Gap Junctions In The Nervous System Neuroscience Intelligence Unit

This book deals with the types of gap junction proteins (connexins) and their distribution within the nervous system, the physiological properties of channels formed of each connexin, and the role of gap junction channels in functions of normal and pathological brain and peripheral nerve. Although glial tissue is emphasized, additional groups of chapters deal with neurons in the central nervous system and with the retina.

The genetic, molecular, and cellular mechanisms of neural development are essential for understanding evolution and disorders of neural systems. Recent advances in genetic, molecular, and cell biological methods have generated a massive increase in new information, but there is a paucity of comprehensive and up-to-date syntheses, references, and historical perspectives on this important subject. The Comprehensive Developmental Neuroscience series is designed to fill this gap, offering the most thorough coverage of this field on the market today and addressing all aspects of how the nervous system and its components develop. Particular attention is paid to the effects of abnormal development and on new psychiatric/neurological treatments being developed based on our increased understanding of developmental mechanisms. Each volume in the series consists of review style articles that average 15-20pp and feature numerous illustrations and full references. Volume 1 offers 48 high level articles devoted mainly to patterning and cell type specification in the developing central and peripheral nervous systems. Series offers 144 articles for 2904 full color pages addressing ways in which the nervous system and its components develop Features leading experts in various subfields as Section Editors and article Authors All articles peer reviewed by Section Editors to ensure accuracy, thoroughness, and scholarship Volume 1 sections include coverage of mechanisms which: control regional specification, regulate proliferation of neuronal progenitors and control differentiation and survival of specific neuronal subtypes, and controlling development of non-neural cells

Graduate students in neuroanatomy, neurochemistry, neurophysiology, and molecular neurobiology will find the book indispensable. It is also a vital companion for researchers in these fields as well as clinicians in neurology, neurosurgery, neuropathology, neuro-oncology, physiatry, and psychiatry."--BOOK JACKET.

Understanding how the brain functions is one of the most ambitious current scientific goals. This challenge will only be accomplish by a multidisciplinary approach involving genetics, molecular biology, optics, ethology, neurobiology and mathematics and using tractable model systems. The zebrafish larva is a transparent genetically tractable small vertebrate, ideal for the combination state-of-the- art imaging techniques (e.g. two-photon scanning microscopy, single-plane illumination microscopy, spatial light modulator microscopy and lightfield microscopy), bioluminiscence and optogenetics to monitor and manipulate neuronal activity from single specific neurons up to the entire brain, in an intact behaving organism. Furthermore, the zebrafish model offers large and increasing collection of mutant and transgenic lines modelling human brain diseases. With these advantages in hand, the zebrafish larva became in the recent years, a novel animal model to study neuronal circuits and behaviour, taking us closer than

ever before to understand how the brain controls behaviour.

The nervous system is made up of a large number of interacting elements. To understand how such a complex system functions requires the construction and analysis of computational models at many different levels. This book provides a step-by-step account of how to model the neuron and neural circuitry to understand the nervous system at all levels, from ion channels to networks. Starting with a simple model of the neuron as an electrical circuit, gradually more details are added to include the effects of neuronal morphology, synapses, ion channels and intracellular signalling. The principle of abstraction is explained through chapters on simplifying models, and how simplified models can be used in networks. This theme is continued in a final chapter on modelling the development of the nervous system. Requiring an elementary background in neuroscience and some high school mathematics, this textbook is an ideal basis for a course on computational neuroscience.

This collection of reviews contains contributions by internationally recognized immunologists and molecular and cellular neurobiologists. Uniquely, it puts side by side cellular communication devices and signaling mechanisms in the immune and nervous systems and discusses mechanisms of interaction between the two systems, the significance of which has only recently been fully appreciated.

Dendrites form the major receiving part of neurons. It is within these highly complex, branching structures that the real work of the nervous system takes place. The dendrites of neurons receive thousands of synaptic inputs from other neurons. However, dendrites do more than simply collect and funnel these signals to the soma and axon; they shape and integrate the inputs in complex ways. Despite being discovered over a century ago, dendrites received little research attention until the early 1950s. Over the past few years there has been a dramatic explosion of interest in the function of these beautiful structures. Recent new research has developed out understanding of the properties of dendrites, and their role in neuronal function. The first edition of Dendrites was a landmark in the literature, stimulating and guiding further research. The new edition substantially updates the earlier volume, and includes 5 new chapters and color illustrations. It gathers new information on dendrites into a single volume, with contributions written by leading researchers in the field. It presents a survey of the current state of our knowledge of dendrites, from their morphology and development through to their electrical, chemical, and computational properties. As such it will not only be of interest to researchers and graduate-level students in neuroscience, but will also be useful to researchers in computer science and IT, psychology, physiology, and biophysics.

Noradrenergic Signaling and Astroglia integrates what is known about the active role of astroglia in the locus coeruleus-noradrenergic system and outlines the most recent advances in the field. It discusses the molecular mechanisms underlying norepinephrine-induced receptor activation in astroglia, cellular metabolism and CNS energy provision, in vitro, ex vivo, and in vivo models, gliosignalling and neuronal activity, and astroglial networks, gap junctions, and morphological plasticity. The book also addresses the role of astroglial adrenergic receptor activation in memory

formation, cognition, regulation of sleep homeostasis, and lastly in neurological disorders, including trauma (cellular edema), neurodegeneration (Alzheimer's disease), and neuroinflammation (multiple sclerosis). Noradrenergic Signaling and Astroglia is a valuable source of new knowledge for a wide audience, including graduate students, post-doctoral fellows, and researchers in neuroscience, life sciences, and the biological and biomedical sciences. Covers what is currently known about the role of astroglia in the noradrenergic system Provides biochemical and physiological mechanistic data to understand how noradrenergic signals acting on astroglia produce observed effects Includes figures and tables of structures, mechanisms and processes related to astroglia and noradrenergic signaling in CNS

A Cytoplasm Connexon or Hemichannel Cytoplasm external loop I - P. M. N-Termlnus Fig. 1. 1. Topology of gap junction channels. (A) Cap junction channels, extending from the cytoplasm of one cell to the cytoplasm of another, are formed by two connexons or hemichannels connected across extracellular space. (B) Each connexon is formed from six connexin subunits, each having four membrane-spanning domains and both amino and carboxyl termini within the cytoplasm. External/oops (I and II} are believed to provide the high affinity interactions between the hemichannels. 4 Gap }unctions in the Nervous System P-region of voltage sensitive nonjunctional molecules; these contributed disulfide 9 channels. And Delmar's group has ob bridges are presumably involved in intra tained evidence that intracellular acidifi connexin and inter-EL loop tertiary struc cation may result in a conformational ture. An old observation that should be change analogous to the ball and chain repeated stoichiometrically with modern techniques is that gap junction channels model of inactivation of voltage gated ionic can be split into connexons or hemi channels, whereby the carboxyl terminal channels using hyperosmotic disaccharide portion of connexin43 binds to CL, closing 23 solutions again implying that linkage is the channel. Higher order structure of the channel not covalent. is believed to consist of six connexins form ing the hemichannel or connexon in a 3.

Research on intercellular communication through gap junctions has continued to expand, and the meeting on which this book is based brought together many scientists from many different countries and disciplines. In line with the objective of the meeting, this volume focuses on the biological meaning of intercellular communication through gap junctions in various organs. The most recent up-to-date findings have been included in this extensive volume, valuable to all those interested in this rapidly expanding field.

The second edition of Fundamentals of Anaesthesia builds upon the success of the first edition, and encapsulates the modern practice of anaesthesia in a single volume. Written and edited by a team of expert contributors, it provides a comprehensive but easily readable account of all of the information required by the FRCA Primary examination candidate and has been expanded to include more detail on all topics and to include new topics now covered in the examination. As

with the previous edition, presentation of information is clear and concise, with the use of lists, tables, summary boxes and line illustrations where necessary to highlight important information and aid the understanding of complex topics. Great care has been taken to ensure an unrivalled consistency of style and presentation throughout.

ATP, the intracellular energy source, is also an extremely important cell–cell signalling molecule for a wide variety of cells across evolutionarily diverse organisms. The extracellular biochemistry of ATP and its derivatives is complex, and the multiple membrane receptors that it activates are linked to many intracellular signalling systems. Purinergic signalling affects a diverse range of cellular phenomena, including ion channel function, cytoskeletal dynamics, gene expression, secretion, cell proliferation, differentiation and cell death. Recently, this class of signalling molecules and receptors has been found to mediate communication between neurons and non-neuronal cells (glia) in the central and peripheral nervous systems. Glia are critical for normal brain function, development and response to injury. Neural impulse activity is detected by glia and purinergic signalling is emerging as a major means of integrating functional activity between neurons, glia and vascular cells in the nervous system. These interactions mediate effects of neural activity on the development of the nervous system and in association with injury, neurodegeneration, myelination and cancer. Bringing together contributions from experts in diverse fields, including glial biologists, neurobiologists and specialists in purinergic receptor structure and pharmacology, this book considers how extracellular ATP acts to integrate communication between different types of glia, and between neurons and glia. Beginning with an overview of glia and purinergic signalling, it contains detailed coverage of purine release, receptors and reagents, purinergic signalling in the neural control of glial development, glial involvement in information processing, and discussion of the interactions between neurons and microglia.

Astrocytes were the original neuroglia that Ramón y Cajal visualized in 1913 using a gold sublimate stain. This stain targeted intermediate filaments that we now know consist mainly of glial fibrillary acidic protein, a protein used today as an astrocytic marker. Cajal described the morphological diversity of these cells with some ast- cytes surrounding neurons, while the others are intimately associated with vasculature. We start the book by discussing the heterogeneity of astrocytes using contemporary tools and by calling into question the assumption by classical neuroscience that neurons and glia are derived from distinct pools of progenitor cells. Astrocytes have long been neglected as active participants in intercellular communication and information processing in the central nervous system, in part due to their lack of electrical excitability. The follow up chapters review the "nuts and bolts" of ast- cytic physiology; astrocytes possess a diverse assortment of ion channels, neu- transmitter receptors, and transport mechanisms that enable the astrocytes to respond to many of the same signals that act on neurons. Since astrocytes can detect chemical transmitters

that are released from neurons and can release their own extracellular signals there is an increasing awareness that they play physiological roles in regulating neuronal activity and synaptic transmission. In addition to these physiological roles, it is becoming increasingly recognized that astrocytes play critical roles during pathophysiological states of the nervous system; these states include gliomas, Alexander disease, and epilepsy to mention a few.

Biology for AP® courses covers the scope and sequence requirements of a typical two-semester Advanced Placement® biology course. The text provides comprehensive coverage of foundational research and core biology concepts through an evolutionary lens. Biology for AP® Courses was designed to meet and exceed the requirements of the College Board's AP® Biology framework while allowing significant flexibility for instructors. Each section of the book includes an introduction based on the AP® curriculum and includes rich features that engage students in scientific practice and AP® test preparation; it also highlights careers and research opportunities in biological sciences.

Authored by leading experts in the field, this book provides the first comprehensive overview of the mechanisms of early patterning and morphogenesis in zebrafish. It summarizes the current knowledge and the key questions for the next decade of research.

Intercellular communication is part of a complex system of communication that governs basic cellular activities and coordinates cell actions. The ability of cells to perceive and correctly respond to their environment is the basis of growth and development, tissue repair, and immunity as well as normal tissue homeostasis. Errors in cellular information processing are responsible for diseases such as cancer, autoimmunity, diabetes, and neurological and psychiatric disorders. There is substantial drug development concentrating on this and intercellular communication is the basis of much of neuropharmacology. By understanding cell signaling, diseases may be treated effectively and, theoretically, artificial tissues may be yielded. Neurotransmitters/receptors, synaptic structure and organization, gap junctions, neurotrophic factors and neuropeptides are all explored in this volume, as are the ways in which signaling controls neuroendocrinology, neuroimmunology and neuropharmacology. Intercellular Communication in the Nervous System provides a valuable desk reference for all scientists who consider signaling. * Chapters offer impressive scope with topics addressing neurotransmitters/receptors, synaptic structure and organization, neuropeptides, gap junctions, neuropharmacology and more * Richly illustrated in full color with over 200 figures * Contributors represent the most outstanding scholarship in the field, with each chapter providing fully vetted and reliable expert knowledge

This book collates the contributions of a selected number of neuroscientists that are interested in the molecular, preclinical, and clinical aspects of neurotransmission research. The seven chapters in this book address the latest research/review data related to GABA/glutamate system's organization and function, the structure of receptors, subtypes and their ligands, as well as the translational approach and clinical implications. The book offers readers a rich collection of data regarding current and future applications of GABA and glutamate neurotransmission, including promising research strategies and potential clinical benefits.

Invertebrates have proven to be extremely useful model systems for gaining insights into the neural and molecular mechanisms of sensory processing, motor control and higher functions such as feeding behavior, learning and memory, navigation, and social behavior. A major factor in their enormous contributions to neuroscience is the relative simplicity of invertebrate nervous systems. In addition, some invertebrates, primarily the molluscs, have large cells, which allow analyses to take place at the level of individually identified neurons.

Individual neurons can be surgically removed and assayed for expression of membrane channels, levels of second messengers, protein phosphorylation, and RNA and protein synthesis. Moreover, peptides and nucleotides can be injected into individual neurons. Other invertebrate model systems such as Drosophila and Caenorhabditis elegans offer tremendous advantages for obtaining insights into the neuronal bases of behavior through the application of genetic approaches. The Oxford Handbook of Invertebrate Neurobiology reviews the many neurobiological principles that have emerged from invertebrate analyses, such as motor pattern generation, mechanisms of synaptic transmission, and learning and memory. It also covers general features of the neurobiology of invertebrate circadian rhythms, development, and regeneration and reproduction. Some neurobiological phenomena are species-specific and diverse, especially in the domain of the neuronal control of locomotion and camouflage. Thus, separate chapters are provided on the control of swimming in annelids, crustaea and molluscs, locomotion in hexapods, and camouflage in cephalopods. Unique features of the handbook include chapters that review social behavior and intentionality in invertebrates. A chapter is devoted to summarizing past contributions of invertebrates to the understanding of nervous systems and identifying areas for future studies that will continue to advance that understanding.
Gap Junctions in the Nervous SystemSpringer Science & Business Media
Gap junction channels are a group of intercellular channels expressed in tissues and organs to synchronize many physiological processes. A gap junction channel is formed by the docking of two hemichannels, and each hemichannel is a hexamer of connexins. The field of gap junction channel and hemichannel research has recently exploded and became one of the most active areas of cell biology. Numerous novel approaches and techniques have been developed, but there is no single book dedicated to the unique techniques and protocols employed for the research on these large pore channels. This book fills the gap and focuses on protocols, approaches and reviews of gap junction channels and connexin hemichannels. It will be a useful reference for graduate students, postdoctoral fellows and researchers. Anyone with an interest in gap junction channels and hemichannels will need this summary of state-of-the-art techniques and protocols.
Essential textbook for all undergraduate students of neurobiology, physiology, cell biology and preclinical medicine.
Concepts of Biology is designed for the single-semester introduction to biology course for non-science majors, which for many students is their only college-level science course. As such, this course represents an important opportunity for students to develop the necessary knowledge, tools, and skills to make informed decisions as they continue with their lives. Rather than being mired down with facts and vocabulary, the typical non-science major student needs information presented in a way that is easy to read and understand. Even more importantly, the content should be meaningful. Students do much better when they understand why biology is relevant to their everyday lives. For these reasons, Concepts of Biology is grounded on an evolutionary basis and includes exciting features that highlight careers in the biological sciences and everyday applications of the concepts at hand.We also strive to show the interconnectedness of topics within this extremely broad discipline. In order to meet the needs of today's instructors and students, we maintain the overall organization and coverage found in most syllabi for this course. A strength of Concepts of Biology is that instructors can customize the book, adapting it to the approach that works best in their classroom. Concepts of Biology also includes an innovative art program that incorporates critical thinking and clicker questions to help students

understand--and apply--key concepts.

This book provides a state of the art account of present knowledge of the biophysics of cell-to-cell channels. It is divided into two sections, one dealing with two-cell systems and the other with reconstitution systems.

Plasma membrane-associated channels known as gap junctions, along with their protein building blocks-connexins-have an important functional role in a range of immunological processes, including heart function, cell growth and specialization, and early development. Spanning basic science and potential clinical applications, Connexin Cell Communicati

Astrocytes play diverse roles in central nervous system (CNS) function and dysfunction, and the connections that the astrocyte makes with other cells of the brain are essential for a variety of important neural tasks. Bringing together contributions from international experts at the top of their field, Astrocytes: Wiring the Brain emphasizes cellular connections and surveys the most current findings on astrocyte activity. The first section of the book identifies major astrocyte biomarkers and describes how they define the different connectivity domains. Next, the book examines the role of these connections. It explains how their function can be manipulated under physiological conditions and how dysfunction of the connectivity leads to aberrant brain performance. The final section explores the alterations of glia that have been observed in specific diseases of the brain. These include epilepsy, autoimmune encephalitis, Alzheimer's disease, autism, and major depression. The book identifies key mechanisms responsible for these alterations. An important and emerging field, astrocytes and their functions are critical to neuroscientists and neurologists, both in academia and in industry, particularly in the search for and development of new drugs to combat a variety of diseases affecting the CNS. As research continues to grow in this area, this volume will spur heightened advances and understanding into the effects of these neural cells on a range of pathologies.

Gap junctions between glial cells or neurons are ubiquitously expressed in the mammalian brain and play a role in brain development including cell differentiation, cell migration and survival, and tissue homeostasis, as well as in human diseases including hearing loss, neuropathies, epilepsy, brain trauma, and cardiovascular disease. This volume provides neuroscience researchers and students with a single source for information covering the physiological, behavioral and pathophysiological roles of gap junctions in the brain. In addition, the book also discusses human disease conditions associated with mutations in single gap junction connexion genes, making it applicable to clinicians doing translational research. Finally, it includes reviews of pharmacological studies with gap junction blockers and openers, summarizing information obtained from phenotyping gap junctions mouse mutants. Serves as the most current and comprehensive reference available covering the physiological, behavioral and pathophysiological roles of gap junctions in the brain

Chapters summarize knowledge of the basic physiology of gap junctions in the brain, as well as of human disease conditions associated with mutations in single gap junction connexin genes Includes reviews of pharmacological studies with gap junction blockers and openers, summarizing information obtained from phenotyping gap junctions mouse mutants

The brain is the most complex organ in our body. Indeed, it is perhaps the most complex structure we have ever encountered in nature. Both structurally and functionally, there are many peculiarities that differentiate the brain from all other organs. The brain is our connection to the world around us and by governing nervous system and higher function, any disturbance induces severe neurological and psychiatric disorders that can have a devastating effect on quality of life. Our understanding of the physiology and biochemistry of the brain has improved dramatically in the last two decades. In particular, the critical role of cations, including magnesium, has become evident, even if incompletely understood at a mechanistic level. The exact role and regulation of magnesium, in particular, remains elusive, largely because intracellular levels are so difficult to routinely quantify. Nonetheless, the importance of magnesium to normal central nervous system activity is self-evident given the complicated homeostatic mechanisms that maintain the concentration of this cation within strict limits essential for normal physiology and metabolism. There is also considerable accumulating evidence to suggest alterations to some brain functions in both normal and pathological conditions may be linked to alterations in local magnesium concentration. This book, containing chapters written by some of the foremost experts in the field of magnesium research, brings together the latest in experimental and clinical magnesium research as it relates to the central nervous system. It offers a complete and updated view of magnesiums involvement in central nervous system function and in so doing, brings together two main pillars of contemporary neuroscience research, namely providing an explanation for the molecular mechanisms involved in brain function, and emphasizing the connections between the molecular changes and behavior. It is the untiring efforts of those magnesium researchers who have dedicated their lives to unraveling the mysteries of magnesiums role in biological systems that has inspired the collation of this volume of work.

Packed with easily understood, up-to-date and clinically relevant material, this is the only physiology book junior anaesthetists will need.

Connexins: A Guide is a practical and valuable reference and text covering a wide scope of information about the connexin family of membrane channel proteins. The editors and contributing authors intend for this cutting-edge work to be informative to scientists wishing to learn about the field, as well as to those who are active researchers in this area. Connexins: A Guide masterfully addresses specific needs of the scientific community; it is a comprehensive and

comprehensible narrative of the uncommonly diverse connexin field, making previously hard-to-find information easily accessible, while also presenting intelligible insights into the extensive experimental methods and conceptual frameworks necessary to appreciate and understand the important roles that connexin channel proteins play in health and disease. Intended for use by advanced undergraduate, graduate and medical students, this book presents a study of the unique biochemical and physiological properties of neurons, emphasising the molecular mechanisms that generate and regulate their activity.

Epilepsy is a devastating group of neurological disorders characterized by periodic and unpredictable seizure activity in the brain. There is a critical need for new drugs and approaches given than at least one-third of all epilepsy patients are not made free of seizures by existing medications and become "medically refractory". Much of epilepsy research has focused on neuronal therapeutic targets, but current antiepileptic drugs often cause severe cognitive, developmental, and behavioral side effects. Recent findings indicate a critical contribution of astrocytes, star-shaped glial cells in the brain, to neuronal and network excitability and seizure activity. Furthermore, many important cellular and molecular changes occur in astrocytes in epileptic tissue in both humans and animal models of epilepsy. The goal of Astrocytes and Epilepsy is to comprehensively review exciting findings linking changes in astrocytes to functional changes responsible for epilepsy for the first time in book format. These insights into astrocyte contribution to seizure susceptibility indicate that astrocytes may represent an important new therapeutic target in the control of epilepsy. Astrocytes and Epilepsy includes background explanatory text on astrocyte morphology and physiology, epilepsy models and syndromes, and evidence from both human tissue studies and animal models linking functional changes in astrocytes to epilepsy. Beautifully labelled diagrams are presented and relevant figures from the literature are reproduced to elucidate key findings and concepts in this rapidly emerging field. Astrocytes and Epilepsy is written for neuroscientists, epilepsy researchers, astrocyte investigators as well as neurologists and other specialists caring for patients with epilepsy. Presents the first comprehensive book to synthesize historical and recent research on astrocytes and epilepsy into one coherent volume Provides a great resource on the field of astrocyte biology and astrocyte-neuron interactions Details potential therapeutic targets, including chapters on gap junctions, water and potassium channels, glutamate and adenosine metabolism, and inflammation

Drugs affecting the nerves and the brain are among the most commonly used in contemporary medicine. This book examines the mechanism by which such substances cause their therapeutic effects or undesirable side-effects, in relation to underlying physiological and pathological processes. This new edition has been extensively revised and reorganised; the section on the autonomic system has been greatly expanded. Other changes reflect the significant

advances in our understanding of drug action in the peripheral and central nervous systems which have arisen through the application of new electrophysiological and computer techniques. The volume summarises the explosion of information concerning endogenous opioids, other peptides, the benzodiazepines and their receptors. Later chapters deal with the activity and role of drugs in a number of disorders including epilepsy, schizophrenia and depression. This textbook is suitable for undergraduates in pre-clinical medical sciences, pharmaceutical and natural sciences; and for post-graduates and trainees in neuroscience, psychiatry and anaesthesia.

"PH and Brain Function offers thorough coverage of this increasingly important area of research, beginning with the fundamental concepts, which include methodological and theoretical issues such as the measurement of pH and the concept of pH in neurobiology. It explores aspects of regulation and modulation of intracellular pH in brain cells, surveys the changes in pH that occur with neural activity and how these changes affect neural activity, and discusses the role of pH in the pathophysiology of neurological diseases." "pH and Brain Function is an important resource for researchers in all areas of neuroscience as well as cell biology and physiology." --Book Jacket.

An understanding of the nervous system at virtually any level of analysis requires an understanding of its basic building block, the neuron. From Molecules to Networks provides the solid foundation of the morphologic, biochemical, and biophysical properties of nerve cells. All chapters have been thoroughly revised for this second edition to reflect the significant advances of the past 5 years. The new edition expands on the network aspects of cellular neurobiology by adding a new chapter, Information Processing in Neural Networks, and on the relation of cell biological processes to various neurological diseases. The new concluding chapter illustrates how the great strides in understanding the biochemical and biophysical properties of nerve cells have led to fundamental insights into important aspects of neurodegenerative disease. • Written and edited by leading experts in the field, the second edition completely and comprehensively updates all chapters of this unique textbook • Discusses emerging new understanding of non-classical molecules that affect neuronal signaling • Full colour, professional graphics throughout • Includes two new chapters: Information Processing in Neural Networks - describes the principles of operation of neural networks and the key circuit motifs that are common to many networks in the nervous system. Molecular and Cellular Mechanisms of Neurodegenerative Disease - introduces the progress made in the last 20 years in elucidating the cellular and molecular mechanisms underlying brain disorders, including Amyotrophic Lateral Sclerosis (ALS), Parkinson disease, and Alzheimer's disease.

Scientists agree that exposure to toxic agents in the environment can cause neurological and psychiatric illnesses ranging from headaches and depression to syndromes resembling parkinsonism. It can even result in death at high

exposure levels. The emergence of subclinical neurotoxicity--the concept that long-term impairments can escape clinical detection--makes the need for risk assessment even more critical. This volume paves the way toward definitive solutions, presenting the current consensus on risk assessment and environmental toxicants and offering specific recommendations. The book covers: The biologic basis of neurotoxicity. Progress in the application of biologic markers. Reviews of a wide range of in vitro and in vivo testing techniques. The use of surveillance and epidemiology to identify neurotoxic hazards that escape premarket screening. Research needs. This volume will be an important resource for policymakers, health specialists, researchers, and students.