

JEFFREY A. NORTON • PHILIP S. BARIE
R. RANDAL BOLLINGER • ALFRED E. CHANG
STEPHEN F. LOWRY • SEAN J. MULVIHILL
HARVEY I. PASS • ROBERT W. THOMPSON
EDITORS

Surgey

Basic Science and
Clinical Evidence

SECOND EDITION

 Springer

Surgery

Second Edition

Surgery

Basic Science and Clinical Evidence

Second Edition

Edited by

Jeffrey A. Norton, MD, FACS

Robert L. and Mary Ellenburg Professor, Department of Surgery; Chief, Divisions of Surgical Oncology and General Surgery, Department of Surgery, Stanford University Medical Center, Stanford, California

Philip S. Barie, MD, MBA, FCCM, FACS

Professor, Departments of Surgery and Public Health; Chief, Division of Critical Care and Trauma, NewYork-Presbyterian Hospital/Weill Cornell Medical College, New York, New York

R. Randal Bollinger, MD, PhD, FACS

Professor, Departments of Surgery and Immunology, Duke University Medical Center, Durham, North Carolina

Alfred E. Chang, MD, FACS

Chief, Division of Surgical Oncology, Hugh Cabot Professor of Surgery, Department of Surgery, University of Michigan, Comprehensive Cancer Center, Ann Arbor, Michigan

Stephen F. Lowry, MD, MBA, FACS

Professor and Chairman, Department of Surgery, University of Medicine and Dentistry of New Jersey, Robert Wood Johnson Medical School, New Brunswick, New Jersey

Sean J. Mulvihill, MD, FACS

Professor and Chair, Department of Surgery; Senior Director of Clinical Affairs, Huntsman Cancer Institute; The University of Utah, Salt Lake City, Utah

Harvey I. Pass, MD, FACS

Professor, Departments of Cardiothoracic Surgery and Surgery, New York University Medical Center, New York, New York

Robert W. Thompson, MD, FACS

Professor of Surgery (Section of Vascular Surgery), Radiology, and Cell Biology and Physiology; Vice-Chairman for Research, Department of Surgery, Washington University School of Medicine, St. Louis, Missouri

Jeffrey A. Norton, MD, FACS

Robert L. and Mary Ellenburg Professor, Department of Surgery; Chief, Divisions of Surgical Oncology and General Surgery, Department of Surgery, Stanford University Medical Center, Stanford, CA, USA

Philip S. Barie, MD, MBA, FCCM, FACS

Professor, Departments of Surgery and Public Health; Chief, Division of Critical Care and Trauma, NewYork-Presbyterian Hospital/Weill Cornell Medical College, New York, NY, USA

R. Randal Bollinger, MD, PhD, FACS

Professor, Departments of Surgery and Immunology, Duke University Medical Center, Durham, NC, USA

Alfred E. Chang, MD, FACS

Chief, Division of Surgical Oncology, Hugh Cabot Professor of Surgery, Department of Surgery, University of Michigan, Comprehensive Cancer Center, Ann Arbor, MI, USA

Stephen F. Lowry, MD, MBA, FACS

Professor and Chairman, Department of Surgery, University of Medicine and Dentistry of New Jersey, Robert Wood Johnson Medical School, New Brunswick, NJ, USA

Sean J. Mulvihill, MD, FACS

Professor and Chair, Department of Surgery; Senior Director of Clinical Affairs, Huntsman Cancer Institute; The University of Utah, Salt Lake City, UT, USA

Harvey I. Pass, MD, FACS

Professor, Departments of Cardiothoracic Surgery and Surgery, New York University Medical Center, New York, NY, USA

Robert W. Thompson, MD, FACS

Professor of Surgery (Section of Vascular Surgery), Radiology, and Cell Biology and Physiology; Vice-Chairman for Research, Department of Surgery, Washington University School of Medicine, St. Louis, MO, USA

ISBN: 978-0-387-30800-5 e-ISBN: 978-0-387-68113-9

DOI: 10.1007/978-0-387-68113-9

Library of Congress Control Number: 20079218816

© 2008 Springer Science+Business Media, LLC

All rights reserved. This work may not be translated or copied in whole or in part without the written permission of the publisher (Springer Science+Business Media, LLC, 233 Spring Street, New York, NY 10013, USA), except for brief excerpts in connection with reviews or scholarly analysis. Use in connection with any form of information storage and retrieval, electronic adaptation, computer software, or by similar or dissimilar methodology now known or hereafter developed is forbidden.

The use in this publication of trade names, trademarks, service marks, and similar terms, even if they are not identified as such, is not to be taken as an expression of opinion as to whether or not they are subject to proprietary rights.

While the advice and information in this book are believed to be true and accurate at the date of going to press, neither the authors nor the editors nor the publisher can accept any legal responsibility for any errors or omissions that may be made. The publisher makes no warranty, express or implied, with respect to the material contained herein.

Printed on acid-free paper

9 8 7 6 5 4 3 2 1

springer.com

To our families

Preface

When the first edition of *Surgery: Basic Science and Clinical Practice* published, evidence-based medicine principles were just starting to be embraced by the surgery community. Our second edition comes at a critical time in surgical care when surgeons are expected to use the best available evidence to support their every day decisions in patient care, citing critical scientific evidence to support their decisions. No longer is it acceptable to simply say, "We do it this way because we always do it this way." The practice of surgery has evolved from *considering* the principles of evidence-based medicine to actively incorporating those principles into practice. We have taken great care to ensure that *Surgery* meets the needs of both students and clinicians, providing the scientific background, the clinical decision-making skills, and the surgical techniques to provide the best possible patient care.

For this new edition, the editorial board has recruited a new member of the team. In order to provide the necessary emphasis on trauma and critical care, we asked Dr. Philip S. Barie to work with Dr. Stephen F. Lowry to thoroughly expand and improve those topics. The reader will quickly see the added depth and scope of coverage—a marked improvement over the previous edition. We have thoroughly revised every chapter and sharpened the focus on our evidence-based approach, including EBM tables and enhanced figures in every chapter. New chapters discuss transfusion therapy, intraabdominal and nosocomial infections, severe sepsis and shock, mechanical ventilation, imaging in critical care patients, burns and inhalation injury, vascular trauma, traumatic injury of the spine, and surgical rehabilitation. We have identified particular patient populations that require specialized care, including the elderly, neonates, children, and obese patients. We also discuss the needs of pregnant and immunocompromised patients, who require variations in surgical management and care. These chapters are well-illustrated and packed with important evidence to allow enlightened choices.

We have included new chapters on vascular access for dialysis, chemotherapy and nutritional support, thoracic infections, and video-assisted thoracic surgery. The transplant section has been brought up to date and expanded to include transplantation of the intestine. Fundamentals of cancer genomics and proteomics and fundamentals of cancer cell biology and molecular targeting are essential to changes in cancer patient care and treatment, so we have expanded those topics in the oncology section. Finally, there is a new section on biomaterials, energy transfer, and robotics that provide the busy practicing surgeon with new methods and innovative perspectives for modern surgical care. In summary, the book has been thoroughly updated with recent advances in both scientific evidence and clinical practice, including 28 new chapters discussing exciting new areas in surgery. We have focused on current references and evidence to give the reader the most up-to-date information possible.

We hope you will agree that this book, with its consistent and long-established EBM focus, is different from other surgical textbooks. The contributing authors are all clinically active experts who have written comprehensive, current chapters. We believe the chapters on emerging topics strike a balance describing both the current status of practice and the possibilities on the horizon. The chapters have been carefully edited to provide a smooth, readable text. As in previous editions, the evidence-based tables provide information that is consistently formatted and carefully rated, based on the quality of the study design and conduct.

We will soon be embracing the changes in both learning and practice brought on by the ubiquity of computers in medicine. In addition to the print version of this book, we will bring together the timely content of journal articles with the authoritative content of a traditional textbook. At our soon-to-be launched web portal, users will be able to call up topics by book chapter, by general subject, or through a search function. (Similarly, journal readers will be able to access the content of *Surgery* when reading articles in a linked journal.) From this portal, users can navigate easily and seamlessly between book chapters, journal articles, and, where available, video clips. An online image library, references linked to online databases with full text retrieval (when available), and related clinical and biomedical data will also be available. In addition, an e-book version of *Surgery: Basic Science and Clinical Evidence* is now available, in combination with the print book or as a stand-alone digital resource.

In short, *Surgery: Basic Science and Clinical Evidence* continues to be different and exciting. We have strived to combine the past and present, with an optimistic eye to the future. *Surgery* represents the state of the art and science of the full range of surgical practice as we now know it. We hoped to expand on our past success and create a key reference source for residents and students. We hope readers are as excited about this edition as we are and we invite you to send your comments. Please let us hear from you, as we want to update the book frequently, continuing to improve upon it and make it more reader friendly. We wish you good reading.

Jeffrey A. Norton, MD, FACS
Philip S. Barie, MD, MBA, FCCM, FACS
R. Randal Bollinger, MD, PhD, FACS
Alfred E. Chang, MD, FACS
Stephen F. Lowry, MD, MBA, FACS
Sean J. Mulvihill, MD, FACS
Harvey I. Pass, MD, FACS
Robert W. Thompson, MD, FACS
January 2008

Acknowledgments

The Editorial Board wishes to thank both the editorial and production staff at Springer for their support and encouragement, Mary Shirazi, whose wonderful medical illustrations appear throughout the book, and Barbara Chernow and Kathy Jackson-Cleghorn of Chernow Editorial Services for their outstanding work in coordinating the production of this text.

I personally would also like to thank my family members for their continued help and support, specifically Cathy, John, Meg, Pat, and Tim.

Jeffrey A. Norton, MD

This book is dedicated to all who thirst for knowledge, and strive to improve the care of the surgical patient.

Philip S. Barie, MD, MBA

The untiring support and encouragement of my wife, Monika Bollinger is gratefully acknowledged. I sincerely appreciate the superb work of each author who contributed to the transplantation section and especially the participation of my former colleagues and trainees, Drs. Duane Davis, Douglas Farmer, Bob Harland, Allan Kirk, Stuart Knechtle, Christine Lau, Brian Lima, and Betsy Tuttle-Newhall.

R. Randal Bollinger, MD, PhD

To my wife, Lana, for her support in this effort.

Alfred E. Chang, MD

To Susette, Alex, Lorna, and Kate, who make the “day job” all the more meaningful, and to Debbie, Micki, and Lynn, who help make the “day job” a pleasure. To my mentors, Dick Kraft, Frank Moody, Murray Brennan, and Tom Shires, who instilled a love of surgery and imparted (hopefully) a modicum of their great wisdom.

Stephen F. Lowry, MD

To the surgical trainees who will use this reference for inspiring me with their commitment to excellence, to my own mentor, Haile Debas, MD, for his teaching, advice, and support, and to my wife Kim and sons Michael, Jeffrey, and Timothy for bringing joy to my life.

Sean J. Mulvihill, MD

To my family, Helen, Eric, and Ally Pass, for their constant support.

Harvey I. Pass, MD

To my surgical mentors, Norm Thompson (dad), John Mannick, Ron Stoney, and Greg Sicard, for their inspiration and instruction. To my students, residents, and fellows, who keep me challenged, and to Della for keeping it all in order. To my wonderful wife Michelle and the joy of our lives, Taylor Alexandra, who makes it all worthwhile.

Robert W. Thompson, MD

Contents

Preface	vii
Acknowledgments	ix
Contributors	xix
Evidence-Based Tables	xxxiii

Section One Fundamentals of Surgical Care

1	Origins of Modern Surgery	3
	<i>Ira M. Rutkow</i>	
2	Evidence-Based Surgery	21
	<i>Robin S. McLeod</i>	
3	Cell Structure, Function, and Genetics	37
	<i>Siobhan A. Corbett and Ramsey A. Foty</i>	
4	Mediators of Inflammation and Injury	75
	<i>Stephen F. Lowry, Edward Lin, and Steve E. Calvano</i>	
5	Substrate Metabolism	101
	<i>Edward Lin and Stephen F. Lowry</i>	
6	Nutrition	111
	<i>Kenneth A. Kudsk and Danny O. Jacobs</i>	
7	Perioperative Fluids and Electrolytes	139
	<i>Avery B. Nathens and Ronald V. Maier</i>	
8	Hemostasis and Coagulation	149
	<i>Marcel Levi and Tom van der Poll</i>	
9	Transfusion Therapy	167
	<i>Lena M. Napolitano</i>	
10	Wounds: Biology, Pathology, and Management	191
	<i>H. Peter Lorenz and Michael T. Longaker</i>	
11	Diagnosis and Treatment of Infection	209
	<i>David L. Dunn</i>	
12	Infections of Skin and Soft Tissue	237
	<i>Philip S. Barie and Soumitra R. Eachempati</i>	
13	Intraabdominal Infections	259
	<i>Michael A. West and Michael B. Shapiro</i>	

14	Nosocomial Infections	273
	<i>Pamela A. Lipsett</i>	
15	Severe Sepsis and Septic Shock	287
	<i>Steven M. Opal</i>	
16	Shock and Resuscitation	305
	<i>Avery B. Nathens and Ronald V. Maier</i>	
17	Perioperative Management	323
	<i>Philip S. Barie</i>	
18	Anesthesia	353
	<i>Joseph D. Tobias and Russell Wall</i>	
19	Management of Perioperative Pain	381
	<i>Susannah S. Wise</i>	
Section Two Biology and Practice of Trauma and Critical Care		
20	Development of Trauma and Critical Care	397
	<i>G. Tom Shires[†]</i>	
21	Trauma Systems, Triage, and Disaster Management	403
	<i>Jeffrey Hammond</i>	
22	Monitoring of Cardiovascular and Respiratory Function	409
	<i>Philip S. Barie and Soumitra R. Eachempati</i>	
23	Imaging of the Critically Ill Patient	423
	<i>Amy D. Wyrzykowski and Grace S. Rozycki</i>	
24	Risk Prediction, Disease Stratification, and Outcome Description in Critical Surgical Illness	433
	<i>John C. Marshall</i>	
25	Burns and Inhalation Injury	447
	<i>Roger W. Yurt</i>	
26	Traumatic Brain Injury	461
	<i>Kyle Chapple and Roger Hartl</i>	
27	Trauma to the Torso	471
	<i>Deborah M. Stein and Thomas M. Scalea</i>	
28	Trauma to the Pelvis and Extremities	505
	<i>Dean G. Lorich, Michael J. Gardner, and David L. Helfet</i>	
29	Vascular Trauma	521
	<i>Peter P. Lopez and Enrique Ginzberg</i>	
30	Traumatic Injury of the Spine	545
	<i>Justin F. Fraser, John Boockvar, and Roger Hartl</i>	
31	Multiple Organ Dysfunction Syndrome	563
	<i>Donald E. Fry</i>	
32	Mechanical Ventilation	577
	<i>David J. Dries and John F. Perry, Jr.</i>	

[†]Deceased

33	Renal Replacement Therapy	597
	<i>John C.L. Wang, Roxana M. Bologa, and Stuart D. Saal</i>	
34	Open Abdomen.	613
	<i>Claudia E. Goettler and Michael F. Rotondo</i>	
35	Principles of Surgical Rehabilitation	631
	<i>Michael W. O'Dell and Tammy Noren</i>	

Section Three Care of Unique Populations

36	Pediatric Surgery	649
	<i>Russell K. Woo and Craig T. Albanese</i>	
37	Surgery in the Immunocompromised Patient	697
	<i>John Mihran Davis and Kathleen King Casey</i>	
38	Evidence-Based Bariatric Surgery	709
	<i>John Morton</i>	
39	Surgical Care of the Pregnant Patient	729
	<i>Erika J. Lu and Myriam J. Curet</i>	
40	Palliative and End-of-Life Care	737
	<i>Sharon M. Weinstein and Olivia Walton</i>	

Section Four Gastrointestinal and Abdominal Surgery

41	History of Surgery of the Gastrointestinal Tract.	743
	<i>Sean J. Mulvihill and Haile T. Debas</i>	
42	Assessment of Acute Abdominal Symptoms.	759
	<i>William P. Schecter</i>	
43	Principles of Minimally Invasive Surgery	771
	<i>Theodore N. Pappas and Alison M. Fecher</i>	
44A	Esophagus: Benign Diseases of the Esophagus	791
	<i>C. Daniel Smith and David A. McClusky III</i>	
44B	Malignant Tumors of the Esophagus.	827
	<i>Gail Darling</i>	
45	Stomach and Duodenum	841
	<i>Robert E. Glasgow and Michael D. Rollins</i>	
46	Pancreas	875
	<i>Robert E. Glasgow and Sean J. Mulvihill</i>	
47	Biliary System.	911
	<i>Hobart W. Harris</i>	
48	Liver	943
	<i>Courtney Scaife</i>	
49	Small Intestine	963
	<i>Richard A. Hodin and Jeffrey B. Matthews</i>	
50	Appendix.	991
	<i>David Soybel</i>	

51	Colon, Rectum, and Anus	1011
	<i>Mark L. Welton, Andrew A. Shelton, George J. Chang, and Madhulika G. Varma</i>	
52	Spleen	1111
	<i>Alan T. Lefor and Edward H. Phillips</i>	
53	Hernias and Abdominal Wall Defects	1133
	<i>Daniel J. Scott and Daniel B. Jones</i>	
Section Five Endocrine Surgery		
54	History of Endocrine Surgery	1181
	<i>Jeffrey A. Norton</i>	
55	Parathyroid	1189
	<i>Matthew B. Bloom and Jeffrey A. Norton</i>	
56	Thyroid	1211
	<i>Ronald J. Weigel</i>	
57	Adrenal	1229
	<i>Robert Udelsman</i>	
58	Neuroendocrine Tumors of the Pancreas and Gastrointestinal Tract and Carcinoid Disease	1249
	<i>David A. Peterson, James P. Dolan, and Jeffrey A. Norton</i>	
59	Multiple Endocrine Neoplasia	1285
	<i>Terry C. Lairmore</i>	
Section Six Vascular Surgery		
60	History of Vascular Surgery	1299
	<i>Jesse E. Thompson</i>	
61	Pathobiology of Vascular Disease	1317
	<i>Bryan W. Tillman and Randolph L. Geary</i>	
62	Cerebrovascular Disease	1337
	<i>Peter L. Faries, Sheela T. Patel, and K. Craig Kent</i>	
63	Diseases of the Thoracic Aorta	1359
	<i>Marineh Yagubian and Thoralf M. Sundt</i>	
64	Diseases of the Great Vessels and the Thoracic Outlet	1375
	<i>Spencer J. Melby and Robert W. Thompson</i>	
65	Abdominal Aortic Aneurysms	1397
	<i>B. Timothy Baxter and Brad A. Winterstein</i>	
66	Arterial Disease of the Lower Extremity	1413
	<i>Michael A. Golden</i>	
67	Venous Disease and Pulmonary Embolism	1429
	<i>Gregory L. Moneta and Mathew I. Foley</i>	
68	Vascular Access for Dialysis, Chemotherapy, and Nutritional Support	1457
	<i>R. Randal Bollinger and Stuart J. Knechtle</i>	

Section Seven Thoracic Surgery

69	History of Cardiac Surgery	1471
	<i>Larry W. Stephenson</i>	
70	Preoperative and Postoperative Care of the Thoracic Surgery Patient	1481
	<i>Jessica Scott Donington</i>	
71	Lung Neoplasms	1491
	<i>Frank C. Detterbeck, Scott N. Gettinger, and Mark A. Socinski</i>	
72	Thoracic and Pulmonary Infections	1525
	<i>Frank A. Baciewicz, Jr.</i>	
73	Video-Assisted Thoracic Surgery	1535
	<i>Matthew J. Schuchert, James D. Luketich, and Hiran C. Fernando</i>	
74	Pleura: Anatomy, Physiology, and Disorders	1551
	<i>Joseph S. Friedberg and John C. Kucharczuk</i>	
75	Mediastinum	1571
	<i>Mark I. Block</i>	
76	Congenital Heart Disease	1601
	<i>Carl L. Backer and Constantine Mavroudis</i>	
77	Adult Heart Disease	1621
	<i>Todd K. Rosengart, William de Bois, Edgar Chedrawy, and Malica Vukovic</i>	
78	Cardiac Replacement Therapy	1669
	<i>Benjamin C. Sun</i>	

Section Eight Transplantation Surgery

79	History of Clinical Transplantation	1681
	<i>Thomas E. Starzl</i>	
80	Immunology of Transplantation	1705
	<i>Allan D. Kirk and Eric A. Elster</i>	
81	Rejection	1737
	<i>J. Richard Thistlethwaite and David Bruce</i>	
82	Principles of Organ Preservation	1747
	<i>Brian Lima and J.E. Tuttle-Newhall</i>	
83	Kidney Transplantation	1759
	<i>Stuart J. Knechtle</i>	
84	Pancreas and Islet Transplantation	1773
	<i>Robert C. Harland and Marc R. Garfinkel</i>	
85	Liver Transplantation	1787
	<i>Douglas W. Hanto, Scott R. Johnson, Seth J. Karp, and Khalid Khwaja</i>	
86	Transplantation of the Intestine	1827
	<i>Fady M. Kaldas and Douglas G. Farmer</i>	
87	Lung Transplantation	1839
	<i>Christine L. Lau, G. Alexander Patterson, and R. Duane Davis</i>	

- 88 Heart Transplantation 1861
Catherine Sudarshan, Daniel Kreisel, and Bruce R. Rosengard

Section Nine Cancer Surgery

- 89 History of Surgical Oncology 1889
Walter Lawrence, Jr.
- 90 Genetics of Cancer 1901
John E. Phay and Jeffrey F. Moley
- 91 Fundamentals of Cancer Genomics and Proteomics 1925
Jimmy C. Sung, Alice Y. Lee, and Timothy J. Yeatman
- 92 Fundamentals of Cancer Cell Biology and Molecular Targeting 1933
Steven N. Hochwald, David Bloom, Vita Golubovskaya, and William G. Cance
- 93 Immunology of Cancer 1947
Craig L. Slingluff, Jr.
- 94 Principles of Cancer Surgery 1965
John H. Donohue
- 95 Radiation as an Adjunct to Surgery 1985
Barbara-Ann Millar and Laura A. Dawson
- 96 Benign and Malignant Diseases of the Breast 2005
Helen A. Pass
- 97 Melanoma and Other Cutaneous Malignancies 2037
Vernon K. Sondak, Eric H. Jensen, and Kim A. Margolin
- 98 Soft Tissue Sarcoma 2061
Peter W.T. Pisters
- 99 Gastrointestinal Stromal Tumors 2087
Jason S. Gold and Ronald P. DeMatteo
- 100 Head and Neck Malignancies 2097
Jeffrey S. Moyer and Carol R. Bradford
- 101 Surgical Emergencies in the Cancer Patient 2117
Jeffrey J. Sussman
- 102 Nutritional Care of Cancer Patients 2123
David A. August and Maureen B. Huhmann
- 103 Regional Therapy of Cancer 2151
Douglas L. Fraker

Section Ten Associated Disciplines

- 104 Urology 2175
Joseph C. Presti, Jr.
- 105 Gynecology 2197
Hillary B. Boswell, Janet S. Rader, and David E. Cohn

106	Neurosurgery	2217
	<i>Philip Starr</i>	
107	Orthopaedic Surgery	2233
	<i>David W. Lowenberg and Andrew Fang</i>	
108	Plastic Surgery	2263
	<i>W. Thomas Lawrence and Adam Lowenstein</i>	

Section Eleven Modern Practice of Surgery

	Technology, the Surgeon, and Surgical Innovation: An Introduction	2289
	<i>Michael E. Gertner and Thomas Krummel</i>	
109	Biomaterials and the Evolution of Hernia Repair I: The History of Biomaterials and the Permanent Meshes	2291
	<i>Raul A. Cortes, Edward Miranda, Hanmin Lee, and Michael E. Gertner</i>	
110	Biomaterials and the Evolution of Hernia Repair II: Composite Meshes	2305
	<i>Raul A. Cortes, Edward Miranda, Hanmin Lee, and Michael E. Gertner</i>	
111	Biomaterials and the Evolution of Hernia Repair III: Biologically Derived Prosthetic Meshes	2317
	<i>Raul A. Cortes, Edward Miranda, Hanmin Lee, and Michael E. Gertner</i>	
112	Injectable Biomaterials in Surgery	2325
	<i>Bilal Shafi, Carlos Mery, Gary Binyamin, Joseph Knight, and Michael E. Gertner</i>	
113	Energy Transfer in the Practice of Surgery	2345
	<i>James Wall and Michael E. Gertner</i>	
114	Robot-Assisted Surgery: Technology and Current Clinical Status	2355
	<i>Russell K. Woo, David A. Peterson, David Le, Michael E. Gertner, and Thomas Krummel</i>	
	Index	2373

Contributors

Craig T. Albanese, MD

Professor, Pediatrics and Obstetrics and Gynecology, Department of Surgery, Stanford University Medical Center; Chief, Division of Pediatric Surgery and Director of Surgical Services, Lucile Packard Children's Hospital, Stanford, CA, USA

David A. August, MD

Associate Professor, Chief, Division of Surgical Oncology, Department of Surgery, University of Medicine and Dentistry of New Jersey, Robert Wood Johnson Medical School, and the Cancer Institute of New Jersey, New Brunswick, NJ, USA

Frank A. Baciewicz, Jr., MD

Associate Professor, Department of Cardio-Thoracic Surgery, Wayne State University/Harper Hospital, Detroit, MI, USA

Carl L. Backer, MD

A. C. Buehler Professor, Division of Cardiovascular-Thoracic Surgery, Department of Surgery, Children's Memorial Hospital, Northwestern University Feinberg School of Medicine, Chicago, IL, USA

Philip S. Barie, MD, MBA

Professor, Departments of Surgery and Public Health; Chief, Division of Critical Care and Trauma, New York-Presbyterian Hospital/Weill Cornell Medical College, New York, NY, USA

B. Timothy Baxter, MD

Professor, Department of Surgery, University of Nebraska Medical Center and the Methodist Hospital, Omaha, NE, USA

Gary Binyamin, PhD

Surgical Innovation Fellow, Department of Surgery, Stanford University, James H. Clark Center, Stanford, CA, USA

Mark I. Block, MD

Director, Department of Thoracic Oncology, Memorial Regional Cancer Center, Hollywood, FL, USA

David Bloom, PhD

Postdoctoral Associate, Department of Surgery, University of Florida College of Medicine, Gainesville, FL, USA

Matthew B. Bloom, MD

Resident, Department of Surgery, Stanford University, Stanford, CA, USA

R. Randal Bollinger, MD, PhD

Professor, Departments of Surgery and Immunology, Duke University Medical Center, Durham, NC, USA

Roxana M. Bologa, MD

Assistant Professor, Departments of Clinical Medicine and Surgery, Weill Cornell Medical College; Co-Director, Peritoneal Dialysis, The Rogosin Institute, New York, NY, USA

John Boockvar, MD

Alvina and Willis Murphy Assistant Professor, Departments of Neurological Surgery, and Surgery,
Weill Cornell Medical College, New York, NY, USA

Hillary B. Boswell, MD

Staff Physician, The Women's Specialists of Houston, General Obstetrics and Adult Gynecology,
Pediatric and Adolescent Gynecology, St. Luke's Medical Tower, Houston, TX, USA

Carol R. Bradford, MD, FACS

Medical Director, Head and Neck Cancer Clinic; Professor, Department of Otolaryngology/Head and
Neck Surgery, University of Michigan, UM Comprehensive Cancer Center, Ann Arbor, MI, USA

David Bruce, MD, FACS

Transplant Surgeon, Department of Transplant Surgery, LifeLink Healthcare Institute, Tampa, FL, USA

Steve E. Calvano, PhD

Associate Professor, Department of Surgery, University of Medicine and Dentistry of New Jersey,
Robert Wood Johnson Medical School, New Brunswick, NJ, USA

William G. Cance, MD

Professor and Chairman, Department of Surgery, University of Florida College of Medicine,
Gainesville, FL, USA

Kathleen King Casey, MD

Chief, Infectious Disease, Department of Medicine, Jersey Shore University Medical Center, Neptune,
NJ, USA

George J. Chang, MD

Assistant Professor, Department of Surgical Oncology, The University of Texas M. D. Anderson
Cancer Center, Houston, TX, USA

Kyle Chapple, MD

Resident, Department of Neurological Surgery, Weill Cornell Medical College, New York, NY, USA

Edgar Chedrawy, MD

Assistant Professor, Department of Surgery, University of Illinois at Chicago, Chicago, IL, USA

David E. Cohn, MD

Associate Professor, Divisions of Gynecologic Oncology, Departments of Obstetrics and Gynecology,
The Ohio State University College of Medicine and Public Health, Columbus, OH, USA

Siobhan A. Corbett, MD

Associate Professor, Department of Surgery, University of Medicine and Dentistry of New Jersey,
Robert Wood Johnson Medical School, Clinical Academic Building, New Brunswick, NJ, USA

Raul A. Cortes, MD

Clinical Fellow, Department of Surgery, University of California, San Francisco, San Francisco, CA,
USA

Myriam J. Curet, MD, FACS

Associate Professor, Department of Surgery, Stanford University, Stanford, CA, USA

Gail Darling, MD, FACS, FRCSC

Associate Professor, Department of Thoracic Surgery, University Health Network, Toronto, Ontario,
Canada

John Mihran Davis, MD

Professor, Department of Surgery, Jersey Shore University Medical Center, Neptune, NJ, USA

R. Duane Davis, MD

Professor, Division of Cardiothoracic Surgery, Department of Surgery, Duke University Medical
Center, Durham, NC, USA

Laura A. Dawson, MD

Assistant Professor, Department of Radiation Oncology, University of Toronto/Princess Margaret Hospital, Toronto, Ontario, Canada

Haile T. Debas, MD[†]

Executive Director, UCSF Global Health Sciences; Maurice Galante Distinguished Professor, Dean Emeritus, School of Medicine, Vice Chancellor Emeritus, Medical Affairs, Chancellor Emeritus, Department of Surgery, University of California, San Francisco, San Francisco, CA, USA

William de Bois, MD

Fellow, Department of Surgery, Heart Center at Stony Brook, Stony Brook University, Stony Brook, NY, USA

Ronald P. DeMatteo, MD

Vice Chair, Department of Surgery; Head, Division of General Surgical Oncology; Director, General Surgical Oncology Fellowship Program, Memorial Sloan-Kettering Cancer Center, New York, NY, USA

Frank C. Detterbeck, MD

Professor; Section Chief; Surgical Director, Department Thoracic Oncology; Associate Director, Department for Clinical Affairs, Yale Cancer Center, Yale-New Haven Hospital, New Haven, CT, USA

James P. Dolan, MD

Lieutenant Colonel, USAF, MC, Chief, Department of General Surgery, Keesler Medical Center, Biloxi, MI, USA

Jessica Scott Donington, MD

Assistant Professor, Department of Cardiothoracic Surgery, Stanford University Medical Center, Stanford, CA, USA

John H. Donohue, MD

Professor, Department of Surgery, Mayo Medical School; Consultant, Division of Gastroenterologic and General Surgery, Mayo Clinic, Rochester, MN, USA

David J. Dries, MSE, MD

Assistant Medical Director, Department of Surgical Care, HealthPartners Medical Group; John F. Perry, Jr. Professor, Department of Surgery, University of Minnesota, St. Paul, MN, USA

David L. Dunn, MD, PhD

Vice President for Health Sciences, Professor, Department of Surgery, University at Buffalo/SUNY, Buffalo, NY, USA

Soumitra R. Eachempati, MD

Associate Professor, Departments of Surgery and Public Health, Weill Cornell Medical College; Associate Attending Surgeon, NewYork-Presbyterian Hospital, New York, NY, USA

Eric A. Elster, MD

Assistant Professor, Department of Surgery, Uniformed Services University; Transplantation Branch, National Institutes of Health, Bethesda, MD, USA

Andrew Fang, MD

Attending, Department of Orthopedics, South San Francisco Medical Center, San Francisco, CA, USA

Peter L. Faries, MD

Chief, Departments of Endovascular Surgery and Surgery, Cornell University, Weill Cornell Medical College, Columbia University College of Physicians and Surgeons, New York, NY, USA

Douglas G. Farmer, MD

Associate Professor, Department of Surgery, David Geffen School of Medicine at UCLA; Director, Intestinal Transplant Program, Director, Pediatric Liver Transplant Program, Co-Director, Intestinal Failure Center, Division of Liver and Pancreas Transplantation, Dumont UCLA Transplant Center, Los Angeles, CA, USA

Alison M. Fecher, MD

Fellow, Department of Surgery, Duke University Medical Center, Durham, NC, USA

Hiran C. Fernando, MBBS

Associate Professor, Department of Cardiothoracic Surgery, Boston University, Boston, MA, USA

Mathew I. Foley, MD

Vascular Surgeon, Legacy Columbia Vascular and Endovascular Division, Legacy Emanuel Hospital and Health Center, Portland, OR, USA

Ramsey A. Foty, PhD

Assistant Professor, Department of Surgery, University of Medicine and Dentistry of New Jersey, Robert Wood Johnson Medical School, New Brunswick, NJ, USA

Douglas L. Fraker, MD

Jonathon Rhoads Professor, Department of Surgery; Vice-Chairman, Clinical Affairs, Department of Surgery, University of Pennsylvania, Philadelphia, PA, USA

Justin F. Fraser, MD

Resident, Department of Neurological Surgery, NewYork-Presbyterian Hospital, New York, NY, USA

Joseph S. Friedberg, MD

Associate Professor, Chief, Division of Thoracic Surgery, Department of Surgery, University of Pennsylvania Medical Center at Presbyterian, Philadelphia, PA, USA

Donald E. Fry, MD

Adjunct Professor, Department of Surgery, Northwestern University Feinberg School of Medicine, Chicago, IL, USA

Michael J. Gardner, MD

Senior Clinical Associate, Department of Orthopaedic Surgery, Hospital for Special Surgery, New York, NY, USA

Marc R. Garfinkel, MD

Assistant Professor, Department of Surgery, University of Chicago Medical Center, Center for Advanced Medicine, Chicago, IL, USA

Randolph L. Geary, MD

Professor, Department of General Surgery, Wake Forest University School of Medicine, Winston-Salem, NC, USA

Michael E. Gertner, MD

Consulting Assistant Professor, Department of Surgery, Stanford University, Stanford, CA, USA

Scott N. Gettinger, MD

Assistant Professor, Department of Medicine, Yale Medical Oncology, New Haven, CT, USA

Enrique Ginzberg, MD

Professor, DeWitt Daughtry Family, Department of Surgery, Miller School of Medicine, University of Miami, Miami, FL, USA

Robert E. Glasgow, MD

Assistant Professor, Department of Surgery, University of Utah, Salt Lake City, UT, USA

Claudia E. Goettler, MD

Assistant Professor, Traumatology and Surgical Critical Care, Department of Surgery, Brody School of Medicine, East Carolina University, Greenville, NC, USA

Jason S. Gold, MD

Staff Surgeon, Surgical Service VA Boston Healthcare System, West Roxbury MA; Lecturer, Department of Surgery, Brigham and Women's Hospital, Harvard Medical School, Boston, MA, USA

Michael A. Golden, MD

Chief, Division of Vascular Surgery and Endovascular Therapy, Department of Surgery, Penn Presbyterian Medical Center, Philadelphia, PA, USA

Vita Golubovskaya, PhD

Research Assistant Professor, Department of Surgery, University of Florida College of Medicine, Gainesville, FL, USA

Jeffrey Hammond, MD, MBA, MPH

Professor, Department of Surgery, University of Medicine and Dentistry of New Jersey, Robert Wood Johnson Medical School, New Brunswick, NJ, USA

Douglas W. Hanto, MD, PhD

Lewis Thomas Professor, Department of Surgery, Harvard Medical School; Chief, Division of Transplantation, Beth Israel Deaconess Medical Center, Boston, MA, USA

Robert C. Harland, MD

Associate Professor, Departments of Surgery and Medicine, Director, Kidney and Pancreas Transplantation, Comer Children's Hospital, University of Chicago, Center for Advanced Medicine, Chicago, IL, USA

Hobart W. Harris, MD, MPH

Professor and Chief, Division of General Surgery, Vice-Chair, Department of Surgery, University of California, San Francisco, CA, USA

Roger Hartl, MD

Assistant Professor, Neurological Surgery, Weill Cornell Medical College, New York, NY, USA

David L. Helfet, MD

Professor, Department of Orthopaedic Surgery, Weill Cornell Medical Center, Director, Orthopedic Trauma Service, Hospital for Special Surgery/NewYork-Presbyterian Hospital, New York, NY, USA

Steven N. Hochwald, MD

Assistant Professor, Department of Surgical Oncology, Molecular Genetics and Microbiology, University of Florida College of Medicine, Gainesville, FL, USA

Richard A. Hodin, MD

Associate Professor, Department of Surgery, Massachusetts General Hospital, Harvard Medical School, Boston, MA, USA

Maureen B. Huhmann, MS, RD

Instructor, Department of Primary Care, University of Medicine and Dentistry of New Jersey, New Brunswick, NJ, USA

Danny O. Jacobs, MD, MPH

Professor and Chairman, Department of Surgery, Duke University Medical Center, Durham, NC, USA

Eric H. Jensen, MD

Fellow, Department of Surgical Oncology, H. Lee Moffitt Cancer Center and Research Institute, Tampa, FL, USA

Scott R. Johnson, MD

Instructor, Department of Surgery, Harvard Medical School; Surgical Director of Kidney Transplantation, Beth Deaconess Medical Center, Boston, MA, USA

Daniel B. Jones, MD

Associate Professor, Harvard Medical School; Chief, Minimally Invasive Surgery, Beth Israel Deaconess Medical Center, Boston, MA, USA

Fady M. Kaldas, MD

Surgical Research Fellow, Department of Surgery, University of California, Los Angeles, CA, USA

Seth J. Karp, MD

Assistant Professor, Department of Surgery, Harvard Medical School; Division of Transplantation, Beth Israel Deaconess Medical Center, Boston, MA, USA

K. Craig Kent, MD

Chief, Combined Columbia and Cornell Division of Vascular Surgery, New York-Presbyterian Hospital, New York, NY; Professor, Department of Surgery, Columbia University College of Physicians and Surgeons, New York; Greenberg-Starr Professor, Department of Surgery, Weill Cornell Medical College, New York, NY, USA

Khalid Khwaja, MD

Instructor, Department of Surgery, Harvard Medical School; Surgical Director of Pancreas Transplantation, Beth Israel Deaconess Medical Center, Boston, MA, USA

Allan D. Kirk, MD, PhD

Chief, Transplantation Branch, National Institutes of Health, Bethesda, MD, USA

Stuart J. Knechtle, MD

Ray D. Owen Professor, Departments of Transplantation and Surgery, University of Wisconsin Medical School, Madison, WI, USA

Joseph Knight, MS

Biodesign Innovation Fellow, Department of Cardiovascular Medicine, Stanford University, Stanford, CA, USA

Daniel Kreisel, MD, PhD

Assistant Professor, Division of Cardiothoracic Surgery, Department of Surgery, Washington University School of Medicine, St. Louis, MO, USA

Thomas Krummel, MD

Emile Holman Professor and Chair, Department of Surgery, Division of Pediatric Surgery, Stanford University, Stanford, CA, USA

John C. Kucharczuk, MD

Assistant Professor, Department of Cardiothoracic Surgery, Hospital of the University of Pennsylvania, Philadelphia, PA, USA

Kenneth A. Kudsk, MD

Professor, Department of Surgery, Vice Chairman of Surgical Research, University of Wisconsin-Madison, Madison, WI, USA

Terry C. Lairmore, MD

Director, Division of Surgical Oncology, Scott and White Memorial Hospital and Clinic, Texas A&M University System Health Science Center, Temple, TX, USA

Christine L. Lau, MD

Fellow, Division of Cardiothoracic Surgery, Department of Surgery, Washington University School of Medicine, St. Louis, MO, USA

W. Thomas Lawrence, MD, MPH

Professor and Chief, Department of Plastic Surgery, University of Kansas Medical Center, Sutherland Institute, Kansas City, KS, USA

Walter Lawrence, Jr., MD

Professor Emeritus, Division of Surgical Oncology, Department of Surgery, Virginia Commonwealth University College of Medicine, Richmond, VA, USA

David Le, MD

Resident, Department of Surgery, Stanford University Medical Center, Stanford, CA, USA

Alice Y. Lee, MS

Computation Biologist, H. Lee Moffitt Cancer Center and Research Institute, Tampa, FL, USA

Hanmin Lee, MD

Associate Professor, Department of Surgery, Pediatrics, and OB-Gyn and Reproductive Services, University of California, San Francisco, San Francisco, CA, USA

Alan T. Lefor, MD, MPH

Professor, Department of Surgery, Jichi Medical University, Center for Graduate Medical Education, Shimotsuke, Tochigi, Japan

Marcel Levi, MD, PhD

Professor, Department of Medicine, Academic Medical Center, University of Amsterdam, Amsterdam, The Netherlands

Brian Lima, MD

Research Fellow, Department of Cardiothoracic Surgery, Duke University, Durham, NC, USA

Edward Lin, MD

Assistant Professor, Department of Surgery, Emory University School of Medicine, Atlanta, GA, USA

Pamela A. Lipsett, MD

Professor, Department of Surgery, Anesthesiology/Critical Care Medicine, Johns Hopkins University Schools of Medicine and Nursing, Baltimore, MD, USA

Michael T. Longaker, MD, MBA

Deane P. and Louise Mitchell Professor, Department of Surgery (Plastic and Reconstructive); Director, Children's Surgical Research, Lucile Packard Children's Hospital, Stanford University School of Medicine, Stanford, CA, USA

Peter P. Lopez, MD

Assistant Professor, DeWitt Daughtry Family, Department of Surgery, Miller School of Medicine, University of Miami, Ryder Trauma Center, Jackson Memorial Medical Center, Miami, FL, USA

H. Peter Lorenz, MD

Associate Professor, Department of Surgery (Plastic and Reconstructive); Investigator, Children's Surgical Research Program, Stanford University School of Medicine, Stanford, CA, USA

Dean G. Lorch, MD

Assistant Professor, Department of Orthopedic Surgery, Weill Cornell Medical Center; Associate Director, Orthopaedic Trauma Service, Hospital for Special Surgery/NewYork-Presbyterian Hospital, New York, NY, USA

David W. Lowenberg, MD

Chairman, Department of Orthopedic Surgery, California Pacific Medical Center, San Francisco, CA, USA

Adam Lowenstein, MD

Private Practice, Mendocito Center for Aesthetic Plastic Surgery, Santa Barbara, CA, USA

Stephen F. Lowry, MD, MBA

Professor and Chairman, Department of Surgery, University of Medicine and Dentistry of New Jersey, Robert Wood Johnson Medical School, New Brunswick, NJ, USA

Erika J. Lu, MD

Resident, Department of Surgery, Stanford University Medical Center, Stanford, CA, USA

James D. Luketich, MD

Professor, Department of Surgery; Chief, Division of Thoracic and Foregut Surgery, University of Pittsburgh, Pittsburgh, PA, USA

Ronald V. Maier, MD

Jane and Donald D. Trunkey Professor, Vice Chair, Department of Surgery; Surgeon-in-Chief, Department of Surgery, Harborview Medical Center, Seattle, WA, USA

Kim A. Margolin, MD

Associate Director for Clinical Research, Division of Medical Oncology and Therapeutics Research; Professor, Division of Hematology and Hematopoietic Cell Transplantation; Staff Physician, Medical Oncology, City of Hope National Medical Center, Duarte, CA, USA

John C. Marshall, MD

Professor, Department of Surgery, Critical Care Medicine, University of Toronto/St. Michael's Hospital, Toronto, Ontario, Canada

Jeffrey B. Matthews, MD

Christian R. Holmes Professor, Chairman, Department of Surgery, University of Cincinnati College of Medicine, Cincinnati, OH, USA

Constantine Mavroudis, MD

Willis J. Potts Professor, Department of Surgery; Surgeon-in-Chief, Division of Cardiovascular-Thoracic Surgery, Children's Memorial Hospital, Northwestern University Feinberg School of Medicine, Chicago, IL, USA

David A. McClusky, III, MD

Chief Resident, Department of Surgery, Emory University Hospital, Atlanta, GA, USA

Robin S. McLeod, MD, FRCSC

Professor, Department of Surgery, University of Toronto; Head, Division of General Surgery, Mount Sinai Hospital, Toronto, Ontario, Canada

Spencer J. Melby, MD

Senior Resident, Department of General Surgery, Barnes-Jewish Hospital and Washington University School of Medicine, St. Louis, MO, USA

Carlos Mery, MD, MPH

Surgical Innovation Fellow, Department of Surgery, Stanford University, Mountain View, CA, USA

Barbara-Ann Millar, MBChB

Assistant Professor, Department of Radiation Oncology, University of Toronto/Princess Margaret Hospital, Toronto, Ontario, Canada

Edward Miranda, MD

Attending Surgeon, Department of Plastic and Reconstructive Surgery, California-Pacific Medical Center, San Francisco, CA, USA

Jeffrey F. Moley, MD

Professor, Division of General Surgery, Department of Surgery; Chief, Cancer and Endocrine Surgery Section; Associate Director, Siteman Cancer Center, Washington University School of Medicine, St. Louis, MO, USA

Gregory L. Moneta, MD

Professor and Chief, Department of Vascular Surgery, Oregon Health and Science University, Portland, OR, USA

John Morton, MD, MPH

Director, Department of Bariatric Surgery, Stanford School of Medicine, Stanford, CA, USA

Jeffrey S. Moyer, MD

Assistant Professor, Department of Otolaryngology, Director of Medical Student Education, University of Michigan, A. Alfred Taubman Health Care Center, Ann Arbor, MI, USA

Sean J. Mulvihill, MD

Professor and Chair, Department of Surgery; Senior Director of Clinical Affairs, Huntsman Cancer Institute; The University of Utah, Salt Lake City, UT, USA

Lena M. Napolitano, MD

Professor, Department of Surgery; Chief, Surgical Critical Care; Program Director, Surgical Critical Care Fellowship; Associate Chair, Department of Critical Care, University of Michigan School of Medicine, Ann Arbor, MI, USA

Avery B. Nathens, MD, PhD, MPH

Associate Professor, Director, Surgical Critical Care, Department of Surgery, University of Washington/Harborview Medical Center, Seattle, WA, USA

Tammy Noren, PT, MSPT

Assistant Chief Physical Therapist, Department of Rehabilitation Medicine, NewYork-Presbyterian Hospital, Weill Cornell Medical Center, New York, NY, USA

Jeffrey A. Norton, MD

Robert L. and Mary Ellenburg Professor, Department of Surgery, Chief, Divisions of Surgical Oncology and General Surgery, Department of Surgery, Stanford University Medical Center, Stanford, CA, USA

Michael W. O'Dell, MD

Acting Chief and Professor, Department of Rehabilitation Medicine, New York, NY, USA

Steven M. Opal, MD

Professor, Infectious Disease Division, Department of Medicine, Brown Medical School, Providence, RI, USA

Theodore N. Pappas, MD

Professor and Vice President, Department of Administration and Surgery; Executive Medical Director, Private Diagnostic Clinic, Duke University Medical Center, Durham, NC, USA

Helen A. Pass, MD

Assistant Professor, Department of Clinical Surgery, Columbia University; Assistant Attending Surgeon, NewYork-Presbyterian Hospital/Columbia University Medical Center, New York, NY, USA

Sheela T. Patel, MD

Resident, Department of Surgery, Weill Cornell Medical College, Columbia University College of Physicians and Surgeons, New York, NY, USA

G. Alexander Patterson, MD

Joseph C. Bancroft Professor, Department of Surgery; Chief, Division of Cardiothoracic Surgery, Department of General Thoracic Surgery, Washington University School of Medicine, St. Louis, MO, USA

John F. Perry, Jr., MD

Professor, Department of Surgery, University of Minnesota, Minneapolis, MN, USA

David A. Peterson, MD

Resident, Department of Surgery, Stanford University Medical Center, Stanford, CA, USA

John E. Phay, MD

Assistant Professor, Divisions of Surgical Oncology, Department of Surgery, Vanderbilt University Medical Center, Nashville, TN, USA

Edward H. Phillips, MD

Director, Center for Minimally Invasive Surgery, Department of Surgery, Cedars-Sinai Medical Center, Los Angeles, CA, USA

Peter W.T. Pisters, MD

Professor, Department of Surgical Oncology, The University of Texas M. D. Anderson Cancer Center, Houston, TX, USA

Joseph C. Presti, Jr., MD

Associate Clinical Professor, Department of Urology, University of California, San Francisco, San Francisco, CA, USA

Janet S. Rader, MD

Professor, Division of Gynecologic Oncology, Department of Obstetrics and Gynecology; Associate Professor, Department of Genetics, Washington University School of Medicine, St. Louis, MO, USA

Michael D. Rollins, MD

Assistant Professor, Department of Surgery, University of Utah, Salt Lake City, UT, USA

Bruce R. Rosengard, MD

Associate Professor, Department of Surgery, Cardiac Surgical Unit, Massachusetts General Hospital, Boston, MA, USA

Todd K. Rosengart, MD

Chief, Cardiothoracic Surgery, Co-Director of the Heart Center at Stony Brook, Stony Brook University, Stony Brook, NY, USA

Michael F. Rotondo, MD

Professor, Chairman, Department of Surgery, Brody School of Medicine, East Carolina University, Greenville, NC, USA

Grace S. Rozycki, MD, MBA

Professor, Department of Surgery; Director, Trauma and Surgical Critical Care, Emory University School of Medicine, Grady Memorial Hospital, Atlanta, GA, USA

Ira M. Rutkow, MD

Clinical Professor, Department of Surgery, University of Medicine and Dentistry of New Jersey, Newark, NJ, USA

Stuart D. Saal, MD

Professor, Departments of Clinical Medicine and Surgery, Weill Cornell Medical College; Vice President for Hospital Affairs; Medical Director, Transplantation Program; Co-Director, Renal Consultation Service; Co-Director, Apheresis, The Rogosin Institute, New York, NY, USA

Courtney Scaife, MD

Assistant Professor, Department of Surgery, University of Utah, Salt Lake City, UT, USA

Thomas M. Scalea, MD

Physician-in-Chief, R Adams Cowley Shock Trauma Center; Director, Program in Trauma, University of Maryland School of Medicine, Baltimore, MD, USA

William P. Schechter, MD

Professor, Department Clinical Surgery, University of California, San Francisco, University of California, San Francisco, San Francisco, CA, USA

Matthew J. Schuchert, MD

Instructor, Department of Surgery, University of Pittsburgh, Pittsburgh, PA, USA

Daniel J. Scott, MD

Associate Professor and William Henderson Chair, Director, Tulane Center for Minimally Invasive Surgery, Tulane University School of Medicine, New Orleans, LA, USA

Bilal Shafi, MD, MSE

Surgical Innovation Fellow, Departments of Surgery and Cardiovascular Medicine, Stanford University, Palo Alto, CA, USA

Michael B. Shapiro, MD

Associate Professor, Department of Surgery, Trauma and Critical Care, Feinberg School of Medicine, Northwestern University, Chicago, IL, USA

Andrew A. Shelton, MD

Assistant Professor, Department of Surgery, Stanford University School of Medicine, Stanford, CA, USA

G. Tom Shires, MD[†]

Professor, Department of Surgery, University of Nevada School of Medicine, Las Vegas, NV, USA

Craig L. Slingluff, Jr., MD

Joseph Helms Farrow Professor, Department of Surgery, University of Virginia, Charlottesville, VA, USA

C. Daniel Smith, MD

Professor and Chair, Department of Surgery, Mayo Clinic Jacksonville, Jacksonville, FL, USA

Mark A. Socinski, MD

Associate Professor, Department of Medicine, Lineberger Comprehensive Cancer Center, University of North Carolina, Chapel Hill, NC, USA

Vernon K. Sondak, MD

Chief, Division of Cutaneous Oncology; Professor, Departments of Surgery and Interdisciplinary Oncology, H. Lee Moffitt Cancer Center and Research Institute, Tampa, FL, USA

David Soybel, MD

Senior Staff Surgeon, Division of General and Gastrointestinal Surgery, Brigham and Women's Hospital, Brigham and Women's Hospital, Division of General and Gastrointestinal Surgery, Boston, MA, USA

Philip Starr, MD, PhD

Associate Professor, Dolores Cakebread Endowed Chair, Co-Director, Functional Neurosurgery Program, Department of Neurological Surgery, University of California, San Francisco; Surgical Director, Parkinson's Disease Research, Education and Care Center (PADRECC) at San Francisco Veteran's Affairs Medical Center, San Francisco, CA, USA

Thomas E. Starzl, MD, PhD

Professor, Department of Surgery, Thomas E. Starzl Transplantation Institute, University of Pittsburgh, Pittsburgh, PA, USA

Deborah M. Stein, MD, MPH

Assistant Professor, Department of Surgery, R Adams Cowley Shock Trauma Center, University of Maryland School of Medicine, Baltimore, MD, USA

Larry W. Stephenson, MD

Ford-Webber Professor, Department of Surgery; Professor and Chief, Cardiothoracic Surgery, Wayne State University, School of Medicine, Detroit, MI, USA

Catherine Sudarshan, FRAS

Attending, Cardiothoracic Division, Papworth Hospital, Cambridge, United Kingdom

Benjamin C. Sun, MD

Associate Professor and Director, Departments of Cardiac Transplantation and Mechanical Support and Surgery, The Ohio State University Medical Center, Columbus, OH, USA

Thoralf M. Sundt, MD

Professor, Department of Surgery, Mayo Clinic, Rochester, MN, USA

Jimmy C. Sung, MD, JD

Senior Resident, Department of Surgery, University of South Florida, Tampa, FL, USA

Jeffrey J. Sussman, MD

Assistant Professor, Department of Surgery, University of Cincinnati/VAMC Cincinnati, Cincinnati, OH, USA

J. Richard Thistlethwaite, MD, PhD

Professor, Department of Surgery; President, Medical Staff, The University of Chicago Medical Center, Chicago, IL, USA

[†]Deceased

Jesse E. Thompson, MD

Professor, Department of Surgery, Baylor University Medical Center, Dallas, TX, USA

Robert W. Thompson, MD

Professor, Departments of Surgery (Section of Vascular Surgery), Radiology, and Cell Biology and Physiology; Vice-Chairman for Research, Department of Surgery; Attending Surgeon, Barnes-Jewish Hospital and Washington University School of Medicine, St. Louis, MO, USA

Bryan W. Tillman, MD, PhD

Assistant Instructor, Department of Surgery, Wake Forest University Medical Center, Winston-Salem, NC, USA

Joseph D. Tobias, MD

Vice-Chairman, Department of Anesthesiology; Russell and Mary Sheldon Chair, Department of Pediatric Intensive Care; Chief, Division of Pediatric Anesthesiology; Professor, Department of Pediatrics and Anesthesiology, University of Missouri, Columbia, MO, USA

J.E. Tuttle-Newhall, MD

Assistant Professor, Department of Surgery, Duke University, Durham, NC, USA

Robert Udelsman, MD, MBA

Professor and Chairman, Department of Surgery, Yale University School of Medicine, New Haven, CT, USA

Tom van der Poll, MD, PhD

Professor, Laboratory of Experimental Medicine, Academic Medical Center, University of Amsterdam, Amsterdam, The Netherlands

Madhulika G. Varma, MD

Attending, UCSF Center for Colorectal Surgery, University of California, San Francisco, Medical Center, San Francisco, CA, USA

Malica Vukovic, MD

Instructor, Department of Medicine, Evanston Hospital, Evanston, IL, USA

James Wall, MD

Resident, Department of Surgery, University of California, San Francisco, San Francisco, CA, USA

Russell Wall, MD

Director, Resident Education, Department of Anesthesia, Georgetown University, Washington, DC, USA

Olivia Walton, PA-C

Physicians Assistant, Department of Anesthesiology, University of Utah, Huntsman Cancer Institute, Salt Lake City, UT, USA

John C.L. Wang, MD, PhD

Professor, Departments of Clinical Medicine and Surgery, Weill Cornell Medical College; Vice President for Out-Patient Services; Director, Jack J. Dreyfus Clinic of Rogosin Kidney Center; Director, Adoptive Immunotherapy Program; Director, Nephrology; Co-Director, Renal Consultation Service, The Rogosin Institute, New York, NY, USA

Ronald J. Weigel, MD, PhD

Professor and Head, Department of Surgery, University of Iowa Roy J. and Lucille A. Carver College of Medicine and University of Iowa Hospitals and Clinics, Iowa City, IA, USA

Sharon M. Weinstein, MD

Associate Professor, Department of Anesthesiology, University of Utah, Huntsman Cancer Institute, Salt Lake City, UT, USA

Mark L. Welton, MD

Associate Professor, Department of Surgery, Stanford University Medical Center, Stanford, CA, USA

Michael A. West, MD, PhD

Professor, Department of Surgery, Trauma/Critical Care, Northwestern University, Feinberg School of Medicine, Chicago, IL, USA

Brad A. Winterstein, MD

Assistant Professor, Department of Surgery, University of Nebraska Medical Center and the Methodist Hospital, Omaha, NE, USA

Susannah S. Wise, MD

Instructor, Department of Surgery, University of Medicine and Dentistry of New Jersey, Robert Wood Johnson Medical School, New Brunswick, NJ, USA

Russell K. Woo, MD

General Surgery Resident, Department of Surgery, Stanford University Medical Center, Stanford, CA, USA

Amy D. Wyrzykowski, MD

Assistant Professor, Department of Surgery, Emory University School of Medicine, Grady Memorial Hospital, Atlanta, GA, USA

Marineh Yagubian, MD

Resident, Department of Surgery, Mayo Clinic, Rochester, MN, USA

Timothy J. Yeatman, MD

Associate Center Director, Department of Clinical Investigations; Professor, Department of Interdisciplinary Oncology, H. Lee Moffitt Cancer Center and Research Institute, Tampa, FL, USA

Roger W. Yurt, MD

Johnson and Johnson Distinguished Professor and Vice Chairman, Department of Surgery; Director, William Randolph Hearst Burn Center, Weill Cornell Medical College, New York-Presbyterian Hospital, New York, NY, USA

Evidence-Based Tables



All evidence-based tables are indicated in the text by an

TABLE 6.1.	Perioperative and Early Feeding Studies with Substantial Number of Well-Nourished or Moderately Malnourished Patients.	114
TABLE 6.2.	Enteral Versus Parenteral or Delayed Feeding in Trauma Patients	115
TABLE 6.3.	Enteral Versus Parenteral or Other Therapy in General Surgical Patients	116
TABLE 6.4.	Immune-Enhancing Diets Versus Standard Diet	119
TABLE 6.5.	Carbohydrate Versus Lipid as Primary Nonprotein Calorie Source	121
TABLE 8.1.	Summary of Randomized Controlled Trials on the Efficacy and Safety of Low Molecular Weight Heparin in the Prevention of Postoperative Venous Thromboembolism in Patients Undergoing General Surgery, Major Orthopedic Surgery (Total Hip Replacement and Total Knee Replacement), and Trauma Surgery (Level I Evidence)	152
TABLE 9.5.	Indications for Cryoprecipitate.	170
TABLE 9.6.	Results of Epidemiological Studies on Anemia and Blood Transfusion in Critical Care	172
TABLE 12.2.	Recent Prospective Trials of Antibiotic Therapy for Complicated Skin and Skin Structure Infections.	241
TABLE 12.4.	Recent Prospective Trials of Antibiotic Therapy for Complicated Skin and Skin Structure Infections of the Foot in Patients with Diabetes Mellitus	243
TABLE 12.11.	Systemic Antimicrobial Prophylaxis in Colorectal Surgery: Systematic Review of Randomized Controlled Trials.	247
TABLE 12.13.	Antibiotic Prophylaxis for Reduction of Surgical Site Infection Following Clean Surgery: Two Meta-Analyses.	248
TABLE 12.14.	Meta-Analysis of Measures to Prevent Infection Following Arterial Reconstruction.	248
TABLE 13.1.	Bacteria Isolated from Clinical Intraabdominal Infection (% of Patients in Whom a Particular Organism Was Recovered)	260
TABLE 13.3.	Adjunctive (Nonantibiotic) Measures to Prevent Infection.	262
TABLE 13.4.	Use of Perioperative Antibiotic Prophylaxis.	264
TABLE 13.5.	Open Appendectomy (OA) Versus Laparoscopic Appendectomy (LA) for Acute Appendicitis	265
TABLE 13.6.	Single-Stage Versus Two-Stage Operation for Complicated Acute Diverticulitis	266
TABLE 13.7.	Antibiotics for Abdominal Trauma	268
TABLE 17.4.	Guidelines to Perioperative Cardiovascular Evaluation of Noncardiac Surgery	330

TABLE 17.5.	Evidence-Based Pulmonary Risk Stratification for Noncardiothoracic Surgery	331
TABLE 17.6.	Evidence-Based Strategies to Reduce Pulmonary Risk for Noncardiothoracic Surgery	332
TABLE 17.9.	Summary of Evidence-Based Guidelines for Prevention of Venous Thromboembolic Disease in Surgical Patients from Fifth American College of Chest Physicians Consensus Conference on Antithrombotic Therapy, 1998	333
TABLE 17.13.	Summary of Evidence-Based Guidelines for Red Blood Cell Transfusions for Acute Blood Loss	338
TABLE 17.14.	Summary of Evidence-Based Guidelines for Red Blood Cell and Plasma Transfusions.	338
TABLE 17.17.	Evidence-Based Practice Management Guideline for the Evaluation of Fever in Critically Ill Adult Patients	344
TABLE 17.18.	Summary of Evidence-Based Clinical Guidelines for the Prevention of Nosocomial Bacterial Pneumonia	346
TABLE 19.2.	Preoperative Versus Postoperative Analgesia	384
TABLE 19.3.	Local Infusion Pump Versus Systemic Opioids	386
TABLE 19.4.	Minimally Invasive Surgery Versus Open Surgery	387
TABLE 19.7.	Epidural Versus Intravenous Opioid Postoperative Analgesia	389
TABLE 22.5.	Evidence for Utility of Pulmonary Artery Catheter in Perioperative Patients.	417
TABLE 22.6.	Evidence for Utility of Pulmonary Artery Catheter in Monitoring Critically Ill Patients	418
TABLE 25.2.	Management of Inhalation Injury	450
TABLE 25.4.	Burn Shock Resuscitation.	451
TABLE 25.7.	Reports on Mortality in Patients with Thermal Injury in the Past Decade	456
TABLE 27.1.	Representative Clinical Experience with CT Scan for the Diagnosis of Penetrating Torso Trauma	474
TABLE 27.2.	Representative Clinical Experience with CT Scan for the Diagnosis of Blunt Chest Trauma	478
TABLE 27.3.	Representative Clinical Experience with CT Scan for the Diagnosis of Blunt Abdominal Trauma	480
TABLE 27.4.	Representative Clinical Experience with Ultrasound for the Diagnosis of Torso Trauma	482
TABLE 27.5.	Representative Clinical Experience with Nonoperative Management of Blunt Hepatic Injuries.	487
TABLE 27.6.	Representative Clinical Experience with Nonoperative Management of Blunt Splenic Injuries	490
TABLE 28.2.	Therapeutic Angiographic Embolization.	509
TABLE 28.4.	Prospective Evaluation of the Effect of a Damage Control Approach Versus Early Intramedullary Nailing	512
TABLE 28.5.	Plate Fixation to Reamed Intramedullary Nailing in Chest Injury	514
TABLE 28.6.	Early Fracture Stabilization and Worse Neurological Outcomes	515
TABLE 28.7.	Early Fixation of Fractures in the Brain-Injured Patient with Good Outcomes	516