

# Contents

Foreword ix  
Preface xi  
Acknowledgments xiii

## PART I

### NEUROANATOMY AND NEUROANATOMIC LOCALIZATION 1

---

#### 1 Diagnostic Reasoning in Neurology and the Neurologic History and Examination 1

Localization in Neurologic Diagnosis: Determining  
*Where* The Problem Is 1  
Time Course in Neurologic Diagnosis: Determining  
*What* The Problem Is 2  
Associated Symptoms and Signs in Neurologic  
Diagnosis 3  
Introduction to the Neurologic Examination 3

#### 2 Introduction to Neuroimaging and Cerebrospinal Fluid Analysis 11

Neuroimaging in Clinical Practice 11  
Overview of Neuroimaging Interpretation 12  
Interpretation of Brain CT 12  
Interpretation of Brain MRI 13  
Contrast-Enhanced Neuroimaging 17  
Vascular Imaging 19  
Nuclear Medicine Studies: Positron Emission  
Tomography And Single Photon Emission  
Computed Tomography 21  
Neuroimaging of the Spine 21  
Cerebrospinal Fluid Analysis 21

#### 3 Overview of the Anatomy of the Nervous System 25

Central Nervous System (CNS) and Peripheral  
Nervous System (PNS) 25  
Hemispheres and Lobes of the Brain 25  
Gray Matter and White Matter of the Brain and  
Spinal Cord 26  
The Meninges: Coverings of the Brain and  
Spinal Cord 26  
The Cerebral Venous Sinuses 29  
The Ventricular System and Cerebrospinal Fluid  
Flow 29

#### 4 The Motor and Somatosensory Pathways and Approach to Weakness and Sensory Loss 33

The Corticospinal Tracts 33  
The Corticobulbar Tracts 36  
Somatosensory Pathways for the Body 36  
Localization of Motor and Sensory Deficits 38

#### 5 The Spinal Cord and Approach to Myelopathy 41

Overview of Spinal Cord Anatomy 41  
Lamination of the Long Tracts in the  
Spinal Cord 41  
Spinal Cord Syndromes 42  
Spinal Cord Pathways For Bowel and  
Bladder Control 44  
Causes of Myelopathy 45

#### 6 The Visual Pathway and Approach to Visual Loss 47

Anatomy of the Visual Pathway 47  
Approach to Visual Loss 48  
Disorders of Visual Cognition 50

#### 7 The Cerebral Hemispheres and Vascular Syndromes 53

Cortical Regions 53  
Subcortical Structures: Thalamus and  
Basal Ganglia 55  
Arterial Supply of the Cerebral Hemispheres 57  
Clinical Syndromes Associated With Cerebral  
Vascular Territories 59

#### 8 The Cerebellum and Approach to Ataxia 67

Anatomy and Function of The Cerebellum 67  
Arterial Supply of the Cerebellum 70  
Approach to Ataxia 70

#### 9 The Brainstem and Cranial Nerves 75

Overview of Brainstem Anatomy 75  
Clinical Applications of Basic Brainstem  
Anatomy 77

- 10 Pupillary Control and Approach to Anisocoria** *Cranial Nerves 2 and 3* 83  
 Pupillary Constriction: the Parasympathetic Pathway 83  
 Pupillary Dilation: the Sympathetic Pathway 84  
 Approach to Anisocoria and Other Pupillary Abnormalities 87
- 11 Extraocular Movements and Approach to Diplopia** *Cranial nerves 3, 4, and 6* 91  
 Extraocular Movements I: Muscles and their Innervation 91  
 Extraocular Movements II: Cranial Nerves 3, 4, and 6 93  
 Extraocular Movements III: Supranuclear Control of Horizontal and Vertical Gaze 96  
 Approach to Diplopia 101
- 12 The Auditory and Vestibular Pathways and Approach to Hearing Loss and Dizziness/Vertigo** *Cranial Nerve 8* 105  
 The Auditory System 105  
 Approach to Hearing Loss 105  
 The Vestibular System 107  
 Approach to Dizziness and Vertigo 110
- 13 Facial Sensation and Movement and Approach to Facial Sensory and Motor Deficits** *Cranial nerves 5 and 7* 117  
 Trigeminal Nerve (Cranial Nerve 5) 117  
 Facial Nerve (Cranial Nerve 7) 120
- 14 Cranial Nerves 1, 9, 10, 11, and 12** 125  
 Cranial Nerve 1 (Olfactory Nerve) 125  
 Cranial Nerve 9 (Glossopharyngeal) and Cranial Nerve 10 (Vagus) 125  
 Cranial Nerve 11 (Spinal Accessory) 126  
 Cranial Nerve 12 (Hypoglossal) 128
- 15 The Peripheral Nervous System and Introduction to Electromyography/Nerve Conduction Studies** 129  
 Introduction to Anatomy and Diseases of the Peripheral Nervous System 129  
 Anatomy and Diseases of Nerve Roots: Radiculopathy 130  
 Diseases of Dorsal Root Ganglia: Ganglionopathy (Sensory Neuronopathy) 134  
 Diseases of the Brachial or Lumbosacral Plexus: Plexopathy 134  
 Diseases of Peripheral Nerves 135  
 Introduction to EMG and Nerve Conduction Studies 136

- 16 Radiculopathy, Plexopathy, and Mononeuropathies of the Upper Extremity** 141  
 Neuroanatomy of the Upper Extremity 141  
 Cervical Radiculopathy 145  
 Brachial Plexopathy 147  
 Mononeuropathies of the Upper Extremity 147
- 17 Radiculopathy, Plexopathy, and Mononeuropathies of the Lower Extremity** 157  
 Neuroanatomy of the Lower Extremity 157  
 Lumbosacral Radiculopathy and Lumbar Canal Stenosis 159  
 Lumbosacral Plexopathy 163  
 Mononeuropathies of the Lower Extremity 163  
 Approach to Foot Drop 165

## PART II

## DISEASES OF THE NERVOUS SYSTEM 167

---

- 18 Seizures and Epilepsy** 167  
 Definitions and Causes of Seizures and Epilepsy 167  
 Evaluation of Patients With Seizures 168  
 Clinical Features of Seizures 169  
 Electroencephalography (EEG) in the Evaluation of Seizures 170  
 Evaluation and Management of Patients After a First Seizure 171  
 Outpatient Management of Epilepsy 173  
 Special Scenarios in the Management of Seizures and Epilepsy 175  
 Status Epilepticus 178
- 19 Vascular Diseases of the Brain and Spinal Cord** 179  
 Overview of Ischemic Stroke and Intracerebral Hemorrhage 179  
 Ischemic Stroke 180  
 Intracerebral Hemorrhage 192  
 Central Nervous System Vascular Malformations 195  
 Subarachnoid Hemorrhage 196  
 Intraventricular Hemorrhage 198  
 Subdural Hematoma 199  
 Epidural Hematoma 200  
 Cerebral Venous Sinus Thrombosis and Cortical Vein Thrombosis 200  
 Other Cerebrovascular Disorders 201  
 Vascular Disease of the Spinal Cord 203

- 20 Infectious Diseases of the Nervous System 207**  
*Meningitis* 207  
 Viral Encephalitis 212  
 Focal Infectious Brain Lesions 214  
 Infections of the Spine 218  
 Infections of Nerve Roots 219  
 Infectious Peripheral Neuropathies 219  
 Infection at the Neuromuscular Junction:  
   Botulism 219  
 Infectious Myositis 220  
 Neurologic Manifestations of HIV 220
- 21 Demyelinating Diseases of the Central Nervous System 223**  
 Multiple Sclerosis 223  
 Neuromyelitis Optica 227  
 Acute Disseminated Encephalomyelitis 228  
 Optic Neuritis 229  
 Transverse Myelitis 229
- 22 Delirium, Dementia, and Rapidly Progressive Dementia 231**  
 Approach to Altered Cognition 231  
 Delirium 231  
 Dementia 233  
 Rapidly Progressive Dementia 238
- 23 Movement Disorders 241**  
 Introduction to Movement Disorders 241  
 Tremor 241  
 Myoclonus 243  
 Chorea 244  
 Dystonia 246  
 Tics, Tourette's Syndrome, and Sterotypies 246  
 Parkinsonism, Parkinson's Disease, and Parkinson-Plus Syndromes 247  
 Other Movement Disorders 253
- 24 Neoplastic and Paraneoplastic Disorders of the Nervous System and Neurologic Complications of Chemotherapy and Radiation Therapy 255**  
 Intracranial Tumors 255  
 Tumors of the Spine 258  
 Tumors of the Cranial Nerves 260  
 Tumors of the Peripheral Nervous System 261  
 Neurocutaneous Syndromes and Associated Nervous System Neoplasms 262  
 Neurotoxicity of Chemotherapy and Radiation Therapy 262  
 Paraneoplastic Syndromes of the Nervous System 264
- 25 Disorders of Intracranial Pressure 269**  
 Increased Intracranial Pressure (Intracranial Hypertension) 269  
 Decreased Intracranial Pressure (Intracranial Hypotension) 273
- 26 Headache 275**  
 Approach to Headache 275  
 Secondary Causes of Headache 275  
 Primary Headache Disorders 276  
 Other Causes of Headache 279
- 27 Peripheral Neuropathy 281**  
*Classification and Differential Diagnosis of Peripheral Polyneuropathy* 281  
 Acute Polyneuropathy 283  
 Chronic Polyneuropathy 284
- 28 Motor Neuron Disease 289**  
 Overview of Motor Neuron Disease 289  
 Amyotrophic Lateral Sclerosis (ALS) and its Variants 289  
 Spinal Muscular Atrophy (SMA) and Spinal Bulbar Muscular Atrophy (Kennedy's Disease) 291
- 29 Disorders of the Neuromuscular Junction 293**  
 Myasthenia Gravis 293  
 Congenital Myasthenic Syndromes and Neonatal Myasthenia Gravis 296  
 Lambert-Eaton Myasthenic Syndrome 296
- 30 Diseases of Muscle 299**  
 Causes of Muscle Disease 299  
 Clinical Features of Muscle Disease 299  
 Laboratory Testing in Muscle Disease 300  
 Inflammatory Myopathies 300  
 Muscular Dystrophies 301  
 Distal Myopathies (*Distal Muscular Dystrophies*) 303  
 Congenital Muscular Dystrophies and Congenital Myopathies 304  
 Metabolic Myopathies 304  
 Mitochondrial Myopathies 306  
 Hyperkalemic and Hypokalemic Periodic Paralysis 306  
 Muscle Disease Due to Systemic Diseases and Medications 307
- 31 Leukodystrophies and Mitochondrial Disorders 309**  
*Leukodystrophies* 309  
 Mitochondrial Diseases 309
- Index 313