

The Official Compendia of Standards

USP 24

NF 19

U.S. Pharmacopeia & National Formulary

U.S. PHARMACOPEIA
The Standard of QualitySM

2000

USP 24

THE UNITED STATES PHARMACOPEIA

NF 19

THE NATIONAL FORMULARY

By authority of the United States Pharmacopeial Convention, Inc., meeting at Washington, D.C., March 9–12, 1995. Prepared by the Committee of Revision and published by the Board of Trustees

Official from January 1, 2000

UNITED STATES PHARMACOPEIAL CONVENTION, INC.
12601 Twinbrook Parkway, Rockville, MD 20852

NOTICE AND WARNING

Concerning U.S. Patent or Trademark Rights

The inclusion in the Pharmacopeia or in the National Formulary of a monograph on any drug in respect to which patent or trademark rights may exist shall not be deemed, and is not intended as, a grant of, or authority to exercise, any right or privilege protected by such patent or trademark. All such rights and privileges are vested in the patent or trademark owner, and no other person may exercise the same without express permission, authority, or license secured from such patent or trademark owner.

Concerning Use of USP or NF Text

Attention is called to the fact that USP and NF text is fully copyrighted. Authors and others wishing to use portions of the text should request permission to do so from the Secretary of the USPC Board of Trustees.

© 1999 The United States Pharmacopeial Convention, Inc.
12601 Twinbrook Parkway, Rockville, MD 20852.

All rights reserved

ISSN 0195-7996

ISBN 1-889788-03-1

Continuous Revision of the USP and the NF

The need for continuously refining specifications and updating standards is a natural consequence of the introduction of new drugs and the accelerated growth of knowledge in the pharmaceutical sciences.

In order to keep the *United States Pharmacopeia* and the *National Formulary* abreast of these developments and to maintain the official standards accordingly, the main volume is revised regularly by *Supplements*. *Interim Revision Announcements* are issued between *Supplements* as necessary.

Interim Revision Announcements pertaining to this volume of *USP* and *NF* are published in the journal, *Pharmaceutical Forum*. Reprints of *Interim Revision Announcements* are available on order. A single copy of each *Interim Revision Announcement* is available without charge for each subscription to *USP-NF*. Each request should be sent to USPC at the address shown below. Corrections and revisions included in *Interim Revision Announcements* are incorporated in the next regular *Supplement*.

Supplements to USP 24-NF 19 are issued serially as necessary, with the *Index* in the latest *Supplement* being fully cumulative with respect to all *Supplements* issued previously. Thus, in order to keep the compendia up to date, the user needs to keep all of the *Supplements*. Cumulation of the *Supplements* into a new main volume will occur whenever the amount of text in the *Supplements* becomes unwieldy for the user, or the logistics of publication so dictate. The publication cycle of main volumes may therefore vary from the five-year interval characteristic of new main volumes published since 1950.

An electronic version of the USP-NF is available. The complete text of USP is available in a fully searchable electronic format for ease of use. It allows the user to conduct searches that would not have been cost effective or possible with the printed format, and provides fully integrated up-to-date text as it is updated with each *Supplement*.

Inquiries, Comments, and Suggestions

for revisions in the *USP* or *NF* text should be addressed to USP:

12601 Twinbrook Parkway
Rockville, MD 20852 USA
Telephone: 1-301-881-0666

FAX: 1-301-816-8373
Telex: 710828-9787
Ordering Dept.: 1-800-227-8772

REVISION PROCESS FOR USP-NF STANDARDS

- Interested parties submit comments regarding compendial revisions.
- ↓
- Scientific staff liaison sends comments to Subcommittee for review/approval.
- ↓
- Revision proposal appears in *Pharmaceutical Forum* for public comment.
- ↓
- Comments on *PF* are reviewed by Subcommittee.
- ↓
- Subcommittee approves proposal for official adoption.
- ↓
- DSD Executive Committee approves official adoption.
- ↓
- Board of Trustees approves publication [fiduciary responsibility].

People

United States Pharmacopeial Convention

Officers (1995–2000)

Edwin D. Bransome, Jr., M.D.
President (1999–)
Augusta, GA

Jane E. Henney, M.D.
President (1995–1998)
Albuquerque, NM

John T. Fay, Jr., Ph.D.
Treasurer

San Clemente, CA

Mark Novitch, M.D.
Past President
Washington, DC

Jerome A. Halperin
Secretary
Rockville, MD

Board of Trustees (1995–2000)

Jordan L. Cohen, Ph.D.¹
Chair
Lexington, KY

Edwin D. Bransome, Jr., M.D.³
(1995–1999)
ex officio (1999–)
Augusta, GA

William H. Campbell, Ph.D.¹
Chapel Hill, NC

John T. Fay, Jr., Ph.D.
ex officio
San Clemente, CA

Jean Paul Gagnon, Ph.D.²
Kansas City, MO

Jane E. Henney, M.D.
ex officio (1995–1998)
Albuquerque, NM

Edward L. Langston, R.Ph., M.D.³
Rock Island, IL

Joseph A. Mollica, Ph.D.²
Princeton, NJ

Grace Powers Monaco, J.D.⁴
Burgess, VA

Mark Novitch, M.D.
ex officio
Washington, DC

Robert E. Vestal, M.D.³
(1999–)
Boise, ID

Edward Zalta, M.D.²
Newport Beach, CA

General Committee of Revision 1995–2000

Jerome A. Halperin,
Executive Vice President, USPC,
12601 Twinbrook Parkway
Rockville, MD 20852
Chair

Lee T. Grady, Ph.D.⁵
*Vice President and Director
of Standards Development*

Keith W. Johnson⁵
*Vice President and Director
of Information Development*

Lloyd V. Allen, Jr., Ph.D.
Oklahoma City, OK

Jerry R. Allison, Ph.D.⁶ (1995)
New Brunswick, NJ

Thomas J. Ambrosio, Ph.D.
Kenilworth, NJ

Ann B. Amerson, Pharm.D.
Lexington, KY

Gordon L. Amidon, Ph.D.
Ann Arbor, MI

Gregory E. Amidon, Ph.D.
Kalamazoo, MI

Henry L. Avallone
Titusville, NJ

Larry L. Augsburger, Ph.D.
Baltimore, MD

Leonard C. Bailey, Ph.D.
Piscataway, NJ

Jorge R. Barrio, Ph.D.
Los Angeles, CA

Gregory B. Bennett, Ph.D., M.B.A.
East Hanover, NJ

Terrence F. Blaschke, M.D.
Stanford, CA

Judy P. Boehlert, Ph.D.
Park Ridge, NJ

James C. Boylan, Ph.D.
Abbott Park, IL

R. Edward Branson, Ph.D.
Brookville, MD

William H. Briner, Capt.⁶ (1995–1998)
Durham, NC

Harry G. Brittain, Ph.D.
Milford, NJ

Paul M. Bummer, Ph.D. R.Ph.
Lexington, KY

Stephen R. Byrn, Ph.D.
West Lafayette, IN

Peter R. Byron, Ph.D.
Richmond, VA

Ronald J. Callahan, Ph.D.
Boston, MA

Herbert S. Carlin, D.Sc.
Califon, NJ

Culley C. Carson, M.D.
Chapel Hill, NC

Lester Chafetz, Ph.D.
Kansas City, MO

Yie W. Chien, Ph.D.
Piscataway, NJ

Henry M. Chilton, Pharm.D.
Winston-Salem, NC

Zak T. Chowhan, Ph.D.
Hunt Valley, MD

Sebastian G. Ciancio, D.D.S.
Buffalo, NY

Patricia E. Cole, Ph.D., M.D.
Stony Brook, NY

David S. Cooper, M.D.
Baltimore, MD

Murray S. Cooper, Ph.D.
Islamorada, FL

William A. Craig, M.D.
Madison, WI

Stephanie Y. Crawford, Ph.D.
Chicago, IL

Edward M. Croom, Ph.D.
University, MS

Ian E. Davidson, Ph.D., M.B.A.
Kansas City, MO

Leon Ellenbogen, Ph.D.
Wayne, NJ

Hans Fisher, Ph.D. (1995–1998)
New Brunswick, NJ

Edward A. Fitzgerald, Ph.D.
Rockville, MD

Everett Flanigan, Ph.D.
Kankakee, IL

¹ Representing pharmacy.

² At large.

³ Representing medicine.

⁴ Public member.

⁵ 12601 Twinbrook Parkway
Rockville, MD 20852.

⁶ Deceased.

- Thomas S. Foster, Pharm.D.**
Lexington, KY
- C. David Fox, Ph.D.**
Rouses Point, NY
- Sylvan G. Frank, Ph.D.**
Columbus, OH
- David O. Freedman, M.D.**
Birmingham, AL
- Joseph F. Gallelli, Ph.D.**
Bethesda, MD
- Barry D. Garfinkle, Ph.D.**
West Point, PA
- Robert L. Garnick, Ph.D.**
So. San Francisco, CA
- John Christian Gillin, M.D.**
San Diego, CA
- Douglas D. Glover, R.Ph., M.D.**
Morgantown, WV
- Alan M. Goldberg, Ph.D.**
Baltimore, MD
- Dennis K.J. Gorecki, Ph.D.**
Saskatoon, Saskatchewan, CANADA
- Robert M. Guthrie, M.D.**
Columbus, OH
- Samir A. Hanna, Ph.D.**
Lawrenceville, NJ
- Stanley L. Hem, Ph.D.**
West Lafayette, IN
- Evelyn V. Hess, M.D., F.A.C.P., M.A.C.R.**
Cincinnati, OH
- Joy Hochstadt, Ph.D.**
New York, NY
- Richard D. Johnson, Ph.D., Pharm.D.**
Kansas City, MO
- Joy Joseph (1998–)**
San Fernando, CA
- H. Thomas Karnes, Ph.D.**
Richmond, VA
- David B. Katague, Ph.D.**
Rockville, MD
- Rosalyn C. King, Pharm.D., M.P.H.**
Silver Spring, MD
- Gordon L. Klein, M.D., M.P.H.**
Galveston, TX
- Harvey G. Klein, M.D.**
Bethesda, MD
- Joseph E. Knapp, Ph.D.**
Pittsburgh, PA
- Michael S. Korczynski, Ph.D.**
Baltimore, MD
- Helen F. Krause, M.D.**
Pittsburgh, PA
- Paul Kucera, Ph.D.**
Pearl River, NY
- Pauline M. Lacroix, M.S.**
Ottawa, Ontario, CANADA
- Vernon C. Langston, D.V.M., Ph.D.**
Mississippi State, MS
- Thomas P. Layloff, Ph.D.**
St. Louis, MO
- Patricia D. Leinbach, Ph.D.**
Rockville, MD
- Herbert Letterman, Ph.D. (1998–)**
New Providence, NJ
- John W. Levchuk, Ph.D.**
Rockville, MD
- Robert D. Lindeman, M.D.**
Albuquerque, NM
- Charles H. Lochmüller, Ph.D.**
Durham, NC
- Hugh E. Lockhart, Ph.D.**
East Lansing, MI
- Edward G. Lovering, Ph.D.**
Nepean, Ontario, CANADA
- Catherine M. MacLeod, M.D.**
Chicago, IL
- Carol S. Marcus, Ph.D., M.D.**
Torrance, CA
- Joan C. May, Ph.D.**
Rockville, MD
- Michael Mayersohn, Ph.D.**
Tucson, AZ
- Keith M. McErlane, Ph.D.**
Vancouver, BC, CANADA
- Thomas Medwick, Ph.D.**
Piscataway, NJ
- Robert F. Morrissey, Ph.D.**
New Brunswick, NJ
- Terry E. Munson**
Fairfax, VA
- Steven L. Nail, Ph.D.**
West Lafayette, IN
- Harold S. Nelson, M.D.**
Denver, CO
- David W. Newton, Ph.D.**
Winchester, VA
- Sharon J. Northup, Ph.D., M.B.A.**
Deerfield, IL
- Samuel W. Page, Ph.D.**
Washington, DC
- Garnet E. Peck, Ph.D.**
West Lafayette, IN
- Robert V. Petersen, Ph.D.**
Salt Lake City, UT
- Rosemary C. Polomano, Ph.D., M.S.N., R.N.**
Philadelphia, PA
- Ronald E. Reid, Ph.D.**
Vancouver, BC, CANADA
- Thomas P. Reinders, Pharm.D.**
Richmond, VA
- Christopher T. Rhodes, Ph.D.**
Kingston, RI
- Jim E. Riviere, D.V.M., Ph.D.**
Raleigh, NC
- George A. Robertson, Ph.D.**
Frederick, MD
- Joseph R. Robinson, Ph.D.**
Madison, WI
- Lary A. Robinson, M.D.**
Tampa, FL
- Harold N. Rode, Ph.D.**
Ottawa, Ontario, CANADA
- Dan M. Roden, M.D.**
Nashville, TN
- David B. Roll, Ph.D.**
Salt Lake City, UT
- Thomas W. Rosanske, Ph.D.**
Kansas City, MO
- Theodore J. Roseman, Ph.D.**
Round Lake, IL
- Peter C. Ruenitz, Ph.D.**
Athens, GA
- Sally S. Seaver, Ph.D.**
Concord, MA
- Gordon D. Schiff, M.D.**
Chicago, IL
- Paul L. Schiff, Jr., Ph.D.**
Pittsburgh, PA
- Ralph F. Shangraw, Ph.D.⁶ (1995–1998)**
Baltimore, MD
- Eli Shefter, Ph.D.**
La Jolla, CA
- Eric B. Sheinin, Ph.D.**
Rockville, MD
- Robert L. Siegle, M.D.**
San Antonio, TX
- Edward B. Silberstein, M.D.**
Cincinnati, OH
- Marilyn Dix Smith, Ph.D.**
Princeton, NJ
- Emil J. Staba, Ph.D.**
Minneapolis, MN
- Thomas E. Starzl, M.D., Ph.D.**
Pittsburgh, PA
- Robert S. Stern, M.D.**
Boston, MA
- James T. Stewart, Ph.D.**
Athens, GA
- Scott V.W. Sutton, Ph.D.**
Fort Worth, TX
- Dennis P. Swanson, M.S.**
Pittsburgh, PA
- Henry S.I. Tan, Ph.D.**
Cincinnati, OH
- Thomas D. Thomson, Ph.D., V.M.D.**
Greenfield, IN
- Clarence T. Ueda, Pharm.D., Ph.D.**
Omaha, NE
- Huib J.M. van de Donk, Ph.D.**
Bilthoven, THE NETHERLANDS
- Stanley van den Noort, M.D.**
Irvine, CA
- Joseph C. Veltri, Pharm.D.**
Salt Lake City, UT
- Robert E. Vestal, M.D.**
(1995–1999)
Boise, ID
- Irving W. Wainer, Ph.D.**
Washington, DC
- Philip D. Walson, M.D.**
Columbus, OH
- Elliott T. Weisman**
Philadelphia, PA
- Paul F. White, Ph.D., M.D.**
Dallas, TX
- Richard J. Whitley, M.D.**
Birmingham, AL
- Robert G. Wolfangel, Ph.D.**
St. Louis, MO
- Manfred E. Wolff, Ph.D.**
Laguna Beach, CA
- Marie Linda A. Workman, Ph.D., R.N.**
Cleveland, OH
- Wesley E. Workman, Ph.D.**
St. Louis, MO
- Timothy J. Wozniak, Ph.D.**
Indianapolis, IN
- Dale Eric Wurster, Ph.D.**
Iowa City, IA
- John W. Yarbro, M.D., Ph.D.**
Springfield, IL
- Lynn C. Yeoman, Ph.D.**
Houston, TX
- Thom J. Zimmerman, M.D., Ph.D.**
Louisville, KY

Executive Committee of Revision

JEROME A. HALPERIN, *Chair*

Lester Chafetz, Ph.D.; Joseph F. Gallelli, Ph.D.; Gordon L. Klein, M.D., M.P.H.; Robert D. Lindeman, M.D.; Carol S. Marcus, Ph.D., M.D.; Joseph R. Robinson, Ph.D.

USP Nomenclature Committee

HERBERT S. CARLIN, D.Sc., *Chair*

William M. Heller, Ph.D., *Consultant/Advisor*

Ann B. Amerson, Pharm.D.; Lester Chafetz, Ph.D.; Stephanie Y. Crawford, Ph.D.; Everett Flanigan, Ph.D.; Douglas D. Glover, R.Ph., M.D.; Richard D. Johnson, Ph.D., Pharm.D.; Edward G. Lovering, Ph.D.; Rosemary C. Polomano, Ph.D., M.S.N., R.N.; Thomas P. Reinders, Pharm.D.; Eric B. Sheinin, Ph.D.; Thomas D. Thomson, Ph.D., V.M.D.; Philip D. Walson, M.D.

Division of Standards Development Executive Committee

THOMAS P. LAYLOFF, Ph.D., *Chair*

Gregory E. Amidon, Ph.D.; Judy P. Boehlert, Ph.D.; James C. Boylan, Ph.D.; William H. Briner, Capt.⁶ (1995–1998); Herbert S. Carlin, D.Sc.; Zak T. Chowhan, Ph.D.; Everett Flanigan, Ph.D.; Thomas S. Foster, Pharm.D.; Robert L. Garnick, Ph.D.; Dennis K.J. Gorecki, Ph.D.; Stanley L. Hem, Ph.D.; Joseph E. Knapp, Ph.D.; Paul Kucera, Ph.D. (1996–); Thomas P. Layloff, Ph.D.; Edward G. Lovering, Ph.D.; Thomas Medwick, Ph.D.; Sharon J. Northup, Ph.D., M.B.A.; David B. Roll, Ph.D. (1998–); Ralph F. Shangraw, Ph.D.⁶ (1995–1998); E. John Staba, Ph.D. (1995–1996); James T. Stewart, Ph.D.; Dennis P. Swanson, M.S. (1998–); Henry S.I. Tan, Ph.D.; Elliott T. Weisman

Division of Standards Development Subcommittees

ANT. Subcommittee on Antibiotics

HENRY S.I. TAN, Ph.D., *Chair*

Samir A. Hanna, Ph.D.; David B. Katague, Ph.D.; Paul Kucera, Ph.D.; Keith M. McErlane, Ph.D.; Jim E. Riviere, D.V.M., Ph.D.; Eli Shefter, Ph.D.; Eric B. Sheinin, Ph.D.; Thomas D. Thomson, Ph.D., V.M.D.

BBV. Subcommittee on Biopolymers, Bioproducts, and Vaccines

EVERETT FLANIGAN, Ph.D., *Chair*

Yie W. Chien, Ph.D.; Murray S. Copper, Ph.D.; Barry D. Garfinkle, Ph.D.; George A. Robertson, Ph.D.; Huib J.M. van de Donk, Ph.D.; Richard J. Whitley, M.D.; Manfred E. Wolff, Ph.D.

BGT. Subcommittee on Biotechnology and Gene Therapy

ROBERT L. GARNICK, Ph.D., *Chair*

R. Edward Branson, Ph.D.; Paul M. Bummer, Ph.D., R.Ph.; Patricia E. Cole, Ph.D., M.D.; Joseph F. Gallelli, Ph.D.; Harold N. Rode, Ph.D.; Sally S. Seaver, Ph.D.; Wesley E. Workman, Ph.D.; Lynn C. Yeoman, Ph.D.

CH1. Subcommittee on Chemistry 1

STANLEY L. HEM, Ph.D., *Chair*

Lloyd V. Allen, Jr., Ph.D.; H. Thomas Karnes, Ph.D.; Patricia D. Leinbach, Ph.D.; Joan C. May, Ph.D.; Thomas Medwick, Ph.D.; Thomas D. Thomson, Ph.D., V.M.D.

CH2. Subcommittee on Chemistry 2

DENNIS K.J. GORECKI, Ph.D., *Chair*

Gregory B. Bennett, Ph.D., M.B.A.; Lester Chafetz, Ph.D.; H. Thomas Karnes, Ph.D.; Charles H. Lochmüller, Ph.D.; Eli Shefter, Ph.D.; Marilyn Dix Smith, Ph.D.

CH3. Subcommittee on Chemistry 3

JUDY P. BOEHLERT, Ph.D., *Chair*

Stephen R. Byrn, Ph.D.; Ian E. Davidson, Ph.D., M.B.A.; Thomas P. Layloff, Ph.D.; Keith M. McErlane, Ph.D.; Peter C. Ruenitz, Ph.D.; Irving W. Wainer, Ph.D.

CH4. Subcommittee on Chemistry 4

ELLIOTT T. WEISMAN, *Chair*

Harry G. Brittain, Ph.D.; Pauline M. Lacroix, M.S.; Thomas W. Rosanske, Ph.D.; Eric B. Sheinin, Ph.D.; Timothy J. Wozniak, Ph.D.

CH5. Subcommittee on Chemistry 5

EDWARD G. LOVERING, Ph.D., *Chair*

Leonard C. Bailey, Ph.D.; Peter R. Byron, Ph.D.; Charles H. Lochmüller, Ph.D.; James T. Stewart, Ph.D.; Robert G. Wolfangel, Ph.D.; Manfred E. Wolff, Ph.D.; Wesley E. Workman, Ph.D.

DBA. Subcommittee on Dissolution and Bioavailability

THOMAS S. FOSTER, PHARM.D., *Chair*

Gordon L. Amidon, Ph.D.; Stephen R. Byrn, Ph.D.; Michael Mayersohn, Ph.D.; Christopher T. Rhodes, Ph.D.; Joseph R. Robinson, Ph.D.; Thomas W. Rosanske, Ph.D.; Theodore J. Roseman, Ph.D.; Eli Shefter, Ph.D.; Clarence T. Ueda, Pharm.D., Ph.D.

EX1. Subcommittee on Excipients—Monographs

ZAK T. CHOWHAN, Ph.D., *Chair*

Larry L. Augsburger, Ph.D.; Peter R. Byron, Ph.D.; C. David Fox, Ph.D.; Sylvan G. Frank, Ph.D.; Joan C. May, Ph.D.; Garnet E. Peck, Ph.D.; Ralph F. Shangraw, Ph.D.

EX2. Subcommittee on Excipients—Methods

GREGORY E. AMIDON, Ph.D., *Chair*

Larry L. Augsburger, Ph.D.; Harry G. Brittain, Ph.D.; Stephen R. Byrn, Ph.D.; C. David Fox, Ph.D.; Garnet E. Peck, Ph.D.; Dale E. Wurster, Ph.D.

GEN. Subcommittee on General Chapters

THOMAS P. LAYLOFF, Ph.D., *Chair*

Judy P. Boehlert, Ph.D.; Irving W. Wainer, Ph.D.

MCB. Subcommittee on Microbiology

JOSEPH E. KNAPP, Ph.D., *Chair*

Henry L. Avallone; Murray S. Cooper, Ph.D.; Edward A. Fitzgerald, Ph.D.; Barry D. Garfinkle, Ph.D.; Michael S. Korczynski, Ph.D.; John W. Levchuk, Ph.D.; Robert F. Morrissey, Ph.D.; Terry E. Munson; Steven L. Nail, Ph.D.; Scott V.W. Sutton, Ph.D.; Huib J.M. van de Donk, Ph.D.

MPI. Subcommittee on Multisource Products Issues

JAMES T. STEWART, Ph.D., *Chair*

NAT. Subcommittee on Natural Products

E. JOHN STABA, Ph.D., *Chair* (1995–1996)

PAUL KUCERA, Ph.D., *Chair* (1996–)

Edward M. Croom, Ph.D.; David B. Katague, Ph.D.; Edward G. Lovering, Ph.D.; Samuel W. Page, Ph.D.; Paul L. Schiff, Jr., Ph.D.; E. John Staba, Ph.D.

NDN. Subcommittee on Nonprescription Drugs and Nutritional Supplements

RALPH F. SHANGRAW, Ph.D., *Chair*⁶ (1995–1998)

DAVID B. ROLL, Ph.D., *Chair* (1998–)

Larry L. Augsburger, Ph.D. (1998–); Leon Ellenbogen, Ph.D.; Hans Fisher, Ph.D. (1995–1998); Dennis K.J. Gorecki, Ph.D.; Joy Joseph (1998–); Herbert Letterman, Ph.D. (1998–); Edward G. Lovering, Ph.D.

PSD. Subcommittee on Packaging, Storage, and Distribution

THOMAS MEDWICK, Ph.D., *Chair*

Lloyd V. Allen, Jr., Ph.D.; Thomas J. Ambrosio, Ph.D.; Larry L. Augsburger, Ph.D.; Leonard C. Bailey, Ph.D.; Zak T. Chowhan, Ph.D.; Hugh E. Lockhart, Ph.D.; David W. Newton, Ph.D.; Christopher T. Rhodes, Ph.D.

RAD. Subcommittee on Radiopharmaceuticals

WILLIAM H. BRINER, Capt., *Chair* (1995–1998)

DENNIS P. SWANSON, M.S., *Chair* (1998–)

Jorge R. Barrio, Ph.D.; Ronald J. Callahan, Ph.D.; Henry M. Chilton, Pharm.D.; Edward B. Silberstein, M.D.; Robert G. Wolfgang, Ph.D.

TBC. Subcommittee on Toxicity, Biocompatibility, and Cell Culture

SHARON J. NORTHUP, Ph.D., M.B.A., *Chair*

Thomas J. Ambrosio, Ph.D.; Alan M. Goldberg, Ph.D.; Joy Hochstadt, Ph.D.; Robert V. Petersen, Ph.D.; Ronald E. Reid, Ph.D.; Peter C. Ruenitz, Ph.D.; Marie Linda A. Workman, Ph.D., R.N.

W&P. Subcommittee on Water and Parenterals

JAMES C. BOYLAN, Ph.D., *Chair*

Henry L. Avallone; Joseph F. Gallelli, Ph.D.; John W. Levchuk, Ph.D.; Terry E. Munson; Steven L. Nail, Ph.D.; David W. Newton, Ph.D.; Theodore J. Roseman, Ph.D.; Marie Linda A. Workman, Ph.D.; R.N.

USP Reference Standards Committee

LEE T. GRADY, Ph.D., *Chair, ex officio*

Judy P. Boehlert, Ph.D.; Zak T. Chowhan, Ph.D.; Everett Flanagan, Ph.D.; Stanley L. Hem, Ph.D.; Thomas P. Layloff, Ph.D.; Edward G. Lovering, Ph.D.; Sharon J. Northup, Ph.D.

USP-FDA Joint Committee on Bioequivalence

ROBERT A. RIPPERS, *Chair*

Representing FDA, Rockville, MD:

Ramakant M. Mhatre, Ph.D.; Larry A. Ouderkerk; Robert A. Rippers

Representing USP, Rockville, MD:

Thomas S. Foster, Pharm.D.; Lee T. Grady, Ph.D.; Barbara B. Hubert; Lewis J. Leeson, Ph.D.

USP-FDA Antibiotic Monograph Subcommittee

WILLIAM W. WRIGHT, Ph.D., *Chair*

Representing FDA, Rockville, MD:

Peter Dionne; Katharine A. Freeman; James M. Timper, Jr., M.S.; Robert A. Rippers

Representing USP, Rockville, MD:

Roger Dabbah, Ph.D.; Lee T. Grady, Ph.D.; William W. Wright, Ph.D.

Division of Standards Development Panels

Advisory Panel on Analytical Methods for Nonprescription Drugs and Nutritional Supplements

RALPH F. SHANGRAW, Ph.D., *Chair*, (1995–1998) Baltimore MD; HERBERT LETTERMAN, Ph.D., *Chair*, (1998–) New Providence, NJ; Norman W. Atwater, Ph.D., Columbus, NJ; David M. Baaske, Ph.D., Baltimore, MD; Frederick Bangert, Morrisville, NC; Ofelia Barretto, Buena Park, CA; Ira Berry, Union, NJ; Hemi Bhagwan, Ph.D., Nutley, NJ; Arthur D. Bond, Ph.D., Richmond, VA; Joy Joseph, San Fernando, CA; Marilyn Langley, Greenville, SC; Michael J. Lebel, Ottawa, Ontario, CANADA; Jeffery L. Otto, Ph.D., Arvada, CO; Walter A. Schulze, Carson, CA; Michael Smela, Jr., Rockville, MD; Paula Jo Meyer Stout, Ph.D., Morgantown, WV; Margaret A. Targove, Ph.D., Princeton, NJ; William VanMeter, Allegan, MI; George L. Walker, Memphis, TN

Advisory Panel on Compendial Items: Storage, Shipment, and Distribution

LEONARD C. BAILEY, Ph.D., *Chair*, Piscataway, NJ; Anthony Carfagno, Bethlehem, PA; Clyde R. Erskine, Newton Square, PA; Herbert Letterman, Ph.D., New Providence, NJ.

Advisory Panel on Gene and Cell Therapies

SALLY S. SEAVER, Ph.D., *Chair*, Concord, MA; Patricia E. Cole, Ph.D., M.D., Smithtown, NY; Steward Craig, Ph.D., Baltimore, MD; Gary C. DuMoulin, Ph.D., Cambridge, MA; Joyce D. Francis, Ph.D., Gaithersburg, MD; Joseph F. Gallelli, Ph.D., Bethesda, MD; Robert L. Garnick, Ph.D., So. San Francisco, CA; Richard D. Huhn, M.D., Bethesda, MD; Beth Hutchins, Ph.D., San Diego, CA; Ann Jakubowski, Ph.D., M.D., New York, NY; Andra Miller, Ph.D., Rockville, MD; Elizabeth J. Read, M.D., Bethesda, MD; Nancy C. Sajjadi, San Diego, CA; William E. Tente, Lincoln, RI; Joyce Frey Vasconcells, Ph.D., Rockville, MD

Advisory Panel on Identification and Standardization of Natural Products

PAUL L. SCHIFF, JR., Ph.D., *Chair*, Pittsburgh, PA; Dennis V.C. Awang, Ph.D., Ottawa, Ontario, CANADA; Ezio Bombardelli, Ph.D., Milan, ITALY (1997–); Robert P. Borris, Ph.D., Rahway, NJ (1995–1996); Werner Busse, Ph.D., Karlsruhe, GERMANY (1997–); Horace G. Cutler, Ph.D., Atlanta, GA; Jonathan W. DeVries, Ph.D., Minneapolis, MN; Patrick Dunn, Carson, CA; Gary W. Elmer, Ph.D., Seattle, WA; Fran S. Ertl, Long Beach, CA (1996–); Patrick Hoffman, Ph.D., Hunt Valley, MD; Charles D. Hufford, Ph.D., University, MS; Michael Ihrig, Ph.D., Eschborn, GERMANY; A. Douglas Kinghorn, Ph.D., Chicago, IL; Nahid Mokhtari-Rejali, Ph.D., Rockville, MD; William Popin, M.S., American Fork, UT (1997–); Amala Raman, Ph.D., London, UNITED KINGDOM; Rory P. Remmel, Ph.D., Minneapolis, MN (1995–1997); Brent Roth, Park City, UT (1996–1997); Walter A. Schulze, Carson, CA (1996–1997); Sidney J. Stohs, Ph.D., Omaha, NE

Expert Advisory Panel on Pharmacy Compounding Practices

THOMAS MEDWICK, Ph.D., *Chair*, Piscataway, NJ; Martin Golden, *Consultant/Coordinator*, Smyrna, DE; Lloyd V. Allen, Jr., Ph.D., Oklahoma City, OK; Suggy Chrai, Ph.D., East Windsor, NJ; Mary Ann Kirkpatrick, Richmond, VA; David Liebman, Baltimore, MD; Paul Lofholm, Pharm.D., Kentfield, CA; James R. Morse, Tucson, AZ; J. Graham Naim, Ph.D., Toronto, Ontario, CANADA; David W. Newton, Ph.D., Winchester, VA; Evelyn D. Timmons, Paradise Valley, AZ

Advisory Panel on Microbiological Control and Process Validation

JOSEPH E. KNAPP, Ph.D., *Chair*, Pittsburgh, PA; James E. Akers, Ph.D., Kansas City, MO; Michael J. Akers, Ph.D., Indianapolis,

IN; Wei-Wei Chang, Ph.D., Canton, MA; Richard Levy, Ph.D., Bedford, MA; Tibor Matula, Ph.D., Ottawa, Ontario, CANADA; T.C. Soli, Ph.D., Greenville, NC; Marlys E. Weary, Mount Prospect, IL

Advisory Panel on Multisource Products

JAMES T. STEWART, Ph.D., *Chair*, Athens, GA; Edward M. Cohen, Ph.D., Carmel, NY; Peter Jeffs, Ottawa, Ontario, CANADA; Lewis J. Leeson, Ph.D., Montville, NJ; Jeffery L. Otto, Ph.D., Arvada, CO; Sidney J. Smith, Ph.D., Markham, Ontario, CANADA; V. Subramanian, Ph.D., Northvale, NJ; Alice Till, Ph.D., Washington, DC; Vincent S. Venturella, Ph.D., Cedar Grove, NJ

Advisory Panel on Pharmacy Compounding General Chapter

MARY ANN KIRKPATRICK, *Chair*, Richmond, VA; Martin Golden, *Consultant/Coordinator*, Smyrna, DE; Suggy Chrai, Ph.D., East Windsor, NJ; Paul Lofholm, Pharm.D., Kenfield, CA; David W. Newton, Ph.D., Winchester, VA; Evelyn D. Timmons, Paradise Valley, AZ

Review Panel on Pharmacy Compounding Practices

THOMAS MEDWICK, Ph.D., *Chair*, Piscataway, NJ; Martin Golden, R.Ph. *Consultant/Coordinator*, Smyrna, DE; John W. Andrews, Winston Salem, NC; Daniel J. Jacob, Tucson, AZ; Nicholas G. Lordi, Ph.D., Piscataway, NJ; Timothy D. Moore, Columbus, OH; R. T. Moss, Jr., Florence, SC; Glynn G. Raymond, Ph.D., Albuquerque, NM; James A. Rogers, Ph.D., Edmonton, Alberta, CANADA; Howard L. Stark, Kansas City, MO; Judith E. Thompson, M.S., Madison, WI

Advisory Panel on Physical Test Methods

GREGORY E. AMIDON, Ph.D., *Chair*, Kalamazoo, MI; Michael S. Bergren, Ph.D., Kalamazoo, MI; David J.W. Grant, D.Phil., Minneapolis, MN; Keith Marshall, Ph.D., Brick, NJ; Shigeru Itai, Ph.D., Ohmiya-shi, Saitama, JAPAN

Advisory Panel on Polymeric Excipients

GARNET E. PECK, Ph.D., *Chair*, West Lafayette, IN; Tim D. Cabelka, Ph.D., Midland, MI; George Chen, Ph.D., Ridgefield, CT; Richard Fengl, Ph.D., Kingsport, TN; Bruno Hancock, Ph.D., Point-Claire-Dorval, Quebec, CANADA; James McGinity, Ph.D., Austin, TX; Kinam Park, Ph.D., West Lafayette, NJ; Stuart Porter, Ph.D., West Point, PA; Joseph Sieczkowski, Ph.D., Rockville, MD; Thomas A. Wheatley, Princeton, NJ

Review Panel on Spanish Translation of USP Text

SOLOMON STAVCHANSKY, Ph.D., *Chair*, Austin, TX; Aquiles Arancibia, Ph.D., Santiago, CHILE; Enrique Fefer, Ph.D., Washington, DC; Regina Pezoa, Ph.D., Santiago, CHILE; Marcelo Vernengo, Ph.D., Buenos Aires, ARGENTINA

DIVISION OF INFORMATION DEVELOPMENT

EXECUTIVE COMMITTEE

Robert E. Vestal, M.D., *Chair*
Ann B. Amerson, Pharm.D.
James C. Boylan, Ph.D.
Herbert S. Carlin, D. Sc.
Culley C. Carson III, M.D.
Sebastian G. Ciancio, D.D.S.
Evelyn V. Hess, M.D., F.A.C.P., M.A.C.R.
V. Cory Langston, D.V.M., Ph.D. Diplomate ACVCP
Catherine M. MacLeod, M.D.
Rosemary C. Polomano, Ph.D., M.S.N., R.N.
Thomas P. Reinders, Pharm.D.
Dan M. Roden, M.D.
Gordon D. Schiff, M.D.
Robert S. Stern, M.D.
Joseph C. Veltri, Pharm.D.

DIVISION OF INFORMATION DEVELOPMENT ADVISORY PANELS

Anesthesiology

Paul F. White, Ph.D., M.D., *Chair*, Dallas, TX; Charles J. Coté, M.D., Chicago, IL; Peter S.A. Glass, M.D., Durham, NC; Michele E. Gold, Ph.D., C.R.N.A., Beverly Hills, CA; Frederick J. Goldstein, Ph.D., Philadelphia, PA; Thomas K. Henthorn, M.D., Denver CO; Michael B. Howie, M.D., Columbus, OH; Robert J. Hudson, M.D., Winnipeg, Canada; Scott D. Kelley, M.D., San Francisco, CA; Susan K. Palmer, M.D., Aurora, CO; Carl E. Rosow, M.D., Ph.D., Boston, MA; Mark A. Schumacher, Ph.D., M.D., San Francisco, CA; Peter S. Sebel, Ph.D., Atlanta, GA; Mehernoor F. Watcha, M.D., Philadelphia, PA; Matthew B. Weinger, M.D., San Diego, CA; Richard B. Weiskopf, M.D., San Francisco, CA; David H. Wong, Pharm.D., M.D., Long Beach, CA

Blood and Blood Products

Harvey G. Klein, M.D., *Chair*, Bethesda, MD; James P. AuBuchon, M.D., Lebanon, NH; Morris A. Blajchman, M.D., Hamilton, Ontario, Canada; Marcela Contreras, M.D., London, England; Alfred J. Grindon, M.D., Atlanta, GA; Douglas A. Kennedy, Ph.D., Ottawa, Ontario, Canada; Craig M. Kessler, M.D., Washington, DC; Jukka Koistinen, M.D., Ph.D., Helsinki, Finland; Volker Kretschmer, M.D., Ph.D., Marburg, Germany; Margot S. Kruskall, M.D., Boston, MA; Naomi L.C. Luban, M.D., Washington, DC; Jay E. Menitove, M.D., Kansas City, MO; Paul M. Ness, M.D., Baltimore, MD; Henk W. Reesink, M.D., Ph.D., Amsterdam, The Netherlands; William T. Sawyer, M.S., Chapel Hill, NC; Karen A. Skalla, RN, MSN, AOCN, Brownsville, VT; Ronald G. Strauss, M.D., Iowa City, IA

Cardiovascular and Renal Drugs

Dan M. Roden, M.D., *Chair*, Nashville, TN; Jonathan Abrams, M.D., Albuquerque, NM; Joseph S. Alpert, M.D., Tucson, AZ;

Jerry L. Bauman, Pharm.D., Chicago, IL; Ellen D. Burgess, M.D., Calgary, Alberta, Canada; James H. Chesebro, M.D., New York, NY; Moses Chow, Pharm.D., Hartford, CT; Joseph Cinanni, M.D., Ottawa, Ontario, Canada; Peter B. Corr, Ph.D., St. Louis, MO; David J. Driscoll, M.D., Rochester, MN; Dwain L. Eckberg, M.D., Richmond, VA; Andrew E. Epstein, M.D., Birmingham, AL; Arthur M. Feldman, M.D., Ph.D., Pittsburgh, PA; Michael P. Frenneaux, M.D., Wales, England; William H. Frishman, M.D., Valhalla, NY; Edward D. Frohlich, M.D., New Orleans, LA; Donald B. Hunnighake, M.D., Minneapolis, MN; Joseph L. Izzo, Jr., M.D., Buffalo, NY; Norman M. Kaplan, M.D., Dallas, TX; Peter R. Kowey, M.D., Wynnewood, PA; Joseph Loscalzo, M.D., Ph.D., Boston, MA; Patrick A. McKee, M.D., Oklahoma City, OK; Juan Carlos Prieto, M.D., Santiago, Chile; Jane F. Schultz, R.N., M.S.N., Hayfield, MN; Alexander M.M. Shepherd, M.D., Ph.D., San Antonio, TX; Burton E. Sobel, M.D., Burlington, VT; Raymond L. Woosley, M.D., Ph.D., Washington, DC

Children and Medicines (Ad Hoc)

Janice M. Ozias, Ph.D., *Chair*, Austin, TX; Anna Birma Almarsdottir, Ph.D., Copenhagen, Denmark; Pilar Aramburuzabala, Ph.D., Segovia, Spain; Roger Bibace, Ph.D., Worcester, MA; Judith Igoe, RN, MS, FAAN, Denver, CO; Renée R. Jenkins, M.D., Washington, DC; Margo Kroshus, R.N., Rochester, MN; Colleen Lum Lung, R.N., MSN, CPNP, Littleton, CO; Carolyn H. Lund, R.N., San Francisco, CA; Robert O'Brien, Ph.D., Chevy Chase, MD; Robert H. Pantell, M.D., San Francisco, CA; Susan Schneider, M.P.H., Bethesda, MD; Bernard A. Sorofman, Ph.D., Iowa City, IA; Wayne A. Yankus, M.D., Midland Park, NJ

Clinical Toxicology/Substance Abuse

Joseph C. Veltri, Pharm.D., *Chair*, Salt Lake City, UT; Neal L. Benowitz, M.D., San Francisco, CA; Usoa E. Busto, Pharm.D., To-

ronto, Ontario, Canada; Timothy R. Dring, Woodbridge, NJ; David J. George, Ph.D., Madison, NJ; Edward P. Krenzelok, Pharm.D., Pittsburgh, PA; David C. Lewis, M.D., Providence, RI; Michael Montagne, Ph.D., Boston, MA; Claudio A. Naranjo, M.D., North York, Ontario, Canada; Edward J. Otten, M.D., Cincinnati, OH; Paul Pentel, M.D., Minneapolis, MN; Lorie G. Rice, San Francisco, CA; Elizabeth J. Scharman, Pharm.D., Charleston, WV; Michael W. Shannon, M.D., Boston, MA; Rose Ann G. Soloway, RN, MEd, ABAT, Washington, DC; Anthony C. Tommasello, M.S., Baltimore, MD; Theodore G. Tong, Pharm.D., Tucson, AZ; Alison M. Trinkoff, ScD, RN, Baltimore, MD; William A. Watson, Pharm.D., San Antonio, TX; Julian White, M.D., North Adelaide, Australia

Consumer Interest/Health Education

Gordon D. Schiff, M.D., *Chair*, Chicago, IL; Michael J. Ackerman, Ph.D., Bethesda, MD; Frank J. Ascione, Pharm.D., Ph.D., Ann Arbor, MI; Roger Bibace, Ph.D., Worcester, MA; Allan H. Bruckheim, M.D., Harrison, NY; Mary E. Carman, Ottawa, Ontario, Canada; Margaret A. Charters, Ph.D., Syracuse, NY; Laura J. Cranston, Fairfax Station, VA; Jennifer Cross, San Francisco, CA; David A. Danielson, Roslindale, MA; Sandra M. Fabregas, R.Ph., San Juan, PR; Sophia Jones-Redmond, Chicago, IL; Louis H. Kompare, Franklin, TN; Margo Kroshus, R.N., Rochester, MN; Bruce L. Lambert, Ph.D., Chicago, IL; Arthur Levin, M.P.H., New York, NY; Roberto Lopez Linares, Lima, Peru; Janet M. Manuel, Halifax, Nova Scotia, Canada; Frederick S. Mayer, R.Ph., M.P.H., San Rafael, CA; Jacqueline D. McLeod, M.P.H., New York, NY; Charles Medawar, London, England; Nancy Milio, Ph.D., Chapel Hill, NC; Michael A. Moné, Frankfort, KY; Janet Ohene-Frempong, Philadelphia, PA; James C. Wohlleb, Little Rock, AR

Critical Care Medicine

Catherine M. MacLeod, M.D., *Chair*, Glen Elly, IL; Robert A. Balk, M.D., Chicago, IL; Philip S. Barie, M.D., New York, NY; Thomas P. Bleck, M.D., Charlottesville, VA; Eugene Y. Cheng, M.D., Milwaukee, WI; Susan S. Fish, Pharm.D., M.P.H., Boston, MA; Edgar R. Gonzalez, Pharm.D., Richmond, VA; Angela M. Hadbavny, Pharm.D., Pittsburgh, PA; John W. Hoyt, M.D., Pittsburgh, PA; Louis J. Ling, M.D., Minneapolis, MN; Sheldon A. Magder, M.D., Montreal, Quebec, Canada; Daniel A. Notterman, M.D., Princeton, NJ; Sharon D. Peters, M.D., St. John's, Newfoundland; Domenic A. Sica, M.D., Richmond, VA; George A. Skowronski, New South Wales, Australia

Dentistry

Sebastian G. Ciancio, D.D.S., *Chair*, Buffalo, NY; B. Ellen Byrne, D.D.S., Ph.D., Richmond, VA; Barbara R. Clark, Pharm.D., Kansas City, MO; Frederick Curro, D.M.D., Ph.D., Jersey City, NJ; Tommy W. Gage, D.D.S., Ph.D., Dallas, TX; Daniel A. Haas, D.D.S., Ph.D., Toronto, Ontario, Canada; Richard E. Hall, D.D.S., Ph.D., Buffalo, NY; John T. Hamilton, Ph.D., London, Ontario, Canada; Angelo J. Mariotti, D.D.S., Ph.D., Columbus, OH; Linda C. Niessen, D.M.D., Dallas, TX; Clarence L. Trummel, D.D.S., Farmington, CT; Joel M. Weaver II, D.D.S., Ph.D., Columbus, OH; Clifford W. Whall, Jr., Ph.D., Chicago, IL; Raymond P. White, Jr., D.D.S., Ph.D., Chapel Hill, NC; Richard L. Wynn, Ph.D., Baltimore, MD; John A. Yagiela, D.D.S., Ph.D., Los Angeles, CA

Dermatology

Robert S. Stern, M.D., *Chair*, Boston, MA; Beatrice B. Abrams, Ph.D., East Hanover, NJ; Richard D. Baughman, M.D., Lebanon, NH; Mary-Margaret Chren, M.D., San Francisco, CA; Diane M. Cooper, Ph.D., R.N., Bay Pines, FL; Ponciano D. Cruz, M.D., Dallas, TX; Vincent Falanga, M.D., Miami, FL; James J. Ferry, Ph.D., Kalamazoo, MI; Vincent C. Ho, M.D., Vancouver, British Columbia, Canada; Donald P. Lookingbill, M.D., Jacksonville, FL; Stuart Maddin, M.D., Vancouver, British Columbia, Canada; Milton Orkin, M.D., Minneapolis, MN; Amy S. Paller, M.D., Chicago, IL; Jean-Claude Roujeau, M.D., Creteil Cedex, France; Neil H. Shear,

M.D., Toronto, Ontario, Canada; Celia A. Viets, M.D., Ottawa, Ontario, Canada; Dennis P. West, Ph.D., Chicago, IL

Diagnostic Agents—Nonradioactive

Robert L. Siegle, M.D., *Chair*, San Antonio, TX; Leonard M. Baum, R.Ph., Princeton, NJ; Martin J. K. Blomley, M.B., London, England; Robert C. Brasch, M.D., San Francisco, CA; Olivier Clement, M.D., Ph.D., Paris, France; Sachiko T. Cochran, M.D., Los Angeles, CA; Kathryn L. Grant, Pharm.D., Tucson, AZ; Kenneth D. Hopper, M.D., Hershey, PA; Fred T. Lee, Jr., M.D., Madison, WI; Robert F. Mattrey, M.D., San Diego, CA; James A. Nelson, M.D., Seattle, WA; Jovitas Skucas, M.D., Rochester, NY; Gerald L. Wolf, Ph.D., M.D., Charlestown, MA

Drug Utilization Review

Terrence F. Blaschke, M.D., *Chair*, Stanford, CA; David M. Angaran, R.Ph., Powell, OH; Edward P. Armstrong, Pharm.D., Tucson, AZ; Jim L. Blackburn, Pharm.D., Saskatoon, Saskatchewan, Canada; Catherine E. Burley, M.D., Fayetteville, GA; Patricia J. Byrns, M.D., Chicago, IL; Elizabeth A. Chrischilles, Ph.D., Iowa City, IA; Theodore M. Collins, R.Ph., Madison, WI; Robert P. Craig, Pharm.D., Scottsdale, AZ; W. Gary Erwin, Pharm.D., Radnor, PA; Stan N. Finklestein, M.D., Cambridge, MA; Catherine A. Harrington, Pharm.D., Ph.D., Fairfax, VA; Mark L. Horn, M.D., New York, NY; Judith K. Jones, M.D., Ph.D., Arlington, VA; Michael L. Kelly, R.Ph., Jackson, MS; Duane M. Kirking, Pharm.D., Ph.D., Ann Arbor, MI; Ann M. Koeniguer, R.Ph., Summerfield, NC; David Lee, M.D., Arlington, VA; Gary M. Levine, R.Ph., St. Louis, MO; Gladys Peachey, RN, MEd, MHSc, Dundas, Ontario, Canada; Eleanor M. Perfetto, Ph.D., Bethesda, MD; T. Donald Rucker, Ph.D., River Forest, IL; Daniel W. Saylak, D.O., Bryan, TX; Fredrica E. Smith, M.D., Los Alamos, NM; Brian L. Strom, M.D., M.P.H., Philadelphia, PA; Ilene H. Zuckerman, Pharm.D., Baltimore, MD

Endocrinology

David S. Cooper, M.D., *Chair*, Baltimore, MD; Robert L. Barbieri, M.D., Wellesley, MA; Stuart J. Brink, M.D., Waltham, MA; R. Keith Campbell, Pharm.D., Pullman, WA; Ernesto Canalis, M.D., Hartford, CT; Betty J. Dong, Pharm.D., San Francisco, CA; Shereen Ezzat, M.D., Toronto, Ontario, Canada; Lawrence A. Frohman, M.D., Chicago, IL; Steven R. Goldring, M.D., Boston, MA; Jerome M. Hershman, M.D., Los Angeles, CA; Robert G. Josse, M.B., Toronto, Ontario, Canada; Michael M. Kaplan, M.D., West Bloomfield, MI; Selma Kaplan, M.D., Ph.D., San Francisco, CA; Marvin E. Levin, M.D., Chesterfield, MO; Marvin M. Lipman, M.D., Scarsdale, NY; Daniel J. Marante, M.D., Miami, FL; Barbara J. Maschak-Carey, RN, Philadelphia, PA; Shlomo Melmed, M.D., Los Angeles, CA; Ronald P. Monsaert, M.D., Danville, PA; John E. Morley, M.B., B.Ch., St. Louis, MO; Paul Saenger, M.D., Bronx, NY; Mary Lee Vance, M.D., Charlottesville, VA; Leonard Wartofsky, M.D., Washington, DC

Family Practice

Robert M. Guthrie, M.D., *Chair*, Columbus, OH; John A. Brose, D.O., Athens, OH; Mark E. Clasen, M.D., Ph.D., Dayton, OH; Yves Garipey, Ste-Foy, Quebec, Canada; Sloan Karver, M.D., Wyomissing, PA; Joseph A. Lieberman III, M.D., Wilmington, DE; Charles D. Ponte, Pharm.D., Morgantown, WV; John W. Robinson, M.D., Salt Lake City, UT; Jack M. Rosenberg, Pharm.D., Ph.D., Hillsdale, NJ; Jorge E. Sanchez, M.D., San Salvador, El Salvador; John E. Thornburg, D.O., Ph.D., East Lansing, MI; Richard A. Wherry, M.D., Dahlonega, GA; Theodore L. Yarbboro, Sr., M.D., M.P.H., Sharon, PA

Gastroenterology

Gordon L. Klein, M.D., *Chair*, Galveston, TX; Karl E. Anderson, M.D., Galveston, TX; Paul Bass, Ph.D., Madison, WI; Adrian M. Di Bisceglie, M.D., St. Louis, MO; Jack A. DiPalma, M.D., Mobile, AL; Thomas Q. Garvey III, M.D., Potomac, MD; Flavio Habal, M.D., Ph.D., Toronto, Ontario, Canada; Eric G. Hassall, M.D., Vancouver, British Columbia, Canada; Alan F. Hofmann, M.D., La

Jolla, CA; Paul E. Hyman, M.D., Orange, CA; Agnes V. Klein, M.D., Ottawa, Ontario, Canada; James H. Lewis, M.D., Washington, DC; Bernard Mehl, D.P.S., New York, NY; Joel E. Richter, M.D., Cleveland, OH; William J. Snape, Jr., M.D., Long Beach, CA; C. Noel Williams, M.D., Halifax, Nova Scotia, Canada; Hyman J. Zimmerman, M.D., Bethesda, MD

Geriatrics

Robert E. Vestal, M.D., *Chair*, Boise, ID; Darrell R. Abernethy, M.D., Washington, DC; Mark H. Beers, M.D., West Point, PA; Robert A. Blouin, Pharm.D., Lexington, KY; S. George Carruthers, M.D., London, Ontario, Canada; Martin J. Connolly, M.D., Cheshire, England; Madeline Feinberg, Pharm.D., Silver Spring, MD; Jerry H. Gurwitz, M.D., Worcester, MA; Geri R. Hall, Ph.D., ARNP, CS, Fountain Hills, AZ; Martin D. Higbee, Pharm.D., Tucson, AZ; Brian B. Hoffman, M.D., Palo Alto, CA; Barbara A. Liu, M.D., North York, Canada, Ontario; Ann Miller, Morro Bay, CA; Paul A. Mitenko, M.D., Nanaimo, British Columbia, Canada; Janice B. Schwartz, M.D., Chicago, IL; Joanne G. Schwartz, M.D., Chicago, IL; William Simonson, Pharm.D., Portsmouth, VA; Daniel S. Sitar, Ph.D., Winnipeg, Manitoba, Canada; Alastair J.J. Wood, M.D., Nashville, TN; Carla Zeilmann, Pharm.D., St. Louis, MO

Hematologic and Oncologic Disease

John W. Yarbro, M.D., Ph.D., *Chair*, Columbia, MO; Joseph S. Bailes, M.D., Dallas, TX; Laurence H. Baker, D.O., Ann Arbor, MI; Edward Braud, M.D., Springfield, IL; Donald C. Doll, M.D., Columbia, MO; Ross C. Donehower, M.D., Baltimore, MD; Jan M. Ellerhorst-Ryan, R.N., Cincinnati, OH; Martha Harczy, M.D., Ottawa, Ontario, Canada; David T. Harris, M.D., Wynnewood, PA; Connie Henke Yarbro, R.N., Columbia, MO; Charles Hoppel, M.D., Cleveland, OH; B. J. Kennedy, M.D., Minneapolis, MN; Barnett S. Kramer, M.D., M.P.H., Bethesda, MD; Celeste Lindley, Pharm.D., Chapel Hill, NC; Michael J. Mastrangelo, M.D., Philadelphia, PA; Paulette Mehta, M.D., Gainesville, FL; Perry D. Nisen, M.D., Ph.D., Abbott Park, IL; David S. Rosenthal, M.D., Cambridge, MA; Roy L. Silverstein, M.D., New York, NY; Samuel G. Taylor, M.D., Chicago, IL; Raymond B. Weiss, M.D., Rockville, MD

Infectious Disease Therapy

William A. Craig, M.D., *Chair*, Madison, WI; P. Joan Chesney, M.D., Memphis, TN; C. Glenn Cobbs, M.D., Birmingham, AL; Courtney V. Fletcher, Pharm.D., Minneapolis, MN; Frederick G. Hayden, M.D., Charlottesville, VA; Carol A. Kauffman, M.D., Ann Arbor, MI; Marc LeBel, Pharm.D., Ste-Foy, Quebec, Canada; S. Ragnar Norrby, M.D., Ph.D., Lund, Sweden; Laszlo Palkonyay, M.D., Ottawa, Ontario, Canada; Douglas D. Richman, M.D., La Jolla, CA; Xavier Saez-Llorens, M.D., Miami, FL; Roy T. Steigbigel, M.D., Stony Brook, NY; Richard J. Whitley, M.D., Birmingham, AL

International Health

Rosalyn C. King, Pharm.D., M.P.H., *Chair*, Silver Spring, MD; Eugenie Brown, Pharm.D., Kingston, Jamaica; Laura Ceron, Pharm.D., Lima, Peru; Albin Chaves Matamoros, M.D., San Jose, Costa Rica; Gabriel Daniel, Washington, DC; Enrique Fefer, Ph.D., Rockville, MD; Peter H.M. Fontilus, Curacao, Netherlands Antilles; Reginald F. Gipson, M.D., M.P.H., Cairo, Egypt; Mariatou Tala Jallow, Pharm.D., Banjul, The Gambia; Mohan P. Joshi, M.D., Kathmandu, Nepal; David E. Kuhl, Pharm.D., Albuquerque, NM; Richard O. Laing, M.D., Boston, MA; Thomas Lapnet-Moustapha, Pharm.D., Yaounde, Cameroon; Denise Leclerc, Ph.D., Montreal, Quebec, Canada; Aissatou Lo, Dakar, Senegal; David Ofori-Adjei, M.D., Accra, Ghana; Dr. S. Ofosu-Amaah, Accra, Ghana; James Rankin, Arlington, VA; Dennis Ross-Degnan, Boston, MA; Budiono Santoso, M.D., Ph.D., Yogyakarta, Indonesia; Fela Viso Gurovich, Ph.D., Mexico City, Mexico; Krisantha Weerasuriya, M.D., Colombo, Sri Lanka; Albert I. Wertheimer, Ph.D., West Point, PA

Medication Counseling Behavior Guidelines (Ad Hoc)

Frank J. Ascione, Pharm.D., Ph.D., *Chair*, Ann Arbor, MI; John E. Arradondo, M.D., Nashville, TN; Candace Barnett, Atlanta, GA;

Allan H. Bruckheim, M.D., Harrison, NY; Mark E. Clasen, M.D., Ph.D., Dayton, OH; Frederick Curro, D.M.D., Ph.D., Jersey City, NJ; Robin DiMatteo, Ph.D., Riverside, CA; Diane B. Ginsburg, Austin, TX; Denise Grimes, Jackson, MI; Richard Herrier, Tucson, AZ; Barry Kass, R.Ph., Boston, MA; Thomas Kellenberger, Pharm.D., Montvale, NJ; Alice Kimball, Darnestown, MD; Patricia A. Kramer, B.Sc., Bismarck, ND; Patricia Kummeth, Rochester, MN; Ken Leibowitz, Philadelphia, PA; Colleen Lum Lung, R.N., MSN, CPNP, Littleton, CO; Louise Matte, B.Sc., B.Pharm., Montreal, Quebec, Canada; Amy Outlaw, Pharm.D., Stone Mountain, GA; Constance Pavlides, R.N., Rockville, MD; Scotti Russell, Richmond, VA; Lisa Tedesco, Ph.D., Ann Arbor, MI

Neurology

Stanley van den Noort, M.D., *Chair*, Irvine, CA; A. Leland Albright, M.D., Pittsburgh, PA; Elizabeth U. Blalock, M.D., Anaheim, CA; Mitchell F. Brin, M.D., New York, NY; Louis R. Caplan, M.D., Boston, MA; James C. Cloyd, Pharm.D., Minneapolis, MN; Mark J. Fisher, M.D., Los Angeles, CA; Kathleen M. Foley, M.D., New York, NY; Robert A. Gross, M.D., Ph.D., Rochester, NY; Stanley Hashimoto, M.D., Vancouver, British Columbia, Canada; William C. Koller, M.D., Ph.D., Kansas City, KS; Ilo E. Leppik, M.D., Minneapolis, MN; Ira T. Lott, M.D., Orange, CA; T.J. Murray, M.D., Halifax, Nova Scotia, Canada; Judith A. Paice, Ph.D., R.N., Chicago, IL; Richard D. Penn, M.D., Chicago, IL; Roger J. Porter, M.D., Philadelphia, PA; Neil H. Raskin, M.D., San Francisco, CA; James F. Toole, M.D., Winston-Salem, NC; Howard L. Weiner, M.D., Boston, MA

Nursing Practice

Rosemary C. Polomano, Ph.D., M.S.N., R.N., *Chair*, Pottstown, PA; Bonnie J. Adamson, R.N., London, Ontario, Canada; Ramona A. Benkert, M.S.N., R.N., Plymouth, MI; Mecca S. Cranley, Ph.D., R.N., Buffalo, NY; Linda Felver, Ph.D., R.N., Portland, OR; Hector Hugo Gonzalez, Ph.D., R.N., San Antonio, TX; Theodore L. Goodfriend, M.D., Madison, WI; Ada K. Jacox, R.N., Ph.D., Detroit, MI; Daisy M. Jones, R.N., Chicago, IL; Patricia Kummeth, Rochester, MN; Ida S. Martinson, Ph.D., R.N., Hung Hom, Hong Kong; GINETTE A. Pepper, Ph.D., R.N., Denver, CO; Geraldine A. Peterson, M.A., R.N., Potomac, MD; Linda C. Pugh, Ph.D., R.N., Hershey, PA; Sharon S. Rising, M.S.N., Cheshire, CT; April H. Vallerand, Ph.D., R.N., Manalapan, NJ

Nutrition and Electrolytes

Robert D. Lindeman, M.D., *Chair*, Albuquerque, NM; Jeffrey P. Baker, M.D., Toronto, Ontario, Canada; Connie W. Bales, Ph.D., R.D., Durham, NC; Dennis M. Bier, M.D., Houston, TX; Gladys Block, Ph.D., Berkeley, CA; Karim Anton Calis, Pharm.D., M.P.H., Rockville, MD; David F. Driscoll, Ph.D., Boston, MA; P.W.F. Fischer, Ph.D., Ottawa, Ontario, Canada; Dr. Nigel Gericke, Sun Valley, South Africa; Walter H. Glinsmann, M.D., Washington, DC; Helen A. Guthrie, Ph.D., State College, PA; John N. Hathcock, Ph.D., Washington, DC; Leslie M. Klevay, M.D., Grand Forks, ND; Linda S. Knox, Ph.D., R.N., Philadelphia, PA; Bonnie Liebman, M.S., Washington, DC; Sohrab Mobarhan, M.D., Maywood, IL; Robert M. Russell, M.D., Boston, MA; Harold H. Sandstead, M.D., Galveston, TX; Benjamin Torun, M.D., Ph.D., Miami, FL; Carlos A. Vaamonde, M.D., Miami, FL; Stanley Wallach, M.D., New York, NY

Obstetrics and Gynecology

Douglas D. Glover, M.D., *Chair*, Morgantown, WV; Rudi Ansbacher, M.D., Ann Arbor, MI; James E. Axelson, Ph.D., Aldergrove, British Columbia, Canada; Augusto Bondani, M.D., Ph.D., Mexico City, Mexico; Florence Comite, M.D., New Haven, CT; Marilyn C. Frederiksen, M.D., Chicago, IL; L. Wayne Hess, M.D., Columbia, MO; Art Jacknowitz, Pharm.D., Morgantown, WV; William J. Ledger, M.D., New York, NY; Andre-Marie Leroux, M.D., Ottawa, Ontario, Canada; William A. Nahhas, M.D., Dayton, OH; Warren N. Otterson, M.D., Bulverde, TX; Anne Pastuszak, Ph.D., Toronto, Ontario, Canada; Johanna F. Perlmutter, M.D., M.P.H.,

Boston, MA; Richard H. Reindollar, M.D., Boston, MA; Ronald J. Ruggiero, Pharm.D., San Francisco, CA; Pamela Shrock, Ph.D., Roslyn Harbor, NY; G. Millard Simmons, Jr., M.D., Morgantown, WV; Phillip G. Stubblefield, M.D., Boston, MA; Raul G. Toledo, M.D., San Salvador, El Salvador

Ophthalmology

Thom J. Zimmerman, M.D., *Chair*, Louisville, KY; Steven R. Abel, Pharm.D., Indianapolis, IN; Jules L. Baum, M.D., Wellesley Hills, MA; Lee R. Duffner, M.D., Golden Beach, FL; Forrest Ellis, M.D., Indianapolis, IN; David L. Epstein, M.D., Durham, NC; Robert Fechtner, M.D., Louisville, KY; Allan J. Flach, Pharm.D., M.D., Corte Madera, CA; Frederick T. Fraunfelder, M.D., Portland, OR; Gary N. Holland, M.D., Los Angeles, CA; David A. Lee, M.D., Los Angeles, CA; Vincent H.L. Lee, Ph.D., Los Angeles, CA; Joel S. Mindel, M.D., Ph.D., New York, NY; Steven M. Podos, M.D., New York, NY; Graham E. Trope, M.B., Ph.D., Toronto, Ontario, Canada; Roberto Warman, M.D., Miami, FL; Kirk R. Wilhelmus, M.D., Houston, TX

Otorhinolaryngology

Helen F. Krause, M.D., *Chair*, Pittsburgh, PA; Robert E. Brummett, Ph.D., Portland, OR; Linda J. Gardiner, M.D., Fort Myers, FL; Cedric F. Grigg, Ph.D., Victor, NY; Julianna Gulya, M.D., Bethesda, MD; James A. Hadley, M.D., Rochester, NY; David B. Hom, M.D., Minneapolis, MN; Donald C. Lanza, M.D., Philadelphia, PA; Richard L. Mabry, M.D., Dallas, TX; Scott C. Manning, M.D., Seattle, WA; Lawrence J. Marentette, M.D., Ann Arbor, MI; Robert A. Mickel, M.D., Ph.D., San Francisco, CA; Arnold M. Noyek, M.D., Toronto, Ontario, Canada; Randal A. Otto, M.D., San Antonio, TX; Leonard P. Rybak, M.D., Ph.D., Springfield, IL; Randal S. Weber, M.D., Philadelphia, PA

Outcomes and Cost-Effectiveness (Ad Hoc)

Elizabeth A. Chrischilles, Ph.D., *Co-chair*, Iowa City, IA; Stan N. Finklestein, M.D., *Co-chair*, Cambridge, MA; Jerome L. Avorn, M.D., Boston, MA; Lisa A. Bero, Ph.D., San Francisco, CA; Robert S. Epstein, M.D., Montvale, NJ; Steven F. Finder, M.D., M.B.A., San Antonio, TX; Deborah A. Freund, Ph.D., Bloomington, IN; Gordon H. Guyatt, M.D., Hamilton, Ontario, Canada; Abraham G. Hartzema, Pharm.D., Ph.D., Chapel Hill, NC; Joel W. Hay, Ph.D., Los Angeles, CA; Paul C. Langley, Ph.D., Denver, CO; Kathleen N. Lohr, Ph.D., Research Triangle Park, NC; Nicolaas Otten, Pharm.D., Ottawa, Ontario, Canada; A. David Paltiel, Ph.D., New Haven, CT; Eleanor M. Peretto, Ph.D., Bethesda, MD; Kevin A. Schulman, M.D., M.B.A., Washington, DC; Kathleen A. Weis, Dr.P.H., NP, Rockville, MD

Parasitic and Tropical Disease

David O. Freedman, M.D., *Chair*, Birmingham, AL; Prof. Tomas D. Arias, Ph.D., Panama City, Panama; Michele Barry, M.D., New Haven, CT; Frank J. Bia, M.D., New Haven, CT; P. Das Gupta, M.D., New Delhi, India; Philip R. Fischer, M.D., Salt Lake City, UT; Eduardo Gotuzzo, M.D., Lima, Peru; M. Gail Hill, Ph.D., RN, CRNP, Birmingham, AL; Dennis D. Juraneck, M.D., Atlanta, GA; Jay S. Keystone, M.D., Toronto, Ontario, Canada; Dennis E. Kyle, Ph.D., Washington, DC; Sornchai Looareesuwan, M.D., Bangkok, Thailand; Douglas W. MacPherson, M.D., Hamilton, Ontario, Canada; Philippa A. McDonald, M.D., Ottawa, Ontario, Canada; Richard Pearson, M.D., Charlottesville, VA; Peter D. Walzer, M.D., Cincinnati, OH; A. Clinton White, Jr., M.D., Houston, TX

Pediatric Anesthesiology (Ad Hoc)

Charles J. Coté, M.D., *Chair*, Chicago, IL; J. Michael Badgwell, M.D., Las Vegas, NV; Barbara W. Brandom, M.D., Pittsburgh, PA; Ryan Cook, M.D., Pittsburgh, PA; John J. Downes, M.D., Philadelphia, PA; Dennis M. Fisher, M.D., San Francisco, CA; John E. Forestner, M.D., Fort Worth, TX; Helen W. Karl, M.D., Seattle, WA; Harry G.G. Kingston, M.D., Portland, OR; Anne Marie Lynn, M.D., Seattle, WA; Robert J. Mamlok, M.D., Lubbock, TX; Mark

Shriner, M.D., Philadelphia, PA; Victoria Simpson, M.D., Ph.D., Denver, CO; Mehernoor F. Watcha, M.D., Philadelphia, PA

Pediatrics

Philip D. Walson, M.D., *Chair*, Columbus, OH; Cheston M. Berlin, Jr., M.D., Hershey, PA; Nancy Jo Braden, M.D., Phoenix, AZ; George S. Goldstein, M.D., Elmsford, NY; Russell J. Hopp, D.O., Omaha, NE; Ralph E. Kauffman, M.D., Kansas City, MO; Joan M. Korth-Bradley, Pharm.D., Ph.D., Philadelphia, PA; Richard D. Leff, Pharm.D., Shawnee Mission, KS; Carolyn H. Lund, R.N., San Francisco, CA; Maureen C. Maguire, R.N., Baltimore, MD; Mark A. Riddle, M.D., Baltimore, MD; Emilio J. Sanz, M.D., Ph.D., Tenerife, Spain; Wayne Snodgrass, M.D., Galveston, TX; Stephen P. Spielberg, M.D., Ph.D., Raritan, NJ; Jose Teran, M.D., Quito, Ecuador; Robert M. Ward, M.D., Salt Lake City, UT; Sumner J. Yaffe, M.D., Bethesda, MD

Pharmacy Practice

Thomas P. Reinders, Pharm.D., *Chair*, Richmond, VA; Hannes Enlund, Ph.D., Kuopio, Finland; Donald J. Filibeck, Pharm.D., Dublin, OH; Ned E. Heltzer, M.S., Philadelphia, PA; Frederick Klein, Montvale, NJ; Calvin H. Knowlton, Ph.D., Lumberton, NJ; Patricia A. Kramer, B.Sc., Bismarck, ND; Diane Lamarre, Saint Lambert, Quebec, Canada; Shirley P. McKee, B.Sc., Houston, TX; Eucharía E. Nnadi-Okolo, Ph.D., Washington, DC; John E. Ogden, M.S., Burke, VA; Henry A. Palmer, Ph.D., Storrs, CT; Roger P. Potyk, Pharm.D., San Antonio, TX; Betsy L. Sleath, Ph.D., Chapel Hill, NC; William E. Smith, Pharm.D., Richmond, VA; Craig S. Stern, Pharm.D., Northridge, CA; Linda S. Tyler, Pharm.D., Salt Lake City, UT; John H. Vandel, R.Ph., Torrington, WY; Joan H. Veal, Rockville, MD; Mary Ann Wagner, Alexandria, VA; Glenn Y. Yokoyama, Pharm.D., Pasadena, CA

Psychiatric Disease

John Christian Gillin, M.D., *Chair*, San Diego, CA; Ross J. Baldessarini, M.D., Belmont, MA; R.H. Belmaker, M.D., Beersheva, Israel; Alex A. Cardoni, M.S. Pharm., Hartford, CT; Larry Ereshesky, Pharm.D., San Antonio, TX; W. Edwin Fann, M.D., Houston, TX; Jan Fawcett, M.D., Chicago, IL; John Feighner, M.D., San Diego, CA; Burton J. Goldstein, M.D., Williams Island, FL; Clarice Gorenstein, Ph.D., Sao Paulo, Brazil; Paul Grof, M.D., Ottawa, Ontario, Canada; Russell T. Joffe, M.D., Hamilton, Ontario, Canada; Nancy E. Johnston, R.N., Thornhill, Ontario, Canada; Stephen R. Marder, M.D., Los Angeles, CA; Stuart A. Montgomery, M.D., London, England; Andrew A. Nierenberg, M.D., Boston, MA; Fred Quitkin, M.D., New York, NY; Ruth Robinson, Saskatoon, Saskatchewan, Canada; Matthew V. Rudorfer, M.D., Rockville, MD; Carl Salzman, M.D., Boston, MA; Colette F. Strnad, Ph.D., Ottawa, Ontario, Canada; Karen A. Theesen, Pharm.D., Omaha, NE; Thomas W. Uhde, M.D., Detroit, MI; George E. Woody, M.D., Philadelphia, PA

Pulmonary Disease/Allergy

Harold S. Nelson, M.D., *Chair*, Denver, CO; John A. Anderson, M.D., Detroit, MI; Emil J. Bardana, Jr., M.D., Portland, OR; I. Leonard Bernstein, M.D., Cincinnati, OH; Alexander G. Chuchalin, M.D., Ph.D., Moscow, Russia; Nicholas J. Gross, M.D., Ph.D., Hines, IL; Karen Huss, DNSc, R.N., Potomac, MD; Elliot Israel, M.D., Boston, MA; John W. Jenne, M.D., Sandia Park, NM; H. William Kelly, Pharm.D., Albuquerque, NM; James P. Kemp, M.D., San Diego, CA; Bennie C. McWilliams, Jr., M.D., Albuquerque, NM; Shirley Murphy, M.D., Chapel Hill, NC; Thomas F. Myers, M.D., Maywood, IL; Gary S. Rachelefsky, M.D., Los Angeles, CA; Joe Reisman, M.D., Toronto, Ontario, Canada; Robert E. Reisman, M.D., Williamsburg, NY; Albert L. Sheffer, M.D., Boston, MA; Paul C. Stillwell, M.D., San Diego, CA; Stanley J. Szefer, M.D., Denver, CO; Virginia S. Taggart, M.P.H., Bethesda, MD; David G. Tinkleman, M.D., Denver, CO; John H. Toogood, M.D., London, Ontario, Canada; Martin D. Valentine, M.D., Baltimore, MD; Sally E. Wenzel, M.D., Denver, CO

Radiopharmaceuticals

Carol S. Marcus, Ph.D., M.D., *Chair*, Torrance, CA; J.D. Bernardy, J.D., Lexington, MA; Dik Blok, Pharm.D., Leiden, The Netherlands; Capt William H. Briner, Durham, NC; Janet F. Eary, M.D., Seattle, WA; David L. Gilday, M.D., Toronto, Ontario; Don Lyster, Ph.D., Vancouver, British Columbia, Canada; John G. McAfee, M.D., Chevy Chase, MD; James A. Ponto, M.S., Iowa City, IA; Mark H. Rotman, Pharm.D., M.S., Middletown, MD; Carl Seidel, M.S., Denton, TX; Barry A. Siegel, M.D., St. Louis, MO; Edward B. Silberstein, M.D., Cincinnati, OH; Roberta A. Strohl, RN, MN, Baltimore, MD; James B. Stubbs, Ph.D., Alpharetta, GA; Dennis P. Swanson, M.S., Pittsburgh, PA; Andrew T. Taylor, M.D., Atlanta, GA; Mathew L. Thakur, Ph.D., Philadelphia, PA; Ann Warbick-Cerone, Kanata, Ontario, Canada; John H. Waterman, MS, Arlington Heights, IL; Robert G. Wolfangel, Ph.D., St. Louis, MO

Rheumatology-Clinical Immunology

Evelyn V. Hess, M.D., *Chair*, Cincinnati, OH; Donato Alarcon-Segovia, M.D., Mexico City, Mexico; John Baum, M.D., Rochester, NY; David H. Campen, M.D., Santa Clara, CA; Paul Emery, M.D., Leeds, England; Daniel E. Furst, M.D., Seattle, WA; Jean G. Gispén, M.D., Oxford, MS; Esther Gonzales-Pares, M.D., San Juan, PR; Donna J. Hawley, R.N., Ed.D., Wichita, KS; Israeli A. Jaffe, M.D., New York, NY; Daniel J. Lovell, M.D., M.P.H., Cincinnati, OH; Walter P. Maksymowych, M.D., Edmonton, Alberta, Canada; Donald R. Miller, Pharm.D., Fargo, ND; Ivan G. Otterness, Ph.D., Groton, CT; Robert L. Rubin, Ph.D., La Jolla, CA; Lee S. Simon, M.D., Boston, MA; Daniel J. Stechschulte, M.D., Kansas City, KS; Michael E. Weinblatt, M.D., Boston, MA; Michael H. Weisman, M.D., San Diego, CA; William S. Wilke, M.D., Cleveland, OH; David E. Yocum, M.D., Tucson, AZ

Surgical Drugs and Devices

Lary A. Robinson, M.D., *Chair*, Tampa, FL; Kay A. Ball, M.S.A., R.N., Lewis Center, OH; Alan R. Dimick, M.D., Birmingham, AL; H. Kim Lyerly, M.D., Durham, NC; Henry J. Mann, Pharm.D., Minneapolis, MN; Joseph A. Moylan, M.D., Miami, FL; Ronald Lee Nichols, M.D., New Orleans, LA; Hiram C. Polk, Jr., M.D., Louisville, KY; Robert P. Rapp, Pharm.D., Lexington, KY; Ronald Rubin, M.D., West Newton, MA

Therapeutic Information Management

Ann B. Amerson, Pharm.D., *Chair*, Lexington, KY; Marie A. Abate, Pharm.D., Morgantown, WV; Wesley G. Byerly, Pharm.D., Winston-Salem, NC; Teresa Dowling, Pharm.D., Wilmington, DE; Thomas M. Gesell, Pharm.D., Morris Plains, NJ; Stephen R. Kaplan, M.D., Buffalo, NY; Ossy M.J. Kasilo, Ph.D., Harare, Zimbabwe; Aishah A. Latiff, Ph.D., Penang, Malaysia; Leslie A. Lenert, M.D., Stanford, CA; Dr. Hubert G.M. Leufkens, Utrecht, The Netherlands; M. Laurie Mashford, M.D., Victoria, Australia; Louise

Matte, B.Sc., B.Pharm., Cap-Rouge, Quebec, Canada; Kurt A. Proctor, Ph.D., Alexandria, VA; Carol A. Romano, Ph.D., R.N., C., FAAN, Bethesda, MD; Cedric M. Smith, M.D., Buffalo, NY; Gary H. Smith, Pharm.D., Baltimore, MD; Dennis F. Thompson, Pharm.D., Oklahoma City, OK; William G. Troutman, Pharm.D., Albuquerque, NM; Gordon J. Vanscoy, Pharm.D., Irwin, PA; Valentin A. Vinogradov, M.D., Ph.D., Moscow, Russia; Lee A. Wanke, Seattle, WA; Antonio Carlos Zanini, M.D., Ph.D., Sao Paulo, Brazil

Transplant Immunology

Thomas E. Starzl, M.D., Ph.D., *Chair*, Pittsburgh, PA; Clyde F. Barker, M.D., Philadelphia, PA; Gilbert J. Burckart, Pharm.D., Pittsburgh, PA; Paul M. Colombani, M.D., Baltimore, MD; Allan P. Donner, Ph.D., London, Ontario, Canada; Robert A. Good, Ph.D., M.D., St. Petersburg, FL; Carl C. Groth, M.D., Ph.D., Huddinge, Sweden; John A. Hansen, M.D., Seattle, WA; Roger L. Jenkins, M.D., Boston, MA; John R. Lake, M.D., San Francisco, CA; Leonard Makowka, M.D., Ph.D., Los Angeles, CA; Suzanne V. McDiarmid, M.D., Los Angeles, CA; Ali Naji, M.D., Ph.D., Philadelphia, PA; David H. Sachs, M.D., Boston, MA; Joseph A. Tami, Pharm.D., Carlsbad, CA; Angus W. Thomson, Ph.D., Pittsburgh, PA; Raman Venkataramanan, Ph.D., Pittsburgh, PA; Professor Roger Williams, CBE, London, England

Urology

Culley C. Carson III, M.D., *Chair*, Chapel Hill, NC; John A. Belis, M.D., Hershey, PA; B.J. Reid Czarapata, CRNP, Rockville, MD; Sam D. Graham, Jr., M.D., Atlanta, GA; Mireille Gregoire, M.D., Quebec, Quebec, Canada; Wayne Hellstrom, M.D., New Orleans, LA; Joseph M. Khoury, M.D., Chapel Hill, NC; Marguerite C. Lippert, M.D., Charlottesville, VA; Michael G. Mawhinney, Ph.D., Morgantown, WV; Nelson Rodrigues Netto, Jr., M.D., Sao Paulo, Brazil; Mariano Rosello-Barbera, M.D., Palma de Mallorca, Spain; Randall G. Rowland, M.D., Ph.D., Lexington, KY; J. Patrick Spirnak, M.D., Cleveland, OH; William F. Tarry, M.D., Morgantown, WV; Chris M. Teigland, M.D., Charlotte, NC; Robert M. Weiss, M.D., New Haven, CT

Veterinary Medicine

V. Cory Langston, D.V.M., Ph.D., *Chair*, Mississippi State, MS; Michael D. Apley, D.V.M., Ph.D., Ames, IA; Gordon W. Brumbaugh, D.V.M., Ph.D., College Station, TX; Thomas J. Burkgren, D.V.M., M.B.A., Perry, IA; Cynthia T. Culmo, R.Ph., Austin, TX; Lloyd E. Davis, Ph.D., D.V.M., Champaign, IL; Patricia M. Dowling, D.V.M., M.S., Saskatoon, Saskatchewan, Canada; Stuart D. Forney, M.S., Fort Collins, CO; Antoinette D. Jernigan, D.V.M., Ph.D., Groton, CT; Mark G. Papich, D.V.M., Raleigh, NC; Thomas E. Powers, D.V.M., Ph.D., Columbus, OH; Jim E. Riviere, D.V.M., Ph.D., Raleigh, NC; Charles R. Short, D.V.M., Ph.D., Baton Rouge, LA; Hector Sumano Lopez, D.V.M., Ph.D., Mexico City, Mexico; Jeffrey R. Wilcke, D.V.M., Blacksburg, VA

Collaborators During 1995–2000

Participants in the Revision and Reference Standards Programs During the Period 1995–2000 Who Are Not Otherwise Mentioned

Wallace P. Adams, Rockville, MD
 Ken Adelberg, Calabasas, CA
 Therese Agami, Montvale, NJ
 Adela Aguirre, Covington, GA
 Harunoleu Amagasse, Mission Viejo, CA
 John Anderson, Greenville, SC
 Joseph J. Anisko, Westborough, MA
 Peter C. Aprile, Westbury, NY
 Agn s Artiges, Strasbourg, France
 Richard Ashley, Pomona, NY
 Robert W. Ashworth, Whippany, NJ
 Anand Baichwal, Patterson, NY
 Elizabeth Bancroft, Irvine, CA
 Steve J. Bannister, Bristol, TN
 James Banschbauh, Cincinnati, OH
 Michael Barazia, Waunakee, WI
 Thomas A. Barber, Round Lake, IL
 David B. Barry, South El Monte, CA
 Javid A. Bashir, Pittsburgh, PA
 Linda J. Bauer, Kingsport, TN
 Timothy P. Bechard, Rouses Point, NY
 Jacquelyn Behnke, Milwaukee, WI
 Barry Behnken, Mequon, WI
 Gerrit Bekendam, Deventer, The Netherlands
 Harriet Benson, Palo Alto, CA
 Anna Bentley, Gibbstown, NJ
 Stephen A. Bernadyn, Research Triangle Park, NC
 Ira R. Berry, East Hanover, NJ
 Lynn M. Best, Round Lake, IL
 Anthony C. Bevilacqua, Waltham, MA
 William F. Beyer, Kalamazoo, MI
 Pranab Bhattacharya, Laurelton, NY
 Francois Bigeard, Vitry sur Seine, France
 Peter Billiaert, Markham, Ontario, Canada
 John S. Bingman, Phillipsburg, PA
 Rafik H. Bishara, Indianapolis, IN
 Scott Blary, Richmond, VA
 Louis Blecher, Wayne, NJ
 Michael I. Bloomstein, Somerville, NJ
 John R. Bodenmiller, Cincinnati, OH
 Sanford Bolton, Jamaica, NY
 Ezio Bombardelli, Milan, Italy
 Dario Bonacorsi, Milan, Italy
 Arthur D. Bond, Richmond, VA
 Ben Borsje, Weesp, The Netherlands
 S. Ian Borst, Etobicoke, Ontario, Canada
 Charles Boudreau, Collegeville, PA
 Charles E. Boufford, Wyandotte, MI
 Paul A. Bouis, Phillipsburg, NJ
 Martin Brenner, Conshohocken, PA
 Edward S. Brewton, Columbus, OH
 Harry Brittain, Milford, NJ
 Frederick R. Brofazi, Kenilworth, NJ
 Virginia Brown, Chattanooga, TN
 Donald A. Brown, Fort Worth, TX
 Scott L. Buell, Zebulon, NC
 Volker B hler, Ludwigshafen, Germany
 Thomas Bunting, Totowa, NJ
 Donald A. Buss, Kansas, MO
 Leonard E. Bustamante, Princeton, NJ
 Larry Callan, Princeton, NJ
 John R. Carpenter, St. Joseph, MO
 James Carroll, Raritan, NJ
 Patricia Carter, Rockford, IL
 Davis Caskey, Richmond, VA
 Alan R. Caswell, North Chicago, IL
 Donald Chaisson, Vacaville, CA
 Imtiaz Chaudry, Kenilworth, NJ
 Charles G. Chavdarian, Palo Alto, CA
 Simon Chernomorsky, Piscataway, NJ
 Elvin Clausen, Wilmington, DE
 Edward M. Cohen, Danbury, CT
 Michael Cohen, Philadelphia, PA
 Charles C. Collins, Pittsburgh, PA
 Sam Costanza, Cincinnati, OH
 Edward A. Cotty, Melville, NY
 Raymond Cox, North Chicago, IL
 Erwin Coyne, Maywood, IL
 R. V. Croes, New Castle, DE
 Ronald J. Darnowski, Rahway, NJ
 Pankaj Dave, Fairfield, NJ
 Jairus David, Fremont, MI
 Neil Davis, Philadelphia, PA
 Psyche D. Davis, Zebulon, NC
 Ekke Demant, West Haven, CT
 Christopher DeMerlis, Philadelphia, PA
 Ellen J. deVries, Weesp, The Netherlands
 W. Timothy DeWald, Rahway, NJ
 Shrikant Dighe, Rockville, MD
 Jeffrey Y. Ding, Columbus, OH
 Allan H. Doane, Morris Plains, NJ
 Thomas F. Dolan, Collegeville, PA
 Gary D. Dolch, Mt. Olive, NJ
 David Domann, Titusville, NJ
 John Dougherty, Indianapolis, IN
 Nancy E. Dowd, New York, NY
 Carl D'Ruiz, Highpoint, NC
 J. F. Dunne, Geneva, Switzerland
 Jim Dworak, West Des Moines, IA
 John C. Dwyer, Round Lake, IL
 James T. Elfstrum, Westport, CT
 Craig Elton, Trumbull, CT
 Magnus Erickson, M lndal, Sweden
 Lynn E. Ericson, Somerville, NJ
 George J. Eschenfelder, Syracuse, NY
 Michael Falkow, New York, NY
 Jawed Fareed, Maywood, IL
 James Fargher, Toledo, OH
 David A. Fay, St. Louis, MO
 Kurt Feilner, Ludwigshafen, Germany
 Thomas Ferder, Earth City, MO
 Barbara Ferguson, Springfield, NJ
 Margaret H. Fitzkie, Lancaster, PA
 Richard Forrester, Mason, OH
 James E. Fox, Atlanta, GA
 Mary Freeman, Seymour, IN
 Ruta Freimanis, Chicago, IL
 Sophia Fuerst, Chicago, IL
 Bruno Gabetta, Settala, Italy
 David Ganderton, Devon, UK
 Juana Garcia, Charlotte, NC
 Robert L. Garnick, San Francisco, CA

Milton Geller, Miami, FL
 Thomas F. Genova, Raritan, NJ
 Ronald C. George, Cincinnati, OH
 Richard Gettings, Midland, MI
 Raenel Gibson, Allegan, MI
 William E. Gilbertson, Rockville, MD
 John R. Gillis, Bozeman, MT
 John P. Gleason, St. Louis, MO
 Andreas P. Gloor, Lavelfirger, Switzerland
 Mason P. Goldman, Rockville, MD
 Ralph Gomez, Nutley, NJ
 Ana Goncalves, Lisbon, Portugal
 Sidney Goode, Midland, MI
 Stanley P. Gorak, New Castle, DE
 Barbara Goulding, Shirley, NY
 Diane Grandberry, Wilmington, DE
 Stanley Gratz, Philadelphia, PA
 Rodney J. H. Gray, Wilmington, DE
 Carolyn E. Green, Cranbury, NJ
 Bernard J. Greenspan, San Diego, CA
 Wolfgang Grimm, Biberach and der Riss, Germany
 Gerald Guest, Mundelein, IL
 Lee "Skip" Gustafson, Frederick, MD
 Helen A. Guthrie, State College, PA
 W. Hall, Nottingham, UK
 Samir A. Hanna, New Brunswick, NJ
 William Hanson, Chatsworth, CA
 Royal Hanson, Chatsworth, CA
 Karl Harris, Washington, D.C.
 William E. Heary, LaJolla, CA
 Lori Henning, Philadelphia, PA
 Dwight D. Henshaw, Jr., Morgentown, WV
 Germain Heyndrickx, Ghent, Belgium
 Rich Hibbs, St. Louis, MO
 Wanda E. Hicks, Bethesda, MD
 Debora D. Hinman, Sunnyvale, CA
 Toshiki Hirai, Tokyo, Japan
 Arnold L. Hirsch, Chicago Heights, IL
 Anil K. Hiteshi, Costa Mesa, CA
 H. Donald Hochstein, Rockville, MD
 Ira J. Holcomb, Rochester, MI
 Norman E. Holden, Upton, L.I., NY
 Rosa Holmes, East Hanover, NJ
 A. George Holstein, Waukegan, IL
 J. Hoogmartens, Leuvein, Belgium
 Harvey R. Hornig, Lincoln, NE
 David Houghton, Manchester, England
 Richard Hunter, Princeton, NJ
 Gary L. Incorvia, St. Louis, MO
 Elizabeth Bancroft Irvine, CA,
 Joichi Ishibashi, Osaka, Japan
 Herman Jaggy, Karlsruhe, Germany
 Stan Jankowski, Los Angeles, CA
 Deborah A. Jaskot, Kulpsville, PA
 John M. Johnson, Elizabeth, NJ
 Fatima N. Johnson, Washington, DC
 Patricia A. Johnson, Rahway, NJ
 Kent T. Johnson, Bloomington, MN
 Raymond N. Johnson, Rouses Point, NY
 Jose C. Joseph, North Chicago, IL
 William Juhl, St. Louis, MO
 Yvonne Juhl, St. Louis, MO
 Sidney Karlan, Pensauken, NJ
 Robert F. Kempa, Longmont, CO
 John Kerins, Nutley, NJ
 Janeen S. Kincaid, West Point, PA
 Karl Kindberg, Mason, OH
 Ross Kirchoffer, St. Louis, MO

Ron Klug, South Haven, MI
 Thomas C. Knott, Baltimore, MD
 Shigeo Kojima, Tokyo, Japan
 Toshio Konomi, Osaka, Japan
 Sabine Kopp-Kubel, Geneva, Switzerland
 Santosh Kottayil, Mundelein, IL
 Christopher C. Kowtna, Wilmington, DE
 Johannes Kramer, Eschborn/Taunus, Germany
 Kevinn P. Kramer, Delaware Water Gap, PA
 Sandra P. Kreuscher, Emeryville, CA
 Paul J. Kucera, Pearl River, NY
 Sonia Kuleszka, Kirkland, Quebec, Canada
 Wayne A. Kvetkosky, Grand Island, NY
 Lynn B. LaCagnin, Morgantown, WV
 John S. Landy, Fort Washington, PA
 Peter F. Lang, Smithtown, NY
 Marilyn Langley, Greenville, SC
 Edward P. Lau, Wilmington, DE
 Daphne Lau, Paramus, NJ
 Ronald J. Lauback, Syracuse, NY
 Linda Lavelle, New Brunswick, NJ
 Larry D. Lawson, Springfield, UT
 Nick V. Lazaridis, Wilmington, NC
 Dennis Lazorchak, Pearl River, NY
 James F. Leary, Canton, MA
 Jon Weis Lemvig, Denmark
 Rod Lenoble, Boulder, CO
 Henry H. Lerner, New Brunswick, NJ
 Louis R. Lieto, Morgantown, WV
 Hetty Lima, Lincolnshire, IL
 Amy Little, Cary, NC
 Eugene Livshits, Allentown, PA
 Barbara Lobberding, Broomfield, CO
 Michael W. Lockney, Sistersville, WV
 Kerry J. Long, Skokie, IL
 Wah Chui Louie, Carlstadt, NJ
 Steven Lum, Raritan, NJ
 Gene E. Lundstrom, Irvine, CA
 Robert M. Lusskin, Madison, WI
 Bruce D. MacDonald, Oak Hill, NY
 Waseem Malick, Nutley, NJ
 David A. Malinzak, Swiftwater, PA
 Peter E. Manni, Philadelphia, PA
 Vincent A. Marino, Broomfield, CO
 Kevin Marks, Fort Worth, TX
 Gregory P. Martin, West Point, PA
 Steven Martin, St. Louis, MO
 Ivan Martin, Nuory, Northern Ireland
 Donna Maslin, Cincinnati, OH
 Howard E. Mason, Stevenage Herts, UK
 James T. Mason, Cincinnati, OH
 Michel M. Matheron, LePlessis-Robinson, France
 William A. Mayer, Collegeville, PA
 Virgil R. Maynard, St. Paul, MN
 Albert P. Mayo, West Orange, NJ
 Kathleen Mays, Union, NJ
 Barbara McDonald, Glendale, CA
 Gerry McEwen, Washington, DC
 Iain J. McGilveray, Ottawa, Ontario, Canada
 Eugene J. McGonigle, Kenilworth, NJ
 Michael J. McLean, Raleigh, NC
 John McNally, Palm Springs, CA
 Laura Melo, Milwaukee, WI
 E. R. Memoli, Yonkers, NY
 Joy E. Merritt, Columbus, OH

Dennis Mertz, Sparks, MD
 Thad J. Meszaras, Cincinnati, OH
 Michel S. Michailidis, Rahway, NJ
 Roger Micheli, Boulder, CO
 Ralph F. Michielli, Rahway, NJ
 Michael E. Miller, Indianapolis, IN
 Kent S. Miller, Broomfield, CO
 Lloyd C. Miller, Escondido, CA
 Robert Miller, Morris Plains, NJ
 Nicholas C. Miller, White Bear Lake, MN
 Cindy Mills, Etobicoke, Ontario, Canada
 David J. Miner, Indianapolis, IN
 Albert Miseje, Lake Success, NY
 Robert Mitchell, Irvine, CA
 Stephen M. Moerlein, St. Louis, MO
 John T. Moerman, Spring House, PA
 Harold Moffett, Milford, DE
 Anthony J. Montana, Morris Plains, NJ
 Peter Monteleone, Syracuse, NY
 Carol M. Moore, Berkeley, CA
 Paolo Morazzoni, Milan, Italy
 Stanley L. Morgan, Bedford, OH
 Thomas A. Morgan, Greenville, NC
 Werner G. Müller, Heusenstamm, Germany
 Shoji Murasugi, Gifu, Japan
 Robert S. Murphy, Melville, NY
 Deepak Naik, Elgin, IL
 Stefanie Nair, Suffern, NY
 Latha Narayan, Detroit, MI
 G. Thomas Neill, Lincoln, NE
 L. G. Neirinck, Montreal, Quebec, Canada
 Eric Nelson, Kansas City, MO
 Randy Nelson, Lincoln, NE
 Ruth A. Nichols, St. Paul, MN
 Clifford Nilsen, Pomona, NY
 Mark Nippoldt, Newark, NJ
 Tom Nowak, North Chicago, IL
 Donald W. Oberkramer, St. Louis, MO
 Bengt Ohrner, Solna, Sweden
 Jean Olsen, Conshohocken, PA
 Bo Olsson, Lund, Sweden
 Jay G. Otten, Wyandotte, MI
 Larry A. Ouderkirk, Rockville, MD
 Gordon Oxborrow, St. Paul, MN
 Anand Pai, Melrose Park, IL
 John Pandolfino, Somerville, NJ
 Gerald J. Papariello, Philadelphia, PA
 J. C. Parekh, Berkeley Heights, NJ
 Suryakant Patel, Little Falls, NJ
 Kathryn Patterson, Arlington Heights, IL
 John D. Paulson, Somerville, NJ
 William Paulson, Chevy Chase, MD
 Frederick C. Pearson, Boulder, CO
 John T. Peebles, Richmond, VA
 Fernand J. Pellerin, Paris, France
 Robert G. Pinko, Washington, DC
 Paul H. Piscia, North Billerica, MA
 Charles A. Plinton, Philadelphia, PA
 Nora Poliakoff, New York, NY
 Leon Poller, Manchester, England
 Stuart C. Porter, West Point, PA
 Joseph E. Presslitz, Morris Plains, NJ
 James Price, Athens, GA
 Daniel L. Prince, Fairfield, NJ
 Dennis Prince, Peal River, NY
 Michelle Quigley, Rochester, NY
 Norman Randall, Essex, UK
 Stanley Rasberry, Gaithersburg, MD
 Marlene Raschiatore, Cherry Hill, NJ

Mike Raya, Eatontown, NJ
 George Raynor, Philadelphia, PA
 Tomas Reeves, Fort Worth, TX
 Michael Ribick, New Brunswick, NJ
 William K. Richards, Lynchburg, VA
 Linda Rihbany, Winchester, MA
 Patricia M. Riley, Columbus, OH
 Robert Rippere, Rockville, MD
 David H. Rogers, Fort Washington, PA
 Alan R. Rogers, London, UK
 Martina Rogge, Ingelheim am Rhine, Germany
 Brian R. Rohrs, Kalamazoo, MI
 Roger Rorer, Elwood, KS
 John J. Rose, New Brunswick, NJ
 Wayne B. Rose, Mendota Heights, MN
 Michael M. Rosen, New York, NY
 Jack Rosen, Kenilworth, NJ
 M. L. Rosenthal, New York, NY
 Gerhard Rotzler, Basel, Switzerland
 Nicholas L. Ruggieri, Bethesda, MD
 Frances Sakers, Summit, NJ
 Thomas R. Sasse, West Philadelphia, PA
 Susan E. Satter, Boulder, CO
 Stanley Scheindlin, Sellersville, PA
 Mary K. Schmidl, Minneapolis, MN
 E. G. Bud Schmidt, St. Paul, MN
 Carol Schnababerle, Cincinnati, OH
 Philip M. Schneider, St. Paul, MN
 Lorne A. Schnell, Kankakee, IL
 Susan Schniepp, Chicago, IL
 Peter J. Schorn, Strasbourg, France
 Neal Schwartzwalter, Indianapolis, IN
 Newton Seitzinger, Fort Collins, CO
 Dhiren N. Shah, Kansas City, MO
 Vinod P. Shah, Rockville, MD
 Robert A. Sharp, Lafayette, IN
 Bob Sherwood, Patterson, NY
 Eugene Shimek, San Antonio, TX
 Judy L. Shimek, Indianapolis, IN
 Toni Shipley, Kingsport, TN
 Gerald K. Shiu, Washington, DC
 Moor U. Siddiqui, Evansville, IN
 Donald Sims, Marietta, GA
 J. L. Sipahimalani, Worli, Bombay, India
 Rostyslaw O. Slabicky, Ridgefield, CT
 Carroll M. Smith, Kankakee, IL
 Richard Snarski, Princeton, NJ
 Virginia Snyder, West Point, PA
 Fabio Soldati, Lugano, Switzerland
 Teri C. Soli, Greenville, NC
 Andrew M. Sopirak, Wilmington, DE
 Marietta Specht, IngelheimamRhein, Germany
 Jean-Marc Spieser, Strasbourg, France
 Stephen Stachelski, Skokie, IL
 Kenneth E. Stank, Greenfield, IN
 Priscilla B. Stanley, Bound Brook, NJ
 Stanley Stein, Princeton, NJ
 Rob V. R. Stephens, Stevenage Herts, UK
 Michael Stokl, Rahway, NJ
 William F. Stringer, St. Petersburg, FL
 John A. Stubbs, Cheshire, UK
 Heinz Stumpf, Karlsruhe, Germany
 Wayne E. Stutsman, Elkhart, IN
 Veerappan S. Subramanian, Northvale, NJ
 Daniel J. Sullivan, Shenandoah, IA
 James E. Swon, Cary, NC
 Yasushi Takeda, Tokyo, Japan

Akira Tanaka, Tokyo, Japan
Patricia A. Tapler, Morris Plains, NJ
Meir Tenne, Tel Aviv, Israel
Tadao Terao, Tokyo, Japan
Alex Terranova, Pinebrook, NJ
Elizabeth Tetley, Washington, DC
Charles G. Theil, St. Paul, MN
Ray J. Thimineur, Waterford, NY
Stephen Thompson, Mountain View, CA
Duckee Toln, St. Louis, MO
Linda Toscano, Deerfield, IL
Kinji Toyoda, Tokyo, Japan
John Trentacosti, Dallas, TX
Roger B. Trigg, London, UK
Frances L. Turnak, Hammond, IN
Samuel M. Tuthill, St. Louis, MO
Norlin Tymes, Baltimore, MD
R. J. Tyrrell, West Point, PA
Mitsuru Uchiyama, Tokyo, Japan
A. M. H. P. van den Besselaar, Leiden,
The Netherlands
C. van der Vlies, Delft, The Netherlands
Michael M. Van Oort, Research Triangle
Park, NC
Jos Van Romay, Beerse, Belgium
Paul Vandenberg, Wayne, NJ
Hubert Vanderhaeghe, Leuven, Belgium
David H. Vaughan, Lynchburg, VA
Terrence Vetter, Dublin, OH
Luciano Virgili, New Brunswick, NJ
John Visconti, Cedar Knolls, NJ
Rosh Vora, South Plainfield, NJ
C. Searle Wadley, North Chicago, IL
Jeanine M. Walenga, Maywood, IL
Robert Walker, Piscataway, NJ

Sigita Wallace, Ridgefield, CT
Richard F. Wallin, Northwood, OH
Phyllis Walsh, Morris Plains, NJ
Ken Warner, New York, NY
William A. Washington, Copiague, NY
David O. Waters, Phoenix, AZ
Marlys E. Weary, Mount Prospect, IL
Kent Webber, Phillipsburg, NJ
Agathe A. Wehrli, Geneva, Switzerland
Fredric B. Weinstein, Cedar Knolls, NJ
Melvin H. Weinswig, Madison, WI
Jon Weis, Lemvig, Denmark
David Wellard, New York, NY
Charles J. Welle, Sandy, UT
William J. Welstead, Jr., Richmond, VA
Fred W. Wendel, Claremont, CA
Theodore M. Wendt, Arlington, TX
Richard H. Wendt, Cincinnati, OH
Pat Werschulz, Somerville, NJ
Thomas X. White, Washington, DC
Richard G. Whitfield, Kalamazoo, MI
Barry H. Willen, Baltimore, MD
Robert R. Williams, Buffalo, NY
Roger L. Williams, Rockville, MD
David E. Williamson, North Chicago, IL
Martin J. Williamson, Columbus, OH
Ronald A. Wohl, Montville, NJ
Pamela Wojtowics, Rockville, MD
Renee P. Worrall, Syosset, NY
Gabrielle Yen, Westbury, NY
Louis W. Yu, Fort Washington, PA
Tony Zesimopolous, Pomona, NY
Mario Zink, Ingelheim am Rhine, Germany
Kathryn Zoon, Bethesda, MD
I. Michael Zulak, Fort Washington, PA