

# Contents

<b>Preface</b> .....	xviii
<b>Acknowledgments</b> .....	xix

## Part I: Anatomy and Physiology

<b>1 Gross Anatomy, Cranial and Spine</b> .....	3
Questions .....	3
Answers .....	6
<b>2 Vascular Anatomy</b> .....	8
Questions .....	8
Answers .....	11
<b>3 Neurophysiology and Regional Brain Syndromes</b> .....	13
Questions .....	13
Answers .....	16

## Part II: General and Neurology

<b>4 Neuroanesthesia</b> .....	21
Questions .....	21
Answers .....	23
<b>5 Sodium Homeostasis and Osmolality</b> .....	24
Questions .....	24
Answers .....	26
<b>6 General Neurocritical Care</b> .....	28
Questions .....	28
Answers .....	29
<b>7 Sedatives, Paralytics, and Analgesics</b> .....	31
Questions .....	31
Answers .....	32
<b>8 Endocrinology</b> .....	34
Questions .....	34
Answers .....	35
<b>9 Hematology</b> .....	37
Questions .....	37
Answers .....	39
<b>10 Neurology for Neurosurgeons</b> .....	41
Questions .....	41
Answers .....	43

## Contents

<b>11</b>	<b>Neurovascular Disorders and Neurotoxicology .....</b>	<b>45</b>
	<b>Questions.....</b>	<b>45</b>
	<b>Answers.....</b>	<b>47</b>

### Part III: Imaging and Diagnosticst

<b>12</b>	<b>Plain Radiology and Contrast Agents.....</b>	<b>51</b>
	<b>Questions.....</b>	<b>51</b>
	<b>Answers.....</b>	<b>53</b>
<b>13</b>	<b>Imaging and Angiography.....</b>	<b>54</b>
	<b>Questions.....</b>	<b>54</b>
	<b>Answers.....</b>	<b>56</b>
<b>14</b>	<b>Electrodiagnostics.....</b>	<b>58</b>
	<b>Questions.....</b>	<b>58</b>
	<b>Answers.....</b>	<b>59</b>

### Part IV: Developmental Anomalies

<b>15</b>	<b>Primary Intracranial Anomalies.....</b>	<b>63</b>
	<b>Questions.....</b>	<b>63</b>
	<b>Answers.....</b>	<b>65</b>
<b>16</b>	<b>Primary Spinal Developmental Anomalies.....</b>	<b>67</b>
	<b>Questions.....</b>	<b>67</b>
	<b>Answers.....</b>	<b>69</b>
<b>17</b>	<b>Primary Craniospinal Anomalies.....</b>	<b>71</b>
	<b>Questions.....</b>	<b>71</b>
	<b>Answers.....</b>	<b>72</b>

### Part V: Coma and Brain Death

<b>18</b>	<b>Coma and Coma Scales .....</b>	<b>75</b>
	<b>Questions.....</b>	<b>75</b>
	<b>Answers.....</b>	<b>77</b>
<b>19</b>	<b>Brain Death and Organ Donation .....</b>	<b>79</b>
	<b>Questions.....</b>	<b>79</b>
	<b>Answers.....</b>	<b>80</b>

### Part VI: Infection

<b>20</b>	<b>Bacterial Infections of the Parenchyma and Meninges and Complex Infections.....</b>	<b>83</b>
	<b>Questions.....</b>	<b>83</b>
	<b>Answers.....</b>	<b>85</b>

<b>21</b>	<b>Skull, Spine, and Postsurgical Infections</b>	.....	87
	<b>Questions</b>	.....	87
		<b>Answers</b>	.....
88			
<b>22</b>	<b>Other Nonbacterial Infections</b>	.....	89
	<b>Questions</b>	.....	89
		<b>Answers</b>	.....
90			

### Part VII: Hydrocephalus and Cerebrospinal Fluid (CSF)

<b>23</b>	<b>Cerebrospinal Fluid</b>	.....	95
	<b>Questions</b>	.....	95
		<b>Answers</b>	.....
96			
<b>24</b>	<b>Hydrocephalus: General Aspects</b>	.....	97
	<b>Questions</b>	.....	97
		<b>Answers</b>	.....
98			
<b>25</b>	<b>Treatment of Hydrocephalus</b>	.....	100
	<b>Questions</b>	.....	100
		<b>Answers</b>	.....
102			

### Part VIII: Seizures

<b>26</b>	<b>Seizures: Classification and Syndromes</b>	.....	105
	<b>Questions</b>	.....	105
		<b>Answers</b>	.....
106			
<b>27</b>	<b>Antiseizure Medication (ASM)</b>	.....	108
	<b>Questions</b>	.....	108
		<b>Answers</b>	.....
110			
<b>28</b>	<b>Special Seizure Consideration</b>	.....	113
	<b>Questions</b>	.....	113
		<b>Answers</b>	.....
115			

### Part IX: Pain

<b>29</b>	<b>Pain</b>	.....	119
	<b>Questions</b>	.....	119
		<b>Answers</b>	.....
121			

### Part X: Peripheral Nerves

<b>30</b>	<b>Peripheral Nerves</b>	.....	125
	<b>Questions</b>	.....	125
		<b>Answers</b>	.....
127			

## Contents

<b>31</b>	<b>Entrapment Neuropathy.....</b>	128
	Questions.....	128
	Answers.....	131
<b>32</b>	<b>Nonentrapment Peripheral Neuropathies .....</b>	133
	Questions.....	133
	Answers.....	135

## Part XI: Neuro-Ophthalmology and Neurotology

<b>33</b>	<b>Neuro-Ophthalmology.....</b>	139
	Questions.....	139
	Answers.....	141
<b>34</b>	<b>Neurotology.....</b>	143
	Questions.....	143
	Answers.....	145

## Part XII: Tumors of the Nervous and Related Systems

<b>35</b>	<b>Tumor Classification and General Information .....</b>	149
	Questions.....	149
	Answers.....	151
<b>36</b>	<b>Genetic Tumor Syndromes Involving CNS.....</b>	153
	Questions.....	153
	Answers.....	156
<b>37</b>	<b>Adult Diffuse Glioma .....</b>	158
	Questions.....	158
	Answers.....	159
<b>38</b>	<b>Pediatric Type Diffuse Tumors.....</b>	161
	Questions.....	161
	Answers.....	162
<b>39</b>	<b>Circumscribed Astrocytic Gliomas .....</b>	163
	Questions.....	163
	Answers.....	164
<b>40</b>	<b>Glioneuronal and Neuronal Tumors .....</b>	166
	Questions.....	166
	Answers.....	167
<b>41</b>	<b>Ependymal Tumors.....</b>	169
	Questions.....	169
	Answers.....	171
<b>42</b>	<b>Choroid Plexus Tumors .....</b>	173
	Questions.....	173
	Answers.....	174

<b>43</b>	<b>Embryonal Tumors.....</b>	176
	<b>Questions .....</b>	176
	<b>Answers .....</b>	178
<b>44</b>	<b>Pineal Tumors and Pineal Region Lesions .....</b>	179
	<b>Questions .....</b>	179
	<b>Answers .....</b>	181
<b>45</b>	<b>Cranial and Paraspinal Nerve Tumors.....</b>	183
	<b>Questions .....</b>	183
	<b>Answers .....</b>	185
<b>46</b>	<b>Meningiomas (Intracranial).....</b>	187
	<b>Questions .....</b>	187
	<b>Answers .....</b>	189
<b>47</b>	<b>Mesenchymal, Nonmeningothelial Tumors .....</b>	191
	<b>Questions .....</b>	191
	<b>Answers .....</b>	193
<b>48</b>	<b>Melanocytic Tumors and CNS Germ Cell Tumors .....</b>	195
	<b>Questions .....</b>	195
	<b>Answers .....</b>	196
<b>49</b>	<b>Hematolymphoid Tumors Involving the CNS .....</b>	198
	<b>Questions .....</b>	198
	<b>Answers .....</b>	200
<b>50</b>	<b>Tumors of the Sellar Region .....</b>	202
	<b>Questions .....</b>	202
	<b>Answers .....</b>	204
<b>51</b>	<b>PitNET/Adenomas—Clinical Consideration .....</b>	205
	<b>Questions .....</b>	205
	<b>Answers .....</b>	207
<b>52</b>	<b>Pituitary Tumors Evaluation .....</b>	209
	<b>Questions .....</b>	209
	<b>Answers .....</b>	211
<b>53</b>	<b>PitNET/Adenomas—General Management .....</b>	213
	<b>Questions .....</b>	213
	<b>Answers .....</b>	215
<b>54</b>	<b>PitNET/Adenomas—Surgical Management, Outcome, and Recurrence Management....</b>	217
	<b>Questions .....</b>	217
	<b>Answers .....</b>	219

**Part XIII: Other Tumors and Tumor-Like Conditions**

<b>55</b>	<b>Metastasis to the CNS</b>	.....	223
	<b>Questions</b>	.....	223
	<b>Answers</b>	.....	225
<b>56</b>	<b>Other Tumors, Cysts, and Tumor-Like Lesions</b>	.....	227
	<b>Questions</b>	.....	227
	<b>Answers</b>	.....	228
<b>57</b>	<b>Pseudotumor Cerebri Syndrome (PTCS)</b>	.....	229
	<b>Questions</b>	.....	229
	<b>Answers</b>	.....	230
<b>58</b>	<b>Tumor and Tumor-Like Lesions of the Skull</b>	.....	231
	<b>Questions</b>	.....	231
	<b>Answers</b>	.....	233
<b>59</b>	<b>Tumors of the Spine and Spinal Cord</b>	.....	235
	<b>Questions</b>	.....	235
	<b>Answers</b>	.....	237

**Part XIV: Head Trauma**

<b>60</b>	<b>Head Trauma: General Information, Grading, and Initial Management</b>	.....	241
	<b>Questions</b>	.....	241
	<b>Answers</b>	.....	244
<b>61</b>	<b>Concussion, High Altitude Cerebral Edema, Cerebrovascular Injuries</b>	.....	246
	<b>Questions</b>	.....	246
	<b>Answers</b>	.....	248
<b>62</b>	<b>Neuromonitoring in Head Trauma</b>	.....	250
	<b>Questions</b>	.....	250
	<b>Answers</b>	.....	252
<b>63</b>	<b>Skull Fractures</b>	.....	254
	<b>Questions</b>	.....	254
	<b>Answers</b>	.....	255
<b>64</b>	<b>Traumatic Hemorrhagic Conditions</b>	.....	257
	<b>Questions</b>	.....	257
	<b>Answers</b>	.....	259
<b>65</b>	<b>Gunshot Wounds and Nonmissile Penetrating Brain Injuries</b>	.....	261
	<b>Questions</b>	.....	261
	<b>Answers</b>	.....	262
<b>66</b>	<b>Pediatric Head Injury</b>	.....	264
	<b>Questions</b>	.....	264
	<b>Answers</b>	.....	266

<b>67</b>	<b>Head Injury: Long-Term Management, Complications, and Outcome .....</b>	267
	<b>Questions .....</b>	267
	<b>Answers .....</b>	269

#### Part XV: Spine Trauma

<b>68</b>	<b>Spine Injuries—General Information, Neurologic Assessment, Whiplash and Sports-Related Injuries, Pediatric Spine Injuries.....</b>	273
	<b>Questions .....</b>	273
	<b>Answers .....</b>	275
<b>69</b>	<b>Management of Spinal Cord Injury .....</b>	277
	<b>Questions .....</b>	277
	<b>Answers .....</b>	279
<b>70</b>	<b>Occipitoatlantoaxial Injuries.....</b>	280
	<b>Questions .....</b>	280
	<b>Answers .....</b>	282
<b>71</b>	<b>Subaxial (C3 through C7) Injuries/Fractures .....</b>	284
	<b>Questions .....</b>	284
	<b>Answers .....</b>	286
<b>72</b>	<b>Thoracic, Lumbar, and Sacral Spine Fracture.....</b>	288
	<b>Questions .....</b>	288
	<b>Answers .....</b>	290
<b>73</b>	<b>Penetrating Spine Injuries and Long-Term Complications of Spine Injuries .....</b>	292
	<b>Questions .....</b>	292
	<b>Answers .....</b>	293

#### Part XVI: Nontraumatic Spine and Spinal Cord Conditions

<b>74</b>	<b>Low-Back Pain.....</b>	297
	<b>Questions .....</b>	297
	<b>Answers .....</b>	299
<b>75</b>	<b>Lumbar Disk Herniation and Radiculopathy .....</b>	301
	<b>Questions .....</b>	301
	<b>Answers .....</b>	303
<b>76</b>	<b>Thoracic Disk Herniation .....</b>	305
	<b>Questions .....</b>	305
	<b>Answers .....</b>	306
<b>77</b>	<b>Cervical Disk Herniation.....</b>	308
	<b>Questions .....</b>	308
	<b>Answers .....</b>	310

## Contents

---

<b>78</b>	<b>Cervical Degenerative Disk Disease and Cervical Myelopathy</b>	312
	Questions .....	312
	Answers .....	314
<b>79</b>	<b>Spine Measurements</b>	316
	Questions .....	316
	Answers .....	317
<b>80</b>	<b>Idiopathic Scoliosis</b>	319
	Questions .....	319
	Answers .....	320
<b>81</b>	<b>Lumbar and Thoracic Degenerative Disk Disease</b>	322
	Questions .....	322
	Answers .....	324
<b>82</b>	<b>Adult Spinal Deformity and Degenerative Scoliosis</b>	326
	Questions .....	326
	Answers .....	327
<b>83</b>	<b>Special Conditions Affecting Spine</b>	329
	Questions .....	329
	Answers .....	332
<b>84</b>	<b>Special Conditions Affecting the Spinal Cord</b>	334
	Questions .....	334
	Answers .....	336

### Part XVII: Subarachnoid Hemorrhage and Aneurysms

<b>85</b>	<b>Aneurysm—Introduction, Grading, and Special Conditions</b>	341
	Questions .....	341
	Answers .....	343
<b>86</b>	<b>Critical Care of Aneurysm Patients</b>	345
	Questions .....	345
	Answers .....	347
<b>87</b>	<b>SAH from Cerebral Aneurysm Rupture</b>	349
	Questions .....	349
	Answers .....	351
<b>88</b>	<b>Aneurysm Type by Location</b>	354
	Questions .....	354
	Answers .....	356
<b>89</b>	<b>Special Aneurysms and Nonaneurysmal SAH</b>	358
	Questions .....	358
	Answers .....	359

**Part XVIII: Vascular Malformations**

<b>90</b>	<b>Vascular Malformations</b>	.....	363	
	Questions .....	363	Answers .....	364
<b>91</b>	<b>Angiographically Occult Vascular Malformations</b>	.....	365	
	Questions .....	365	Answers .....	367

**Part XIX: Stroke and Occlusive Cerebrovascular Disease**

<b>92</b>	<b>Stroke—General Information and Physiology</b>	.....	371	
	Questions .....	371	Answers .....	373
<b>93</b>	<b>Evaluation and Treatment for Acute Ischemic Stroke</b>	.....	375	
	Questions .....	375	Answers .....	376
<b>94</b>	<b>Cerebral Arterial Dissections and Moyamoya Disease</b>	.....	377	
	Questions .....	377	Answers .....	379
<b>95</b>	<b>Other Vascular Occlusive Conditions</b>	.....	381	
	Questions .....	381	Answers .....	383
<b>96</b>	<b>Intracerebral Hemorrhage in Older Adults</b>	.....	385	
	Questions .....	385	Answers .....	387
<b>97</b>	<b>ICH in Young Adults and Pediatrics</b>	.....	389	
	Questions .....	389	Answers .....	390

**Part XX: Outcome Assessment**

<b>98</b>	<b>Outcome Assessment</b>	.....	395	
	Questions .....	395	Answers .....	396

**Part XXI: Differential Diagnosis**

<b>99</b>	<b>Differential Diagnosis by Location or Radiographic Finding—Intracranial</b>	.....	401	
	Questions .....	401	Answers .....	404

## Contents

---

<b>100</b>	<b>Differential Diagnosis by Location or Radiographic Finding—Spine</b>	406
	Questions .....	406
	Answers .....	407
<b>101</b>	<b>Differential Diagnosis (DDx) by Signs and Symptoms—Primarily Intracranial</b>	409
	Questions .....	409
	Answers .....	411
<b>102</b>	<b>Differential Diagnosis (DDx) by Signs and Symptoms—Primarily Spine and Other</b>	412
	Questions .....	412
	Answers .....	414

## Part XXII: Procedures, Interventions, Operations

<b>103</b>	<b>Intraoperative Dyes, OR Equipment, Surgical Hemostasis, and Bone Extenders</b>	419
	Questions .....	419
	Answers .....	420
<b>104</b>	<b>Craniotomies—General Information and Cortical Mapping</b>	422
	Questions .....	422
	Answers .....	424
<b>105</b>	<b>Posterior Fossa Craniotomies</b>	426
	Questions .....	426
	Answers .....	427
<b>106</b>	<b>Supratentorial Craniotomies</b>	428
	Questions .....	428
	Answers .....	429
<b>107</b>	<b>Approaches to the Lateral and Third Ventricles, Decompressive Craniectomies, and Cranioplasty</b>	431
	Questions .....	431
	Answers .....	433
<b>108</b>	<b>Spine—Cervical</b>	434
	Questions .....	434
	Answers .....	436
<b>109</b>	<b>Spine—Thoracic and Lumbar</b>	437
	Questions .....	437
	Answers .....	439
<b>110</b>	<b>Miscellaneous Surgical Procedures</b>	440
	Questions .....	440
	Answers .....	442
<b>111</b>	<b>Functional Neurosurgery and Stereotactic Neurosurgery</b>	444
	Questions .....	444
	Answers .....	446

---

<b>112</b>	<b>Neurovascular Compression Syndromes</b>	.....	448
	<b>Questions</b>	.....	448
	<b>Answers</b>	.....	450
<b>113</b>	<b>Pain Procedures</b>	.....	451
	<b>Questions</b>	.....	451
	<b>Answers</b>	.....	452
<b>114</b>	<b>Seizure Surgery</b>	.....	454
	<b>Questions</b>	.....	454
	<b>Answers</b>	.....	455
<b>115</b>	<b>Radiation Therapy (XRT)</b>	.....	457
	<b>Questions</b>	.....	457
	<b>Answers</b>	.....	459
<b>116</b>	<b>Endovascular Neurosurgery</b>	.....	460
	<b>Questions</b>	.....	460
	<b>Answers</b>	.....	461
	<b>Index</b>	.....	463