

1	GROSS STRUCTURE OF THE BRAIN	1
	I Divisions of the Brain	1
2	DEVELOPMENT OF THE NERVOUS SYSTEM	10
	I The Neural Tube	10
	II The Neural Crest	10
	III The Cranial Neuropore	12
	IV The Caudal Neuropore	12
	V Microglia	12
	VI Myelination	12
	VII The Optic Nerve and Chiasma	12
	VIII The Hypophysis (pituitary gland)	12
	IX Congenital Malformations of the CNS	13
3	NEUROHISTOLOGY	17
	I Neurons	17
	II Nissl Substance	17
	III Axonal Transport	17
	IV Anterograde (Wallerian) Degeneration	18
	V Chromatolysis	18
	VI Regeneration of Nerve Cells	18
	VII Neuroglia	19
	VIII The Blood–Brain Barrier	19
	IX The Blood–CSF Barrier	19
	X Pigments and Inclusions	20
	XI Classification of Nerve Fibers	21
	XII Tumors of the CNS and PNS	21
	XIII Cutaneous Receptors	23
4	BLOOD SUPPLY	25
	I The Spinal Cord and Caudal Brainstem	25
	II The Internal Carotid System	25
	III The Vertebrobasilar System	27
	IV The Blood Supply of the Internal Capsule	28
	V Veins of the Brain	28

- VI Venous Dural Sinuses 29
- VII Angiography 29
- VIII The Middle Meningeal Artery 29

5 MENINGES, VENTRICLES, AND CEREBROSPINAL FLUID 36

- I Meninges 36
- II Ventricular System 38
- III Cerebrospinal Fluid 39
- IV Herniation 39

6 SPINAL CORD 44

- I Gray and White Rami Communicans 44
- II Spinal Nerves 44
- III Conus Medullaris 44
- IV Location of the Major Motor and Sensory Nuclei of the Spinal Cord 45
- V The Cauda Equina 47
- VI The Myotatic Reflex 47

Case 6-1 49

- I Posterior (Dorsal) Column—Medial Lemniscus Pathway 49
- II Anterolateral System 51
- III Lateral Corticospinal Tract 51

Case 6-2 54

- I Diseases of the Motor Neurons and Corticospinal Tracts 54
- II Sensory Pathway Lesions 55
- III Combined Motor and Sensory Lesions 55
- IV Peripheral Nervous System (PNS) Lesions 57
- V Intervertebral Disk Herniation 57
- VI Cauda Equina Syndrome (Spinal Roots L3 to C0) 57
- VII Conus Medullaris Syndrome (Cord Segments S3 to C0) 58

7 BRAINSTEM 59

- I Introduction 59
- II Cross Section Through the Caudal Medulla 59
- III Cross Section Through the Mid-Medulla 59
- IV Cross Section Through the Rostral Medulla 61
- V Cross Section Through the Caudal Pons 62
- VI Cross Section Through the Mid-Pons 63
- VII Cross Section Through the Rostral Pons 63
- VIII Cross Section Through the Caudal Midbrain 64
- IX Cross Section Through the Rostral Medulla 64
- X Corticonuclear Fibers 64

Lesions of the Brainstem 65

- I Lesions of the Medulla 65
- II Lesions of the Pons 65
- III Lesions of the Midbrain 66
- IV Acoustic Neuroma (Schwannoma) 67
- V Jugular Foramen Syndrome 67
- VI "Locked-in" Syndrome 68
- VII Central Pontine Myelinolysis 68
- VIII "Top of the Basilar" Syndrome 68
- IX Subclavian Steal Syndrome 68
- X The Cerebellopontine Angle 68

8 AUTONOMIC NERVOUS SYSTEM 70

- I Introduction 70
- II Cranial Nerves (CN) With Parasympathetic Components 71
- III Communicating Rami 73
- IV Neurotransmitters 73
- V Clinical Correlation 73

9 CRANIAL NERVES 75

- I The Olfactory Nerve 75
- II The Optic Nerve (CN II) 75
- III The Oculomotor Nerve (CN III) 76
- IV The Trochlear Nerve (CN IV) 77
- V The Trigeminal Nerve (CN V) 78
- VI The Abducent Nerve (CN VI) 80
- VII The Facial Nerve (CN VII) 80
- VIII The Vestibulocochlear Nerve (CN VIII) 82
- IX The Glossopharyngeal Nerve (CN IX) 83
- X The Vagal Nerve (CN X) 84
- XI The Accessory Nerve (CN XI) 85
- XII The Hypoglossal Nerve (CN XII) 85

10 TRIGEMINAL SYSTEM 87

- I Introduction 87
- II The Trigeminal Ganglion 87
- III Trigeminothalamic Pathways 88
- IV Trigeminal Reflexes 89
- V The Cavernous Sinus 90

11 DIENCEPHALON 92

- I Introduction 92
- II The Thalamus 92

- III Blood Supply 94
- IV The Internal Capsule 94
- V The hypothalamus 95

12 AUDITORY SYSTEM 100

- I Introduction 100
- II The Auditory Pathway 100
- III Hearing Defects 102
- IV Auditory Tests 102

13 VESTIBULAR SYSTEM 104

- I Introduction 104
- II The Labyrinth 104
- III The Vestibular Pathways 104
- IV Vestibulo-ocular Reflexes 106

14 VISUAL SYSTEM 108

- I Introduction 108
- II The Visual Pathway 108
- III The Pupillary Light Reflex Pathway 111
- IV The Pupillary Dilation Pathway 111
- V The Near Reflex and Accommodation Pathway 112
- VI Cortical and Subcortical Centers for Ocular Motility 113
- VII Clinical Correlation 114

15 LIMBIC SYSTEM 116

- I Introduction 116
- II Major Components 116
- III The Papez Circuit 116
- IV Clinical Correlations 118

16 BASAL NUCLEI AND EXTRAPYRAMIDAL MOTOR SYSTEM 120

- I Basal Nuclei (Ganglia) 120
- II The Extrapyrarnidal (Striatal) Motor System 120
- III Clinical Correlation 121

17 CEREBELLUM 126

- I Function 126
- II Anatomy 127
- III The Deep Cerebellar Nuclei 128
- IV The Major Cerebellar Circuit 128

- V Cerebellar Dysfunction 129
- VI Cerebellar Syndromes and Tumors 129

18 CEREBRAL CORTEX 131

- I Introduction 131
- II The Six-Layered Neocortex 131
- III Functional Areas 132
- IV Focal Destructive Hemispheric Lesions and Symptoms 135
- V Cerebral Dominance 135
- VI Split Brain Syndrome 137
- VII Other Lesions of the Corpus Callosum 138
- VIII Brain and Spinal Cord Tumors 138
- IX Apraxia 138
- X Aphasia 139
- XI Dysprosodies 140

19 CROSS-SECTIONAL ANATOMY OF THE BRAIN 142

- I Introduction 142

20 NEUROTRANSMITTERS 161

- I Major Neurotransmitters 161
- II Functional and Clinical Considerations 165

Appendix I: Table of Cranial Nerves 167

Appendix II: Table of Common Neurological Disease States 170

Glossary 173

Index 183