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Jasper's Basic Mechanisms of the Epilepsies, 4th Edition

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JASPER'S BASIC MECHANISMS OF THE EPILEPSIES, 4TH EDITION

edited by Jeffrey L. Noebels, Massimo Avoli, Michael A. Rogawski, Richard W. Olsen, and Antonio V. Delgado-Escueta, 1,264 pp., Oxford University Press, 2012, \$225

Since the publication of the first edition of *Jasper's Basic Mechanisms of the Epilepsies* in 1969, this book has served as the gold standard for epilepsy researchers as well as an indispensable resource for clinicians as scientific advances find their way into clinical translation. It is unquestionably the “bible” of epilepsy research. The fourth edition, published in 2012, exceeds the previous editions in both content and heft, weighing in at just under 7 pounds. With 90 chapters and more than 1,200 pages, this volume is monumental by any definition. The list of 199 contributing authors reads like a who's who of experts in epilepsy research. It is the kind of book one would like to curl up with on a lazy winter afternoon—ah—if only there was time to absorb the book in its enormity!

Each successive volume of *Jasper's* has sought to highlight modern techniques and cutting-edge concepts in epilepsy investigation, and this edition continues that tradition. The coverage is encyclopedic and the topic discussions are comprehensive. The book is divided into 5 major sections. The first section provides an overview of research and basic mechanisms of the epilepsies and describes the seminal early contributions of Herbert H. Jasper. An inspirational and energizing chapter by Philip Schwartzkroin overviews why and how basic epilepsy research is done, both for the intellectual excitement and for the importance of making new discoveries for the benefit of patients; it made me feel like rushing to the laboratory straightaway!

The second section deals with the fundamentals of neuronal excitability relevant to seizures and epilepsy, with focus on newly recognized channelopathies. Detailed descriptions cover the range of voltage- and ligand-mediated ion channels, including all of the classic ion channels as well as more recently described channels such as the hyperpolarization-activated cyclic nucleotide-gated channel. Neurotransmitter receptors and their role in epilepsy are covered in great detail, including newer techniques

such as optogenetics and functional imaging of neural circuits. The variety of oscillations that synchronize epileptic activity are considered from both experimental and modeling points of view, and a chapter on computer modeling of epilepsy introduces a unique perspective on how neuronal networks underlying epilepsy might be conceptualized and analyzed. The fact that a chapter on the basic mechanisms of infantile spasms even exists—with the recent development of at least 6 relevant models—is a testament to the exciting recent progress in understanding the neurobiological mechanisms underlying this and related epileptic encephalopathies.

The third section discusses the mechanisms of seizure susceptibility and epileptogenesis, with prominent coverage of traumatic brain injury and post-traumatic epilepsy, febrile seizures, the role of the blood–brain barrier, and a variety of factors involved with cell death and survival related to seizure activity. Updates are provided on questions that have plagued the field for decades, such as the roles of dentate gyrus dysfunction, mossy fiber sprouting, and cell death in epileptogenesis. Glia are afforded their due respect as an important contributor to epileptic circuitry.

The fourth section focuses on epilepsy genes and development, illustrating the rapid advances in understanding the detailed genetic underpinnings of neuronal excitability. The chapters on gene discovery and strategies for studying the epilepsy genome provide an essential background to approach this increasingly important area. Several chapters in this section also deal with epilepsy comorbidities, including behavior, depression, migraine, and autism. Comorbidities have been discussed infrequently until recently but are now recognized as equally if not more important to patients' well-being than seizures.

The final portion of the volume details a wide variety of epilepsy therapeutics, including classic and newer antiepileptic drugs, neurosteroids, dietary approaches, gene targeting, and brain stimulation techniques. This topic is new to the fourth edition and provides an experimental context for cutting-edge investigations in epilepsy therapeutics. The critical issue of drug resistance and potential targets of antiepileptogenic agents are considered in detail as are newer techniques such as stem cell therapies and other gene therapies.

The graphics are superb, including many color figures. My critiques are few. Some redundancy is expected but is not burdensome here, as each chapter can stand alone. It would have been helpful for the editor of each section to provide an overview and summary. For example, one could easily become lost in details of the many facets of GABA receptors. No fewer than 13 chapters elaborate the roles of GABA receptors and GABAergic function in the regulation of neuronal excitability and in various epilepsy syndromes.

The editors should be commended for this current edition of *Jasper's*, a landmark work that updates and extends progress in epilepsy research over the past decade or so. The book highlights basic science advances that complement parallel progress in clinical research. The concept of a "cure" in epilepsy has received much acclaim; though the reality of a permanent cure is a distant dream, the present volume documents substantial

progress on many fronts that is moving this dream toward reality. This volume should be at arms' reach of any clinician or scientist interested in epilepsy. Fortunately for those not willing to carry around a 7-pound tome, all chapters are available online via the National Center for Biotechnology Information in Bethesda, Maryland. One can only imagine, with the pace of current research, the advances that will be documented in the next edition of *Jasper's Basic Mechanisms of the Epilepsies*.

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Disclosure: Dr. Stafstrom is recent past associate editor of *Epilepsia* and serves as chief editor for basic science of *Epilepsy Currents*. He receives royalty payments for contributions to Up-To-Date and has received compensation for consulting with Questcor. Go to Neurology.org for full disclosures.

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