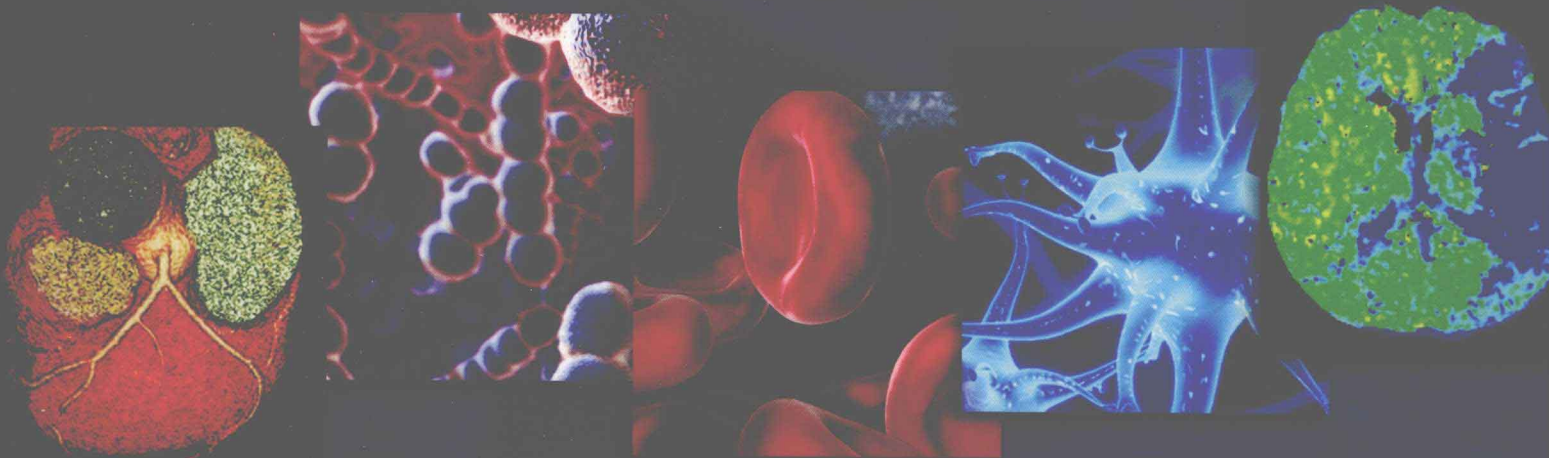


17th Edition

HARRISON'S

Principles of
**INTERNAL
MEDICINE**



Fauci • Braunwald • Kasper • Hauser
Longo • Jameson • Loscalzo

Volume I

17th Edition

HARRISON'S

Principles of INTERNAL MEDICINE

EDITORS

Anthony S. Fauci, MD

Chief, Laboratory of Immunoregulation; Director,
National Institute of Allergy and Infectious Diseases,
National Institutes of Health, Bethesda

Eugene Braunwald, MD

Distinguished Hersey Professor of Medicine,
Harvard Medical School; Chairman, TIMI Study Group,
Brigham and Women's Hospital, Boston

Dennis L. Kasper, MD

William Ellery Channing Professor of Medicine,
Professor of Microbiology and Molecular Genetics,
Harvard Medical School; Director, Channing Laboratory,
Department of Medicine, Brigham and Women's Hospital, Boston

Stephen L. Hauser, MD

Robert A. Fishman Distinguished Professor and Chairman,
Department of Neurology, University of California,
San Francisco, San Francisco

Dan L. Longo, MD

Scientific Director, National Institute on Aging,
National Institutes of Health, Bethesda and Baltimore

J. Larry Jameson, MD, PhD

Professor of Medicine;
Vice-President for Medical Affairs and Lewis Landsberg Dean,
Northwestern University Feinberg School of Medicine, Chicago

Joseph Loscalzo, MD, PhD

Hersey Professor of the Theory and Practice of Medicine,
Harvard Medical School; Chairman, Department of Medicine;
Physician-in-Chief, Brigham and Women's Hospital, Boston

VOLUME I



Medical

New York Chicago San Francisco Lisbon London Madrid Mexico City
New Delhi San Juan Seoul Singapore Sydney Toronto

Note: Dr. Fauci's and Dr. Longo's works as editors and authors were performed outside the scope of their employment as U.S. government employees. These works represent their personal and professional views and not necessarily those of the U.S. government.

Harrison's
PRINCIPLES OF INTERNAL MEDICINE
Seventeenth Edition

Copyright © 2008, 2005, 2001, 1998, 1994, 1991, 1987, 1983, 1980, 1977, 1974, 1970, 1966, 1962, 1958 by The McGraw-Hill Companies, Inc. All rights reserved. Printed in the United States of America. Except as permitted under the United States Copyright Act of 1976, no part of this publication may be reproduced or distributed in any form or by any means, or stored in a data base or retrieval system, without the prior written permission of the publisher.

1234567890 DOWDOW 098

Single Edition Set ISBN 978-0-07-146633-2; MHID 0-07-146633-9

Single Edition Book ISBN 978-0-07-159991-7; MHID 0-07-159991-6

Two Volume Set ISBN 978-0-07-147691-1; MHID 0-07-147691-1

Volume 1 ISBN 978-0-07-147692-8; MHID 0-07-147692-X

Volume 2 ISBN 978-0-07-147693-5; MHID 0-07-147693-8

DVD ISBN 978-0-07-159990-0; MHID 0-07-159990-8

FOREIGN LANGUAGE EDITIONS

Arabic (13e): McGraw-Hill Libri Italia srl (1996)

Chinese Long Form (15e): McGraw-Hill International Enterprises, Inc., Taiwan

Chinese Short Form (15e): McGraw-Hill Education (Asia), Singapore

Croatian (16e): Placebo, Split, Croatia

French (16e): Medecine-Sciences Flammarion, Paris, France

German (16e): ABW Wissenschaftsverlagsgesellschaft mbH, Berlin, Germany

Greek (16e): Parissianos, S.A., Athens, Greece

Italian (16e): The McGraw-Hill Companies, Srl, Milan, Italy

Japanese (16e): MEDSI-Medical Sciences International Ltd, Tokyo, Japan

Korean (16e): McGraw-Hill Korea, Inc., Seoul, Korea

Polish (14e): Czelej Publishing Company, Lubin, Poland (2000)

Portuguese (16e): McGraw-Hill Interamericana do Brazil, Rio de Janeiro, Brazil

Romanian (14e): Teora Publishers, Bucharest, Romania (2000)

Serbian (15e): Publishing House Romanov, Bosnia & Herzegovina, Republic of Serbska

Spanish (16e): McGraw-Hill Interamericana de Espana S.A., Madrid, Spain

Turkish (15e): Nobel Tip Kitabevleri, Ltd., Istanbul, Turkey

Vietnamese (15e): McGraw-Hill Education (Asia), Singapore

This book was set in Minion, Myriad, and Dax by Silverchair Science + Communications, Inc. The editors were James Shanahan and Mariapaz Ramos Englis; editorial assistant was Jenna Esposito. The production director was Phil Galea and production manager was Catherine Saggese. The index was prepared by Barbara Littlewood. The text designer was Alan Barnett of alan barnett design; cover design was by David Dell'Accio. The medical illustrator was Daniel Knopsnyder.

R.R. Donnelley and Sons, Inc., was printer and binder.

Library of Congress Cataloging-in-Publication Data

Harrison's principles of internal medicine. -- 17th ed. / editors, Anthony S. Fauci ... [et al.].

p. ; cm.

Includes bibliographical references and index.

ISBN-13: 978-0-07-146633-2 (hardcover : v. 2 : alk. paper)

ISBN-10: 0-07-146633-9 (hardcover : v. 2 : alk. paper)

ISBN-13: 978-0-07-147691-1 (hardcover : set : v. 2 : alk. paper)

ISBN-10: 0-07-147691-1 (hardcover : set : v. 2 : alk. paper) 1. Internal medicine. I. Fauci, Anthony S.,

II. Title: Principles of internal medicine.

[DNLM: 1. Internal Medicine. WB 115 H322 2008]

RC46.H333 2008

616--dc22

2007012181



George W. Thorn
1906–2004

George W. Thorn was an editor of the first seven editions and Editor-in-Chief of the eighth edition. As a founding editor, he had an enormous impact on *Harrison's* and thereby on the education of countless thousands of physicians and medical students. His incisive-

ness, inventiveness, and originality, coupled with his broad knowledge of clinical medicine and medical science and his unswerving dedication to the application of techniques of contemporary science to the advancement of clinical medicine, played a vital role in the original organization of this textbook.

George Thorn began his remarkable career in endocrinologic research as a medical student at the University of Buffalo School of Medicine. Following a stint in general practice, which subsequently served him well as an educator, clinical investigator, and consultant, he obtained research training and held faculty positions at several institutions. In 1942, at the age of 36, he became Hersey Professor of the Theory and Practice of Physic (Medicine) at Harvard Medical School and Physician-in-Chief at Brigham and Women's. During the three decades in which he filled these positions with distinction, he created one

of the first modern academic medical units where the education of physician-scientists, the highest standards of clinical care, and the conduct of exciting clinical research were inextricably intertwined and mutually reinforcing. Thorn's personal investigative interests focused on the adrenal cortex and the kidney. He developed techniques for the diagnosis of adrenal disease that are still in wide use. He characterized salt-losing nephritis and catalyzed the development of renal dialysis and the work that led to the development of renal transplantation.

George Thorn played many leadership roles in medicine and medical science. As a member of the governing board of the Massachusetts Institute of Technology (MIT) he was instrumental in the development of the Harvard-MIT program in Health Science and Technology. He was the founder, Director, and then President of the Howard Hughes Medical Institute, which became a major world force in the conduct of fundamental biomedical research under his leadership.

Thorn has influenced most profoundly a number of institutions: Harvard, the Brigham, MIT, and the Hughes Institute. To these and to *Harrison's*, he brought a unique blend of ebullience, imagination, curiosity, personal leadership, good humor, warmth, and compassion, which inspired generations of Harvard medical students, Brigham residents and research fellows, Hughes investigators, and editorial colleagues. The present Editors are pleased to express their admiration for this medical giant and beloved friend by dedicating this seventeenth edition of *Harrison's* to George W. Thorn, one of the founders of this book.

THE EDITORS

NOTICE

Medicine is an ever-changing science. As new research and clinical experience broaden our knowledge, changes in treatment and drug therapy are required. The authors and the publisher of this work have checked with sources believed to be reliable in their efforts to provide information that is complete and generally in accord with the standards accepted at the time of publication. However, in view of the possibility of human error or changes in medical sciences, neither the authors nor the publisher nor any other party who has been involved in the preparation or publication of this work warrants that the information contained herein is in every respect accurate or complete, and they disclaim all responsibility for any errors or omissions or for the results obtained from use of the information contained in this work. Readers are encouraged to confirm the information contained herein with other sources. For example and in particular, readers are advised to check the product information sheet included in the package of each drug they plan to administer to be certain that the information contained in this work is accurate and that changes have not been made in the recommended dose or in the contraindications for administration. This recommendation is of particular importance in connection with new or infrequently used drugs.

COVER ILLUSTRATIONS

- (1) **Figure 222-10.** Three-dimensional reconstruction of a CT angiogram demonstrating a normal main left coronary artery arising from the aorta and its two branches, the left anterior descending artery (left) and the left circumflex artery (right).
- (2) Computer rendition of chains of *Streptococcus pneumoniae* bacteria. This gram-positive oval-shaped bacterium is one of the causes of pneumonia. Although found living harmlessly in the body, *S. pneumoniae* can cause dangerous opportunistic infections of the lung. (Credit: Hybrid Medical Animation/Photo Researchers, Inc.)
- (3) Three-dimensional representation of blood cells.
- (4) Illustration of a myelinated axon with sodium channels clustered at the nodes of Ranvier where axonal depolarization occurs; this event results in saltatory conduction, with nerve impulse jumping from one node to the next.
- (5) **Figure 364-15A.** A CT perfusion mean transit-time map showing delayed perfusion of the left middle cerebral artery distribution.

For complete text for these chapters, see Harrison's, 17e, DVD

Chapter e1 The Safety and Quality of Health Care

A number of interventions that have been demonstrated to improve the safety and quality of care are available today and should be used more widely in clinical practice. Other interventions are undergoing evaluation, and still others are being developed in parallel with new technologies such as electronic health records systems. Many interventions will require changing the structure of care—for example, moving to a more team-oriented approach and ensuring that patients are more involved in their own care. Payers and the general public are now demanding better information about safety and quality as well as better performance in these areas. The clear implication is that these domains will need to be addressed directly by providers. Thus, physicians must learn about these two domains, how they can be improved, and the relative strengths and limitations of our current ability to measure them.

Chapter e2 Economic Considerations in the Practice of Medicine

Physicians need to develop and maintain an understanding of this topic and to reflect that understanding in their professional behavior. Covered in this chapter are the many causes of rising health care costs, with new technology being the main one; the ways in which insurance coverage (including Medicare and Medicaid) can drive demand for health care services; the influence of health professionals, hospitals, and the pharmaceutical and device industries on the supply of health care; and the different strategies available for cost control. With health care spending in the United States at >16% of the gross domestic product (as of 2005), this chapter should be of interest to all physicians.

Chapter e3 Racial and Ethnic Disparities in Health Care

This chapter illustrates how such disparities persist in spite of the great improvements in overall health and life expectancy. Many graphs and bar charts document the nature, extent, and root causes of differences in health care for minorities. These causes include social determinants, lack of access, complexity of the health care system, stereotyping, and patient-level factors such as mistrust. Key recommendations to bring about improvement are given, as is advice to the individual health care provider (e.g., being aware of disparities, practicing culturally competent care, avoiding stereotyping, and working to build trust).

Chapter e4 Ethical Issues in Clinical Medicine

This chapter discusses fundamental ethical guidelines, patients who lack decision-making capacity, decisions about life-sustaining interventions, conflicts of interest, and just allocation of resources. The chapter helps the physician to follow two fundamental but frequently conflicting ethical principles: respecting patient autonomy and acting in the patient's best interest. Also discussed are assessment of a patient's capacity to make medical decisions, choice of a surrogate, and standards for surrogate decision-making; care of dying patients, do-not-resuscitate orders, and decisions about when to withdraw or withhold life-sustaining interventions; and the risks of financial incentives, gifts from pharmaceutical companies, fear of treating HIV-infected patients, and reporting medical errors. The less-experienced physician will gain confidence in dealing with these perplexing and, at times, emotionally draining issues.

Chapter e5 Atlas of Rashes Associated with Fever

This chapter presents high-quality images of a variety of rashes that have an infectious etiology and are commonly associated with fever.

Even the most astute and experienced clinician is often diagnostically challenged by a patient with fever and rash, given the broad differential diagnosis. This atlas will help the physician to rapidly narrow the differential, promptly recognize key features, and administer appropriate and sometimes life-saving therapy.

Chapter e6 Memory Loss

This chapter discusses the formation of both long- and short-term memories. Long-term memory is divided into declarative and nondeclarative memory; the former is further subdivided into semantic and episodic memories. Nondeclarative memory is subdivided into skills and habits (procedural memory), priming, conditioning, and nonassociative learning. Also covered are the associated anatomic substrates for each. Lesions in any of these associated areas cause deficits in storing, retaining, and retrieving information. Short-term, or working, memory relies on different regions of the brain, and lesions that disrupt their structure or function can be devastating. Testing of working memory can be effectively performed at the bedside. More detailed testing of memory should probably be done by a neuropsychologist, neuropsychiatrist, or behavioral neurologist.

Chapter e7 Atlas of Oral Manifestations of Disease

This atlas presents numerous outstanding photographs illustrating many oral conditions that indicate clinical disease either in the mouth or elsewhere. There is significant clinical value in examining the oral cavity for signs of disease, as the health status of the oral cavity is connected to cardiovascular disease and diabetes mellitus.

Chapter e8 Approach to the Patient with a Heart Murmur

This chapter provides comprehensive coverage of heart murmurs (systolic, diastolic, and continuous), their major attributes, and their response to bedside maneuvers, detected by auscultation. Together with the history, clinical context, and associated findings, this information allows the clinician to construct a differential diagnosis to guide the need for and urgency of further testing, such as echocardiography, transesophageal echocardiography, or cardiac CT or MRI.

Chapter e9 Atlas of Urinary Sediments and Renal Biopsies

This chapter illustrates key diagnostic features of selected kidney diseases, using light microscopy, immunofluorescence, and electron microscopy. Common urinalysis findings are also documented. The chapter amplifies the physician's knowledge of disorders of the kidney and urinary tract.

Chapter e10 Atlas of Skin Manifestations of Internal Disease

The atlas provides pictures of a selected group of inflammatory skin eruptions and neoplastic conditions, illustrating (1) common skin diseases and lesions, (2) nonmelanoma skin cancer, (3) melanoma and pigmented lesions, (4) infectious diseases and the skin, (5) immunologically mediated skin disease, and (6) skin manifestations of internal disease. Physicians frequently have to decide whether a cutaneous process is confined to the skin—a pure dermatologic event—or whether it is a manifestation of internal disease relating to the patient's overall medical condition, given the marked rise in both melanoma and non-melanoma skin cancer.

This atlas gives many examples of both normal and abnormal blood smears and a guide to blood smear interpretation. A normal peripheral blood smear is shown, as are normal granulocytes, monocytes, eosinophils, basophils, plasma cells, and bone marrow. Abnormal smears illustrate the defects found in conditions such as iron-deficiency anemia, sickle cell anemia, aplastic anemia, metastatic cancer, erythroid hyperplasia, acute myeloid and lymphoblastic leukemias, chronic myeloid and lymphoid leukemias, adult T cell leukemia, follicular lymphoma, and Burkitt's lymphoma, among others.

Chapter e12 **Thymoma**

The chapter begins with a brief overview of the composition and function of the thymus and lists the various abnormalities that can occur. A thymoma develops when epithelial cells in the thymus become neoplastic. A link to myasthenia gravis (MG) is noted; about 30% of patients with a thymoma have MG, and MG patients have a high incidence of thymic abnormalities. Thymomas may be associated with other conditions (e.g., pure red cell aplasia) but to a lesser degree. Staging and histologic classification are presented. Early-stage disease is treated by surgical resection, with or without postoperative radiation. A multimodality approach is taken in late-stage disease: neoadjuvant chemotherapy followed by surgery, radiation therapy, and additional consolidation chemotherapy.

Chapter e13 **Late Consequences of Cancer and Its Treatment**

This chapter discusses the long-term consequences of successful cancer treatment. Some problems may be related to the cancer itself or to the normal aging process, but many are caused by therapy, whether surgery, radiation, or chemotherapy. There may also be associated psychosocial problems. The consequences are covered in two ways—by organ system and by cancer type. It is now apparent that monitoring of cancer survivors is a critical component of their overall health care and that some aspects of primary treatment should be modified, where possible, to reduce later consequences.

Chapter e14 **Laboratory Diagnosis of Infectious Diseases**

The chapter documents the evolution of methods used in the clinical microbiology laboratory to detect and identify viral, bacterial, fungal, and parasitic agents and to determine the antibiotic susceptibility of bacterial and fungal pathogens. Detection methods range from microscopic visualization, aided by a variety of stains, to systems that detect and amplify biologic signals. Identification methods include both classic biochemical phenotyping and more sophisticated methods such as gas chromatography and nucleic acid tests. Perhaps most useful to the nonspecialist is the large table giving clear and precise instructions for collection and transport of specimens to the laboratory for culture.

Chapter e15 **Infectious Complications of Burns and Bites**

This chapter details the consequences of breaches in the skin from animal bites and scratches, which allow the inoculation of microorganisms into deeper, susceptible host tissues, and from burns, which may cause massive destruction of the integument and derangements in humoral and cellular immunity. The patient's own flora and organisms from the hospital environment can cause infections in burn injuries, and the frequency of infection parallels the extent and severity of the injury. Immunosuppression resulting from severe burns also puts patients at risk of infections, as do the necessary manipulations for clinical care. The risks of infection, both local and systemic, that can result from the variety of microorganisms involved in an animal or human

bite are detailed. The treatment section covers wound management, antibiotic therapy for established infection and for prophylactic purposes, and rabies and tetanus prophylaxis.

Chapter e16 **Laboratory Diagnosis of Parasitic Infections**

This chapter emphasizes the importance of the history and epidemiology of a patient's illness. Tables provide clear information on the geographic distribution, transmission, anatomic locations, and methods employed for the diagnosis of flatworm, roundworm, and protozoal infections. These tables should help the physician select the appropriate body fluid or biopsy site for microscopic examination. Other tables give information about the identification of parasites in samples from specific anatomic locations. Also listed are parasites frequently associated with eosinophilia and the serologic and molecular tests currently available for parasitic infections.

Chapter e17 **Pharmacology of Agents Used to Treat Parasitic Infections**

This chapter deals exclusively with the pharmacologic properties of the agents used to treat infections due to parasites. Information on these agents' major toxicities, spectrum of activity, and safety for use during pregnancy and lactation is presented in Chap. 201.

Chapter e18 **Atlas of Blood Smears of Malaria and Babesiosis**

This chapter provides both thin and thick blood films for *Plasmodium falciparum*, *P. vivax*, *P. ovale*, and *P. malariae*. The thick film allows detection of densities as low as 50 parasites per microliter, with great sensitivity; the thin film is better for speciation and provides useful prognostic information in severe falciparum malaria. One thin blood film showing trophozoites of *Babesia* is included.

Chapter e19 **Atlas of Electrocardiography**

This chapter shows electrocardiograms to supplement those used in Chap. 221. The interpretations emphasize findings of specific teaching value.

Chapter e20 **Atlas of Noninvasive Cardiac Imaging**

This chapter provides "real-time" image clips, as they are viewed in clinical practice, as well as additional static images. Noninvasive cardiac imaging is essential to the diagnosis and management of patients with known or suspected cardiovascular disease. This atlas supplements Chap. 222, which describes the principles and clinical applications of these important techniques.

Chapter e21 **Atlas of Cardiac Arrhythmias**

This chapter shows electrocardiograms to supplement those used in Chaps. 225 and 226. The interpretations emphasize findings of specific teaching value.

Chapter e22 **Atlas of Atherosclerosis**

The atlas consists of six videos that highlight some of the current understanding of atherosclerosis. Topics include pulse pressure, plaque instability, rudiments of the clinically important lipoproteins, formation and complications of atherosclerotic plaques, mechanisms of atherogenesis, and metabolic derangements that underlie the metabolic syndrome.

Chapter e23 **Atlas of Percutaneous Revascularization**

The atlas presents seven case studies ranging from cardiogenic shock with left main coronary artery obstruction to percutaneous aortic

valve replacement. The cases are illustrated by a selection of electrocardiograms, videos of angiograms, graphs, and CT scans, providing a good teaching tool.

Chapter e24 Atlas of Chest Imaging

The atlas is a collection of chest x-rays and CT scans illustrative of specific major findings, which are categorized by those of volume loss, loss of parenchyma, interstitial processes, alveolar processes, bronchiectasis, pleural abnormalities, nodules and masses, and pulmonary vascular abnormalities.

Chapter e25 Video Atlas of Gastrointestinal Endoscopy

This atlas demonstrates endoscopic findings in a variety of infectious, inflammatory, vascular, and neoplastic conditions. The premalignant conditions of Barrett's esophagus and colonic polyps are also illustrated. At the end of the chapter are several video clips demonstrating endoscopic treatment modalities for gastrointestinal bleeding, polyps, and biliary stones.

Chapter e26 Atlas of Liver Biopsies

The atlas gives examples of common morphologic features of acute and chronic liver disorders—some involving the lobular areas and others the portal tracts. Liver biopsy is thought to represent the “gold standard” for assessing the degree of liver injury and fibrosis. Other important histologic features include those found in hepatic steatosis, injury of bile ducts in the portal tract, plasma cell infiltration, and portal inflammation affecting portal veins.

Chapter e27 Primary Immunodeficiencies Associated with or Secondary to Other Diseases

The tables in this chapter add to the information given in Chap. 310 by listing (1) the primary immunodeficiencies associated with or secondary to other conditions, and (2) the genes or genetic loci associated with primary immunodeficiencies.

Chapter e28 Atlas of Clinical Imaging in the Vasculitic Diseases

The atlas enhances the information given in Chap. 319 by images illustrating features associated with vasculitic syndromes such as Wegener's granulomatosis, Churg-Strauss syndrome, polyarteritis nodosa, and giant cell and Takayasu's arteritis. The images have been made using mainly CT scans and arteriograms.

Chapter e29 Atlas of Clinical Manifestations of Metabolic Diseases

The atlas provides a visual survey of selected metabolic disorders, which can be used to facilitate learning and thereby enhance the recognition and care of patients with these disorders. The study of metabolic diseases has been invaluable for advancing understanding of human genetics, leading to novel approaches to therapy such as screening programs, blood and organ transplantation, gene therapy, and enzyme replacement.

Chapter e30 Atlas of Neuroimaging

This atlas comprises 29 cases to assist the clinician caring for patients with neurologic symptoms. The majority of the images are MRIs; other techniques used are MR and conventional angiography and CT scans. Many neurologic diseases are illustrated, such as tuberculosis of the central nervous system (CNS), neurosyphilis, CNS aspergillosis, neurosarcoid, middle cerebral artery stenosis, CNS vasculitis, Huntington's disease, and acute transverse myelitis.

Chapter e31 Electrodiagnostic Studies of Nervous System Disorders: EEG, Evoked Potentials, EMG

This chapter covers the two main techniques for electrodiagnosis of neurologic symptoms: the electroencephalogram (EEG) and the electromyogram (EMG). Evoked potentials (sensory, cognitive, and motor) are also covered. The EEG is most useful in evaluating patients with suspected epilepsy but is also helpful in assessing coma and as a noninvasive screening tool for focal structural abnormalities of the brain. EMG enables disorders of the motor units to be detected and characterized as neurogenic or myopathic, and the findings may provide a guide to the severity of an acute nerve disorder or, in chronic or degenerative disorders, whether the process is active or progressive—important for prognosis. Nerve conduction studies, which complement the EMG, are also covered.

Chapter e32 Technique of Lumbar Puncture

This chapter covers the procedure of lumbar puncture (LP) in detail (with illustrations), from indications for imaging and laboratory studies prior to LP, analgesia, positioning, and the procedure itself (including dealing with complications that may arise during LP). Also included is a section on the main complication of LP—the post-LP headache—and its causes and therapy and strategies to avoid it.

Chapter e33 Special Issues in Inpatient Neurologic Consultation

This chapter provides coverage of neurologic diseases and syndromes that are common reasons for inpatient consultation but that are not covered elsewhere in the text. Detailed here are central nervous system dysfunction (hyperperfusion states, post-cardiac bypass brain injury, and post-solid organ transplant injury); common neurologic complications of electrolyte disturbances (hyper- and hyponatremia, hyperosmolality, hypo- and hyperkalemia, and disturbances of calcium and magnesium); and peripheral nervous system dysfunction (including entrapment and obstetric neuropathies).

Chapter e34 Heavy Metal Poisoning

This chapter provides specific information about the four main heavy metals that pose a significant threat to health via occupational and environmental exposures: lead, mercury, arsenic, and cadmium. A table clearly details the main sources, metabolism, toxic effects produced, diagnosis, and appropriate therapy for poisoning from these metals. Other metals covered, though not in the table, are copper, selenium, aluminum, chromium, manganese, and thallium.

Chapter e35 Poisoning and Drug Overdosage

This chapter provides comprehensive coverage of the dose-related adverse effects following exposure to chemicals, drugs, or other xenobiotics. The section on diagnosis gives thorough coverage of the physical examination, laboratory assessment, electrocardiographic and radiologic studies, and toxicologic analysis. The treatment section gives detailed coverage of the general principles of care, supportive care, prevention of poison absorption, enhancement of poison elimination, administration of antidotes, and prevention of reexposure. Pathophysiologic features and treatment of specific toxic syndromes and poisonings are presented in tabular form.

Chapter e36 Pulmonary Biomarkers in COPD

There has been increasing interest in using pulmonary biomarkers to understand and monitor the inflammation in the respiratory tracts of patients with COPD. A biomarker refers to any molecule or material (e.g., cells and tissue) that reflects the disease process. This chapter covers topics on bronchial biopsies, bronchoalveolar lavage, and sputum, among others.

xx Chapter e37 Chagas' Disease: Advances in Diagnosis and Management

Chagasic cardiomyopathy is the major complication resulting from infection by *Trypanosoma cruzi*. This infection is related to the close proximity between humans and triatomines carrying *T. cruzi*. This chapter discusses laboratory diagnosis and both etiologic and complementary treatments for the disease.

Chapter e38 The Polypill

Several risk factors contribute to causing atherosclerotic coronary artery disease, and some of these can be reduced by a variety of drugs. This chapter discusses the advantages and disadvantages of combining these drugs into one pill, the so-called polypill. The advantages include convenience of delivery, inclusion of all drugs thought to be essential for prevention, low cost, and possible enhanced compliance; disadvantages include possible overtreatment of low-risk patients, undertreatment of high-risk patients, and side effects from one or more components.

The authors emphasize that the role of a polypill in secondary and high-risk prevention is still speculative, and more trials need to be carried out. The polypill's greatest risk appears to be that both patients and physicians may give up on eliminating smoking and modifying sedentary lifestyles and unhealthy diets—tried and true risk-modification techniques.

Chapter e39 Mitochondrial DNA and Heritable Traits and Diseases

The structure and function of mitochondrial DNA (mtDNA) are discussed in depth in this chapter, which includes the proposition that the total cumulative burden of somatic mtDNA mutations acquired with age may contribute to aging and common age-related disturbances. Also included are an overview of the clinical and pathologic features of human mtDNA diseases and their presentations (enhanced by useful tables) and a discussion of the role of mtDNA mutations in the metabolic syndrome, type 2 diabetes mellitus, and neurodegenerative diseases in particular. Genetic counseling and treatment for mtDNA diseases round out the discussion.

INTERNATIONAL ADVISORY EDITORS

Oded Abramsky, MD, PhD

Professor and Head, Department of Neurology, Hebrew University Hadassah Medical School, Jerusalem, Israel

Peter J. Barnes, MA, DM, DSc

Professor and Head of Thoracic Medicine, National Heart & Lung Institute; Head of Respiratory Medicine, Imperial College London; Honorary Consultant Physician, Royal Brompton Hospital, London

Professor Dame Carol Black

Royal College of Physicians, Regents Park, London, United Kingdom

John Funder, MD

Professor, Prince Henry's Institute of Medical Research, Clayton, Victoria, Australia

Professor Donald Metcalf

Professor Emeritus, The Royal Melbourne Hospital, Victoria, Australia

Jose Antonio F. Ramires, MD, PhD

Head Professor of Cardiology; General Director of the Heart Institute-INCOR, University of São Paulo Medical School, Brazil

Professor Philippe J. Sansonetti

Unité de Pathogénie Microbienne Moléculaire, INSERM U786 Institut Pasteur, Paris, France

Karl Skorecki, MD

Annie Chutick Professor and Chair in Medicine (Nephrology); Director, Rappaport Research Institute, Technion-Israel Institute of Technology; Director of Medicine and Research Development, Ramban Medical Center, Haifa, Israel

Professor K. Srinath Reddy

Professor and Head, Department of Cardiology, All India Institute of Medical Sciences, Ansari Nagar, New Delhi, India

George Stingl, MD

Department of Dermatology, Medical University of Vienna, Wahringer Gurtel 18-20, Vienna, Austria

Professor Nicholas J. White

Professor of Tropical Medicine, Oxford University, United Kingdom; Mahidol University, Bangkok, Thailand

Numbers in brackets refer to the chapters written or co-written by the contributor.

James L. Abbruzzese, MD

Chair and Professor, GI Medical Oncology; Associate Medical Director, GI and Endoscope Center, Ofc/EVP; University of Texas, MD Anderson Cancer Center, Houston [95]

Elias Abrutyn, MD†

Professor of Medicine and Public Health, Drexel University College of Medicine, Philadelphia [133, 134]

John C. Achermann, MD

Lecturer in Endocrinology, UCL Institute of Child Health, University College, London, United Kingdom [343]

John W. Adamson, MD

Clinical Professor of Medicine, UCSD Cancer Center, Hematology/Oncology, University of California at San Diego, La Jolla [58, 98]

Anthony A. Amato, MD

Associate Professor of Neurology, Harvard Medical School; Chief, Division of Neuromuscular Diseases, Department of Neurology, Brigham and Women's Hospital, Boston [382]

Michael J. Aminoff, MD, DSc

Professor of Neurology, School of Medicine, University of California, San Francisco, San Francisco [23, 25, e31]

Neil M. Ampel, MD

Professor of Medicine, University of Arizona; Staff Physician, SAVAHCS, Tucson [193]

Jennifer Anderson, MD

Clinical Fellow, Department of Newborn Medicine, Children's Hospital of Boston, Boston [69]

Kenneth C. Anderson, MD

Kraft Family Professor of Medicine, Harvard Medical School; Chief, Division of Hematologic Neoplasia, Dana-Farber Cancer Institute, Boston [106, 107]

Elliott M. Antman, MD

Professor of Medicine, Harvard Medical School; Director, Samuel L. Levine Cardiac Unit, and Senior Investigator, TIMI Study Group, Brigham and Women's Hospital, Boston [237, 239]

Frederick R. Appelbaum, MD

Member and Director, Clinical Research Division, Fred Hutchinson Cancer Research Center; Professor and Head, Division of Medical Oncology, University of Washington School of Medicine, Seattle [108]

Gordon L. Archer, MD

Professor of Medicine and Microbiology/Immunology; Associate Dean for Research, School of Medicine, Virginia Commonwealth University, Richmond [127]

Valder Arruda, MD, PhD

Associate Professor of Pediatrics, University of Pennsylvania School of Medicine, Division of Hematology, The Children's Hospital of Philadelphia, Philadelphia [110]

Arthur K. Asbury, MD

Van Meter Professor of Neurology Emeritus, Philadelphia [25, 380]

John R. Asplin, MD

Clinical Associate, Department of Medicine, University of Chicago; Medical Director, Litholink Corporation, Chicago [281]

Kenneth H. Astrin, MD

Associate Professor, Department of Human Genetics, Mount Sinai School of Medicine of New York University, New York [352]

John C. Atherton, MD

Professor of Gastroenterology; Director, Wolfson Digestive Diseases Centre, University of Nottingham, United Kingdom [144]

Jane C. Atkinson, DDS

Program Director, Clinical Trials Program, Center for Clinical Research, National Institute of Dental and Craniofacial Research, National Institutes of Health, Bethesda [e7]

Paul S. Auerbach, MD, MS

Clinical Professor, Department of Surgery, Division of Emergency Medicine, Stanford University School of Medicine, Stanford [391]

K. Frank Austen, MD

AstraZeneca Professor of Respiratory and Inflammatory Diseases, Harvard Medical School; Director, Inflammation & Allergic Diseases Research Section, Division of Rheumatology, Immunology & Allergy, Brigham and Women's Hospital, Boston [311]

Eric H. Awtry, MD

Assistant Professor of Medicine, Boston University School of Medicine, Boston [233, 234]

Bruce R. Bacon, MD

James F. King Endowed Chair in Gastroenterology; Professor of Internal Medicine, Division of Gastroenterology & Hepatology, St. Louis [302, 303]

Lindsey R. Baden, MD

Assistant Professor of Medicine, Harvard Medical School, Boston [171]

†Deceased.

- xxii Kamal F. Badr, MD**
Professor and Dean, School of Medicine, Lebanese American University, Byblos, Lebanon [280]
- Donald S. Baim, MD**
Professor of Medicine, Harvard Medical School; Executive Vice President, Chief Medical and Scientific Officer, Boston Scientific Corporation, Natick [223, 240, e23]
- John R. Balmes, MD**
Professor of Medicine, University of California, San Francisco; Chief, Division of Occupational and Environmental Medicine, San Francisco General Hospital; Professor of Environmental Health Sciences, School of Public Health, University of California, Berkeley [250]
- Robert L. Barbieri, MD**
Kate Macy Ladd Professor of Obstetrics, Gynecology and Reproductive Biology, Harvard Medical School, Boston [7]
- Joanne M. Bargman, MD**
Professor of Medicine, University of Toronto; Director, Peritoneal Dialysis Program, and Co-Director, Combined Renal-Rheumatology Lupus Clinic, University Health Network, Toronto [274]
- Tamar F. Barlam, MD**
Associate Professor of Medicine, Boston University School of Medicine, Boston [115, 140]
- Peter J. Barnes, MA, DM, DSc**
Professor and Head of Thoracic Medicine, National Heart & Lung Institute; Head of Respiratory Medicine, Imperial College London; Honorary Consultant Physician, Royal Brompton Hospital, London [248, e37]
- Miriam J. Baron, MD**
Instructor in Medicine, Harvard Medical School, Boston [121]
- Kenneth J. Bart, MD, MPH, MSHPM**
Professor Emeritus, Epidemiology and Biostatistics, San Diego State University, San Diego; Consultant, National Vaccine Program Office, Office of the Secretary, Department of Health and Human Services, Washington [116]
- Shari S. Bassuk, ScD**
Epidemiologist, Division of Preventive Medicine, Brigham and Women's Hospital, Boston [342]
- David W. Bates, MD, MSc**
Professor of Medicine, Harvard Medical School; Chief, General Medical Division, Brigham and Women's Hospital; Medical Director, Clinical and Qualitative Analysis Program, Partners Healthcare System, Boston [e1]
- Robert P. Baughman, MD**
Professor of Medicine, Cincinnati [322]
- M. Flint Beal, MD**
Anne Parrish Titzel Professor and Chair, Department of Neurology and Neuroscience, Weill Medical College of Cornell University; Neurologist-in-Chief, New York Presbyterian Hospital, New York [360, 371]
- Nicholas J. Beeching, FRCGS (RCPs Glas) DCH, DTM&H**
Senior Lecturer in Infectious Diseases, Liverpool School of Tropical Medicine, University of Liverpool; Consultant and Clinical Lead, Tropical and Infectious Disease Unit, Royal Liverpool University Hospital, Liverpool, United Kingdom [150]
- Robert S. Benjamin, MD**
Professor of Medicine; Chairman, Department of Sarcoma Medical Oncology, The University of Texas MD Anderson Cancer Center, Houston [94]
- Edward J. Benz, Jr., MD**
Richard and Susan Smith Professor of Medicine; Professor of Pediatrics; Professor of Pathology, Harvard Medical School; President and CEO, Dana-Farber Cancer Institute; Director, Dana-Farber/Harvard Cancer Center, Boston [99]
- Jean Bergounioux, MD**
Medical Doctor of Pediatrics, Unité de Pathogénie Microbienne Moléculaire, Paris [147]
- Joseph R. Betancourt, MD, MPH**
Director, The Disparities Solutions Center, Massachusetts General Hospital; Assistant Professor of Medicine, Harvard Medical School [e3]
- Shalender Bhasin, MD**
Chief and Professor, Department of Endocrinology, Diabetes, & Nutrition, Boston University, Boston [340]

- Atul K. Bhan, MBBS, MD**
Professor of Pathology, Harvard Medical School; Director of the Immunopathology Unit, Department of Pathology, Massachusetts General Hospital, Boston [e26]
- David R. Bickers, MD**
Carl Truman Nelson Professor and Chair, Department of Dermatology, College of Physicians and Surgeons, Columbia University Medical Center, New York [57]
- Henry J. Binder, MD**
Professor of Medicine; Professor of Cellular & Molecular Physiology, Yale University, New Haven [288]
- Thomas D. Bird, MD**
Professor, Neurology and Medicine, University of Washington; Research Neurologist, Geriatric Research Education and Clinical Center, VA Puget Sound Health Care System, Seattle [365, e6]
- William R. Bishai, MD, PhD**
Professor of Medicine, The Johns Hopkins School of Medicine, Baltimore [131]
- Bruce R. Bistrian, MD, PhD**
Chief, Clinical Nutrition, Beth Israel Deaconess Medical Center; Professor of Medicine, Harvard Medical School, Boston [73]
- Martin J. Blaser, MD**
Frederick H. King Professor of Internal Medicine; Chair, Department of Medicine; Professor of Microbiology, New York University School of Medicine, New York [144, 148]
- Clara D. Bloomfield, MD**
Distinguished University Professor; William G. Pace III Professor of Cancer Research, Cancer Scholar and Senior Advisor, The Ohio State University Comprehensive Cancer Center and Arthur G. James Cancer Hospital and Richard J. Solove Research Institute, Columbus [104]
- Richard S. Blumberg, MD**
Professor of Medicine, Harvard Medical School; Chief, Division of Gastroenterology, Hepatology and Endoscopy, Brigham and Women's Hospital, Boston [289]
- David Blumenthal, MD, MPP**
Samuel O. Thier Professor of Medicine; Professor of Health Care Policy, Harvard Medical School; Director, Institute for Health Policy, Massachusetts General Hospital/Partners HealthCare System, Boston [e3]
- Jean L. Bolognia, MD**
Professor of Dermatology, Yale Medical School [54]
- George J. Bosl, MD**
Chairman, Department of Medicine, Memorial Sloan-Kettering Cancer Center; Professor of Medicine, Joan and Sanford I. Weill Medical College of Cornell University, New York [92]
- Richard C. Boucher, Jr., MD**
William Rand Kenan Professor of Medicine, University of North Carolina at Chapel Hill; Director, University of Carolina Cystic Fibrosis Center, Chapel Hill [253]
- Eugene Braunwald, MD, MA (Hon), ScD (Hon)**
Distinguished Hersey Professor of Medicine, Harvard Medical School; Chairman, TIMI Study Group, Brigham and Women's Hospital, Boston [1, 35, 36, 217, 219, 220, 230–232, 237–239, e8]
- Irwin M. Braverman, MD**
Professor of Dermatology, Yale University School of Medicine, New Haven [54]
- Otis Webb Brawley, MD**
Professor, Hematology, Oncology, Medicine & Epidemiology, Emory University; Chief Medical Officer, American Cancer Society, Atlanta [78]
- Joel G. Breman, MD, DTPH**
Senior Scientific Advisor, Fogarty International Center, National Institutes of Health, Bethesda [203, e18]
- Barry M. Brenner, MD, AM, DSc (Hon), DMSc (Hon), Dipl (Hon)**
Samuel A. Levine Professor of Medicine, Harvard Medical School; Director Emeritus, Renal Division, Brigham and Women's Hospital, Boston [45, 46, 279, 280, 283]
- George J. Brewer, MD**
Morton S. and Henrietta K. Sellner Active Emeritus Professor of Human Genetics; Active Emeritus Professor of Internal Medicine, University of Michigan Medical School, Ann Arbor [354]

F. Richard Bringham, MD

Senior Vice President for Medicine and Research Management, Massachusetts General Hospital; Associate Professor of Medicine, Harvard Medical School, Boston [346]

Kevin E. Brown, MD

Consultant Medical Virologist, Health Protection Agency, London [177]

Robert H. Brown, Jr., MD, DPhil

Neurologist, Massachusetts General Hospital; Professor of Neurology, Harvard Medical School, Boston [369, 382]

H. R. Büller, MD

Professor of Medicine; Chairman, Department of Vascular Medicine, Amsterdam [111]

David M. Burns, MD

Professor Emeritus, Department of Family and Preventive Medicine, University of California, San Diego School of Medicine, San Diego [390]

Michael J. Burns, MD

Assistant Professor of Medicine, Harvard Medical School, Boston [e35]

Joan R. Butters, MD

Assistant Clinical Professor of Medicine, Harvard Medical School; Clinical Associate in Medicine, Massachusetts General Hospital, Boston [122]

John C. Byrd, MD

D. Warren Brown Professor of Leukemia Research Professor; Co-Director of Hematologic Malignancies, Division of Hematology and Oncology, Arthur G. James Cancer Hospital, Columbus [104]

Stephen B. Calderwood, MD

Morton N. Swartz, MD Academy Professor of Medicine (Microbiology and Molecular Genetics), Harvard Medical School; Chief, Division of Infectious Diseases, Massachusetts General Hospital, Boston [122]

Michael V. Callahan, MD, DTM&H (UK), MSPH

Clinical Associate Physician, Division of Infectious Diseases, Massachusetts General Hospital; Program Manager, Biodefense, Defense Advanced Research Project Agency (DARPA), United States Department of Defense, Washington [19]

Michael Camilleri, MD

Atherton and Winifred W. Bean Professor; Professor of Medicine and Physiology, Mayo Clinic College of Medicine, Rochester [40]

Grant L. Campbell, MD, PhD

Division of Vector-Borne Infectious Diseases, National Center for Infectious Diseases, Centers for Disease Control and Prevention, U.S. Public Health Service, Laporte [152]

Christopher P. Cannon, MD

Associate Professor of Medicine, Harvard Medical School; Associate Physician, Cardiovascular Division, Senior Investigator, TIMI Study Group, Brigham and Women's Hospital, Boston [238]

Jonathan R. Carapetis, MBBS, PhD

Director, Menzies School of Health Research; Professor, Charles Darwin University, Australia [315]

Mark Carlson, MD, MA

Chief Medical Officer and Senior Vice President, Clinical Affairs, St. Jude Medical, Sylmar; Adjunct Professor of Medicine, Case Western Reserve University, Cleveland [21]

Charles B. Carpenter, MD

Professor of Medicine, Harvard Medical School; Senior Physician, Brigham and Women's Hospital, Boston [276]

Brian I. Carr, MD, PhD

Professor of Medicine, Thomas Jefferson University; Director of the Liver Tumor Program, Kimmel Cancer Center, Philadelphia [88]

Lisa B. Caruso, MD, MPH

Assistant Professor of Medicine, Boston Medical Center, Boston [9]

Arturo Casadevall, MD, PhD

Professor of Microbiology and Immunology and of Medicine; Chair, Department of Microbiology and Immunology, Albert Einstein College of Medicine, New York [195]

Agustin Castellanos, MD

Professor of Medicine; Director, Clinical Electrophysiology, University of Miami Miller School of Medicine, Miami [267]

Stanley W. Chapman, MD

Professor of Medicine and Microbiology; Director, Division of Infectious Diseases; Vice-Chair for Academic Affairs, Department of Medicine, University of Mississippi School of Medicine, Jackson [194, 199]

Vinay Chaudhry, MD

Professor and Vice Chair, The Johns Hopkins University School of Medicine; Co-Director, EMG Laboratory, Johns Hopkins Hospital, Baltimore [379]

Lan X. Chen, MD

Clinical Assistant Professor of Medicine, University of Pennsylvania, Penn Presbyterian Medical Center & Philadelphia Veteran Affairs Medical Center, Philadelphia [327]

Yuan-Tsong Chen, MD

Distinguished Research Fellow and Director, Institute of Biomedical Sciences, Academia Sinica, Taiwan [356]

Glenn M. Chertow, MD

Professor of Medicine, Epidemiology and Biostatistics, University of California, San Francisco School of Medicine; Director, Clinical Services, Division of Nephrology, University of California, San Francisco Medical Center, San Francisco [273, 275]

John S. Child, MD

Director, Ahmanson-UCLA Adult Congenital Heart Disease Center; Streisand Professor of Medicine and Cardiology, David Geffen School of Medicine at UCLA, Los Angeles [229]

Yu Jo Chua, MBBS

Research Fellow (Medical Oncology), Royal Marsden Hospital, London [89]

Raymond T. Chung, MD

Associate Professor of Medicine, Harvard Medical School; Director of Hepatology, Massachusetts General Hospital; Medical Director, Liver Transplant Program, Massachusetts General Hospital, Boston [304]

Fredric L. Coe, MD

Professor of Medicine, University of Chicago, Chicago [281]

Jeffrey I. Cohen, MD

Chief, Medical Virology Section, Laboratory of Clinical Infectious Diseases, National Institute of Allergy and Infectious Diseases, National Institutes of Health, Bethesda [174, 184]

Ronit Cohen-Poradosu, MD

Channing Laboratory, Brigham and Women's Hospital, Boston [157]

Francis Collins, MD, PhD

Director, National Human Genome Research Institute, National Institutes of Health, Bethesda [79]

Wilson S. Colucci, MD

Thomas J. Ryan Professor of Medicine, Boston University School of Medicine; Chief, Cardiovascular Medicine, Boston University Medical Center, Boston [233, 234]

Max D. Cooper, MD

Professor of Medicine, Pediatrics, Microbiology, and Pathology, The University of Alabama at Birmingham, Birmingham [310, e27]

Michael J. Corbel, PhD, DSc(Med), FIBiol

Head, Division of Bacteriology, National Institute for Biological Standards and Control, Potters Bar, United Kingdom [150]

Lawrence Corey, MD

Professor of Medicine and Laboratory Medicine; Chair of Medical Virology, University of Washington; Head, Program in Infectious Diseases, Fred Hutchinson Cancer Research Center, Seattle [172]

Felicia Cosman, MD

Associate Professor of Clinical Medicine, Columbia University College of Physicians and Surgeons; Medical Director, Clinical Research Center, Helen Hayes Hospital, West Haverstraw, New York [348]

Mark A. Creager, MD

Professor of Medicine, Harvard Medical School; Simon C. Fireman Scholar in Cardiovascular Medicine; Director, Vascular Center, Brigham and Women's Hospital, Boston [242, 243]

Philip E. Cryer, MD

Irene E. and Michael M. Karl Professor of Endocrinology and Metabolism in Medicine, Washington University, St. Louis [339]

xxiv David Cunningham, MD

Professor of Cancer Medicine, Institute of Cancer Research; Consultant Medical Oncologist, Head of Gastrointestinal Unit, Royal Marsden Hospital, London [89]

John J. Cush, MD

Director of Clinical Rheumatology, Baylor Research Institute; Professor of Medicine and Rheumatology, Baylor University Medical Center, Dallas [325]

Malwina Czarny-Ratajczak, PhD

Research Assistant Professor, Center for Gene Therapy, Tulane University Health Sciences Center, Tulane University, New Orleans [357]

Charles A. Czeisler, MD, PhD

Baldino Professor of Sleep Medicine, and Director, Division of Sleep Medicine, Harvard Medical School; Chief, Division of Sleep Medicine, Department of Medicine, Brigham and Women's Hospital, Boston [28]

Marinos C. Dalakas, MD

Professor of Neurology; Chief, Neuromuscular Diseases Section, NINDS, National Institute of Health, Bethesda [383]

Josep Dalmau, MD, PhD

Professor of Neurology, Division Neuro-Oncology, Department of Neurology, Philadelphia [97]

Daniel F. Danzl, MD

Professor and Chair, Department of Emergency Medicine, University of Louisville School of Medicine, Louisville [20]

Emily Darby, MD

Senior Fellow, Division of Infectious Diseases, University of Washington, Seattle [153]

Robert B. Daroff, MD

Gilbert W. Humphrey Professor of Neurology and Interim Chair, Department of Neurology, Case Western Reserve University School of Medicine and University Hospitals Case Medical Center, Cleveland [22]

Charles E. Davis, MD

Professor of Pathology and Medicine Emeritus, University of California San Diego School of Medicine; Director Emeritus, Microbiology Laboratory, University of California San Diego Medical Center, San Diego [e16]

Mahlon R. DeLong, MD

Timmie Professor of Neurology, Emory University School of Medicine, Atlanta [366]

John Del Valle, MD

Professor and Senior Associate Chair of Graduate Medical Education, Department of Internal Medicine, Division of Gastroenterology, University of Michigan Health System, Ann Arbor [287]

Marie B. Demay, MD

Associate Professor of Medicine, Harvard Medical School; Associate Physician, Massachusetts General Hospital, Boston [346]

Bradley M. Denker,

Associate Professor of Medicine, Harvard Medical School; Physician, Brigham and Women's Hospital; Chief of Nephrology, Harvard Vanguard Medical Associates, Boston [45]

David W. Denning, MBBS

Professor of Medicine and Medical Mycology, University of Manchester; Director, Regional Mycology Laboratory, Manchester Education and Research Centre, Wythenshawe Hospital, Manchester, United Kingdom [197]

David T. Dennis, MD, MPH

Faculty Affiliate, Department of Microbiology, Immunology and Pathology, Colorado State University; Medical Epidemiologist, Division of Influenza, Centers for Disease Control and Prevention, Atlanta [152, 165]

Robert J. Desnick, MD, PhD

Professor and Chair, Department of Genetics and Genomic Sciences, Mount Sinai School of Medicine of New York University, New York [352]

Betty Diamond, MD

Chief, Autoimmune Disease Center, The Feinstein Institute for Medical Research, New York [312]

Jules L. Dienstag, MD

Carl W. Walter Professor of Medicine and Dean for Medical Education, Harvard Medical School; Physician, Gastrointestinal Unit, Massachusetts General Hospital, Boston [298–300, 304, e26]

William P. Dillon, MD

Professor of Radiology, Neurology, and Neurosurgery; Vice-Chair, Department of Radiology; Chief, Neuroradiology, University of California, San Francisco [362, e30]

Charles A. Dinarello, MD

Professor of Medicine, University of Colorado Health Science Center, Denver [17]

Robert G. Dluhy, MD

Program Director, Fellowship in Endocrinology; Professor of Medicine, Brigham and Women's Hospital, Harvard Medical School; Associate Editor, New England Journal of Medicine, Boston [336]

Raphael Dolin, MD

Maxwell Finland Professor of Medicine (Microbiology and Molecular Genetics); Dean for Academic and Clinical Programs, Harvard Medical School, Boston [171, 179, 180]

Neil J. Douglas, MD

Professor of Respiratory and Sleep Medicine, University of Edinburgh; Honorary Consultant Physician, Royal Infirmary of Edinburgh, United Kingdom [259]

Daniel B. Drachman, MD

Professor of Neurology & Neuroscience; WW Smith Charitable Trust Professor of Neuroimmunology, The Johns Hopkins University School of Medicine, Baltimore [381]

David F. Driscoll, PhD

Assistant Professor of Medicine, Harvard Medical School, Boston [73]

Thomas D. DuBose, Jr., MD

Tinsley R. Harrison Professor and Chair of Internal Medicine; Professor of Physiology and Pharmacology, Wake Forest University School of Medicine, Winston-Salem [48]

J. Stephen Dumler, MD

Professor, Division of Medical Microbiology, Department of Pathology, The Johns Hopkins University School of Medicine and Immunology, The Johns Hopkins University Bloomberg School of Public Health, Baltimore [167]

Andrea E. Dunaif, MD

Charles F. Kettering Professor of Medicine and Chief, Division of Endocrinology, Metabolism, and Molecular Medicine, Northwestern University Feinberg School Medicine, Chicago [6]

Samuel C. Durso, MD, MBA

Associate Professor of Medicine, Clinical Director, Division of Geriatric Medicine and Gerontology, The Johns Hopkins University School of Medicine, Baltimore [32, e7]

Janice P. Dutcher, MD

Professor, New York Medical College; Associate Director, Our Lady of Mercy Cancer Center, Bronx [270]

Johanna Dwyer, DSc, RD

Professor of Medicine and Community Health, Tufts University School of Medicine and Friedman School of Nutrition Science and Policy; Senior Scientist Jean Mayer Human Nutrition Research Center on Aging at Tufts; Director of the Frances Stern Nutrition Center, Tufts-New England Medical Center Hospital, Boston [70]

Jeffery S. Dzieczkowski, MD

Physician, St. Alphonsus Regional Medical Center; Medical Director, Coagulation Clinic, Saint Alphonsus Medical Group/Internal Medicine, Boise [107]

Kim A. Eagle, MD

Albion Walter Hewlett Professor of Internal Medicine, Chief of Clinical Cardiology and Director, University of Michigan Cardiovascular Center, University of Michigan, Ann Arbor [8]

Robert H. Eckel, MD

Professor of Medicine, Division of Endocrinology, Metabolism and Diabetes, Division of Cardiology; Professor of Physiology and Biophysics; Charles A. Boettcher II Chair in Atherosclerosis; Program Director, Adult General Clinical Research Center, University of Colorado at Denver and Health Sciences Center; Director Lipid Clinic, University Hospital, Aurora [236]

John E. Edwards, Jr., MD

Chief, Division of Infectious Diseases, Harbor/University of California, Los Angeles Medical Center; Professor of Medicine, David Geffen School of Medicine at the University of California, Los Angeles, Torrance [191, 196]

David A. Ehrmann, MD

Professor of Medicine; Associate Director, University of Chicago General Clinical Research Center, Chicago [50]

Ezekiel J. Emanuel, MD, PhD

Chair, Department of Bioethics, The Warren G. Magnuson Clinical Center, National Institutes of Health, Bethesda [11]

Linda L. Emanuel, MD, PhD

Buehler Professor of Medicine; Director, Buehler Center on Aging, Health & Society, Northwestern University Feinberg School of Medicine, Chicago [11]

Joey English, MD, PhD

Assistant Professor of Neurology, University of California, San Francisco, San Francisco [364]

John W. Engstrom, MD

Professor of Neurology; Clinical Chief of Service; Neurology Residency Program Director, University of California, San Francisco, San Francisco [16, 370]

Paul Farmer, MD, PhD

Maude and Lillian Presley Professor of Medical Anthropology, Department of Social Medicine, Harvard Medical School; Associate Chief, Division of Social Medicine and Health Inequalities, Brigham and Women's Hospital; Co-Founder, Partners In Health, Boston [2]

Anthony S. Fauci, MD, DSc (Hon), DM&S (Hon), DHL (Hon), DPS (Hon), DLM (Hon), DMS (Hon)

Chief, Laboratory of Immunoregulation; Director, National Institute of Allergy and Infectious Diseases, National Institutes of Health, Bethesda [1, 181, 182, 214, 308, 319, e28]

Murray J. Favus, MD

Professor of Medicine, Interim Head, Endocrine Section; Director, Bone Section, University of Chicago Pritzker School of Medicine, Chicago [281, 349]

David T. Felson, MD, MPH

Professor of Medicine and Epidemiology; Chief, Clinical Epidemiology Unit, Boston University, Boston [326]

Robert G. Fenton, MD, PhD

Staff Clinician, National Institute on Aging, National Institutes of Health, Baltimore [80]

Howard L. Fields, MD, PhD

Professor of Neurology; Director, Wheeler Center for Neurobiology of Addiction, University of California, San Francisco, San Francisco [12]

Gregory A. Filice, MD

Professor of Medicine, University of Minnesota; Chief, Infectious Disease Section, Minneapolis Veterans Affairs Medical Center, Minneapolis [155]

Robert Finberg, MD

Professor and Chair, Department of Medicine, University of Massachusetts Medical School, Worcester [82, 126]

Joyce Fingerroth, MD

Associate Professor of Medicine, Harvard Medical School, Boston [126]

Daniel J. Fink, MD, MPH

Associate Professor of Clinical Pathology, College of Physicians and Surgeons, Columbia University, New York [Appendix]

Jeffrey S. Flier, MD

Caroline Shields Walker Professor of Medicine, Harvard Medical School; Dean of the Faculty of Medicine, Harvard School of Medicine, Boston [74]

Agnes B. Fogo, MD

Professor of Pathology, Medicine and Pediatrics; Director, Renal/EM Division, Department of Pathology, Vanderbilt University Medical Center, Nashville [e9]

Sonia Friedman, MD

Assistant Professor of Medicine, Harvard Medical School; Associate Physician, Brigham and Women's Hospital, Boston [289]

Andre D. Furtado, MD

Associate Specialist at the Department of Radiology, Neuroradiology Section, University of California, San Francisco, San Francisco [e30]

Robert F. Gagel, MD

Professor of Medicine and Head, Division of Internal Medicine, University of Texas MD Anderson Cancer Center, Houston [345]

John I. Gallin, MD

Director, The Warren G. Magnuson Clinical Center, National Institutes of Health, Bethesda [61]

J. Michael Gaziano, MD, MPH

Chief, Division of Aging, Brigham and Women's Hospital; Director, Massachusetts Veterans Epidemiology, Research and Information Center (MAVERIC) and Geriatric Research, Education and Clinical Center (GRECC), Boston VA Healthcare System; Associate Professor of Medicine, Harvard Medical School, Boston [218]

Thomas A. Gaziano, MD, MSc

Instructor in Medicine, Harvard Medical School; Associate Physician of Cardiovascular Medicine, Brigham and Women's Hospital, Boston [218]

Susan L. Gearhart, MD

Assistant Professor of Colorectal Surgery and Oncology, The Johns Hopkins University School of Medicine, Baltimore [291, 292, 293, 294]

Robert H. Gelber, MD

Scientific Director, Leonard Wood Memorial Leprosy Research Center, Cebu, Philippines; Clinical Professor of Medicine and Dermatology, University of California, San Francisco, San Francisco [159]

Jeffrey A. Gelfand, MD

Professor of Medicine, Harvard Medical School; Physician, Department of Medicine, Massachusetts General Hospital, Boston [19, 204]

Alfred L. George, MD

Grant W. Liddle Professor of Medicine and Pharmacology; Chief, Division of Genetic Medicine, Department of Medicine, Vanderbilt University, Nashville [271]

Dale N. Gerding, MD

Assistant Chief of Staff for Research, Hines VA Hospital, Hines; Professor, Stritch School of Medicine, Loyola University, Maywood [123]

Anne Gershon, MD

Professor of Pediatrics, Columbia University College of Physicians and Surgeons, New York [185–187]

Marc Ghany, MD

Staff Physician, Liver Diseases Branch, National Institute of Diabetes and Digestive and Kidney Diseases, National Institutes of Health, Bethesda [295]

Raymond J. Gibbons, MD

Arthur M. and Gladys D. Gray Professor of Medicine, Mayo Clinic College of Medicine; Consultant, Cardiovascular Diseases, Mayo Clinic, Rochester [222, e20]

Bruce C. Gilliland,† MD

Professor of Medicine and Laboratory Medicine, University of Washington School of Medicine, Seattle [321, 329–331]

Roger I. Glass, MD, PhD

Director, Fogarty International Center; Associate Director for International Research, National Institutes of Health, Bethesda [183]

Eli Glatstein, MD

Morton M. Kligerman Professor and Vice Chairman, Clinical Director, Department of Radiation Oncology, University of Pennsylvania Medical Center, Philadelphia [216]

Robert M. Glickman, MD

Professor of Medicine, New York University School of Medicine, New York [44]

James F. Glockner, MD

Assistant Professor of Radiology, Mayo Clinic College of Medicine, Rochester [222]

Peter J. Goadsby, MD, PhD, DSc

Professor of Clinical Neurology, Institute of Neurology, Queen Square London; Professor of Neurology, Department of Neurology, University of California, San Francisco, San Francisco [15]

Ary L. Goldberger, MD

Professor of Medicine, Harvard Medical School; Associate Director, Division of Interdisciplinary Medicine and Biotechnology, Beth Israel Deaconess Medical Center, Boston [221, e19, e21]

Samuel Z. Goldhaber, MD

Professor of Medicine, Harvard Medical School; Director, Venous Thromboembolism Research Group, Director, Anticoagulation Service, and Senior Staff Cardiologist, Department of Medicine, Brigham and Women's Hospital, Boston [256]

†Deceased.

xxvi Ralph Gonzales, MD, MSPH

Professor of Medicine, Epidemiology and Biostatistics, University of California, San Francisco, San Francisco [31]

Douglas S. Goodin, MD

Professor of Neurology, University of California, San Francisco, San Francisco [375]

Raj K. Goyal, MD

Mallinckrodt Professor of Medicine, Harvard Medical School, Boston; Physician, VA Boston Healthcare and Beth Israel Deaconess Medical Center, West Roxbury [38, 286]

Gregory A. Grabowski, MD

The A. Graeme Mitchell Chair of Human Genetics; Professor, University of Cincinnati College of Medicine, Department of Pediatrics; Director, Division of Human Genetics, Cincinnati Children's Hospital Medical Center, Cincinnati [355]

Norton J. Greenberger, MD

Clinical Professor of Medicine, Harvard Medical School; Senior Physician, Brigham and Women's Hospital, Boston [305–307]

David E. Griffith, MD

Professor of Medicine; William A. and Elizabeth B. Moncrief Distinguished Professor, University of Texas Health Center, Tyler [161]

Rasim Gucalp, MD

Professor of Clinical Medicine, Albert Einstein College of Medicine, Montefiore Medical Center, Bronx [270]

Chadi A. Hage, MD

Assistant Professor of Medicine, Indiana University School of Medicine, Roudebush VA Medical Center, Pulmonary-Critical Care and Infectious Diseases, Indianapolis [192]

Bevra Hannahs Hahn, MD

Professor of Medicine; Chief of Rheumatology; Vice Chair, Department of Medicine, David Geffen School of Medicine, University of California, Los Angeles, Los Angeles [313]

Janet E. Hall, MD

Associate Professor of Medicine, Harvard Medical School; Associate Physician, Massachusetts General Hospital, Boston [51, 341]

Jesse B. Hall, MD

Professor of Medicine, Anesthesia & Critical Care; Section Chief, Pulmonary and Critical Care Medicine, University of Chicago, Chicago [261]

Scott A. Halperin, MD

Professor of Pediatrics and of Microbiology and Immunology, Dalhousie University, Halifax, Nova Scotia [142]

Raymond C. Harris, Jr., MD

Ann and Roscoe R. Robinson Professor of Medicine; Chief, Division of Nephrology & Hypertension, Department of Medicine, Vanderbilt University, Nashville [272]

Gavin Hart, MD, MPH

Director, STD Services, Royal Adelaide Hospital; Clinical Associate Professor, School of Medicine, Flinders University, Adelaide, South Australia, Australia [154]

Rudy Hartskeerl, PhD

Head, FAO/OIE, World Health Organization and National Leptospirosis Reference Centre, KIT Biomedical Research, Royal Tropical Institute, Amsterdam, The Netherlands [164]

William L. Hasler, MD

Professor of Medicine, Division of Gastroenterology, University of Michigan Health System, Ann Arbor [39, 284]

Terry J. Hassold, PhD

Eastlick Distinguished Professor, Washington State University, Pullman [63]

Joshua Hauser, MD

Assistant Professor of Medicine and Palliative Care; Assistant Director of the Beuler Center on Aging, Northwestern University, Chicago [11]

Stephen L. Hauser, MD

Robert A. Fishman Distinguished Professor and Chairman, Department of Neurology, University of California, San Francisco, San Francisco [1, 360, 361, 371, 372, 375, 380, e32]

Barton F. Haynes, MD

Frederic M. Hanes Professor of Medicine and Immunology, Departments of Medicine and Immunology; Director, Duke Human Vaccine Institute, Duke University School of Medicine, Durham [308]

Douglas C. Heimburger, MD, MS

Professor of Nutrition Sciences; Professor of Medicine; Director, Clinical Nutrition Fellowship Program, University of Alabama at Birmingham, Birmingham [72]

J. Claude Hemphill III, MD, MAS

Associate Professor of Clinical Neurology and Neurological Surgery, University of California, San Francisco; Director, Neurocritical Care Program, San Francisco General Hospital, San Francisco [269]

Patrick H. Henry, MD

Adjunct Clinical Professor of Medicine, University of Iowa, Iowa City [60]

Barbara L. Herwaldt, MD, MPH

Medical Epidemiologist, Division of Parasitic Diseases, Centers for Disease Control and Prevention, Atlanta [205]

Katherine A. High, MD

William H. Bennett Professor of Pediatrics, University of Pennsylvania School of Medicine; Investigator, Howard Hughes Medical Institute, The Children's Hospital of Philadelphia, Philadelphia [65, 110]

Martin S. Hirsch, MD

Professor of Medicine, Harvard Medical School; Professor of Immunology and Infectious Diseases, Harvard School of Public Health; Physician, Massachusetts General Hospital, Boston [175]

Helen H. Hobbs, MD

Investigator, Howard Hughes Medical Institute; Professor of Internal Medicine and Molecular Genetics, University of Texas Southwestern Medical Center, Dallas [350]

Judith S. Hochman, MD

Harold Synder Family Professor of Cardiology; Clinical Chief, the Leon H. Charney Division of Cardiology; New York University School of Medicine; Director, Cardiovascular Clinical Research, New York [226]

Elizabeth L. Hohmann, MD

Associate Professor of Medicine and Infectious Diseases, Harvard Medical School, Massachusetts General Hospital, Boston [132]

A. Victor Hoffbrand, DM

Emeritus Professor of Haematology, Royal Free and University College, London [100]

Steven M. Holland, MD

Senior Investigator and Head, Immunopathogenesis Unit, Clinical Pathophysiology Section, Laboratory of Host Defenses, National Institute of Allergy and Infectious Diseases, National Institutes of Health, Bethesda [61]

King K. Holmes, MD, PhD

William H. Foege Chair, Department of Global Health; Director, Center for AIDS and STD; Professor of Medicine and Global Health, University of Washington; Head, Infectious Diseases, Harborview Medical Center, Seattle [124]

Jay H. Hoofnagle, MD

Director, Liver Diseases Research Branch, Division of Digestive Diseases and Nutrition, National Institute of Diabetes and Digestive and Kidney Diseases, National Institutes of Health, Bethesda [295]

Robert J. Hopkin, MD

Assistant Professor of Clinical Pediatrics, The University of Cincinnati College of Medicine; Division and Program in Human Genetics, Cincinnati Children's Hospital Research Foundation, Cincinnati [355]

Jonathan C. Horton, MD, PhD

William F. Hoyt Professor of Neuro-Ophthalmology; Professor of Ophthalmology, Neurology, and Physiology, University of California, San Francisco, San Francisco [29]

Howard Hu, MD, MPH, ScD

NSF International Chair, Department of Environmental Health Sciences; Professor of Environmental Health, Epidemiology and Medicine, University of Michigan Schools of Public Health and Medicine, Ann Arbor [e34]

Gary W. Hunninghake, MD

Sterba Professor of Medicine; Director, Division of Pulmonary, Critical Care and Occupational Medicine; Director, Institute for Clinical and Translational Science; Director, Graduate Program in Translational Biomedicine; Senior Associate Dean for Clinical and Translational Science, Iowa City [249]

Sharon A. Hunt, MD

Professor, Cardiovascular Medicine, Stanford University, Palo Alto [228]

Charles G. Hurst, MD

Chief, Chemical Casualty Care Division, United States Medical Research Institute of Chemical Defense, Maryland [215]

Steven E. Hyman, MD

Provost, Harvard University; Professor of Neurobiology, Harvard Medical School, Boston [385]

David H. Ingbar, MD

Professor of Medicine, Physiology & Pediatrics; Director, Pulmonary, Allergy, Critical Care & Sleep Division; Executive Director, Center for Lung Science & Health, University of Minnesota School of Medicine; Co-Director, Medical ICU & Respiratory Care, University of Minnesota Medical Center, Fairview [266]

Edward P. Ingenito, MD, PhD

Assistant Professor, Harvard Medical School, Boston [263]

Mark A. Israel, MD

Professor of Pediatrics and Genetics, Dartmouth Medical School; Director, Norris Cotton Cancer Center, Dartmouth-Hitchcock Medical Center, Lebanon [374]

Alan C. Jackson, MD, FRCPC

Professor of Medicine (Neurology) and of Medical Microbiology, University of Manitoba; Section Head of Neurology, Winnipeg Regional Health Authority, Winnipeg, Manitoba, Canada [188]

Richard F. Jacobs, MD, FAAP

President, Arkansas Children's Hospital Research Institute; Horace C. Cabe Professor of Pediatrics, University of Arkansas for Medical Sciences, College of Medicine, Little Rock [151]

J. Larry Jameson, MD, PhD

Professor of Medicine; Vice President for Medical Affairs and Lewis Landsberg Dean, Northwestern University Feinberg School of Medicine, Chicago [1, 62, 64, 96, 332, 333, 335, 340, 343, e29]

Robert T. Jensen, MD

Chief, Digestive Diseases Branch, National Institute of Diabetes, Digestive and Kidney Diseases, National Institutes of Health, Bethesda [344]

Camilo Jimenez, MD

Assistant Professor, Department of Endocrine Neoplasia & Hormonal Disorders, The University of Texas, MD Cancer Center, Houston [345]

Eric C. Johannsen, MD

Assistant Professor, Department of Medicine, Harvard Medical School; Associate Physician, Division of Infectious Diseases, Brigham and Women's Hospital, Boston [188]

Bruce E. Johnson, MD

Director, Lowe Center for Thoracic Oncology, Department of Medical Oncology; Dana-Farber Cancer Institute, Department of Medicine, Brigham and Women's Hospital; Professor of Medicine, Harvard Medical School, Boston [96]

James R. Johnson, MD

Professor of Medicine, University of Minnesota, Minneapolis [143]

Stuart Johnson, MD

Associate Professor, Stritch School of Medicine, Loyola University, Maywood; Staff Physician, Hines VA Hospital, Hines [123]

S. Claiborne Johnston, MD, PhD

Professor, Neurology; Professor, Epidemiology and Biostatistics; Director, University of California, San Francisco Stroke Service, San Francisco [364]

S. Andrew Josephson, MD

Assistant Clinical Professor of Neurology, University of California, San Francisco, San Francisco [26, e33]

Jorge L. Juncos, MD

Associate Professor of Neurology, Emory University School of Medicine; Director of Neurology, Wesley Woods Hospital, Atlanta [366]

Eric Kandel, MD

University Professor; Fred Kavli Professor and Director, Kavli Institute for Brain Sciences; Senior Investigator, Howard Hughes Medical Institute, Columbia University, New York [385]

Marshall M. Kaplan, MD

Professor of Medicine, Tufts University School of Medicine; Chief Emeritus, Division of Gastroenterology, Tufts-New England Medical Center, Boston [43, 296]

Adolf W. Karchmer, MD

Professor of Medicine, Harvard Medical School, Boston [118]

Dennis L. Kasper, MD, MA (Hon)

William Ellery Channing Professor of Medicine, Professor of Microbiology and Molecular Genetics, Harvard Medical School; Director, Channing Laboratory, Department of Medicine, Brigham and Women's Hospital, Boston [1, 113, 115, 121, 135, 140, 157]

Lloyd H. Kasper, MD

Professor of Medicine and Microbiology/Immunology; Co-Director, Program in Immunotherapeutics, Dartmouth Medical School, Lebanon [207]

Daniel Kastner, MD, PhD

Chief, Genetics and Genomic Section, National Institute of Arthritis and Musculoskeletal and Skin Diseases, National Institutes of Health, Bethesda [323]

Elaine T. Kaye, MD

Clinical Assistant Professor of Dermatology, Harvard Medical School; Assistant in Medicine, Department of Medicine, Children's Hospital Medical Center, Boston [18, e5]

Kenneth M. Kaye, MD

Associate Professor of Medicine, Harvard Medical School; Associate Physician, Division of Infectious Diseases, Brigham and Women's Hospital, Boston [18, e5]

Jack A. Kessler, MD

Davis Professor of Stem Cell Biology; Chairman, Davis Department of Neurology, Northwestern University Feinberg School of Medicine, Chicago [67]

Gerald T. Keusch, MD

Associate Provost and Associate Dean for Global Health, Boston University School of Medicine, Boston [116, 149]

Jay S. Keystone, MD, FRCPC

Professor of Medicine, University of Toronto; Staff Physician, Centre for Travel and Tropical Medicine, Toronto General Hospital, Toronto [117]

Sundeep Khosla, MD

Professor of Medicine and Physiology, Mayo Clinic College of Medicine, Rochester [47]

Elliott Kieff, MD, PhD

Harriet Ryan Albee Professor of Medicine and Microbiology and Molecular Genetics, Harvard Medical School; Senior Physician, Brigham and Women's Hospital, Boston [170]

Jim Yong Kim, MD, PhD

Chief, Division of Social Medicine and Health Inequalities, Brigham and Women's Hospital; Director and Professor, François Xavier Bagnoud Center for Health and Human Rights, Harvard School of Public Health; Professor of Social Medicine and Chair, Department of Social Medicine, Harvard Medical School, Boston [2]

Talmadge E. King, Jr., MD

Constance B. Wofsy Distinguished Professor and Interim Chair, Department of Medicine, University of California, San Francisco, San Francisco [255]

Louis V. Kirchhoff, MD, MPH

Professor, Departments of Internal Medicine and Epidemiology, University of Iowa; Staff Physician, Department of Veterans Affairs Medical Center, Iowa City [206]

Joel N. Kline, MD, MSc

Professor, Internal Medicine and Occupational & Environmental Health; Director, University of Iowa Asthma Center, Iowa City [249]

Minoru S. H. Ko, MD, PhD

Senior Investigator & Chief, Developmental Genomics & Aging Section, Laboratory of Genetics, National Institute on Aging, NIH, Baltimore [66]

Barbara A. Konkle, MD

Professor of Medicine and Hematology/Oncology, University of Pennsylvania; Director, Penn Comprehensive Hemophilia and Thrombosis Program, Philadelphia [59, 109]

xxviii **Peter Kopp, MD**

Associate Professor, Division of Endocrinology, Metabolism and Molecular Science, Northwestern University Feinberg School of Medicine, Chicago [62]

Walter J. Koroshetz, MD

Deputy Director, National Institute of Neurological Disorders and Stroke, National Institutes of Health, Bethesda [377]

Theodore A. Kotchen, MD

Associate Dean for Clinical Research; Director, General Clinical Research Center, Medical College of Wisconsin, Wisconsin [241]

Phyllis E. Kozarsky, MD

Professor of Medicine, Infectious Diseases; Co-Director, Travel and Tropical Medicine, Emory University School of Medicine, Atlanta [117]

Barnett S. Kramer, MD, MPH

Associate Director for Disease Prevention, Office of the Director, National Institutes of Health, Bethesda [78]

Stephen M. Krane, MD

Persis, Cyrus and Marlow B. Harrison Distinguished Professor of Medicine, Harvard Medical School, Massachusetts General Hospital, Boston [346]

Alexander Kratz, MD, PhD, MPH

Assistant Professor of Clinical Pathology, Columbia University College of Physicians and Surgeons; Associate Director, Core Laboratory, Columbia University Medical Center, New York-Presbyterian Hospital; Director, Allen Pavilion Laboratory, New York [Appendix]

John P. Kress, MD

Associate Professor of Medicine, Section of Pulmonary and Critical Care, University of Chicago, Chicago [261]

Patricia A. Kritek, MD, EdM

Instructor in Medicine, Harvard Medical School; Co-Director, Harvard Pulmonary and Critical Care Medicine Fellowship, Brigham and Women's Hospital, Boston [e24]

Henry M. Kronenberg, MD

Chief, Endocrine Unit, Massachusetts General Hospital; Professor of Medicine, Harvard Medical School, Boston [346]

Robert F. Kushner, MD

Professor of Medicine, Northwestern University Feinberg School of Medicine, Chicago [75]

Loren Laine, MD

Professor of Medicine, Keck School of Medicine, University of Southern California, Los Angeles [42]

Anil K. Lalwani, MD

Mendik Foundation Professor and Chairman, Department of Otolaryngology; Professor, Department of Pediatrics; Professor, Department of Physiology and Neuroscience, New York University School of Medicine, New York [30]

H. Clifford Lane, MD

Clinical Director; Director, Division of Clinical Research; Deputy Director, Clinical Research and Special Projects; Chief, Clinical and Molecular Retrovirology Section, Laboratory of Immunoregulation, National Institute of Allergy and Infectious Diseases, National Institutes of Health, Bethesda [182, 214]

Carol A. Langford, MD, MHS

Associate Professor of Medicine; Director, Center for Vasculitis Care and Research, Department of Rheumatic and Immunologic Diseases, Cleveland Clinic, Cleveland [319, 321, 329–331, e28]

Wei C. Lau, MD

Associate Professor; Medical Director, Cardiovascular Center Operating Rooms; Director, Adult Cardiovascular Anesthesiology, Ann Arbor [8]

Thomas J. Lawley, MD

William P. Timmie Professor of Dermatology; Dean, Emory University School of Medicine, Atlanta [52, 23, 55, e10]

Thomas H. Lee, MD

Professor of Medicine, Harvard Medical School; Chief Executive Officer, Partners Community Health Care, Inc; Network President, Partners Health Care, Boston [13]

Bruce D. Levy, MD

Associate Professor of Medicine, Harvard Medical School; Pulmonary and Critical Care Medicine, Brigham and Women's Hospital, Boston [262]

Julia B. Lewis, MD

Professor of Medicine, Division of Nephrology and Hypertension, Department of Medicine, Vanderbilt University School of Medicine, Nashville [277]

Peter Libby, MD

Mallinckrodt Professor of Medicine, Harvard Medical School; Chief, Cardiovascular Medicine, Brigham and Women's Hospital, Boston [217, 235, e22]

Richard W. Light, MD

Professor of Medicine, Vanderbilt University, Nashville [257]

Christopher H. Linden, MD

Professor, Department of Emergency Medicine, Division of Medical Toxicology, University of Massachusetts Medical School, Worcester [e35]

Robert Lindsay, MD, PhD

Professor of Clinical Medicine, Columbia University College of Physicians and Surgeons; Chief, Internal Medicine, Helen Hayes Hospital, West Haverhill, New York [348]

Marc E. Lippman, MD

Professor and Chair, Department of Medicine, University of Miami Leonard M. Miller School of Medicine, Miami [86]

Peter E. Lipsky, MD

Chief, Autoimmunity Branch, National Institute of Arthritis, Musculoskeletal, and Skin Diseases, National Institutes of Health, Department of Health and Human Services, Bethesda [312, 314, 325]

David A. Lipson, MD

Assistant Professor of Medicine, Pulmonary, Allergy & Critical Care Division, University of Pennsylvania Medical Center, King of Prussia [34, 345]

Kathleen D. Liu, MD, PhD, MCR

Assistant Professor, Division of Nephrology, San Francisco [273, 275]

Bernard Lo, MD

Professor of Medicine; Director, Program in Medical Ethics, University of California, San Francisco, San Francisco [e4]

Dan L. Longo, MD

Scientific Director, National Institute on Aging, National Institutes of Health, Bethesda and Baltimore [1, 58, 60, 68, 77, 80, 81, 105, 106, 181, e11–e13]

Nicola Longo, MD, PhD

Professor of Pediatrics; Chief, Division of Medical Genetics, Department of Pediatrics, University of Utah, Salt Lake City [358, 359]

Joseph Loscalzo, MD, PhD, MA (Hon)

Hersey Professor of the Theory and Practice of Medicine, Harvard Medical School; Chairman, Department of Medicine, Physician-in-Chief, Brigham and Women's Hospital, Boston [1, 36, 37, 217, 237, 242, 243]

Phillip A. Low, MD

Robert D and Patricia E Kern Professor of Neurology, Mayo Clinic College of Medicine, Rochester [370]

Daniel H. Lowenstein, MD

Professor of Neurology; Director, University of California, San Francisco Epilepsy Center; Associate Dean for Clinical/Translational Research, San Francisco [361, 363]

Elyse E. Lower, MD

Professor of Medicine, University of Cincinnati, Cincinnati [322]

Franklin D. Lowy, MD, PhD

Professor of Medicine and Pathology, Columbia University, College of Physicians & Surgeons, New York [129]

Sheila A. Lukehart, PhD

Professor of Medicine, University of Washington, Seattle [162, 163]

Lucio Luzzatto, MD, PhD

Professor of Hematology, University of Florence; Scientific Director, Istituto Toscano Tumori (ITT), Firenze, Italy [101]

Lawrence C. Madoff, MD

Associate Professor of Medicine, Harvard Medical School, Boston [113, 135, 328, e15]

James H. Maguire, MD, MPH

Professor and Director, International Health Division, Department of Epidemiology and Preventive Medicine, University of Maryland School of Medicine, Baltimore [392]