1996

TRANSACTIONS
AMERICAN OTOLOGICAL SOCIETY, INC.
1996

VOLUME EIGHTY-FOUR

ONE HUNDRED TWENTY-NINTH ANNUAL MEETING

HYATT REGENCY GRAND CYPRESS RESORT

ORLANDO, FLORIDA

MAY 4 AND 5, 1996

Lippincott - Raven
PUBLISHERS
Philadelphia • New York

CONTENTS

Row 1 (left to right): Joseph C. Farmer, Jr., Eiji Yanagisawa, John Leonetti, Robert Jahrsdoerfer, Derald Brackmann, James Sheehy, Gregory J. Matz, A. Julianna Gulya, Robert I. Kohut, *Row 2* (left to right): Salvatore Iurato, Andrew Morrison, Jack Pulec, Anthony Maniglia (up a little), Roger Wehrs, Eugene Derlacki, Richard Bellucci, Dennis Pappas, Aristides Sismanis, Howard House, John House, *Row 3* (left to right): George Lesinski, Thomas Eby, Karen Berliner, Richard Miyamoto, Jay Farrior, Bruce Gantz, Ronald Hoffman, Shokri Radpour, Cecil Hart, Peter Alberti, Donald Kamerer, Barry Hirsch (down a little), *Row 4* (left to right): Paul Lambert, Gordon Hughes, Robert Goldenberg (down a little), Sean Althaus, John Emmett, David Wilson (up a little), Thomas Balkany, Horst Konrad, Patrick Brookhouser, Sam Kinney, Stephen Harner, Robert Ruben, *Row 5* (left section of row): Merle Lawrence, Roger Boles, Edwin Monsell, Herbert Silverstein, Douglas Weider, (space) (right section of row): Norman Wendell Todd, Paul Kileny, Ronald Amedee, Malcolm Graham, *Row 6* (left to right): Helge Rask-Andersen, Charles Luetje, Edward Applebaum, Arvind Kumar, Richard Wiet, Clough Shelton, C. Philip Daspit, Herman Jenkins, Larry Duckert, Mansfield Smith, Julian Nedzelski, *Row 7* (left to right): Dennis Poe, (space), Robert Jackler, Loren Bartels, Jean-Bernard Causse, Simon Parisier, Rinaldo Canalis, Noel Cohen, Newton Coker, Richard Buckingham, Bobby Alford

AMERICAN OTOLOGICAL SOCIETY, INC.

1996 OFFICERS

PRESIDENT
DERALD E. BRACKMANN, M.D.

VICE-PRESIDENT (PRESIDENT-ELECT)
JOSEPH C. FARMER, JR., M.D.

SECRETARY-TREASURER
GREGORY J. MATZ, M.D.

EDITOR-LIBRARIAN
A. JULIANNA GULYA, M.D.

COUNCIL
The above officers and
ROBERT I. KOHUT, M.D.
ROBERT A. JAHRSDOERFER, M.D.
C. GARY JACKSON, M.D.
CHARLES M. LUETJE, M.D.

1997 OFFICERS

PRESIDENT
JOSEPH C. FARMER, JR., M.D.

VICE-PRESIDENT (PRESIDENT-ELECT)
CHARLES M. LUETJE, M.D.

SECRETARY-TREASURER
GREGORY J. MATZ, M.D.

EDITOR-LIBRARIAN
A. JULIANNA GULYA, M.D.

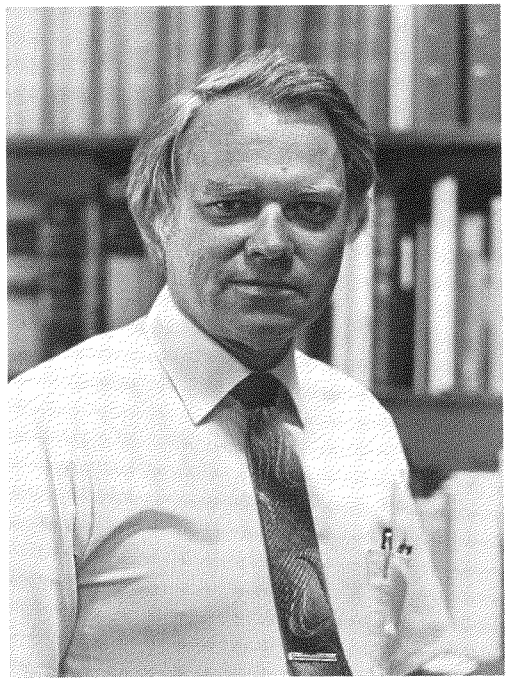
COUNCIL
The above officers and
ROBERT A. JAHRSDOERFER, M.D.
DERALD E. BRACKMANN, M.D.
C. GARY JACKSON, M.D.
HORST R. KONRAD, M.D.

INTRODUCTION OF AWARD OF MERIT RECIPIENT F. BLAIR SIMMONS, M.D.

Robert I. Kohut, M.D.

Dr. Blair Simmons has truly a distinguished and eminent background. As a child and young man, he exhibited a sense of curiosity regarding nature and in general how things worked, both biologic and not biologic. After graduating cum laude from Transylvania College in Lexington, Kentucky, he received a public health service medical student fellowship and graduated from the University of Louisville in Louisville, Kentucky, receiving his M.D. degree. His internship was at Madigan General Hospital from 1956 to 1957, followed by a residency in otolaryngology at Stanford University Medical School from 1959 to 1962. He was a research associate at the Harvard Psychoacoustic Laboratory in 1955 with S.S. Stevens, a research associate at the Walter Reed Institute of Research in Neurophysiology and Auditory Physiology with Robert Galambos in 1958–1959, and a research associate at Stanford University Medical School from 1959 to 1961.

He joined the faculty at Stanford in 1961. He rose in rank, and 10 years later, in 1971, he became Professor and Head of the Division of Otolaryngology of Stanford University Medical School. The curiosity that he exhibited as a child continued and was demonstrated by his research activities, which continued throughout his life. He is a Diplomate of the American Board of Otolaryngology and a member of the American Physiological Society, the Academy of Ophthalmology and Otolaryngology (at the time of his initiation), the Society of University Otolaryngologists, the American Neurotology Society, the American Auditory Society (of which he was President in 1978), the Triological Society, the Otological Society, the Collegium ORLAS, and the Acoustical Society of America. His achievements have been appropriately recognized. He was listed in the American Men of Science in 1961 and in later editions and received the Research Award of the American Academy of Ophthalmology and Otolaryngology in 1963. He has served at the National Institutes of Health on the NIH/NINDS study section on sensory communication. He is listed in *Who's Who in America*, received the Physician Recognition Award of the AAOO, and as early as 1966 was initiated as a member of the National Academy of Sciences and the National Research Council Committee on Hearing, Bioacoustics and Biomechanics. He served on the Nobel Committee for Physiology and Medicine—Solicitation for Nominations in 1983, 1986, and 1987. Among his other points of recognition, he has served on the editorial review board for several distinguished professional journals. He served as Program Chairman for the Research Meeting of the Academy of Ophthalmology and Otolaryngology in 1967, was editor and chairman of the Academy Study Section on Hearing Aids, served on numerous committees for the Academy and medical foundations, and received the first annual award for Contributions to the Infant Hearing Assessment Foundation in 1989. His scientific productivity includes over 140 publications, many of which provided heralding insights into clinical problems and dilem-



F. Blair Simmons, M.D.

mas, others of which addressed fundamental scientific principles, many relating to the auditory and vestibular systems, but others addressing problems regarding respiration and apnea. He is a leader in the development and application of cochlear implants.

Dr. Simmons' depth of understanding, his logical approaches, and his scientific and clinical productivity are well known. The American Otological Society has the privilege of adding to the recognition of Dr. Simmons its highest honor, the Award of Merit.

RESPONSE OF AWARD OF MERIT RECIPIENT

F. Blair Simmons, M.D.

Here is what I would like to say as a thank you for my Award of Merit.

Thank you for this very great honor. Most of you know that it came as a surprise, for I was in Bangkok (O.K., I missed the meeting). Bob Kohut suggested that since I was not present, I might want to review what previous recipients have said after their awards. I took his suggestion and found first that I am in very good company. I also found that there was no common format for saying thank you. I am on my own.

I thank the Committee, then go back some years to S.S. Stevens, who taught me that science is basically "just doing it." Robert Galambos showed me that being open with one's ideas is a lot more fun than hiding them. George Shambaugh, Jr., reinforced this ideal with his own career. It was also he who said, "All right, I will publish the manuscript"—an unheard-of 52 pages in the *Archives*—on what was basically a case report on a cochlear implant.

I think I have learned most from the Stanford residents and medical and graduate students. My special thanks go to then-resident Richard Goode, who, with resident Charles Mongeon, somehow talked the dean into permanently keeping the residency program while I was out of town looking for another job.

AWARD OF MERIT RECIPIENTS 1949–1996

1949 George M. Coates, M.D.
1951 Barry J. Anson, Ph.D., and Theodore H. Bast, Ph.D.
1952 Edmund P. Fowler, M.D.
1953 Julius Lempert, M.D.
1954 Stacy R. Guild, M.D.
1957 Georg von Békésy, Ph.D.
1959 E. Glen Wever, Ph.D.
1960 Hallowell Davis, M.D.
1961 John R. Lindsay, M.D.
1962 William J. McNally, M.D.
1965 Anderson C. Hilding, M.D.
1966 Gordon D. Hoople, M.D.
1967 Merle Lawrence, Ph.D.
1968 Lawrence R. Boies, M.D.
1969 Sir Terence Cawthorne
1970 Senator Joseph Sullivan, M.B.
1971 Samuel Rosen, M.D.
1972 Howard P. House, M.D.
1973 Moses H. Lurie, M.D.
1974 George E. Shambaugh Jr., M.D.
1975 Catherine A. Smith, Ph.D.
1976 Harry Rosenwasser, M.D.
1977 Frank D. Lathrop, M.D.
1978 Juergen Tonndorf, M.D.
1979 John E. Bordley, M.D.
1980 Ben H. Senturia, M.D.
1981 J. Brown Farrior, M.D.
1982 William F. House, M.D.
1983 Victor Goodhill, M.D.
1984 Harold F. Schuknecht, M.D.
1985 Wesley H. Bradley, M.D.
1986 John J. Shea Jr., M.D.
1987 Jack V. Hough, M.D.
1988 George T. Nager, M.D.
1989 Brian F. McCabe, M.D.
1990 Eugene L. Derlacki, M.D.
1991 Richard R. Gacek, M.D.
1992 James L. Sheehy, M.D.
1993 James A. Donaldson, M.D.
1994 Fred H. Linthicum Jr., M.D.
1995 D. Thane R. Cody, M.D., Ph.D.
1996 F. Blair Simmons, M.D.

GUESTS OF HONOR 1949–1996

1949 Harris P. Mosher, M.D.
1950 D. Harold Walker, M.D.
1951 John Mackenzie Brown, M.D.
1952 Edmund P. Fowler, M.D.
1953 H. I. Lillie, M.D.
1956 Stacy R. Guild, Ph.D.
1958 Ralph A. Fenton, M.D.
1961 Julius Lempert, M.D.
1962 Philip Meltzer, M.D.
1963 William J. McNally, M.D.
1964 Kenneth M. Day, M.D.
1965 Senator Joseph Sullivan, M.B.
1966 Dean M. Lierle, M.D.
1967 Lawrence R. Boies, M.D.
1968 Sir Terence Cawthorne
1969 Gordon D. Hoople, M.D.
1970 John R. Lindsay, M.D.
1971 E. Glen Wever, Ph.D.
1972 Frank D. Lathrop, M.D.
1973 Moses H. Lurie, M.D.
1974 Harry Rosenwasser, M.D.
1975 John E. Bordley, M.D.
1976 Ben H. Senturia, M.D.
1977 Henry B. Perlman, M.D.
1978 Howard P. House, M.D.
1979 Hallowell Davis, M.D.
1980 Victor Goodhill, M.D.
1981 Harold F. Schuknecht, M.D.
1982 George E. Shambaugh Jr., M.D.
1983 Wesley H. Bradley, M.D.
1984 Brown Farrior, M.D.
1985 Bruce Proctor, M.D.
1986 Merle Lawrence, Ph.D.
1987 Robert M. Seyfarth, Ph.D.
1988 G. Dekle Taylor, M.D.
1989 Eugene L. Derlacki, M.D.
1990 William F. House, M.D.
1991 Michael E. Glasscock III, M.D.
1992 William E. Hitselberger, M.D.
1993 D. Thane R. Cody, M.D., Ph.D.
1994 Cesar Fernandez, M.D.
1995 Richard R. Gacek, M.D.
1996 James L. Sheehy, M.D.

SCIENTIFIC SESSIONS

1996 PRESIDENTIAL ADDRESS

TRAINING IN OTOLOGY/NEUROTOLOGY

Derald E. Brackmann, M.D.

Derald E. Brackmann, M.D.

In June of 1995 the Accreditation Council for Graduate Medical Education (ACGME) approved the program requirements for fellowship training in otology/neurotology. When this news was released, many questions were raised by our members. Among these were, "What does this mean, and why is this necessary?" General otolaryngologists asked the question, "Is this an attempt by otologists to do all the otology?" Some asked even more basic questions, like "What in the world is the ACGME?" In this presentation I will review the development of fellowship certification, its purpose, and why it is important.

I will first review the process by which residencies are accredited and the process of board certification.

Accreditation of residency training programs is done by the ACGME. This group is composed of representatives from the American Medical Association, the American Hospital Association, the Council of Medical and Surgical Subspecialties, the Association of American Medical Colleges, and the American Board of Medical Specialties. That group appoints a Residency Review Committee (RRC) with representatives from the American College of Surgeons, the American Medical Association, and the American Board of Otolaryngology. The ACGME and RRC are responsible for developing the criteria for accreditation of residency and fellowship training programs as well as their review and continuing approval.

The American Board of Otolaryngology, of course, is responsible for accrediting individuals through the board examination process. The parent organization is the American Board of Medical Specialties (ABMS). Representatives from each of the boards compose the ABMS, each responsible for accrediting the residents in their respective specialties. The certificate issued by each board must be approved by the ABMS. Thus, certificates of added qualification must be approved by the ABMS. Our board alone cannot do this. With this background, let me now review the history of the American Otological Society in the development of the accreditation of fellowships.

The process of approving fellowships in otology/neurotology has been long and arduous. It began in May of 1984 when then-president Jack Hough organized a meeting to explore this possibility. Dr. Howard House was chairman, and Frank Sooy was vice-chairman. Seventeen other members of the society (including me as the junior member) met during the annual meeting to discuss the desirability and feasibility of recognition of special competency in otology/neurotology. There was general agreement that this was desirable, and discussion continued, addressing the following points:

1. Restructuring training programs so as to devote the first three years of residency to general otolaryngology and the final or fourth

year to one of the subspecialty areas such as otology/neurotology.
2. Developing fellowship programs in the subspecialty.
3. Establishing what criteria should be required to ensure that the fellowships serve the purpose for which they were designed.
4. How much post-fellowship clinical experience should be considered adequate.
5. Recognition of those individuals who meet all of the requirements.

Subsequent to the initial meeting a number of task forces were formed to consider these and other issues.

In 1986, then-president Brian McCabe along with the Council appointed a board of review with the charge to further develop the criteria for fellowships in otology/neurotology. At that time it was uncertain whether the ACGME had an interest in this, and the American Otological Society was prepared to carry on this activity on its own. After further consideration, however, it was decided that it would be best do this through recognized accrediting agencies, and in 1989, the American Otological Society and the American Neurotology Society formally asked the ACGME to approve fellowship training in otology/neurotology and the RRC to regulate training programs. At that same time, independently a committee of the American Board of Otolaryngology discussed certification of added qualification in the various subspecialties of otolaryngology–head and neck surgery. Thus the process was started.

Over the ensuing six years the document which finally was approved was developed. This was a tedious process; drafts of the document were circulated on two different occasions to all ACGME members, as well as our own fellowship and residency directors. Neurological surgery, neurology, and physical and rehabilitative medicine specialties had some concerns with the requirements. This required altering language in the document until it was finally acceptable to these specialties as well as our own Society executives.

At the same time that the Otolaryngology Residency Review Committee was working on ACGME approval for training programs, the American Board of Otolaryngology continued seeking approval for a certificate of added qualification (CAQ) for certifying individuals who had completed approved training. The ABO was finally successful in obtaining approval by the ABMS to issue a CAQ for otology/neurotology. This CAQ allows the ABO to certify qualified individuals completing training from accredited training programs. Thus the mechanism is in place to issue a CAQ to those completing an approved fellowship. The mechanics are now being developed with significant input from the AOS and ANS.

This explains how we came to this point. The question as to why this is necessary, or even desirable, remains.

The constitution of the American Otological Society states that one of the aims of the Society is to foster and deliver the best of otologic care to the people of America. This is the primary goal of accreditation of fellowship training. When this process started, more than 10 years ago, the Council recognized that there was great variation in fellowship training programs, ranging from formal programs of one year's duration to preceptorships of a few months. Without recognition by organized medicine, individuals were often experiencing difficulty in obtaining privileges to perform the procedures for which they had been trained. There is no question that fellowship training will be greatly improved by standardization and accreditation by the ACGME.

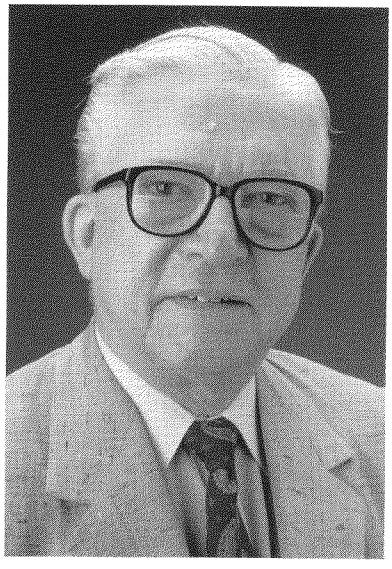
Some have questioned the requirement for a two-year fellowship. It is true that many can master the technical skills to safely perform the procedures of neurotology in one year. The subspecialty is in need of more than just technicians, however. This additional training will allow a more in-depth study of the basic science of the specialty, as well as more cross collaboration with colleagues from other disciplines such as neurology, neurosurgery, and neuroradiology. There will also be more opportunity for fellows to become involved in meaningful research.

One concern is that there will be fewer programs able to meet the strict criteria outlined by the ACGME. While this is true, I'm not sure that it is necessarily detrimental. Dr. Robert Dobie analyzed the number of neurotologists who would be trained if the current number in training were to remain the same over the years. He projected that by the year 2030, there would be only four acoustic tumors per year per neurotologist, and that figure assumes that every acoustic neuroma diagnosed would be treated by a neurotologist. Obviously it is not necessary to train 20 or 30 neurotologists per year as we are now doing.

In conclusion, the ACGME, ABO, AOS, and ANS executives believe that the approved special requirements for otology/neurotology for standardized training will improve training and maintain high-quality patient care. It is also essential for the future preservation and growth of the subspecialty of otology/neurotology.

PRESENTATION OF GUEST OF HONOR JAMES L. SHEEHY, M.D.

Derald E. Brackmann, M.D.



James L. Sheehy, M.D.

One of the enjoyable aspects of being the president of a society is that it offers the opportunity to recognize people whom you admire and to whom you owe a debt of gratitude. Today it gives me great pleasure to honor James L. Sheehy, who has contributed so greatly to my career.

My first encounter with Jim was as a resident at Los Angeles County USC Medical Center. Everyone is familiar with Jim's superb teaching techniques. His highly organized approach to a problem and logical analysis made a great impression on me. He taught me the techniques of chronic ear surgery that I use to this very day.

Jim encouraged me to do clinical research and write. He spent many hours editing my papers and making constructive criticisms.

Jim has also had a great influence on many other members of our Society. His presentation and slide techniques and his panel moderation techniques have become a standard for our specialty. He is a past Award of Merit recipient, and it is my great pleasure to add the Society's Guest of Honor to his many others. Thank you, Jim for your contributions to my career and to the American Otological Society.

REMARKS OF GUEST OF HONOR

TINNITUS: A FEW THOUGHTS

James L. Sheehy, M.D.

I thank President Derald Brackmann and the Council for making me the 1996 Guest of Honor at the annual meeting of the American Otological Society.

In reflecting on what to say after thanking all of you for the honor (Dr. Brackmann said I must say something!), I thought it might be of interest to you to hear some things I have learned about managing the tinnitus patient.

Take an interest.—If the patient says that tinnitus (or head noise) is the main reason for this first visit, then dwell on it, despite the fact that you may see an obvious "cause" when looking at the hearing test.

What does the noise sound like?

Is it in both ears? Or is it localized in the middle of the head?

What do you personally think caused it? (The answer to this question at times can be very revealing.)

If the patient indicates that the noise is there all the time, ask whether it is more noticeable in quiet. (This is to find out if in fact it is a "normal pattern.") The answer at times is very revealing: "I never notice it when I am busy"; or "It's only when I try to go to sleep."

The explanation.—Assuming that there is normal hearing in both ears or a symmetric sensorineural hearing impairment, do not start off by saying, "It's not serious." It *is* serious to the patient. Say, instead, "Let me summarize things first. There is no evidence of tumor or infection, no evidence that you are going to go deaf." At this time there is often a great sigh of relief along with a smile; you have answered the most important questions already and the patient is ready to listen to anything else you have to say.

If you have surmised that the patient is terribly worried, you need to explain the process of habituation. Do not say, "You've got to ignore it." This is translated into "The doctor says I have to live with it."

I have already explained to the patient (using a diagram in our tinnitus booklet) how the electrical impulses come from the inner ear into the brainstem. "In the brainstem there is what I call the habituator" (I mark an *X* in the brainstem area at this point) "and most of the time the habituator stops the impulses from rising to a conscious level."

"Everyone has impulses coming in from all over the body, but they get stopped here [the *X*]. As an example, you don't normally feel the shoes on your feet, do you? But you do now that I have called your attention to it!"

"You don't normally feel your wristwatch, do you? Take it off and put it on the other wrist." A big smile (usually) develops. The patient has begun to understand what is meant by habituation. If the patient's problem with tinnitus is obviously posing a major difficulty, or if I am specifically asked, I state that the commonest cause of failure of the habituator, like a computer malfunction, is severe stress or depression. This at times brings forth comments that are very helpful for the patient and for the doctor. The direction of the conversation may well then change for the patient's benefit.

So, I strongly recommend that when dealing with a patient with tinnitus you do two things: 1) take an interest, and 2) explain it in a way that the patient can understand.

Let me thank the American Otological Society and Dr. Brackmann for having me as Guest of Honor this year.

PRESIDENTIAL CITATION
JOSEPH C. FARMER, JR., M.D.

Derald E. Brackmann, M.D.

One of the relatively new traditions of the Society is to award a Presidential Citation to someone who has made a significant contribution to the Society. It is my pleasure to present this award to Joseph C. Farmer, Jr., M.D.

Joe served the Society as Editor-Librarian from 1991 to 1995. During that time he worked tirelessly on the *Transactions* of our Society. A major undertaking was the editing of the history of American Otological Society. Joe spent many hours to complete publication of our rich history. Joe also serves as Director and Secretary-Treasurer of the *American Journal of Otology*. Those who know Joe well consider him a peacemaker. This character trait has been evident in the steadying influence he has had in the development of the *American Journal of Otology* during sometimes turbulent times.

Joe is one of those who works diligently without fanfare. I would like to partially remedy that oversight by awarding him this Presidential Citation.

REPLY

Joseph C. Farmer, Jr., M.D.

Thank you very much. I greatly appreciate this honor.

A SAFE AND EFFECTIVE TECHNIQUE FOR THE MOBILIZED FOOTPLATE IN OTOSCLEROSIS SURGERY

William H. Lippy, M.D., Michael J. Fucci, M.D., Arnold G. Schuring, M.D., and Franklin M. Rizer, M.D.

ABSTRACT

Managing a mobilized footplate in stapedectomy surgery can be challenging. Between 1963 and 1992, 145 footplates were inadvertently mobilized during otosclerosis surgery. A vein graft and a 4.0 mm Robinson prosthesis were placed on all footplates, making no attempt to remove the footplate. There were 73 thin, blue footplates and 72 thick, white footplates. Hearing results in the thin, blue footplate group were 97% successful and 100% satisfactory at three years. No footplate refixed. In the thick, white group, hearing was 60% successful and 72% satisfactory at six months. Footplate refixation was found at revision in all but one unsuccessful case. After revision, the thick, white group had 79% successful and 89% satisfactory hearing results at three years. No patient in either group was worse. We conclude that placing a vein graft and a Robinson prosthesis is a safe and effective technique for a mobilized footplate. If the footplate is thin and blue, there is little or no risk of refixation. If the footplate is thick and white, approximately 30% will require revision.

Presented at the 129th annual meeting of the American Otological Society, Orlando, FL, May 4, 1996.

Reprint requests: Michael J. Fucci, M.D., Warren Otologic Group, 3893 East Market Street, Warren, OH 44484.

BAROTRAUMA FOLLOWING STAPES SURGERY: A SURVEY OF RECOMMENDED RESTRICTIONS AND CLINICAL EXPERIENCES

Willard C. Harrill, M.D., Herman A. Jenkins, M.D., and Newton J. Coker, M.D.

ABSTRACT

Since the introduction of the modern stapedectomy by Shea in 1955, rapid changes in technology have brought more accessibility to activities that may be detrimental to the successful outcome of stapes surgery. With over 555 million travelers on air carriers in the United States during 1994 and over 6 million active sport divers, today's otolaryngologists have greater exposure to post-stapedectomy patients who participate in activities that alter middle and inner ear pressures. Despite the many reports of barotrauma following stapes surgery, there are no generally accepted postoperative restrictions of activities prone to produce rapid barometric pressure change. The literature is also unclear as to whether or not actual clinical outcomes are affected by the variability in advised postoperative barorestrictions. To identify the postoperative barorestrictions currently in use today, the members of the American Otological Society and American Neurotology Society were surveyed. The objectives were to identify a consensus on the postoperative barorestrictions following stapes surgery and to examine the clinical barotrauma experience these physicians have encountered over their years of practice.

Bobby R. Alford Department of Otorhinolaryngology and Communicative Sciences, Baylor College of Medicine, Houston, TX 77030.

The authors thank Carol M. Ashton, M.D., Department of Internal Medicine, Baylor College of Medicine, and Laura L. Ferlic, Baylor College of Medicine Design and Analysis Unit, Department of Internal Medicine, for assistance with the survey design and data analysis. We also thank S. Harold Reuter, M.D., for reviewing the paper.

OUTCOME OF RESIDENT-PERFORMED STAPEDECTOMY: IMPLICATIONS

Ofer Jacobowitz, M.D., Ph.D., and Peter J. Catalano, M.D.

ABSTRACT

With the decline in the number of stapedectomies performed, the adequacy of resident training and the outcome of resident-performed procedures have been called into question. There are many published series of resident-performed stapedectomies with success rates of 62%–82%, well below the 90%–95% rate of trained otologists. We recently reviewed our series of 55 consecutive stapedectomies, entirely performed by 20 residents over five years, with respect to attending *supervision* and audiometric outcome. In all stapedectomies, large fenestra technique, Robinson bucket-handle prosthesis, and vein graft oval window seal were utilized. Fourteen procedures were performed without otologist supervision (group I). Closure of the air–bone gap to within 10 dB occurred in 3 patients in group I (21%) and 23 patients in group II (56%). One profound sensorineural hearing loss occurred in a group II patient due to a purulent middle ear infection. The outcome of supervised procedures (group II), albeit poor, is comparable to that cited in the literature; the outcome of unsupervised procedures (group I) is unacceptable. Thus our results emphasize the need for close intraoperative supervision and experience in middle ear surgery. Furthermore, our series and other studies highlight the fact that even with close attending supervision, the outcome of resident-performed stapedectomies is suboptimal, given that stapedectomies are both difficult and uncommon. Thus, stapedectomy is perhaps more akin to other advanced inner ear procedures, such as singular neurectomy or vestibular nerve section, and henceforth operative training should be limited to fellows or residents bound for further otological training.

Department of Otolaryngology, Mount Sinai School of Medicine, 1 Gustave L. Levy Place, New York, NY 10029, (212) 241-5957 (ph.), (212) 831-3700 (fax).

A META-ANALYSIS REVIEW OF REVISION STAPES SURGERY WITH ARGON LASER: EFFECTIVENESS AND SAFETY

*†Richard J. Wiet, M.D., ‡Douglas C. Kubek, D.O., *Paul Lemberg, M.D., and *Arkadiush T. Byskosh, M.D.

ABSTRACT

Objective: To determine if there is an advantage in safety and outcome efficacy with the use of argon laser in revision stapes surgery as compared to conventional instruments.

Data Sources: A search of the published English-language literature, 1970–1995, was done using the following key words: revision, surgery, stapes, laser, stapedotomy, and argon laser.

Study Selection: The following inclusion criteria were used to select articles for the meta-analysis: revision cases only, a comprehensive review of intraoperative pathological findings that led to the failure, and accurate documentation by the author, confirmed by our statisticians with a modified chi square test. Eleven studies without the use of the laser ($n = 1,147$) and four studies with the use of the laser ($n = 170$), including our own patients ($n = 23$), were entered into the model.

Data Extraction: The data had to meet strict audiometric criteria, which included preoperative and postoperative audiogram pure-tone average air–bone gap. Postoperative audiograms had to include five classifications, and these audiograms had to be obtained a minimum of six months after revision surgery.

Data Synthesis: A log-linear model was developed for this meta-analysis study with each study analyzed individually and collectively.

Conclusion: Revision stapes surgery utilizing the laser has statistically significant ($P = 0.002$) advantage in both safety and efficacy over revision procedures performed using conventional instruments.

*Department of Otolaryngology–Head and Neck Surgery, †Department of Neurosurgery, Northwestern University Medical School, Chicago, IL; ‡Chicago College of Osteopathic Medicine, Olympia Fields, IL.

Reprint requests: Richard J. Wiet, M.D., 950 North York Road, Suite 102, Hinsdale, IL 60521, (708) 789-3110 (ph.), (708) 789-3137 (fax).

DISCUSSION PERIOD I
Papers 1–4

Dr. Derald E. Brackmann (Los Angeles, CA): These four papers on stapedectomy are now open for discussion.

Dr. George Lesinsky (Cincinnati, OH): Congratulations, Rich, on your paper showing the value of the argon laser in stapedectomy revision. I would like to make several comments, if I might, since I began research twelve years ago, specifically regarding lasers and their safety in revision stapedectomy. We have now revised 230 cases and I guess the major conclusion we can draw about the value of the laser is that 135 of those 230 cases had previously failed attempts at revision with standard techniques (as many as four failures) before they were referred for successful revision surgery with the laser. The second comment I would like to make is that there is an enormous difference between the absorption characteristics of collagen among the different wavelengths of available lasers. A tenth of a millimeter of collagen will absorb about 20% of argon or KTP laser energy; 80% will pass through. These data came from studies that were done at the Laser Biomedical Research Institute at MIT. Half of the energy of an argon or KTP laser impacting on a standard-size stapes bone passes into the inner ear. There is a significant difference in absorption characteristics based on wavelength. The ideal wavelengths for collagen and stapes bone are urbium:YAG (2.9 microns), CO_2, and finally the excimer lasers; these lasers have the best absorption characteristics. One last word of caution: those of you who read my papers, if you are going to use my techniques, please use them with the CO_2 laser; I do not believe they are safe for the argon laser. If you are going to use an argon or a KTP laser, follow the techniques described by surgeons who use those lasers. There is a significant difference in safety, and it is technique dependent.

Dr. Derald E. Brackmann (Los Angeles, CA): Thank you, George. Dr. Causse.

Dr. Jean-Bernard Causse (Beziers, France): I would like to ask Dr. Rich Wiet if he does not feel that not only is laser a safer technique, but that some cases should be reserved for the laser? For instance, if there has been total removal of the footplate, and you are looking for the loop of the prosthesis (which may be in the vestibule), isn't it easier to vaporize the tissue around the loop with the laser to find out that the loop is not in the vestibule but still in the fibrous tissue? With mechanical instruments there is a risk of tearing the utricle or saccule. Do you agree with this concept, Rich?

Dr. Richard Wiet (Hinsdale, IL): I would like to answer Dr. Lesinsky and Dr. Causse. I must echo something Dr. Lesinsky warned us about. There was a very fine paper by Dr. Bruce Gantz years ago (when he was a fellow with Dr. Ugo Fisch) showing the danger of the argon laser energy directly entering the vestibule. For those of us who use the argon laser, we basically pothole the footplate in a rosette fashion and finish off the stapedotomy with a drill or a pick; so, I think for those of you who are learning this technique, Dr. Lesinsky's cautioning statement is well-founded. Now, to answer Dr. Causse's question about situations in which you face a total removal with wire near the vestibule: I think there is an advantage to using the laser there, Bernard. We found, with the Fisher's exact test, that in cases with pathology near the oval window, use of the laser offered substantial advantage. We are not talking about the ossicular chain, for example, incus erosion problems, but in uncovering pathology at the oval window, where, I think, a laser has a definite advantage. That is why I believe that lasers may become the treatment of choice in the future.

STAPEDIUS TENDON RECONSTRUCTION: J.B. CAUSSE TECHNIQUE AND RESULTS

Jean-Bernard Causse, M.D., Robert Vincent, M.D., and Martine Michat, M.D.

ABSTRACT

In two-thirds of patients operated on for otosclerosis, the pyramidal process is lower than the attachment of the stapedius tendon onto the superior portion of the posterior crus. When the fixed stapes has been replaced by a piston, the inverted shape of the joint existing between the footplate and the edge of the oval fossa is eliminated. In such a case, the stapedius tendon should be attached to the shaft of the piston in a perpendicular orientation. A Polycel ring and loose perivenous connective tissue helps to fix the tendon to the piston shaft. The stapedial reflex is measured using impedance testing. To date, one-year postoperative results have been 73% positive stapes reflex.

Presented at the 129th annual meeting of the American Otological Society, Orlando, FL, May 4–5, 1996.

Reprint requests: Jean-Bernard Causse, M.D., J. Causse Clinic, Traverse de Béziers, 34440 Colombiers/Béziers, France, (33) 67 35 62 29 (ph.), (33) 67 35 66 32 (fax).

THE EFFICACY OF HYALURONIC ACID FOAM AS A MIDDLE EAR PACKING AGENT IN EXPERIMENTAL TYMPANOPLASTY

James L. Krupala, M.D., Gerard J. Gianoli, M.D., and Russell A. Smith, B.S.

ABSTRACT

The efficacy of hyaluronic acid (HA) foam in the prevention of middle ear adhesions and other structural abnormalities in guinea pigs undergoing experimental tympanoplasty was investigated. Postoperative changes in the middle ear were evaluated by light microscopy after six weeks. The presence of adhesions, diminution of air space, new bone formation, tympanic membrane formation, and mucosal inflammation were characterized with an objective grading system. Results were compared to those achieved with absorbable gelatin sponge and in a control group (no middle ear packing). HA foam, as compared to gelatin sponge, demonstrated a trend toward increased air space preservation, decreased mucosal inflammation, and decreased new bone formation. Further experimental trials are warranted.

Department of Otolaryngology–Head and Neck Surgery, Tulane University Medical Center, 1430 Tulane Ave., New Orleans, LA 70112-2699, (504) 588-5453 (ph.), (505) 582-7846 (fax).

Presented at the 129th annual meeting of the American Otological Society, Orlando, FL, May 4–5, 1996.

Supported in part by a grant from Genzyme Corporation, Cambridge, MA.

CHRONIC TYMPANIC MEMBRANE PERFORATIONS REPAIRED WITH SYNTHETIC MEMBRANE IMPLANTS

Dennis G. Pappas, Jr., M.D., and Dennis G. Pappas, Sr., M.D.

ABSTRACT

In a majority of cases chronic tympanic perforations require surgical intervention and total reconstruction of the tympanic membrane (TM). The use of viable membranous tissues for autologous transplantation has historically been very successful. Yet there remain difficult cases involving elderly patients or patients who may not tolerate anesthesia. Furthermore, tympanoplasty procedures require hospitalization, which is time-consuming and expensive, reasons enough to employ simple, inexpensive methods where possible. In high-risk cases a readily available synthetic membrane alternative would be preferable and valuable. We attempted to develop a simple outpatient method of healing chronic TM perforations. Large perforations were created in the chinchilla. Using an experimental protocol, large-segment synthetic membrane implants were placed over the chronic perforation in contact with the residual TM. Control ears did not receive a membrane. The synthetic membrane implants were found to be lined with epithelium. Clinical trials utilizing synthetic membrane implants in chronic TM perforation are being initiated.

2937 7th Avenue South, Birmingham, AL 35233.

POSTINFLAMMATORY MEDIAL CANAL FIBROSIS

Peyman Saadat, B.A., and †William H. Slattery III, M.D.

ABSTRACT

Objective: To describe the diagnosis and treatment of postinflammatory medial canal fibrosis by reviewing a large series.

Study Design: Retrospective chart review.

Setting: Tertiary referral center, private otologic practice.

Patients: Twenty-four patients with a clinical diagnosis of postinflammatory medial canal stenosis. Only one of the 16 females and eight males was under 18 years of age. The mean age for the group was 50.5 years (range, 5–78 years). Fourteen patients had bilateral disease.

Intervention: Surgical therapy was performed on 14 ears (11 patients), medical therapy on nine.

Results: For patients undergoing surgical treatment, mean pure-tone average hearing threshold improved from 37 dB preoperatively to 26 dB postoperatively. Air–bone gap improved from 24 dB to 15 dB. There were three recurrences of disease in the surgery group.

Conclusion: Postinflammatory medial canal stenosis is a rare disorder resulting from chronic external otitis that requires surgical intervention to correct the resulting conductive hearing loss.

---

*University of Southern California School of Medicine, Los Angeles, CA.; †House Ear Institute and House Ear Clinic, Los Angeles, CA 90057-9927.

Presented at the 129th annual meeting of the American Otological Society, Orlando, FL, May 4, 1996.

Reprint requests: William H. Slattery III, M.D., House Ear Institute, 2100 West Third Street, 5th floor, Los Angeles, CA 90057-9927, (213) 483-4431 (ph.), (213) 413-0950 (fax).

DISCUSSION PERIOD II
Papers 5–8

Dr. Derald E. Brackmann (Los Angeles, CA): These four papers are now open for discussion. Dr. Derlacki.

Dr. Eugene Derlacki (Chicago, IL): It is awfully interesting to hear somebody get up and say there is going to be interest in closing perforations nonsurgically. I would like to remind people that in 1973 I reported, at the Academy, a 25-year experience with closing perforations of the tympanic membrane as an office procedure. We closed 1,100 out of 1,400 cases attempted, and to this day we continue to use that same treatment in the office. We are way beyond 1,500 perforations closed in the office, and our test animal is, of course, the human being, not the laboratory animal, in which it is very difficult to keep the perforation from closing. Second, regarding the experience with the HA foam in animals, one must be wary of extrapolating results from animal experiments to humans. A number of years back papers reported on stapes surgery in animals, and if the investigators did not use antibiotics, it was considered almost criminal—and was published in that manner. We have not used antibiotics in our stapes cases for well over 30 years because we had more patients who had complications from antibiotics than patients who had infections when antibiotics were not used. So, you have to be careful what you extrapolate from animal experimentation.

Dr. Richard J. Belucci (New York, NY): You must consider that all perforations of the eardrum are self-healing. It is the condition of the middle ear and the eustachian tube that make such perforations chronic.

DNA ANALYSIS OF HUMAN CHOLESTEATOMAS

*Rosemary B. Desloge, M.D. *John F. Carew, M.D., †Connie L. Finstad, Ph.D., ‡Melissa G. Steiner, Ph.D., *Jodi Sassoon, M.D., *Mark J. Levenson, M.D., ‡Lisa Staiano-Coico, Ph.D., *Simon C. Parisier, M.D., and *Anthony P. Albino, Ph.D.

ABSTRACT

Cholesteatoma is a destructive lesion of the middle ear and/or mastoid process that produces complications by erosion of the temporal bone. The clinical hallmarks of cholesteatomas, namely invasion, migration, uncoordinated proliferation, altered differentiation, aggressiveness, and recidivism, are traits typically associated with the neoplastic cell. However, there is little evidence to support or refute the speculation that cholesteatomas are a low-grade squamous cell neoplasm. The existence of defects in the genetic complement of the major cellular constituents composing a cholesteatoma, fibroblasts and keratinocytes, would support the speculation that cholesteatomas are a neoplasm, since cancers commonly manifest quantitative and qualitative alterations in the normal euploid complement of genetic information, resulting in a cell that has an abnormal or aneuploid amount of DNA. Measurement of the DNA content (ploidy), by flow cytometry and image analysis, is useful in identifying alterations in the DNA within cells and tissues. We analyzed the DNA content of 11 human cholesteatomas and nine normal tissue specimens using flow cytometry and six cholesteatoma specimens using image analysis. One cholesteatoma specimen demonstrated an abnormal aneuploid DNA content; the remainder demonstrated normal euploid DNA content.

*Department of Otolaryngology/Head and Neck Surgery, Manhatten Eye, Ear and Throat Hospital, 210 East 64th Street, New York, NY 10021; †Department of Surgery, Memorial Sloan-Kettering Cancer Center, 1275 York Avenue, New York, NY 10021; ‡Department of Cell Biology and Genetics, New York Hospital–Cornell Medical Center, New York, NY 10021.

Reprint requests: Anthony P. Albino, Ph.D., Manhatten Eye, Ear and Throat Hospital, 210 East 64th Street, New York, NY 10021, (212) 838-9200 x2415 (ph.), (212) 579-2141 (fax).

RETRACTION CHOLESTEATOMA OF THE SINUS TYMPANI

John P. Leonetti, M.D., Richard A. Buckingham, M.D., and Sam J. Marzo, M.D.

ABSTRACT

Posteromedial retraction of the tympanic membrane, between the oval window superiorly and the round window niche inferiorly, results in the formation of an epithelium-lined pocket within the sinus tympani recess. Failure to recognize posterior invagination of the tympanic membrane intraoperatively will lead to inadvertent tearing of the tympanomeatal flap at the level of the annulus, with epithelial seeding of the middle ear and probably cholesteatoma recurrence. This paper focuses on the clinical manifestations and radiographic findings suggestive of sinus tympani epithelial retraction of the pars tensa and provides direct correlation between human cross-sectional temporal bone anatomy and otomicroscopy. The surgical management of these challenging lesions includes initial endaural access, external meatal bone removal posteromedial to the tympanic annulus and anterior to the vertical portion of the facial nerve, and middle ear ventilation following marsupialization of the epithelial retraction. While early tympanic membrane retraction can be treated with a ventilation tube, deep epithelial pockets may require additional surgical treatment. A method for the management of sinus tympani cholesteatomas is demonstrated.

Department of Otolaryngology–Head and Neck Surgery, Loyola University Medical Center, Maywood, IL 60153.

Reprint requests: John P. Leonetti, M.D., Department of Otolaryngology–Head and Neck Surgery, Loyola University Medical Center, 2160 South First Avenue, Maywood, IL 60153, (708) 216-4804 (ph.), (708) 216-4834 (fax).

ENDOSCOPIC MANAGEMENT OF ACQUIRED CHOLESTEATOMA

Muaaz Tarabichi, M.D.

ABSTRACT

There is increased awareness of the advantages of the endoscope when evaluating old mastoid cavities for recurrent disease; the same advantages could be applied in the initial surgical management of acquired cholesteatoma. Thirty-six patients with acquired cholesteatoma underwent transcanal exploration of the middle ear in which the endoscope was used instead of the microscope. There were two distinct groups of patients. In one group, 25 patients had endoscopically accessible disease. Wide transcanal atticotomy was performed and the sac was completely removed. The defect was then reconstructed with composite tragal graft. In the second group, 11 patients had extensive disease involving the mastoid cavity proper. Transcanal atticotomy was performed and the bony defect was extended posteriorly into the antrum and was packed and left open. There was no evidence of facial nerve injury in either group, and bone conduction thresholds were stable except in one patient who had lateral canal fistula and severe preoperative sensorineural hearing loss and dizziness. The endoscope offers less invasive alternatives in the surgical management and allows ongoing surveillance of acquired cholesteatoma.

Department of Surgery, Kenosha Hospital and Medical Center, 3535 30th Avenue, Suite 204, Kenosha, WI 53144, (414) 652-2887 (ph.), (414) 652-0547 (fax).

REFINED MASTOID RECONSTRUCTION WITH THE PEDICLED POSTAURICULAR PERICHONDRIAL FLAP

*Larry G. Duckert, M.D., Ph.D., *Kathleen H. Makielski, M.D., and †Jan Helms, M.D.

ABSTRACT

Successful canal wall reconstruction after open cavity surgery may be compromised by both immediate (graft dehiscence and infection) or delayed (graft retraction, absorption and extrusion) complications. Many of the healing problems following canal wall reconstruction are related to incomplete soft tissue coverage and limited blood supply. Two years ago we reported our favorable experience using large cartilage-perichondrial autograft "shields" to reconstruct remnant tympanic membranes. The closure rate of greater than 90% in less than favorable conditions we believe was in part related to the rapid revascularization of the graft and the mechanical support provided by the perichondrium. Encouraged by the early results achieved in the middle ear with the cartilage-perichondrial graft, we modified our method of mastoid reconstruction in cases where graft viability was challenged by inadequate canal or bowl skin coverage and questionable nutritional source. Under these conditions we complemented the single-sheet conchal bowl cartilage graft with a broad-based perichondrial flap developed from the posterior surface of the auricle. The flap was used over three years in 36 cases of canal wall reconstruction in conjunction with conchal cartilage grafts, with few complications. In this manner we were consistently able to achieve better soft tissue coverage of the graft, eliminate lateral graft dehiscence, and encourage rapid reeipithelization of the canal. By implication, we believe this flap provides a source of nutritional support for the free cartilage graft as well as the overlying skin.

*Department of Otolaryngology–Head and Neck Surgery, University of Washington, Box 356515, Seattle, WA 98196-6515; †University of Würzburg, Würzburg, Germany.

DISCUSSION PERIOD III
Papers 9–12

Dr. Derald E. Brackmann (Los Angeles, LA): The previous four papers are now open for discussion.

Dr. James L. Sheehy (Los Angeles, CA): I want to comment on Dr. Leonetti's paper. It was an excellent paper, and I want to add some comments that he did not make. I suspect he knows them well, and they may be in the paper. First, if you have an ear that looks terrible but does not cause any trouble, do not operate! The damage is already done. Second, all of you are familiar with Dr. Buckingham's photographs. One thing not appreciated at times is that the reason these ears look the way they do is not because they have eustachian tube problems but because they have very thin tympanic membranes. I mention it only so that you are aware of it, because, as Buckingham pointed out in his pictures, when it looked like this you put a tube in, and so forth. But the problem is not so much the eustachian tube as the thin drum.

Dr. Duckert's paper was very good. The one thing to remember (and he pointed it out) is that you have to block the access to the mastoid. When you do this reconstruction, as opposed to obliteration, you set yourself up for recurrent cholesteatoma. I, and most of us at our place, do not do that sort of thing.

Dr. Bradley Pickett (San Jose, CA): I enjoyed your presentation, Dr. Leonetti. I was wondering if you could clarify something for me. Your approach is to remove the posterior annulus, and in that way you can deal with disease that extends into the retrotympanum. But it appears, at least from what I saw, that you are addressing disease that is lateral to the facial nerve. How do you address disease in the sinus tympani with that approach?

Dr. Simon Parisier (New York, NY): I would like to comment on Dr. Tarabichi's paper. Cholesteatoma can be a very serious, life-threatening problem. The desire to use endoscopes and to avoid a postauricular incision is worrisome. The type of surgery that was demonstrated, in which epitympanic defects were left to granulate in, leads one to wonder what the long-term results of such a procedure are, and makes me very uncomfortable. I just wanted to comment that I felt that the thrust of the surgery was not to use endoscopes but to eradicate disease.

Dr. Jay Farrior (Tampa, FL): I have a comment regarding Dr. Leonetti's paper. The facial nerve, at the inferior annulus, is approximately 10 mm posterior to the annulus. You can remove a considerable amount of bone, which will give you direct exposure to the sinus tympani. Usually the surgery is done for more of an adhesive otitis media that is not reversible with the PE tube, and for people with recurrent and chronic infections who cannot be maintained medically. The other thing that we found in those patients is that their hearing, if you do reconstruction, is often worse because of the adhesive otitis media. I have found endoscopes very helpful in approaching disease in the sinus tympani and hypotympanum, for they allow you to remove all cholesteatoma matrix safely and completely from these areas.

Dr. James L. Sheehy (Los Angeles, CA): What Jay said is correct, except that the facial nerve is not always in that position. If any of you are going to do this, I recommend that you read the article published by Dr. Ward Litton, I think in a 1969 issue of *Laryngoscope*, on the relationship of the tympanic annulus to the facial nerve. If you do that, you will see what the facial nerve variations are, and they are considerable, both from anterior to posterior and from medial to lateral.

Dr. John Leonetti (Maywood, IL): The disease is definitely medial to the facial nerve. In the approach through the ear canal, you have to take the bone down right to the anterior surface of the vertical segment of the facial nerve in order to look over the lip of the facial nerve itself, which is where the retraction pocket is located. So, the answer to the question is, yes, we are treating disease medial to the facial nerve by removing the bone right up to the facial nerve. Now, in order to eradicate the disease, that is, take out the cholesteatoma matrix, a transmastoid approach may be required, in which case the matrix is dissected from behind and pushed forward. We do not try to take the matrix off the promontory, the facial nerve itself, or

the stapedial tendon; what we try to do is to remove just enough bone so that we can see the posterior limit of the retraction, dissect in the submucosal layer, see how it is coming off the ossicular chain, and then decide whether or not to perform ossiculoplasty.

Dr. Muuaz Tarabichi (Kenosha, WI): Of course, we are not going to use the endoscope just to use the endoscope. The question is, if you could eradicate and control cholesteatoma safely without causing damage on the way in or on the way out, why not do it? I understand that this is just the first step, and many more studies looking at this issue are needed, but the fact is that you can avoid postauricular procedures and still have a safe and effective surgery.

A NEW ADHESIVE BONDING MATERIAL FOR THE CEMENTATION OF IMPLANTABLE DEVICES IN OTOLOGIC SURGERY

*Anthony J. Maniglia, M.D., †Nobuo Nakabayashi, Ph.D., ‡Michael M. Paparella, M.D., and *John W. Werning, M.D., D.M.D.

ABSTRACT

Presently, there are no FDA-approved adhesive bone cements for the surgical fixation of prosthetic materials in the middle ear. The development and future application of implantable hearing devices for sensorineural hearing loss mandates the need to develop a biocompatible adhesive bone cement. A promising new cement, 4-META/MMA-TBB opaque resin, has shown remarkable adhesive properties as a bone cement in vivo. The cement is composed of 4-methacryloyloxyethyl trimellitate anhydride (4-META) and methyl methacrylate (MMA) as monomers and tri-*n*-butyl borane (TBB) as an initiator. An electromagnetic semi-implantable hearing device presently under development was implanted into the middle ear of five cats using 4-META/MMA-TBB resin to cement a titanium-encased magnet to the incus. Gross microscopic examination prior to animal sacrifice (mean = 9.6 mo) demonstrated maintenance of middle ear anatomic integrity without evidence of ongoing inflammation. The cemented magnets remained firmly adherent to the incuses in all subjects. Serial brainstem response audiometry remained stable throughout the period of implantation. Light microscopic studies of the temporal bone showed no evidence of toxicity or inflammation. Transmission electron microscoy of the incuses demonstrated a unique "hybrid layer" at the bone–cement interface that elucidates the mechanism of interfacial adhesion. Our investigation highlights the special biomechanical properties as well as the biocompatibility of 4-META/MMA-TBB resin that make it an attractive bone-bonding agent for use in otologic surgery, including its potential usefulness during ossicular reconstruction.

---

*Department of Otolaryngology–Head and Neck Surgery, Case Western Reserve University, Cleveland, OH; †Institute for Medical and Dental Engineering, Tokyo Medical and Dental University, Tokyo, Japan; ‡Department of Otolaryngology–Head and Neck Surgery, University of Minnesota, Minneapolis, MN

Presented at the 129th annual meeting of the American Otological Society, Orlando, FL, May 4, 1996.

Reprint requests: Anthony J. Maniglia, M.D., Department of Otolaryngology–Head and Neck Surgery, University Hospitals of Cleveland, 11100 Euclid Avenue, Cleveland, OH 44106, (216) 844-5003 (ph.), (216) 844-5727 (fax).

Research was supported by NIH grant R01-DC01953-03.

A NEUROPHYSIOLOGICAL APPROACH TO TREATING HYPERACUSIS

William C. Gray, M.D., Pawel Jastreboff, Ph.D., Sc.D., and Susan L. Gold, M.A.

ABSTRACT

Objective: To present demographic, clinical, and audiometric data on a series of patients with severe hyperacusis.

Study Design: Retrospective case review.

Setting: Tertiary referral center.

Patients: All patients presenting to the University of Maryland Tinnitus and Hyperacusis Center between 1991 and 1995 with the chief complaint of severe hyperacusis and followed for at least 12 months.

Interventions: Otologic evaluation and treatment by the use of binaural low-level broad band noise from Viennatone AMTi devices following a specific protocol.

Main Outcome Measures: Subjective response of hyperacusis symptom.

Results: Twelve of 26 patients reported improvement in hyperacusis, ranging from slight to total resolution of the problem. Fourteen of 26 reported no significant change.

Conclusions: Hyperacusis is difficult to treat. Some patients benefit from therapy with low-level broad band noise.

Division of Otolaryngology, Department of Surgery, University of Maryland School of Medicine, 16 South Eutaw Street, Suite 500, Baltimore, MD 21201.

MRI FINDINGS IN SUDDEN HEARING LOSS

*William H. Slattery III, M.D., †William W.M. Lo, M.D., and ‡James E. Saunders, M.D.

ABSTRACT

Objective: To better understand the etiology of sudden sensorineural hearing loss by examining radiologic findings and to determine the prevalence of acoustic tumor as a cause.

Study Design: Retrospective case review, re-review of MRI scans.

Setting: Tertiary referral center, private otology and neurotology practice.

Patients: One hundred sixty-eight patients with sudden sensorineural hearing loss who underwent MRI imaging with gadolinium performed locally, and 41 more recent such patients who underwent MRI imaging with gadolinium within one month of symptom onset.

Intervention: MRI with gadolinium-enhanced T1-weighted image as well as T1- and T2-weighted noncontrast images.

Main Outcome Measures: Abnormality on MRI, either acoustic tumor or other nontumor abnormality.

Results: Eight patients in the first group (4.7%) and five in the second group (12.2%) had tumors identified on MRI. Sixteen other patients had abnormalities in the middle ear, cochlea, eighth nerve complex, or central areas.

Conclusions: Abnormalities of the labyrinth are seen on MRI with gadolinium in individuals with sudden sensorineural hearing loss.

---

*House Ear Clinic and House Ear Institute, Los Angeles, CA; †Radiology Department, St. Vincent's Medical Center, Los Angeles, CA; ‡Saints Hearing and Balance Center, Oklahoma City, OK.

Presented at the 129th annual meeting of the American Otological Society, Orlando, FL, May 4, 1996.

Reprint requests: William H. Slattery III, M.D., House Ear Institute, 2100 West Third Street, 5th floor, Los Angeles, CA 90057, (213) 483-9930 (ph.), (213) 413-0950 (fax).

PLASMAPHERESIS IN AUTOIMMUNE INNER EAR DISEASE: LONG-TERM FOLLOW-UP

Charles M. Luetje, M.D., and †Karen I. Berliner, Ph.D.

ABSTRACT

Objective: Outcome study of long-term hearing benefits of plasmapheresis (PMP) in presumed autoimmune inner ear disease (AIED).

Study Design: Case series, with retrospective chart review, written questionnaire, telephone interview, and follow-up examination.

Setting: Private practice otology and neurotology referral center.

Patients: Sixteen patients (5 males, 11 females) whose symptoms were compatible with the diagnosis of AIED, who underwent PMP, and who had two-year or later objective follow-up. Age ranged from 8 to 62 years (mean, 40.9 years). Follow-up ranged from 2 to 12 years (mean of 6.7 years).

Intervention: PMP at one or more times during the active phase of disease.

Main Outcome Measure: Stability of hearing, defined according to the AAO-HNS-recommended criteria for reporting hearing results in Ménière's disease.

Results: Eight of 16 (50%) patients had improved or stable hearing in one or both ears. Eleven of 28 (39.3%) ears with measurable hearing pre-PMP were improved or stable. Only 25% of patients required continued use of immunosuppressive drugs.

Conclusion: PMP may be beneficial as an adjunctive therapy for maintaining hearing in some patients with AIED. Cost and reimbursement factors are major obstacles to use of this therapy. The overall success rate and individual patient results warrant further study of PMP in the treatment of AIED.

---

*Otologic Center, Inc., Kansas City, MO; †Los Angeles, CA.

Presented at the 129th meeting of the American Otological Society, Orlando, FL, May 4–5, 1996.

Reprint requests: Charles M. Luetje, M.D., Otologic Center, Inc., 3100 Broadway, Suite 509, Kansas City, MO 64111, (816) 531-7373 (ph.), (816) 531-1404 (fax).

DISCUSSION PERIOD IV
Papers 13–16

Dr. Derald E. Brackmann (Los Angeles, CA): The papers are open for discussion.

Dr. Brian Blakley (Detroit, MI): My question is for Dr. Luetje. Plasmapheresis is very interesting. How long does the effect last, and how does plasmapheresis compare with medical treatment with corticosteroids? Is the effect longer with plasmapheresis, or do you have to repeat it? Have you directly compared plasmapheresis with corticosteroids alone?

Dr. Jack Hough (Oklahoma City, OK): I wish to compliment Dr. Tony Maniglia. Not only was his presentation outstanding, but the work that he has done over the years is remarkable. Working with all these people that are in other disciplines, getting them together, and moving them along in a project like that is an amazing accomplishment! We also have been working in that same direction, and I know how one little barrier can keep you from success; getting just a little bit of glue in the right place is something that he has found to be a great stumbling block. We have found another stumbling block, and that is getting the right covering for the devices so they will be biocompatible. We are working toward the same goal, and he has my profound respect and admiration.

Dr. Jack Pulec (Los Angeles, CA): I would like to comment on Dr. Gray and colleagues' paper. This phenomenon is something that we have seen for some time. It is not common but very disturbing. The term hyperacusis is troublesome because it does not denote what we are really talking about. Possibly a term such as "acousodynia" or "acoustic phobia" might be more descriptive and more correct. Second, the pathology of this is fascinating, yet we have no temporal bone specimens; we have no knowledge of what is actually going on. We only know that a normal patient exposed to loud noise can develop this phenomenon instantly, and there is no good treatment (other than an earplug). I would make a plea that we look for these patients and recruit them into the temporal bone donor programs.

Dr. Clough Shelton (Salt Lake City, UT): I enjoyed Dr. Slattery's paper on MRI and sudden hearing loss. At the University of Utah we employ a fast spin-echo MRI protocol without gadolinium to screen for acoustic tumors, such as in the setting of sudden hearing loss. The concern is that if we did not use gadolinium, we might miss some important pathology. The question to Bill is: Do you think that, in your series, any patient would have been missed or not treated if gadolinium had not been used? What I am referring to is some enhancement you might see in the cochlea or around the nerves.

Dr. John Li (West Palm Beach, FL): I have another question for Dr. Slattery: Are you saying that we should perform an MRI study in every single case of sudden sensorineural hearing loss, and is it okay to do just the fast spin-echo study? What is your recommendation based on pricing and cost control?

Dr. Derald Brackmann (Los Angeles, CA): Tony, I have a question now. Did I understand correctly that the cement is available for clinical use?

Dr. Anthony Maniglia (Cleveland, OH): The cement is available only for dental use; it is the material dentists use to cement a crown or a bridge. It is not available for otologists. We have an IDE from the FDA, but we still have to do work to ensure that the device is going to have a long-standing good effect in patients. I hope that in the next two or three years the cement will be approved for otology. We have research in progress to see if the bone-to-bone cementation will be effective enough.

Dr. William Slattery III (Los Angeles, CA): In response to Dr. Clough Shelton's first question, use of the fast spin-echo technique will be fascinating, as more people have the ability to do that. Unfortunately, there are still some centers that are not able to do the fast spin-echo technique. As far as missing cases, I think the cases that might be missed are those that have contrast enhancement of the cochlea, which could potentially be intracochlear neuromas; whether or not you will be able to see that on the fast spin-echo images is something that has to be determined. Regarding the fast spin-echo technique and detection of acoustic neuromas, we probably are not missing any of those patients, but

then again, that was not part of our study. In answer to the question of whether an MRI should be performed in every patient with sudden sensorineural hearing loss, I go back to our series of 837 patients; acoustic tumors were seen in about 4%, and in a second series, in about 6%. So, I think the incidence of acoustic neuromas in patients with sudden sensorineural hearing loss is about 4%–6%. You have to take that into consideration when making your decision of what treatment you are going to recommend or what imaging modality you are going to use to evaluate those patients.

RADIATION-INDUCED TUMORS OF THE TEMPORAL BONE

*Lawrence R. Lustig, M.D., *†Robert K. Jackler, M.D., and *Michael J. Lanser, M.D.

ABSTRACT

Objective: To study a rare but devastating complication following radiotherapy to the head and neck: radiation-induced malignancies of the temporal bone.

Study Design: A retrospective case review of five patients with radiation-induced tumors involving the temporal bone.

Setting: Tertiary referral center.

Patients: Patients with tumors involving the temporal bone considered to be radiation-associated.

Main Outcome Measures: Initial tumor histology, radiation-induced tumor histology, latency between radiotherapy and diagnosis of the radiation-associated malignancy, amount of radiation received, therapeutic interventions, and survival statistics for each patient.

Results: Among the five cases of radiation-induced tumors of the temporal bone were two osteosarcomas, two fibrosarcomas, and one squamous cell carcinoma. All five temporal bone tumors occurred in individuals who had previously received 5000 cGy or more of radiation. The initial histologic diagnoses include two astrocytomas, a glomus jugulare, a malignant meningioma, and a vestibular schwannoma. There was an average latency period of 17 years (range, 7–23 years) between completion of radiation therapy and diagnosis of the malignancy. Four patients were treated with resection plus chemotherapy and one decided against therapy. The prognosis was poor, with survival time ranging from 7 to 14 months after the diagnosis of radiation-induced tumor.

*Department of Otolaryngology–Head and Neck Surgery, †Department of Neurological Surgery, University of California, San Francisco, CA 94117.

INTRACRANIAL COMPLICATIONS OF TEMPORAL BONE OSTEORADIONECROSIS

*John P. Leonetti, M.D., †Thomas Origitano, M.D., Ph.D., †Douglas Anderson, M.D., ‡Edward Melian, M.D., and *Mark Severtson, M.D.

ABSTRACT

Radiation-induced osteonecrosis of the temporal bone contributed to the development of life-threatening intracranial complications in four patients seen between 1987 and 1994. The primary tumor site for which radiotherapy was delivered included the brain, the nasopharynx, the external auditory canal, and the parotid gland. The period between the completion of radiotherapy and the observed complications ranged from 12 to 26 years, and the radiation dosage ranged from 60 to 72 Gy. One patient presented with a brain abscess and an ipsilateral carotid artery aneurysm, another patient developed sigmoid sinus thrombosis with meningitis, and two patients had meningitis with epidural abscesses. All four patients had long-standing otorrhea as a preceding symptom, and all patients developed otalgia with headache.

The pathophysiology, prevention, diagnosis, and treatment options of intracranial complications associated with temporal bone osteoradionecrosis are addressed through these case presentations.

*Department of Otolaryngology–Head and Neck Surgery, †Department of Neurological Surgery, and ‡Department of Radiation Oncology, Loyola University Medical Center, Maywood, IL 60153.

PREOPERATIVE ENDOVASCULAR OCCLUSION OF THE INFERIOR PETROSAL SINUS AND CONDYLAR VEINS IN JUGULAR FORAMEN SURGERY

Moisés A. Arriaga, M.D., †David A. Carrier, M.D., and †Richard T. Dahlen, M.D.

ABSTRACT

Objective: This report describes the clinical indications, technique, and advantages of a procedure for preoperative embolization of the inferior petrosal sinus (IPS) and anterior or posterior condylar veins (CV).

Study Design: Retrospective review of consecutive cases.

Setting: Tertiary referral center.

Interventions: All patients underwent preoperative endovascular occlusion of the IPS and CV prior to surgery of the jugular foramen.

Main Outcome Measures: The outcome measures were blood loss during opening of the jugular bulb, operative time for hemostasis in the jugular bulb, lower cranial nerve function, and adverse sequelae of the preoperative IPS and CV occlusion procedure.

Results: Metallic coils were positioned during venous, transfemoral angiography in the IPS and CV of three patients undergoing jugular foramen surgery. With this technique there was no appreciable bleeding when the jugular bulb was opened after ligation of the jugular vein and sigmoid sinus. Consequently, no additional time was needed for hemostasis in this area, and no packing-related lower cranial neuropathies occurred.

Conclusion: Preoperative occlusion of the IPS and CV is a helpful adjunct in jugular foramen surgery to decrease blood loss, lessen operative time, and eliminate the need for packing, which may damage the lower cranial nerves.

*Division of Otology/Neurotology and †Division of Neuroradiology, Wilford Hall Medical Center, Lackland Air Force Base, TX 78236.

Reprint requests: Moisés A. Arriaga, M.D., Allegheny Neuroscience Institute and Pittsburgh Ear Associates, 420 East North Avenue, Suite 402, Pittsburgh, PA 15212, (412) 359-4656 (ph.), (412) 321-3229 (fax).

The opinions expressed in this article are those of the authors and do not necessarily represent those of the Department of Defense or other departments of the United States Government.

MANAGEMENT OF COMPLICATIONS FROM TEMPORAL BONE FRACTURES

Hilary A. Brodie, M.D., Ph.D., and Teresa C. Thompson, D.V.M.

ABSTRACT

A retrospective review of 699 patients with 820 temporal bone fractures admitted to the University of California, Davis, Medical Center over a five-year period was conducted. The incidence, management, and outcomes of facial nerve trauma, cerebrospinal fluid (CSF) fistula, meningitis, and hearing loss were analyzed. The 820 fractured temporal bones resulted in 58 facial nerve injuries, 122 cases of CSF fistula, 15 cases of meningitis, and 168 patients with hearing loss. Transverse temporal bone fractures that disrupted the otic capsule resulted in a significantly higher incidence of facial paralysis (48%) than fractures that spared the otic capsule (6%). The two most important prognostic factors in recovery of facial function were severity and onset of paralysis. All patients with incomplete paralysis recovered. All but one patient with delayed-onset palsies had good recovery of function. In the immediate-onset group with complete paralysis, 40% had poor recovery of function. Ninety-five of the 122 CSF fistulas closed spontaneously with conservative management within one week. Surgical closure of CSF fistulas was necessary in only seven patients. Patients whose CSF fistulas persisted longer than seven days had a significantly greater risk of developing meningitis (23%) than patients whose fistulas closed within seven days (3%) ($P = 0.001$). Another important risk factor for the development of meningitis was concurrent infection.

The use of prophylactic antibiotics and the factors guiding the approach to closure of CSF fistulae are reviewed.

Department of Otolaryngology, Head and Neck Surgery, University of California, Davis, Medical Center, Davis, CA 95616.

Reprint requests: Hilary A. Brodie, M.D., Ph.D., Otolaryngology Research Laboratories, University of California, Davis, School of Medicine, 1515 Newton Court, Room 209, Davis, CA 95616, (916) 754-5042 (ph.), (916) 754-5046 (fax), habrodie@ucdavis.edu (e-mail).

Philip H. Kass, D.V.M., Ph.D., provided valuable statistical assistance and suggestions.

DISCUSSION PERIOD V
Papers 17–20

Dr. Derald E. Brackmann (Los Angeles, CA): These papers are now open for discussion.

Dr. Arvind Kumar (Chicago, IL): My question is for Dr. Arriaga. I enjoyed your paper. We have been trying to occlude the jugular bulb in jugular bulb tumor cases. With glomus tumors it has not been possible because you cannot access the inferior petrosal sinus, but with those lesions which are outside it is possible. My question is: Did you find that it helped you in not having to transpose the facial nerve in these cases in which you were able to occlude the jugular bulb?

Dr. Ronald A. Hoffman (New York, NY): My question is for Dr. Brodie about CSF leaks. You mentioned that after seven days, the leaks were closed surgically. Do you have any experience with continuous lumbar CSF drainage?

Dr. Donald Kamerer (Pittsburgh, PA): I would like to commend Dr. Lustig and Dr. Leonetti on their presentations about complications following irradiation of the temporal bone. We recently became aware of a patient who developed a malignant schwannoma following gamma radiation for what was thought to be an acoustic tumor. The patient was not ours, and we did not participate in the surgery. It is impossible to tell, of course, whether this lesion was malignant prior to gamma radiation or not because it was never biopsied; however, we remain suspicious of the same.

Dr. Buddy Horwitz (Houston, TX): My question is for Dr. Leonetti. In the cases in which you managed osteoradionecrosis surgically, did you turn in any kind of vascular flap to help the bone heal (because it is very avascular)? I have one case right now whose picture looks exactly the same as the picture you showed, and I am meticulously cleaning out bone sequestra and keeping the patient's ear clean.

Dr. Gregory Matz (Chicago, IL): My question is for Dr. Brodie. Are your 800 cases from one or two institutions, or from the rest of the world?

Dr. John Leonetti (Maywood, IL): To answer the question, no, I did not turn any vascularized flaps, but we do use a large conchal flap the way one normally would for a modified radical mastoidectomy. The cholesteatoma matrix I just left over the exposed bone. When we do a modified radical mastoidectomy for chronic otitis media, I just try to get most of the raw bone covered with the conchal flap.

Dr. Moisés Arriaga (San Antonio, TX): To answer Dr. Kumar's question about help with exposure without having to transpose the facial nerve—definitely, on that first patient, I think we probably would have had to do a complete mobilization as opposed to a limited mobilization of the facial nerve if we had had to deal with bleeding from the jugular bulb. So, I think there is a potential advantage in terms of exposure. I am not quite so quick to give up on the possibility of it in glomus jugulare surgery, but I think we may have to come up with some different catheters.

Dr. John Leonetti (Maywood, IL): One quick comment regarding Dr. Arriaga's technique. We had a patient recently with a jugulare foramen chondrosarcoma and an occluded jugular bulb. We thought it would be fine to go through the sigmoid sinus as one normally would for a glomus jugulare. We came across a large condylar vein and occipital sinus, and after all the resection was done, all extradurally, the patient had a postoperative venous infarction in the brainstem and the cerebellum. The conclusion was that these veins are more significant than we think in some cases, and you may want to counsel your patient before angiography that occlusion of these veins may result in a posterior fossa venous complication.

Dr. Moisés Arriaga (San Antonio, TX): I would certainly agree that venous infarction is something you need to think about and counsel patients about, but you are going to counsel the patients about potential problems regardless, because you are only going to do this procedure if you are going to take those structures at surgery. The other area where you may get into trouble and where again the anatomy is not as well-defined as it should be is in the superior petrosal sinus and the venous plexuses around the vein of Labbé. Even if you save the vein

of Labbé you may run into trouble because of unnamed venous conduits in the area.

Dr. Hilary Brodie (Sacramento, CA): To answer the question on management of the CSF fistulas, we generally place the patient on bed rest and elevate the head of the bed. Stool softeners are prescribed. If the leak continues, we place a lumbar drain. If lumbar drainage fails, we then follow through with closure of the CSF leak. On the question of the derivation of these temporal bone fractures, these cases all came from one institution, the University of California at Davis. There are two dudes out there whom most of the patients blame it on. They must be pretty mean!

CLINICAL AND SURGICAL IMPLICATIONS OF RECENT DATA ON THE MECHANICS OF THE HUMAN MIDDLE EAR

*†Saumil N. Merchant, M.D., *‡Michael E. Ravicz, M.S., *†Sunil Puria, Ph.D., *Susan E. Voss, S.M., *†Kenneth R. Whittemore, Jr., M.S., *‡William T. Peake, Sc.D., and *†‡John J. Rosowski, Ph.D.

ABSTRACT

Objective: To review current concepts of the mechanical processes of the human middle ear and to apply them to practical issues in clinical otology and tympanoplasty surgery.

Background: The wide range of conductive hearing losses associated with middle-ear pathology and reconstruction cannot be adequately explained by simple models of middle ear function.

Methods: Variables used to describe the system are *sound pressure, volume velocity,* and *acoustic impedance.* The relationship between specific middle ear structures and these variables allows inferences to be drawn regarding sound conduction in the normal, diseased, and reconstructed middle ear.

Results and Conclusions:

1. Sound can be transmitted from the ear canal to the cochlea via two mechanisms: the tympano-ossicular system (ossicular coupling) and direct acoustic stimulation of the oval and round windows (acoustic coupling). Acoustic coupling is negligibly small in normal ears but can play a significant role in some diseased and reconstructed ears.
2. In the normal ear, middle ear pressure gain (which is the result of ossicular coupling) is frequency-dependent and less than generally believed.
3. The severity of conductive hearing loss due to middle ear disease or after tympanoplasty surgery can be predicted by the degree to which ossicular coupling, acoustic coupling, and stapes-cochlear input impedance are altered.

4. Hearing after type IV and V tympanoplasty is determined solely by acoustic coupling. The difference in magnitude between the oval and round window pressures is more important than the difference in phase in determining cochlear input.
5. In tympanoplasty types I, II, and III, adequate middle ear and round window aeration is necessary. The TM-ossicular configuration is less crucial.

---

*Department of Otolaryngology and Eaton-Peabody Laboratory of Auditory Physiology, Massachusetts Eye and Ear Infirmary, Boston, MA; †Department of Otology and Laryngology, Harvard Medical School, Boston, MA; ‡Research Laboratory of Electronics, Massachusetts Institute of Technology, Cambridge, MA.

Presented at the 129th annual meeting of the American Otological Society, Orlando, FL, May 4–5, 1996.

Reprint requests: Saumil N. Merchant, M.D., Department of Otolaryngology, Massachusetts Eye and Ear Infirmary, 243 Charles Street, Boston, MA 02114, (617) 573-3503 (ph.), (617) 573-3914 (fax).

Supported in part by NIH grants K08 DC 00088 and P01 DC 00119.

THE USE OF ORGANOTYPIC CULTURES OF CORTI'S ORGAN TO STUDY THE PROTECTIVE EFFECTS OF ANTIOXIDANT MOLECULES ON CISPLATIN-INDUCED DAMAGE OF AUDITORY HAIR CELLS

*Richard D. Kopke, M.D., *Wei Liu, B.S., *Ramin Gabaizadeh, B.S., *Joseph Feghali, M.D., †David Spray, Ph.D., *Phil Garcia, M.D., ‡Howard Steinman, Ph.D., §Bridgitte Malgrange, Ph.D., *Robert J. Ruben, M.D., ‖Leonard Ryback, M.D., Ph.D., *†‡Thomas R. Van De Water, Ph.D.

ABSTRACT

Hypothesis: Cisplatin causes the generation of reactive oxygen species (ROS), which interferes with the antioxidant defense system of Corti's organ and results in damage to the hair cells.

Background: Cisplatin is a widely used chemotherapeutic agent with a dose-limiting side effect of ototoxicity. Evidence is accumulating that cisplatin interferes with the antioxidant defense system of Corti's organ.

Methods: Organotypic explants of P-3 rat organ of Corti was the in vitro model system. The presence of intact auditory hair cells and stereocilia bundle integrity was assayed by phalloidin-FITC staining. Fluorescent dye probes detected ROS and glutathione (GSH). Spectrophotometric analysis determined antioxidant enzyme levels.

Results: There was a rapid, dose-dependent cisplatin cytotoxicity in the explants. An accumulation of ROS and a reduction in GSH levels were observed within cisplatin-exposed hair cells. BSO, an inhibitor of GSH formation, enhanced cisplatin ototoxicity, whereas RPIA, an adenosine agonist, elevated antioxidant enzyme levels and ameliorated cisplatin toxicity. The following molecules protected hair cells from cisplatin-induced damage: GSH, glutathione diethyl ester (GSHe), ebselen (EBS), 4-methylthiobenzoic acid (MTBA), and D-methionine (D-MET). Ebselen, MTBA, and D-methionine in vitro protection correlates with in vivo protection in rats.

Conclusions: Organotypic culture of Corti's organ has been validated as a model for studying cisplatin toxicity and for screening otoprotective molecules. Cisplatin may damage auditory hair cells by generating ROS, depleting intracellular GSH and interfering with antioxidant enzymes within the cochlea. Agents that bolster the cochlea's antioxidant system can prevent cisplatin destruction of auditory hair cells. Identified protectant agents may prove to be clinically useful in limiting or completely protecting from cisplatin ototoxicity.

---

*Department of Otolaryngology, †Department of Neuroscience, ‡Department of Biochemistry, Albert Einstein College of Medicine, 1410 Pelham Parkway, South, Bronx, NY 10461; §Department of Human Physiology and Pathophysiology, University of Liege, Belgium; ‖Southern Illinois University School of Medicine, Springfield, IL.

The authors thank Drs. Binder and Blanchard for assistance in synthesizing the glutathione diethylester, Dr. Sliwinski for assistance with statistical analysis, Drs. Schwartz and Rosenbaum for helpful suggestions, Dr. Rowe for assistance with GSHS-T determinations, and Rose Imperati for typing the manuscript.

Work was supported by the Hearing Research Fund of the Communication Disorders Institute of the Montefiore Medical Center (T.R.V.).

The views expressed in this article are those of the authors and do not reflect the official policy or position of the Department of the Army, Department of Defense, or the U.S. Government.

GLYCOLIPID ANTIGENS IN THE HUMAN COCHLEO-VESTIBULAR SYSTEM

*Elias M. Michaelides, M.D., ‡Masanaga Yamawaki, M.D., *Aristides Sismanis, M.D., †Robert K. Yu, Ph.D., and †Toshio Ariga, Ph.D.

ABSTRACT

Glycolipids are molecules located on the surface of normal nerve cells. Recently, antibodies against sulfated glucoronosyl glycolipids (SGGL) antigens have been implicated in the pathogenesis of immune-mediated peripheral neuropathies such as Guillain-Barré syndrome and demyelinative polyneuropathy. SGGLs have been reported to be present in peripheral nerves, optic nerve, and sympathetic ganglia. The presence of SGGLs in the cochleo-vestibular system has not been previously reported. We studied 12 specimens (vestibular neuroepithelia, endolymphatic ducts and sacs, eighth nerve, pons, cerebellum, and temporal cerebrum) for the presence of sulfated glucoronosyl paragloboside (SGPG) antigen, a common SGGL. Specimens were obtained from five patients undergoing otologic procedures for acoustic neuromas or intractable Ménière's disease and from one fresh cadaver with no known history of otologic disease. Immunostaining on thin-layer chromatography was used. SGPG antigen was detected in all specimens except the endolymphatic duct, pons, cerebellum, and temporal cerebrum. We speculate that SGPG antigens may be important antigens in immune-mediated processes involving not only the inner ear but also the eighth nerve and endolymphatic sac.

*Department of Otolaryngology–Head and Neck Surgery and †Department of Biochemistry and Molecular Biophysics, Medical College of Virginia/Virginia Commonwealth University, Richmond, VA; ‡Department of Neurology, Saitama Commonwealth Rehabilitation Center, Saitama, Japan.

Reprint requests: Aristides Sismanis, M.D., Department of Otolaryngology–Head and Neck Surgery, MCV Box 980146, Richmond, VA 23298, (804) 828-3965 (ph.), (804) 828-5779 (fax).

HAIR CELL FORMATION IN CULTURES OF DISSOCIATED CELLS FROM THE VESTIBULAR SENSORY EPITHELIUM OF THE BULLFROG

*Ricardo Cristobal, M.D., *Ivan Lopez, M.D., Scott Chiang, M.D., Dynio Honrubia, M.D., Cesar Zamora, M.D., †Araceli Espinosa de los Monteros, Ph.D., and *Vicente Honrubia, M.D., D.M.Sc.

ABSTRACT

Recent studies have established that the sensory organs in the inner ear are capable of producing sensory cells after birth. However, the mechanisms responsible for the regulation of this process are not well defined. Experiments were conducted to standardize an in vitro preparation of dispersed cells and to demonstrate new hair cell (HC) formation from the vestibular end organ of the bullfrog. By the use of sequenced photomicroscopy, new HCs were consistently observed in the culture system beginning two days post-plating. Division of progenitor cells with subsequent differentiation of one of the daughter cells into new HCs was documented, demonstrating that division and differentiation are involved in the formation of new HCs in vitro. Histologic verification of HCs was obtained by utilizing phalloidin-rhodamine stain to the F fraction of actin (the chief component of the stereocilia), immunocytochemistry for the presence of calmodulin in the cytoplasm of hair cells, and transmission electron microscopy. Finally, studies with a mitotic tracer were conducted in order to determine the growth fraction of the culture and to evaluate postmitotic HC formation. The conclusive evidence from this study indicates an in vitro preparation capable of generating new HCs, thus providing a powerful tool for further studying the process of HC formation in the vestibular end organ.

*Victor Goodhill Ear Center, Division of Surgery (Head and Neck), and †Mental Retardation Research Center, University of California, Los Angeles, School of Medicine, Los Angeles, CA 90095.

Supported by NIH grant DC 01404.

DISCUSSION PERIOD VI
Papers 21–24

Dr. Derald E. Brackmann (Los Angeles, CA): These four papers are now open for discussion.

Dr. Charles Luetje (Kansas City, MO): This question is for Dr. Kopke. Your paper has tremendous implications for those patients receiving cisplatinum via blood-brain barrier disruption for gliobastoma multiforme. Do you have any comments on current treatment modalities for these patients?

Dr. Robert Ruben (New York, NY): I commend Dr. Cristobal and the group in Los Angeles for superior work, as we begin to look at a way of making the ear replenish itself. I have a couple of questions. Did you try to block mitotic activity? There are some problems with BrdU; do you have any tritiated studies? With the elegance of your preparation, did you look at one cell and follow through by culturing that one cell to see if you would get two or three? I ask this question because your numbers show that you appear to have a decrease in the number of cells over time.

Dr. Gregory Matz (Chicago, IL): My question is for Dr. Kopke, and it is almost the same question as Dr. Luetje's. With cisplatinum ototoxicity affecting about 25% of patients in cancer studies, where are we now with the human application of this?

Dr. Michael Seidman (Detroit, MI): Have you applied this at all to noise-induced hearing loss or sudden sensorineural hearing loss? Maybe Dr. Brackmann can increase his wonderful hearing results with middle fossa acoustic tumor resection with this? By using this prior to middle fossa surgery, instead of having 70% of people with improved hearing we could have 90% or 95%, if the hearing loss is all related to cochlear blood flow or to the cochlear nerve.

Dr. Richard Kopke (New York, NY): Thank you for your interest and your questions. We hope to move in the direction of clinical trials studying cisplatinum ototoxicity. We are doing some additional animal studies, and Dr. Ryback and colleagues are moving in the same direction. We hope that we will receive approval for clinical trials in the near future and that we will be able to make a difference for our patients. It is interesting that as we look at different ways that the cochlea is damaged, there seems to be a final common pathway involving reactive oxygen species. We hope to try some of these compounds in preventing noise-induced hearing losses as well, and that is a particular interest of mine, as I am in the military.

Dr. Ricardo Cristobal (Los Angeles, CA): In regard to the question as to whether we have tried to block mitotic activity, we have not tried that, but we know that proliferation is involved in hair cell formation. We do not say that other mechanisms might not be involved in this new hair cell formation. With regard to the problems with BrdU and tritiated thymidine, our results with BrdU show that perhaps the enzymatic treatment slightly disrupted the morphology of the cell, but it was very easy to distinguish BrdU-labeled cells from non-labeled cells. Regarding whether we have looked at one single cell, we have observed cells for up to two or three days and we were able to observe mitosis and differentiation of the daughter cells in a few locations.

PREDICTIVE VALUE OF INTRAOPERATIVE BRAINSTEM AUDITORY EVOKED RESPONSES IN SURGERY FOR CONDUCTIVE HEARING LOSSES

*†Samuel H. Selesnick, M.D., *†Jonathan D. Victor, M.D, Ph.D.,
*Ravinder K. Tikoo, M.D., and *†David J. Eisenman, M.D.

ABSTRACT

Objective: To assess the efficacy of intraoperative brainstem auditory evoked responses (BAER) in predicting postoperative hearing improvement after surgery for conductive hearing loss.

Study Design: Prospective study of consecutive patients undergoing surgery for conductive hearing loss under general anesthesia by a single surgeon.

Setting: Tertiary care university-affiliated medical center.

Patients: All patients undergoing surgery for conductive hearing loss by the senior author between June 25, 1993, and March 20, 1995.

Interventions: Pre- and postreconstruction intraoperative BAERs; pre- and postoperative pure-tone and speech audiometry.

Main Outcome Measures: Changes in audiometric pure-tone air conduction thresholds, bone–air gaps, and speech reception thresholds, compared with changes in BAER wave V latencies.

Results: A decrease in the wave V latency on the intraoperative BAER correlates significantly with improvement in postoperative pure-tone air conduction, bone–air gap, and SRT using chi-square and linear regression analyses.

Conclusions: Intraoperative BAER can reliably predict the success of an ossicular reconstruction under general anesthesia.

---

*Department of Otorhinolaryngology, New York Hospital–Cornell University Medical Center, Manhattan Eye, Ear and Throat Hospital, 525 East 68th Street, New York, NY 10021; †Department of Neurology, New York Hospital–Cornell University Medical Center, New York, NY 10021.

Work was supported in part by funding from grants EY7977 and EY9314 (J.D.V.). The authors thank Cynthia Harden, M.D., and Carl Heise, M.D., for their work in intraoperative monitoring.

INTRAOPERATIVE ELECTROCOCHLEOGRAPHY IN STAPEDECTOMY AND OSSICULAR RECONSTRUCTION

*Jack J. Wazen, M.D., †Ronald Emerson, M.D., and *David Foyt, M.D.*

ABSTRACT

Intraoperative electrocochleography (ECOG) was performed in 22 patients 27 to 73 years of age undergoing stapedectomy for otosclerosis. In each patient, the N1 threshold to click stimulation was measured intraoperatively, before and after the reconstruction. Post-reconstruction ECOG demonstrated improvement in the N1 threshold in 19 cases and no change in one case. Improvement in the intraoperative N1 threshold corresponded with improvement in the postoperative audiogram compared to the preoperative studies. In two other cases the post-reconstruction ECOG was nearly unobtainable, despite improved hearing postoperatively. Intraoperative ECOG appears to be an effective tool for verifying the functional integrity of ossicular reconstructions. Intraoperative ECOG may allow the surgeon to fine-tune the reconstruction to optimize the hearing results. The two cases in which the ECOG deteriorated intraoperatively may reflect a transient cochlear dysfunction following the stapedectomy.

*Department of Otolaryngology–Head and Neck Surgery and †Department of Neurology, Columbia–Presbyterian Medical Center and The College of Physicians and Surgeons, Columbia University, 630 W 168th Street, New York, NY 10032.

PERSPECTIVES ON A STATE-ENACTED HEARING SCREENING AND ASSESSMENT PROGRAM IN THE NEWBORN POPULATION

*Mark J. Abrams, M.D., *Myles L. Pensak, M.D., and †Karen Buhrer, M.A.

ABSTRACT

Interest in the early identification of the hearing-impaired infant has grown significantly over the last quarter century. In March 1988, a law was enacted in Ohio that requires hearing screening and, under certain circumstances, assessment of newborn children. Although the value of such a program engendered little early public debate, the institution of such a program represented a significant challenge from a public health perspective. We examined the problems encountered in the implementation of a state-mandated screening program. Data were gleaned from an index group of 160,000 live births reflecting perspectives on resources, regulations, and medical and socioeconomic guidelines, as well as the implications of this type of legislation for the clinician.

*Department of Otolaryngology, University of Cincinnati College of Medicine, Cincinnati, OH 45267-0528; †Ohio Department of Health, Bureau of Early Intervention, Infant Hearing Screening and Assessment Program, Columbus, OH.

Reprint requests: Myles L. Pensak, M.D., Department of Otolaryngology, University of Cincinnati College of Medicine, 231 Bethesda Avenue, ML 528, Cincinnati, OH 45267-0528.

ALLERGIC EUSTACHIAN TUBE DYSFUNCTION: DIAGNOSIS AND TREATMENT

M. Jennifer Derebery, M.D., and Karen I. Berliner, Ph.D.

ABSTRACT

Objective: To describe the characteristics and response to specific allergy therapy of patients with clinically significant eustachian tube dysfunction secondary to allergy.

Study Design: Retrospective case review.

Setting: Tertiary referral, private otologic practice.

Patients: One hundred fifty-one patients presenting with eustachian tube dysfunction who had evidence of allergy and underwent allergy testing and treatment. The 105 females and 50 males ranged in age from 2.8 years to 84 years (mean age, 41.8 years) (SD = 17.3).

Interventions: Diagnostic allergy testing (inhalants and food) and treatment with immunotherapy and diet.

Main Outcome Measures: Descriptive characteristics and ratings of fullness, allergy symptoms, and well-being as improved, no change, or worse.

Results: All patients had reactivity to inhalants, and 92.3% tested positive to one or more foods. Nearly half of the patients (49.4%) had had at least one advanced test beyond an audiogram as part of their diagnostic evaluation before referral to a tertiary center for treatment; 40% had undergone radiologic assessment. Nearly all had used one or more other treatments without success prior to allergy therapy. The majority were rated as improved on all three symptoms (fullness, 70.9%; allergy symptoms, 82.8%; well-being, 80.2%). Adherence to the recommended elimination diet was significantly related to outcome.

Conclusions: Eustachian tube dysfunction may be due to underlying inhalant and/or food allergies. Even refractory cases of patulous eustachian tube and eustachian tube obstruction that have not responded to traditional medical and surgical management may improve on specific allergy therapy.

---

*House Ear Clinic and House Ear Institute, 2100 West Third Street, Los Angeles, CA 90057.

Presented at the 129th annual meeting of the American Otological Society, Orlando, FL, May 5, 1996.

DISCUSSION PERIOD VII
Papers 25–28

Dr. Derald E. Brackmann (Los Angeles, CA): These four papers are open for discussion.

Dr. William Meyerhoff (Dallas, TX): I have a question for Dr. Derebery. You presented a nice paper showing the correlation between aural fullness and allergy. I was wondering how the diagnosis of eustachian tube dysfunction was made.

Dr. John House (Los Angeles, CA): Again, I'd like to ask Dr. Derebery about her provocative testing. What symptoms specifically do you look for? In these cases were you looking for eustachian tube problems, an increase in fullness, or some other reaction with your provocative testing?

Dr. Robert Ruben (New York, NY): I have questions for a number of the presenters. To Dr. Abrams and colleagues, how many children were actually identified and how many children were missed? What controls did you have with your patients? To the first two papers, it is probably better to use the cochlear potential or frequency-dependent stimulus instead of just a click for the N1 and N2. Also, a question for the authors of both papers: How did you control your sound source? This is a very important consideration in any of this work at the time of operation.

Dr. Jack Pulec (Los Angeles, CA): Regarding Dr. Derebery's work, my question has to do with the abnormally patent eustachian tube and the inclusion of this with symptoms of fullness. I wonder what evidence Dr. Derebery has that allergy can create an abnormally patent eustachian tube, and if so, can she treat an abnormally patent eustachian tube with immunotherapy?

Dr. John Shea, Jr. (Memphis, TN): I'd like to compliment Dr. Derebery on her paper and ask her a question. Has she noted the extraordinary association of autophony with autoimmune disease? This is the thing that came to my attention with the patients in whom I have made the diagnosis of autoimmune disease. I mentioned this to Dr. Brian McCabe a couple of summers ago, and he has noted the same association. I'd like to just briefly mention some of the autoimmune diseases I have seen in association with autophony. The most striking is interstitial cystitis. I have seen one woman with very severe autophony with interstitial cystitis, two or three patients with Bell's palsy, several patients with lupus, and one or two patients with thyroid disease. Have you noticed this association, Dr. Derebery?

Dr. Jennifer Derebery (Los Angeles, CA): The first question was, how do we diagnose eustachian tube dysfunction? The patient's history certainly plays a large role. In many cases patients have had problems with altitude, retraction of the eardrum, etc. We do eustachian tube function testing in many patients, and in our paper we have a breakdown of how we established this diagnosis. The next question was, do we reproduce the symptoms of ear fullness with provocative food testing? In many cases, yes. For those of you who do not practice clinical allergy, in provocative food testing the physician injects minute amounts of the purified food extract (the food antigen) and tries to reproduce, in miniature, the symptoms that are produced when the patient eats that food, after which it is absorbed, digested, and enters the bloodstream. Because the amounts that are injected in a test are much smaller than are typically ingested in food, the symptoms are often much more subtle than after an oral challenge. The most common symptom we get on provocative food testing is nasal congestion. Indeed, the most common symptom produced by food allergy is nasal congestion or upper respiratory symptoms. What was the evidence we had that allergy can produce a patulous eustachian tube, and how do we treat it? Again, there are published papers which suggest that in some cases, allergy can produce a patulous eustachian tube. Most of the time you are looking at tympanographic evidence of what is going on with a patulous eustachian tube. It is actually very hard to document, and it is hard to get a seal. When careful studies have been done, it has been shown that the problem with the patulous eustachian tube is the active muscle contraction of the tensor veli palatini. That is the anatomic problem in these cases. It is floppy and it is not working. Again, Saki Kahara has found that half of the patients who present with a patu-

lous eustachian tube show this muscle imbalance, and that is exactly the problem that Bernstein postulates happens with the type I allergic reaction involving the eustachian tube. The last question from Dr. Shea, on autophony and autoimmune disease. That is a very interesting theory. I cannot say that I have seen a strong relationship in most patients with respect to autoimmune hearing loss and autophony.

Dr. Mark Abrams (Cincinnati, OH): To address Dr. Ruben's question about the numbers: those numbers were taken from a 10% sample of the first three years of operation of the program. It came from the Ohio Department of Health and Kip Buhrer, and we are very appreciative for her involvement. As far as controls are concerned, it really is more or less a survey of the gross numbers, so controls were not as much of an issue.

VAGAL NERVE MONITORING: A COMPARISON OF TECHNIQUES IN A CANINE MODEL

*Mark A. Severtson, M.D., *John P. Leonetti, M.D., and †Denise Jarocki, M.S.

ABSTRACT

Hypothesis: Various techniques exist for intraoperative, electrophysiologic vagal nerve monitoring.

Background: Any surgical procedure involving the jugular foramen, the posterior cranial fossa, the infratemporal fossa, the parapharyngeal space, or the thyroid gland may jeopardize the vagus nerve as well as adjacent lower cranial nerves. Strategies for intraoperative vagal nerve monitoring are evolving. Laryngeal electromyography (EMG) is considered the most accurate test for vagal nerve function.

Methods: Four techniques of EMG vagal nerve monitoring were studied in dogs. The thyroarytenoid muscle (TA) was monitored directly in three techniques. Two methods used bipolar hook wire electrodes inserted in the TA percutaneously through the cricothyroid membrane or via direct laryngoscope (DL). The third TA monitoring technique involved the use of an EMG endotracheal tube. The fourth technique used a laryngeal surface EMG electrode that was laryngoscopically placed in the postcricoid space.

After each monitoring device was placed, the vagus nerve was identified bilaterally in the neck. The nerves were sequentially stimulated at a constant current of 4.1 Hz with increasing intensity (starting at 0.05 mAs) to determine the minimum thresholds to stimulate vocal cord contraction. A positive response at the vocal cord was defined as a train of four contractions of 50 mV or greater. The lowest threshold for each technique in each dog was recorded.

Results: A positive response was obtained in 27 of 32 possible cases using a maximum boundary of 0.5 mA for stimulus intensity. Survival analysis was used to generate Kaplan-Meier survival curves, allowing a comparison of the mean time needed to obtain a response. Log-rank chi-squared statistics showed that the survival curves are inhomogenous ($df = 3$, $\chi^2 = 15.58$, $P < 0.001$). The laryngeal surface electrode appeared to offer the most sensitive method for vagal nerve monitoring.

Conclusions: EMG recordings can be successfully obtained through a variety of techniques. The laryngeal surface electrode appears to be the most sensitive technique in the canine model.

*Department of Otolaryngology–Head and Neck Surgery, Loyola University Medical Center, 2160 South First Avenue, Maywood, IL 60153; †Department of Audiology, Edward Hines, Jr. Veterans Administration Hospital.

Partial funding for the research was provided by Xomed-Treace, Jacksonville, FL.

COGNITIVE EVOKED POTENTIALS TO SPEECH STIMULI IN PATIENTS WITH COCHLEAR IMPLANTS

Paul R. Kileny, Ph.D., Teresa A. Zwolan, Ph.D., Angelique Boerst, M.A., and Steven A. Telian, M.D.

ABSTRACT

Objective: To evaluate speech-evoked cognitive evoked potentials (MMN and P300) in adult patients with cochlear implants and to compare their responses with those obtained from normal-hearing controls and with responses obtained from cochlear implant candidates via promontory stimulation.

Study Design: Prospective study of three groups of subjects matched in age. Within and between group comparisons were performed.

Setting: Ambulatory care setting, tertiary care facility.

Patients: Subjects with cochlear implants, normal-hearing listeners who were age-matched to the subjects with implants, and candidates for cochlear implants who were age-matched to the subjects with implants and who were undergoing preoperative promontory stimulation testing.

Intervention: All subjects participated in cognitive evoked potential testing with speech stimuli presented in a roving loudness paradigm.

Main Outcome Measures: Results were compared between groups for significant differences in latency and amplitude measures for cognitive evoked potentials.

Results: Very few differences were noted between normal-hearing subjects and those with implants in terms of amplitude and latency of the response components. In general, amplitude and latency of response components were reduced and/or prolonged in subjects tested with promontory stimulation when compared with results in the normal-hearing subjects and subjects with implants.

Conclusions: It is feasible to obtain reliable speech-evoked cognitive potentials using a roving loudness paradigm from patients with cochlear implants and from implant candidates undergoing promontory stimulation testing. These measures have promise in determining perceptual and cognitive abilities of patients with cochlear implants and those undergoing preoperative evaluation to determine cochlear implant candidacy.

Department of Otolaryngology–Head and Neck Surgery, University of Michigan Medical Center, 1500 East Medical Center Drive, Ann Arbor, MI 48109.

Supported in part by NIH grant R01 DC 01851-02.

ELECTROPHYSIOLOGIC METHODS IN COCHLEAR IMPLANT ASSESSMENT

Tucker G. Stevens, M.Ed., M. Suzanne Hasenstab, Ph.D., Claudia D. Mason, M.Ed., Michael W. LeMay, M.A., George H. Williams, M.D., and Aristides Sismanis, M.D.

ABSTRACT

Electrophysiologic methods serve a number of roles within the context of many cochlear implant programs. These methods can be utilized preoperatively to assist in the determination of candidacy, intraoperatively to indicate device integrity and function, and postoperatively to aid in programming and benefit assessment. Twenty-eight children from the Pediatric Cochlear Implant Program at the Medical College of Virginia were evaluated in the clinic using electric acoustic reflex thresholds, averaged electrode voltages, electric auditory brainstem response, electric middle latency response, and electric P300 response. The goals were to trace cochlear implant function from the cochlear implant device to high-level processing centers of the brain without the structured cooperation of the child, and to determine the practicality and feasibility of performing such evaluations in the clinical setting. The primary difficulty encountered was controlling myogenic artifact and its deleterious effects on the evoked potential recordings. Although the children were not required to participate actively in the evaluation, a high degree of cooperation was necessary. The results indicate that electrophysiologic measures are viable techniques in assessing cochlear implant function and benefit in children.

Department of Otolaryngology–Head and Neck Surgery & Division of Audiology, Medical College of Virginia, Virginia Commonwealth University, Richmond, VA 23298.

PROMONTORY ELECTRICAL STIMULATION IN PATIENTS WITH HEARING LOSS AFTER MIDDLE CRANIAL FOSSA ACOUSTIC TUMOR REMOVAL

*†Rick A. Friedman, M.D., Ph.D., *Derald E. Brackmann, M.D., and *Dawna Mills, M.A.

ABSTRACT

Objective: To investigate the possibility of cochlear implantation in patients with postoperative hearing loss after middle cranial fossa acoustic tumor removal with cochlear nerve preservation.

Study Design: Case series descriptive study.

Setting: Tertiary referral center. Private otologic practice.

Patients: Seven patients who underwent middle cranial fossa acoustic tumor resection and suffered postoperative anacusis with an anatomically intact cochlear nerve. Patients included four men and three women ages 30–60 years who were operated on between 1990 and 1994 and who agreed to return to the center to participate in the study during 1995.

Intervention: Diagnostic electrical promontory stimulation to determine the functional integrity of the cochlear nerve.

Main Outcome Measures: Presence or absence of discrete tone perception, electrical threshold, maximum acceptable level, and dynamic range, gap detection, and temporal difference limen.

Results: Three of seven patients had positive responses to electrical promontory testing (i.e., discrete tone perception). All three were able to perform the gap detection and temporal difference limen tests. None of the preoperative characteristics were related to performance on promontory stimulation testing.

Conclusion: The middle fossa craniotomy approach allows successful auditory nerve preservation, including functional integrity in some cases. Such cases might be suitable for cochlear implantation as a form of auditory rehabilitation.

*House Ear Clinic and House Ear Institute, 2100 West Third Street, Los Angeles, CA 90057; †Department of Otolaryngology–Head and Neck Surgery, Division of Otology/Neurotology and Skull Base Surgery, University of Cincinnati College of Medicine, Cincinnati, OH.

Presented at the 129th annual meeting of the American Otological Society, Orlando, FL, May 5, 1996.

Reprint requests: Derald E. Brackmann, M.D., House Ear Clinic, 2100 West Third Street, Los Angeles, CA 90057, (213) 483-9930 (ph.), (213) 484-5900 (fax).

DISCUSSION PERIOD VIII
Papers 29–32

Dr. Derald E. Brackmann (Los Angeles, CA): These four papers are now open for discussion.

Dr. William House (Newport Beach, CA): I would like to ask Dr. Kileny if in the paradigm to the promontory through a single electrode, there was any similarity to the same paradigm placed through 22 electrodes which are only pulsed one at a time? I hope that question is clear.

Dr. Paul Kileny (Ann Arbor, MI): A comment for Dr. Stevens. We know that the middle latency response matures rather slowly, so probably it is not the best choice for investigating stimulability in young children. It really does not mature until the early teens or so. Second, did you always use the same sequence in testing, because if you did, these kids have been sitting there for a long time, and it stands to reason that whatever was the last of the series of electrophysiologic tests, the children would get the most restless and therefore demonstrate the lowest percentage of positive responses.

A question for Dr. Friedman: The three patients who did have positive promontory stimulation results—did they have any measurable, residual hearing?

To respond to the questions addressed to me: If I understood the question correctly, Dr. House, it is whether we use the same stimulation paradigm for the patients with the implant as with promontory stimulation. Yes, we use exactly the same paradigm. As I mentioned, we only use one of the three stimulus contrasts simply to conserve time in patients with the promontory stimulation. That was the vowel contrast. The responses were very similar to the implanted and the normal-hearing patients with the exception of significantly delayed latencies of the components, which usually indicate, in this category of responses, the more prolonged processing that was necessary for them to resolve these differences. But otherwise we used exactly the same paradigm with no differences whatsoever among the three groups of patients.

Mr. Stevens (Richmond, VA): Dr. Kileny asked about the MLRs in some of the younger patients with regard to maturation of the MLR. We found that the MLR was actually present and we were more likely to get an MLR in a younger patient who had a longer duration of implant use than in an older patient with a short duration of implant use. That has some implications. Is it maturation of the auditory system per se or is it auditory age that makes a difference? I do not know; we had such a small number. Yes, we did use the same test sequence in all our patients. What we did was, when we were getting to the MLR and P300, we would change the movie, and that just put them back into that trance. We did not use a film with the P300, though; we had them actually doing something.

Dr. Rick A. Friedman (Cincinnati, OH): In response to Dr. Kileny's question, all three patients were deaf and there was no auditory response.

COMMUNICATION OUTCOMES RELATED TO EARLY IMPLANTATION

†Diane Brackett, Ph.D., and †Carol V. Zara, M.A.

ABSTRACT

By implanting devices in children between the ages of 2 to 5 years, it may be possible to capitalize on the critical period of early language learning and thus positively affect communicative outcomes. Thirty-three children ages 2–5 years at the time of implantation were followed longitudinally. They were administered a battery of speech perception (closed and open set), speech production, and oral language (vocabulary and syntax) tests at five test intervals across a three-year span. Results showed a rapid improvement in speech production and language acquisition following improved speech perception through a cochlear implant for these children. The improvements exceeded those reported in the literature for older children. The differences in communicative growth between those children receiving an implant before age 3 and those receiving an implant before age 5 are not significant, although there is a trend toward better performance levels among children who receive implants at the youngest ages.

*CHIP Hearing Services, University of Connecticut, Storrs, CT 06269; †League for the Hard of Hearing, New York, NY.

EDUCATIONAL NEEDS AND COST-BENEFIT CONSIDERATIONS IN CHILDREN WITH COCHLEAR IMPLANTS

Howard W. Francis, M.D., Mary Eager Koch, M.A., J. Robert Wyatt, M.D., M.B.A., and John K. Niparko, M.D.

ABSTRACT

While educational "mainstreaming" of the implanted child is an important goal and is often realized with early implantation, the financial costs and benefits entailed by this and other outcomes are key to an initial assessment of cost-benefit. This information will contribute to assessment of the overall cost-effectiveness of cochlear implants in children. Full assessment of cost-effectiveness will depend on:

1. The availability and utilization of appropriate education and rehabilitation services.
2. The degree to which speech and language benefits lead to improved speech perception and production, reading comprehension, and other functional capabilities that impact social, educational, and vocational options.
3. The impact of the device on general measurements of quality of life.

As an initial step in determining the cost-effectiveness of the device in children, we tracked patterns of use of educational and rehabilitative resource utilization of 35 children in the Johns Hopkins Cochlear Implant Program. We used a matrix that classifies school setting (residential vs. special education vs. nonspecialized "mainstream" setting) and levels of rehabilitative support (speech/language therapy and interpreter use) to map past and current use of these services. We categorized utilization patterns with variables based on age of implantation, duration of deafness, communication mode, linguistic skills, and additional handicapping conditions.

Longitudinal assessment following implantation demonstrates a movement across the continuum toward greater education independence. Corresponding cost data based on 1995 State of Maryland Department of Education Budget figures indicates that costs per student in highly dependent (residential) settings are more than fivefold greater than those associated with education independent "mainstream" settings. Initial cost-benefit projections based on observed advancement toward educational independence indicate a net present value of the implant to be $99,501 per device (cost savings minus cost). Highly favorable cost-benefit projections will need to be supplemented with measures of the impact of quality of life to determine overall cost-effectiveness.

Listening Center, Johns Hopkins Department of Otolaryngology–Head and Neck Surgery, Baltimore, MD 21203.

OPEN SET SPEECH PERCEPTION IN CONGENITALLY DEAF CHILDREN USING COCHLEAR IMPLANTS

Susan B. Waltzman, Ph.D., Noel L. Cohen, M.D., Railey H. Gomolin, M.S., Janet E. Green, M.S., William H. Shapiro, M.A., Ronald A. Hoffman, M.D., and J. Thomas Roland, Jr., M.D.

ABSTRACT

The purpose of this study was to assess and document the development of open set speech recognition in congenitally deaf children implanted with the Nucleus multichannel cochlear prosthesis before age 5 years. All thirty-eight congenitally profoundly deaf children who received implants and were followed up at New York University Medical Center for at least one year were subjects for this study. Open set speech perception was evaluated preoperatively and postoperatively using the following: GASP word, GASP sentence, PBK monosyllabic words, Common Phrases test, Multisyllabic Lexical Neighborhood test, and Lexical Neighborhood test. Correlation coefficients were calculated between scores at each interval, and age at implantation and one-way ANOVA analyses were performed independently. Results revealed that all subjects had significant open set speech recognition at the time of the last postoperative evaluation. Thirty-seven of the children use oral language as their sole means of communication; one child uses total communication and attends a regular school with interpreter assistance. Of the remaining children, thirty-six attend mainstream schools and one is in an oral school for the deaf. We conclude that multichannel cochlear implants provide significant and usable open set speech perception in congenitally deaf children implanted before age 5 years. Factors such as programming, training, and educational setting can contribute to outcome.

Department of Otolaryngology, New York University School of Medicine, 550 First Avenue, New York, NY 10016.

Presented at the 129th annual meeting of the American Otological Society, Orlando, FL, May 4–5, 1996.

Research was supported by the Oberkotter Foundation and NIH grant NIDCD 5PO1DC00178.

FACIAL NERVE STIMULATION FOLLOWING NUCLEUS 22 CHANNEL COCHLEAR IMPLANTATION

*David C. Kelsall, M.D., †Jon S. Shallop, Ph.D., *Thomas G. Brammeier, M.D., and ‡Erin C. Prenger, D.O.*

ABSTRACT

Facial nerve stimulation is reported to be an uncommon complication of cochlear implantation, occurring in approximately 3% of adults using the Nucleus 22 channel cochlear implant. Symptoms of facial nerve stimulation can produce significant discomfort, effectively limit cochlear implant use, and in some cases force nonuse or explantation. The etiology of facial nerve stimulation is uncertain, but an association with otosclerosis has been proposed. In reviewing our consecutive series of 200 cochlear implant patients, 14 (7%) have experienced symptoms of facial nerve stimulation. The majority of adult patients suffered from otosclerosis. In an effort to determine the mechanism of facial nerve stimulation, anatomic and radiographic studies were performed. The anatomic data confirmed the closest proximity of the facial canal and the basal turn of the cochlea to be at the labyrinthine segment of the facial nerve. There was also a high correlation for the majority of our patients between the electrodes causing facial nerve stimulation and those found radiographically to be closest to the labyrinthine segment of the facial nerve. We have been able to control facial nerve stimulation in all of our patients, and in two additional patients referred to our center, through programming mode changes. The majority of patients required more elaborate programming techniques, such as simultaneous multiple programming modes. Familiarity with these more elaborate techniques is important for the management of patients with facial nerve stimulation and should be attempted before the decision is made to deactivate electrodes, stop device use, or explant the device.

*Denver Ear Associates, Denver, CO; †Denver Ear Institute, Englewood, CO; ‡Swedish Medical Center, Englewood, CO.

DISCUSSION PERIOD IX
Papers 33–36

Dr. Derald E. Brackmann (Los Angeles, CA): These four papers are now open for discussion.

Dr. Bruce Gantz (Iowa City, IA): I enjoyed your paper, Dr. Waltzman, and the question I have is have you implied that of the 30-some prelingually deafened children who have received implants, all of them—100%—had open set discrimination? I think you have implanted more patients than 30-some at NYU; does this number include all of the patients that you have implanted? Have 100% open set discrimination?

Dr. Newton Coker (Houston, TX): Dr. Kelsall, I greatly enjoyed your paper describing the clinical evidence of facial nerve stimulation in the otosclerotic patient. We have reported in detail the histopathology of a cochlear implant patient who had otosclerosis as the etiology of deafness and who also had facial nerve stimulation. In that report we showed remodeling of the bone and in the area between the labyrinthine part of the fallopian canal and the upper basal turn. So there is some evidence already from temporal bones.

Dr. Jacques Herzog (St. Louis, MO): My first comment is for Dr. Brackett. I enjoyed your paper a lot. It is very important that we talk about communication skills and speech production in these children who have received implants. My question is: You mentioned that 17% of the kids were in TC, and the remainder were in oral programs. Did you look at the differentiation between these two groups to see if there was a difference in their speech production? My second question is for Dr. Francis. Again, yours was a very good paper that showed that implantation will save money in the long run in the education of these children, but did you also look at where children who do not receive implants wind up six to seven years down the road? How do they compare in cost when they eventually do mainstream?

Dr. William House (Newport Beach, CA): I have a question for Dr. Kelsall about how to reduce the current density in terms of the surface electrodes. Actually the current density is highest if you go from the BP plus one where the current density must be very high in order to spread out to the ganglion cells and you can reduce the current density considerably by using a ground electrode which is outside the cochlea. This way you might be able to keep your current density low enough that it would not stimulate the facial nerve, yet still give you some sound percepts. Have you tried any extracochlear grounding so you could keep your current density low?

Dr. Derald E. Brackmann (Los Angeles, CA): Dr. Waltzman, the first question was for you.

Dr. Susan Waltzman (New York, NY): Bruce, we implanted about 175 children at NYU. These cases were congenital, they were consecutive, and they had to meet the criteria. In other words, the children had to be users for one year. These were not just prelingually deaf kids; they were strictly congenitally deaf, and they had to have received implants below a certain age. All of the children who met these criteria are reported here.

Dr. David Kelsall (Englewood, CO): I appreciate Dr. House's observation. We did not try any external electrodes or grounding electrodes. The basis of the variable mode programming is just what you described: to lower the current density by spreading the current between electrodes that are farther apart. For example, BP plus 10 or BP plus 11 would lower the current density compared to the BP plus 1 mode, but we have not tried external grounding electrodes. They probably would be effective.

Dr. Howard Francis (Baltimore, MD): Thank you, Dr. Herzog, for your kind comment and question. In our region we find that the "bronze" hearing aid users essentially stay within the state school for the deaf system or are mainstreamed to classrooms where there is a very high teacher to student ratio with a lot of support services; these are very expensive options. So, they pretty much stay on that track from kindergarten through grade 12. That was our control for this group.

Dr. Diane Brackett (Storrs, CT): That 17% figure regarding total communication use was pre-implant. By 6 months post-implant there was only one

child who was still using a total communication approach. So, it is not possible to really compare this one child with the rest of the 32 children; however, subjectively, this child consistently is at the lower end in terms of spoken language, spoken language acquisition, and speech production.

SOME ANATOMIC OBSERVATIONS ON OTOLITH REPOSITIONING FOR BPPV

Richard A. Buckingham, M.D.

ABSTRACT

The cause of benign paroxysmal positional vertigo (BPPV), a benign disorder of mostly elderly patients, has been attributed to runaway, rogue otoliths in the endolymph that are reputed to somehow slip off the utricular macula, wander into the lumen of the membranous labyrinth, and settle on the utriculofugal side of the crista of the posterior semicircular canal. Anatomic evaluation of the geometry of the labyrinth shows that the utricular or utriculopetal side of the cupula of the posterior semicircular canal would more easily be involved by otoconia falling off the macula of the utricle, since the course to the utriculofugal side of the crista is longer and more tortuous. Futhermore, patients lying in supine positions with loose otoliths in the left labyrinth, for example, who roll to the left should shower their left horizontal semicircular canal cupula with otoconia and experience vertigo well before the posterior semicircular crista could be stimulated. This is seen in the study of the cross-sections. Loose otoliths, once repositioned, could easily slide back into the common crus, the posterior canal, and once again to the utriculofugal side of the posterior cupula. When the patient assumes a supine position there is no assurance that once loose otoliths return to the macula of the utricle they will be refixed on the sterieocilia of the utricle. The good results obtained with physiotherapeutic procedures suggest that some other mechanism than repositioning rogue otoliths could be responsible for the relief of vertigo.

Department of Otolaryngology, University of Illinois College of Medicine, Eye and Ear Infirmary, and Resurrection Hospital, Chicago, IL.

INTRATYMPANIC GENTAMICIN THERAPY: UNIVERSITY OF PITTSBURGH EXPERIENCE

Barry E. Hirsch, M.D., and Donald B. Kamerer, M.D.

ABSTRACT

Medical management of Ménière's disease is successful in approximately 70% of patients treated. Patients with persistent symptoms warrant further intervention which, until recently, required a surgical ablative or destructive procedure such as an endolymphatic shunt, vestibular nerve section, or labyrinthectomy. We have offered intratympanic gentamicin therapy as a treatment alternative for the past seven years. Gentamicin injections were given on a biweekly or weekly basis and terminated based on control of vertigo or objective hearing loss. We retrospectively studied 28 patients who received intratympanic gentamicin injections and were available for at least two-year follow-up. The results of vertigo control and hearing were assessed using the American Academy of Otolaryngology 1985 Committee on Hearing and Equilibrium guidelines. Complete or substantial control of vertigo was achieved in 91% of patients. Hearing loss occurred in approximately one third of patients. Pure-tone average was worse in 30% of patients, word discrimination was worse in 38%, and pure-tone thresholds at 8,000 Hz were worse in 38% of patients. Historically, similar hearing loss occurs in patients who are treated successfully either medically or surgically. Intratympanic gentamicin therapy given by serial titration injections provides significant control of vertigo without the significant cost and potential morbidity of a more invasive surgical procedure.

Department of Otolaryngology, University of Pittsburgh School of Medicine, 200 Lothrop Street, Pittsburgh, PA 15213.

A COMPARISON OF LONG-TERM HEARING RESULTS AFTER VESTIBULAR NEURECTOMY, ENDOLYMPHATIC MASTOID SHUNT, AND MEDICAL THERAPY

*Antonio Quaranta, M.D., †Marina Onofri, M.D., *Vincenzo Sallustio, M.D., and †Salvatore Iurato, M.D.*

ABSTRACT

The hearing results in 29 patients who underwent middle fossa vestibular nerve section and in 17 patients who underwent endolymphatic mastoid shunt were compared with those in 22 patients with Ménière's disease who were offered surgery but declined. The audiologic follow-up was between 5 and 21 years. Patients were subdivided into two cohorts based on their preoperative or initial PTA. In the patients who had hearing worse than 50 dB PTA initially, the PTA declined by 4.3 dB in the vestibular neurectomy group, 11.5 dB in the endolymphatic sac group, and 4 dB in the nonsurgical group. In patients with hearing equal to or better than 50 dB PTA initially, the PTA declined by 25.3 dB in the vestibular neurectomy group, 16.1 in the endolymphatic sac group, and 26.2 dB in the nonsurgical group. These results indicate that patients with poor hearing who underwent operation have stabilized, whereas hearing in patients with good hearing who underwent operation continued to deteriorate, and the same behavior was observed in patients who were offered surgery but declined. This means that in our patients, the vestibular neurectomy and the endolymphatic mastoid shunt did not significantly alter the long-term natural course of hearing deterioration in Ménière's disease. Usable hearing as defined by an SRT $\leq$70 dB and an SDS $\geq$15% was obtained in 31% of patients in the neurectomy group, 35% of the patients in the endolymphatic sac group, and 36% of the patients who declined surgery. Long-term follow-up is necessary to evaluate the hearing results in a chronic disorder like Ménière's disease.

Department of Ophthalmology and Otolaryngology, *Center of Audiology and Otology, and †Center of Bioacoustics, University of Bari, Bari, Italy.

Presented at the 129th annual meeting of the American Otological Society, Orlando, FL, May 4–5, 1996.

Reprint requests: Salvatore Iurato, M.D., Department of Ophthalmology and Otolaryngology, Center of Bioacoustics, Policlinico, I-70124 Bari, Italy, 39 80 5478354 (ph.), 39 80 5478330 (fax), anatomia@cimedoc.uniba.it (e-mail).

Work was supported by grants from CNR (Italian National Research Council). The authors thank Giuseppe Bux and Carole Davidson for their assistance in preparation of the manuscript.

LONG-TERM EFFECTS OF MÉNIÈRE'S DISEASE ON HEARING AND QUALITY OF LIFE

*Sam E. Kinney, M.D., Sharon A. Sandridge, Ph.D., and Craig W. Newman, Ph.D.

ABSTRACT

Objective: To evaluate long-term hearing results and quality of life in Ménière's disease patients.

Study Design: Detailed audiometric evaluation, disease-specific evaluation, and global health quality evaluation of Ménière's disease patients.

Setting: Ambulatory evaluation in a large multispecialty clinic.

Patients: Ménière's disease in only one ear, at least one year post-treatment, <65 years of age, no neurologic or psychological disorders, within driving distance of ambulatory clinic.

Main Outcome Measures: Audiometry, Hearing Handicap Inventory, Dizziness Handicap Inventory, Tinnitus Handicap Inventory, SF-36 Health Survey.

Results: No statistically significant difference in long-term hearing results for natural history, medically- or surgically-treated Ménière's disease patients. Significant disease-specific symptom handicap. Global health handicap greater for emotional disability than physical disability.

Conclusions: Medical and surgical treatment does not significantly influence hearing results in Ménière's disease. Ménière's disease patients have a greater emotional disability than physical disability.

*Department of Otolaryngology/Communication Disorders, Cleveland Clinic Foundation, 9500 Euclid Avenue, Desk A-71, Cleveland, OH 44195-5034.

DISCUSSION PERIOD X
Papers 37–40

Dr. Derald E. Brackmann (Los Angeles, CA): These four papers are now open for discussion.

Dr. Herbert Silverstein (Sarasota, FL): Dr. Hirsch, I enjoyed your paper. I was a little shocked to see my hearing results after vestibular neurectomy were 55% in 1989. We must have improved our technique, because I think our results are a lot better today, and similar to what Dr. Kinney said, the hearing results after endolymphatic sac surgery and vestibular neurectomy are similar and represent the natural history of the Ménière's disease. I want to discuss gentamicin injection. Everybody seems to be injecting gentamicin through the tympanic membrane. What we do is perform an endoscopic procedure before putting in the gentamicin, using the laser to make a small opening in the tympanic membrane in order to examine the round window niche. We find that about 30% of patients have mucosa over the round window, partially obstructing it, and in about 10%, closing it 100%. We remove these membranes, put a piece of Gelfoam down, and then put the gentamicin in. I think doing it blindly may be the explanation for why we are getting all these variable results. If you look at what you are doing while you put the Gelfoam in, I think you can have little more control over the treatment.

Dr. Melton Horwitz (Houston, TX): I also do what Herb just described, but through a formal tympanotomy. I take down the adhesions over the round window and then I put a piece of Gelfoam soaked in gentamicin directly against the round window membrane. My question to Dr. Hirsch relates specifically to the patients with drop attacks. Did you get relief of vertigo in drop attacks with the gentamicin?

Dr. Julian Nedzelski (Toronto, Canada): Dr. Hirsch, would you tell us what the results with respect to the vestibular function were post-treatment? What did the ENG data show?

Dr. John Shea, Jr.: I enjoyed Dr. Hirsch's paper very much. I'd like to ask him a question and then make one observation. What are the criteria by which he stops the injections? His range of treatments is from three to nine. What are his criteria, and does he feel comfortable with the criteria he is using? The effect of the aminoglycoside streptomycin, with which I have had a lot of experience, and gentamicin, with which I have had no experience, is not immediate. So, how does he know what the end point is? I would like to emphasize something that I pointed out at the Otological Society meeting last year—namely, that we ought to be thinking not so much about using destructive drugs like the aminoglycosides, streptomycin and gentamicin, but a therapeutic drug like dexamethasone. In the last couple of years I have more or less completely stopped using streptomycin, with which I had a big experience, and began using dexamethasone in the treatment of Ménière's disease. I will continue that work and report it more thoroughly, but for now I would like to emphasize that dexamethasone is a therapeutic treatment, whereas aminoglycosides are destructive. I certainly agree with Dr. Silverstein about exposing the round window membrane. I have pointed out repeatedly that you have to be sure the round window membrane is open, and part of this operation has to be a thorough opening of the area of round window niche to see if there are adhesions around it.

Mr. Andrew Morrison (London, England): Thank you, Mr. President. I would like to make a comment on the natural history of this disease. The Italians followed patients about 11 years and I think Dr. Kinney's follow-up period was 5 or 6 years. If you follow these patients for 20 years—and I have a great many who have been followed that long—the natural history is rather different. Long term, you will find that the hearing loss has continues; I grant you, the loss plateaus, but later it becomes worse, and then frequently bilateral. Have others had a similar experience with long-term follow-up?

Dr. Jennifer Derebery (Los Angeles, CA): Dr. Hirsch, I enjoyed your presentation very much. We have recently finished reviewing a large series of patients with Ménière's disease whom we have been treating with allergic management for up to nine years. We found no statistical change in hearing and control of vertigo that approaches what you presented with gentamicin. I wonder how many of

your patients have been evaluated or treated for allergies?

Dr. Sam Kinney (Cleveland, OH): I agree with Mr. Morrison's comment that long term, a very high percentage of these patients may develop bilateral Ménière's disease. It will be interesting to see whether the original estimate by Friberg and Stahle will be correct. So far in our data it appears that it is, but it could well be that in the longer term study there will be a drop-off.

Dr. Barry Hirsch (Pittsburgh, PA): Let me try to address all these issues. Dr. Derebery, in terms of whether we evaluated people for allergy, we did not. Dr. Horwitz and Dr. Silverstein both mentioned that there may be fibrosis or scarring obstructing the round window. I think that is an excellent point. In fact, we saw that we had some patients who had undergone previous surgery, including shunt surgery and retrolabyrinthine vestibular neurectomy, and also one patient who had undergone round window exploration to rule out a fistula. It is interesting that these were the patients who needed a greater number of injections. I think that it is possible that drilling in the mastoid may create some bone dust and so on that goes into the middle ear and may obstruct the round window. Dr. Nedzelski asked about our ENG data. The way that Don and I are doing this, we are not monitoring the patient's ENG during treatment; and the reason is that I personally do not think that the ENG will tell you when to stop treatment. I think *you* can monitor when to stop treatment. To address Dr. Shea's question of when do we stop treatment, or how do we do this titration: If you monitor the ENG all you really are doing is saying when the horizontal canal stops working. There are still the superior and posterior canals and the otolithic organs, which you are not really measuring. So, looking at the ENG is not going to tell you exactly what to do. When do we stop treatment? We determine this by the titration method. That means that we are giving it between twice a week or even weekly. We monitor the patient's symptoms. There are three things that we are really looking at: 1) If the patients are having frequent vertigo. It is easy for them to tell you if the frequency of their vertigo is decreasing; 2) Disequilibrium. A lot of patients experience disequilibrium after the second or third injection. If they start complaining of significant disequilibrium, meaning unsteadiness all the time, we will hold off on the next injection until the disequilibrium resolves and we have a feeling for the frequency of the true vertigo attacks; 3) We also monitor hearing. After about the second injection, and then every other injection thereafter, we get an audiogram to see whether patients are developing hearing loss. As I mentioned, there was only that one person who experienced a significant amount of hearing loss after the second injection.

Dr. Salvatore Iurato (Bari, Italy): In this series with a mean audiological follow-up of 12 years, the incidence of contralateral Ménière's disease was over 9%. However, I should mention that apart from the six patients in our series who actually developed contralateral Ménière's disease, quite a few others showed a hearing deterioration much greater than expected for normal age-related hearing loss. So, I agree with what Mr. Morrison said—that on longer follow-up, the incidence of bilateral Ménière's disease will probably be greater.

MANAGEMENT OF ACOUSTIC NEUROMA IN THE ELDERLY POPULATION

*Michael E. Glasscock III, M.D., *Dennis G. Pappas, Jr., M.D., *Spiros Manolidis, M.D., *Peter G. Von Doersten, M.D., *C. Gary Jackson, M.D., and Ian S. Storper, M.D.

ABSTRACT

Ongoing controversy regarding the optimal treatment of acoustic neuromas in the elderly population prompted us to examine our experience in order to arrive at a treatment algorithm. The records of 48 elderly patients with acoustic tumors, ranging from 70 to 90 years, were retrospectively reviewed. In 34 cases the size of the tumor was followed through serial magnetic resonance imaging for an average of 28.5 months (range, 5–108 months). Eight of these patients subsequently required surgery for significant tumor growth during this watched period. In the remainder of the watched cases, the acoustic neuroma was sufficiently slow-growing to preclude surgical therapy. An additional 12 patients were managed surgically from the time of diagnosis. The most commonly performed approach was the translabyrinthine procedure. Perioperative complication rates and facial nerve results were comparable to results achieved in our acoustic neuroma series of over 1,300 cases. There was one perioperative death, however, for a 5% mortality. We conclude that elderly patients with small acoustic neuromas and non-life-threatening symptoms should be offered a trial of observation prior to definitive intervention.

*The Otology Group, Nashville, TN.

ACOUSTIC NEUROMA SURGERY: OUTCOME ANALYSIS OF PATIENT-PERCEIVED DISABILITY

Saurabh B. Shah, M.D., Peter L. Rigby, M.D., Robert K. Jackler, M.D., Jeannie H. Chung, B.S., and Darren D. Cooke, B.S.

ABSTRACT

Objective: Numerous studies have investigated the outcome of acoustic neuroma (AN) treatment using classic medical measures. In an effort to describe the long-term lifestyle consequences of AN removal from the patient's perspective, we asked patients to fill out detailed questionnaires concerning their functional status.

Study Design: Retrospective survey.

Setting: Tertiary referral center.

Patients: One hundred thirty late postoperative AN patients surveyed a minimum of six months following surgery (average, 39 months). Survey response rate was 65% (130 of 200).

Main Outcome Measures: The patient's perception of hearing, balance, facial expression, and eye function in relation to their impact on activities of daily life. Pretreatment and long-term posttreatment functional levels were compared.

Results: When patients were asked to designate their most significant symptom, hearing loss was by far most common (61.3%), followed by balance troubles (14.3%) and facial weakness (10.1%). The relatively low incidence of facial weakness as the dominant complaint was somewhat surprising. In regard to the incidence of each symptom, women were more likely to complain of facial weakness, dry eye, and headache, while men had a marginally higher reported incidence of hearing loss and imbalance. Patient age had no apparent influence on either the distribution or severity of symptomatic complaints. Both hearing in the tumor ear and overall auditory function (e.g., the ability to understand in a restaurant) tended to worsen following surgery. One finding that was both unanticipated and intriguing was an improvement in sound localization ability, reported by 57% of patients following surgery. Although the proportion of patients complaining of frequent tinnitus increased postoperatively, the number of patients who found the tinnitus troublesome decreased markedly. In terms of balance function, only 31% preoperatively and 15% postoperatively described themselves as free of balance difficulties. An aid to ambulation (cane, walker) was needed by 5 patients (4%) preoperatively, two of whom regained the ability to walk independently following tumor removal.

Conclusions: Although virtually all AN patients have persistent symptoms over the long term, the data indicate that most of these are attributable to the tumor itself as opposed to the aftereffects of its surgical removal. The relatively slight difference between preoperative and late postoperative symptom profiles was an unanticipated finding. As the degree of disability tends to increase with larger tumor sizes, these data tend to support a policy of early intervention.

Department of Otolaryngology–Head and Neck Surgery, University of California, San Francisco, CA.

ENDOSCOPICALLY ASSISTED PREVENTION OF CEREBROSPINAL FLUID LEAK IN SUBOCCIPITAL ACOUSTIC NEUROMA SURGERY

Hannu J. Valtonen, M.D., Ph.D., †Dennis S. Poe, M.D., ‡Carl B. Heilman, M.D., and §Edward Tarlov, M.D.

ABSTRACT

Cerebrospinal fluid (CSF) leak remains one of the most common complications following acoustic neuroma surgery. The suboccipital (SO) approach for excision of acoustic neuromas has been increasingly used since gadolinium-enhanced magnetic resonance imaging (MRI) has improved our ability to diagnose smaller tumors. SO approaches are reported to have CSF leak rates of up to 27%, with an average rate of 12%, most leaks representing as rhinorrhea. Ideally, this complication could be avoided by careful closure of all air cells exposed during the approach, especially those commonly found in the posterior wall of the internal auditory canal (IAC) and in the retrosigmoid area. Packing these cells with a variety of materials has been done, but often indirectly, since visualization of all cells with conventional operating microscopes may not be possible. Failure to recognize patent cells due to limited visualization may be an important cause of postoperative CSF leak. We sought to determine if direct inspection of air cells by means of endoscopy could reduce the occurrence of CSF leak in SO acoustic neuroma surgery. We compared CSF rhinorrhea rates in 38 consecutive SO acoustic neuroma operations in which conventional techniques were used to pack the temporal bone defect around the IAC with rates in the succeeding 24 consecutive operations in which endoscopes were used to directly visualize all exposed air cells. After all patent air cells were located endoscopically, they were sealed with bone wax, and then a small fat graft harvested from the wound margin was used to fill the remaining defect. Postoperative CSF rhinorrhea occurred in 7 (18.4%) of 38 operations in which no endoscopic technique was used and in none of 24 operations in which endoscopes were used. The use of endoscopes to visualize the temporal bone air cells that cannot be otherwise directly observed appears to reduce the incidence of postoperative CSF leak in SO acoustic neuroma surgery.

*Central Finland Health Care District, Jyvaskyla Central Hospital, SF-40620 Jyvaskyla, Finland; †Zero Emerson Place, Suite 2C, Boston, MA 02114; ‡Department of Neurosurgery, New England Medical Center, 750 Washington Street, Boston, MA 02111; §Department of Neurosurgery, Lahey-Hitchcock Clinic, 41 Mall Road, Burlington, MA 01805.

Reprint requests: Dennis S. Poe, M.D., Zero Emerson Place, Suite 2C, Boston, MA 02114.

FOCAL INFARCTION OF THE CEREBELLAR PEDUNCLE AS A CAUSE OF PERSISTENT CEREBELLAR DYSFUNCTION FOLLOWING ACOUSTIC NEUROMA SURGERY: A REPORT OF NINE CASES

Peter L. Rigby, M.D., Steven W. Cheung, M.D., David W. Sim, Ed. (ORL), Robert K. Jackler, M.D., and Lawrence H. Pitts, M.D.

ABSTRACT

Objective: To define a clinicopathologic syndrome associated with persistent cerebellar dysfunction following acoustic neuroma (AN) resection.

Study Design: Case series: radiographic and chart review.

Setting: Tertiary referral center.

Patients: Nine AN patients who developed persistent cerebellar dysfunction following AN removal. Each demonstrated abnormality in the ipsilateral cerebellar peduncle on postoperative MRI.

Main Outcome Measures: Cerebellar function and ambulatory status over the first postoperative year.

Results: On MRI, patients had lesions ranging from a discrete, focal deficit less than 1 cm in diameter and involving only one third of the peduncle's thickness to diffuse defects, larger than 2 cm in diameter, that spanned the full thickness of the peduncle. Peducular infarcts are associated with large tumor size (average, 3.7; range, 2.0–4.8 cm in diameter). Long-term functional outcome (>1 year) was mixed. Only half (4/8) recovered normal ambulatory function, two had mild gait disturbance, one required use of a cane, and one needed a walker for mobility.

Conclusions: Peduncle injury most likely stems from interruption of distal branches of the anteroinferior cerebellar artery (AICA). These small vessels are intimately related to the capsule of the tumor and may provide blood supply to both the neoplasm and brain parenchyma. It has long been recognized that interruption of the proximal segment of the AICA results in a severe injury to the pons with resultant devastating neurologic sequelae. A limited AICA syndrome due to loss of its distal ramifications seems a more probable explanation for peduncular infarction than venous insufficiency or direct surgical trauma.

Department of Otolaryngology–Head and Neck Surgery, University of California, San Francisco, CA 94117.

COCHLEAR IMPLANTATION IN PEDIATRIC PATIENTS WITH MONDINI DEFORMITIES

Ronald A. Hoffman, M.D., Laura L. Downey, M.D., Susan B. Waltzman, Ph.D., and Noel L. Cohen, M.D.

ABSTRACT

Cochlear dysplasia increases the complexity of cochlear implantation. To address the surgical and habilitative issues raised by cochlear dysplasia the English literature is reviewed, our experience with three patients is detailed and 200 institutions performing cochlear implants were queried by questionnaire. We summarize the results of 51 cases. A CSF gusher occurred in 40% of patients, most often controlled with fascia packing. Facial nerve anatomy was anomalous in 16% of patients, with 2 surgical injuries; there were no cases of meningitis. All patients who received multichannel implants derive benefits and wear their devices. We conclude that all degrees of cochlear dysplasia, ranging from incomplete partition to common cavity, can be safely implanted and psychoacoustic responses expected.

Department of Otolaryngology, New York University Medical Center, 550 First Avenue, New York, NY 10016.

Presented at the 129th annual meeting of the American Otologic Society, Orlando, FL, May 5, 1996.

DISCUSSION PERIOD XI
Papers 41–45

Dr. Derald E. Brackmann (Los Angeles, CA): These five papers now are open for discussion.

Dr. Herbert Silverstein (Sarasota, FL): I would like to discuss Dr. Glasscock's paper. Our reported results on growth rates are almost identical to his. For the past 23 years we have been doing radical subtotal resections of acoustic neuromas in elderly patients; our goals of surgery are to reduce pressure on the brainstem, preserve the facial nerve, shorten surgical time, and reduce postoperative complications. Our results have been excellent. Facial nerve function is between grade 1 and 2 (House-Brackmann Scale) in 95%. We have had no deaths, no patient has died of tumor, and only four patients (or 16%) needed further surgery. We have 46 patients now that we are following with yearly MRI. No patient over 65 years of age with a tumor presenting at 1.5 cm outside the porus has come to surgery. So, I think in these elderly people, conservative management of these tumors—watchful waiting and doing a subtotal removal with preservation of the facial nerve—is the way to go.

Dr. Noel Cohen (New York, NY): My question is for Dr. Pappas. Could you tell us what your criteria were for failure of watchful waiting? When did you choose to operate on these patients?

Dr. Dennis Pappas, Jr. (Nashville, TN): We chose to operate when the patient developed further neurological symptoms or when the tumor grew faster than usual (anywhere between 0.1 and 0.2 cm/year, on the average).

Mr. Andrew Morrison (London, England): Mr. President, as an overseas member I would like to say, on behalf of the others who are here, how much I have enjoyed the week. I was pleased to hear Willie Atkinson's name mentioned, and I would like to tell an anecdote about him. He was a neurological/neurosurgical registrar at my hospital in London when he did his work on the anterior inferior cerebellar artery. He was a remarkable fellow. He was called to the Bar as a barrister (but he never actually practiced as a barrister). He also wrote detective novels. When his students came on the firm for neurology/neurosurgery, they could be sure that they would be given the job of reading the proofs of most of his detective novels!

INTRODUCTION OF NEW PRESIDENT: DR. JOSEPH C. FARMER, JR., M.D.

Derald E. Brackmann, M.D.

My last official duty is to introduce your next President, who I know will do a wonderful job and who richly deserves it, Dr. Joseph C. Farmer, Jr.

REMARKS OF NEW PRESIDENT

Joseph C. Farmer, Jr., M.D.

Thank you very much, Dr. Brackmann. My first official duty, on behalf of the Council as well as the members of the Otological Society, is to present Dr. Brackmann with this special Otological Society gold pin. On behalf of the Society and Council I would also like to present this certificate to Dr. Brackmann, which reads as follows: "The American Otological Society, Incorporated, presented Derald E. Brackmann, M.D., President 1995–1996, in appreciation and recognition of his service to the Society". He is a very hard act to follow, to say the least, and with the support of the Council, blessings, and prayers, and so forth, I think we will try to leave it in as good of shape as he did.

I must announce that the call for papers next year will go out to all members and program directors; if anybody wishes to receive a call for papers, please write to Dr. Matz's office. Next year the meeting will be in the Scottsdale Princess Hotel, Scottsdale, Arizona, on May 11 and 12th, 1997. The Combined Otolaryngologic Spring Meeting will be held May 10th through the 16th, and the Council will meet on May 10th.

I would like to adjourn the meeting, wish you all well, and hope to see you next year. Thank you.

EXECUTIVE SESSIONS

BUSINESS MEETING

MINUTES—MAY 4–5, 1996

Derald E. Brackmann, M.D., President, called the meeting to order at 12:30 pm, Saturday, May 4, 1996. The minutes of the 1995 AOS Annual Meeting, held in Palm Desert, California, April 29–30, 1995, were approved.

The following new members were presented to the Society, along with their respective proposers:

Active members

Brian W. Blakley, M.D., proposed by Robert Mathog, M.D. and seconded by Jack Kartush, M.D.; Barry E. Hirsch, M.D., proposed by Eugene Myers, M.D. and seconded by Donald E. Kamerer, M.D.; Norman Wendell Todd, M.D., proposed by Dennis Pappas, M.D. and seconded by Claude Pennington, M.D.; Eiji Yanagisawa, M.D., proposed by Jack Pulec, M.D. and seconded by Gordon Hughes, M.D.

Associate members

Daniel Orchik, Ph.D., proposed by John J. Shea, Jr., M.D. and seconded by Wallace Rubin, M.D.

Corresponding members

Wolf J. Mann, M.D., proposed by Ronald Amedee, M.D. and seconded by Gordon Hughes, M.D., David A. Moffat, B.Sc., M.A., proposed by Antonio De la Cruz, M.D. and seconded by Mansfield Smith, M.D., Helge Rask-Andersen, M.D., proposed by Fred Linthicum, M.D. and seconded by John J. Shea, Jr., M.D., and Jens Thomsen, M.D., proposed by Gordon Hughes, M.D. and seconded by Jack Pulec, M.D.

A Nominating Committee, including Drs. Robert Dobie, Chairman, Thomas Balkany, Newton Coker, Antonio De la Cruz, and Bruce Gantz, was elected to prepare the slate of nominees for AOS officers for 1996–1997.

REPORT OF THE SECRETARY-TREASURER

REPORT OF THE SECRETARY

Report of the present membership:

(NOTE: This count includes the nine new members inducted earlier on this date May 4, 1996.)

Active Members	130
Senior Members	72
Associate Members	40
Corresponding Members	7
Honorary Members	8
Emeritus Members	4
Total Members	261

The Society members were reminded that the Society does not have a bylaw restriction as to the number of members. Each member was encouraged to seek out otologists who might qualify for future membership. The requirements for membership are that the person has to be at least half-time or greater in otology, has demonstrated an ability to publish, and is either a member of the Triologic Society or have one paper of Triologic thesis caliber.

Members deceased since last Annual Meeting: J. Brown Farrior, M.D., Clair M. Kos, M.D., Nicholas Torok, M.D.

Candidates for Senior Membership of the Society were announced. A candidate must have reached the age of 70 or have been a member of the Society for 20 years. A voice vote for Senior Membership on each of the following candidates was taken and approved: Francis Catlin, M.D., Patrick Doyle, M.D., H. Edward Maddox, III, M.D., Robert J. Ruben, M.D., William H. Saunders, M.D., and Roger E. Wehrs, M.D.

REPORT OF THE TREASURER

Income Statement—American Otological Society, April 1, 1995 to March 31, 1996

Beginning Balance (April 1, 1996) $81,544.39

INCOME:

COSM Receipts	$26,171.30
MEMBERSHIP Dues and Initiation Fees	56,767.00
RESEARCH FOUNDATION (Transfer Taxes, Accounting Fees, Insurance, Legal Fees)	13,805.25
INCOME—*The American Journal of Otology*	8,500.00
INCOME—*Transactions*	3,115.00
MEMBER'S REIMBURSEMENT TO AOS	658.14
INTEREST (Money Market Account)	2,828.34
TOTAL INCOME (April 1, 1995–March 31, 1996)	111,845.03
TOTAL	$193,389.42

EXPENSES:

ACCME	$ 525.00	
ACCOUNTING FEES	8,024.00	
LEGAL FEES	3,493.30	
DECKER PUBLISHERS		
1994 *Transactions*	11,109.00	
DONATIONS/DUES		
Academy Museum	$2,000.00	
Deafness Research	1,000.00	
Acoustical Soc. (95)	1,000.00	
Acoustical Soc. (96)	1,200.00	5,200.00
ANNUAL MEETING	28,563.92	
FALL MEETING	202.44	
MIDWINTER COUNCIL MEETING	11,231.00	
INSURANCE	4,151.00	
POSTAGE, PRINTING, SUPPLIES	4,568.53	
SOCIETY STAFF EXPENSES		
Annual Secretarial Stipend	3,000.00	
Editor/Librarian Office	3,398.72	6,938.72
INTERNAL REVENUE SERVICE	6,317.31	
COSM MEETING, Spring 1996	360.00	
NEW YORK STATE INCORP FILING FEE	250.00	
MISCELLANEOUS		
Bank Debit	405.65	
Die Cut Award of Merit Medal	2,500.00	
Safety Deposit box	27.50	2,933.15
TOTAL EXPENSES (April 1, 1995–March 31, 1996)		93,867.37
BALANCE IN AOS TREASURY—MARCH 31, 1996		$99,522.05

Dr. Julianna Gulya presented the report of the Editor-Librarian. Dr. Gulya noted that a smooth transition of the office of Editor-Librarian from Dr. Joseph Farmer to herself had taken place, due in no small part to the excellent organizational work done by both Dr. Farmer and his secretary, Ms. Bettye Fitch.

She noted that there is a transition of publishers from Decker to Lippincott-Raven, and a savings in cost is anticipated. The 1994 *Transactions* (Vol. 82) were mailed out in February. Only Active Members receive this with their dues payment. Senior, Associate, and Corresponding members must pay the cost of *Transactions* which has been reduced to $65, including postage and handling for the 1994 volume.

It was noted that the committee which was appointed last year, chaired by Dr. Michael E. Glasscock, III, gave careful deliberation to the issue of continuing the publication of the *Transactions*. The committee's decision was to recommend that the format of the *Transactions* be altered to incorporate only the abstracts of the presentations, as well as the panel discussions and discussions of papers. These latter items were not published in the 1994 *Transactions* due to technical problems, but will be included in the 1995 *Transactions*. It is hoped that this issue will be ready for distribution by the late fall of 1996.

Dr. Gulya noted that the microfilming of those issues of the *Transactions* in danger of deterioration has been completed. Continuing cooperation with Mr. Philip Seitz, AAO-HNS headquarters, assures that the microfilming is done as conditions warrant.

Current review of bids for indexing the *Transactions* is taking place. In addition, the Editor-Librarian's Office is still in need of copies of Volume 2 (1875–1879), Volume 15 (1919), and Volume 16 (1924), which are missing from the full collection. Please notify Dr. Gulya if you can locate any of these particular issues.

Members were reminded to pick up their numbers for the annual photograph which will be taken immediately following the afternoon session.

Dr. Brackmann thanked the members of the 1996 Advisory Committee: Drs. Ronald Amedee, Karen Berliner, Newton Coker, John R.E. Dickins, Stephen Harner, Timothy Jung, Jack Kartush, Arvind Kumar, Charles Luetje, John McElveen, Jr., and William Meyerhoff.

The Business Meeting was adjourned and the first Scientific Session started at 1:00 p.m. with remarks presented by President Derald E. Brackmann. Dr. James Sheehy, the 1996 Guest of Honor, followed with his remarks. Finally Dr. Joseph C. Farmer, was presented the 1996 Presidential Citation.

The Scientific Session was adjourned at 5:00 p.m. with all members staying for the group photograph.

The second Business Meeting was held on Sunday, May 5, 1996. Reports were received as follows:

- Report of the Board of Trustees of the Research Fund of the American Otological Society, given by Dr. Richard Miyamoto.
- Report of the American Board of Otolaryngology, given by Dr. Warren Adkins.
- Report of the American Academy of Otolaryngology, given by Dr. Harold Pillsbury.
- Report of the Award of Merit Committee: Dr. Robert Kohut, Chairman, reported that Drs. Robert Dobie, Harold Tabb, Robert Jahrsdoerfer, and Derald Brackmann had served with him on the selection of the recipient. He noted that the person would be presented at the Sunday evening banquet.
- Report of the Audit Committee, given by Dr. Roger Boles, Chairman.
- Report of the Nominating Committee: The Nominating Committee, Chaired by Dr. Robert Dobie, presented the slate of officers of the AOS for the 1996–1997 year. They are as follows: Drs. Joseph C. Farmer, President, Charles Luetje, President-Elect; Gregory J. Matz, Secretary-Treasurer, Julianna Gulya, Editor-Librarian; and Council Members, Drs. Robert Jahrsdoerfer, Derald E. Brackmann, C. Gary Jackson, and Horst Konrad. There were no nominations from the floor. The nominated slate was accepted by the membership.

In addition, nominations were presented for the Award of Merit Committee: Dr. Richard Gacek and Dr. Mansfield Smith.

The Business Meeting was adjourned and the second session of the Scientific Program began. Following the Scientific Program, Dr. Brackmann turned over the gavel to the incoming President, Joseph C. Farmer, Jr., M.D. Dr. Farmer congratulated Dr. Brackmann on the excellent program he had organized and presented him with a certificate for his presidential year. The meeting was adjourned at 12:30 p.m.

Respectfully submitted,
Gregory J. Matz, M.D.

REPORT OF THE EDITOR-LIBRARIAN

There has been a smooth transition of the office of Editor-Librarian from Dr. Joseph C. Farmer to myself, due in no small part to the excellent organizational work that both he and his secretary Ms. Bettye Fitch did. They have been very helpful in answering any questions, and I would like to acknowledge both of them for a job well done!

We are in the midst of another transition, namely that of the publisher of the *Transactions* of the American Otological Society, from Decker to Lippincott-Raven. As you know, the *American Journal of Otology* is now published by Lippincott-Raven, and we anticipate a savings in cost of the *Transactions* by the efficiency of using the same publisher.

The 1994 *Transactions* (Volume 82) were mailed out this past February; please let me know if there have been any problems in receiving this volume. According to Society bylaws, Senior, Emeritus and Associate members must

pay the cost of the *Transactions*, which for the 1994 volume has been reduced to $65, including postage and handling.

Last year, then AOS President Dr. Robert Jahrsdoerfer and the Council appointed a committee to study the issue of publication of the *Transactions*. That committee, chaired by Dr. Michael E. Glasscock, III, after considerable deliberation, recommended that the format of the *Transactions* be altered to incorporate only the abstracts of the presentations, as well as the Panel Discussions and discussion of papers. These latter items were not published in the 1994 *Transactions* due to technical problems, but will be included in the 1995 *Transactions*.

We expect to have all the materials for the 1995 *Transactions* (Volume 83) to the publisher by the end of summer of 1996, with distribution hopefully sometime in the late fall of 1996.

Microfilming of those issues of the *Transactions* in danger of deterioration has been completed. We will continue to work with Mr. Philip Seitz, the American Academy of Otolaryngology—Head and Neck Surgery Historian, to make sure that continued microfilming is done as condition warrants.

The AOS contributed $2,000 last year for shelving for the Academy archives, which have since been installed, increasing the storage capacity of the Academy.

It has been suggested that the *Transactions* be indexed, so as to make their contents more readily accessible to researchers, and others interested in reviewing the proceedings of the AOS. We are currently reviewing bids for the project for Council approval.

In terms of missing *Transactions*, we are still looking for any copies of Volume 2 (1875–1879), Volume 15 (1919), and Volume 16 (1924).

Now I will voice the usual exhortation for the annual photograph. At the end of this meeting I urge all members to proceed promptly to Judy Matz's desk, and pick up a number that will be used for identification purposes. I think that Dr. Farmer has quite abundantly illustrated some of the problems that can arise without the numbers, so I will not belabor that. Just please, take a number and make sure that your name is recorded along with the number before you leave Judy's desk. The procedure will be as before; first we will take a photograph with everyone holding their number card so that it can be seen by the camera, and so that it is not obscured by the person standing in front. We will then take another photograph without the cards, but with everyone, hopefully, in the same position. Thank you for your cooperation!

Respectfully submitted,
A. Julianna Gulya, M.D., F.A.C.S.

REPORT OF THE BOARD OF TRUSTEES OF THE RESEARCH FUND

The Trustees of the American Otological Society Research Fund, chaired by George Gates, M.D. met in San Francisco on March 23, 1996. At that time the market value of the Fund was $6,551,000. The current asset allocation is 65% in stocks and 35% in fixed income investments. The Trustees elected to continue with Mr. Arthur Schweithelm who has managed the funds since 1980. He announced that he is now with the newly formed Chase Bank due to a merger of the Chemical Bank and Chase Manhattan. I do not think this will change our relationship at all with Mr. Schweithelm. At the time of our review 18 grant applications were evaluated and there were 15 research grants and 3 fellowships in this mix. Also, $15,000 was given to the Friends of the NIDCD to continue to support the work for our institute at the National Institutes of Health. At the time of the meeting, Dr. Joseph C. Farmer, Jr., was installed as the new Chairman. Douglas Mattox, M.D. was elected as new Trustee and Joseph B. Nadol, Jr., M.D. will be alternate Trustee.

Respectfully submitted,
Richard T. Miyamoto, M.D., F.A.C.S.

REPORT OF THE AMERICAN BOARD OF OTOLARYNGOLOGY

The American Board of Otolaryngology is pleased to report on the examination statistics; four examination cycles have now been completed using the new format. Candidates must first pass a written exam and then pass an oral examination in order to become certified. The written and oral examination scores are not combined. Three hundred fifty-two candidates took the written examination in September, 1995. Of those candidates, 14% failed while the remaining 86% became candidates for the oral examination. The oral examination was conducted by eighty-eight guest and associate examiners and 25 ABO directors for three hundred thirty-six candidates in March, 1996 at the Palmer House in Chicago. Two hundred ninety-six candidates passed the exam and were certified for an overall pass rate of 88%. The combined pass rate for the 1995–1996 cycle was 76.7%. At the March Business Meeting Dr. Eugene Myers was elected President and Dr. Charles Krause as President-Elect; Dr. Robert Cantrell was re-elected to a third term as Executive Vice President, and Dr. Richard Holt was elected to the Board of Directors, replacing Dr. Gene Tardy who was elevated to Senior Councilor status after many years of dedicated service to the ABO. Dr. Holt, Clinical Professor of Otolaryngology—Head and Neck Surgery at the University of Texas in San Antonio, has been a guest examiner of the ABO on numerous occasions and was serving as an Associate Examiner at the time of his election. The position of Associate Examiner was initiated three years

ago; to be elected an Associate Examiner an individual must have served as an ABO examiner at least twice, he or she must be prominent in the specialty in the areas of patient care and medical education, and must demonstrate an interest and an ability in the creation of education and test materials. The ABO is committed to elect and train new examiners and to maintaining consistency in the administration of the examination.

Respectfully submitted,
Warren Y. Adkins, Jr., M.D., F.A.C.S.

REPORT OF THE BOARD OF GOVERNORS OF THE AMERICAN ACADEMY OF OTOLARYNGOLOGY—HEAD AND NECK SURGERY

This fall's meeting of the Board of Governors of the Academy was chaired by Dr. Ira Papel, who began the meeting by commenting on the success of the Academy's Voluntary Assessment Program to support practice activities of the Academy's membership. The Academy has conducted an extensive effort in the area of improving the CPT coding system to the advantage of otolaryngologists and is launching an otolaryngology marketing campaign designed to emphasize the importance of ready access to specialists during the changing times of managed care. While we all acknowledge the difficulty of assessing the effect of these programs, it is generally felt by the membership that they are steps in the right direction.

The next order of business was the presentation of an award to Dr. Charles Stiernberg for excellence in his role in the Academy as Director of the Program for the Annual Meeting. The Board of Governors presented him with an award acknowledging his significant efforts. Drs. Myers and Maves then reported on the Long Range Planning Committee of the Academy which in essence divided the activities of the Academy into two areas; those of a trade organization and those of an educational foundation. There was considerable discussion on the establishment of a Political Action Committee for the express purpose of raising funds to support various candidates for political office. I suspect we will be hearing more about these efforts in the future.

Dr. Maves also pointed out that there is a new pamphlet available concerning capitation agreements, clinical indicators and referral guidelines. He anticipates this booklet will be of great assistance to Academy members in dealing with managed care in the future. Drs. Charles Koopman (Socioeconomic), Lee Eisenberg (Practice Affairs), and Nancy Snyderman (Government Relations) gave the report of the Socioeconomic Coordinators. They focused on a major study of the cost of practice as it relates to various formulas for reimbursement and reported that Blue Cross/Blue Shield is beginning to adopt Medicare RBRVS schedules for reimbursing care provided to the patients they insure. There have been many instances in which they provide no compensation for postop care under any circumstances. For example, it was noted that a pediatric T&A in New York City is now reimbursed at $300, which is the adult Medicare rate for tonsillectomy.

A survey of the Board of Governors was taken to assess "what are the major problems our specialty faces at the present time?" The responses were (1) the impact of managed care, (2) manpower issues, and (3) certificates of added qualification. There was a strong consensus in the Board of Governors that these concerns were appropriate and that the sentiment was expressed that we are training too many otolaryngologists in general and specifically training far too many subspecialists in otolaryngology.

Respectfully submitted,
Harold C. Pillsbury, M.D., F.A.C.S.

REPORT OF THE AMERICAN ACADEMY OF OTOLARYNGOLOGY—HEAD AND NECK SURGERY, INC. (AND FOUNDATION) AND COMBINED OTOLARYNGOLOGICAL SOCIETIES MEETING

The Academy's Web Site will be up and operating as of June 20, 1996. If you go by the Academy exhibit booth at the COSM area you will see that we are handing out cards with the Web Site address. It will include the Research Directory, and a number of redesigned pamphlets.

ENT Outreach is a marketing program which is designed to let the primary care physicians, managed care companies, and your patients know what you do. I think all of us understand that many of our patients have a difficult time pronouncing our name, and unfortunately many of the primary care physicians have no idea what we do. As we become more and more dependent upon primary care physicians, gate keepers, and managed care companies, it is increasingly important to describe the role of otolaryngology. I ask you to contact Jamie Lucas at our state/regional society office at One Prince Street, in Alexandria, Virginia 22314, and we will be happy to send her out to put this program on for you.

Lastly, on the Academy side, I do want to let you know that we have formed an international team designed to improve our relationships with our international colleagues and to help recruit more international members as corresponding members of the Academy. At last year's Annual Meeting we had well over one thousand international colleagues present who accounted for a substantial part of the course registration and instruction course fees.

It is a very important part of otolaryngology worldwide and I would like to see the Academy of Otolaryngology—Head and Neck Surgery represented well on a worldwide basis.

With respect to the Foundation, the 501(c)3 portion of the organization, this year is our centennial year. One hundred years ago Dr. Foster called a meeting of ENT physicians in Kansas City, Missouri. We are the direct descendants of that organization which will celebrate its Centennial from September 29 to October 2nd, 1996 in Washington, D.C. We have a number of very special programs planned at that time both with NASA and the Air and Space Museum. We hope to have a real winner program that you will remember for many years to come.

Dr. Edwin Monsell from Henry Ford Hospital in Detroit, Michigan is our first Coordinator for Research. This position was approved last year by our Board of Directors; Dr. Monsell has a Ph.D., and is an individual with tremendous organizational abilities. His charge is to put together an outcomes network for otolaryngology. I look to him to put together a program that is useful and will help obtain important information on what happens with our patients and how we affect their lives. These quality of life issues and the true value of otolaryngologic procedures need to be captured so we can articulate to third party payors and the Government the importance of continuing to serve our patients as we have for the last one hundred years.

Next summer there will be a special meeting, a joint US-UK meeting, in follow-up to a meeting which occurred four years ago in Great Britain. We also will have a Second Joint Plastic Surgery Symposium, which is a cooperative venture between the American Academy of Otolaryngology—Head and Neck Surgery and the American Academy of Facial, Plastic, and Reconstructive Surgery, the Plastic Surgery Educational Foundation, and the Plastic Surgeons' Aesthetic Society, with all four organizations being represented as full and equal partners. This Symposium will be held July 23–27, 1997 in Boston, Massachusetts.

The September issue of the *Journal of the American Academy of Otolaryngology—Head and Neck Surgery* will publish a series of articles called the "Ethical Otolaryngologist", an outgrowth of a book that was produced by an ophthalmologist two years ago called, obviously, the "Ethical Ophthalmologist". These articles are very real, work-a-day articles that deal with the every day dilemmas we face in today's medical market place and in our practices with patients. As we are being pressured to move from a profession into a business paradigm, I think our members face ethical dilemmas that none of us could have anticipated. Dr. Neil Ward has championed this project during his presidential year and I think it will be a seminal collection of papers that you can use for educating residents, you can review yourself, and give us a real sign post for the future to hold close to us those ethical principles which we all took when we received the Hippocratic Oath and our medical degree.

Respectfully submitted,
Michael D. Maves, M.D., M.B.A.

REPORT OF THE AMERICAN COLLEGE OF SURGEONS

As of December 31st, 1994, there are 3863 otolaryngologists who are active members in the American College of Surgeons. Otolaryngology represents 8% of the active members and the fourth largest total after general surgery, urology, and orthopaedics.

The College has appointed a special task force which will collect data to measure outcomes in a clinical setting and provide information and education relative to outcomes.

The College continues to sponsor seminars on how surgeons can cope with the increasing problem of managed care. In addition, seminars have been initiated for residents getting started in a surgical practice.

In the area of professional liability, the second edition of *Professional Liability Risk Management*, a manual for surgeons, is in the process of revision. The College joins with the American Medical Association, 49 state medical and 60 national medical and surgical specialty societies supporting legislation establishing a $250,000 cap on non-economic damages. The American College of Surgeons continues to support the American Tort Reform Association and National Medical Liability Reform Coalition.

With regard to the single payor issue, which is before Congress, the American College of Surgeons consistently supports the principles of protection of the patient's right to choose physician or surgeon, increasing patient access, protection of physician/surgeon autonomy, reimbursement for services provided, and controlled health care costs.

The College has been active in testifying before the House Ways and Means Committee (Health Subcommittee) on graduate medical education and in support of Medicare Volume Performance Standards and expenditure targets.

Of particular interest to surgeons is the proposal to establish a single Medicare Volume Performance Standard and fee schedule conversion factor for all physician services. This past November, the College organized 18 surgical specialty societies in sending a coalition letter to the Senate and House budget conferees expressing the need for a multi-year phase-in to a single conversion factor.

The College is increasingly concerned about the increasing prevalence of hepatitis C and its transmissibility in the health care environment since there is currently no vaccine against it.

The College now has in place a World Wide Web service and home page which eventually will include such information as demographic directories, various data-

bases, meeting and event calendars, abstract submission dates and cancer and trauma registry data information.

Over the past seven years, the College has raised more than 9 million dollars from individuals, estates, corporations and foundations. The College is in the process of locating a new building for its headquarters in Chicago, which will house its entire administrative staff. Finally, the dues will remain the same for 1996.

Respectfully submitted,
Gregory J. Matz, M.D.

REPORT OF THE AUDIT COMMITTEE

The members of the Audit Committee individually reviewed the financial records of the Society and subsequently discussed their reviews by phone. We found the records submitted to us by the Treasurer, Dr. Matz, to be clear and in good order. We were pleased to find the financial status of the Society to be very solid.

The Audit Committee wishes to thank Dr. Matz for providing to it the detailed records of income and expenses documented by specific-itemized checks written during the year. We also want to thank Dr. Matz and his staff for all the good work they have done in managing the financial affairs of the Society over the past year.

Respectfully submitted,
Roger Boles, M.D., Chairman
Sam Kinney, M.D.
Richard Wiet, M.D.

REPORT OF THE NOMINATING COMMITTEE

The Committee consisted of Dr. Robert Dobie, Chairman, along with Drs. Thomas Balkany, Newton Coker, Tony De la Cruz, and Bruce Gantz. We present for your consideration the following slate of officers for the 1996–1997 year: Drs. Joseph C. Farmer, Jr., President; Charles Luetje, II, President-Elect; Gregory J. Matz, Secretary-Treasurer; A. Julianna Gulya, Editor-Librarian; and Council Members, Drs. Robert Jahrsdoerfer, Derald E. Brackmann, C. Gary Jackson, and Horst Konrad. Our nominations for membership on the Award of Merit Committee for 1997 are Drs. Richard Gacek and Mansfield Smith.

Respectfully submitted,
Robert A. Dobie, M.D.

The following obituary appeared in the *Ear, Nose and Throat Journal* in September 1995, and is reprinted with permission of the editor, Dr. Jack Pulec. The photograph is kindly provided by Mrs. Dorothy Whittemore, Dr. Farrior's Office Manager and Secretary for over a score of years.

Dr. Farrior was elected to Active Membership in 1957 and to Senior Membership in 1988.

A. Julianna Gulya, M.D., Editor

The death of Brown Farrior on May 8, 1995 was a loss to the specialty of otology. His career spanned more than 58 years from the days of lethal mastoiditis through fenestration stapedectomy to modern tympanoplasty and ossicular chain reconstruction. Through his courses, lectures and exhibits, he has inspired many of today's leading otologists.

Brown Farrior was a second-generation Floridian and the son of the second otolaryngologist in Florida. He moved to Tampa as an infant in 1912 with his family. He received his training in otolaryngology at the University of Michigan and completed his training in 1939. During residency, after treating a physician who died of petrositis, he dissected numerous temporal bones and explored a transmastoid route to the petrous apex, now known as the infralabyrinthine approach. Following residency he trained with Julius Lempert in fenestration surgery. During that time he met his lifelong friend George Shambaugh and began using the Zeiss operating microscope in preference to the surgical loops for fenestration surgery. Since 1947, when he purchased his first surgical microscope, he was an advocate for microaccurate ear surgery.

His first exhibit at the American Academy of Ophthalmology and Otolaryngology in 1947, on the tomographic anatomy of the temporal bone, became one of the classic Academy teaching atlases. From 1947 to 1987 he regularly taught courses at the Academy and presented numerous exhibits. One of his greatest personal accomplishments was winning the Billings Gold Medal, AMA first prize, twice: for exhibits on 3-D anatomy of stapes surgery in 1959 and tympanoplasty and mastoidectomy in 1969. I do not believe any other individual or private practice has accomplished this feat. During his life he published over 100 papers including Academy atlases on 3-D stapes surgery in 1964, tympanoplasty and mastoidectomy in 3-D, volumes 1, 2 and 3 in 1969, which were revised in 1987.

His greatest personal honors have been to present the Wherry Memorial Lecture in 1976 at the American Academy of Otolaryngology, to be President of the American Otological Society in 1982 and to receive its award of merit in 1983.

Joseph Brown Farrior
1911–1995

Outside otology, which was his first love, Brown Farrior was an avid outdoorsman, enjoying fishing, hunting and golf. He also enjoyed an orange grove near Tampa, his personal retreat since 1954 and the place he spent the day prior to his death.

Until the time of his death he remained active and continued to work on lectures and courses. Brown Farrior, who has taught many of us the principles of complex ear surgery in a single operation, will be missed by his friends, colleagues, students and family.

The following obituary appeared in the *Bulletin of the American Academy of Otolaryngology-Head and Neck Surgery* in March 1996, and is reprinted with the permission of the author, Dr. Howard P. House and the editor, Dr. Jerome C. Goldstein. The photograph is obtained from the Archives of the American Academy of Otolaryngology-Head and Neck Surgery through the courtesy of Mr. Philip Seitz, the Historian of the American Academy of Otolaryngology–Head and Neck Surgery.

Dr. Kos was elected to Active Membership in 1954 and to Senior Membership in 1981.

A. Julianna Gulya, M.D., Editor

It is with great sadness that I write this tribute to a great man who suddenly passed away on January 22, 1996 in a retirement home in Arlington, TX. C. Michael Kos, MD lived a very productive and rewarding life in every way and has left our world for better for having been a part of it. Mike's greatest achievement was in 1936 when he married a very lovely and special lady, Dorothy McGinley, and later had three children, Suzanne, Kathleen, and Michael.

Mike was born in 1911 in Washington, IA. He received both BS and MD degrees from the University of Nebraska in 1933 and 1937, respectively. He completed his residency at the Massachusetts Eye and Ear Infirmary in 1941. His Chief was Dr. Harris P. Mosher, who befriended Mike and Dotty when he realized their financial need and did so many things to help make those years as a resident much more enjoyable. Dr. Mosher recognized Mike's unusual abilities and encouraged him to have an academic career.

On completion of his residency he entered the military as a flight surgeon and moved rapidly from a captain to a lieutenant colonel. During the war, he served for two years at Randolph Field in TX as director of otolaryngology, and then moved on to Washington, DC, serving as a consultant in otology to the surgeon general until 1946.

Following his military career, he spent one year at Duke University followed by a year with Dr. Julius Lempert in 1947 in fenestration surgery. At this time, he was recruited by Dr. Dean Lierle to head their department of otology at the University of Iowa.

After a number of years, he opened his own office in Iowa City and, subsequently, was elected to succeed Bill Benedict, MD as the executive secretary/treasurer of the American Academy of Ophthalmology and Otolaryngology from 1969 until 1980 when the Academy divided into two separate Academies of Ophthalmology and Otolaryngology. These were very difficult years for Mike, as he commuted between his Iowa City office and the office of the Academy in Rochester, MN.

Clair M. Kos
1911–1996

Mike's curriculum vitae reads like a telephone book. He published many papers and lectured throughout this country and abroad, mostly about his favorite subject—the field of otosclerosis. He pioneered a technique of performing a stapedectomy on unsuccessful fenestration cases, using a wire prosthesis from the malleus. His annual instruction courses at the Academy from 1945 to 1977 were invariably sold out well in advance.

Mike was a member of all our national societies and president of the prestigious American Otological Society that also bestowed on him its highest honor, the Award of Merit. He was very active and held offices in all our national societies, and his

honors and activities in many organizations are far too numerous to mention in this tribute.

Mike was a handyman par excellence. He loved to tinker with electronic devices of all types. With his knowledge of mechanics, he could fix engines and repair any or all household problems. One of his hobbies that brought him great pleasure was his fascination with boats. It started with a small boat, and he soon graduated to a large, beautiful 50-foot houseboat for cruising the Mississippi River with his numerous friends. He would use the houseboat as his summer home at Lake City, MN, where he could be closer to the Academy headquarters offices.

In December, 1986, Mike lost his beloved wife upon whom he was so very dependent. She played a vital role throughout his life. In his later years, we enjoyed reminiscing about the past, during which time he had contributed so much to humanity.

Mike has left the world a better world by being a part of it. His family and his multitude of friends will miss him greatly, but no one can take from us our fond and dear memories. How fortunate we were to have been his friends.

The following obituary appeared in the *Ear, Nose and Throat Journal* in July 1996, and is reprinted with permission of the author, Dr. Arvind Kumar, and the editor, Dr. Jack Pulec.

Dr. Torok was elected to Active Membership in 1974 and to Senior Membership in 1984.

A. Julianna Gulya, M.D., Editor

Nicholas Torok was born in Budapest, Hungary on June 13, 1909. His life thus spanned the two world wars and the intervening years in his native Hungary were politically and socially tumultuous. Despite many of these difficulties, Dr. Torok graduated from medical school in 1934 at the University of Budapest and completed his residency in otolaryngology in 1940.

The year 1945 was a momentous one. Nazism had finally come to an end, but the conditions in Hungary continued to be abysmal and as Budapest lay in ruins, Hitler's tyranny was replaced by the equally odious tyranny of the Soviets. Scientific inquiry lay at a standstill. Creativity, which is the key to progress in sciences, rarely blossoms in such an environment.[1] But the human spirit is indomitable, and even in these dismal circumstances, Dr. Torok maintained an optimistic outlook and began to rebuild his interrupted career. At that time he was already an Assistant Professor in the Department of Otolaryngology at the University of Budapest. Even at this early stage of his career, Dr. Torok developed an interest in the complexities of the inner ear. In collaboration with an enthusiastic and young head of the Department of Neurology, he started evaluating patients with complaints of dizziness. The technology available to Dr. Torok for the clinical evaluation of the vestibular system was limited to a stop watch, syringe and Bartel's glasses. Despite these limitations, he persevered in making meaningful clinical observations. At that time, vestibular function was being evaluated by the duration of the post-caloric nystagmus.[2] This was not surprising since no reliable techniques of recording nystagmus were yet available and, by clinical observation, the only features of thermally induced nystagmus that could be quantified were the duration and the total number of beats in a nystagmic reaction. Both those measures were subject to wide observer error. Dr. Torok was hopeful, however, that an instrument would soon be developed which could record the post-caloric nystagmus and thus quantify vestibular sensitivity, much like an audiometer had begun to measure auditory function. In the course of his clinical evaluations, Dr. Torok noted that the frequency of the nystagmus increased progressively, reached a peak, and then gradually declined. He felt that graphing the response would allow him to determine the peak frequency which, in his opinion, was the true measure of vestibular sensitivity. To this end, he counted the number of beats in alternative five-second intervals immediately after delivery of a caloric stimulus. Analysis of the number of beats counted showed that the frequency of the nystagmus per five-second interval did indeed progressively rise, reach a peak, and then decline. The peak frequency, in his opinion, represented vestibular function in numerical terms and he called it the culmination frequency. The concept of slow phase velocity was yet to develop. He reported these observations in 1948 in the *Acta Otolaryngologica* (Stockholm).[3] Today, this idea is an accepted fact and regarded as a commonplace, self-evident truth. However, in the late forties it was a radical departure from established dogma.

Nicholas Torok
1909–1996

In 1947, Dr. Torok and his lovely wife Elizabeth Esther, immigrated to the U.S. Dr. Torok was invited to join the Department of Otolaryngology at the University of Illinois in Chicago as a faculty member. Mrs. Torok, a biochemist, joined the faculty of Northwestern University.

In his 1948 paper in the *Acta*, Dr. Torok mentioned the fact that while it was possible to assess auditory function with an audiometer, there was no corresponding apparatus to record nystagmus. His creative mind focused on this problem and shortly after arriving in Chicago, he observed that before crossing the threshold of an elegant store, the doors opened automatically before him! With a little investigation, the mechanism became clear. He immediately consulted a physicist, Dr. Barnothy, who also worked at the University of Illinois and was a fellow countryman. Dr. Barnothy explained the principle involved, and Dr. Torok quickly saw a clinical application. He in turn explained to Dr. Barnothy the differential reflective properties of the iris and sclera and asked him to build an apparatus which would accurately record spontaneous and induced eye movements. Dr. Barnothy enthusiastically complied: the first model of the photo-electric nystagmograph (PENG) was born and the first scientific paper describing a method of *clinically* recording eye movements was published in the *Annals of Otology, Rhinology and Laryngology* in 1951.[4] In short order, an improved model was developed and the records from this one were noise-free and the linearity of the system well-documented. Yet, as often happens in science, the noisier, less accurate electronystagmographic (ENG) system found so much favor that vestibular evaluations began to be called "ENGs."

Soon after joining the Department of Otolaryngology, Dr. Torok was allowed the use of a room for vestibular evaluations and research and he had a rotating chair built and installed. With increasing clinical experience with this technique he found that the rotating chair provided no meaningful diagnostic information. He therefore continued to focus his attention on the caloric test. The bithermal test was not intellectually appealing, and consequently he persevered with the Veits technique[5] he brought with him from Europe. This consisted of irrigating each ear with 10ml of water at 20°C. However, he was not completely happy when in many instances the records from such a weak stimulation were poorly detectable or markedly reduced. To evaluate the vestibular function more reliably, he decided to apply an additional stimulus of 100ml at the same temperature. This of course implied developing norms and these were established and the results published.[6] A new technique of caloric testing was thus developed and began to be used in clinical evaluations. Very soon Dr. Torok noticed that in some patients the 100ml stimulus response was equal to or less than the 10ml response. This seemed paradoxical and had it not been for his intellectual curiosity and honesty, such a response would have been dismissed as a technical error. But whenever this paradoxical phoenomenon was observed, Dr. Torok rested the patient and confirmed the previous findings. Being an avid reader, he came across a book on sensory inhibition written by a fellow countryman, George von Bekesy.[7] Bekesy addressed the issue of reduced auditory perception with simultaneous increases of intensity of auditory stimulation. Based on this information, the validity of the phenomenon Dr. Torok was observing began to take shape in his mind. He established norms for the ratios between the strong and weak stimuli culmination frequencies and completed a retrospective review of the charts of all those patients in whom this paradoxical response was observed. This revealed that a significant number of these patients suffered from neurologic disorders of the posterior cranial fossa. Thus was born the term *vestibular decruitment* and he first reported these findings before the American Otological Society in 1970.[8] Further observations were reported in 1973[9] and 1976.[10] Meanwhile, the gold standard of neuro-imaging has been constantly improving and so has the sensitivity of *vestibular decruitment*.

Dr. Torok's investigations have also included experimental and clinical studies of benign paroxysmal postural vertigo[11] and Ménière's disease.[12] His landmark article[12] on the treatment of Ménière's disease deserves to be read by all residents as it puts the most fashionable nostrums of the past and present into perspective. This paper is still timely, although it is now 19 years since its publication.

Dr. Torok's love of neurotology manifested within The Electronystagmography Study Club which evolved eventually into the American Neurotology Society (ANS).[13] He served as a president of the society. Dr. Torok's support of the Society, even during his retirement, was continued. In 1990, he donated an award open to all ANS members as well as non-members for the best paper in vestibular research. This carries a yearly cash award of $3,000 in perpetuity.

Dr. Torok's interests extended far beyond neurotology and medicine. As mentioned before, he was an avid reader. He loved history, not as a catalogue of dates and rules, but as an exploration of the development of culture, art, philosophy and civilization. This interest spilled over into a love of travel,

and the study of architecture, photography and classical music.

The University of Illinois was indeed fortunate to have had a man with such a creative mind as a member of the faculty, and I am personally proud to call him my teacher and dear friend. Dr. Torok breathed his last on Tuesday, April 30th, after a short illness. He is survived by his wife of 57 years, Elizabeth Esther.

REFERENCES

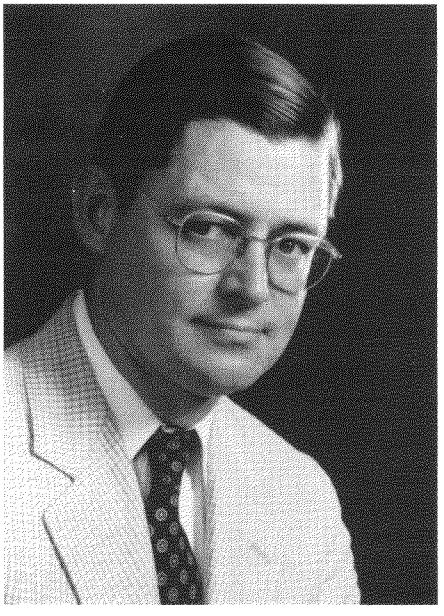
1. Pulec JL. Creativity: The key to progress (Editorial). Am J Otol 1992; 13:391–2.
2. Fitzgerald G, Hallpike CE. Studies in human vestibular function. I. Observations on the directional preponderance ("Nystagmusbereitschaft") of caloric nystagmus resulting from central lesions. Brain 1942; 65:115–37.
3. Torok N. Significance of the frequency of caloric nystagmus. Acta Otolaryngol (Stockh) 1948; 36:38–50.
4. Torok N, Guillemin V, Barnothy JM. Photoelectric nystagmography. Ann Otol Rhinol Laryngol 1951; 60:917–26.
5. Veits C. Zur anatomischen charakteristik der absoluten kalorischen indifferenzlage. Archiv Ohrenheilk 1928; 118: 301–10.
6. Torok N. Differential caloric stimulations in vestibular diagnosis. Arch Otolaryngol 1969; 90:52–7.
7. von Bekesy G. Sensory Inhibition. Princeton, Princeton University Press, 1967.
8. Torok N. New parameter of vestibular sensitivity. Ann Otol Rhinol Laryngol 1970; 79:808–17.
9. Torok N. Vestibular decruitment. Ann Otol Rhinol Laryngol 1973; 82:868.
10. Torok N. Vestibular decruitment in central nervous system disease. Ann Otol Rhinol Laryngol 1976; 85:131–5.
11. Torok N, Kumar A. An experimental evidence of etiology in postural vertigo. ORL 1978; 40:32–42.
12. Torok N. Old and new in Ménière's disease. Laryngoscope 1977; 87:1870–7.
13. Marcus R. History of the Neurotology Society (1965–1990). Otolaryng HNS 1991; 104:1–4.

NEW MEMBERS 1996

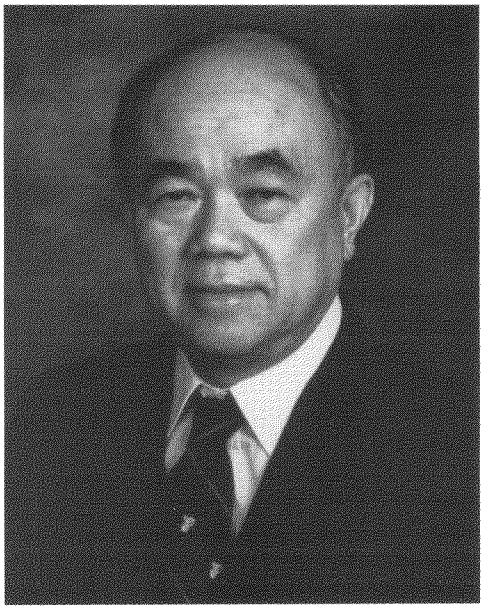
Active Members

Brian W. Blakley, M.D.
Wayne State University
Suite 5E-UHC
540 E. Canfield Avenue
Detroit, MI 48201
(with wife Joan)

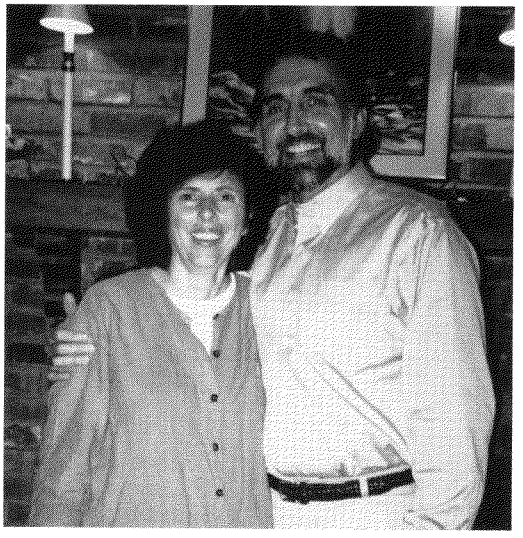
Barry E. Hirsch, M.D.
Eye and Ear Institute Building
200 Lothrop Street, Suite 500
Pittsburgh, PA 15213
(with wife Jean)



Norman Wendell Todd, Jr., M.D.
1052 Castle Falls Drive
Atlanta, GA 30329



Eiji Yanagisawa, M.D.
98 York Street
New Haven, CT 06511

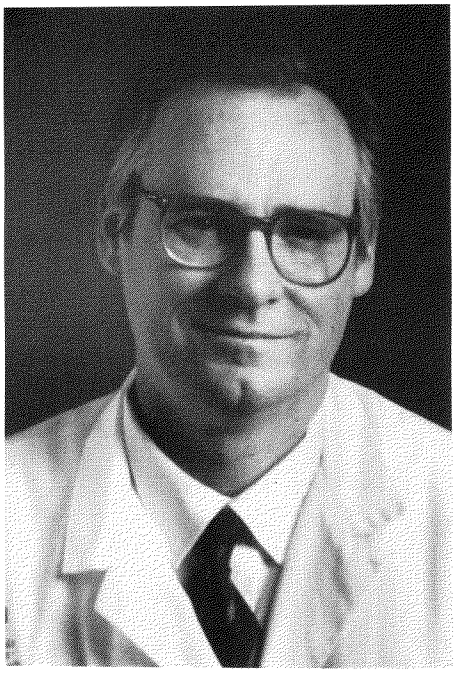


Daniel J. Orchik, Ph.D.
6133 Poplar Pike
Memphis, TN 38119
(with wife Andrea)

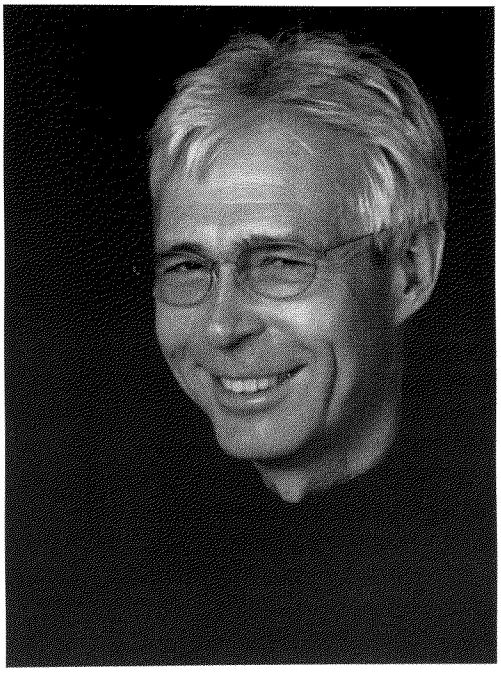
Corresponding Members

Wolf J. Mann, M.D.
University ENT Department
Mainz Medical School
Langenbeckstr. 1
D551101
Mainz
Germany
(with wife Brigitta holding daughter Caroline and daughter Sophie-Luise in the foreground)

David A. Moffat, B.Sc., M.A.
Department of Otoneurological and
Skull Base Surgery
Clinic 10
Addenbrooke's Hospital
Hills Road
Cambridge, CB2 2QQ
England, U.K.
(with wife Jane)



Helge Rask-Andersen, M.D., Ph.D.
Stigbergsvagen 11
752 42
Uppsala, Sweden



Jens Thomsen, M.D.
ENT Department
Gentofte University Hospital
DK-2900
Hellerup, Denmark

1996–1997 MEMBERSHIP LIST
AMERICAN OTOLOGICAL SOCIETY, INC.

Active Members

1987 Adkins, Warren Y., Dept. of Otolaryngology, Medical Univ. of South Carolina, 171 Ashley Avenue, Charleston, SC 29425

1988 Adour, Kedar, Sir Charles Bell Society, 1000 Green Street #1203, San Francisco, CA 94133

1982 Alberti, Peter W., 259 Glencairn Avenue, Toronto, Ontario, M5N 1T8 CANADA

1970 Alford, Bobby R., 6501 Fannin Street, Houston, TX 77030

1987 Althaus, Sean R., 5201 Norris Canyon Rd. #230, San Ramon, CA 94583-5405

1995 Amedee, Ronald, Dept. of Otolaryngology-HNS, Tulane Univ. Med. Ctr. SL-59, 1430 Tulane Avenue, New Orleans, LA 70112-2699

1985 Applebaum, Edward, 1855 West Taylor Street, Room 2.42, Chicago, IL 60612-7242

1993 Babin, Richard W., River Bend Head & Neck Assoc., 6570 Stage Road, Suite 245, Bartlett, TN 38134

1991 Balkany, Thomas J., Univ. of Miami School of Medicine, Dept. of Otolaryngology, PO Box 016960—D 48, Miami, FL 33101

1992 Bartels, Loren J., Harbourside Medical Tower—Ste 610, 4 Columbia Drive, Tampa, FL 33606

1995 Beatty, Charles W., Mayo Clinic, Dept. of Otolaryngology, 200 First Avenue, SW—Ste. 100, Rochester, MN 55905

1983 Black, F. Owen, 2222 N.W. Lovejoy, Suite 411, Portland, OR 97210

1996 Blakley, Brian, Wayne State University, 540 E. Canfield Ave.—Ste. 5E UHC, Detroit, MI 48201

1977 Bluestone, Charles D., 3705 Fifth Avenue, Pittsburgh, PA 15213-2583

1982 Boles, Roger, 400 Parnassus Avenue, Suite 717A, San Francisco, CA 94122

1979 Brackmann, Derald E., 2100 West Third Street—1st Floor, Los Angeles, CA 90057

1978 Britton, B. Hill, Univ. of Oklahoma-HSC, Dept. of Otolaryngology, PO Box 26901, Oklahoma City, OK 73190

1988 Brookhouser, Patrick E., Boystown National Institute of Communication Disorders in Children, 555 N. 30th Street, Omaha, NE 68131

1991 Canalis, Rinaldo F., 457—15th Street, Santa Monica, CA 90402

1979 Cantrell, Robert W., University of Virginia—MSC, Box 179, Charlottesville, VA 22908

1984 Chole, Richard, Otology Research Lab, 1159 Surge III, Davis, CA 95616

1976 Clemis, Jack D., 734 LaVergne Avenue, Wilmette, IL 60091

1985 Cohen, Noel L., Dept. of Otolaryngology, NYU Medical Center, 530 First Avenue, New York, NY 10016

1991 Coker, Newton J., Texas Ear, Nose & Throat Consultants, 6550 Fannin, Suite 2001, Houston, TX 77030

1995 Daspit, C. Phillip, 222 W. Thomas Rd., Suite 114, Phoenix, AZ 85013

1975 Dayal, Vijay S., Department of Otolaryngology, University of Chicago Medical Ctr, MC 1035, 5841 South Maryland Avenue, Chicago, IL 60637

1991 De la Cruz, Antonio, 2100 W. Third Street—lst Flr., Los Angeles, CA 90057

1991 Dickins, John R.E., 9601 Lile Drive, #1200—Medical Towers Building, Little Rock, AR 72205

1985 Dobie, Robert A., Dept of Otolaryngology, UTSA, 7703 Floyd Curl Drive, San Antonio, TX 78284

1988 Duckert, Larry G., Department of Otolaryngology, P. O. Box 351928, RL-30, University of Washington, Seattle, WA 98195

1995 Eby, Thomas L., University of Alabama-Birmingham, Dept. of Otolaryngology, 1501 5th Avenue South, Birmingham, AL 35233

1988 Eden, Avrim R., Dept. of Otolaryngology, Mount Sinai Medical Ctr, Box 1189, 1 Gustave Levy Place, New York, NY 10029-6574

1990 Emmett, John R., 6133 Poplar Pike at Ridgeway, Memphis, TN 38119

1981 Eviatar, Abraham, 25 Morris Lane, Scarsdale, NY 10583

1994 Facer, George W., Mayo Clinic, 200 First Street, S.W., Rochester, MN 55905

1984 Farmer, Joseph C., Division of Otolaryngology-HNS, Duke Univ Medical Ctr, Box 3805, Durham, NC 27710

1990 Farrior, III, Jay B., 509 W. Bay Street, Tampa, FL 33606

1978 Fredrickson, John M., 517 South Euclid—Box 8115, St. Louis, MO 63110

1969 Gacek, Richard R., 750 East Adams Street, Syracuse, NY 13210

1987 Gantz, Bruce J., Dept of Otolaryngology-HNS, University of Iowa, 200 Hawkins Drive, Iowa City, IA 52242

1983 Gardner, Jr., L. Gale, 899 Madison Avenue, Suite 602A, Memphis, TN 38103

1987 Gates, George A., University of Washington, Department of Otolaryngology, 1959 NE Pacific St. RL-30, PO Box 375462, Seattle, WA 98195

1973 Glasscock, III, Michael E., 300 20th Avenue, North, Suite 502, Nashville, TN 37203
1995 Goebel, Joel A., 517 South Euclid, Box 8115, St. Louis, MO 63110
1989 Goldenberg, Robert A., 111 West First St, Suite 600, Dayton, OH 45402
1990 Goode, Richard L., 300 Pasteur Drive R135, Stanford, CA 94305
1992 Goycoolea, Marcos V., Pedro Lira U 11154, Lo Barnechea, Santiago, CHILE
1979 Graham, Malcolm D., Georgia Ear Institute, 4700 Waters Avenue—Box 23665, Savannah, GA 31404-3665
1991 Gulya, A. Julianna, 1558 North Colonial Terrace, Arlington, VA 22209
1987 Harker, Lee A., Boystown National Research Hospital, 555 North 30th Street, Omaha, NE 68131
1987 Harner, Stephen G., Mayo Clinic, 200 First Street SW, Rochester, MN 55905
1988 Harris, Jeffery P., 9350 Campus Point Drive, 0970, LaJolla, CA 92037-0970
1992 Hart, Cecil W. J., 707 North Fairbanks Ct., Suite 1000, Chicago, IL 60611
1984 Hawke, W. Michael, 1849 Yonge Street, Ste. 10, Toronto, Ontario M4S 1Y2 CANADA
1996 Hirsch, Barry E., Eye and Ear Institute Bldg., 200 Lothrop St.—Suite 500, Pittsburgh, PA 15213
1992 Hoffman, Ronald A., 1430 Second Avenue—Suite 110, New York, NY 10021
1984 House, John W., 2100 West Third Street, Los Angeles, CA 90057
1987 Hughes, Gordon B., Dept of Otolaryngology, One Clinic Ctr. A-71 Cleveland, OH 44195
1992 Jackler, Robert K., Univ. of California-San Francisco, 350 Parnassus Ave., Suite 210, San Francisco, CA 94117
1994 Jackson, Carol A., 361 Hospital Road, Suite 325, Newport Beach, CA 92663
1990 Jackson, C. Gary, The Otology Group, 300 20th Avenue, North, Suite 502, Nashville, TN 37203
1992 Jahn, Anthony, 556 Eagle Rock Avenue, Roseland, NJ 07068
1982 Jahrsdoerfer, Robert A., Dept. of Otolaryngology, University of Virginia Med. Ctr., Box 430, Charlottesville, VA 22908
1987 Jenkins, Herman A., Dept of Otolaryngology, Baylor College of Medicine, One Baylor Plaza, Houston, TX 77030
1990 Jung, Timothy K., 3975 Jackson St., Suite 202, Riverside, CA 92503
1988 Kamerer, Donald B., Eye and Ear Hospital, 200 Lothrop Street, Suite 500, Pittsburgh, PA 15213
1991 Kartush, Jack, Michigan Ear Institute, 27555 Middlebelt Road, Farmington Hills, MI 48334
1992 Katsarkas, Anthanasios, Royal Victoria Hospital—#E4.48, 687 Pine Avenue, Montreal, Quebec H3A 1A1, CANADA
1987 Keim, Robert J., 13504 Green Cedar Lane, Oklahoma City, OK 73131
1981 Kinney, Sam E., 9500 Euclid Avenue, Cleveland, OH 44195-5034
1976 Kohut, Robert I., Bowman Gray School of Medicine, Dept of Otolaryngology, Medical Center Boulevard, Winston-Salem, NC 27157-1034
1991 Konrad, Horst, Southern Illinois University, School of Medicine, Div. of Otolaryngology, PO Box 19230, Springfield, IL 62794-1618
1993 Kumar, Arvind, 1855 W. Taylor St., M/C 648, Chicago, IL 60612
1995 Lambert, Paul R., Dept. of Otolaryngology-HNS, University of Virginia Med. Ctr., Health Sciences Center-Box 430, Charlottesville, VA 22908
1995 Leonetti, John P., Loyola University Medical Center, 2160 S. First Avenue, Bldg. 105—Room 1870, Maywood, IL 60153
1993 Lesinski, S. George, 629 Oak Street, Suite 201, Cincinnati, OH 45206
1987 Lindeman, Roger C., 1100 Ninth Avenue—#900, Seattle, WA 98101
1988 Lippy, William H., 3893 East Market Street, Warren, Ohio 44484
1991 Luetje, Charles M., Otologic Center, Inc., Penntower Office Center, 3100 Broadway, Suite 509, Kansas City, MO 64111
1987 Mangham, Jr., Charles A., Seattle Ear Clinic, 600 Broadway, Suite 340, Seattle, WA 98122
1989 Maniglia, Anthony J., Dept. of Otolaryngology, University Hospitals of Cleveland, 11100 Euclid Avenue, Cleveland, OH 44106-5045
1985 Mathog, Robert H., 4201 St. Antoine—5E-UHC, Detroit, MI 48201
1992 Mattox, Douglas E., 1314 Locust Avenue, Ruxton, MD 21204
1979 Matz, Gregory J., Loyola University Medical Center, Dept of Otolaryngology-HNS, 2160 South First Avenue, Bldg. 105, Room 1870, Maywood, IL 60153
1965 McCabe, Brian F., University of Iowa, Dept of Otolaryngology, 200 Hawkins Drive E230,GH, Iowa City, Iowa 52242-1078
1987 McDonald, Thomas J.P., Mayo Clinic, 200 First Street, SW, Rochester, MN 55905
1981 Meyerhoff, William L., Univ. of Texas Health Science Ctr., 5323 Harry Hines Blvd. GL-208, Dallas, TX 75235
1987 Miyamoto, Richard T., 702 Barnhill Drive—Ste. 860, Indianapolis, IN 46202
1995 Monsell, Edwin M., Dept. of Otolaryngology-HNS, Henry Ford Hospital K-8, 2799 W. Grand Blvd., Detroit, MI 48202
1975 Montgomery, William, 243 Charles Street, Boston, MA 02114
1988 Nadol, Jr., Joseph B., 243 Charles Street, Boston, MA 02114
1987 Nedzelski, Julian M., Dept of Otolaryngology, Sunnybrook Medical Center, 2075 Bayview Avenue, Toronto, Ontario M4N 3M5, CANADA
1985 Neely, J. Gail, Washington University School of Med., 517 South Euclid Avenue, Box 8115, St. Louis, MO 63110
1995 Nelson, Ralph A., House Ear Institute, Inc., 2100 West Third Street—Ste. 111, Los Angeles, CA 90057

1995 Niparko, John P., Dept. of Otolaryngology-HNS, Johns Hopkins Hospital, P.O. Box 41402, Baltimore, MD 21203-6402
1993 Olsson, James E., Texas Neurosciences Institute, 4410 Medical Drive, Suite 550, San Antonio, TX 78229
1968 Paparella, Michael M., 701 25th Avenue South—Ste. 200, Minneapolis, MN 55454
1985 Pappas, Dennis, 2937 7th Avenue South, Birmingham, AL 35233
1983 Pappas, James J., 9601 Lile Drive, #1200—Medical Towers Building, Little Rock, AR 72205
1982 Parisier, Simon C., 210 East 64th Street, New York, NY 10021
1986 Parkin, James L., University of Utah School of Medicine, Department of Surgery—Ste 3B110, 50 North Medical Drive, Salt Lake City, UT 84132
1992 Pensak, Myles L., Univ. of Cincinnati, P.O. Box 670528, Cincinnati, OH 45267-0528
1988 Pillsbury, Harold C., 610 Burnett-Womack Bldg., CB7070, University of North Carolina, Chapel Hill, NC 27599-7070
1995 Poe, Dennis S., Zero Emerson Place, Suite 2-C, Boston, MA 02114
1989 Proctor, Leonard R., 8102 Halton Rd., Baltimore, MD 21204
1969 Pulec, Jack, 1245 Wilshire Blvd., Room 503, Los Angeles, CA 90017
1989 Radpour, Shokri, RLR VA Medical Ctr, 1481 West 10th Street (112A), Indianapolis, IN 46202
1992 Roland, Peter S., Department of Otolaryngology, 5323 Harry Hines Blvd., Dallas, TX 75235-9035
1972 Ronis, Max L., 3400 North Broad Street, Philadelphia, PA 19140
1989 Rybak, Leonard P., SIU School of Medicine, Dept. of Surgery, P.O. Box 19230, Springfield, IL 62794-1312
1992 Sasaki, Clarence T., Yale Univ. School of Medicine, Section of Otolaryngology, P.O. Box 208041, New Haven, CT 06520-8041
1990 Sataloff, Robert T., 1721 Pine Street, Philadelphia, PA 19103
1983 Schindler, Robert A., 350 Parnassus Avenue, Suite 210, San Francisco, CA 94117-3608
1995 Schleuning, Alexander J., 3181 S.W. Sam Jackson Park Road, Portland, OR 97201
1990 Schuring, Arnold G., 3893 East Market Street, Warren, OH 44484
1993 Schwaber, Mitchell, 702 Overton Park, Nashville, TN 37215
1967 Shea, Jr., John J., 6133 Poplar Pike, Memphis, TN 38119
1995 Shelton, Clough, 50 North Medical Drive, 3C120, Salt Lake City, UT 84132
1973 Silverstein, Herbert, 1961 Floyd Street, Suite A, Sarasota, FL 33579
1972 Singleton, George T., University of Florida, JHMHC, Box J-264, Gainesville, FL 32610
1993 Sismanis, Aristides, 1917 Windingridge Drive, Richmond, VA 23233
1973 Smith, Mansfield F.W., 2400 Samaritan Drive #100, San Jose, CA 95124
1988 Smith, Peter G., Midwest Otologic Group, 621 South New Ballas Rd., St. Louis, MO 63141
1979 Spector, Gershon Jerry, 517 South Euclid Avenue, Campus Box 8115, St. Louis, MO 63110
1996 Todd, Jr., N. Wendell, 1052 Castle Falls Drive, Atlanta, GA 30329-4135
1993 Wazen, Jack J., Columbia University, 630 W. 168th Street, New York, NY 10032
1990 Weider, Dudley J., 38 Rip Road, Hanover, NH 03755
1987 Wiet, Richard J., 950 York Road, Hinsdale, IL 60521
1992 Wilson, David F., 911 N.W. 18th Avenue, Portland, OR 97209
1996 Yanagisawa, Eiji, 98 York Street, New Haven, CT 06511

Senior Members

1988 (1960) Armstrong, Beverly W., 3034 Hampton Ave., Charlotte, NC 28207
1994 (1969) Bailey, Jr., H.A. Ted, 9601 Lile Drive, #1200—Medical Towers Bldg., Little Rock, AR 72205
1990 (1958) Bellucci, Richard J., 162 East 71st Street, New York, NY 10021
1988 (1961) Bradley, Wesley H., 13 Saybrook East, Glenmont, NY 12077
1988 (1964) Brockman, Seymour J., 222 S. McCarty Dr., Beverly Hills, CA 90212
1994 (1969) Buckingham, Richard A., 145 Northwest Highway, Park Ridge, IL 60068
1992 (1972) Caparosa, Ralph J., 420 E. North Avenue #402, Pittsburgh, PA 15212-4746
1996 (1975) Catlin, Francis I., 13307 Queensbury Lane, Houston, TX 77079
1994 (1973) Chandler, J. Ryan, 1700 NW 10th Avenue, Miami, FL 33136
1990 (1958) Cody, III, Claude C., 529 E. Friar Tuck Lane, Houston, TX 77024
1992 (1969) Cody, D. Thane., 541 LeMaster Dr., Ponte Vedra Beach, FL 32082
1990 (1966) Cole, James M., 1301 Red Ln., Danville, PA 17821-1333
1989 (1968) Compere, Wesley E., 3755 Avocado Blvd. #503, LeMesa, CA 91941
1995 (1972) Crabtree, James A., 1332 Westhaven Rd., San Marino, CA 91108
1981 (1961) Daly, John F., 1500 Palisade Avenue #27C, Fort Lee, NJ 07024-5318
1989 (1958) Derlacki, Eugene L., Northwestern Medical, Faculty Foundation, 707 N. Fairbanks Ct., Suite 1010, Chicago, IL 60611
1994 (1974) Donaldson, James A., Seattle Ear Clinic, 600 Broadway, #340, Seattle, WA 98122-5371
1996 (1987) Doyle, Patrick J., #150—809 West 41st Avenue, Vancouver, BC, CANADA V5Z 2N6
1971 (1939) Druss, Joseph G., 145 East 92nd Street, New York, NY 10128
1993 (1971) Duvall, III, Arndt J., Dept of Otolaryngology, Box 396, 420 Delaware St., Minneapolis, MN 55455
1973 (1953) Glorig, Aram, 9941 Westhaven Circle, Westminster, CA 92683-7552
1993 (1970) Harris, Irwin, 2160 Century Woods Way, Los Angeles, CA 90067-6307

1993 (1973) Harrison, Wiley H., Northwestern Medical Faculty Fnd., 707 N. Fairbanks Ct. Suite 1010, Chicago, IL 60611
1992 (1972) Hilding, David A., 945 Hospital Drive—Suite #1, Price, UT 84501
1975 (1951) Hilger, Jerome, 1700 Lexington Avenue—Suite 409, St. Paul, MN 55118
1990 (1970) Hohmann, Albert, 3154 Shoreline Lane, St. Paul, MN 55112-3764
1990 (1960) Hough, Jack V., 3400 NW 56th Street, Oklahoma City, OK 73112
1975 (1947) House, Howard P., 2100 West Third Street, Los Angeles, CA 90057
1995 (1964) House, William F., Newport Lido Medical Center, 361 Hospital Road, Suite 327, Newport Beach, CA 92663
1975 (1953) Jordan, Raymond E., 520 Bay Villas Lane, Naples, FL 33963
1972 (1952) Juers, Arthur L., 5701 Coach Gate Wynde, Apt 50, Louisville, KY 40207
1991 (1967) Linthicum, Jr., Fred H., 2100 West Third Street, 5th floor, Los Angeles, CA 90057
1995 (1969) Litton, Ward B., 17 Eagle Pointe Pass, P.O. Box 266, Rapid City, IL 61278
1996 (1970) Maddox, H. Edward, 7777 Southwest Freeway, Houston, TX 77074
1987 (1975) Marcus, Richard E., 691 Sheridan Road, Winnetka, IL 60093
1990 (1974) Michelson, Robin P., A717, 400 Parnassus Avenue, San Francisco, CA 94143
1989 (1965) Moon, Jr., Cary N., 1135 Inglecress Drive, Charlottesville, VA 22901
1987 (1952) Moore, James A., 525 East 68th Street, New York, NY 10021
1978 (1957) Myers, David, 1919 Chestnut, Apt. #1119, Philadelphia, PA 19103
1994 (1974) Myers, Eugene, Eye and Ear Institute, 200 Lathrop Street, Suite 500, Pittsburgh, PA 15213
1994 (1988) Nager, George T., Dept. OTL-HNS, Johns Hopkins Hosp., 550 N. Broadway, Baltimore, MD 21205-2020
1993 (1968) Naunton, Ralph F., DCSD-NIDCD EPS-400B, 6120 Executive Boulevard, Rockville, MD 20892
1993 (1973) Pennington, Claude L., PO Box 1916, Macon, GA 31202
1992 (1975) Powers, W. Hugh, 728 Wind Willow Way, Simi Valley, CA 93065
1983 (1959) Proud, Gunner O., 3721 West 87th Street, Shawnee Mission, KS 66206
1983 (1958) Rambo, J.H. Thomas, 150 East 77th Street, New York, NY 10021
1993 (1972) Ritter, Frank N., 2675 Englave Drive, Ann Arbor, MI 48103
1991 (1969) Robinson, Mendell, 130 Waterman Street, Providence, RI 02906
1996 (1974) Ruben, Robert, Montefiore Medical Center, 111 East 210th Street VCA-4, Bronx, NY 10467-2490
1992 (1967) Rubin, Wallace, 3434 Houma Boulevard, Suite 201, Metairie, LA 70006
1993 (1967) Ruggles, Richard L., 11201 Shaker Boulevard, Cleveland, OH 44104
1994 (1960) Sataloff, Joseph, 1721 Pine Street, Philadelphia, PA 19103
1996 (1972) Saunders, William H., 456 W. 10th Avenue, Columbus, OH 43210
1989 (1966) Schlosser, Woodrow D., 1557A Pheasant Walk, Fort Pierce, FL 34950
1990 (1957) Schuknecht, Harold F., 243 Charles Street, Boston, MA 02114
1975 (1950) Shambaugh, Jr., George, 40 South Clay St, Hinsdale, IL 60521
1994 (1965) Sheehy, James L., 2100 West Third Street, Los Angeles, CA 90057
1995 (1973) Simmons, F. Blair, 300 Pasteur Drive, Room R-135, Palo Alto, CA 94025
1980 (1958) Smith, J. Brydon, 21 Farrington Drive, Willowdale, Ontario, M2L 2B4, CANADA
1993 (1973) Snow, Jr., James B., National Institute on Deafness, and Communicative Disorders, 9000 Rockville Pike, 313C02, Bethesda, MD 20892
1990 (1967) Stroud, Malcolm H., (address unknown)
1971 (1947) Stuart, Edwin A., Camp Hill Hospital, Halifax, NOVA SCOTIA
1990 (1961) Tabb, Harold G., 1430 Tulane Avenue, New Orleans, LA 70112
1985 (1965) Taylor, G. Dekle, 13500 Mandarin Road, Jacksonville, FL 32223
1972 (1946) Truex, Edward H., 37 Farmington, Rd., Wethersfield, CT 06109
1981 (1962) Waltner, Jules G., 903 Park Avenue, New York, NY 10021
1994 (1972) Ward, Paul H., UCLA School of Medicine, Division of Head and Neck Surgery, 10833 LeConte Ave., 62-132 Center for Health Sciences, Los Angeles, CA 90024
1996 (1975) Wehrs, Roger E., 6465 South Yale, Tulsa, OK 74136
1989 (1972) Wilson, William H., 1133 Oneida Street, Denver, CO 80220
1986 (1964) Withers, Ben T., 4703 Ivanhoe, Houston, TX 77027
1994 (1971) Wolfson, Robert J., 1920 Chestnut Street, Portland, OR 97201
1987 (1964) Wright, William K., 3671 Delmonte, Houston, TX 77019

Emeritus Members

1992 (1977) Bergstrom, Lavonne, 304 20th Street, Manhattan Beach, CA 90266
1978 (1963) Boyd, Harold M. E., 313 Via Anita, Redondo Beach, CA 90277
1987 (1994) Goin, Donald W., 1145 E. Warren Avenue, Denver, CO 80210
1973 (1957) Tolan, John F., 3419 47th Avenue NE, Seattle, WA 98105

Associate Members

1992 Altschuler, Richard A. Ph.D., Kresge Hearing Research Inst., University of Michigan, 1301 N. Ann Street, Ann Arbor, MI 48109-0506

1995 Berliner, Karen I. Ph.D., 2252 Linnington Avenue, Los Angeles, CA 90064
1979 Bohne, Barbara A. Ph.D., 517 South Euclid Avenue, St. Louis, MO 63110
1978 Butler, Robert A. Ph.D., Department of Surgery, University of Chicago, 950 E. 59th Street, Chicago, IL 60637
1973 Fernandez, Cesar M.D., 950 E. 59th Street, Chicago, IL 60637
1959 Graybiel, Ashton, M.D. Warrington, FL
1977 Gussen, Ruth M.D., (last address—not sure if correct), 31 24 Rehabilitation Center, UCLA School of Medicine, Los Angeles, CA 90024
1992 Hamid, Mohamed A. Ph.D., 50 Greentree, Moreland Hills, OH 44022
1992 Hannley, Maureen T. Ph.D., 2801 Park Center Dr., Alexandria, VA 22302
1972 Hawkins, Jr, Joseph E. Ph.D., Kresge Hearing Research Inst., Ann Arbor, MI 48109
1989 Hinojosa, Raul M.D., 5316 Hyde Park Boulevard, Chicago, IL 60615
1972 Honrubia, Vincente M.D., 10833 Le Conte Avenue, Los Angeles, CA 90024
1973 Igarashi, Makoto M.D., University Research Center, Nihon University, 8-24, Kudan-minami, 4chome, Chiyoda-ku, Tokyo 102 JAPAN
1994 Iurato, Salvatore J. M.D., Cattedra Di Bioacustica, dell-Universita di Bari, Policlinico, 70124, Bari, ITALY
1960 Johnson, Walter H. Ph.D., St. Michael's Hospital, 30 Bond Street, Toronto, Ontario, M5B 1W8, CANADA
1979 Johnsson, Lars-Goran M.D., Simmarstigen 10A2, Helsinki 33, FINLAND
1980 Juhn, S.K. M.D., Univ. of Minn. Medical School, 2001 6th St. SE, Minneapolis, MN 55455
1969 Kiang, Nelson Y.S. Ph.D., 18 Cedar Lane Way, Boston, MA 02108
1994 Kileny, Paul R., Ph.D., Department of Otolaryngology, 1500 E. Medical Cntr. Dr., Ann Arbor, MI 48109-0312
1978 Kimura, Robert S. Ph.D., 243 Charles Street, Boston, MA 02114
1959 Lawrence, Merle Ph.D., 1535 Shorelands Dr. East, Vero Beach, FL 32963
1973 Lim, David J. M.D., House Ear Institute, 2100 West Third St.—5th Flr., Los Angeles, CA 90057
1986 Merzenich, Michael Ph.D., University of California, Coleman Laboratory HSE 871, San Francisco, CA 94143
1979 Miller, Josef M. Ph.D., University of Michigan, Kresge Hearing Research Inst, 1301 East Ann Street, Ann Arbor, MI 48109
1985 Morizono, Tetsuo M.D., Dept. of Otolaryngology, Fukuoka University Medical School, 814-01Rm, Jonak-Kufukuoka, Nanakuma 7-45-1, JAPAN
1978 Neff, William D. Ph.D., (retired from Indiana U., no forwarding address)
1996 Orchik, Daniel J. Ph.D., 6133 Poplar Pike, Memphis, TN 38119
1970 Rosenblith, Walter A. Ph.D., M.I.T., Rm 3-240, Cambridge, MA 02139
1986 Rubel, Edwin W. Ph.D., Dept of Otolaryngology, RL-30 University of Washington, Seattle, WA 98195
1989 Ryu, Jai H. Ph.D., Dept of Otolaryngology, Bowman Gray School of Medicine, Winston-Salem, NC 27157
1975 Sando, Isamu M.D., 203 Lothrop Street, Pittsburgh, PA 15213
1992 Schacht, Jochen Ph.D., Kresge Hearing Research Inst, University of Michigan, 1301 East Ann Street, Ann Arbor, MI 48109-0506
1950 Silverman, S. Richard Ph.D., 2510 NW 38th Street, Gainesville, FL 32601
1962 Smith, Catherine A. Ph.D., (last address—not sure if correct), 16200 Pacific Hwy #34, Lake Oswego, OR 97201
1992 Snyder, Jack McLean Ph.D., Dept of Otolaryngology, RL-30 University of Washington, Seattle, WA 98195
1971 Thalmann, Ruediger M.D., 517 South Euclid Avenue, St. Louis, MO 63110
1970 Valvassori, Galdino M.D., 697 Sheridan Rd., Winnetka, IL 60093
1987 Van De Water, Thomas M.D., Albert Einstein College of Med, Kennedy Center 302, 1410 Pelham Pky. S., Bronx, NY 10461-1101
1974 Vernon, Jack A. Ph.D., 3515 S.W. Sam Jackson Park Rd., Portland, OR 97201
1971 Ward, W. Dixon, Ph.D., Falcon Heights, MN
1984 Zwislocki, Jozef J. ScD., Institute of Sensory Research, Syracuse University, Syracuse, NY 13210

Corresponding Members

1995 Bagger-Sjoback, Dan, M.D., Dept. of Otolaryngology, Karolinska Hospital 17176, Stockholm, SWEDEN S104
1995 Booth, Mr. J. Barton, 18 Upper Wimpole Street, London W1M 7TB, UNITED KINGDOM
1995 Causse, Jean-Bernard, M.D., Traverse de Beziers, 34440 Colombiers, FRANCE
1996 Mann, Wolf J., M.D., University ENT Department, Mainz Medical School, Langenbeckstr .1, D55101 Mainz, GERMANY
1996 Moffat, Mr. David A., Dept of Otoneurological and Skull Base Surgery, Clinic 10, Addenbrooke's Hospital, Hills Road, Cambridge, CB2 2QQ, UNITED KINGDOM
1996 Rask-Andersen, Helge, M.D., Ph.D., Stigbergsvagen 11, 752 42, Uppsala, SWEDEN
1996 Thomsen, Jens, M.D., ENT Department, Gentofte University Hospital, DK-2900, Hellerup, DENMARK

Honorary Members

1993 Albernaz, Pedro, 4405 N.W. 73rd Ave., Suite 20-40003, Miami, FL 33166
1993 Belal, Aziz, Neurotology Section, ORL Dept., Alexandria Schl of Medicine, Alexandria, EGYPT
1993 Choissone, Edgar, 25897 E 30, Apartado 62-277, Caracas, VENEZUELA 1060
1985 Fisch, Ugo, Forchstrasse 26, Frenbach, SWITZERLAND
1992 Goldstein, Jerome C., 1200 N. Nash St. Apt. 1138, Arlington, VA 22209

1968 Jongkees, L.B.W., Reijnier Vinkeleskade 71, 1071 S2 Amsterdam, ENT Dept. Wilhelmina Gasthuis, THE NETHERLANDS

1985 Morrison, Andrew, "Dyers", Marden Ash, Chipping Ongar, Essex CM5 9BT UNITED KINGDOM

1992 Nomura, Yasuya, Dept of Otolaryngology, Showa University 1-5-8, Hatanodai, Shinagawa-ku, Tokyo 142, JAPAN

1983 Portmann, Michel, 114 Ave de'Ares, Bordeaux, FRANCE 33074

DECEASED (1995–1996)

1988 (1957) Farrior, J. Brown, M.D., Tampa, FL (Died May 8, 1995)

1981 (1954) Kos, Clair M., Arlington, TX (Died January 22, 1996)

1984 (1974) Torok, Nicholas, Clarendon Hills, IL (Died April 30, 1996)

INDEX

SUBJECT INDEX

AUTHOR INDEX