University of Florida Brain Institute

tel: (352-392-2571)
fax: (352-395-0279)
e-mail: rbriggs@ufmmr1.health.ufl.edu / rbriggs@ufl.edu

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