

Contents

1 Elements of the Nervous System	2
Information Flow in the Nervous System ..	2
Neurons and Synapses	2
Neurons	2
Synapses.....	5
Neurotransmitters and Receptors	6
Functional Groups of Neurons	7
Glial Cells	8
2 Somatosensory System	10
Peripheral Components of the Somatosensory System and Peripheral Regulatory Circuits	10
Receptor Organs.....	10
Peripheral Nerve, Dorsal Root Ganglion, Posterior Root.....	12
Peripheral Regulatory Circuits.....	16
Central Components of the Somatosensory System	22
Posterior and Anterior Spinocerebellar Tracts ..	22
Posterior Columns.....	24
Anterior Spinothalamic Tract.....	26
Lateral Spinothalamic Tract	27
Other Afferent Tracts of the Spinal Cord.....	29
Central Processing of Somatosensory Information	30
Somatosensory Deficits due to Lesions at Specific Sites along the Somatosensory Pathways	30
3 Motor System	34
Central Components of the Motor System and Clinical Syndromes of Lesions Affecting Them	34
Motor Cortical Areas.....	34
Corticospinal Tract (Pyramidal Tract)	36
Corticonuclear (Corticobulbar) Tract.....	37
Other Central Components of the Motor System	37
Lesions of Central Motor Pathways	38
Peripheral Components of the Motor System and Clinical Syndromes of Lesions Affecting Them	41
Clinical Syndromes of Motor Unit Lesions....	42
Complex Clinical Syndromes due to Lesions of Specific Components of the Nervous System	42
Spinal Cord Syndromes	42
Vascular Spinal Cord Syndromes.....	54
Spinal Cord Tumors.....	54
Nerve Root Syndromes (Radicular Syndromes).....	55
Plexus Syndromes	60
Peripheral Nerve Syndromes	63
Syndromes of the Neuromuscular Junction and Muscle.....	69

4 Brainstem	72		
Surface Anatomy of the Brainstem	72	Vestibulocochlear Nerve (CN VIII)—Cochlear Component and the Organ of Hearing	107
Medulla.....	72	Vestibulocochlear Nerve (CN VIII)—Vestibular Component and Vestibular System.....	113
Pons.....	74	Vagal System (CN IX, X, and the Cranial Portion of XI).....	119
Midbrain.....	74	Hypoglossal Nerve (CN XII)	125
Cranial Nerves	74	Topographical Anatomy of the Brainstem ..	127
Origin, Components, and Functions.....	74	Internal Structure of the Brainstem.....	127
Olfactory System (CN I).....	79	Brainstem Disorders	137
Visual System (CN II)	81	Ischemic Brainstem Syndromes	137
Eye Movements (CN III, IV, and VI).....	85		
Trigeminal Nerve (CN V).....	97		
Facial Nerve (CN VII) and Nervus Intermedius	103		
5 Cerebellum	150		
Surface Anatomy	150	Cerebellar Function and Cerebellar Syndromes	156
Internal Structure	151	Vestibulocerebellum.....	156
Cerebellar Cortex.....	151	Spinocerebellum	158
Cerebellar Nuclei	152	Cerebrocerebellum	158
Afferent and Efferent Projections of the Cerebellar Cortex and Nuclei	153	Cerebellar Disorders	159
Connections of the Cerebellum with Other Parts of the Nervous System	154	Cerebellar Ischemia and Hemorrhage.....	159
		Cerebellar Tumors.....	160
		Genetic and Metabolic Diseases of the Cerebellum	161
6 Diencephalon and Autonomic Nervous System	164		
Location and Components of the Diencephalon	164	Hypothalamus	172
Thalamus	166	Location and Components	172
Nuclei	166	Hypothalamic Nuclei	173
Position of the Thalamic Nuclei in Ascending and Descending Pathways.....	167	Afferent and Efferent Projections of the Hypothalamus	173
Functions of the Thalamus.....	170	Functions of the Hypothalamus	176
Syndromes due to Thalamic Lesions	170	Peripheral Autonomic Nervous System	182
Thalamic Vascular Syndromes.....	171	Fundamentals.....	182
Epithalamus	171	Sympathetic Nervous System.....	184
Subthalamus	172	Parasympathetic Nervous System	186
Location and Components	172	Autonomic Innervation and Functional Disturbances of Individual Organs.....	187
		Visceral and Referred Pain	192

7 Limbic System	196		
Anatomy	196	Functions of the Limbic System	200
Internal and External Connections.....	197	Types of Memory.....	201
Major Components of the Limbic System ..	197	Memory Dysfunction—the Amnesic Syndrome and Its Causes.....	203
Hippocampus.....	197		
Microanatomy of the Hippocampal Formation	197		
Amygdala.....	199		
8 Basal Ganglia	210		
Preliminary Remarks on Terminology	210	Function and Dysfunction of the Basal Ganglia	215
The Role of the Basal Ganglia in the Motor System: Phylogenetic Aspects	210	Clinical Syndromes of Basal Ganglia Lesions	215
Components of the Basal Ganglia and Their Connections	211		
Nuclei	211		
Connections of the Basal Ganglia	213		
9 Cerebrum	224		
Development	224	Association Fibers	233
Gross Anatomy and Subdivision of the Cerebrum	226	Commissural Fibers	234
Gyri and Sulci.....	226	Functional Localization in the Cerebral Cortex	235
Histological Organization of the Cerebral Cortex	228	Methods	235
Laminar Architecture.....	228	Primary Cortical Fields.....	237
Cerebral White Matter	232	Association Areas.....	244
Projection Fibers	232	Frontal Lobe.....	245
		Higher Cortical Functions and Their Impairment by Cortical Lesions	245
10 Coverings of the Brain and Spinal Cord; Cerebrospinal Fluid and Ventricular System	256		
Coverings of the Brain and Spinal Cord	256	Structure of the Ventricular System.....	258
Dura Mater.....	256	Cerebrospinal Fluid Circulation and Resorption.....	259
Arachnoid.....	258	Disturbances of Cerebrospinal Fluid Circulation—Hydrocephalus.....	260
Pia Mater	258		
Cerebrospinal Fluid and Ventricular System	258		

11 Blood Supply and Vascular Disorders of the Central Nervous System	266
Arteries of the Brain	266
Extradural Course of the Arteries of the Brain..	266
Arteries of the Anterior and Middle Cranial Fossae	268
Arteries of the Posterior Fossa.....	271
Collateral Circulation in the Brain	273
Veins of the Brain	274
Superficial and Deep Veins of the Brain	274
Dural Sinuses	275
Blood Supply of the Spinal Cord	276
Arterial Anastomotic Network	276
Venous Drainage	278
Cerebral Ischemia	278
Arterial Hypoperfusion	278
Particular Cerebrovascular Syndromes.....	290
Impaired Venous Drainage from the Brain ...	296
Intracranial Hemorrhage	298
Intracerebral Hemorrhage (Nontraumatic)...	298
Subarachnoid Hemorrhage.....	300
Subdural and Epidural Hematoma.....	304
Vascular Syndromes of the Spinal Cord	305
Arterial Hypoperfusion	305
Impaired Venous Drainage.....	306
Spinal Cord Hemorrhage and Hematoma	307
Bibliography	308
Index	313