

Contents

- 1 Global Burden of Neurologic Disease 1
Jennifer Sevush-Garcy and Mitchell S. V. Elkind

SECTION I

APPROACH TO THE NEUROLOGIC PATIENT 8

Section Editor: *Lewis P. Rowland*

- 2 Signs and Symptoms in Neurologic Diagnosis:
Approach to the Patient 8
Lewis P. Rowland and Timothy A. Pedley
- 3 The Neurologic Examination 11
James M. Noble

SECTION II

COMMON PROBLEMS IN NEUROLOGY 30

Section Editor: *J. Kirk Roberts*

- 4 Dizziness, Vertigo, and Hearing Loss 30
J. Kirk Roberts
- 5 Syncope and Spells 36
Tina Shih
- 6 Seizures and Status Epilepticus 41
David Roh and Jan Claassen
- 7 Headache and Facial Pain 47
Julio R. Vieira and Denise E. Chou
- 8 Pain, Numbness, and Paresthesias 54
Comana M. Cioroianu
- 9 Visual Disturbances 60
Jeffrey G. Odel and Julia Mallory
- 10 Delirium 75
Adam B. King and Christopher G. Hughes
- 11 Dementia and Memory Loss 81
Lawrence S. Honig
- 12 Involuntary Movements 88
Elan D. Louis
- 13 Muscle Weakness, Cramps, and Stiffness 94
Comana M. Cioroianu and Lewis P. Rowland
- 14 Gait Disorders 107
Ashwini K. Rao
- 15 Acute Stroke: The First Hour 118
Barry M. Czeisler and Stephan A. Mayer
- 16 Acute Spinal Cord Syndromes 130
Natalie R. Weathered and Noam Y. Harel

- 17 Focal Mass Lesions 137
Michelle Wilson Bell, Alexander G. Khandji, and Fabio M. Iwamoto

- 18 Stupor and Coma 153
Jan Claassen, Stephan A. Mayer, and John C. M. Brust
- 19 Brain Death 164
Eelco F. M. Wijdicks

SECTION III

DIAGNOSTIC TESTS 169

Section Editor: *James M. Noble*

- 20 Computed Tomography 169
Daniel S. Chow and Angela Lignelli
- 21 Magnetic Resonance Imaging 174
Vesselin Zdravkov Miloushev and Angela Lignelli
- 22 Positron Emission Tomography and Single-Photon Emission Computed Tomography 187
William Charles Kreisl
- 23 Neurovascular Ultrasound 191
Tatjana Rundek
- 24 Angiography and Endovascular Neuroradiology 198
Charles A. Bruno Jr and Daniel H. Sahlein
- 25 Electroencephalography and Evoked Potentials 206
Nicolas Gaspard and Emily J. Gilmore
- 26 Electromyography, Nerve Conduction Studies, and Magnetic Stimulation 216
Louis H. Weimer, Clifton L. Gooch, Thomas H. Brannagan III, and Seth L. Pullman
- 27 Autonomic Testing 227
Louis H. Weimer
- 28 Vision, Hearing, and Balance Testing 231
J. Kirk Roberts
- 29 Sleep Studies 234
Andrew J. Westwood and Carl W. Bazil
- 30 Neuropsychological Evaluation 241
Yaakov Stern
- 31 Lumbar Puncture and Cerebrospinal Fluid Analysis 246
Nancy J. Edwards, Tareq Saad H. Almaghrabi, and Kiwon Lee
- 32 Brain, Nerve, and Muscle Biopsy 251
John F. Crary, Thomas H. Brannagan III, and Kurenai Tanji
- 33 Intracranial Pressure and Neurocritical Care Monitoring 255
Charles L. Francoeur and Stephan A. Mayer
- 34 Genetic Testing and DNA Diagnosis 263
Jill S. Goldman and Jacinda B. Sampson

SECTION IV**CEREBROVASCULAR DISEASES 267****Section Editor: Stephan A. Mayer**

- 35 Acute Ischemic Stroke 267
Charles C. Esenwa, Barry M. Czeisler, and Stephan A. Mayer
- 36 Transient Ischemic Attack 285
Randolph S. Marshall
- 37 Hypoxic–Ischemic Encephalopathy 288
Alexandra S. Reynolds and Sachin Agarwal
- 38 Intracerebral Hemorrhage 295
Stephan A. Mayer, Fred Rincon, and J. P. Mohr
- 39 Subarachnoid Hemorrhage 303
Stephan A. Mayer, Gary L. Bernardini, and Robert A. Solomon
- 40 Cerebral Venous and Sinus Thrombosis 313
Natalie Organek and Jennifer A. Frontera
- 41 Vascular Malformations 319
J. P. Mohr and John Pile-Spellman
- 42 Central Nervous System Vasculitis 325
Fawaz Al-Mufti and Stephan A. Mayer
- 43 Posterior Reversible Encephalopathy Syndrome and Other Cerebrovascular Syndromes 336
Sara K. Rostanski, Fawaz Al-Mufti, Claire S. Riley, and Joshua Z. Willey
- 44 Primary and Secondary Stroke Prevention 351
Charles C. Esenwa and Mitchell S. V. Elkind

SECTION V**NEUROTRAUMA 359****Section Editor: Neeraj Badjatia**

- 45 Concussion 359
James M. Noble and John F. Crary
- 46 Traumatic Brain Injury 364
Neeraj Badjatia, Gunjan Y. Parikh, and Stephan A. Mayer
- 47 Traumatic Spinal Cord Injury 380
Christopher E. Mandigo, Michael G. Kaiser, and Peter D. Angevine
- 48 Traumatic Cranial and Peripheral Nerve Injuries 390
Jennifer F. Russo, Charles B. Mikell, and Christopher J. Winfree

SECTION VI**DEMENTIA 405****Section Editor: Karen S. Marder**

- 49 Mild Cognitive Impairment 405
Lawrence S. Honig
- 50 Alzheimer Disease 410
Lawrence S. Honig, Scott A. Small, and Richard Mayeux
- 51 Frontotemporal Dementia 419
Edward D. Huey and Stephanie Cosentino

- 52 Lewy Body Dementias 424
Sarah C. Janicki and Karen S. Marder
- 53 Vascular Dementias 432
Nikolaos Scarmeas

SECTION VII**HEADACHE AND PAIN SYNDROMES 437****Section Editor: Denise E. Chou**

- 54 Primary and Secondary Headache Syndromes 437
Peter J. Goadsby and Denise E. Chou
- 55 Cranial Neuralgias and Facial Pain Disorders 450
Marianna Shnayderman Yugrakh and Denise E. Chou
- 56 Complex Regional Pain Syndrome 458
Michael L. Weinberger and Thomas H. Brannagan III
- 57 Neuropathic Pain 462
Thomas H. Brannagan III

SECTION VIII**EPILEPSY AND PAROXYSMAL DISORDERS 468****Section Editor: Carl W. Bazil**

- 58 Epilepsy 468
Carl W. Bazil, Shraddha Srinivasan, and Timothy A. Pedley
- 59 Ménière Syndrome, Benign Paroxysmal Positional Vertigo, and Vestibular Neuritis 490
Ian S. Storper
- 60 Transient Global Amnesia 494
John C. M. Brust

SECTION IX**CENTRAL NERVOUS SYSTEM INFECTIONS 496****Section Editor: Karen L. Roos**

- 61 Acute Bacterial Meningitis and Infective Endocarditis 496
Burk Jubelt and Barnett R. Nathan
- 62 Brain Abscess and Parameningeal Infections 505
Gary L. Bernardini
- 63 Other Bacterial Central Nervous System Infections and Toxins 516
Barnett R. Nathan and Burk Jubelt
- 64 Chronic Meningitis 526
Joseph R. Zunt and Kelly J. Baldwin
- 65 Parasitic Infections 537
Gustavo C. Román
- 66 Viral Infections 542
Shibani S. Mukerji and Jennifer L. Lyons
- 67 HIV and AIDS 565
Kiran Thakur, Ned Sacktor, Carolyn Barley Britton, and Barbara S. Koppel
- 68 Prion Diseases 584
Lawrence S. Honig

SECTION X**DEMYELINATING AND INFLAMMATORY DISEASES 593****Section Editor:** *Claire S. Riley*

- 69 Multiple Sclerosis and Allied Demyelinating Diseases 593
Claire S. Riley
- 70 Pontine and Extrapontine Myelinolysis 616
Gary L. Bernardini and Elliott L. Mancall
- 71 Autoimmune Meningitis and Encephalitis 620
Lawrence S. Honig
- 72 Neurosarcoidosis 628
John C. M. Brust

SECTION XI**MOVEMENT DISORDERS 631****Section Editor:** *Elan D. Louis*

- 73 Essential Tremor 631
Elan D. Louis
- 74 Tics and Tourette Syndrome 636
Stanley Fahn and Daphne Robakis
- 75 Restless Legs Syndrome 640
William G. Ondo
- 76 Dystonia 644
Stanley Fahn
- 77 Hemifacial Spasm 657
Paul Greene
- 78 Myoclonus 660
Pichet Termsarasab and Steven J. Frucht
- 79 Hereditary and Acquired Ataxias 666
Rachel Saunders-Pullman, Susan B. Bressman, and Roger N. Rosenberg
- 80 Tardive Dyskinesia and Other Neuroleptic-Induced Syndromes 686
Un Jung Kang, Robert E. Burke, and Stanley Fahn
- 81 Chorea 691
Joseph Jankovic and Stanley Fahn
- 82 Huntington Disease 698
Karen S. Marder
- 83 Parkinson Disease 704
Stanley Fahn and Un Jung Kang
- 84 Parkinson-Plus Syndromes 722
Paul Greene

SECTION XII**NEUROMUSCULAR DISEASES 731****Section Editor:** *Lewis P. Rowland*

- 85 Amyotrophic Lateral Sclerosis and Motor Neuron Diseases 731
Rebecca Traub and Hiroshi Mitsumoto

- 86 Bell Palsy and Cranial Neuropathies 740
Comana M. Cioroiu and Thomas H. Brannagan III
- 87 Acquired Peripheral Neuropathies 750
Thomas H. Brannagan III and Kurenai Tanji
- 88 Inherited Peripheral Neuropathies 775
Chiara Pisciotta and Michael E. Shy
- 89 Myasthenia Gravis and Disorders of the Neuromuscular Junction 785
Christina M. Ulane and Lewis P. Rowland
- 90 Inflammatory Myopathies 798
Rebecca Traub, Christina M. Ulane, and Kurenai Tanji
- 91 Critical Illness Myopathy and Neuropathy 807
Michio Hirano and Louis H. Weimer
- 92 Endocrine and Toxic Myopathies 810
Christina M. Ulane
- 93 Periodic Paralysis and Other Channelopathies 814
Comana M. Cioroiu and Lewis P. Rowland
- 94 Stiff Person Syndrome and Peripheral Nerve and Muscle Hyperexcitability 819
Jonathan Perk, Christina M. Ulane, and Lewis P. Rowland
- 95 Metabolic and Mitochondrial Myopathies in Adults 826
Michio Hirano, Salvatore DiMauro, and Lewis P. Rowland

SECTION XIII**NEUROONCOLOGY 834****Section Editor:** *Andrew B. Lassman*

- 96 Gliomas 834
Mikael L. Rinne and Patrick Y. Wen
- 97 Metastatic Tumors 849
Enid Choi, Graeme F. Woodworth, and Minesh P. Mehta
- 98 Tumors of the Meninges 861
Thomas J. Kaley
- 99 Primary Central Nervous System Lymphoma 867
Tracy T. Batchelor
- 100 Tumors of the Pituitary Gland 873
John Ausiello, Pamela U. Freda, and Jeffrey N. Bruce
- 101 Pineal Region Tumors 881
Jeffrey N. Bruce
- 102 Acoustic Neuroma and Other Skull Base Tumors 888
Randy S. D'Amico and Michael B. Sisti
- 103 Spinal Tumors 896
David Cachia, Claudio E. Tatsui, and Mark R. Gilbert
- 104 Paraneoplastic Syndromes 907
Lauren R. Schaff and Lewis P. Rowland
- 105 Complications of Cancer Therapy 912
Jasmin Jo and David Schiff

SECTION XIV**HYDROCEPHALUS AND CEREBRAL EDEMA 918****Section Editor: Fred Rincon**

- 106 Hydrocephalus 918
Michelle L. Ghobrial, Leon D. Prockop, and Fred Rincon
107 Brain Edema and Disorders of Intracranial Pressure 929
Stephan A. Mayer
108 Intracranial Hypotension 940
Emitseilu K. Iluonakhamhe, Tiffany R. Chang, and Kiwon Lee

SECTION XV**SPINAL CORD DISORDERS 946****Section Editor: Paul C. McCormick**

- 109 Intervertebral Disk Disease and Radiculopathy 946
Peter D. Angevine, Hani R. Malone, and Paul C. McCormick
110 Cervical and Lumbar Spinal Stenosis 954
Lewis P. Rowland and Paul C. McCormick
111 Acquired and Hereditary Myelopathies 959
Natalie R. Weathered and Noam Y. Harel

SECTION XVI**AUTONOMIC AND SLEEP DISTURBANCES 968****Section Editor: Louis H. Weimer**

- 112 Neurogenic Orthostatic Hypotension, Autonomic Failure, and Acquired and Familial Autonomic Neuropathy 968
Louis H. Weimer
113 Paroxysmal Sympathetic Hyperactivity after Acute Brain Injury 975
Huimahn Alex Choi, Sophie Samuel, and Teresa A. Allison
114 Sleep Disorders 979
Carl W. Bazil and Andrew J. Westwood

SECTION XVII**SYSTEMIC ORGAN FUNCTION AND THE BRAIN 990****Section Editor: Kiwon Lee**

- 115 Heart–Brain Interactions 990
Shouri Lahiri and Stephan A. Mayer
116 Respiratory Support for Neurologic Diseases 996
David B. Seder and Stephan A. Mayer
117 Endocrine Diseases and the Brain 1002
Gary M. Abrams and Hyman M. Schipper
118 Hematologic Diseases and the Brain 1013
Andreas H. Kramer
119 Hepatic Disease and the Brain 1030
Charles L. Francoeur and Stephan A. Mayer
120 Renal Disease and the Brain 1037
J. Kirk Roberts and Stephan A. Mayer

121 Gastric and Genitourinary Function and the Brain 1043*Alden Doerner Rinaldi and Charles C. Esenwa*

- 122 Bone Diseases and the Central Nervous System 1049
Roger N. Rosenberg and Alison M. Pack
123 Malnutrition, Malabsorption, and B₁₂ and Other Vitamin Deficiencies 1055
Rebecca Traub and Laura Lennihan
124 Neurologic Disease during Pregnancy 1061
Alison M. Pack
125 Neurologic Complications of Organ Transplantation 1070
Eelco F. M. Wijdicks

SECTION XVIII**NEUROLOGIC TOXIDROMES 1074****Section Editor: John C. M. Brust**

- 126 Alcoholism 1074
John C. M. Brust
127 Drug Intoxication and Withdrawal 1084
John C. M. Brust
128 Neurotoxicology 1090
Christopher Zammit
129 Radiation Injury 1107
Christopher Zammit and Edward (Mel) J. Otten
130 Electrical and Lightning Injury 1113
Christopher Zammit and Edward (Mel) J. Otten
131 Decompression Illness 1116
Christopher Zammit and Edward (Mel) J. Otten

SECTION XIX**PEDIATRIC NEUROLOGY 1119****Section Editor: James J. Riviello Jr**

- 132 Neonatal Neurology 1119
Arthur M. Mandel
133 Nervous System Formation and Malformation 1130
Gary D. Clark
134 Inborn Errors of Metabolism 1150
Marc C. Patterson
135 Chromosomal Disorders and Disorders of DNA 1174
Marc C. Patterson
136 The Floppy Infant 1181
Darryl C. De Vivo and Jahannaz Dastgir
137 Disorders of Motor and Mental Development 1188
Toni S. Pearson and Reet K. Sidhu
138 Autism Spectrum Disorders 1197
Reet K. Sidhu
139 Mitochondrial Encephalomyopathies 1204
Salvatore DiMauro and Michio Hirano

- | | |
|---|--|
| <p>140 Neurocutaneous Syndromes 1218
<i>Marc C. Patterson</i></p> <p>141 Spinal Muscular Atrophies of Childhood 1229
<i>Petra Kaufmann and Darryl C. De Vivo</i></p> <p>142 Progressive Muscular Dystrophies 1231
<i>Mathula Thangarajh, Petra Kaufmann, Louis H. Weimer, Michio Hirano, and Lewis P. Rowland</i></p> <p>143 Seizures in Children 1247
<i>James J. Riviello Jr and Douglas R. Nordli Jr</i></p> <p>144 Stroke in Children 1254
<i>Sally M. Sultan</i></p> <p>145 Congenital and Childhood Central Nervous System Tumors 1265
<i>James H. Garvin Jr</i></p> <p>146 Pediatric Brain Injury and Shaken Baby Syndrome 1293
<i>Joshua Cappell and Steven G. Kernie</i></p> <p>147 HIV, Fetal Alcohol Syndrome, and Drug Effects 1298
<i>Claudia A. Chiriboga</i></p> | <p>150 Anxiety Disorders, Posttraumatic Stress Disorder, and Obsessive–Compulsive Disorder 1319
<i>Franklin R. Schneier</i></p> <p>151 Somatic Symptom Disorders 1326
<i>Anna Lopatin Dickerman and Philip R. Muskin</i></p> |
|---|--|

SECTION XX

RECOVERY AND END-OF-LIFE CARE 1335

Section Editor: Laura Lennihan

- | | |
|--|--|
| <p>152 Neurologic Rehabilitation 1335
<i>Heidi Schambra and Laura Lennihan</i></p> | <p>153 Ethical and End-of-Life Issues in Neurology 1341
<i>Fred Rincon, Lewis P. Rowland, and Stephan A. Mayer</i></p> |
|--|--|

Index 1346

SECTION XX

PSYCHIATRY AND NEUROLOGY 1305

Section Editor: David H. Strauss

- | | |
|--|--|
| <p>148 Psychosis 1305
<i>Jacob S. Ballon and T. Scott Stroup</i></p> | <p>149 Mood Disorders 1312
<i>Licínia Ganancia, Alejandro S. Cazzulino, and Maria A. Oquendo</i></p> |
|--|--|