GLASSCOCK-SHAMBAUGH

耳外科学

SURGERY OF THE EAR

第6版







A. JULIANNA GULYA LLOYD B. MINOR **DENNIS S. POE**





PEOPLE'S MEDICAL PUBLISHING HOUSE

COMMERCIAL PROPERTY.

耳外科学 SURGERN OF THE EAR

NAME OF

•••

A ALAMADA SERVE

50+40 H PO



Glasscock-Shambaugh

耳外科学

SURGERY OF THE EAR

附书热键: 01g 67605754 010-6526481@sigeoH a northfuld by yould gryngold Distriction

次: 2000 年 6 月第 1 版 2010 年 6 月第 1 版第 1 次印刷

标准书号: ISBN 978-7-117-12863-6/R - 12864

GLASSCOCK-SHAMBAUGH SURGERY OF THE EAR, 6/E

Reprint by People's Medical Publishing House, Beijing, China

© 2010 PMPH-USA

2 Enterprise Drive, Suite 509, Shelton, CT 06484, USA

Tel: (203) 402-0646

E-mail: info@pmph-usa.com

All rights reserved. No part of this publication may be reproduced, stored in a retrieval system, or transmitted, in any form or media or by any means, electronic, mechanical, photocopying, recording, or otherwise, without prior written permission from PMPH-USA.

图书在版编目(CIP)数据

耳外科学 = Glasscock-shambaugh: 英文/(美) 古立牙(Gulya, A. J.) 主编. 一北京: 人民卫生出版社, 2010.6

ISBN 978-7-117-12863-6

I. ①耳··· Ⅱ. ①古··· Ⅲ. ①耳病-耳鼻喉外科手术 -英文 Ⅳ. ①R764.9

中国版本图书馆 CIP 数据核字 (2010) 第 074393 号

门户网: www.pmph.com 出版物查询、网上书店卫人网: www.ipmph.com 护士、医师、药师、中医师、卫生资格考试培训

版权所有, 侵权必究!

耳外科学

主 编: A. Julianna Gulya

Lloyd. B. Minor

Dennis S. Poe

出版发行: 人民卫生出版社 (中继线 010-59780011)

地 址:北京市朝阳区潘家园南里19号

邮 编: 100021

E - mail: pmph @ pmph.com

购书热线: 010-67605754 010-65264830

010-59787586 010-59787592

印 刷:北京汇林印务有限公司

经 销:新华书店

开 本: 889×1194 1/16 印张: 51.5

字 数: 1765 千字

版 次: 2010年6月第1版 2010年6月第1版第1次印刷

标准书号: ISBN 978-7-117-12863-6/R • 12864

定价(含光盘): 368.00元

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

(凡属印装质量问题请与本社销售中心联系退换)

Glasscock-Shambaugh SURGERY of the EAR

6 EDITION

EDITORS

AINA JULIANNA GULYA, MD, FACS (Editor-in-Chief)

Clinical Professor of Otolaryngology—Head and Neck Surgery

The George Washington University

Washington, D.C.

Former Chief of Clinical Trials Branch

National Institute on Deafness and Other Communication

Disorders

Bethesda, Maryland

LLOYD B. MINOR, MD, FACS

Provost and Senior Vice President for Academic Affairs

The Johns Hopkins University

University Distinguished Service Professor of

Otolaryngology-Head & Neck Surgery

The Johns Hopkins University School of Medicine

Baltimore, Maryland

DENNIS S. POE, MD, FACS

Associate Professor, Department of Otology and Laryngology

Harvard Medical School

Department of Otolaryngology at Children's Hospital

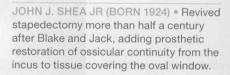
Boston, Massachusetts

Visiting Professor, Department of Otolaryngology

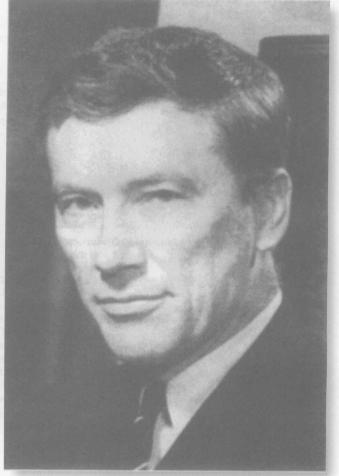
Tampere University Medical School, Tampere, Finland



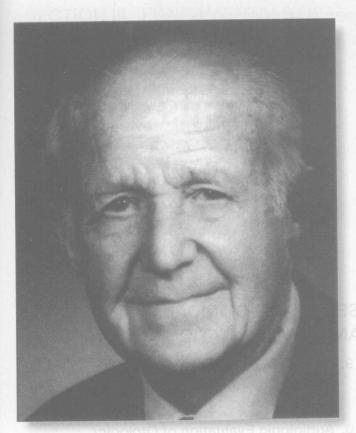
JULIUS LEMPERT (1890–1968) •
Foremost advocate of the endaural approach to the temporal bone. His one-stage fenestration operation led to the renaissance of reconstructive surgery for conductive hearing loss.







WILLIAM F. HOUSE, MD (BORN 1923) • The "father of neurotology." He pioneered the early diagnosis and translabyrinthine removal of vestibular schwannomas and the development of the cochlear implant.



GEORGE E. SHAMBAUGH JR, MD (1903–1999) • Author of the first and second editions of Surgery of the Ear and senior coauthor of the third edition.

MICHAEL E. GLASSCOCK III, MD, FACS • Editor of the fourth edition of Surgery of the Ear and co-editor of the fifth.

Brad A. Stach, PhD /
Virginia Ramachandran, AuD

15. Tinnitus 293
Elina Kari, MD / Douglus E. M
Pawel I. Jastreboff, PhD, ScD, M

Itis

Foreword

When George Shambaugh Jr. took 6 months off from his busy private practice of otology in the late 1950s to write the first edition of *Surgery of the Ear*, I doubt he had any idea that the book would become a classic text studied by generations of young surgeons.

A span of 50 years sees a multitude of advances in any medical specialty, and otology is no exception. That first edition was published in 1959 at the beginning of a new era in otology ushered in by the likes of Samuel Rosen, John J. Shea Jr., and William F. House. Rosen's stapes mobilization led to Shea's stapedectomy, which galvanized the imagination of every otolaryngologist in the world. Then in 1960, William F. House began his monumental work on acoustic neuromas (vestibular schwannomas), establishing neurotology as a subspecialty now recognized by the American Board of Otolaryngology—Head and Neck Surgery.

House's contributions dominated the literature in the following decades. He developed the intact canal wall mastoidectomy, introduced the use of canal skin for tympanoplasty, established the endolymphatic shunt procedure for the control of the symptoms of Ménière's disease, and finally crowned his accomplishments with his pioneering work on the first cochlear and brainstem implants.

In 1959 children born with profound hearing loss were destined to spend their life in the deaf culture. They had to rely on American Sign Language to communicate with each other and essentially never integrated into the hearing world. Now these children are provided with a cochlear implant at an early age, learn to speak, and do remarkably well in a normal hearing environment.

Technology was vastly different back then. The Zeiss operating microscope of 1959 had no viewing tube, TV, or

16-mm movie camera. These all came later through the efforts of Jack Urban, an engineer who worked directly with House in Los Angeles. There were no CT, MRI, or PET scans and no surgical lasers. Audiology was limited to air and bone conduction, speech discrimination, and the tone decay test. The ABR and acoustic emissions had yet to be discovered. The internet was decades away, as were personal computers, laptops, cell phones, fax machines, and the multitude of other high-tech devices we take for granted today. So in reviewing that first edition, I am struck by how simple it was at the time. We couldn't imagine what was to come. And as a resident and later in my fellowship, it all appeared a little daunting.

It is important to update any medical text on a regular basis because science is not a static field. This current edition is far different from the 1959 one that I cut my teeth on. It has been edited by three fine otologists, Julianna Gulya, Dennis Poe, and Lloyd Minor. I'm grateful to have had the opportunity to work with each one of them as part of my fellowship program in Nashville. This sixth edition reflects the current state of the art in our specialty and includes a DVD with 30 video clips of current diagnostic procedures and surgical techniques. W. B. Saunders published the first few editions, B. C. Decker transitioned it into the 21st century and now a new publisher, PMPH-USA, Ltd, is taking it forward. This is a classic that should continue on a regular basis.

I am grateful for the many contributors who have made this edition so outstanding. At this point in time, I simply sit back and marvel at the intelligence and commitment of my younger colleagues. So, I dedicate this text to them. As Howard House was fond of saying, "our specialty is in the good hands of modern day Otonauts."

Michael E. Glasscock III, MD, FACS Austin, TX May 2009

Preface

In his Preface to the Fifth Edition of *Surgery of the Ear*, Michael E. Glasscock III was indeed prescient in his prediction that updating would be needed within 6 to 8 years. Much has changed in otology/neurotology since the last edition, and to remain relevant, this text required change as well.

One major change, apparent on even the most casual inspection, is the addition of color illustrations. Also updated and enhanced is the video DVD that accompanies the book—including 30 videos of important diagnostic and surgical procedures. The "Temporal Bone Dissection Guide Appendix" is updated with several new illustrations.

Several new chapters have been added, for example, "Hearing Aids," "Vestibular Rehabilitation," and "Tinnitus Rehabilitation," reflecting the importance of these management options in the armamentarium of the neurotologist. Two other new chapters, "Tumor Biology" and "The Prevention and Management of Cerebrospinal Fluid Leaks," now consolidate information that was previously scattered across several chapters, enabling more efficient, targeted use of that information. Acknowledging the explosion of options available to the surgeon, "Ossicular Reconstruction" and "Tympanoplasty" are now addressed in two distinct chapters. Many other chapters have been extensively updated, incorporating the advances of the past 6 years.

We aspired to maintain the historic heritage of this classic text and continue the tradition established by Drs. Glasscock and Shambaugh while updating chapters. This sixth edition remains a practical and comprehensive, yet manageable, reference in otology/neurotology that promises to be of great value to both experi-

enced surgeons and trainees preparing for board exams.

A. Julianna Gulya, MD, FACS Lloyd B. Minor, MD, FACS Dennis S. Poe, MD, FACS

Contributors

Stephanie Moody Antonio, MD

Assistant Professor, Department of Otolaryngology— Head & Neck Surgery Eastern Virginia Medical School

Norfolk, VA

* Diseases of the Auricle, External Auditory Canal, and Tympanic Membrane

Ben J. Balough, MD

Captain, Medical Core, United States Navy Sherman Department of Otolaryngology Naval Medical Center San Diego, CA

* Surgical Anatomy of the Temporal Bone and Dissection Guide

Sanjay A. Bhansali, MD, FACS

Ear Consultants of Georgia

Atlanta, GA

* Vestibular Testing

Dennis I. Boirab, MD

Michigan Ear Institute, Farmington Hills, MI Chairman, Department of Otolaryngology, Beaumont Hospital, Royal Oak, MI Oakland University School of Medicine Rochester, MI

Director, Neuroscience Center, Providence Park Hospital, Novi, MI

Clinical Professor, Department of Otolaryngology and Neurosurgery, Wayne State University Farmington Hills, MI

* Vestibular Testing

* Surgical Anatomy of the Temporal Bone and Dissection Guide

Derald E. Brackmann, MD

Clinical Professor of Otolaryngology—Head and Neck Surgery/Neurological Surgery University of Southern California School of Medicine President and Board of Directors House Ear Institute Los Angeles, CA * Auditory Brainstem Implant

John P. Carey, MD

Associate Professor, Department of Otolaryngology—Head & Neck Surgery Johns Hopkins Medical Center Baltimore, MD

* Surgical Treatment of Peripheral Vestibular Disorders

Keith A. Casper, MD

Assistant Professor, Department of Otolaryngology—Head & Neck Surgery University of Cincinnati Academic Health Center Cincinnati, OH

* Surgery for Cancer of the External Ear

* Surgery for Malignant Lesions

Martin J. Citardi, MD

Professor and Chair, Department of Otorhinolaryngology—Head & Neck Surgery University of Texas Medical School Houston, TX

* Surgery for Cystic Lesions of the Petrous Apex

Benjamin T. Crane, MD, PhD

Assistant Professor, Department of Otolaryngology University of Rochester Medical Center Rochester, NY

* Surgical Treatment of Peripheral Vestibular Disorders

* Surgical Anatomy of the Temporal Bone and Dissection Guide

Roberto A. Cueva, MD, FACS

Regional Neurotologist/Skull Base Surgeon, Southern California Permanente Medical Group Associate Clinical Professor/Voluntary and Co-Director of Neurotology Fellowship

University of California

San Diego, CA

- * Principles of Temporal Bone and Skull Base Surgery
- * Neurophysiologic Monitoring in Otologic/ Neurotologic Surgery
- * Prevention and Management of Cerebrospinal Fluid Leaks

Christopher J. Danner, MD

Director of Clinical Research, Tampa Bay Hearing & Balance Disorder Center

Associate Clinical Professor

Department of Communicative Disorders

University of South Florida, Tampa, FL

Associate Director of Prosper Ménière Society Little Rock, AR

* Prevention and Management of Cerebrospinal Fluid Leaks

Charles C. Della Santina, MD, PhD

Associate Professor of Otolaryngology—Head & Neck Surgery and Biomedical Engineering

Director, Johns Hopkins Vestibular

Neuroengineering Lab

Johns Hopkins School of Medicine

Baltimore, MD

* Implantable Middle Ear and Bone Conduction Hearing Devices

Chris De Souza, MD, FACS

Visiting Assistant Professor of Otolaryngology, State University of New York—Downstate

Medical Center

Brooklyn, NY

Consultant Otology Surgeon, Tata Memorial Hospital Mumbai, India

* Intracranial Complications of Otitis Media

David R. Friedland, MD, PhD

Associate Professor and Chief, Division of Otology and Neuro-otologic Skull Base Surgery

Department of Otolaryngology and Communication Sciences

Medical College of Wisconsin

Milwaukee, WI

* Stereotactic Radiosurgery and Radiotherapy for Temporal Bone Tumors

Lendra M. Friesen, MS

Director of Cochlear Implant Research, Department of Otolaryngology, Sunnybrook Health Sciences Centre

Associate Scientist, Sunnybrook Research Institute Associate Professor, Department of Otolaryngology University of Toronto

Toronto, ON, Canada

* Auditory Brainstem Implant

Bruce J. Gantz, MD

Professor and Chair, Department of Otolaryngology— Head & Neck Surgery

University of Iowa Hospitals and Clinics Iowa City, IA

* Surgery of the Facial Nerve

M. Miles Goldsmith, MD, FACS

Georgia Ear Institute

Savannah, GA

* Image-Guided Systems in Neurotology/Skull Base Surgery

Quinton Gopen, MD

Instructor, Department of Otology and Laryngology Harvard Medical School

Department of Otolaryngology, Children's Hospital Boston, MA

* Endoscopic Diagnosis and Surgery of Eustachian Tube Dysfunction

* Pathology and Clinical Course Inflammatory Diseases of the Middle Ear

Samuel P. Gubbels, MD

Assistant Professor, Department of Surgery,
Division of Otolaryngology
University of Wisconsin
Madison, WI
* Surgery of the Facial Nerve

Aina Julianna Gulya, MD, FACS

Clinical Professor of Otolaryngology—Head & Neck Surgery

The George Washington University

Washington, DC

Former Chief of Clinical Trials Branch, National Institute on Deafness and Other Communication Disorders

Bethesda, MD

- * Developmental Anatomy of the Temporal Bone and Skull Base
- * Anatomy of the Temporal Bone and Skull Base

Ophir Handzel, MD, LLB

Department of Otolaryngology—Head & Neck Surgery

Tel-Aviv Sourasky Medical Center

Tel-Aviv, Israel western grant and shared shared and to not so to

Surgery for Otosclerosis

David S. Haynes, MD

Director, Division of Otology and Neurotology

The Otology Group of Vanderbilt

Neurotology Fellowship Program Director,

Associate Professor, Department of Otolaryngology

Associate Professor, Department Hearing and Speech Sciences

Vanderbilt University Medical Center

Nashville, TN

* Clinical Diagnosis

* Canal-Wall-Up Mastoidectomy

Stefan Heller, PhD about to food a virasovin U your

Associate Professor, Department of Otolaryngology— Head & Neck Surgery

Stanford University School of Medicine

Stanford, CA

* Auditory Physiology: Inner Ear

Masoud Hemmati, MD

Professor and Chairman, Department of Radiology University of Illinois

Chicago, IL

* Imaging of the Temporal Bone

Gayle E. Hicks, PhD, DABNM

Diplomat of the American Board of Neurophysiologic Monitoring, American Board of Audiology, Board Certification

Neurodynamics, Inc.

San Diego, CA

* Neurophysiologic Monitoring in Otologic/ Neurotologic Surgery

William E. Hitselberger, MD

Neurosurgeon

Los Angeles, CA

* Auditory Brainstem Implant

Gordon B. Hughes, MD

Program Director—Clinical Trials, Division of Scientific Programs

National Institute on Deafness & Other

Communication Disorders
National Institutes of Health

Bethesda, MD

* Surgery for Cystic Lesions of the Petrous Apex

Timothy E. Hullar, MD, FACS M, motev A I miles

Assistant Professor, Department Otolaryngology— Head & Neck Surgery

Department of Anatomy and Neurobiology, Program in Audiology & Communication Sciences
Washington University School of Medicine
St. Louis, MO

* Vestibular Physiology and Disorders of the Labyrinth

C. Gary Jackson, MD, FACS

Nashville, TN

* Principles of Temporal Bone and Skull Base Surgery

* Surgery for Benign Tumors of the Temporal Bone

Robert A. Jahrsdoerfer, MD

Professor, Department of Otolaryngology—Head & Neck Surgery

University of Virginia School of Medicine Charlottesville, VA

* Surgery for Congenital Aural Atresia

Pawel J. Jastreboff, PhD, ScD, MBA

Professor, Department of Otolaryngology—Head & Neck Surgery

Emory University School of Medicine Atlanta, GA

* Tinnitus

Elina Kari, MD

Department of Otolaryngology—Head & Neck Surgery

Emory University School of Medicine Atlanta, GA

* Tinnitis

B. Maya Kato, MD 30A3 CM enived to leuma?

Michael R. Gatto & Associates

Palm Springs, CA

* Vestibular Testing

Bradley W. Kesser, MD

Associate Professor, Department of Otolaryngology—
Head & Neck Surgery

University of Virginia Health System

Charlottesville, VA

* Surgery for Congenital Aural Atresia

Arvind Kumar, MD, FRCS

Emeritus Professor, Department of Otolaryngology University of Illinois

Adjunct Professor, Department of Otolaryngology Northwestern University

Chicago, IL

Ear Institute of Chicago

Hinsdale, IL

* Aural Complications of Otitis Media

John F. Kveton, MD, FACS

Clinical Professor of Surgery (Otolaryngology) & Neurosurgery

Yale University School of Medicine

New Haven, CT

* Open Cavity Mastoid Operations

Anil K. Lalwani, MD

Professor, Department of Otolaryngology, Pediatrics, Physiology & Neuroscience

New York University School of Medicine

New York, NY

* Genetics in Otology and Neurotology

Joung Lee, MD

Professor of Surgery, Department of Neurosurgery The Cleveland Clinic—Lerner College of Medicine Cleveland, OH

* Surgery for Cystic Lesions of the Petrous Apex

John P. Leonetti, MD

Professor and Vice-Chairman, Department of Otolaryngology, Neurotology, Otology, and Skull Base Surgery

Co-director of the Loyola Center for

Cranial Base Surgery

Loyola University Medical Center

Maywood, IL

* Surgery for Benign Tumors of the Temporal Bone

S. George Lesinski, MD

Otologist, Queen City Ear/Nose/Throat Association Director, Midwest Ear Foundation Cincinnati, OH

* Lasers in Otology

Samuel C. Levine, MD, FACS

Professor, Otolaryngology and Neurosurgery University of Minnesota Minneapolis, MN

* Intracranial Complications of Otitis Media

Charles Limb, MD

Associate Professor, Department of Otolaryngology— Head and Neck Surgery

Johns Hopkins University School of Medicine Baltimore, MD

* Neurophysiology: The Central Auditory System

Lawrence R. Lustig, MD

Francis A. Sooy Professor, Department of
Otolaryngology—Head & Neck Surgery
University of California—San Francisco
San Francisco, CA

* Implantable Middle Ear and Bone Conduction Hearing Devices

Sam J. Marz, MD

Professor, Department of Otolaryngology, Otology,
Neurotology, and Skull Base Surgery
Residency Program Director
Director of the Loyola Hearing Center
Loyola University Medical Center
Maywood, IL

* Surgery for Benign Tumors of the Temporal Bone

Kinuko Masaki, PhD

Department of Otolaryngology—Head & Neck Surgery Stanford University School of Medicine Stanford, CA

* Auditory Physiology: Inner Ear

Douglas E. Mattox, MD

Professor and William Chester Warren, Jr, MD Chairman, Department of Otolaryngology— Head & Neck Surgery Emory University School of Medicine

Emory University School of Medicine Atlanta, GA

* Tinnitis

Bradford J. May, PhD

Professor, Department of Otolaryngology— Head & Neck Surgery Johns Hopkins University School of Medicine Baltimore, MD

* Neurophysiology: The Central Auditory System

Michael J. McKenna, MD

Professor, Department of Otology & Laryngology Massachusetts Eye & Ear Infirmary Boston, MA

* Surgery for Otosclerosis

Saumil N. Merchant, MD

Eliasen Professor of Otology and Laryngology Harvard Medical School Director, Otopathology Laboratory and Co-director Wallace Middle Ear Research Unit Massachusetts Eye and Ear Infirmary Boston, MA

* Acoustics and Mechanics of the Middle Ear

Anand N. Mhatre, PhD

Assistant Professor, Department of Otolaryngology, and Physiology & Neuroscience New York University School of Medicine New York, NY

* Genetics in Otology and Neurotology

Lloyd B. Minor, MD, FACS MM, Moines 118 Ams 8

Provost and Senior Vice President for Academic Affairs The Johns Hopkins University

University Distinguished Service Professor of
Otolaryngology—Head & Neck Surgery

The Johns Hopkins University School of Medicine Baltimore, MD

* Vestibular Physiology and Disorders of the Labyrinth

* Surgical Treatment of Peripheral Vestibular Disorders

Matthew R. O'Malley, MD

Midwest Ear Institute Indianapolis, Indiana

* Clinical Diagnosis

Steven R. Otto, MA

Senior Research Associate, Department of Communication and Auditory Neuroscience House Ear Institute Los Angeles, CA

* Auditory Brainstem Implant

Mark D. Packer, MD

Assistant Clinical Professor, Otolaryngology University of Texas Medical School at San Antonio Director of Otology and Neurotology, Wilford Hall Medical Center, Lackland Air Force Base San Antonio, TX

* Tumor Biology, Vestibular Schwannoma

Nathan C. Page, MD

Department of Otolaryngology Rady Children's Hospital San Diego, CA

* Vestibular Physiology and Disorders of the Labyrinth

Myles Pensak, MD, FACS

H.B. Broidy Professor and Chairman, Department of Otolaryngology—Head & Neck Surgery University of Cincinnati Academic Health Center Cincinnati, OH

* Surgery for Cancer of the External Ear

* Surgery for Malignant Lesions

Travis J. Pfannenstiel, MD

Major, United States Army Otology, Neurotology and Skull Base Surgery Naval Medical Center San Diego, CA

* Vestibular Testing

Dennis S. Poe, MD, FACS

Associate Professor, Department of Otolaryngology and Laryngology, Harvard Medical School

Department of Otolaryngology at Children's Hospital Boston, MA

Visiting Professor, Department of Otolaryngology Tampere University Medical School

Tampere, Finland

* Endoscopic Diagnosis and Surgery of Eustachian Tube Dysfunction

* Endoscope-Assisted Ear Surgery

* Ossicular Chain Reconstruction

Virginia Ramachandran, AuD

Senior Staff Audiologist, Division of Audiology
Department of Otolaryngology—Head and Neck Surgery
Henry Ford Hospital
Detroit, MI

* Hearing Aids

Peter S. Roland, MD

Professor and Chairman, Otolaryngology—Head & Neck Surgery

Professor, Neurological Surgery

Chief, Pediatric Otology

University of Texas Southwestern Medical Center Dallas, TX

* Cochlear Implants in Adults and Children

John J. Rosowski, PhD

Professor of Otology & Laryngology and Health Sciences & Technology

Harvard Medical School

Principal Investigator, Eaton Peabody Laboratory of Auditory Physiology, Massachusetts Eye & Ear Infirmary

Boston, MA

Affiliate Faculty Member, Division of Health Sciences & Technology

Harvard University—Massachusetts Institute of Technology

Cambridge, MA

* Acoustics and Mechanics of the Middle Ear

Paul M. Ruggieri, MD

Head, Sections of Neuroradiology and MRI Imaging Institute

The Cleveland Clinic, Cleveland, OH

* Surgery for Cystic Lesions of the Petrous Apex

Christina L. Runge-Samuelson, MD, PhD

Associate Professor, Department of Otolaryngology and Communication Sciences

Medical College of Wisconsin

Milwaukee, WI

* Stereotactic Radiosurgery and Radiotherapy for Temporal Bone Tumors

Ravi N. Samy, MD

Assistant Professor, Department of Otolaryngology University of Cincinnati College of Medicine Cincinnati, OH

* Surgery of the Facial Nerve

Michael C. Schubert, PT, PhD

Assistant Professor, Department of Otolaryngology-Head and Neck Surgery Johns Hopkins School of Medicine

Baltimore, MD

* Vestibular Rehabilitation

Robert V. Shannon, PhD

Scientist, Auditory Implant Research Laboratory House Ear Institute

Research Professor of Biomedical Engineering / Neuroscience

University of Southern California

Los Angeles, CA

* Auditory Brainstem Implant

Michael J. Shinners, MD

Clinical Assistant Professor, Pritzker School of Medicine

University of Chicago

Evanston, IL

* Intracranial Complications of Otitis Media

Aristides Athanasiadis-Sismanis, MD, FACS

Professor of Otorhinolaryngology, Medical School of Athens University

Director, ORL Clinic

Ippokration Hospital

Athens, Greece

* Tympanoplasty: Tympanic Membrane Repair

* Ossicular Chain Reconstruction

Brad A. Stach, PhD

Director, Division of Audiology

Department of Otolaryngology—Head &

Neck Surgery

Henry Ford Hospital

Detroit, MI

* Audiologic Evaluation of Otologic/Neurotologic Disease

* Rehabilitation: Hearing Aids

Veronika Starlinger, MD

Department of Otolaryngology—Head &

Neck Surgery

Medical University of Vienna

Vienna, Austria

* Auditory Physiology: Inner Ear

Barry Strasnick, MD, FACS

Professor and Chairman, Department of Otolaryngology—Head & Neck Surgery Eastern Virginia Medical School Norfolk, VA

* Diseases of Auricle, External Auditory Canal, Tympanic Membrane

Elizabeth H. Toh, MD

Department of Otolaryngology, Lahey Clinic Burlington, MA

* Auditory Brainstem Implant

Galdino E. Valvassori, MD

Professor, Department of Radiology University of Illinois Chicago, IL

* Imaging of the Temporal Bone

P. Ashley Wackym, MD, FACS, FAAP

Vice President of Research, Legacy Health President, Ear and Skull Base Institute Portland, OR

* Stereotactic Radiosurgery and Radiotherapy for Temporal Bone Tumors

D. Bradley Welling, MD, PhD, FACS

Professor and Chair, Otology and Neurotology The Ohio State University College of Medicine Department of Otolaryngology—Head & Neck Surgery

The Ohio State University Medical Center Columbus, OH

* Tumor Biology

* Vestibular Schwannoma

Richard Wiet, MD, FACS

Professor of Clinical Otolaryngology and Neurosurgery

Northwestern University

Chicago, IL

Ear Institute of Chicago

Hinsdale, IL

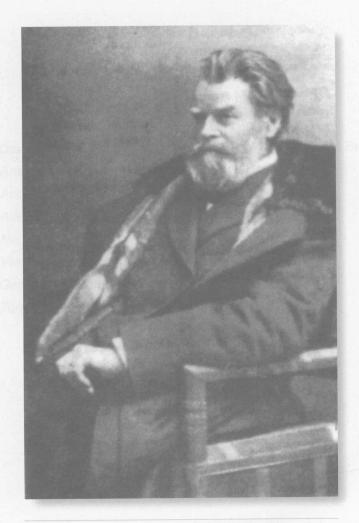
* Aural Complications of Otitis Media

Justin Wittkopf, MD

Otology/Neurotology and Skull Base Surgery Affiliated Ear Nose and Throat Physicians Woodstock, IL

* Canal-Wall-Up Mastoidectomy

Scientific Foundations



FRIEDRICH BEZOLD (1842–1908) • Clarified the differentiation by tuning fork tests of conductive and sensorineural hearing losses and the clinical diagnosis of otosclerosis. His clear and concise Textbook of Otology served as a model for Shambaugh as he wrote his Surgery of the Ear.

Contents

Foreword *xi*Preface *xiii*Contributors *xv*

SECTION I. SCIENTIFIC FOUNDATIONS

- Developmental Anatomy of the Temporal Bone and Skull Base 3 Aina Julianna Gulya, MD, FACS
- Anatomy of the Temporal Bone and Skull Base 29
 Aina Julianna Gulya, MD, FACS
- 3. Acoustics and Mechanics of the Middle Ear 49
 Saumil N. Merchant, MD / John J. Rosowski, PhD
- 4. Auditory Physiology: Inner Ear 73

 Veronika Starlinger, MD / Kinuko Masaki, PhD /
 Stefan Heller, PhD
- Neurophysiology: The Central Auditory System 85
 Bradford J. May, PhD / Charles Limb, MD
- 6. Vestibular Physiology and Disorders of the Labyrinth 113

 Timothy E. Hullar, MD, FACS /
 Nathan C. Page, MD / Lloyd B. Minor, MD, FACS
- 7. Genetics in Otology and Neurotology 137
 Anil K. Lalwani, MD /
 Anand N. Mhatre, PhD
- 8. Tumor Biology 151
 D. Bradley Welling, MD, PhD, FACS / Mark D. Packer, MD

SECTION II. CLINICAL EVALUATION AND REHABILITATION

- 9. Clinical Diagnosis 171
 Matthew R. O'Malley, MD /
 David S. Haynes, MD
- Audiologic Evaluation of Otologic/ Neurotologic Disease 189
 Brad A. Stach, PhD
- 11. Vestibular Testing 223

 Dennis I. Bojrab, MD /
 Sanjay A. Bhansali, MD, FACS /
 Travis J. Pfannenstiel, MD / B. Maya Kato, MD
- 12. Endoscopic Diagnosis and Surgery of Eustachian Tube Dysfunction 245

 Dennis S. Poe, MD, FACS /

 Quinton Gopen, MD
- 13. Imaging of the Temporal Bone 255
 Galdino E. Valvassori, MD /
 Masoud Hemmati, MD
- 14. Hearing Aids 281
 Brad A. Stach, PhD /
 Virginia Ramachandran, AuD
- **15. Tinnitus 293**Elina Kari, MD / Douglas E. Mattox, MD / Pawel J. Jastreboff, PhD, ScD, MBA
- **16. Vestibular Rehabilitation 307** *Michael C. Schubert, PT, PhD*