

Mc
Graw
Hill
Education

成人心脏外科学

CARDIAC SURGERY IN THE ADULT

主 编 Laurence H. Cohn, MD

主 译 郑 哲

主 审 胡盛寿

— 第 4 版 —



人民卫生出版社
PEOPLE'S MEDICAL PUBLISHING HOUSE

成人心脏外科学

CARDIAC SURGERY IN THE ADULT

第4版

人民卫生出版社

图书在版编目(CIP)数据

成人心脏外科学/(美)柯恩(Cohn, L.H.)主编;郑哲译.
—北京:人民卫生出版社,2016
ISBN 978-7-117-21887-0

I. ①成… II. ①柯…②郑… III. ①心脏外科学
IV. ①R654

中国版本图书馆CIP数据核字(2015)第310435号

人卫社官网	www.pmph.com	出版物查询, 在线购书
人卫医学网	www.ipmph.com	医学考试辅导, 医学数据库服务, 医学教育资源, 大众健康资讯

版权所有, 侵权必究!

图字:01-2012-5165

成人心脏外科学

主 译: 郑 哲

出版发行: 人民卫生出版社(中继线 010-59780011)

地 址: 北京市朝阳区潘家园南里19号

邮 编: 100021

E-mail: pmph@pmph.com

购书热线: 010-59787592 010-59787584 010-65264830

印 刷: 北京人卫印刷厂

经 销: 新华书店

开 本: 889×1194 1/16 印张: 74

字 数: 3325千字

版 次: 2016年4月第1版 2016年4月第1版第1次印刷

标准书号: ISBN 978-7-117-21887-0/R·21888

定 价: 498.00元

打击盗版举报电话: 010-59787491 E-mail: WQ@pmph.com

(凡属印装质量问题请与本社市场营销中心联系退换)

Lawrence H. Cohn
Cardiac Surgery in the Adult, 4e
0-07-163312-X

Copyright © 2012 by McGraw-Hill Education.

All Rights reserved. No part of this publication may be reproduced or transmitted in any form or by any means, electronic or mechanical, including without limitation photocopying, recording, taping, or any database, information or retrieval system, without the prior written permission of the publisher.

This authorized Chinese translation edition is jointly published by McGraw-Hill Education and People's Medical Publishing House. This edition is authorized for sale in the People's Republic of China only, excluding Hong Kong, Macao SAR and Taiwan.

Copyright © 2015 by McGraw-Hill Education and People's Medical Publishing House.

版权所有。未经出版人事先书面许可，对本出版物的任何部分不得以任何方式或途径复制或传播，包括但不限于复印、录制、录音或通过任何数据库、信息或可检索的系统。

本授权中文简体字翻译版由麦格劳-希尔（亚洲）教育出版公司和人民卫生出版社合作出版。此版本经授权仅限在中华人民共和国境内（不包括香港特别行政区、澳门特别行政区和台湾）销售。

版权© 2015 由麦格劳-希尔（亚洲）教育出版公司与人民卫生出版社所有。

本书封面贴有 McGraw-Hill Education 公司防伪标签，无标签者不得销售。

敬告

本书的作者、译者及出版者已尽力使书中的知识符合出版当时国内普遍接受的标准。但医学在不断地发展，随着科学研究的不断探索，各种诊断分析程序和临床治疗方案以及药物使用方法都在不断更新。强烈建议读者在使用本书涉及的诊疗仪器或药物时，认真研读使用说明，尤其对于新的产品更应如此。出版者拒绝对因参照本书任何内容而直接或间接导致的事故与损失负责。

需要特别声明的是，本书中提及的一些产品名称（包括注册的专利产品）仅仅是叙述的需要，并不代表作者推荐或倾向于使用这些产品；而对于那些未提及的产品，也仅仅是因为限于篇幅不能一一列举。

本着忠实于原著的精神，译者在翻译时尽量不对原著内容做删节。然而由于著者所在国与我国的国情不同，因此一些问题的处理原则与方法，尤其是涉及宗教信仰、民族政策、伦理道德或法律法规时，仅供读者了解，不能作为法律依据。读者在遇到实际问题时应根据国内相关法律法规和医疗标准进行适当处理。

成人心脏外科学

CARDIAC SURGERY IN THE ADULT

第4版

主 编 Laurence H. Cohn, MD

主 译 郑 哲

主 审 胡盛寿

副主译 吉冰洋 王古岩 王 欣 凤 玮 杨克明

孙晓刚 张士举

译 者 (按姓氏笔画排序)

王 维 王 德 王越夫 尹朝华 孔 博

田 川 史 艺 朱 贤 刘文超 刘重洋

闫 鹏 许政曦 孙 骋 孙燕华 芮 璐

严 华 苏文君 杜俊喆 李 方 李 琦

李汉美 杨立猛 杨丽静 张 岩 张 恒

张昌伟 陆海松 林 野 林 深 金 蕾

周 纯 周 荟 周伯颐 赵振华 段福建

侯剑峰 饶辰飞 姜 睿 贾 爱 顾大川

徐 飞 徐 晋 高 伟 高 爽 崔勇丽

富 强 解衍博 廖中凯 樊红光

人民卫生出版社

编者名录

Michael A. Acker, MD

Professor, Department of Surgery, University of Pennsylvania School of Medicine, Philadelphia, Pennsylvania
Ischemic Mitral Regurgitation

Arvind K. Agnihotri, MD

Assistant Professor, Department of Surgery, Harvard Medical School, Boston, Massachusetts
Surgical Treatment of Complications of Acute Myocardial Infarction

Cary W. Akins, MD

Clinical Professor of Surgery, Department of Surgery, Harvard Medical School, Boston, Massachusetts
Myocardial Revascularization with Carotid Artery Disease

Jeremiah G. Allen, MD

Resident, Department of Surgery, Johns Hopkins Hospital, Baltimore, Maryland
Heart Transplantation

Robert H. Anderson, MD

Professor Emeritus, Institute of Child Health, University College, London, United Kingdom
Surgical Anatomy of the Heart

Mark P. Anstadt, MD

Associate Professor, Department of Surgery, Wright State University, Dayton, Ohio
Cardiopulmonary Resuscitation

Sary Aranki, MD

Associate Professor of Surgery, Harvard Medical School, Boston, Massachusetts
Mitral Valve Replacement

Pavan Atluri, MD

Assistant Professor of Surgery, Division of Cardiovascular Surgery, Department of Surgery, University of Pennsylvania, Philadelphia, Pennsylvania
Ischemic Mitral Regurgitation

Frank A. Baciewicz, Jr., MD

Professor of Cardiothoracic Surgery, Wayne State University, Detroit, Michigan
History of Cardiac Surgery

William A. Baumgartner, MD

Vincent L. Gott Professor, Division of Cardiac Surgery, Johns Hopkins Hospital, Baltimore, Maryland
Heart Transplantation

Joseph E. Bavaria, MD

Professor of Surgery, Department of Surgery, Hospital of the University of Pennsylvania, Philadelphia, Pennsylvania
Ascending Aortic Aneurysms

Shanda H. Blackmon, MD, MPH

Assistant Professor, Department of Surgery, Weill Cornell Medical College, Houston, Texas
Cardiac Neoplasms

Steven F. Bolling, MD

Professor of Cardiac Surgery, University of Michigan, Ann Arbor, Michigan
Nontransplant Surgical Options for Heart Failure

John Bozinovski, MD

Attending Cardiac Surgeon, Royal Jubilee Hospital, Victoria, BC, Canada
Extent II Thoracoabdominal Aortic Aneurysm Repair (DVD)

R. Morton Bolman, III, MD

Professor of Surgery, Harvard Medical School, Brigham and Women's Hospital, Boston, Massachusetts
Deep Hypothermic Circulatory Arrest

Morgan L. Brown, MD, PhD

Chief Resident, Department of Anesthesiology and Pain Medicine, University of Alberta, Edmonton, Alberta, Canada
Indications for Revascularization

Redmond P. Burke, MD

Professor of Pediatric Cardiac Surgery, Florida International University, Miami, Florida
Surgery for Adult Congenital Heart Disease

John G. Byrne, MD

William S. Stoney Professor of Cardiac Surgery, Vanderbilt Medical Center, Nashville, Tennessee
Reoperative Valve Surgery

Richard P. Cambria, MD

Professor of Surgery, Harvard Medical School, Boston, Massachusetts
Myocardial Revascularization with Carotid Artery Disease

Frederick Y. Chen, MD, PhD

Associate Professor of Surgery, Brigham and Women's Hospital, Harvard Medical School, Boston, Massachusetts
Computed Tomography of the Adult Cardiac Surgery Patient: Principles and Applications; Mitral Valve Repair

Albert T. Cheung, MD

Department of Anesthesiology and Critical Care, Hospital of the University of Pennsylvania, Philadelphia, Pennsylvania
Cardiac Anesthesia

W. Randolph Chitwood, Jr., MD, FRCS (Eng)

Professor of Cardiovascular Sciences, East Carolina University, Greenville, North Carolina
Minimally Invasive and Robotic Mitral Valve Surgery

George T. Christakis, MD, FRCS(C)

Professor of Surgery, University of Toronto, Toronto, Ontario, Canada
Bioprosthetic Aortic Valve Replacement: Stented Pericardial and Porcine Valves

6 编者名录

Lawrence H. Cohn, MD

Virginia and James Hubbard Professor of Cardiac Surgery, Division of Cardiac Surgery, Harvard Medical School, Brigham and Women's Hospital, Boston, Massachusetts

Surgical Anatomy of the Heart; Minimally Invasive Aortic Valve Surgery; Mitral Valve Repair

William E. Cohn, MD

Associate Professor of Surgery, Transplant & Assist Devices Cardiothoracic Surgery, Baylor College of Medicine, Houston, Texas

Total Artificial Heart

John V. Conte, MD

Professor, Cardiac Surgery, Johns Hopkins University, Baltimore, Maryland

Heart Transplantation

Joseph S. Coselli, MD

Professor and Cullen Foundation Endowed Chair, Division of Cardiothoracic Surgery, Michael E. DeBakey Department of Surgery, Baylor College of Medicine, Houston, Texas

Descending and Thoracoabdominal Aortic Aneurysms

John M. Craig, MD

Chief Resident, Division of Cardiac Surgery, Massachusetts General Hospital, Boston, Massachusetts

Pericardial Disease

Willard M. Daggett, Jr., MD

Professor of Surgery Emeritus, Department of Surgery, Harvard Medical School, Boston, Massachusetts

Surgical Treatment of Complications of Acute Myocardial Infarction

Ralph J. Damiano, Jr., MD

Professor of Surgery, Department of Surgery, Washington University School of Medicine, St. Louis, Missouri

Surgery for Atrial Fibrillation

Tirone E. David, MD

Professor of Surgery, University of Toronto, Toronto, Ontario, Canada

Aortic Valve Repair and Aortic Valve-Sparing Operations; Surgical Treatment of Aortic Valve Endocarditis

William J. DeBois, MBA, CCP

Director, Cardiothoracic Surgery-Perioperative Services, Weill Cornell Medical College, New York, New York

Transfusion Therapy and Blood Conservation

Nimesh D. Desai, MD, PhD

Assistant Professor of Surgery, Department of Surgery, Hospital of the University of Pennsylvania, Philadelphia, Pennsylvania

Ascending Aortic Aneurysms

Verdi J. DiSesa, MD, MBA

Professor of Surgery, Temple University School of Medicine, Philadelphia, Pennsylvania

Valvular and Ischemic Heart Disease

Robert E. Eckart, DO

Director, Cardiac Arrhythmia Service, Department of Medicine, San Antonio Military Medical Center, San Antonio, Texas

Interventional Therapy for Atrial and Ventricular Arrhythmias

Fred H. Edwards, MD

Professor of Surgery, University of Florida, Jacksonville, Florida

Assessment of Cardiac Operations to Improve Performance

Samuel Edwards, MD

Clinical Fellow in Medicine, Beth Israel Deaconess Medical Center, Boston, Massachusetts

Pathophysiology of Aortic Valve Disease

Andrew W. El Bardissi, MD, MPH

Clinical Fellow of Surgery, Department of Surgery, Harvard Medical School, Brigham and Women's Hospital, Boston, Massachusetts

Deep Hypothermic Circulatory Arrest

Ann M. Emery, RN

Minneapolis, Minnesota

Aortic Valve Replacement with a Mechanical Cardiac Valve Prosthesis

Robert W. Emery, MD

Medical Director, Cardiovascular Surgery, St. Joseph's Hospital, St. Paul, Minnesota

Aortic Valve Replacement with a Mechanical Cardiac Valve Prosthesis

Maurice Enriquez-Sarano, MD

Professor, Mayo Clinic College of Medicine, Rochester, Minnesota

Principle and Practice of Echocardiography in Cardiac Surgery

Laurence M. Epstein, MD

Chief, Arrhythmia Service, Associate Professor of Medicine, Brigham and Women's Hospital, Harvard Medical School, Boston, Massachusetts

Interventional Therapy for Atrial and Ventricular Arrhythmias

Volkmar Falk, MD, PhD

Professor of Medicine Cardiovascular Surgery, University Hospital, Zurich, Switzerland

Minimally Invasive Myocardial Revascularization

James I. Fann, MD

Associate Professor of Cardiothoracic Surgery, Stanford University, Stanford, California

Pathophysiology of Mitral Valve Disease

Robert Saeid Farivar, MD, PhD

Assistant Professor, Cardiothoracic Surgery, University of Iowa, Iowa City, Iowa

Cardiac Surgical Physiology

Victor A. Ferraris, MD, PhD

Tyler Gill Professor of Surgery, Department of Surgery, University of Kentucky, Lexington, Kentucky

Assessment of Cardiac Operations to Improve Performance

O. Howard Frazier, MD

Professor of Surgery, Baylor College of Medicine and University of Texas Health Science Center, Houston, Texas

Total Artificial Heart

Robert P. Gallegos, MD, PhD

Cardiac Surgeon, Department of Cardiac Surgery, Brigham and Women's Hospital, Boston, Massachusetts

Mitral Valve Replacement

Isaac George, MD

Instructor in Surgery, Division of Cardiothoracic Surgery, Columbia University College of Physicians and Surgeons, New York Presbyterian Hospital, Columbia University Medical Center, New York, New York

Myocardial Revascularization after Acute Myocardial Infarction

A. Marc Gillinov, MD

Staff Cardiac Surgeon, Thoracic and Cardiovascular Surgery,
Cleveland Clinic, Cleveland, Ohio
*Pathophysiology of Aortic Valve Disease; Surgical Treatment of Mitral
Valve Endocarditis*

Donald D. Glower, MD

Professor of Surgery, Duke University Medical Center, Durham,
North Carolina
Left Ventricular Aneurysm

G. V. Gonzalez-Stawinski, MD

Department of Thoracic and Cardiovascular Surgery, Cleveland
Clinic, Cleveland, Ohio
Coronary Artery Reoperations

Joseph H. Gorman, III, MD

Professor of Surgery, University of Pennsylvania, Philadelphia,
Pennsylvania
Ischemic Mitral Regurgitation

Robert C. Gorman, MD

Professor of Surgery, University of Pennsylvania, Philadelphia,
Pennsylvania
Ischemic Mitral Regurgitation

Danielle Gottlieb, MD

Tissue Engineering for Cardiac Valve Surgery

Roberta A. Gottlieb, MD

Professor and Frederick G. Henry Chair in the Life Sciences, Biology
Department, San Diego State University, San Diego, California
Myocardial Protection

Kevin L. Greason, MD

Assistant Professor, Division of Cardiovascular Surgery, Mayo Clinic,
Rochester, Minnesota
Myocardial Revascularization with Cardiopulmonary Bypass

James P. Greelish, MD

Assistant Professor of Cardiac Surgery, Vanderbilt University,
Nashville, Tennessee
Reoperative Valve Surgery

Igor D. Gregoric, MD

Associate Chief, Transplant Services; Director, Mechanical
Circulatory Support; Clinical Associate Professor of Surgery;
Department of Cardiothoracic and Vascular Surgery, Texas Heart
Institute at St. Luke's Episcopal Hospital; The University of
Texas Health and Science Center Houston and The University of
MD Anderson Cancer Center, Houston, Texas
Total Artificial Heart

Randall B. Griep, MD

Professor and Chairman Emeritus, Department of Cardiothoracic
Surgery, Mount Sinai School of Medicine, New York, New York
Aneurysms of the Aortic Arch

Bartley P. Griffith, MD

Professor of Cardiac Surgery, University of Maryland, Baltimore,
Maryland
Immunobiology of Heart and Heart-Lung Transplantation

Gary L. Grunkemeier, MD

Director, Medical Data Research Center, Providence Health &
Services, Portland, Oregon
Statistical Treatment of Surgical Outcome Data

Tomas Gudbjartsson, MD, PhD

Professor of Surgery, Landspítali University Hospital, Department
of Cardiothoracic Surgery, Faculty of Medicine, University of
Iceland, Reykjavik, Iceland
Mitral Valve Replacement

Michael E. Halkos, MD

Assistant Professor of Cardiothoracic Surgery, Emory University
School of Medicine, Atlanta, Georgia
Myocardial Revascularization without Cardiopulmonary Bypass

John W. Hammon, MD

Professor Emeritus of Surgery, Department of Cardiothoracic
Surgery, Wake Forest University School of Medicine, Winston-
Salem, North Carolina
Extracorporeal Circulation

Michael H. Hines, MD

Professor of Pediatric Surgery, Division of Cardiovascular Surgery,
University of Texas Medical School at Houston, Houston,
Texas
Extracorporeal Circulation

David M. Holzhey, MD

Consultant, Cardiac Surgery, University of Leipzig, Leipzig,
Germany
Minimally Invasive Myocardial Revascularization

Jan Hommerding, RN, CNP

Heart Care Intervention NP, Heart Care, St. Joseph's Hospital,
St. Paul, Minnesota
Aortic Valve Replacement with a Mechanical Cardiac Valve Prosthesis

Keith A. Horvath, MD

Director, Cardiothoracic Surgery Research Program, Chief,
Cardiothoracic Surgery, National Heart, Lung and Blood
Institute, National Institutes of Health, Bethesda, Maryland
*Transmyocardial Laser Revascularization and Extravascular
Angiogenic Techniques to Increase Myocardial Blood Flow*

Lynn C. Huffman, MD

Thoracic Resident, Cardiac Surgery, University of Michigan, Ann
Arbor, Michigan
Nontransplant Surgical Options for Heart Failure

Joseph Huh, MD

Associate Professor of Cardiothoracic Surgery, Baylor College of
Medicine, Houston, Texas
Descending and Thoracoabdominal Aortic Aneurysms

John S. Ikonomidis, MD, PhD, FRCS(C)

Horace G. Smithy Professor and Chief, Division of Cardiothoracic
Surgery, Medical University of South Carolina, Charleston,
South Carolina
Trauma to the Great Vessels

Neil B. Ingels, Jr., PhD

Consulting Professor, Cardiothoracic Surgery, Stanford University
Medical Center, Stanford, California
Pathophysiology of Mitral Valve Disease

O. Wayne Isom, MD

The Terry Allen Kramer Professor, Cardiothoracic Surgery, New York
Presbyterian-Weill Cornell Medical Center, New York,
New York
Transfusion Therapy and Blood Conservation

8 编者名录

M. Salik Jahania, MD

Associate Professor of Surgery, Department of Surgery, Wayne State University School of Medicine, Detroit, Michigan
Myocardial Protection

Stuart W. Jamieson MD, FRCS

Endowed Chair and Distinguished Professor, Chief of Cardiovascular and Thoracic Surgery, Cardiovascular and Thoracic Surgery, University of California, San Diego, San Diego, California
Pulmonary Embolism and Pulmonary Thromboendarterectomy

Craig M. Jarrett, MD

Clinical Fellow in Surgery, Department of Surgery, Massachusetts General Hospital, Boston, Massachusetts
Pathophysiology of Aortic Valve Disease

Ruyun Jin, MD, MCR

Biostatistician, Medical Data Research Center, Providence Health & Services, Portland, Oregon
Statistical Treatment of Surgical Outcome Data

David L. Joyce, MD

Chief Resident, Cardiothoracic Surgery, Stanford University, Palo Alto, California
Lung Transplantation and Heart-Lung Transplantation

Zain I. Khalpey, MD, PhD, MRCS(Eng)

Cardiothoracic Surgery Fellow, Cardiac Surgery, Brigham and Women's Hospital, Harvard Medical School, Boston, Massachusetts
Postoperative Care of Cardiac Surgery Patients

Edward H. Kincaid, MD

Associate Professor of Cardiothoracic Surgery, Wake Forest University School of Medicine, Winston Salem, North Carolina
Aortic Valve Replacement with a Stentless Bioprosthetic Valve: Porcine or Pericardial

Neal D. Kon, MD

Howard Holt Bradshaw Professor and Chair, Cardiothoracic Surgery, Wake Forest School of Medicine, Winston-Salem, North Carolina
Aortic Valve Replacement with a Stentless Bioprosthetic Valve: Porcine or Pericardial

Karl H. Krieger, MD

Professor and Vice Chairman Philip Geier Professor of Cardiothoracic Surgery, CT Surgery, New York Presbyterian Hospital Cornell, New York, New York
Transfusion Therapy and Blood Conservation

Irving L. Kron, MD

S. Hurt Watts Professor and Chairman, Department of Surgery, University of Virginia Health System, Charlottesville, Virginia
Aortic Dissection

Jeremy D. Kukafka, MD

Assistant Professor, Anesthesiology and Critical Care, University of Pennsylvania School of Medicine, Philadelphia, Pennsylvania
Cardiac Anesthesia

Kanako K. Kumamaru, MD

Research Fellow, Radiology, Brigham and Women's Hospital, Boston, Massachusetts
Computed Tomography of the Adult Cardiac Surgery Patient: Principles and Applications

Leonard Y. Lee, MD

Associate Professor of Clinical Cardiothoracic Surgery, Department of Cardiothoracic Surgery, Weill Cornell Medical College of Cornell University, New York, New York
Transfusion Therapy and Blood Conservation

Eric J. Lehr, MD, PhD

Co-Director of Minimally Invasive and Robotic Cardiac Surgery, Director of Cardiac Surgery Research and Education, Swedish Medical Center, Seattle, Washington
Minimally Invasive and Robotic Mitral Valve Surgery

Scott A. LeMaire, MD

Professor and Director of Research, Division of Cardiothoracic Surgery, Michael E. DeBakey Department of Surgery, Baylor College of Medicine; Texas Heart Institute at St. Luke's Episcopal Hospital, Houston, Texas
Descending and Thoracoabdominal Aortic Aneurysms

Jerrold H. Levy, MD

Professor of Anesthesiology, Deputy Chair for Research, Co-Director Cardiothoracic Anesthesiology, Cardiothoracic Anesthesiology and Critical Care, Emory University School of Medicine, Atlanta, Georgia
Cardiac Surgical Pharmacology

James E. Lowe, MD

Professor of Surgery, Division of Cardiovascular and Thoracic Surgery, Duke University School of Medicine, Durham, North Carolina
Cardiopulmonary Resuscitation; Left Ventricular Aneurysm

Bruce W. Lytle, MD

Professor of Surgery, Department of Thoracic and Cardiovascular Surgery, Heart and Vascular Institute, Cleveland Clinic, Cleveland, Ohio
Coronary Artery Reoperations

Michael J. Mack, MD

Medical Director, Cardiovascular Surgery, Baylor Health Care System, Dallas, Texas
Percutaneous Catheter-Based Mitral Valve Repair

Michael M. Madani, MD

Professor of Cardiovascular and Thoracic Surgery, University of California-San Diego, San Diego, California
Pulmonary Embolism and Pulmonary Thromboendarterectomy

Joren C. Madsen, MD, DPhil

Professor of Surgery, Massachusetts General Hospital, Boston, Massachusetts
Surgical Treatment of Complications of Acute Myocardial Infarction

Hari R. Mallidi, MD

Assistant Professor, Department of Cardiothoracic Surgery, Stanford University, Stanford, California
Lung Transplantation and Heart-Lung Transplantation

Manu N. Mathur, MD

Consultant, Cardiothoracic Surgeon, Cardiothoracic Surgery, Royal North Shore Hospital, Sydney, Australia
Aneurysms of the Aortic Arch

John E. Mayer, Jr., MD

Professor of Surgery, Harvard Medical School, Boston, Massachusetts
Tissue Engineering for Cardiac Valve Surgery

Edwin C. McGee, Jr., MD

Associate Professor of Surgery, Northwestern University's Feinberg School of Medicine, Chicago, Illinois
Temporary Mechanical Circulatory Support

Spencer J. Melby, MD

Assistant Professor, Division of Cardiothoracic Surgery, University of Alabama at Birmingham, Birmingham, Alabama
Surgery for Atrial Fibrillation

Philippe Menasché, MD, PhD

Assistance Publique-Hôpitaux de Paris, Hôpital Européen Georges Pompidou, Department of Cardiovascular Surgery, Université Paris Descartes, Paris, France
Stem Cell-Induced Regeneration of Myocardium

Robert M. Mentzer, Jr., MD

Professor, Cardiothoracic Surgery and Physiology, Wayne State University School of Medicine, Detroit, Michigan
Myocardial Protection

Carlos M. Mery, MD, MPH

Cardiothoracic Surgery Fellow, Division of Thoracic and Cardiovascular Surgery, University of Virginia, Charlottesville, Virginia
Aortic Dissection

Hector I. Michelena, MD

Assistant Professor, Division of Cardiovascular Diseases, Mayo Clinic, Rochester, Minnesota
Echocardiography in Cardiac Surgery

Tomislav Mihaljevic, MD

Chief of Staff, Chair of Heart and Vascular Institute, Cleveland Clinic Abu Dhabi, United Arab Emirates
Pathophysiology of Aortic Valve Disease

Michael R. Mill, MD

Professor and Chief, Cardiothoracic Surgery, University of North Carolina at Chapel Hill, Chapel Hill, North Carolina
Surgical Anatomy of the Heart

D. Craig Miller, MD

Thelma and Henry Doelger Professor, Cardiovascular Surgery, Stanford University Medical Center, Stanford, California
Pathophysiology of Mitral Valve Disease

R. Scott Mitchell, MD

Professor, Cardiothoracic Surgery, Stanford University School of Medicine, Stanford, California
Endovascular Therapy for the Treatment of Thoracic Aortic Disease

Nader Moazami, MD

Attending Surgeon, Cardiothoracic Surgery, Minneapolis Heart Institute, Minneapolis, Minnesota
Temporary Mechanical Circulatory Support

Susan D. Moffatt-Bruce, MD, PhD

Associate Professor, Surgery, Ohio State University, Columbus, Ohio
Endovascular Therapy for the Treatment of Thoracic Aortic Disease

Friedrich W. Mohr, MD, PhD

Professor and Chief of the Department of Cardiac Surgery and Medical Director of the Heart Center Leipzig, Department of Cardiac Surgery, Heart Center Leipzig, University of Leipzig, Leipzig, Germany
Minimally Invasive Myocardial Revascularization

Yoshifumi Naka, MD, PhD

Associate Professor of Surgery, Columbia University College of Physicians and Surgeons, New York, New York
Long-term Mechanical Circulatory Support

Vuyisile T. Nkomo, MD, MPH

Assistant Professor, Cardiovascular Diseases and Internal Medicine, Mayo Clinic, Rochester, Minnesota
Echocardiography in Cardiac Surgery

Robert A. Oakes, MD

Resident, Department of Surgery, Division of Cardiac Surgery, Brigham and Women's Hospital, Boston, Massachusetts
Deep Hypothermic Circulatory Arrest

Patrick T. O'Gara, MD

Professor, Medicine, Harvard Medical School, Boston, Massachusetts
Preoperative Evaluation for Cardiac Surgery

Robert F. Padera, Jr. MD, PhD

Assistant Professor, Pathology, Harvard Medical School, Boston, Massachusetts
Cardiovascular Pathology

Steven M. Parnis, BS

Assistant Director, Center for Cardiac Support, Cardiovascular Surgery Research, Texas Heart Institute, Houston, Texas
Total Artificial Heart

Gosta B. Pettersson, MD, PhD

Vice Chair, Department of Thoracic and Cardiovascular Surgery, Cleveland Clinic, Cleveland, Ohio
Surgical Treatment of Mitral Valve Endocarditis

Karin Przyklenk, PhD

Director and Professor, Cardiovascular Research Institute, Wayne State University School of Medicine, Detroit, Michigan
Myocardial Protection

John D. Puskas, MD

Chief Cardiac Surgery, Associate Chief Cardiothoracic Surgery, Cardiothoracic Surgery Emory University Midtown, Atlanta, Georgia
Myocardial Revascularization without Cardiopulmonary Bypass

Goya Raikar, MD

Medical Director Oklahoma Heart Hospital, Cardiovascular Surgery, Oklahoma Heart Physicians, Oklahoma City, Oklahoma
Aortic Valve Replacement with a Mechanical Cardiac Valve Prosthesis

James G. Ramsay, MD

Professor, Chief of Service, Anesthesiology/Critical Care, Emory University, Atlanta, Georgia
Cardiac Surgical Pharmacology

Ardawan J Rastan, MD, PhD

Associate Professor, Department of Cardiac Surgery, University of Leipzig, Leipzig, Germany
Minimally Invasive Myocardial Revascularization

James D. Rawn, MD

Director, Cardiac Surgery Intensive Care Unit, Brigham and Women's Hospital, Boston, Massachusetts
Postoperative Care of Cardiac Surgery Patients

10 编者名录

Michael J. Reardon, MD

Professor, Cardiovascular Surgery, The Methodist Hospital,
Houston, Texas
Cardiac Neoplasms

T. Brett Reece, MD

Assistant Professor, Department of Surgery, Division of
Cardiothoracic Surgery, University of Colorado, Aurora,
Colorado
Aortic Dissection

Robert C. Robbins, MD

Professor, Cardiothoracic Surgery—Adult Cardiac Surgery, Chair,
Department of Cardiothoracic Surgery, Director, Stanford
Cardiovascular Institute, Stanford University School of Medicine,
Stanford, California
Lung Transplantation and Heart-Lung Transplantation

Evelio Rodriguez, MD

Associate Professor, Cardiovascular Sciences and Pediatrics, East
Carolina Heart Institute at East Carolina University, Greenville,
North Carolina
Minimally Invasive and Robotic Mitral Valve Surgery

Jean Marie Ruddy, MD

Resident, Department of General Surgery, Medical University of
South Carolina, Charleston, South Carolina
Trauma to the Great Vessels

Christian T. Ruff, MD, MPH

Instructor of Medicine, Associate Physician, Cardiovascular
Division, Department of Medicine, Harvard Medical
School and Brigham and Women's Hospital, Boston,
Massachusetts
Preoperative Evaluation for Cardiac Surgery

Frank J. Rybicki, MD, PhD

Director, Applied Imaging Science Lab and Associate Professor,
Department of Radiology, Brigham and Women's
Hospital and Harvard Medical School, Boston,
Massachusetts
*Computed Tomography of the Adult Cardiac Surgery Patient: Principles
and Applications*

Edward B. Savage, MD

Clinical Associate Professor of Surgery, Florida International
University, Miami, Florida
Cardiac Surgical Physiology

Joseph E. Savino, MD

Professor of Anesthesiology and Critical Care, Department of
Anesthesiology and Critical Care, University of Pennsylvania
School of Medicine, Philadelphia, Pennsylvania
Cardiac Anesthesia

Hartzell V. Schaff, MD

Stuart W. Harrington Professor of Surgery, Department of Surgery,
Mayo Clinic, Rochester, Minnesota
Multiple Valve Disease

Jan D. Schmitto, MD, PhD

Cardiothoracic Surgeon, Department of Cardiac, Thoracic,
Transplantation and Vascular Surgery, Hannover Medical School,
Hannover, Germany
Postoperative Care of Cardiac Surgery Patients

Frederick J. Schoen, MD, PhD

Professor of Pathology and Health Sciences and Technology, Harvard
Medical School, Executive Vice Chairman, Department of
Pathology, Brigham and Women's Hospital, Director, Cardiac
Pathology, Brigham and Women's Hospital, Boston, Massachusetts
Cardiovascular Pathology

Ashish S. Shah, MD

Assistant Professor of Surgery, Surgical Director, Lung
Transplantation, Johns Hopkins Cardiac Surgery, Baltimore,
Maryland
Heart Transplantation

David M. Shahian, MD

Professor of Surgery, Harvard Medical School, Boston, Massachusetts
Assessment of Cardiac Operations to Improve Performance

Ahmad Y. Sheikh, MD

Clinical Fellow, Cardiothoracic Surgery, Stanford University,
Stanford, California
Lung Transplantation and Heart-Lung Transplantation

Prem S. Shekar MD, FRCSE

Assistant Professor of Surgery, Harvard Medical School, Boston,
Massachusetts
Minimally Invasive Aortic Valve Surgery

Richard J. Shemin, MD

Robert and Kelly Day Chair of Cardiothoracic Surgery, Department
of Surgery, David Geffen School of Medicine at UCLA, Los
Angeles, California
Tricuspid Valve Disease

Tarang Sheth, MD, FRCPC

Director of Cardiac MR and CT, Diagnostic Imaging, Trillium
Health Centre, Mississauga, Ontario, Canada
*Computed Tomography of the Adult Cardiac Surgery Patient:
Principles and Applications*

David Spielvogel, MD

Professor, Department of Surgery, Division of Cardiothoracic
Surgery, New York Medical College, Valhalla, New York
Aneurysms of the Aortic Arch

Henry M. Spotnitz, MD

George H. Humphreys, II, Professor of Surgery, Department of
Surgery, Columbia University Medical Center, New York,
New York
Surgical Implantation of Pacemakers and Automatic Defibrillators

Sotiris C. Stamou, MD, PhD

Assistant Professor of Surgery, Thoracic and Cardiovascular Surgery,
Spectrum Health, Grand Rapids, Michigan
Surgical Treatment of Mitral Valve Endocarditis

Paul Stelzer, MD

Professor of Cardiothoracic Surgery, Mount Sinai Medical Center,
New York, New York
Stentless Aortic Valve Replacement: Autograft/Homograft

Larry W. Stephenson, MD

Ford Webber Professor of Surgery and Chief, Division of
Cardiothoracic Surgery, Wayne State University School of
Medicine, Specialist-in-Chief, Cardiothoracic Surgery, Detroit
Medical Center, Detroit, Michigan
History of Cardiac Surgery

Thoralf M. Sundt III, MD

Professor, Surgery, Harvard Medical School, Chief of Cardiac Surgery, Massachusetts General Hospital, Boston, Massachusetts
Indications for Revascularization; Myocardial Revascularization with Cardiopulmonary Bypass

Rakesh M. Suri, MD, DPhil

Associate Professor of Cardiovascular Surgery, Mayo Clinic, Rochester, Minnesota
Multiple Valve Disease

Lars G. Svensson, MD, PhD

Director Aorta Center; Marfan and CTD Clinic; Director Quality and Process, Improvement; Professor of Surgery, Department of Thoracic and Cardiovascular Surgery, Cleveland Clinic, Cleveland, Ohio
Percutaneous Treatment of Aortic Valve Disease

Hiroo Takayama, MD

Assistant Professor of Surgery, Columbia University, New York, New York
Long-term Mechanical Circulatory Support

Kenichi A. Tanaka, MD

Associate Professor, Department of Anesthesiology, Emory University, Atlanta, Georgia
Cardiac Surgical Pharmacology

Robin Varghese, MD

Instructor, Cardiothoracic Surgery, Mount Sinai Medical Center, New York, New York
Stentless Aortic Valve Replacement: Autograft/Homograft

William J. Vernick, MD

Assistant Professor, Department of Anesthesia and Critical Care, Hospital of the University of Pennsylvania, Philadelphia, Pennsylvania
Cardiac Anesthesia

Jennifer D. Walker, MD

Assistant Professor of Surgery, Surgery, Harvard Medical School, Boston, Massachusetts
Pericardial Disease

Scott A. Weldon, MA, CMI

Medical Illustration, Division of Cardiothoracic Surgery, Baylor College of Medicine, Houston, Texas
Extent II Thoracoabdominal Aortic Aneurysm Repair (DVD)

James T. Willerson, MD

President and Medical Director, Cardiology, Texas Heart Institute at St. Luke's Episcopal Hospital, Houston, Texas
Myocardial Revascularization with Percutaneous Devices

Mathew Williams, MD

Assistant Professor of Surgery and Medicine, Columbia University, New York, New York
Myocardial Revascularization after Acute Myocardial Infarction

James M. Wilson, MD

Director of Cardiology Education, Texas Heart Institute at St. Luke's Episcopal Hospital, Houston, Texas
Myocardial Revascularization with Percutaneous Devices

Berhane Worku, MD

Research Fellow, Cardiothoracic Surgery, Columbia University, New York, New York
Long-term Mechanical Circulatory Support

Bobby Yanagawa, MD, PhD

Division of Cardiac and Vascular Surgery, Schulich Heart Program, Sunnybrook Health Sciences Centre, Toronto, Ontario, Canada
Bioprosthetic Aortic Valve Replacement: Stented Pericardial and Porcine Valves

Yifu Zhou, MD

Staff Scientist, Cardiothoracic Surgery Research Program, National Heart, Lung and Blood Institute, National Institutes of Health, Bethesda, Maryland
Transmyocardial Laser Revascularization and Extravascular Angiogenetic Techniques to Increase Myocardial Blood Flow

中文版序

《成人心脏外科学》（第4版）汇集了心脏领域最前沿的学术成果和全世界知名心脏病专家最新的治疗经验；而且其涉及领域较广，针对成人获得性、感染性、先天性、创伤性心脏疾病都进行了详细的论述，另外，在成人心脏病患者围手术期管理领域也进行了深入地探讨。我相信这本书对于每一位从事心脏外科工作的医生来说都是有着特殊价值的工具，不仅可以帮助我们针对不同患者选择最有效的治疗手段，更可以使我们了解如何应用先进技术进行临床实践。

《成人心脏外科学》（第4版）得以问世凝聚了各位参与成员的心血，在这里我要感谢 McGraw Hill 为本书出版作出贡献的各位成员，尤其是 Brian Belval 先生。另外，我要感谢在 Brigham and Women 医院心外科工作的执行助理 Ann Maloney 和全世界知名的心脏专家们，他们在百忙之中抽出时间为我们提供

了不同领域最前沿、最权威的信息。

《成人心脏外科学》（第4版）中文版是本书问世以来的第一个外文译本，充分说明心脏外科学在中国的迅速发展。我曾经走访过中国的 20 多座城市，给我留下深刻印象的不仅仅是中国的美丽风景和悠久历史，还有中国心脏外科学同仁治疗获得性和先天性心脏疾病时展现出的专业性。在过去的 30 年中，中国心脏外科获得的进步是显著的，如今在中国已经涌现出一批全球领先的心脏外科中心。

在此我感到十分荣幸可以将《成人心脏外科学》（第4版）中文版献给最具天资的中国医生。

Lawrence H. Cohn, MD

哈佛医学院

Brigham and Women 医院

译者序

随着社会的不断发展，心血管疾病已经成为导致国人死亡的最主要原因之一，在对国民健康构成重大威胁的同时，也造成巨大的社会经济损失。所幸，针对于心血管疾病，涌现诸多行之有效的治疗手段与技术，使得医生面对复杂心脏疾患不再束手无策，显著改善了心血管疾病患者的预后。

我国心血管外科在近年呈现快速的增长趋势，同时，心血管麻醉技术、体外循环技术、心脏手术后康复等相关领域的快速发展，共同促进了心血管外科的发展。但我国心血管外科整体水平与国际先进水平相比仍有一定差距，尚缺乏准确、权威、前沿的参考书籍，这也是我们此次翻译第4版《成人心脏外科学》的最初契机。

该系列书籍最早由 L. Henry Edmunds Jr. 主编，历经三版，现已成为心外科医师的必备参考书籍。Dr. Lawrence Cohn 作为第2版的共同主编、第3版主编，为此书的出版做出了大量卓越的贡献，使此书始终位于学科理论与技术发展的前沿。第4版《成人心脏外科学》汇集和展示了当今世界最优秀的心

血管外科专家的最新经验和最新知识，该书的问世，将在帮助业内同仁理解最新诊治理念、掌握最佳诊治技术和诊治手段等方面，发挥巨大的作用。第4版《成人心脏外科学》涵盖了心血管外科不用领域的几乎全部内容，从疾病的流行病学资料、发病机制、临床表现、治疗方法、预后判断等内容都做了详细的论述，相信在该译本的帮助下，我国医生可以从中汲取到提升自身以及提升我国心血管外科发展的力量。

在此，我要对参加该书翻译工作的心血管外科医生、麻醉科医生、体外循环科医生表示感谢，是他们的严谨认真和不懈努力铸就了该译本的出现。

因为自身水平的限制，译本中难免出现错漏和不恰当之处，望广大同仁及时指正。

国家心血管病中心 阜外医院

郑 哲 胡盛寿

原著前言

非常荣幸能够为此书撰写前言。该系列书籍最早由 L. Henry Edmunds Jr. 主编，历经三版，现已成为心外科医师的必备参考书籍。Dr. Cohn 作为第 2 版的共同主编、第 3 版主编，为此书的出版做出了大量卓越的贡献，使此书始终位于学科理论与技术发展的前沿。相信此版面世后，众多心外科医师将会有类似的感受。

这是因为 Dr. Cohn 秉承的理念为“信息发布的即时性”及“涵盖心血管外科发展的历史、现状及未来”，这均是很有价值的观点。

第 4 版《成人心脏外科学》无疑将坚实地继承这一传统。本书共 70 章，几乎涵盖了心脏外科所能涉及的所有领域。编者也皆是心脏外科领域的顶级专家。如读者未能找到某一专题，则该领域极可能尚属空白。

在此必须提及的是 Dr. Cohn 在多年前刚刚开始编撰此书时的长远决定：填补既有的参考书籍与当前学科前沿的鸿沟。他领导并个人资助将第 3 版

《成人心脏外科学》作为 CTS 网站的免费下载学习材料，为众多无法及时获得亟需知识的外科医师提供了宝贵的学习材料。我们对 Dr. Cohn 的人文与博爱精神表示感谢。

《成人心脏外科学》的迅速更新缩小了信息爆炸时代的参考书籍的滞后性：第 3 版发布于 2007 年，第 4 版在 2011 年末即面世。这也与读者对最新的理念和知识的需求相符。在此，让我们为此本与时俱进、指导学科发展的重要书籍的发行做出努力的 Brigham and Women Hospital 的勤勉工作人员、McGraw-Hill 出版社，尤其是主编 Dr. Cohn 表示最深的敬意！

Thomas B. Ferguson, MD

Professor Emeritus of Cardiothoracic Surgery

华盛顿大学医学院

于圣路易斯，密苏里州

原著序

第4版《成人心脏外科学》汇集和展示了当今世界最优秀的心血管外科专家的最新经验和最新知识，其主题包括成人获得性、先天性、感染性及创伤性心脏疾病的外科诊治，同时涵盖了患者的围手术期处理等重要环节。

审视2007年出版的第3版内容，不难发现，近年来在心血管外科学的诸多领域又涌现出了较多新观点、新理念、新方法。我相信，第4版《成人心脏外科学》的问世，将在帮助业内同仁理解最新诊治理念、掌握最佳诊治技术和诊治手段等方面，发挥巨大的作用。此外，编者们对描述各种获得性心脏病手术技术的章节进行了全面更新，并着重强调了传统心血管外科治疗手段的重要性。

我要将第4版《成人心脏外科学》献给外科生涯中教育、指导过我的老师们。在日趋向高精尖方向发展的心血管外科领域，我要强调上级指导老师这一角色的重要性，他们在外科住院医师、年轻研究者的培养和训练中发挥着极为重要的作用。在医学院学习期间，Dr Norman Shumway曾鼓励我成为一名心外科医生，并给我指明了方向。我在国家心脏病研究所学习期间，Dr Andrew Gleen Morrow及其搭档Dr Eugene Braunwald教育我如何成为一名有良好学术思维的心外科医生。当我开始正式的外科手术训练时，加利福尼亚大学的Dr J Englebert Dunphy给予了我大量细致的指导。当我进入波士顿Brigham and Women医院以后，我又荣幸地获得了在享有盛名的Dr Francis D Moore手下工作的机会。此外，我所敬重的朋友、同事Dr John J Collins Jr.，给了我第一份也是迄今为止我唯一的工作——心外科医生，我们已经一起共事30多年，打造出了全国最为优秀的心

血管外科团队之一。我的另一个年代更近的指导老师是Dr John A Mannick，他是世界心血管外科领域的杰出领导者之一。潜移默化中，这些学界前辈对我的职业生涯产生了深远影响。因此，没有高瞻远瞩的前辈们的指引，我们绝不可能在心血管外科领域达到至臻至善的艺术境界。

在此，我还想对为本书的编纂出版作出贡献的人们说声谢谢。首先，感谢L Henry Hank Edmunds博士最初关于编写《成人心脏外科学》的学术灵感及其对我本人实施该计划的信任。感谢为本书出版付出辛勤汗水的McGraw Hill公司员工们，特别是Brian Belval先生。此外，我非常感激我在Brigham and Women's Hospital心外科的行政助理Ann Maloney，她在本书编排过程中事无巨细的提供了完善的后勤保障，这对于本书的成功出版至关重要。特别感谢Dr Thomas Ferguson，这位心脏外科领域的先驱和领袖、美国心胸外科两大学术机构的主席，为第4版《成人心脏外科学》题写了精彩的前言。

最为重要的是，我要深深感谢本书各章节的编者，他们大多是当今世界最为忙碌的临床医生，感谢他们为使本书极具时效性的成为一本高质量的著作而花费的心血和时间。

最后，感谢我的家人，Roberta、Leslie、Jennifer、Stephen、Carly以及Rachel，感谢他们在我组织编写第4版《成人心脏外科学》的过程中，赋予我无限的支持、耐心和爱。

Lawrence H. Cohn, 医学博士

于马萨诸塞州波士顿市

目 录

第一部分

基 础

第1章 心脏外科历史	2	第6章 成人心脏外科患者的计算机断层扫描： _原则和应用	119
第2章 心脏外科解剖	17	第7章 心脏手术的评价和质量促进	140
第3章 心脏外科生理	35	第8章 外科结果数据的统计学处理	160
第4章 心脏外科药理	55		
第5章 心血管病理	76		

第二部分

围手术期/术中管理

第9章 心脏外科的术前评估	170	第14章 深低温停循环	275
第10章 心脏麻醉	179	第15章 心肌保护	285
第11章 心脏外科的超声心动检查	202	第16章 心脏外科患者的术后监护	304
第12章 体外循环	227	第17章 心肺复苏	320
第13章 输血治疗与血液保护	266	第18章 短期机械循环支持	333

第三部分

缺血性心脏病

第19章 再血管化指征	350	第26章 冠状动脉再次手术	452
第20章 经皮心肌再血管化	365	第27章 激光心肌血运重建和增加心肌 血流的促血管生成技术	467
第21章 体外循环下心肌再血管化	380	第28章 急性心梗并发症的外科治疗：心梗 后室间隔穿孔和游离壁破裂	481
第22章 非体外循环下心肌再血管化	399	第29章 缺血性二尖瓣反流	502
第23章 合并颈动脉疾病的心肌再血管化	414	第30章 左室室壁瘤	517
第24章 急性心肌梗死后心肌再血管化	425		
第25章 微创心肌再血管化	440		