

151297

# ANESTHESIOLOGY

DAVID E. LONGNECKER  
DAVID L. BROWN • MARK F. NEWMAN • WARREN M. ZAPOL

# Contents

|                                                                                                        |       |  |
|--------------------------------------------------------------------------------------------------------|-------|--|
| CONTRIBUTORS                                                                                           | xiii  |  |
| FOREWORD                                                                                               | xxiii |  |
| PREFACE                                                                                                | xxv   |  |
| <b>PART 1</b>                                                                                          |       |  |
| <b>THE SPECIALTY OF ANESTHESIOLOGY</b>                                                                 |       |  |
| CHAPTER 1                                                                                              | 2     |  |
| <b>The Evolution of Anesthesiology as a Clinical Discipline—A Lesson in Developing Professionalism</b> |       |  |
| <i>Douglas R. Bacon, MD, MA</i>                                                                        |       |  |
| CHAPTER 2                                                                                              | 12    |  |
| <b>The Scope and Future of Anesthesia Practice</b>                                                     |       |  |
| <i>Michael S. Avidan, MBBCh, DA, FCA<br/>and Alex S. Evers, MD</i>                                     |       |  |
| CHAPTER 3                                                                                              | 20    |  |
| <b>Safety and Quality: The Guiding Principles of Patient-Centered Care</b>                             |       |  |
| <i>Jeffrey B. Cooper, PhD, and<br/>David E. Longnecker, MD, FRCA</i>                                   |       |  |
| <b>PART 2</b>                                                                                          |       |  |
| <b>PREPARING FOR ANESTHESIA</b>                                                                        |       |  |
| <b>SECTION A: Approach to the Anesthesia Patient</b>                                                   |       |  |
| CHAPTER 4                                                                                              | 40    |  |
| <b>Overview of Preoperative Assessment and Management</b>                                              |       |  |
| <i>Bobbie Jean Sweitzer, MD</i>                                                                        |       |  |
| CHAPTER 5                                                                                              | 68    |  |
| <b>The Anesthetic Plan for Healthy Patients</b>                                                        |       |  |
| <i>Patrick E. Benedict, MD,<br/>and Kevin K. Tremper, PhD, MD</i>                                      |       |  |
| <b>SECTION B: Preoperative Evaluation of the Anesthesia Patient</b>                                    |       |  |
| CHAPTER 6                                                                                              | 89    |  |
| <b>Appropriate and Effective Use of Consultants</b>                                                    |       |  |
| <i>Lee Goldman, MD, and Thomas H. Lee, MD</i>                                                          |       |  |
| CHAPTER 7                                                                                              | 95    |  |
| <b>Evaluation of the Patient with Cardiovascular Disease</b>                                           |       |  |
| <i>Ronald P. Olson, MD</i>                                                                             |       |  |
| CHAPTER 8                                                                                              | 122   |  |
| <b>Evaluation of the Patient with a Difficult Airway</b>                                               |       |  |
| <i>James C. Phero, DMD, Andranik Ovassapian, MD,<br/>and William E. Hurford, MD</i>                    |       |  |
| CHAPTER 9                                                                                              | 134   |  |
| <b>Evaluation of the Patient with Pulmonary Disease</b>                                                |       |  |
| <i>Philip G. Boysen, MD, MBA</i>                                                                       |       |  |
| CHAPTER 10                                                                                             | 145   |  |
| <b>Evaluation of the Patient with Neuropsychiatric Disease</b>                                         |       |  |
| <i>John Morris, MD, and Dell Burkey, MD</i>                                                            |       |  |
| CHAPTER 11                                                                                             | 156   |  |
| <b>Evaluation of the Patient with Neuromuscular or Skeletal Disease</b>                                |       |  |
| <i>Philip D. Bailey, Jr., DO, and Joseph R. Tobin, MD</i>                                              |       |  |
| CHAPTER 12                                                                                             | 173   |  |
| <b>Evaluation of the Patient with Endocrine Disease or Diabetes Mellitus</b>                           |       |  |
| <i>A.D. John, MD, and F.E. Sieber, MD</i>                                                              |       |  |
| CHAPTER 13                                                                                             | 194   |  |
| <b>Evaluation of the Patient with Renal Disease</b>                                                    |       |  |
| <i>Mark Stafford-Smith, MD, CM, FRCPC,<br/>George Lappas, MD, and Andrew D. Shaw, MB, BS, FRCA</i>     |       |  |

|                                                                                       |                        |                                                                                                                                                                                                              |                                                         |
|---------------------------------------------------------------------------------------|------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------|
| <b>CHAPTER 14</b>                                                                     | <b>216</b>             | <b>PART 3</b>                                                                                                                                                                                                | <b>SAFETY AND RISK REDUCTION IN ANESTHESIA PRACTICE</b> |
| <b>Evaluation of Patients with Hepatic Disease</b>                                    | Richard A. Wiklund, MD |                                                                                                                                                                                                              |                                                         |
| <b>CHAPTER 15</b>                                                                     | <b>239</b>             | <b>CHAPTER 24</b>                                                                                                                                                                                            | 42                                                      |
| <b>Anesthetic Considerations for the Patient with Anemia or Coagulation Disorders</b> |                        | <b>Anesthesia Risk</b>                                                                                                                                                                                       |                                                         |
| <i>Edwin G. Avery, IV, MD</i>                                                         |                        | <i>Fredrick K. Orkin, MD, MBA, MSc, and David E. Longnecker, MD, FRCA</i>                                                                                                                                    |                                                         |
| <b>CHAPTER 16</b>                                                                     | <b>267</b>             | <b>CHAPTER 25</b>                                                                                                                                                                                            | 45                                                      |
| <b>Evaluation of the Patient with Perioperative Malnutrition</b>                      |                        | <b>Approaches to Quality Improvement in Anesthesia Care</b>                                                                                                                                                  |                                                         |
| <i>Jacob T. Gutsche, MD, and Clifford S. Deutschman, MS, MD, FCCM</i>                 |                        | <i>David S. Smith, MD, PhD, and Lee A. Fleisher, MD</i>                                                                                                                                                      |                                                         |
| <b>CHAPTER 17</b>                                                                     | <b>279</b>             | <b>CHAPTER 26</b>                                                                                                                                                                                            | 46                                                      |
| <b>Principles of Antimicrobial Therapy</b>                                            |                        | <b>Positioning of Patients for Operation</b>                                                                                                                                                                 |                                                         |
| <i>Richard Teplick, MD, and Robert H. Rubin, MD, FACP, FCCP</i>                       |                        | <i>Vijaya Gottumukkala, MB, BS, MD (Anes), FRCA, DipABA</i>                                                                                                                                                  |                                                         |
| <b>CHAPTER 18</b>                                                                     | <b>300</b>             | <b>CHAPTER 27</b>                                                                                                                                                                                            | 47                                                      |
| <b>Preoperative Assessment of the Newborn</b>                                         |                        | <b>Electricity, Electrical Safety, and Instrumentation in the Operating Room</b>                                                                                                                             |                                                         |
| <i>Myron Yaster, MD, and Richard A. Elliott, MD</i>                                   |                        | <i>Robert H. Stiefel, MS, CCE, and Julian M. Goldman, MD</i>                                                                                                                                                 |                                                         |
| <b>CHAPTER 19</b>                                                                     | <b>310</b>             | <b>PART 4</b>                                                                                                                                                                                                |                                                         |
| <b>Evaluation of Children</b>                                                         |                        | <b>MANAGING ANESTHESIA CARE</b>                                                                                                                                                                              |                                                         |
| <i>Randall C. Wetzel, MBBS, MRCP, LRCS, MBA, FAAP, FCCM</i>                           |                        | <b>SECTION A: Monitoring the Anesthesia Patient</b>                                                                                                                                                          |                                                         |
| <b>CHAPTER 20</b>                                                                     | <b>341</b>             | <b>CHAPTER 28</b>                                                                                                                                                                                            | 49                                                      |
| <b>Evaluation of the Geriatric Patient</b>                                            |                        | <b>Perioperative Information Management Systems</b>                                                                                                                                                          |                                                         |
| <i>Stanley Muravchick, MD, PhD, and Katherine Grichnik, MD</i>                        |                        | <i>J.P. Abenstein, MSE, MD</i>                                                                                                                                                                               |                                                         |
| <b>CHAPTER 21</b>                                                                     | <b>358</b>             | <b>CHAPTER 29</b>                                                                                                                                                                                            | 51                                                      |
| <b>Evaluation of the Pregnant Patient</b>                                             |                        | <b>Hemodynamic Monitoring</b>                                                                                                                                                                                |                                                         |
| <i>Robert Gaiser, MD</i>                                                              |                        | <i>Shahar Bar-Yosef, MD, Rebecca A. Schroeder, MD, and Jonathan B. Mark, MD</i>                                                                                                                              |                                                         |
| <b>CHAPTER 22</b>                                                                     | <b>374</b>             | <b>CHAPTER 30</b>                                                                                                                                                                                            | 55                                                      |
| <b>Evaluation of the Obese Patient</b>                                                |                        | <b>Intraoperative Transesophageal Echocardiography: A Systematic Approach</b>                                                                                                                                |                                                         |
| <i>Babatunde O. Ogunnaike, MD, and Charles W. Whitten, MD</i>                         |                        | <i>Larry Field, MD, George Lappas, MD, Angus Christie, MD, Andrew Green, MD, Steven Morozowich, MD, Tamas Szabo, MD, PhD, Qin Zhang, MD, Stephen Murphy, MD, Ravi Bissessar, MD, and Solomon Aronson, MD</i> |                                                         |
| <b>CHAPTER 23</b>                                                                     | <b>396</b>             | <b>CHAPTER 31</b>                                                                                                                                                                                            | 57                                                      |
| <b>Evaluation of the Patient with Alcohol or Drug Addiction</b>                       |                        | <b>Monitoring Respiratory Function</b>                                                                                                                                                                       |                                                         |
| <i>Paul S. Pagel, MD, PhD, Judith A. May, MD, and David C. Warltier, MD, PhD</i>      |                        | <i>Dean R. Hess, PhD, RRT, and Robert M. Kacmarek, PhD, RRT</i>                                                                                                                                              |                                                         |

|                                                                                                                                                      |             |                                                                                                      |             |
|------------------------------------------------------------------------------------------------------------------------------------------------------|-------------|------------------------------------------------------------------------------------------------------|-------------|
| <b>CHAPTER 32</b>                                                                                                                                    | <b>598</b>  | <b>CHAPTER 42</b>                                                                                    | <b>897</b>  |
| <b>Intraoperative Neurologic Monitoring</b>                                                                                                          |             | <b>Total Intravenous Anesthesia</b>                                                                  |             |
| <i>John C. Keifer, MD, and Cecil O. Borel, MD</i>                                                                                                    |             |                                                                                                      |             |
| <b>CHAPTER 33</b>                                                                                                                                    | <b>619</b>  | <b>CHAPTER 43</b>                                                                                    | <b>918</b>  |
| <b>Monitoring and Managing Neuromuscular Blockade</b>                                                                                                |             | <b>Cardiovascular Drugs</b>                                                                          |             |
| <i>Richard M. Pino, MD, PhD, and Hassan H. Ali, MD</i>                                                                                               |             |                                                                                                      |             |
| <b>CHAPTER 34</b>                                                                                                                                    | <b>639</b>  | <i>Alina Nicoara, MD, Mark Abel, MD, David Bronheim, MD, and Daniel Thys, MD</i>                     |             |
| <b>Monitoring and Managing Perioperative Electrolyte Abnormalities, Acid-Base Disorders, and Fluid Replacement</b>                                   |             | <b>CHAPTER 44</b>                                                                                    | <b>954</b>  |
| <i>Patrick J. Neligan, MD, and Jiri Horak, MD</i>                                                                                                    |             |                                                                                                      |             |
| <b>SECTION B: Managing the Airway</b>                                                                                                                |             |                                                                                                      |             |
| <b>CHAPTER 35</b>                                                                                                                                    | <b>685</b>  | <b>Pharmacology of Local Anesthetics</b>                                                             |             |
| <b>Airway Management</b>                                                                                                                             |             | <i>James E. Heavner, DVM, PhD</i>                                                                    |             |
| <i>P. Allan Klock Jr., MD, and Andranik Ovassapian, MD</i>                                                                                           |             |                                                                                                      |             |
| <b>SECTION C: Anesthesia Drugs and Drug Delivery Systems</b>                                                                                         |             |                                                                                                      |             |
| <b>CHAPTER 36</b>                                                                                                                                    | <b>718</b>  | <b>SECTION D: Regional Anesthesia</b>                                                                |             |
| <b>Mechanisms of General Anesthetic Action</b>                                                                                                       |             | <b>CHAPTER 45</b>                                                                                    | <b>974</b>  |
| <i>Max B. Kelz, MD, PhD, Jay Yang, MD, PhD, and Roderic G. Eckenhoff, MD</i>                                                                         |             |                                                                                                      |             |
| <b>CHAPTER 37</b>                                                                                                                                    | <b>739</b>  | <b>Incorporating Regional Anesthesia into Anesthetic Practice</b>                                    |             |
| <b>Pharmacology of Inhalational Anesthetics</b>                                                                                                      |             | <i>Richard W. Rosentritt, MD, and David L. Brown, MD</i>                                             |             |
| <i>Stuart A. Forman, MD, PhD, and George A. Mashour, MD, PhD</i>                                                                                     |             |                                                                                                      |             |
| <b>CHAPTER 38</b>                                                                                                                                    | <b>767</b>  | <b>CHAPTER 46</b>                                                                                    | <b>978</b>  |
| <b>Anesthesia Delivery System</b>                                                                                                                    |             | <b>Neuraxial Anesthesia</b>                                                                          |             |
| <i>James B. Eisenkraft, MD</i>                                                                                                                       |             |                                                                                                      |             |
| <b>CHAPTER 39</b>                                                                                                                                    | <b>821</b>  | <i>Daniel T. Warren, MD, and Spencer S. Liu, MD</i>                                                  |             |
| <b>Principles of Pharmacokinetics and Pharmacodynamics: Applied Clinical Pharmacology for the Practitioner</b>                                       |             | <b>CHAPTER 47</b>                                                                                    | <b>1009</b> |
| <i>Ken B. Johnson, MD, and Talmage D. Egan, MD</i>                                                                                                   |             |                                                                                                      |             |
| <b>CHAPTER 40</b>                                                                                                                                    | <b>849</b>  | <b>Paravertebral Anesthesia</b>                                                                      |             |
| <b>Pharmacology of Intravenous Anesthetics</b>                                                                                                       |             | <i>Holly Evans, MD, FRCPC, and Stephen M. Klein, MD</i>                                              |             |
| <i>Mark Dershawitz, MD, PhD, and Carl E. Rosow, MD, PhD</i>                                                                                          |             |                                                                                                      |             |
| <b>CHAPTER 41</b>                                                                                                                                    | <b>869</b>  | <b>CHAPTER 48</b>                                                                                    | <b>1025</b> |
| <b>Pharmacology of Opioid Analgesics</b>                                                                                                             |             | <b>Peripheral Nerve Blocks</b>                                                                       |             |
| <i>Carl E. Rosow, MD, PhD, and Mark Dershawitz, MD, PhD</i>                                                                                          |             |                                                                                                      |             |
| <b>CHAPTER 49</b>                                                                                                                                    | <b>1053</b> | <i>Denise J. Wedel, MD, and Terese T. Horlocker, MD</i>                                              |             |
| <b>Managing Adverse Outcomes during Regional Anesthesia</b>                                                                                          |             | <b>CHAPTER 50</b>                                                                                    | <b>1081</b> |
| <i>Ban CH Tsui, MSc, MD, FRCPC, and Brendan T. Finucane, MBBCh, FRCPC</i>                                                                            |             |                                                                                                      |             |
| <b>SECTION E: Specialty Areas of Anesthetic Practice</b>                                                                                             |             |                                                                                                      |             |
| <b>CHAPTER 51</b>                                                                                                                                    | <b>1140</b> | <b>Neuroanesthesia</b>                                                                               |             |
| <b>Cardiac Anesthesia</b>                                                                                                                            |             | <i>Michael M. Todd, MD, David S. Warner, MD, PhD, Mazen A. Maktabi, MD, and Kamila Vagnerova, MD</i> |             |
| <i>Mark A. Chaney, MD, Albert T. Cheung, MD, Christopher A. Troianos, MD, Jessica L. Willert, MD, David A. Zvara, MD, and Stanton K. Shernan, MD</i> |             |                                                                                                      |             |

|                                                                                                   |             |                                                                                               |             |
|---------------------------------------------------------------------------------------------------|-------------|-----------------------------------------------------------------------------------------------|-------------|
| <b>CHAPTER 52</b>                                                                                 | <b>1174</b> | <b>CHAPTER 63</b>                                                                             | <b>1520</b> |
| <b>Anesthesia for Surgical Treatment of Congenital Heart Disease: A Problem-Oriented Approach</b> |             | <b>Anesthesia for Children</b>                                                                |             |
| <i>James S. Harrington, MD, Avinash C. Shukla, MBBS, and Paul R. Hickey, MD</i>                   |             | <i>Lucinda L. Everett, MD</i>                                                                 |             |
| <b>CHAPTER 53</b>                                                                                 | <b>1213</b> | <b>CHAPTER 64</b>                                                                             | <b>1541</b> |
| <b>Thoracic Anesthesia</b>                                                                        |             | <b>Anesthesia for Orthopedic Surgery</b>                                                      |             |
| <i>Stuart J. Weiss, MD, PhD, and E. Andrew Ochroch, MD, MSCE</i>                                  |             | <i>Gavin Martin, MB, Dara Breslin, MB, and Todd Stevens, MD</i>                               |             |
| <b>CHAPTER 54</b>                                                                                 | <b>1284</b> | <b>CHAPTER 65</b>                                                                             | <b>1558</b> |
| <b>Anesthesia for Major Vascular Surgery</b>                                                      |             | <b>Anesthesia for Ophthalmic Surgery</b>                                                      |             |
| <i>Alina Nicoara, MD, and Madhav Swaminathan, MD</i>                                              |             | <i>Salvatore J. Basta, MD</i>                                                                 |             |
| <b>CHAPTER 55</b>                                                                                 | <b>1314</b> | <b>CHAPTER 66</b>                                                                             | <b>1582</b> |
| <b>Anesthesia for Gastrointestinal Surgery</b>                                                    |             | <b>Anesthesia for Otorhinolaryngologic (Ear, Nose, and Throat) Surgery</b>                    |             |
| <i>Martin Slodzinski, MD, PhD, and William T. Merritt, MD, MBA</i>                                |             | <i>Bil Ragan, MD</i>                                                                          |             |
| <b>CHAPTER 56</b>                                                                                 | <b>1338</b> | <b>CHAPTER 67</b>                                                                             | <b>1608</b> |
| <b>Anesthesia for Liver Surgery and Transplantation</b>                                           |             | <b>Outpatient Anesthesia</b>                                                                  |             |
| <i>Warren S. Sandberg, MD, PhD, and Douglas E. Raines, MD</i>                                     |             | <i>J. Lance Lichtor, MD, and Suhas V. Kalghatgi, MBBS, MD, FFARCSI</i>                        |             |
| <b>CHAPTER 57</b>                                                                                 | <b>1378</b> | <b>CHAPTER 68</b>                                                                             | <b>1621</b> |
| <b>Anesthesia for Heart or Lung Transplantation</b>                                               |             | <b>Monitored Anesthetic Care and Conscious Sedation</b>                                       |             |
| <i>Benjamin A. Kohl, MD, and Joseph S. Savino, MD</i>                                             |             | <i>Robert S. Harris, MD, and Peter S. Sebel, MB, BS, PhD, MBA</i>                             |             |
| <b>CHAPTER 58</b>                                                                                 | <b>1396</b> | <b>CHAPTER 69</b>                                                                             | <b>1649</b> |
| <b>Anesthesia for Kidney, Pancreas, or Other Organ Transplantation</b>                            |             | <b>Anesthesia Care for Diagnostic or Therapeutic Procedures Outside of the Operating Room</b> |             |
| <i>David S. Beebe, MD, and Kumar G. Belani, MBBS, MS</i>                                          |             | <i>Monica Davis, MD</i>                                                                       |             |
| <b>CHAPTER 59</b>                                                                                 | <b>1420</b> | <b>CHAPTER 70</b>                                                                             | <b>1661</b> |
| <b>Endocrine Surgery and Intraoperative Management of Endocrine Conditions</b>                    |             | <b>Anesthesia for Trauma Patients</b>                                                         |             |
| <i>Robert A. Peterfreund, MD, PhD, and Stephanie L. Lee, MD, PhD</i>                              |             | <i>John K. Stene, MD, PhD, and Christopher M. Grande, MD, MPH</i>                             |             |
| <b>CHAPTER 60</b>                                                                                 | <b>1450</b> | <b>CHAPTER 71</b>                                                                             | <b>1671</b> |
| <b>Anesthetic Considerations for Genitourinary and Renal Surgery</b>                              |             | <b>Anesthetic Management of the Burned Patient</b>                                            |             |
| <i>Maurizio Cereda, MD, and Sean Kennedy, MD</i>                                                  |             | <i>Edward A. Bittner, MD, PhD, Loreta Grecu, MD, and J.A. Jeevendra Martyn, MD</i>            |             |
| <b>CHAPTER 61</b>                                                                                 | <b>1471</b> | <b>PART 5</b>                                                                                 |             |
| <b>Anesthesia for Obstetric Care and Gynecologic Surgery</b>                                      |             | <b>POSTOPERATIVE CARE OF THE ANESTHESIA PATIENT</b>                                           |             |
| <i>Lawrence C. Tsien, MD</i>                                                                      |             |                                                                                               |             |
| <b>CHAPTER 62</b>                                                                                 | <b>1502</b> | <b>CHAPTER 72</b>                                                                             | <b>1681</b> |
| <b>Anesthesia for Newborn Surgical Emergencies</b>                                                |             | <b>Recovery of the Healthy Patient</b>                                                        |             |
| <i>Myron Yaster, MD, and Mark I. Rossberg, MD</i>                                                 |             | <i>Loreta Grecu, MD, Edward A. Bittner, MD, PhD, and Edward George, MD, PhD</i>               |             |

|                                                                                 |             |                                                                 |             |
|---------------------------------------------------------------------------------|-------------|-----------------------------------------------------------------|-------------|
| <b>CHAPTER 73</b>                                                               | <b>1700</b> | <b>CHAPTER 83</b>                                               | <b>1852</b> |
| <b>Postoperative Complications</b>                                              |             | <b>Mechanical Ventilation for the Surgical Patient</b>          |             |
| <i>Edward A. Bittner, MD, PhD, Loreta Grecu, MD, and Edward George, MD, PhD</i> |             | <i>Robert M. Kacmarek, PhD, RRT, and Dean R. Hess, PhD, RRT</i> |             |
| <b>CHAPTER 74</b>                                                               | <b>1716</b> | <b>CHAPTER 84</b>                                               | <b>1873</b> |
| <b>Management of Acute Postoperative Pain</b>                                   |             | <b>Cardiopulmonary Resuscitation</b>                            |             |
| <i>Jane C. Ballantyne, MD, FRCA</i>                                             |             | <i>Charles W. Otto, MD, FCCM</i>                                |             |

**PART 6**  
**THE CRITICALLY ILL PATIENT**

|                                                                                               |             |                                                                                                                                                           |             |
|-----------------------------------------------------------------------------------------------|-------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------|-------------|
| <b>CHAPTER 75</b>                                                                             | <b>1738</b> | <b>CHAPTER 85</b>                                                                                                                                         | <b>1892</b> |
| <b>The Pathophysiology of Critical Illness</b>                                                |             | <b>Blood and Blood Component Therapy</b>                                                                                                                  |             |
| <i>Luca M. Bigatello, MD, Judith Hellman, MD, David Liu, MD, PhD, and Warren M. Zapol, MD</i> |             | <i>Ian J. Welsby, BSc, MBBS, FRCA, and Steven J. Bredehoeft, MD</i>                                                                                       |             |
| <b>CHAPTER 76</b>                                                                             | <b>1754</b> | <b>CHAPTER 86</b>                                                                                                                                         | <b>1912</b> |
| <b>Evaluation of the Patient with Multiple Organ Dysfunction Syndrome</b>                     |             | <b>Cognitive Dysfunction after Anesthesia and Surgery</b>                                                                                                 |             |
| <i>Jean Kwo, MD, and Judith Hellman, MD</i>                                                   |             | <i>Mark F. Newman, MD, and Joseph P. Matthews, MD</i>                                                                                                     |             |
| <b>CHAPTER 77</b>                                                                             | <b>1772</b> | <b>CHAPTER 87</b>                                                                                                                                         | <b>1925</b> |
| <b>Evaluation of the Burned Patient</b>                                                       |             | <b>Protection of the Central Nervous System in Surgical Patients</b>                                                                                      |             |
| <i>Edward A. Bittner, MD, PhD, Loreta Grecu, MD, and J. A. Jeevendra Martyn, MD</i>           |             | <i>W. Andrew Kofke, MD, MBA, FCCM</i>                                                                                                                     |             |
| <b>CHAPTER 78</b>                                                                             | <b>1784</b> | <b>CHAPTER 88</b>                                                                                                                                         | <b>1947</b> |
| <b>Evaluation of the Trauma Patient</b>                                                       |             | <b>Anaphylactic Reactions and Anesthesia</b>                                                                                                              |             |
| <i>Edward George, MD, PhD</i>                                                                 |             | <i>Robert S. Holzman, MD, FAAP</i>                                                                                                                        |             |
| <b>CHAPTER 79</b>                                                                             | <b>1797</b> | <b>CHAPTER 89</b>                                                                                                                                         | <b>1964</b> |
| <b>Developing the Anesthetic Plan for the Critically Ill Patient</b>                          |             | <b>Malignant Hyperthermia, Thermoregulation, and Perioperative Hypothermia</b>                                                                            |             |
| <i>Jean Kwo, MD</i>                                                                           |             | <i>Sheila Muldoon, MD, Nyamkhishig Sambuughin, PhD, Maria Voelkel, BA, Rolf Bunger, MD, PhD, Hilary P. Grocott, MD, FRCPC, and Christopher Sulzer, MD</i> |             |
| <b>CHAPTER 80</b>                                                                             | <b>1811</b> | <b>PART 8</b>                                                                                                                                             |             |
| <b>Monitoring and Transport of the Critically Ill Patient</b>                                 |             | <b>CARE OF THE CHRONIC PAIN PATIENT</b>                                                                                                                   |             |
| <i>Michael G. Fitzsimons, MD, FCCP, and Nathaniel Sims, MD</i>                                |             | <b>CHAPTER 90</b>                                                                                                                                         | <b>2000</b> |
| <b>CHAPTER 81</b>                                                                             | <b>1828</b> | <b>Mechanisms of Chronic Pain</b>                                                                                                                         |             |
| <b>Postoperative Care of the Noncardiac Surgical ICU Patient</b>                              |             | <i>Gary J. Brenner, MD, PhD, and Clifford J. Woolf, MD, PhD</i>                                                                                           |             |
| <i>Michael C. Banks, MD, and C. William Hanson, III, MD</i>                                   |             | <b>CHAPTER 91</b>                                                                                                                                         | <b>2020</b> |
| <b>CHAPTER 82</b>                                                                             | <b>1841</b> | <b>Common Pain Syndromes</b>                                                                                                                              |             |
| <b>Hemodynamic Support of the Critically Ill Patient</b>                                      |             | <i>Basem Hamid, MD</i>                                                                                                                                    |             |
| <i>Jean-Louis Vincent MD, PhD</i>                                                             |             |                                                                                                                                                           |             |

|                                                      |      |                                                                    |      |
|------------------------------------------------------|------|--------------------------------------------------------------------|------|
| <b>CHAPTER 92</b>                                    | 2042 | <b>CHAPTER 96</b>                                                  | 2135 |
| <b>Medical Management of Chronic Pain</b>            |      | <b>Substance Dependence and Abuse in Anesthesia Care Providers</b> |      |
| <i>Marc A. Huntoon, MD</i>                           |      | <i>Raymond C. Roy, PhD, MD</i>                                     |      |
| <b>CHAPTER 93</b>                                    | 2072 | <b>CHAPTER 97</b>                                                  | 2155 |
| <b>Interventional Management of Chronic Pain</b>     |      | <b>The Economics of Health Care and Anesthesia Practice</b>        |      |
| <i>Carlos A. Pino, MD, and James P. Rathmell, MD</i> |      | <i>Franklin Dexter, MD, PhD, and Amr E. Abouleish, MD, MBA</i>     |      |
| <b>CHAPTER 94</b>                                    | 2106 | <b>CHAPTER 98</b>                                                  | 2172 |
| <b>Palliative and Cancer Pain Care</b>               |      | <b>Practice Management</b>                                         |      |
| <i>Phillip C. Phan, MD, and Allen W. Burton, MD</i>  |      | <i>Philip J. Mesisca, MBA, CMPE, and Susan Chapman Moss, MPH</i>   |      |
| <b>PART 9</b>                                        |      | <b>APPENDIX A</b>                                                  | 218: |
| <b>PRACTICE RELATED ISSUES</b>                       |      | <i>Mark Dershwitz, MD, PhD, and Carl E. Rosow, MD, PhD</i>         |      |
| <b>CHAPTER 95</b>                                    | 2126 | <b>INDEX</b>                                                       | 219  |
| <b>Legal Issues in Anesthesiology</b>                |      |                                                                    |      |
| <i>C. Lee Parmley, MD, JD</i>                        |      |                                                                    |      |