1997

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AMERICAN OTOLOGICAL SOCIETY, INC.
1997

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ONE HUNDRED THIRTIETH ANNUAL MEETING

SCOTTSDALE PRINCESS HOTEL
SCOTTSDALE, ARIZONA
MAY 10 AND 11, 1997

LIPPINCOTT WILLIAMS & WILKINS

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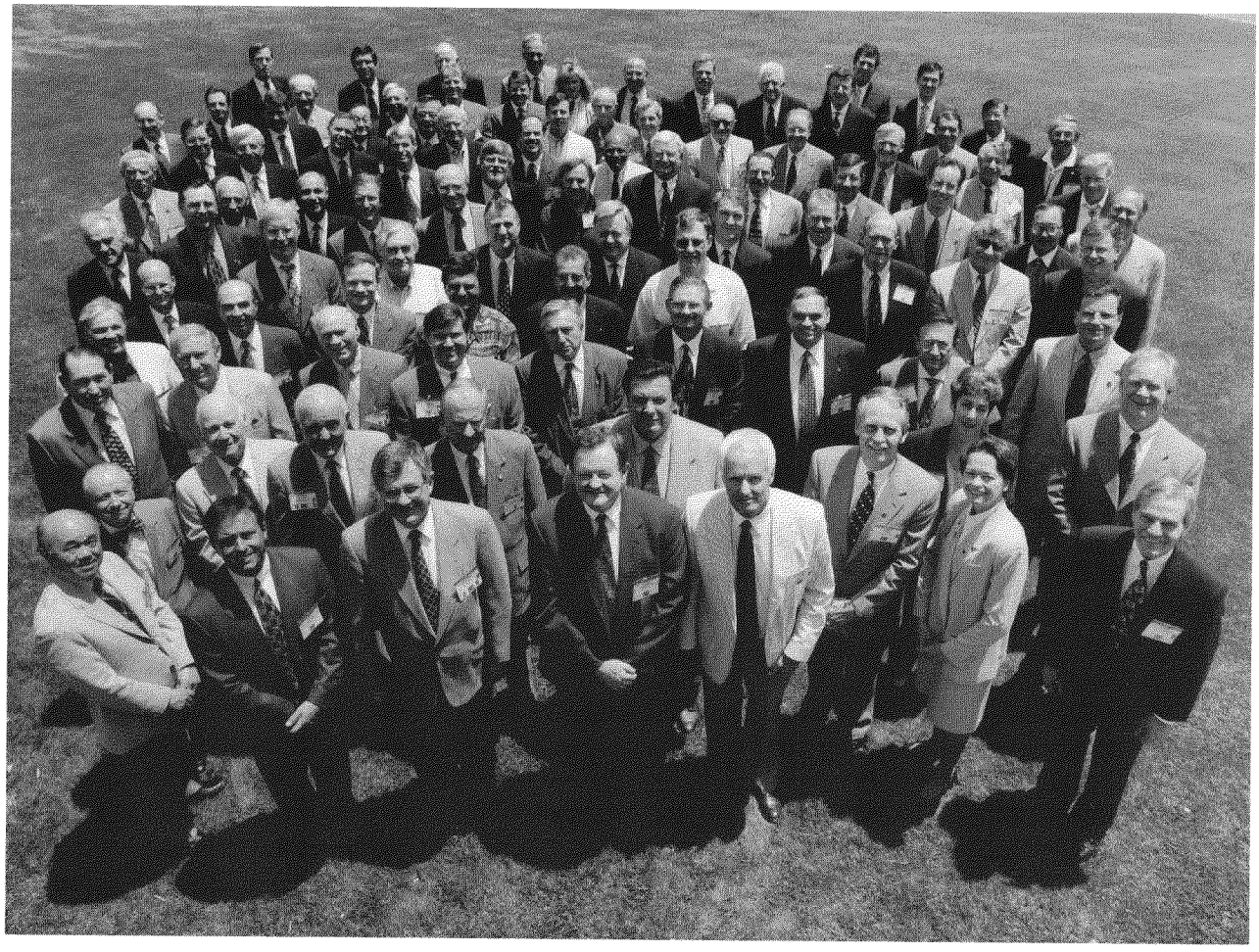

Row 1 (left to right): Eiji Yanagisawa, John Leonetti, Gregory Matz, Joseph Farmer, Mansfield Smith, Julianna Gulya, Robert Jahrsdoerfer. *Row 2* (left to right): Roger Wehrs, Eugene Derlacki, Robert Kohut, Thane Cody, Gary Jackson, Charles Luetje, Karen Berliner, Charles Beatty. *Row 3* (left to right): Jack Pulec, Jack Hough, Harold Tabb, Phillip Wackym, Vicente Honrubia, James Olsson, Pawel Jastreboff, Edgar Chiosonne, Ronald Amedee. *Row 4* (left to right): George Lesinski, Shokri Radpour, Paul Lambert, Allan Rubin, Mohamed Hamid, Brian Blakley, Owen Black, Rinaldo Canalis, Herman Jenkins. *Row 5* (left to right): Raul Hinojosa, Leonard Rybak, Ruediger Thalmann, Gail Neely, Patrick Brookhouser, Newton Coker, Paul Kileny, Richard Miyamoto, David Wilson. *Row 6* (left to right): Richard Gacek, Thomas Haberkamp, Herbert Silverstein, Jack Wazen, David Moffat, Paul Fagan, Gershon Spector, John Emmett, Myles Pensak, Clough Shelton, Steven Telian. *Row 7* (left to right): John Shea, Robert Wolfson, David Barrs, John McElveen, Arnold Schuring, Thomas Eby, Arvind Kumar, William Montgomery, Edward Applebaum, Alexander Schleuning, Cecil Hart, Dudley Weider. *Row 8* (left to right): Edwin Monsell, Norman Todd, Ralph Nelson, Steven Juhn, Isamu Sando, Donald Kamerer, Barry Hirsch, Richard Ruggles, James Pappas, (break), Salvatore Iurato, David Hilding. *Row 9* (left to right): Hugh Powers, Horst Konrad, Ilmari Pyykko, Bruce Gantz, Carol Jackson, Kedar Adour, Robert Sataloff, Malcolm Graham, Dennis Pappas, Dennis Poe, K. J. Lee. *Row 10* (left to right): Robert Jackler, Simon Parisier, Phillip Daspit, (space), Mitchell Schwaber.

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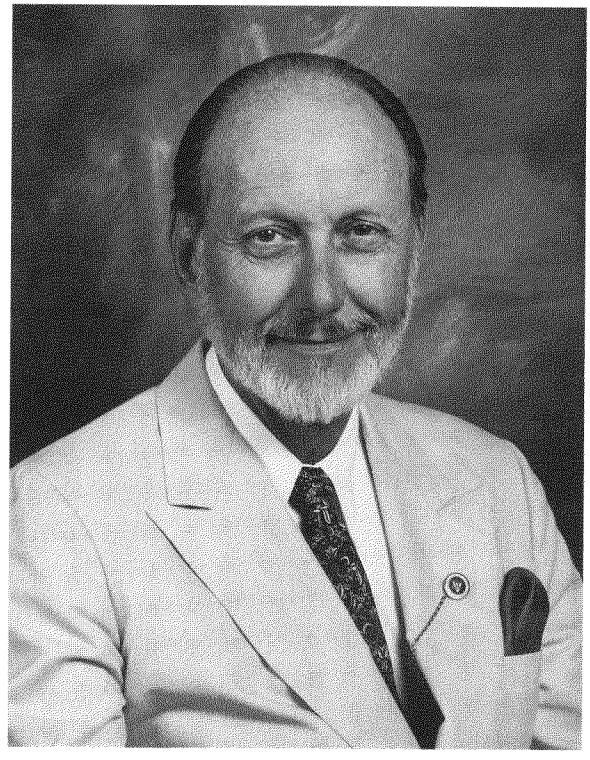
INTRODUCTION OF AWARD OF MERIT RECIPIENT MICHAEL E. GLASSCOCK III, M.D.

Robert A. Jahrsdoerfer, M.D.

I am honored to be able to introduce the Award of Merit recipient. From the series of photographs that have been presented, you recognize Michael E. Glasscock. Born in Texas, he traveled to Tennessee to receive his higher education, earning a B.S. from Tennessee Polytechnical Institute and an M.D. from the University of Tennessee. Remaining in Tennessee for the majority of his surgical and otolaryngological training, he elected to expand his expertise, completing a fellowship in otology/neurotology at the House Ear Clinic, which he later joined as a private practice and research fellow. He was drawn back to Tennessee, where he established an otology/neurotology practice that gained worldwide recognition and respect in the pioneering days of acoustic neuroma and lateral skull-base surgery. Scores of fellows have benefited from his educational skills by participating in his fellowship training program, while hundreds of otolaryngologists have profited from attendance at his temporal bone dissection courses, especially those sponsored by the EAR Foundation (which he founded).

He is a prolific author, having published more than 250 scientific papers and three books, two of which have gone through multiple editions. He founded the *American Journal of Otology* and nurtured it as its first Editor-in-Chief. The *American Journal of Otology* has evolved into the world's leading journal in otology/neurotology, and is now jointly owned by the American Otological Society and the American Neurotology Society as a result of his generous donation of the journal to these societies.

He has served the American Otological Society as a member of the Council and as President, and he has been recognized by the American Otological Society as its Guest of Honor and as a Presidential Citation recipient.



Michael E. Glasscock III, M.D.

He is the father of seven children and is truly fortunate to have married Janet Parsons, with whom he has returned home to Texas.

It is with great pleasure that I present the Award of Merit to Mike Glasscock—a valued friend and highly esteemed colleague.

ACCEPTANCE OF THE AWARD OF MERIT

Michael E. Glasscock III, M.D., F.A.C.S.

I was just thinking about the Award of Merit today, and how nice it must feel to receive this award. Little did I think that I would actually be receiving this award tonight! My imagination didn't even come close to guessing how nice it feels to be so honored! Thank you so very much.

AWARD OF MERIT RECIPIENTS 1949–1997

1949 George M. Coates, M.D.
1951 Barry J. Anson, Ph.D., and Theodore H. Bast, Ph.D.
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1994 Fred H. Linthicum Jr., M.D.
1995 D. Thane R. Cody, M.D., Ph.D.
1996 F. Blair Simmons, M.D.
1997 Michael E. Glasscock III, M.D.

GUESTS OF HONOR 1949–1997

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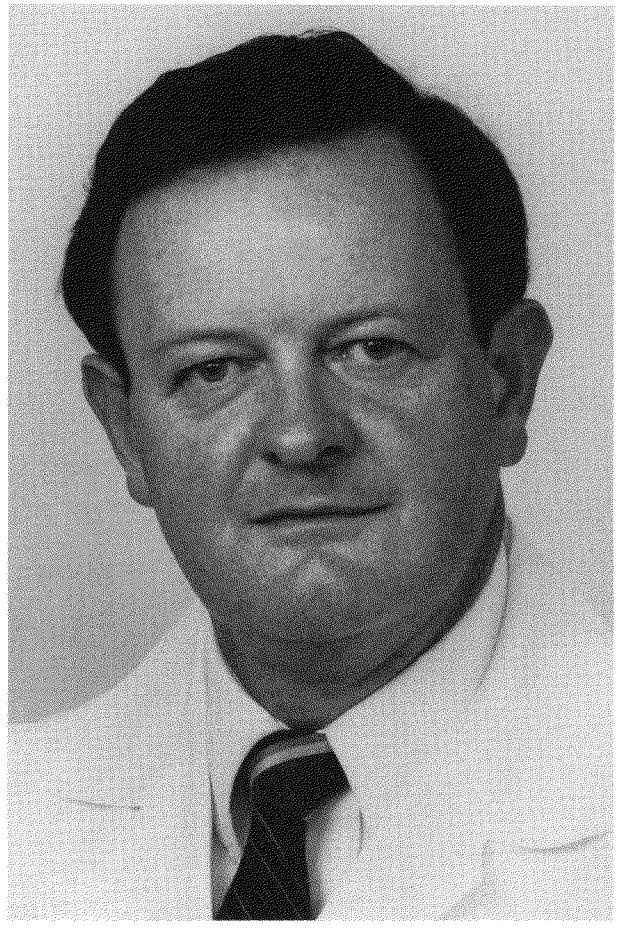
1988 G. Dekle Taylor, M.D.
1989 Eugene L. Derlacki, M.D.
1990 William F. House, M.D.
1991 Michael E. Glasscock III, M.D.
1992 William E. Hitselberg, M.D.
1993 D. Thane R. Cody, M.D., Ph.D.
1994 Cesar Fernandez, M.D.
1995 Richard R. Gacek, M.D.
1996 James L. Sheehy, M.D.
1997 Mansfield F. W. Smith, M.D.

PRESENTATION OF GUEST OF HONOR MANSFIELD F. W. SMITH, M.D., M.S.

Joseph C. Farmer Jr., M.D.

I would like to open the meeting by extending a hearty welcome to all members and guests to this, the one hundred thirtieth annual meeting of the American Otological Society. You are all welcome and I hope that each of you has an informative, enjoyable time. I will not give a presidential address this year; instead I will use the time for the presentation of our guest of honor. Dr. Mansfield Smith is well known to all. He is a worldwide leader in otology and neurotology and has done great things for the specialty. This picture shows Mansfield in Mansfield, England, at the Mansfield Pub, where they serve Mansfield Ale! He usually travels with his wonderful wife, Linda, and they have been practically everywhere. Mansfield was educated at Berkeley in the turbulent fifties. He received his M.D. from George Washington University in 1956 and completed his residency in otolaryngology at the University of Michigan. Currently, he is founder and chief executive officer of the Hearing Institute for Children and Adults Medical Group in San Jose, California, a position he has held since 1963. He is also the founder and chairman of the California Transplant Bank, the Northern California Transplant Bank. He has had multiple titles and honors, including guest lecturer for the Harold F. Schuknecht series at Harvard, and visiting professor at the Royal Society of Medicine. His other honors include membership in Alpha Omega Alpha, and the vice presidency of the Western Section of the Triological Society. He is the founding editor of *Otolaryngology—Head and Neck Surgery*, and he served as the editor-librarian of the American Otological Society from 1986 to 1992. He has had multiple presidencies, including that of the Pacific Coast Oto-Ophthalmological Society, the Otological Society (1991–92), the American Academy of Head and Neck Surgery, and the Pulitzer Society. His editorial appointments are numerous and include the editorial boards of otolaryngology's notable journals, as well as the presidency of the board of directors of the *American Journal of Otolaryngology* in its formative years in 1992, after it was transferred to the two societies. He is an accomplished author of two books and a contributing author to ten additional textbooks. It is with great pleasure that I present this year's American Otological Society Guest of Honor, Dr. Mansfield Smith.



Joseph C. Farmer Jr., M.D.

The citation reads: "For his leadership and devotion to the American Otological Society and to the advancement of Otology and Neurotology worldwide on the occasion of the One Hundred and Thirtieth Annual Meeting of the American Otological Society."

REMARKS OF GUEST OF HONOR

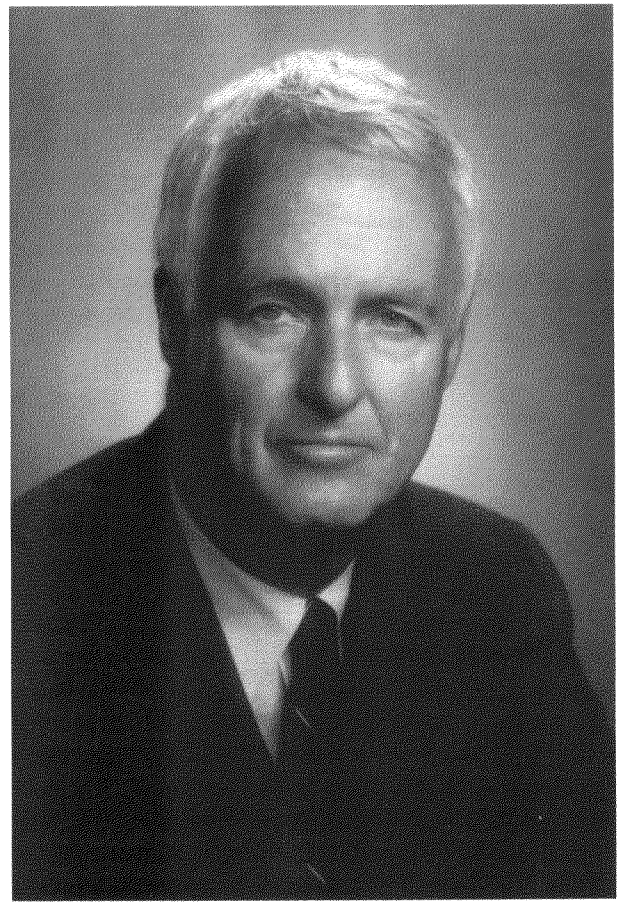
THE HERITAGE AND DUTY OF THE AMERICAN OTOLOGICAL SOCIETY

Mansfield F. W. Smith, M.D., M.S.

The American Otological Society is one of the oldest specialty societies in the world. It is classified by the U.S. Internal Revenue Service as a 501c3 educational and charitable foundation, or public trust. Thus our primary responsibility is to the public.

The American Otological Society's duty traditionally has been to foster education and research in otology. Why not national outcomes research to develop diagnostic and treatment protocols for those most distressing and common otologic ailments—for example, sudden hearing loss, progressive sensorineural hearing loss, and facial paralysis? This effort could be coordinated with the American Academy of Otolaryngology–Head and Neck Surgery, with the AOS influencing and overseeing the conduct of the studies in otology.

Because development of sound clinical protocols are important to our patients and our profession, we should work as a team with related societies to institute a format for these studies as soon as possible.



Mansfield F. W. Smith, M.D., M.S.

PRESIDENTIAL CITATION
BLAKE WILSON, B.S.E.E., DEWEY LAWSON, PH.D., CHARLES FINLEY, PH.D., and MARIANGELI ZERBI, M.S.

Joseph C. Farmer Jr., M.D.

I have the honor and pleasure of presenting Presidential Citations to a team of cochlear implant investigators from the Research Triangle Institute in North Carolina. The work of this team, led by Blake Wilson and consisting of Dewey Lawson, Charles Finley, and Mariangeli Zerbi, has significantly advanced the usefulness of cochlear implants. The demonstration that different speech-processing strategies are needed for different patients and the development of the continuous interleaved sampling (CIS) strategies has given profoundly deaf patients additional chances to achieve speech understanding without using visual cues.

Their work has received recognition throughout North America. They were presented the Annual Technology Award by *Discover* magazine. The *Raleigh News and Observer*, the leading paper in our area, acknowledged this award with a long article. The investigators have been recognized internationally at a recent cochlear implant meeting in Vienna; the leader of the team, Blake Wilson, was one of two guests of honor.

It is with great pleasure that I present these Presidential Citations to Blake Wilson, Dewey Lawson, Charles Finley, and Mariangeli Zerbi. Accepting for the team will be Blake Wilson and Dewey Lawson.

The citation reads: "To The Research Triangle Institute for major contributions to the restoration of hearing to profoundly deaf persons on the occasion of the One Hundred Thirtieth Annual Meeting of the American Otological Society." Blake and Dewey, congratulations! Here are the citations for Charles Finley and Mariangeli Zerbi.

REPLY

Blake Wilson, B.S.E.E.

We are deeply honored by this citation. Thank you, Dr. Farmer.

WITHIN-PATIENT COMPARISONS AMONG PROCESSING STRATEGIES FOR COCHLEAR IMPLANTS

*†Dewey T. Lawson, Ph.D., *†Blake S. Wilson, B.S.E.E., *Mariangeli Zerbi, M.S., ‡Patricia A. Roush, M.A., *†Chris van den Honert, Ph.D., *†Charles C. Finley, Ph.D., †Debara L. Tucci, M.D., and †Joseph C. Farmer Jr., M.D.*

ABSTRACT

Studies have been completed with five of seven subjects implanted with a research version of the Nucleus implant system that includes percutaneous access to the standard Nucleus electrode array. This access allowed laboratory comparisons with a variety of speech-processing strategies, including (1) continuous interleaved sampling (CIS) processors with prescribed sets of parameter choices, (2) "*n*-of-*m*" designs, in which *n* electrodes are selected from *m* available electrodes for each cycle of stimulation, again with prescribed sets of parameter choices, and (3) a monopolar version of the clinical spectral peak (SPEAK) processor. Tests to evaluate the strategies included identification of 16 or 24 consonants in an /a/-consonant-/a/ context. Results from these tests demonstrated advantages both of relatively high rates of stimulation (833 pulses per second on each channel) and an extended frequency range for the bandpass filters (350 to 9500 Hz as opposed to 350 to 5600 Hz) for both CIS and *n*-of-*m* processors.

*Center for Auditory Prosthesis Research, Research Triangle Institute; †Division of Otolaryngology–Head & Neck Surgery, Duke University Medical Center; ‡Division of Speech Pathology and Audiology, Duke University Medical Center.

Presented at the 130th Annual Meeting of the American Otological Society, Scottsdale, AZ, May 10–11, 1997.

Reprint requests: D. T. Lawson, Center for Auditory Prosthesis Research, Research Triangle Institute, PO Box 12194, Research Triangle Park, NC 27709.

Work supported by NIH projects N01-DC-2-2401 and N01-DC-5-2103. Support for the implant systems and associated clinical costs was provided by Cochlear Corporation.

BILATERAL COCHLEAR IMPLANTS CONTROLLED BY A SINGLE SPEECH PROCESSOR

*†Dewey T. Lawson, Ph.D., *†Blake S. Wilson, B.S.E.E., *Mariangeli Zerbi, M.S., *†Chris van den Honert, Ph.D., *†Charles C. Finley, Ph.D., †Joseph C. Farmer Jr., M.D., ‡John T. McElveen Jr., M.D., and §Patricia A. Roush, M.A.*

ABSTRACT

A patient rendered profoundly deaf by *Listeria rhomboencephalitis,* with partial insertion of a nucleus 22 electrode array and radiographic evidence of rapid bilateral ossification, received a second cochlear implant in the other ear, where full insertion was achieved. The patient routinely uses a pair of independent clinical MSP processors with her two implants. Laboratory studies have been undertaken to assess potential benefits of placing stimulation of the electrodes in both ears under the control of a single continuous interleaved sampling (CIS) processor. All 24 useable BP+1 electrode assignments (16 left ear, 8 right ear) were included in common studies of pitch discrimination and pitch ranking. Three bilateral pairs of such assignments were identified as capable of supporting interaural comparisons with no perceptable difference in pitch. Interaural time-delay studies using 50 ms bursts of 80 μs/phase pulses at 480 pulses/s demonstrate the ability of this subject to identify the ear receiving the earlier onset for delays extending down to less than 150 μs. Interaural amplitude difference studies with the same types of stimuli demonstrate this subject's ability to identify the ear receiving the stronger stimulus based on the smallest amplitude differences available from the implanted device. Preliminary studies have compared the subject's medial consonant identification scores when using CIS processors with channels assigned to various unilateral and bilateral sets of electrodes.

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*Center for Auditory Prosthesis Research, Research Triangle Institute; †Division of Otolaryngology–Head & Neck Surgery, Duke University Medical Center; ‡Carolina Ear and Hearing Clinic; §Division of Speech Pathology and Audiology, Duke University Medical Center.

Presented at the 130th Annual Meeting of the American Otological Society, Scottsdale, AZ, May 10–11, 1997.

Reprint requests: D. T. Lawson, Center for Auditory Prosthesis Research, Research Triangle Institute, PO Box 12194, Research Triangle Park, NC 27709.

Work supported by NIH projects N01-DC-2-2401 and N01-DC-5-2103.

PERFORMANCE WITH THE 20+2L LATERAL WALL COCHLEAR IMPLANT

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

ABSTRACT

Objective: The purpose of this study was to investigate the operating characteristics of the Nucleus 20+2L lateral wall cochlear implant, including speech-recognition results.

Study Design: This was a prospective randomized study involving five different modes of stimulation.

Setting: This study was carried out in an academic tertiary referral center.

Patients: The patients included in this study were adult cochlear implant candidates, from ages 44 to 74. Length of deafness ranged from 1 to 58 years with a variety of etiologies.

Interventions: All patients were implanted with the 20+2L implant, which includes an intrascalar electrode array as well as an apically placed extracochlear, titanium-encased ball electrode in contact with the endosteum of the apical turn. All patients underwent psychophysical and speech-recognition testing in five different modes of electrode configuration.

Main Outcome Measure(s): The main outcome measures included thresholds, comfort levels, dynamic ranges, and speech recognition results obtained in five electrode configuration modes.

Results: Thresholds were significantly lower (repeated measures ANOVA) in both monopolar conditions when compared to bipolar mode of stimulation. A binomial statistical analysis indicated that in two of six patients activated in all five modes of stimulation, the monopolar modes of stimulation resulted in improved speech-recognition scores.

Conclusions: The results of the study demonstrate the feasibility of the use of an apical lateral cochlear wall electrode in conjunction with an intrascalar electrode array. It further demonstrated the superiority of monopolar stimulation in selected patients.

Department of Otolaryngology, University of Michigan Medical School.
Funding Source: NIH-NIDCD RO1-DC01851-0
Reprint requests: Paul R. Kileny, Ph.D., University of Michigan Medical Center, Department of Otolaryngology, Division of Audiology and Electrophysiology, TC 1904, 1500 E. Medical Center Drive, Ann Arbor, MI 48109–0312.

THE CLARION MULTI-STRATEGY COCHLEAR IMPLANT: SURGICAL TECHNIQUE, COMPLICATIONS, AND RESULTS: A SINGLE INSTITUTIONAL EXPERIENCE

Anil K. Lalwani, M.D., Jannine B. Larky, M.A., C.C.C.-A., Michael J. Wareing, F.R.C.S., Karen Kwast, C.C.C.-A., M.A., and Robert A. Schindler, M.D.

ABSTRACT

Objective: To review a single institution's experience with the Clarion Multi-Strategy Cochlear Implant, with respect to surgical technique, surgical complications, and rehabilitative outcome.

Study Design: Review of patients implanted with the Clarion Multi-Strategy Cochlear Implant.

Setting: Tertiary referral center with care delivered in inpatient and outpatient settings.

Patients: The first 37 patients were implanted under an Investigational Device Exemption (IDE) as part of the FDA clinical trial of the Clarion implant. Subsequent patients were implanted after the device received FDA approval. Patients met the following criteria for implantation: 18 years of age or older, psychological and emotional stability, profound postlingual deafness without evidence of middle ear disease, one cochlea at least partially patent, and marginal or no benefit from conventional hearing aids.

Intervention: Implantation with the Clarion Multi-Strategy Cochlear Implant.

Main Outcome Measures: Presence or absence of surgical complications; auditory performance with open- and closed-set word and sentence recognition testing.

Results: Forty-seven patients have been implanted. Three patients have suffered complications: two cases of delayed onset facial palsy both resolved with steroid therapy, and one case of internal cochlear stimulator migration required refixation. Significant improvement in speech understanding has been seen in the majority of implantees within the first six months of device use. Specifically, at six months, scores on CID sentences (implant alone) improved from a preoperative mean of 9% to a mean of 72%, and scores on the NU-6 monosyllabic word test increased from a preoperative mean of 3% (range, 0–20%) to a mean of 35% (range, 0–80%). More than two-thirds (68%) of the adults were able to understand at least 50% of sentences over the telephone, and half were able to understand at least 75% of the sentence material.

Conclusions: Our institutional experience with the Clarion Multi-Strategy Cochlear Implant demonstrates minimal surgical morbidity and significant improvement on all open-set test measures of sentence and word recognition.

Division of Otology, Neurotology & Skull Base Surgery, Department of Otolaryngology–Head & Neck Surgery, University of California San Francisco.

Presented at the 130th Annual Meeting of the American Otological Society, Scottsdale, AZ, May 10–11, 1997

Reprint requests: Anil K. Lalwani, M.D., Division of Otology, Neurotology and Skull Base Surgery, Department of Otolaryngology–Head & Neck Surgery, 350 Parnassus Avenue, Suite 210, San Francisco, CA 94117.

COCHLEAR IMPLANTATION AFTER LABYRINTHECTOMY

*George W. Facer, M.D., F.A.C.S., †Robert H. Brey, Ph.D., and †Anna Mary Peterson, M.A.

ABSTRACT

Objective: The goal of the investigation was to report on a method used to aid in the intraoperative ear selected for cochlear implantation employing electrical brainstem response. Initial patient response was compared with longer-term results of cochlear implantation after labyrinthectomy.

Study Design: This was a specific retrospective review of a single case of cochlear implantation after labyrinthectomy.

Setting: The study involved a tertiary referral center in both an ambulatory and hospital setting.

Patient: The study reported on a single patient who was evaluated for the possibility of a cochlear implant, and who then underwent a successful cochlear implant.

Interventions: A case study of a profoundly deaf individual is presented, including the diagnostic measures used to determine the candidacy for cochlear implantation, the ear selected, and rehabilitation.

Main Outcome Measures: Both the early (3 months) and later (14 months) postoperative results clearly demonstrate that a cochlear implant in a prior labyrinthectomy can be beneficial.

Results: The early and later results after cochlear implantation are compared in a single case study.

Conclusions: This case study demonstrates that there is an improvement in sound awareness and speech recognition, as well as improved communication after cochlear implantation in a previously labyrinthectomized ear.

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*Department of Otorhinolaryngology, Mayo Clinic; †Section of Audiology Mayo Clinic.
Reprint requests: George W. Facer, M.D., F.A.C.S., Department of Otorhinolaryngology, Mayo Clinic, 200 1st St., S.W., Rochester, MN 55905.

LANGUAGE ACQUISITION IN PRELINGUALLY DEAF CHILDREN WITH COCHLEAR IMPLANTS

Richard T. Miyamoto, M.D., Mario A. Svirsky, Ph.D., Amy M. Robbins, M.S., and Karen Iler Kirk, Ph.D.

ABSTRACT

Objective: Expressive language skills were assessed in prelingually deafened children who have received a multichannel cochlear implant, and then compared to those of unimplanted deaf children.

Study Design: Regression slopes were calculated from cross-sectional data from unimplanted deaf children to predict language extra growth expected from maturation. Longitudinal language scores were recorded from deaf children who have received a multichannel cochlear implant and compared to those expected from maturation.

Setting: Tertiary referral center.

Patients: Prelingually deafened children who have received a multichannel cochlear implant.

Intervention: Multichannel cochlear implant.

Main Outcome Measure: Expressive language skills assessed using Reynell Developmental Language Scales.

Results: Prelingually deaf children with cochlear implants were language-delayed at the time of implantation, but their rate of language growth after implantation paralleled normal-hearing children.

Conclusions: Prelingually deafened children with cochlear implants acquire language beyond that anticipated from maturation.

Indiana University School of Medicine, Department of Otolaryngology - Head & Neck Surgery, DeVault Otologic Research Laboratory.

Research was supported by NIH-NIDCD grants DC00423 and DC00064.

Reprint requests: Richard T. Miyamoto, M.D., Arilla Spence DeVault Professor and Chairman, 702 Barnhill Drive, Suite 0860, Indianapolis, IN 46202.

LONG-TERM RESULTS REGARDING SOCIALIZATION, REHABILITATION, AND EDUCATION IN CHILDREN WITH COCHLEAR IMPLANTS

Wesley D. Vander Ark, M.D., M. Suzanne Hasenstab, Ph.D., F.A.A.A., Sean K. Kastetter, M.A., C.C.C.-A., and Jon E. Isaacson, M.D.

ABSTRACT

Cochlear implants have been shown to be an effective rehabilitative option for both adults and children with profound sensorineural hearing loss. Studies concerning the impact and effect of these implants have resulted in technological advances and new generations of implants. The primary objective of a cochlear implant is to help individuals who are profoundly deaf function more easily in society. The 1995 NIH Consensus Conference Statement on Cochlear Implants states that the effect of implants on adults has been excellent, with less dependency and loneliness, and improved social integration. However, the social, educational, and rehabilitative effect of these implants on children has only recently been under investigation.

Through the cooperation of Cochlear Corporation, we mailed a survey of 25 questions to parents of 2,626 children implanted with the Nucleus 22 channel implant over the past 10 years at centers in the United States and Canada. The questionnaire addressed educational level, rehabilitative services, and socialization of these children following implantation. For the purpose of this paper, descriptive analyses were performed on selected items to determine educational and rehabilitative services children are receiving and the activities in which they participate. Further in-depth analyses of the data are in progress.

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

Reprint requests: M. Suzanne Hasenstab, Ph.D., F.A.A.A., Medical College of Virginia Hospitals, P.O. Box 980150, Richmond, VA 23298.

COCHLEAR IMPLANTATION IN CHILDREN UNDER TWO YEARS OF AGE

Susan B. Waltzman, Ph.D., and Noel L. Cohen, M.D.

ABSTRACT

Objective: The purpose of this study was to determine the viability of implanting children less than two years of age and to assess the development of speech perception.

Study Design: This was a prospective study with a follow-up period of one to five years.

Subjects: The subjects consisted of 11 consecutive profoundly deaf children from ages 14 to 23 months who were implanted with the Nucleus cochlear implant at NYU Medical Center.

Methods: Closed- and open-set speech perception was assessed preoperatively and postoperatively using the following measures: ESP, NU-CHIPS, GASP word, GASP sentence, PBK word, Common Phrases, MLNT, and LNT tests.

Results: A paired *t*-test was used to examine changes in scores from the preoperative test interval to the last available postoperative assessment. Results indicate that all subjects had significant improvement from their preoperative performance to the last postoperative evaluation, and all were using oral language as their means of communication. There were no medical/surgical complications.

Conclusions: Children less than two years of age receive substantial benefit from a multichannel cochlear implant with no increase in risk when compared with older children.

Department of Otolaryngology, New York University School of Medicine. Research was supported by the Oberkotter Foundation and NIH NIDCD #5P01DC00178.

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SPEECH RECOGNITION PERFORMANCE OF OLDER CHILDREN WITH COCHLEAR IMPLANTS

Mary Joe Osberger, Ph.D., Laurel Fisher, Ph.D., Susan Zimmerman-Phillips, M.S., Lisa Geier, M.A., and Mary J. Barker, M.A.

ABSTRACT

Hypothesis: The primary purpose of this study was to determine whether children five years of age and older, with onset of deafness prior to the acquisition of spoken language (i.e., prelingually deafened) derived more benefit from multichannel cochlear implants than from conventional hearing aids. It was hypothesized that children who used oral communication (speech plus listening) would demonstrate higher levels of performance after implantation than children who used total communication (English sign system plus speech and listening).

Background: Previous research suggests that prelingually deafened children implanted at an older age derive limited benefit from cochlear implants. Changes in candidacy criteria and advances in technology, however, may make cochlear implants a more viable treatment option for this patient group.

Methods: A within-subjects, repeated-measures design was used to compare patients' preoperative performance with hearing aids to postoperative performance with the Clarion cochlear implant after three and six months of device use. Pre- and postoperative performance was analyzed separately for children who used oral and total communication.

Results: Both groups of children (oral and total communication) demonstrated significant postoperative improvement on all outcome measures over time. Postoperative scores of the children who used oral communication were significantly higher than those of the children who used total communication on four of the five outcome measures.

Conclusions: Prelingually deafened children who do not receive cochlear implants until five years of age or older derive significant benefit from current implant devices compared to that obtained with conventional hearing aids. The greatest benefit is derived by children who use oral communication, with much more limited benefit achieved by children who use total communication.

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DISCUSSION PERIOD I
COCHLEAR IMPLANTS AND PEDIATRIC COCHLEAR IMPLANTS
Papers 1–9

Dr. Joseph C. Farmer Jr. (Durham, NC): Thank you very much. The floor is open for discussion of these four papers and also the five papers presented in the first session.

Dr. Mansfield Smith (San Jose, CA): I congratulate Dr. Osberger for having set the gold standard for a voice presentation this morning. Thank you.

Dr. Farmer: I'm sorry we are having so much trouble this morning, but maybe with time, things will gradually work out. I think this room has an echo. It has several echoes as a matter of fact.

Dr. Douglas Bigelow (Philadelphia, PA): In regard to the paper earlier on cochlear implantation after labyrinthectomy, what would the authors do, or anybody else who has experience with this, if they did not get any results with promontory stimulation prior to implantation after labyrinthectomy?

Dr. George Facer (Rochester, MN): There have been several reports that if you do not get a response to a transtympanic promontory stimulation, you still may get a reaction with the cochlear implant and electrically stimulate the cochlea. In two of our patients who had bilateral acoustic neuromas we have done promontory stimulation. As we did not obtain a response, we did not implant the patients, electing tactile aid rehabilitation. So, I do not know.

Dr. Noel Cohen (New York, NY): We have implanted, I believe, four patients, who had a negative promontory stimulation on both ears and none of them achieved open-set speech understanding. But they all had some response and some closed-set understanding. We have implanted one patient who had an acoustic neuroma removed with an attempt to preserve hearing. We saved the nerve, lost the hearing, and did a promontory stimulation ten days postoperatively, which was negative. We repeated it a month later and, since the promontory stimulation was now positive, we put a cochlear implant in him. He is about three years postoperative and has open-set word understanding and can use the telephone.

Dr. Bruce Gantz (Iowa City, IA): I would like to ask Dr. Osberger two questions. I enjoyed your presentation. The results that you are showing at six months are extremely impressive for children that are prelingually deafened. Did the kids in the oral programs have a little more hearing than those that were in the TC programs preoperatively? Secondly, do you think, since we have all seen that it takes a couple of years for some of these prelingual kids to obtain open-set word understanding, that the TC kids will catch up over time?

Dr. Mary Joe Osberger (Sylmar, CA): First of all, the oral children did have better unaided pure tone thresholds, and that may be why they end up in oral programs—because the potential is better for them there. The point I was trying to make was not that one method is better than the other, but, given this is the way these children present themselves for cochlear implantation, what are the predicted outcomes? Because we have been asked, how well are these older children doing and should we still implant them? I think the previous history of the child is extremely important, especially in these older children. If they have had oral training, if they have a little bit of residual hearing, I think these results are suggesting that they can do very, very well with the cochlear implant. The TC children who are older gain some benefit, but it is not as extensive; I think this needs to be conveyed to families considering the cochlear implant. When we look at our whole study group in terms of the oral and TC children, the TC children—even those implanted at a younger age—do benefit, but so far at least, after 12 months of device use, they do not catch up. Whether they will or not I do not know, and of course, as I mentioned, there are many factors that decide what communication mode is appropriate for a child, but I am not trying to address that. I am just saying the way these kids show up at your implant center, these are some predicted results based on what they are like when they come to you.

Dr. Edgar Chissone (Caracas, Venezuela): I have a question for Dr. Cohen. Regarding your 11 patients under two years of age, what was the age of the youngest patient at the time of operation? Where

will be the limit to the earliest age at implantation?

Dr. Cohen: Our youngest child was 14 months. To the best of my knowledge, there was a child of 11 months operated on. I do not know if anyone has done a cochlear implant on a child younger than that.

Dr. Paul Kileny (Ann Arbor, MI): Just a couple of brief, follow-up comments on Dr. Osberger's excellent presentation. First, I think we have to make sure that we distinguish between a total communication program where little or no oral education is used, and one where, in fact, oral speech is used in conjunction with sign. Additionally, we have followed these kinds of children at the University of Michigan, and we find that if you look at them beyond two years postimplantation they equalize. So the TC children no longer do poorer than the oral children. I think the initial results six months postoperatively are similar to what Dr. Osberger showed, but if you follow them further down the line they tend to equalize.

ASSOCIATION OF COL1A1 AND OTOSCLEROSIS: EVIDENCE FOR A SHARED GENETIC ETIOLOGY WITH MILD OSTEOGENESIS IMPERFECTA

†Michael J. McKenna, M.D., †‡Arthur G. Kristiansen, †Mary L. Bartley, R.N., §John J. Rogus, Sc.D., and ‡‖Jonathan L. Haines, Ph.D.

ABSTRACT

Otosclerosis is a common bone disease of the human otic capsule that has an underlying hereditary predisposition. The histopathology and clinical manifestations of otosclerosis are strikingly similar to the milder forms of osteogenesis imperfecta in which mutations of type I collagen genes have been established as the underlying cause. We investigated the genetic basis of otosclerosis by conducting an association study using polymorphic DNA markers from patients with clinical otosclerosis and random controls. This study revealed a significant association between clinical otosclerosis and the type I collagen COL1A1 gene using three different polymorphic markers within the gene. We propose that some cases of clinical otosclerosis are caused by mutations within the COL1A1 gene that are similar to those found in mild forms of osteogenesis imperfecta, and that result in null expression of the mutant allele. The initiation of the remodeling process may be caused by a persistent measles virus infection, and its extension and spread may be related to abnormalities in bone metabolism caused by COL1A1 mutations.

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A HUMAN TEMPORAL BONE STUDY OF STAPES FOOTPLATE MOVEMENT

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ABSTRACT

Hypothesis: This study was designed to determine whether stapes movement is pistonlike or complex.

Background: The literature provides conflicting information on whether stapes footplate motion is only pistonlike or has other types of movement, such as hingelike or rocking.

Methods: Using ten freshly harvested human cadaver temporal bones, three targets were placed on the stapes footplate through an extended facial recess approach. The targets were 0.5 mm pieces of reflective adhesive material positioned on the long axis of the footplate at the anterior crus, central footplate, and posterior crus. Displacement and phase of the three targets were measured from 0.2 to 10 kHz at an 90-dB sound pressure level input at the tympanic membrane. The measuring system was a sophisticated laser Doppler vibrometer (LDV). A computer program (Tymptest) calculated footplate displacement and relative phase at the three sites as well as the ratio of anterior-posterior rocking movement of the footplate long axis to displacement at the center.

Results: Above 1.0 kHz, anterior-posterior rocking motion increases logarithmically with frequency; below 1.0 kHz stapes vibration is predominantly pistonlike.

Conclusions: The clinical application of these findings is in ossicular replacement prosthesis design that will mimic normal stapes vibration, minimize rocking, and maximize pistonlike movement.

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EARLY POSTLASER STAPEDOTOMY HEARING THRESHOLDS

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ABSTRACT

Objective: Auditory testing is not routinely performed within four to six weeks after stapedotomy, because hearing acuity is thought to be transiently depressed. In rare circumstances, postsurgical auditory and vestibular complaints may lead to hearing testing soon after stapedectomy. The early postoperative effects of CO_2 and KTP lasers, which are now routinely used to perform stapedotomies, have not been reported. The purpose of this report is to present normative data for auditory thresholds measured within two weeks of laser stapedotomy.

Study Design: Prospective, unblinded.

Setting: Three academic medical centers.

Patients: Thirty-six subjects undergoing stapedotomy for otosclerosis by five surgeons.

Main Outcome Measures: Behavioral audiometry was performed using standard techniques preoperatively, and less than or equal to 14 days and more than 30 days postoperatively.

Results: The CO_2 laser was used in 26 stapedotomy procedures and the KTP laser was used in 12. Nine cases were revision procedures. Bone conduction pure tone averages and speech discrimination scores did not worsen during the early postoperative period. Bone conduction at 250 and 4,000 Hz dropped slightly within the first two weeks (−4.3 and −6.7 dB) but recovered thereafter. Bone conduction at 1,000 Hz actually improved within the first week postoperatively (+6.2 dB, $p = 0.021$). Significant improvements in air-conduction thresholds (and air-bone gap) were seen at the second week and late (>30 days postoperatively) audiometry. The results for CO_2 and KTP laser-treated groups were not significantly different.

Conclusions: Cochlear function is not significantly depressed in the early postoperative period following laser (CO_2 or KTP) stapedotomy.

From the Departments of Otolaryngology at the *University of Florida, †Tulane University, ‡Michigan Ear Institute, and §Providence Hospital.

Presented at the 130th Annual Meeting of the American Otological Society, Scottsdale, AZ, May 10–11, 1997.

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LASER STAPEDOTOMY MINUS PROSTHESIS (LASER STAMP): A MINIMALLY INVASIVE PROCEDURE

Herbert Silverstein, M.D.

ABSTRACT

Objective: To determine whether hearing can be restored in patients with minimal otosclerosis using a laser without a prosthesis.

Study Design: Retrospective case review of 12 patients with minimal otosclerosis who underwent a laser stapedotomy without prosthesis (laser STAMP) procedure.

Setting: An otology/neurotology tertiary referral center.

Patients: Patients were chosen for the procedure if there was a blue footplate with minimal otosclerosis confined to the *fissula ante fenestrum*.

Interventions: Using a handheld probe (CeramOptic) and the HGM argon laser, the anterior crus of the stapes was vaporized. Next, a linear stapedotomy was made across the anterior one-third of the footplate. If otosclerosis is confined to the fissula antefenestrum, the stapes becomes completely mobile. The stapedotomy opening is sealed with an adipose tissue graft from the ear lobe.

Main Outcome Measures: Pure-tone audiometry with appropriate masking and auditory discrimination testing before surgery, at six weeks and one year after surgery.

Results: The average air-bone gap was closed to a mean of 2.6 dB (SD, 3.3 dB). The average improvement in air-bone gap was 17.4 dB (SD, 7.6 dB). The discrimination scores remained unchanged. Audiometric testing of five cases with one year follow-up demonstrates that excellent hearing results are maintained.

Conclusions: In selected cases of minimal otosclerosis confined to the *fissula ante fenestrum,* normal mobility of the ossicular chain can be obtained without a prosthesis by vaporizing the anterior crus and making a linear stapedotomy across the anterior one-third of the footplate. The advantages of the procedure are that the stapedius tendon and most of the normal stapes remain intact, eliminating hyperacusis. The procedure is less invasive: inner ear trauma is reduced, possible prosthesis problems are avoided, and postoperative barotrauma risk is minimized. Minimal surgery is done for minimal disease. If the stapes refixes at some time in the future, a conventional stapedotomy can still be performed.

Research supported by a grant from the Ear Research Foundation, Sarasota, FL.

Presented at the 130th Annual Meeting of the American Otological Society, Scottsdale, AZ, May 10–11, 1997.

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FORTY YEARS OF STAPES SURGERY

John J. Shea Jr., M.D.

ABSTRACT

During the past forty years, I have performed 14,449 stapedectomy operations.

The age at operation ranged from 6 to 89 years, the average age was 52 years. The otosclerotic focus was anterior in 58%, in the rim in 25%, obliterated in 11%, in the footplate in only 5%, posterior in 0.5%, and inferior in 0.4%.

Primary stapedectomy was performed on 76%, and revision stapedectomy on 24%. The entire footplate was removed in 29%, and one-half or less of the footplate in 71%.

The oval window opening was sealed with vein in 55%, with the lining membrane of the middle ear in 25%, with Gelfoam in 9%, with perivenous loose connective tissue in 7%, and fascia, perichondrium, etc., in 4%.

The original Teflon piston was used in 59% of ears, especially in the beginning, but after the development of the platinum Teflon cup piston prosthesis in the late 1960s, this prosthesis was used in almost all operations, primary and revision.

In the primary stapedectomy group, success was achieved in 95.1% of ears after 1 year, 94.7% of ears after 2 to 5 years, and 62.5% after more than 30 years. In the revision stapedectomy group, success was achieved in 71.1% after 1 year, 62.4% after 2 to 5 years, and 59.4% after 6 to 36 years. Further sensorineural hearing loss occurred in 1.8% of primary operations, and 4% of revisions.

The causes of delayed conductive hearing loss were dislocation of the prosthesis in 41.5% of ears, eversion of the lining membrane of the vestibule, with or without erosion of the lower incus in 26.3% of ears, bony and/or fibrous closure of the oval window in 15.7% of ears, epitympanic fixation of the incus and/or malleus in 14.3% of ears, and other causes in 2.2%.

Complications included complete sensorineural hearing loss in 86 (0.6%) ears, perilymph leak in 37 (0.25%) ears, tympanic membrane perforation in 27 (0.18%) ears, and temporary facial nerve paralysis in 11 (0.07%) ears. In about 30%, there was a significant sensorineural hearing loss coming on after 20 years, more than one would expect in matched controls without otosclerosis.

On balance, stapedectomy and reconstruction of the sound-conducting mechanism of the middle ear has been a successful operation, restoring the hearing in most patients, and it has stood the test of time, now 40 years.

Shea Clinic

Presented at the 130th Annual Meeting of the American Otological Society, Scottsdale, AZ, May 10–11, 1997.

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DISCUSSION PERIOD II
OTOSCLEROSIS, STAPES FUNCTION AND SURGERY
Papers 10–14

Dr. Joseph C. Farmer Jr. (Durham, NC): The floor is now open for discussion of these papers.

Dr. Eugene L. Derlacki (Chicago, IL): What goes around comes around. I really enjoyed Herb Silverstein's presentation on partial stapedectomy. Dr. Harold Schuknecht had a magnificent symposium at the Henry Ford Hospital and I know a number of people in the audience who attended that. A lot of us were showing our particular techniques. I was slow to adopt Dr. John Shea's complete stapedectomy so I entitled our technique "the graduated bypass stapes surgery." Without the benefit of that wonderful laser we used to accomplish the removal of the distal portion of the anterior crus and the anterior involvement just posterior as it extends into the footplate. Those cases did beautifully. It is a fine technique. John, you might give it a try. I loved it. I have done many ears in which I have done the second ear maybe 25 years later and did a stapedectomy; the partial stapedectomy was still holding up beautifully. It is a good technique.

Dr. John House (Los Angeles, CA): A question and a comment regarding Dr. Shea's paper. I enjoyed it very much. It is a wonderful experience and thank you for sharing everything. The question I have is, why use the preoperative bone conduction in comparison to the postoperative air, particularly in your long-term follow-up, because I would really like to see what has happened to the conductive component of the hearing loss over the years. We know that the nerve obviously will deteriorate over time, but what happens to the actual air-bone gap? So we should really be comparing the bone conduction at the time of the air-conduction audiogram. Do you have any comment regarding what has actually happened to the air-bone gap over the years? I have a question for Herb Silverstein. Herb, why do you do it under general anesthesia instead of local?

Dr. Herb Silverstein (Sarasota, FL): We have been doing all stapes surgery under general anesthesia since 1983, when my fellowship program started. I do this mainly for the patient's comfort. The patients seemed to like the general anesthesia and I have had no problems using it. One thing I forgot to mention in my paper is that my partner, Dr. Seth Rosenberg, says he is going to get a paper out of this one way or another in a few years to determine whether this operation will hold up.

Dr. John Shea (Memphis, TN): To answer Dr. House's question, actually I kept the air-bone gap as the criterion we looked at. We call that decline in bone conduction a complication rather than a failure. So, we have the failure and success rate, but we are looking at the decline in hearing, actually, over time. All of us know that about one-third of the patients we do stapedectomy on over time go back to wearing hearing aids because their nerve declines. That is what we are looking at. I would like to have Dr. Ge stand up; he is my fellow from Shanghai who spent a year doing this study, in which he analyzed 5,000 patients. We looked at some 40-year results with the anterior crurotomy operation we did in the early period. Our initial results were good, but over time there was refixation and a decline in the air-bone gap closure in about 20% of these. We did not do them with a laser; perhaps the results would have been better with a laser.

Dr. Richard Goode (Palo Alto, CA): I had a comment on Dr. Antonelli's excellent paper and the thought is that the laser stapedotomy with the smaller opening produces less serous labyrinthitis. There is another explanation that I would raise that we found in the laboratory relating to air bubbles entering the cochlea at the time of the surgery. With the smaller hole of the laser stapedotomy at least intuitively you would think that there may be less air-bubble entry. The larger the hole, there might be more. These bubbles produce a sensorineural hearing loss, which has also been reported in humans by Yanagihara, but at the higher frequencies. We think the bubbles take a while to get out, maybe weeks—though you would think it may be less—but it is certainly several days. So, these early losses reflect a mechanical problem that is absorbed rather than a difference in trauma, although obviously that could exist also.

Dr. Neil M. Sperling (Brooklyn, NY): I have a question for Dr. McKenna and also for Dr. Shea, perhaps. Surgeons today can only dream of a 15,000-

case experience with stapes surgery. I wonder if there is any real evidence that the incidence of the disease has changed or whether the backlog of cases from previous years has been used up?

Dr. Michael McKenna (Boston, MA): I ask this question so often. Basically, there are two explanations that could be playing a role. One is that back in the heyday when Drs. Shea and House first got going on stapedectomy, there was a tremendous backlog of patients who needed operations, and there were only a few people who were doing the operation. They were the people who could accumulate this kind of experience until eventually a steady state was reached. At the same time a number of other surgeons became trained in the technique and the patient pool was diluted. The other possible explanation is the putative role of the measles virus in otosclerosis. We know that the incidence of subacute sclerosing panencephalitis, which is a persistent measles virus infection of the central nervous system, dropped to about one-third of what it was before the advent of the live measles vaccine in the 1960s. It would also not be surprising if it had had some influence on the incidence of otosclerosis. It is difficult to get that data in this country because of the way our health-care system is organized, but there is some evidence from Sweden to suggest that the incidence of newly diagnosed otosclerosis is on the decline suggesting perhaps a possible effect. I talked to Dr. Bretlau about this and he tells me in his country that does not appear to be the case. So, that is one explanation that might account for it, but we do not have the answer at this point.

THE PROTECTIVE ASPECTS OF BRAIN DERIVED NEUROTROPHIC FACTOR (BDNF) FOLLOWING GENTAMICIN OTOTOXICITY

*Ivan Lopez, Ph.D., *Vicente Honrubia, M.D., D.M.Sc., *Seung-Chul Lee, M.D., *Won-Ho Chung, M.D., *Gang Li, M.D., Ph.D., *Karl Beykirch, M.S., and †Paul Micevych, Ph.D.

ABSTRACT

The effect of brain derived neurotrophic factor (BDNF) in the process of hair cell recovery was investigated in the vestibular sensory epithelium of the chinchilla after local gentamicin (GM) ototoxic treatment. The inner ear of a group of animals was treated simultaneously with a Gelfoam® pellet containing 50 μg of GM and the other containing 1 μg BDNF. A second group of animals were treated with a 50 μg GM pellet and one week later with another pellet with 1 μg of BDNF. Data from these animals were compared with that from animals that received GM only for the same time periods. Histologic analysis of the treated horizontal semicircular canal cristae was made at the light microscopic level and the number of hair cells and supporting cells was estimated using the optical dissector method. One week after simultaneous treatment of GM and BDNF, type I hair cells decreased to 20% of the normal value, but type II hair cells number did not change (121%). The number of supporting cells remained near normal (92%). These results are in contrast to GM treatment alone, in which all type I hair cells were destroyed, and only a small fraction of type II hair cells survived (15%). At two weeks posttreatment, all type I hair cells disappeared, but type II hair cells decreased to 80%. Supporting cells decreased significantly (63%). In GM–only treatment, no type I hair cells were present, only 18% of type II hair cells survived and supporting cells decreased to 74%. At four weeks posttreatment, type II hair cells recovered to the normal value (114%), no type I hair cells were found, and the number of supporting cells was near normal (85%). Similar values were observed at eight weeks posttreatment. In GM–only treatment, type II hair cell numbers never reached the normal value (77%) and supporting cells slightly decreased to 85%. In the second group, at two weeks after GM administration (one week after BDNF application), the sensory epithelium had numerous type II hair cells (81%), however, no type I hair cells were found. Normal-looking supporting cells (76%) were found at the base of the sensory epithelium aligned over the basal lamina. The accelerated recovery continued at the four-week time point, when the sensory epithelium had numerous well-developed type II hair cells (104%) and 12% of type I hair cells. Supporting cells were at the untreated levels representing 109%. At eight weeks posttreatment, the recov-

ery of type II hair cells and supporting cells was complete although the recovery of type I hair cells was limited. These results suggest that BDNF minimizes the ototoxic effect of GM on the hair cells. The surprisingly large number of new hair cells after BDNF in the GM-treated animal is clear evidence of the proliferative regenerative capacity of the sensory organs, and that BDNF induces cell proliferation.

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EFFECT OF PROTECTIVE AGENTS AGAINST CISPLATIN OTOTOXICITY

Leonard P. Rybak, M.D., Ph.D., Kazim Husain, Ph.D., Craig Morris, B.S., Craig Whitworth, M.A., and Satu Somani, Ph.D.

ABSTRACT

Hypothesis: The goals of this investigation are to compare the efficacy of three protective agents against cisplatin-induced elevation of auditory brainstem response (ABR) thresholds, and to examine whether these protective agents prevent cisplatin-induced alterations of the antioxidant defense system in the cochlea of the rat.

Background: Cisplatin is an ototoxic antitumor agent. Previous animal studies have shown that cisplatin administration causes an elevation of ABR thresholds. These auditory changes are accompanied by alterations in the concentration of glutathione (GSH) and the antioxidant enzymes in the cochlea. Our previous work has indicated that the protective agent diethyldithiocarbamate (DDTC) prevents the decrease in GSH, the alteration of antioxidant enzyme activity, and the disruption of cochlear function with cisplatin administration.

Methods: Wistar rats were sedated and underwent pretreatment ABR testing using clicks and tone-burst stimuli at 8, 16, and 32 kHz. Control rats received saline by IP injection. Positive controls were administered cisplatin (16 mg/kg IP). Three groups of rats received protective agents in combination with cisplatin. DDTC–protected rats were given 600 mg/kg of DDTC subcutaneously 1 hour after cisplatin. MTBA–protected animals were given 250 mg/kg of this agent IP 30 minutes before cisplatin. Animals protected with ebselen were given 16 mg/kg IP 1 hour before cisplatin. ABR thresholds were reported 72 hours after cisplatin administration in all groups. Cochleas were removed and extracts of the tissues were analyzed for GSH, activities of antioxidant enzymes (superoxide dismutase, catalase, glutathione peroxidase, and glutathione reductase), and malondialdehyde (MDA) (as an index of lipid peroxidation).

Results: Cisplatin-treated rats were found to have significant ABR threshold shifts, ranging from 27 to 40 dB. Rats administered each of the three protective agents in combination with cisplatin were found to have ABR threshold shifts of less than 10 dB. The cochleas of rats administered cisplatin alone were found to have nearly a 50% depletion of GSH, and about a 50% reduction in the activities of superoxide dismutase, glutathione peroxidase and glutathione reductase, while catalase activity reduced to 70% of control value. These changes were accompanied by a reciprocal elevation of MDA of 165%. These changes, namely the depletion of GSH and antioxidant enzyme activity and MDA elevation in the cochlea were largely attenuated by the administration of the protective agents tested.

Conclusion: These findings suggest that cisplatin ototoxicity is related to lipid peroxidation, and that the use of protective agents prevents hearing loss and lipid peroxidation by sparing the antioxidant system in the cochlea. These results suggest the possibility that the clinical use of protective agents could effectively reduce or prevent damage to the inner ear of patients receiving cisplatin chemotherapy, provided that the antitumor effect is not altered.

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CHOLESTEATOMA: A MOLECULAR AND CELLULAR PUZZLE

Anthony P. Albino, Ph.D., Charles P. Kimmelman, M.D., and Simon C. Parisier, M.D.

ABSTRACT

Cholesteatomas can result from several specific insults: (1) negative middle ear pressure or inadequate ventilation, (2) ingrowth of keratinizing epithelium at the margin of a perforation, (3) invagination of the tympanic membrane in the form of a retraction pocket, and possibly (4) metaplasia of the middle ear mucosa or tympanic membrane epithelium. However, the specific biological programs induced by these insults, as well as the molecular and cellular defects that result in the clinical hallmarks of acquired and congenital cholesteatomas, are unknown. The focus of our ongoing research is to determine the existence of defects in the normal biology, biochemistry, and genetic complement of the major cellular constituents comprising a cholesteatoma (i.e., fibroblasts and keratinocytes). This knowledge will be critical in answering a number of important questions for which we have no satisfactory answers. For example: (1) What are the specific molecular and cellular defects that explain each clinical feature of cholesteatomas (i.e., invasion, migration, uncoordinated proliferation, altered differentiation, aggressiveness, and recidivism)?; (2) Are the different types of cholesteatomas (i.e., acquired, congenital, and recidivistic) also different at the molecular and cellular levels?; and (3) How can this knowledge be useful in a clinical setting?

Before resolving the molecular basis for the pathogenesis of cholesteatomas, it is important to first present plausible models that could explain how a cholesteatoma becomes invasive, migratory, hyperproliferative, aggressive, and racidivistic. Although these biological phenomena can be treated as individual events in the discussion of a model system, several of these traits are probably inseparably linked *in vivo*. There are at least four possible molecular models of cholesteatoma pathogenesis: (1) low-grade squamous neoplasia (2) defective wound healing; (3) pathologic collision of the host inflammatory response, middle ear epithelium, and a bacterial infection; and (4) unknown idiopathic process.

Our analysis to date supports several suppositions concerning the pathobiology of cholesteatomas. First, cholesteatoma epithelium behaves more like a wound-healing process than a neoplasia. The available evidence to date does not indicate that cholesteatomas have inherent genetic instability, a critical feature of all malignant lesions. Second, the induction of hyperproliferative cells in all layers of the cholesteatoma epidermis implicates a potential idiopathic response to both internal events, as well as external stimuli in the form of cytokines released by infiltrating inflammatory cells. Third, the presence of bacteria may provide a critical link between the cholesteatoma and the host, which

prevents the cholesteatoma epithelium from terminating specific differentiation programs and returning to a quiescent state in which it becomes minimally proliferative, nonmigratory, and noninvasive. Fourth, none of our data suggests that there are any obvious molecular or cellular differences between the various types of cholesteatomas (primary and secondary acquired, recidivistic, and congenital). Continued research should delineate the precise molecular and cellular dysfunctions involved in the pathogenesis of cholesteatomas, and show how this knowledge can be useful in the clinical management of cholesteatomas.

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Research was supported by funds from The Children's Hearing Institute of The Manhattan Eye, Ear, and Throat Hospital.

CYTOTOXICITY OF CYTOKERATIN MONOCLONAL ANTIBODY AGAINST KERATINOCYTES: A POSSIBLE THERAPEUTIC ADJUNCT FOR CHOLESTEATOMA?

Moisés A. Arriaga, M.D., F.A.C.S., and †Patricia Dixon, M.S.

ABSTRACT

Hypothesis: Monoclonal antibodies directed against cytokeratin subtypes in cholesteatoma produce growth inhibition of keratinocytes.

Background: Despite elegant surgical procedures for cholesteatoma, residual disease is an important clinical problem. Although gross cholesteatoma removal is usually feasible, microscopic foci of residual keratinocytes may develop into clinically significant disease. This study was designed to evaluate the keratinocyte cytotoxicity of monoclonal antibodies directed against a cytokeratin subtype relatively unique to cholesteatoma.

Methods: Keratinocytes and skin fibroblasts were trypsinized, counted, and seeded in multiwell plates. The cells were exposed to mouse monoclonal antibody to cytokeratin 10 at dilutions of 1:10, 1:25, 1:50, 1:100, and 1:200 with 6 replicates. After 24, 48, and 96 hours of incubation, cells that had been pulsed with 3H-thymidine were harvested. Cellular DNA was processed for quantification of 3H-thymidine incorporation with a beta scintillation counter. Cells exposed to antibody are reported as percent inhibition relative to controls.

Results: Inhibition ranged from 88.9% for the 1:10 concentration to 26.9% for the 1:200 concentration following 24 hours of incubation. Similar effects were noted at the 48- and 96-hour intervals. Overall, the effect was significantly more pronounced on the keratinocytes than inhibition on skin fibroblasts.

Conclusions: These results suggest that monoclonal antibodies have *in vitro* activity against keratinocytes. Additional investigation of a possible role for cytokeratin monoclonal antibodies should be pursued with a goal of developing a clinically useful biological adjunct for cholesteatoma management.

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Presented at the 130th Annual Meeting of the American Otological Society, Scottsdale, AZ, May 10–11, 1997.

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DISCUSSION PERIOD III
OTOTOXICITY AND CHOLESTEATOMA
Papers 15–18

Dr. Joseph C. Farmer Jr. (Durham, NC): We have some time for discussion.

Dr. Cecil Hart (Chicago, IL): I would like to compliment Dr. Lopez on the clarity of his presentation. Theoretically, it seems to be possible that the factor might have an additional, or an only, effect on inhibiting the effect of gentamicin, rather than protecting the target organ. If that is the case, perhaps it might have a deleterious effect on the efficacy of gentamicin in its primary purpose. This is theoretical, and I wonder if you have any thoughts on that. Perhaps the concomitant vs. sequential treatment might clarify it.

Dr. Michael D. Seidman (Detroit, MI): I have a question for Dr. Rybak. Have you looked at N-acetyl cysteine? You know, there is some suggestion that N-acetyl cysteine will get into the cells better than possibly glutathione and maybe have a greater protective effect.

Dr. Leonard Rybak (Springfield, IL): That is one agent we have not tried yet in vitro. Dr. Richard Kopke did use N-acetyl cysteine in vitro, and found some protective effect. So that would be worth looking at.

Dr. Ivan Lopez (Los Angeles, CA): Gentamicin has different effects, as demonstrated here. In the first experiment it has a proliferative and in the second experiment it has a preventive effect. We are going to begin to study the mechanism for this.

Dr. Charles M. Luetje (Kansas City, MO): Dr. Rybak, have you had any experience with the agents used with carboplatin in BBBD (blood-brain-barrier disruption)?

Dr. Rybak: The group at Oregon, which is primarily involved in the study of BBBD, has found high-dose sodium thiosulfate to be effective. One potential problem is possible interference with the antitumor effect, but so far they do not think that is a problem. They had a tremendous incidence of hearing loss in those patients in whom they did disrupt the blood-brain-barrier with carboplatin combination. So far, they seem to be getting protection with the thiosulfate and the desired antitumor effect, as well.

Dr. Ruediger Thalmann (St. Louis, MO): I would like to ask Dr. Lopez why he thinks in the 50 years since aminoglycosides were introduced and the ototoxic effects were seen that the powerful, spontaneous regenerative ability of type II hair cells has been overlooked by our colleagues? Secondly, do these cells reconnect with the nerve supply? If this is the case, and they start functioning, do we need to re-evaluate our thinking about central vestibular compensation?

Dr. Lopez: There are two systems—the hair cells and the nerve fibers, but they communicate very closely. For example, BDNF because it is present in both places, it can in some cases protect the hair cells and in some cases protect the nerve fibers.

Dr. Mohamed Hamid (Cleveland, OH): I have a question for Dr. Lopez. Did you notice any concomitant physiological and behavioral changes in the animal that underwent toxicity vs. the others?

Dr. Lopez: This study was specifically done in animals we studied histologically; we have another group of animals where we are beginning to study the recovery with gentamicin alone and with BDNF, but we have only preliminary data. We have seen some increased recovery in animals treated with BDNF for up to six months but this study is preliminary.

INTRATYMPANIC GENTAMICIN INJECTION FOR THE TREATMENT OF MENIERE'S DISEASE

Tarek F. Youssef, M.D., and Dennis S. Poe, M.D., F.A.C.S.

ABSTRACT

Objective: To study the effectiveness of intratympanic injection of gentamicin as an option in the treatment of unilateral Meniere's disease patients who are refractory to medical treatment.

Study Design: Prospective case series.

Setting: Physician's office setting in a tertiary-care hospital.

Patients: The results of 37 patients who became eligible for reporting according to the American Academy of Otolaryngology Head and Neck Surgery (AAO-HNS) guidelines for reporting treatment results of Meniere's disease.

Intervention: Intratympanic injections of a prepared gentamicin concentration of approximately 30 mg/ml were given on a weekly basis until the patient reported cessation of vertigo attacks. Patients reclined for 45 minutes after each injection.

Outcome Measures: The 1995 AAO-HNS guidelines were used in this report, and measures included pure tone hearing results, word recognition scores, vertigo control scores, and ice water calorics after a 24-month minimum follow-up.

Results: Vertigo control was achieved in 32 patients (87%), 15 patients (41%) had complete recovery from vertigo spells, 17 (46%) had substantial recovery, and 5 (14%) had treatment failure requiring additional surgery to control vertigo. Hearing results showed that 21 (72%) patients had unchanged or better hearing, 10 (28%) patients had an average threshold shift of 10–25 dB, 4 patients (11%) had a threshold shift between 16–25 dB, 1 patient (3%) 26–40 dB, and 1 patient (3%) had a threshold shift of more than 40 dB.

Conclusions: We found intratympanic gentamicin to be a useful alternative to surgery. The flexible treatment protocol allowed for better hearing monitoring compared to the more frequent injection schedules of other studies, and it yielded a lower rate of severe hearing loss. It had a higher failure rate for vertigo control and greater amount of hearing loss than our experience with vestibular nerve section.

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THE ROLE OF ENDOLYMPHATIC MASTOID SHUNT SURGERY IN THE MANAGED CARE ERA

Myles L. Pensak, M.D., F.A.C.S., and Rick A. Friedman, M.D., Ph.D.

ABSTRACT

Objective: Ongoing controversy regarding the surgical management of Meniere's disease has prompted us to review the effectiveness of the endolymphatic mastoid shunt procedure in the control of vertigo. In the current managed care environment where outcome measures, cost effectiveness, and procedural efficacy must be demonstrated, the surgeon can no longer rely upon anecdotal or empirical observations regarding the effectiveness of a treatment paradigm.

Study Design: Retro-operative case review.

Setting: Tertiary care center.

Patients: The records of 327 patients with presumed Meniere's-related vertigo referred to the University of Cincinnati Medical Center were reviewed. One hundred nine patients underwent endolymphatic mastoid shunt. Our study population consists of 96 of these patients that were available for five years of follow-up.

Interventions: Endolymphatic mastoid shunt for the control of medically refractoy vertigo.

Main Outcome Measure: Control of vertigo.

Results: Employing the Arenberg anatomic classification system, patients with a type I endolymphatic sac achieved 68% control of vertigo, those with a type II endolymphatic sac had a 92% control rate, and patients with a type III endolymphatic sac achieved 78% relief.

Conclusions: Based upon an assessment of outcome variables, the authors conclude that there remains a definite role for endolymphatic shunt surgery in the contemporary approach to patients with Meniere's disease.

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Presented at the 130th Annual Meeting of the American Otological Society, Scottsdale, AZ, May 10–11, 1997.

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THE ACUTE EFFECTS OF HEMODIALYSIS ON THE INNER EAR

Jeffrey J. Dyer, M.D., Barry Strasnick, M.D., John T. Jacobson, Ph.D., and Claire A. Jacobson, M.S.

ABSTRACT

Considerable controversy exists in the literature regarding the sensitivity of the cochlear and retrocochlear structures to local hemodynamic change. Over the past two decades, patients undergoing long-term hemodialysis have been noted to suffer a 15–40% incidence of permanent sensorineural hearing loss. A prospective study was therefore undertaken to determine whether the hemodynamic stress of dialysis would contribute to acute inner ear disturbances as measured by auditory brainstem response. Forty-five subjects were examined for latency shifts produced acutely during and after a single dialysis session. Twenty-nine of the 78 ears (37%) meeting inclusion criteria exhibited significant latency delays during hemodialysis ($p < 0.0001$). Forty-one percent of these ears demonstrated at least partial recovery of their delay within minutes after discontinuation of dialysis, while an equal number demonstrated either no recovery or progression of latency delays. No significant difference in acute recovery was observed between short-term and long-term dialysis patients, nor were significant differences noted when patients were subclassified based on serum electrolyte or hematocrit values. These findings suggest that repeated, acute hemodynamic insult may be associated with insidious hearing loss in this patient population, regardless of how adept the cochlear pathways are to hemodialysis. Further study appears warranted to evaluate the long-term sequelae of such hemodynamic variation within the inner ear.

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AUTOIMMUNE INNER EAR DISEASE: CLINICAL CHARACTERISTICS

*†Ralph A. Nelson, M.D., ‡Donald Robertson, M.D., *†M. Jennifer Derebery, M.D., †Karen I. Berliner, Ph.D.*

ABSTRACT

Objective: To describe the clinical characteristics of a large series of patients diagnosed with autoimmune inner ear disease (AIED).

Study Design: Retrospective series review.

Setting: Private, tertiary, multiphysician otologic practice.

Patients: Two hundred seventy-four patients diagnosed as AIED between 1980 and 1996. The 168 females and 106 males had a mean age at diagnosis of 52.4 years, with a range from 7 to 96 years.

Main Outcome Measures: Descriptive statistics for hearing loss (onset, course, thresholds, discrimination), other otologic diagnoses and symptoms, systemic symptoms, other autoimmune diseases, laboratory test results, and treatment approaches.

Results: Patients did not always present with the 'classic picture' of bilateral, rapidly progressive or fluctuant hearing loss. Only 62% presented with bilateral loss. Most patients had tinnitus (82%) and 60% had vestibular symptoms. The review of systems often contained findings consistent with systemic autoimmunity, including 24.5% with musculoskeletal symptoms. Allergy was present in 35%, and 34% had one or more other specific autoimmune diagnoses. Diagnosis was usually based on clinical suspicion (61%) and was based on laboratory findings alone in only 18%. Overall, 74% had at least one positive laboratory test. Most patients had either a sloping or a flat audiogram. Median time to diagnosis was 1.1 months (mean, 41.6 months; SD, 84.6 months, with some very large outliers).

Conclusions: There is considerable variability around the classic presentation picture. To avoid treatment delay, other symptoms and signs suggestive of autoimmunity must arouse suspicion of the diagnosis. There is no substitute for sound clinical judgment.

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Presented at the 130th Annual Meeting of the American Otological Society, Scottsdale, AZ, May 10–11, 1997.

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LONG-TERM TREATMENT OUTCOMES IN AUTOIMMUNE INNER EAR DISEASE

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ABSTRACT

Objective: To evaluate long-term outcomes of patients diagnosed with autoimmune inner ear disease (AIED) and to explore for possible relationships between types of treatment and hearing improvement.

Study Design: Retrospective series review.

Setting: Private, tertiary, multiphysician otologic practice.

Patients: Two hundred seventy-four patients diagnosed as AIED between 1980 and 1996 form the subject group for description of complications. Only the 136 patients who had pretreatment audiological test data within six months of initial posttreatment testing are included in the analyses related to hearing. This sample includes 58 males (42.6%) and 78 females (57.4%). Their mean age at diagnosis was 51.0 years (SD, 16.6), ranging from 7.1 to 96.1 years.

Interventions: May have included steroids, other immunomodulating drugs, vasodilators, diuretics, allergy treatment, or no known treatment.

Main Outcome Measures: Hearing improvement defined by pure-tone average (PTA) and speech discrimination score (SDS) as well as two different sets of audiological criteria based on thresholds and SDS, patient subjective response, physician's impression of improvement, and complications.

Results: There were small but statistically significant improvements in PTA for the group as a whole for both the better and poorer ears at initial posttreatment testing (means, 3.2 dB and 3.4 dB; $t = 3.11$, $p \leq 0.002$; and $t = 2.53$, $p \leq 0.013$, respectively). There was no significant change in PTA from pretreatment to last follow-up (mean time interval, 4.0 years). Using the AAO-HNS 10-dB/15% criteria, approximately 22% of patients had an improvement in hearing whether based on the better or poorer ear. The majority remained stable. The more liberal criteria yielded improvement rates of 37.2% and 46.4% for better and poorer ears, respectively, at last follow-up, and 63.1% improved in at least one ear. Few significant relationships were found between specific treatments and hearing outcome. Approximately 30% of patients receiving steroids had complications, with 9.6% considered major.

Conclusions: (1) The majority of patients either improved or remained stable over the long-term (2) The great majority of patients did not progress to profound hearing loss, (3) Based on our findings, we would recommend a longer initial course with steroids, and (4) Standardized reporting criteria for evaluating hearing results are needed.

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Presented at the 130th Annual Meeting of the American Otological Society, Scottsdale, AZ, May 10–11, 1997.

DISCUSSION PERIOD IV
INNER EAR DISEASE
Papers 19–23

Dr. Joseph C. Farmer Jr. (Durham, NC): We have time for questions, and I suspect there will be some.

Dr. Barry E. Hirsch (Pittsburgh, PA): Dennis [Poe], I would like to compliment you on your study and excellent presentation. It looks like we are presenting some data that look very similar. I have a couple of questions and some comments to make. First, you have to look at Meniere's disease in terms of its natural history. That is, not the natural history of Meniere's treated medically and Meniere's treated surgically. What we have looked at was that the hearing loss continued to occur with Meniere's treated both surgically and medically. There are papers that have followed hearing following vestibular nerve section and showed that the hearing still continued to deteriorate. What you have tried to show is both the early outcome (one month following your treatment), and then two years following your treatment. Would you clarify for us where the hearing loss occurred? Was it acute or was it something that happened two years down the road? You also mentioned drop attacks and a concern that gentamicin may not be effective for drop attacks. With the few patients that we had we felt that it was pretty effective for drop attacks. Another issue is your dosing. You pointed out that you were having some success at 30 mg/dl and having some hearing loss at that, yet you are ready to go to a higher concentration. Can you justify going to a higher concentration given the hearing loss results you are having right now? We also had one patient who developed a profound hearing loss, so our numbers are similar to yours. We had 3% (1 of 28) who had profound loss, and it occurred by the second injection.

Dr. Dennis Poe (Boston, MA): Thank you, Dr. Hirsch. The first question is whether the hearing loss was acute or chronic. We saw that most of the hearing loss due to the gentamicin occurred acutely. We saw a number of them drift out over time; these tended to be the milder forms of hearing loss, between no hearing loss to 10–15 dB. Regarding drop attacks, we certainly treated several patients, most of whom did very well; my concern is that some did not, and with that kind of unpredictable outcome, if they have severe attacks, injuries can occur in patients. Lastly, regarding concentration, our first study with gelfoam pledgets did use 40 mg/ml and we really did not see any difference in toxicity related to concentration, so we are exploring that. That will be our next report.

Dr. Sanjay Bhansali (Atlanta, GA): I think some of Dr. Shea's work has shown that if you inspect the round window there seems to be a higher success rate. I know you use the endoscope a lot. My question is: Did you inspect the round window of the patients you injected pre-injection? Also, what do you call a significant hearing loss? How soon did it occur and how many dB did you call significant?

Dr. Poe: We did not use endoscopic inspection of the window for this study. That is currently being investigated to see if that is going to change our next protocol report. Regarding the second question, we defined significant hearing loss according to the Academy's criteria, a 10-dB change in the pure tone average or a 15% change in word recognition.

Dr. Carl L. Reams (Danville, PA): My question is also for Dr. Poe. Have you seen anyone with a demonstrable hearing loss, particularly high frequency, who has improved afterwards? I have seen one case in which there has been an improvement after an initial drop.

Dr. Poe: Yes, we saw many patients who had some initial changes, particularly for 8 kHz. Now we are also monitoring 12 kHz. Many patients would have an initial drop; we give them a break from the gentamicin for at least two weeks and then retest them. If it comes back up, they seem to do all right. The patient who had a profound, persistent hearing loss, had an early drop at 4 kHz; we counseled him. We did not want to do more, but he wanted it. So, we gave it, and he got a dead ear.

Dr. Stephen G. Harner (Rochester, MN): Colin Driscoll reported our experience earlier this year, and I reviewed it again for presentation in Sydney. We now have forty patients who are two years, or more, after gentamicin treatment, and one thing we have done—probably more for patient convenience than anything else—is to separate the injections by

one month. We do not see the patients for one month, which allows the ototoxicity to express itself; when we recheck them, we frequently do not do a second injection. Up to this point, of all the people we followed for two years, none of them has had significant hearing loss. I guess I suggest you consider separating your injections or your follow-up a little more and take advantage of that.

Dr. Poe (Boston, MA): Thank you. This certainly is an important issue: how far to space these out. I do believe that spacing our dosing schedule a little more than other series is responsible for our vertigo results being a little worse, but I agree, that would help in our hearing results. This definitely needs to be studied as we see the other reports coming out.

Dr. Kedar Adour (Oakland, CA): I just returned from South Africa and, after a series of lectures there, it was determined that, since Meniere's disease is possibly related to an activation of the *Herpes simplex* virus, a suppressive dose of one form of acyclovir which would be Famvir (250 mg/day 3–12 months) or Veltrex (500 mg/day) should be used. A prospective study is being formulated there. Would you consider such a study?

Dr. Poe: Are you talking about using antivirals for the treatment of acute Meniere's disease?

Dr. Adour: To reduce the attacks of acute Meniere's disease.

Dr. Poe: I have not used them for that purpose. I looked at some other things, such as facial paralysis and sudden hearing loss as having possible viral etiologies, but not Meniere's disease. It is an interesting thought.

Dr. Adour: A question for Dr. Pensak. He quoted Dr. Brad Welling as saying that his meta-analysis supported the use of the endolympathic shunt. If I am not mistaken, aren't the Australians and Dr. Welling suggesting that a sac excision is just as effective as the shunt?

Dr. Myles L. Pensak (Cincinnati, OH): The only part that I quoted from Brad (he sent me a preprint of his paper) is his meta-analysis, which showed an 86% control of vertigo when the literature was reviewed. He is not advocating one therapy or another, this is just the literature from 1986 to 1996.

FACIAL NERVE INJURY IN CONGENITAL AURAL ATRESIA SURGERY

Robert A. Jahrsdoerfer, M.D., and Paul R. Lambert, M.D.

ABSTRACT

The two most serious complications of congenital aural atresia surgery are facial nerve injury and increased hearing loss. Preoperatively, the facial nerve is the single most important concern that parents have for their child. In congenital aural atresia, the facial nerve is typically out of position in 25–30% of cases. This displacement usually involves a sharp bend at the second genu with the nerve crossing the middle ear at the level of the round window to exit into the temporomandibular joint.

In more than 2,000 patients evaluated for a congenital ear malformation, we have encountered a facial nerve paralysis/paresis in 10 cases. Seven patients from more than 1,000 patients operated or were surgical complications of ours, while three patients had their atresia surgery elsewhere with immediate-onset facial nerve paralysis. Two of these three patients subsequently underwent revision surgery by us.

The facial nerve is at risk not only from drilling the new ear canal, but also from the initial skin incision, dissecting in the temporomandibular joint, transposing the nerve in the middle ear, and undermining the preauricular soft tissue to align the new ear canal with the new meatus. Only in one case was the nerve inadvertently transected. This required a cable graft. In the other nine cases, recovery of facial nerve function was spontaneous and complete.

We present recommendations on how to best avoid a displaced facial nerve in congenital atresia. We also note those conditions in which the facial nerve is particularly vulnerable to injury. Discriminate, but not routine, use of facial nerve monitoring is emphasized.

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FACIAL NERVE SURGERY IN THE 19TH AND EARLY 20TH CENTURIES: THE EVOLUTION FROM CROSSOVER ANASTOMOSIS TO DIRECT NERVE REPAIR

Saurabh B. Shah, M.D., Robert K. Jackler, M.D., and Alexander Ramirez, M.D.

ABSTRACT

The historical aspects of facial nerve anatomy and of Bell's palsy have long been favorite topics of otological historians. However, little attention has been paid to the evolution of facial nerve (FN) surgery, a subject with a remarkably rich, engaging history. In the early thirteenth century, Roland, an Italian surgeon, used a red-hot iron to coapt severed nerve endings. In the seventeenth century, Ferrara, another Italian, sutured injured nerves with tortoise tendon dipped in hot red wine. It was not until the late nineteenth century that peripheral nerve suture became a subject of serious scientific study. Although it is ironic, the course of events suggests that the evolution of facial nerve repair was greatly stimulated by the development of the modern mastoid operation. While the simple mastoid operation practiced by Wilde (1853) and others carried little risk of FN injury, more adventuresome procedures such as radical mastoidectomy (Kessel, 1885) carried a much greater risk. The abundance of iatrogenic palsies during this era undoubtedly did much to motivate surgeons to seek a better means of restoring facial animation. Most surgeons would be surprised to learn that crossover anastomoses predated direct nerve repair by nearly half a century. In 1879, the German surgeon Drobnik performed the first facial-spinal accessory anastomosis. Over the next two decades numerous articles were written (most notably by Sir Charles Balance and Harvey Cushing) on crossovers between the FN and cranial nerves IX, X, XI, and XII. While a few tentative attempts at reapproximating severed FNs took place in the first two decades of this century, it was not until 1925 when an actual suture repair of an intratemporal injury was undertaken. This feat was first accomplished by the famous hand surgeon Sterling Bunnell and shortly thereafter by the otolaryngologist Robert Martin. The evolution of FN surgery in the days predating the operating microscope is a rich tapestry of colorful personalities and clashing egos, which saw promising advances relegated to obscurity and some previously obscure techniques become progressively promising.

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ULTRASTRUCTURAL FINDINGS OF A FACIAL NERVE SCHWANNOMA

*Dennis G. Pappas Jr., M.D., *Dennis G. Pappas, Sr., M.D., †Suzanne Chenn, Ph.D., and †Dean Hillman, Ph.D.

ABSTRACT

Objective: To define the ultrastructural characteristics of a facial schwannoma and to compare these findings to those of a series of vestibular schwannomas.

Background: The morphologic and histopathologic features of facial nerve schwannomas are indistinguishable from schwannomas of eighth-nerve origin. Yet, the incidence of facial schwannomas is rare in comparison. While the ultrastructural features of vestibular schwannomas have been well described, electron microscopic examination of facial schwannomas is lacking.

Methods: The facial schwannoma specimen was prepared and examined for light and transmission electron microscopy characteristics. Ultrastructural findings were then compared to a series of vestibular schwannomas.

Results: The ultrastructural characteristics of the facial schwannoma were comparable to a subset of vestibular schwannomas, demonstrating a marked appearance of centrioles in the cell population, an elevated cell density, and smaller amounts of intercellular space. A lack of differentiated features was also characteristic. Unique to the facial nerve tumor was a large quantity of hemi-desmosomes and filaments.

Conclusions: The facial schwannoma and a subset of the vestibular schwannomas demonstrated ultrastructural findings suggestive of an accelerated growth process in comparison to the remaining eighth-nerve tumors. The extensive amount of hemi-desmosomes in the facial tumor indicates a protein overproduction or lack of protein breakdown that could represent a defect in the ability of the cells to form stable intercellular junctions.

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DISCUSSION PERIOD V
FACIAL NERVE DISEASE AND SURGERY
Papers 24–26

Dr. Joseph C. Farmer Jr. (Durham, NC): These papers are open for discussion.

Dr. Jack Pulec (Los Angeles, CA): I enjoyed Dr. Pappas' paper very much. You described the histopathology very well. There is one point that we noticed that we think may be unique to facial nerve neuromas—the presence of little black globular spots that do not seem to be present in vestibular neuromas or cochlear nerve neuromas. There seem to be a lipid globulin or series of lipid globules that have shown up in the majority of our cases. You did not mention this, although I thought I saw a few of these little black globular bodies in some of your sections.

Dr. Dennis Pappas (Birmingham, AL): Again, this was just a case study of one particular tumor. I know the globules that you are talking about. Further immunohistochemical studies are needed to confirm what these structures are.

Dr. Simon Parisier (New York, NY): I enjoyed Dr. Shah's paper a great deal. I just wanted to express our "pride of institution" in that Dr. Duel did his work at the Manhattan Eye and Ear Infirmary in the 1930s. In fact, in reviewing the annual reports, there was a patient at their facial nerve clinic that Dr. Duel had in the 1920s and 1930s. It was an excellent presentation.

OTALGIA: AN ISOLATED SYMPTOM OF MALIGNANT INFRATEMPORAL TUMORS

John P. Leonetti, M.D., †John Li, M.D., and ‡Peter G. Smith, M.D., Ph.D.

ABSTRACT

Objective: To review a series of 18 patients with malignant infratemporal fossa tumors who presented with otalgia as the primary symptom.

Study Design: This was a retrospective case analysis.

Setting: All patients were evaluated and treated at an academic, tertiary care medical institution.

Patients: Between July 1988 and July 1996, eighteen patients were evaluated for otalgia in a normal-appearing ear, and were later found to have a malignant infratemporal fossa tumor.

Intervention(s): Diagnostic testing included radiographic evaluations and tissue sampling through fine needle aspiration cytology. Treatment modalities were histology-dependent.

Main Outcome Measures: The time between the onset of otalgia and the tumor diagnosis was recorded. Overall treatment outcomes were reviewed.

Results: The period between the onset of otalgia and tumor diagnosis ranged from 4 months to 21 months, with a mean of 7.5 months. Adenoid cystic carcinoma was the most commonly seen tumor in this series of patients.

Conclusions: The infratemporal fossa is a relatively protected region that may be the site of malignant neoplasms causing the isolated symptom of otalgia.

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Presented at the 130th Annual Meeting of the American Otological Society, Scottsdale, AZ, May 10–11, 1997.

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CLINICAL ACUMEN AND VESTIBULAR SCHWANNOMA

David A. Moffat, B.Sc., M.S., F.R.C.S., David M. Baguley, M.Sc., M.B.A.
Graham J. Beynon, M.Sc., and Melville Da Cruz, F.R.C.A.S.

ABSTRACT

Objective: To quantify the atypical presentations of vestibular schwannoma in patients and, by applying the audiological criteria for the management of patients to the Cambridge series of such tumors, to demonstrate that clinical acumen is necessary for the effective screening of these tumors.

Study Design: A retrospective case review of 473 patients with vestibular schwannoma.

Setting: Department of Otoneurological and Skull Base Surgery, University Hospital, Cambridge, a tertiary referral center.

Patients: Four hundred seventy-three patients with a unilateral sporadic vestibular schwannoma.

Main Outcome Measures: Principal presenting symptom; criteria for audiological management.

Results: 89.3% of this series of patients had a principal presenting symptom that was typical of vestibular schwannoma (hearing loss, progressive or sudden imbalance or tinnitus). 10.7% had an atypical principal presenting symptom, and this group of patients had significantly larger tumors (Mann-Whitney U test; tied p value = 0.0002), shorter length of history (tied p value <0.0001), and better preserved hearing (tied p value = <0.001) than the typical otologic presentation group. These clinical correlates are related to tumor morphology, and it is hypothesized that the site of the neurolemmal-glial junction (medial or lateral) has an effect here. If the U.S. criteria for the management of a patient by an audiologist is applied to this series of patients, then seven patients (1.5%) would not have had the diagnosis of vestibular schwannoma made. If the U.K. criteria are applied, this number of missed tumors is 17 (3.6%). The addition of unilateral tinnitus as an indicator of the need for otological investigation reduced the number of patients who might be missed to two (0.42%) in the U.S. case, and five (1.1%) for the U.K.

Conclusions: 10.7% of patients with vestibular schwannoma have an atypical principal presenting symptom, and this group has significantly larger tumors than those who present typically. This finding is of particular relevance to the entry point of such cases to the health care system. A number of patients with vestibular schwannoma appear to pass criteria for management by an audiologist without reference to an otological opinion. These patients may not be investigated from an early stage with potential implications for increased morbidity.

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ACOUSTIC NEUROMAS PRESENTING WITH NORMAL OR SYMMETRICAL HEARING: FACTORS ASSOCIATED WITH DIAGNOSIS AND OUTCOME

*Lawrence R. Lustig, M.D., Sasha Rifkin, B.S., *†Robert K. Jackler, M.D., and †Lawrence H. Pitts, M.D.*

ABSTRACT

Objective: To evaluate the clinical features leading to diagnosis in acoustic neuroma patients who present with normal or symmetrical hearing. Underlying tumor characteristics are also studied to identify a possible explanation for this unique presentation in the acoustic neuroma population.

Study Design: This is a retrospective case review comprised of patients that presented with normal audiometry who were identified as having an acoustic neuroma.

Setting: A tertiary referral center.

Patients: Patients with an acoustic neuroma who met the criteria for normal audiometry were included in the report. For this study, abnormal audiometry is defined as an interaural difference of 15 dB or greater at a single frequency, or 10 dB or greater at two or more frequencies, and an interaural speech reception threshold difference of 20 dB or greater, or a speech discrimination score of 20% or greater.

Main Outcome Measures: Presenting symptoms and signs, clinical features that led to the diagnosis of acoustic neuroma, ABR results, tumor location, size and relationship to temporal bone landmarks, surgical intervention, surgical outcome, and results of hearing preservation attempts were tabulated for each patient.

Results: A total of 29 patients (5%) were identified who had normal or symmetrical pure-tone audiograms between 500–4,000 Hz. The average difference in speech reception threshold between the tumor and nontumor ear was 3.2 dB and the average difference in speech detection score was 2.6%. The most common presenting symptoms that led to the diagnosis of the acoustic neuroma were dysequilibrium/vertigo (12 cases), cranial nerve V and VII abnormalities (11 cases), routine screening for families with NF-2 (5 cases), asymmetrical tinnitus (4 cases), headaches (4 cases), unilateral subjective hearing difficulty (4 cases), and incidental finding during evaluation for another problem (4 cases). The average tumor size was 19 mm, with 5 cases presenting with 30 mm or larger sized tumors. There were no radiographic correlates identified that accounted for the presentation of normal audiometry in the presence of an acoustic neuroma. Nineteen patients underwent a hearing preservation procedure (middle fossa or retrosigmoid), 11 of whom had useful hearing postoperatively.

Conclusions: Despite normal audiometry, patients presenting with imbalance or vertigo, Vth or VIIth cranial nerve deficits, or unilateral hearing complaints may warrant further evaluation to rule out the possibility of an acoustic neuroma or other retrocochlear lesion. In order to seek an explanation for this phenomenon, the incidence of various tumor characteristics (e.g., depth of penetration into the internal auditory canal and degree of porous erosion) is discussed and compared with the entire acoustic neuroma population.

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Presented at the 130th Annual Meeting of the American Otological Society, Scottsdale, AZ, May 10–11, 1997.

MANAGEMENT OF NONACOUSTIC CRANIAL NERVE NEUROMATA

Ian S. Storper, M.D., †Akira Ishiyama, M.D., †Michael E. Glasscock III, M.D., and ‡Jeffrey N. Bruce, M.D.

ABSTRACT

Objective: To review our experience with diagnosis and management of nonacoustic neuroma of the cerebellopontine angle and skull base. In addition, management strategies for each type of tumor are suggested.

Study Design: A retrospective review of the charts of all patients at our institutions who underwent surgery for neuroma of the fifth to twelfth cranial nerves, between the years 1980–1996, was undertaken. Presenting symptoms, diagnostic techniques, and treatment are discussed for each type of lesion.

Patients: Four patients with trigeminal neuroma, 1 patient with abducens neuroma, 40 with facial neuroma, 3 with glossopharyngeal neuroma, 21 with vagal neuroma, 1 with accessory neuroma, and 4 with hypoglossal neuroma.

Interventions: Surgical resection vs. observation.

Main Outcome Measures: Freedom from recurrence and/or complication.

Results: Surgical resection achieved in all patients, aside from the patient with abducens neuroma, who is being observed.

Conclusions: The preoperative diagnosis of nonacoustic lower cranial nerve neuroma is fairly common at our institutions. Each type of neuroma requires its own tailored surgical approach. Provided that central complications are not actively occurring, observation is an acceptable method of treatment.

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LATERAL SKULL BASE MALIGNANCY: EXPERIENCE AND RESULTS WITH 81 PATIENTS

Spiros Manolidis, M.D., F.R.C.S.(C), C. Gary Jackson, M.D., F.A.C.S., Peter Von Doersten, M.D., Michael E. Glasscock III, M.D., F.A.C.S., and Dennis Pappas Jr., M.D.

ABSTRACT

Lateral skull-base malignancy is a rare entity that continues to challenge cranial-base surgeons. It is difficult to apply oncologic principles to resection in this region. Loss of function and oftentimes disfigurement, as well as high mortality, accompany such procedures.

We have retrospectively examined our experience with 317 lateral skull base lesions. Of these, 81 patients were treated for malignancy. Epithelial tumors predominate: 26 squamous cell carcinomas, 10 adenocarcinomas, 7 adenoid cystic carcinomas, 4 acinic cell carcinomas, 3 carcinomas ex pleomorphic adenomas, and 4 basal cell carcinomas. The list of tumors of mesenchymal origin numbered: 8 sarcomas, 5 malignant glomus tumors, 3 hemangiopericytomas, 2 malignant neuromas, 6 chordomas, and 3 CNS tumors. The mean age was 48.5, with a range of 5 to 83 years. There were 42 male and 39 female patients.

All patients underwent surgery.

Our mean follow-up time was 54 months, with a range of 1 to 180 months. Forty-three patients were alive without evidence of recurrent disease, 6 were living with disease, 25 were dead of disease, and 3 dead of other causes; 4 were lost to follow-up.

The results are analyzed to define relative incidence and epidemiologic characteristics, identify prognostic features useful in defining outcome, and seek contemporary survival statistics and outcome data for this pathology. Descriptive statistics, histopathology, outcome, factors predictive of outcome, and complications are presented.

DISCUSSION PERIOD VI
SKULL BASE AND ACOUSTIC NEUROMA DIAGNOSIS AND SURGERY
Papers 27–31

Dr. Joseph C. Farmer Jr. (Durham, NC): We have some time for discussion and questions.

Dr. Robert A. Jahrsdoerfer (Charlottesville, VA): Dr. Leonetti's slide said "MRI was indicated." Does otalgia mean that it is indicated?

Dr. Gregory J. Matz (Maywood, IL): John is on an airplane to see his mother. (Laughter.) I knew this question was going to come up! We do clinic together on Mondays. The MRI is usually done at the third or fourth visit with persistent pain. The keys are persistence and follow-up.

RELATIVE PREVALENCE OF DISORDERS OF HEARING OR BALANCE USING HISTOLOGIC DIAGNOSTIC CRITERIA: A TEMPORAL BONE HISTOPATHOLOGIC STUDY

*R. I. Kohut, M.D., †R. Hinojosa, M.D., *J. H. Ryu, Ph.D., ‡G. Howard, Ph.D., §N. P. Hong, M.D., Ph.D., and ‖T. Seo, M.D., Ph.D.*

ABSTRACT

Hypothesis: Relative prevalence of neurotologic disorders can be determined histologically using temporal bone specimens from collections representing a cross-section of society.

Background: A temporal bone collection for microscopic studies from consecutive autopsies makes possible histologic prevalence studies and studies of hearing or balance related to systemic disorders, unlike collections specifically related to hearing or balance.

Methods: Temporal bone specimens from 200 consecutive autopsies were histologically evaluated for five neurotologic disorders having defined histologic criteria. Prevalence was determined and compared relatively and epidemiologically.

Results: Histologically determined prevalence rates were labyrinth capsule patencies (28%), otosclerosis (6.8%), endolymphatic hydrops (4.5%), vestibular neuritis (3.1%), and acoustic neuromas (1.0%). Histologic prevalences are one thousand times greater than those determined epidemiologically.

Conclusions: (1) Prevalence of some disorders of the labyrinth capsule and inner ear are determinable by applying histologic diagnostic criteria to appropriate temporal bone specimen collections. (2) Disorders of the inner ear may be several orders greater than previously epidemiologically estimated. (3) Labyrinth capsule patencies are more prevalent than otosclerosis, hydrops, vestibular neuritis, or acoustic tumors by whole number multiples; when related to disorders of hearing or balance can be clinically predicted; are likely underdiagnosed using currently defined clinical criteria; and are more commonly related to inner ear dysfunction than previously considered. (4) Hydrops or vestibular neuritis may occur less commonly than previously thought in patients having disorders of the inner ear. (5) Clinical and histopathologic diagnostic criteria refinement is warranted. (6) Temporal bone specimens with detailed clinical evaluations are needed for these refinements. (7) Histologic technique refinement is desirable.

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Presented at the 130th Annual Meeting of the American Otological Society, Scottsdale, AZ, May 10–11, 1997.

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CRANIAL ANATOMY AND OTITIS MEDIA: A CADAVER STUDY

N. Wendell Todd, M.D.

ABSTRACT

Background: The eustachian tube is regarded as an etiologic factor for otitis media. Though anatomical cranial differences are suggested, few scientifically rigorous studies have been reported.

Materials: Thirty-five adult cadaver crania.

Methods: Multiple (32) linear and angular measurements were done. Evidence for prior otitis media were two indicators: small mastoid pneumatization seen radiographically and abnormal tympanic membranes at photographic tympanoscopy. Each measurement and each categorization was done twice, independently. The average of the two measurements was used for each comparison. Only consistent categorizations were used for comparison.

Results: Relatively short eustachian tubes were found to associate with the indicators of childhood otitis: $r = 0.39$, $p < 0.05$. A relatively short distance from mid-sella to staphylion and short distance between the ears were also associated with otitis. No angular relation of either the bony or cartilaginous eustachian tube correlated with the otitis indicators. Bilateral symmetry of pneumatization and tympanoscopic categorization, and of the various linear and angular measurements, was apparent.

Conclusion: Comparatively long eustachian tubes, tall posterior facial height, and large interear length correlate with indicators of healthy middle ears.

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Presented at the 130th Annual Meeting of the American Otological Society, Scottsdale, AZ, May 10–11, 1997.

Work supported by the Georgia Lions Lighthouse.

COCHLEAR FUNCTION AFTER DIVISION OF THE LATERAL SEMICIRCULAR CANAL USING THE ARGON LASER AND MICRODRILL

*Josef E. Gurian, M.D., *J. Douglas Green Jr., M.D., †David A. Fabry, Ph.D., and †George W. Facer, M.D.*

ABSTRACT

Hypothesis: Argon laser segmentation of the lateral semicircular canal of the chinchilla seals the membranous labyrinth in a minimally traumatic fashion and allows for better preservation of cochlear function than microdrill segmentation.

Background: Prior reports have suggested that the semicircular canals can be divided without damaging cochlear function. A variety of new surgical techniques, including laser and drill segmentation, are being employed in humans to treat intractable benign positional vertigo or to gain access to the deeper structures of the temporal bone. Comparisons of these techniques have not been done.

Methods: Twenty-five adult chinchillas were randomly separated into one of three groups. In each group, the lateral semicircular canal was divided using one of three methods: argon laser, microdrill, or a combination of argon laser and microdrill. Hearing was assessed using serial threshold auditory brainstem response (ABR) testing preoperatively, postoperatively, and on postoperative days 1, 3, 7, and 14. Temporal bone histology was reviewed from representative animals for each group to insure that semicircular canal division had been accomplished.

Results: All animals had preoperative ABR thresholds less than 20 dB_{nHL}. In all groups, ABR threshold levels fluctuated in the immediate postoperative period but no threshold increased to greater than 40 dB. This was independent of surgical technique. By postoperative day 14, 95% of all ABR thresholds had returned to within 20 dB of their original levels.

Conclusions: This preliminary study suggests that the lateral semicircular canal can be divided by either the argon laser or the microdrill with minimal change in cochlear function. The efficacy of one segmentation technique over another could not be determined.

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Presented at the 130th Annual Meeting of the American Otological Society, Scottsdale, AZ, May 10–11, 1997.

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Work supported by the Mayo Foundation.

DEVELOPMENT OF A NEW OUTCOMES INSTRUMENT FOR CONDUCTIVE HEARING LOSS

Michael G. Stewart, M.D., M.P.H., Herman A. Jenkins, M.D., Newton J. Coker, M.D., James F. Jerger, Ph.D., and Louise H. Loiselle, M.S., C.C.C.-A.

ABSTRACT

Objective: To design and validate a disease-specific outcomes instrument for use in conductive hearing loss (CHL).

Study design: Retrospective survey of 47 patients recently treated for CHL with either a hearing aid or surgery. Patients received the newly designed instrument, the Hearing Satisfaction Scale (HSS), previously validated hearing-specific instruments, and a generic quality-of-life instrument.

Setting: Academic tertiary referral center.

Main Outcome Measures: Test-retest reliability, internal consistency reliability, content validity, criterion validity, and construct validity of the HSS.

Results: Test-retest reliability ($r = 0.72$, $p < 0.001$) and internal consistency reliability were adequate (Cronbach's alpha = 0.83 and 0.74 for the 2 subscales of the HSS). Criterion validity for individual items was adequate ($r = 0.45$, $p = 0.02$) using audiometric data as the criterion standard. Construct validity was also high using results from other instruments; both convergent and divergent validity of the HSS was demonstrated. In addition, the HSS demonstrated the ability to differentially discriminate between subgroups when grouped by level of hearing loss.

Conclusions: The HSS is a valid and reliable instrument for use in outcomes research on CHL.

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LONG TERM RESULTS WITH THE TITANIUM BONE ANCHORED HEARING AID (BAHA): THE U.S. EXPERIENCE

*Jack J. Wazen, M.D., F.A.C.S., *Michelle Caruso, M.D., and †Anders Tjellstrom, M.D., Ph.D.

ABSTRACT

Objective: The purpose of this study is to evaluate the long-term safety and efficacy of the titanium bone anchored hearing aid (BAHA).

Study Design: A retrospective review of 24 patients implanted with the BAHA between 1984 and 1987 in a multi-institution study designed to evaluate the device in the United States was performed. The data were collected from patients' charts, questionnaires, and the Nobel Biocare patient contact and repair records.

Patients: Candidates for the BAHA include patients unable to use a conventional air-conduction hearing aid because of congenital aural atresia, draining mastoid cavities, or recurrent otitis externa. The audiological indications are a conductive or a mixed hearing loss with a bone-conduction average of 45 dB or better and a speech discrimination score of 60% or better.

Intervention: A BAHA was implanted in a two-stage procedure under local anesthesia on an outpatient basis.

Main Outcome Measures: Patient satisfaction with the device and hearing improvement, and complication rates were reviewed.

Results: The majority of the patients analyzed (78.5%) are still using the device with an average of 15.6 hours per day, 10 to 13 years after implantation. The overall satisfaction score was 4.5 (1 = worst, 5 = best). In sound field testing the mean speech reception threshold improved from 52 dB to 27 dB ($p < 0.05$). There were no major complications.

Conclusion: The BAHA is a safe and effective bone conduction hearing aid with wide applications down to a bone conduction hearing level of 4 dB and a discrimination score of 60% or better.

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Presented at the 130th Annual Meeting of the American Otological Society, Scottsdale, AZ, May 10–11, 1997.

TEFLON PASTE INJECTION FOR THE TREATMENT OF ABNORMALLY PATENT EUSTACHIAN TUBE: CURRENT TECHNIQUE AND LONG TERM RESULTS

Jack L. Pulec, M.D.

ABSTRACT

The symptom of autophony, hearing one's own breathing and voice because the Eustachian tube is abnormally open can be an extremely disturbing symptom. Treatment by injection of Teflon paste into the levator palatini muscle anterior to the nasopharyngeal orifice of the tube is an effective treatment. A technique for the accurate placement of the injection has evolved, which results in 80% success for each injection. Injections repeated at two-month or longer intervals yield a similar rate of success. The treatment will be described and the results of 316 cases, 262 of which have been followed from 1 to 33 years, will be given. Physiologic closure producing normal function can be obtained in the majority of patients.

Pulec Ear Clinic, Ear International, Good Samaritan Hospital and The University of Southern California School of Medicine.

Presented at the 130th Annual Meeting of the American Otological Society, Scottsdale, AZ, May 10–11, 1997.

Investigation was supported in part by Ear International, Los Angeles, California.

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DISCUSSION PERIOD VII
TEMPORAL BONE HISTOPATHOLOGY, CRANIAL ANATOMY, PLUS EUSTACHIAN TUBE AND AUDITORY FUNCTION
Papers 32–37

Dr. Joseph C. Farmer Jr. (Durham, NC): The preceding six papers are open for discussion.

Dr. Edward L. Applebaum (Chicago, IL): I would like to address a question to Dr. Kohut. Bob, you analyzed a tremendous number of temporal bone sections and, as I understand it, concluded that (1) there is an enormous difference between labyrinthine patencies and the clinical epidemiology of surgeries done for fistulas, and (2) fistulas are underdiagnosed. Could the data be interpreted differently? Could it be that these labyrinthine patencies were just epiphenomena or incidental findings, and that the surgeries that are done for fistulas, those fistulas that were found were incidental to the disease for which the patient was being explored?

Dr. Robert I. Kohut (Winston-Salem, NC): That is a good question; however, I did not show any epidemiology for fistulas. We do not know what the incidence is. People mix up the terms patency and permeability. A patency has to be permeable for it to result in a perilymphatic fistula. The same is true with otosclerosis. The same is true for the clinical manifestations of acoustic tumors. But patency and permeability are quite different, one is dependent upon the other. We do know the prevalence of the condition that is necessary for permeability to come about. For the perilymphatic fistula to come about is three times as great in prevalence as otosclerosis. We also know that in order for clinical otosclerosis to come about, you have to have a histologic prevalence as well. We have no epidemiologic studies on perilympathic fistulas.

Dr. Robert L. Weisman (Shreveport, LA): I have a question for Dr. Pulec. What is the incidence of serous otitis media in your study group?

Dr. Jack L. Pulec (Los Angeles, CA): After injection, patients sometimes will have an increased propensity for serous otitis media, not different, however, from the normal population. They sometimes will get aerotitis more easily than they did before; they will get serous otitis media that is short and self-limiting with colds or the flu. This has not been a problem. In other words, initially overclosure was a concern, but as it turns out the problem is that it is more difficult to close that tube than one would expect. Now, with the two patients who were not part of this study but eventually were treated with closure, the tube was closed via the middle fossa purposefully, and both of those patients wear permanent Teflon button, ventilating tubes. That was on purpose because of the severe nature of their problem.

Dr. John S. May (Winston-Salem, NC): Again, for Dr. Pulec: I am concerned about the irreversible nature, first, of placing the Teflon, and second, the extent of using the middle fossa approach to obstruct the eustachian tube. Dr. Bluestone described placing a polyethylene catheter with methylmethacrylate, which I used for a number of years. I now have modified it somewhat to a simple, anterior tympanotomy under local anesthesia with placement of bone wax within the lumen of a long T-tube, which is then inserted into the eustachian tube orifice. It serves to baffle the middle ear. I do put a tube in, which usually comes out in six to eight months, and all of these patients have recognized relief of their symptoms. I have one patient, in whom Dr. Bluestone put the catheter, who came to me with pulsatile tinnitus and I was concerned that the catheter had eroded the carotid canal. That was the reason I changed to using a softer, silastic tube that is reversible, easy, and can be done with only local anesthetic. I think that it is a long run for a short slide—the way you are doing that.

Dr. Pulec: You are quite right; there are many different treatments. Most of them in my hands have not been excessively successful; for example, putting tubes into the ears was originally recommended by Greg Gilbert. It really does not work. It sometimes will help the fullness, but that is about it.

I have used the Wright eustachian tube prosthesis; you could fill it nicely with a number 1 or 2 nylon suture, which would just fit in, and you could place that through a stapes tympanomeatal flap. In my hands it would last about two years and then gradually creep out and appear against the drum, and through the drum if you did not do something about it. So, yes, it does work, but there were no long-term successes. The Teflon paste is the only treatment I have come up with that restores function to normal without obstructing the tube. These patients' tubes function normally; it is supposed to open every 3–4 minutes when you yawn or swallow to aerate the middle ear and yet be closed in between. I suspect there may be some new methods devised, but this just happens to have, with the methods we have available, worked well.

Dr. Muaaz Tarabichi (Kenosha, WI): My question is for Dr. Pulec. Would you consider routine psychological evaluation for these patients before allowing them to undergo a procedure like this?

Dr. Pulec: Under normal circumstances, no. Every one of these patients looks like they are neurotic or psychotic and in my paper I pointed out that it is not unusual for patients to be so disturbed that you cannot take an accurate history. In those people, in the office, I put in boric and salicylic acids, which provides a very quick, simple temporary treatment. When you close this tube, they start acting normally almost immediately and they apologize for being silly or acting unusual. For some reason, it makes people appear psychotic. We did a study of this; it is in the literature. Dr. Krarian and company did this on a series of my cases and they found that psychological disturbances did occur and they have defined them in terms of psychological testing. It will drive a patient to suicide in the more severe cases, for the symptoms are terribly disturbing.

Dr. Farmer: I have one final comment and Dr. Pulec and I have discussed this. In many institutions this should have an IRB approval before you proceed. This will vary depending upon what you and your colleagues around the country judge as adequate treatment, or standard treatment, for this. I think the thing to do is do as Jack has suggested, get some legal opinion or consult your local hospital, for they frequently have an institutional review board that can be of help to you. If there is any question as to whether this should be IRB-approved, go ahead and write a protocol, get a good informed consent, and explain to the patient that this is somewhat controversial and this IRB approval is always a good thing to have.

SPONTANEOUS OTOACOUSTIC EMISSIONS IN THE EARLY NEONATE

Sean Kastetter, M.A., C.C.C.-A., and Kerri Rudin, M.Ed., C.C.C.-A.

ABSTRACT

The occurrence of spontaneous otoacoustic emissions (SOAE) in adults and children has been well documented; however, there is a paucity of information regarding the occurrence of SOAE in early neonates. In this study, click-evoked otoacoustic emissions (CEOAE) and SOAE were recorded in 85 healthy neonates (165 ears). The purpose of the study was (1) to determine the presence of SOAEs in the early neonate and (2) to examine the presence of the SOAE and compare the CEOAE response amplitude. SOAEs were present in 64% of the neonates. A higher occurrence was found in female (78%) than in male (52%) neonates. Comparison of SOAE presence with CEOAE amplitude indicated a trend toward SOAE presence with increasing averaged CEOAE amplitude. No SOAE were recorded when the averaged CEOAE was <5 dB. When CEOAE amplitude was >20 dB, 93% of ears revealed SOAE.

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THE EFFECT OF TOPICAL CIPROFLOXACIN ON POSTOPERATIVE OTORRHEA FOLLOWING TYMPANOSTOMY TUBE INSERTION

Terrence E. Zipfel, M.D., David F. Street, M.D., Jeff Wulffman, M.D., Ajit Tipirneni, B.S., Lin Frey, Ph.D., W. Edward Wood, M.D., and William S. Gibson, M.D.

ABSTRACT

Objective: To evaluate the effectiveness of prophylactic ciprofloxacin drops in decreasing the incidence of otorrhea following tympanostomy tube insertion.

Design: Single-blind randomized clinical trial.

Setting: Tertiary-care referral center.

Patients: One hundred forty-seven patients aged 6 months to 14 years undergoing tympanostomy tube insertion.

Intervention: For each patient, one ear was randomly assigned to receive topical ciprofloxacin, placed in the middle and external ear postoperatively, while the contralateral ear served as a control.

Main Outcome Measure: Post-tympanostomy otorrhea occurring during the period from 24 hours after surgery until two-week postoperative check.

Results: Topical ciprofloxacin application following tympanostomy tube insertion was associated with a significantly lower incidence of early post-tympanostomy otorrhea. The rates of otorrhea in the control and treatment groups were 9.5% and 4.1%, respectively ($p = 0.033$).

Conclusions: The topical administration of a single dose of ciprofloxacin solution postoperatively is an effective treatment for the prevention of early post-tympanostomy otorrhea.

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LONG TERM FOLLOW-UP OF VENTILATION TUBES

Stephen G. Harner, M.D., George W. Facer, M.D., Charles W. Beatty, M.D., and Thomas J. McDonald, M.D.

ABSTRACT

Objective: To look at the impact of ventilation tubes 15 years postinsertion and review indications for insertion, short-term, and long-term results.

Study Design: Retrospective chart review and follow-up by letter and phone.

Setting: Tertiary referral center, ambulatory care.

Patients: Children 10 years of age or less who had ventilation tubes inserted in 1981.

Intervention: Ventilation tubes inserted for any indication in this age group during 1981.

Main Outcome Measures: Short-term problems with otorrhea, tube rejection, and need for tube reinsertion. Long-term problems including development of cholesteatoma and/or adhesive otitis media, the need for middle ear and/or mastoid surgery, and auditory function.

Results: The incidence of short-term problems was consistent with other studies. Five patients with cholesteatoma and 20 patients with adhesive otitis media were identified. Tympanoplasty was necessary in 23 patients. The incidence of long-term hearing loss was higher than anticipated; fortunately, the need for amplification was low.

Conclusions: Ventilation tubes remain an important component of the management for middle ear disease in children. There was a greater need for tube reinsertion and middle ear surgery than was anticipated. The long-term impact is less positive. A prospective study of the long-term impact of ventilation tubes is indicated. It is just as important to identify the long-term impact when the tubes are not used.

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Supported by research funds from the Mayo Foundation.

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PEDIATRIC TYMPANOPLASTY OF IATROGENIC PERFORATIONS FROM VENTILATION TUBE THERAPY

Gabriel O. Te, M.D., Franklin M. Rizer, M.D., and Arnold G. Schuring, M.D.

ABSTRACT

Objectives: (1) To determine surgical outcome of tympanoplasty in children with iatrogenic perforations, (2) to determine if age is a factor in successful tympanoplasty, and (3) to determine if surgical outcome is affected by preoperative factors (perforation size and location, otorrhea, cholesteatoma, and tympanosclerosis) or surgical technique (underlay or overlay).

Study Design: Retrospective series review.

Setting: Multiphysician private otologic practice.

Patients: Ninety-three pediatric patients with iatrogenic perforations caused by the insertion of ventilation tubes for otitis media with effusion (OME). Surgical selection criteria included a year's observation of the perforation with a six-month OME-free interval in the involved and contralateral ears. The 46 males and 47 females had a mean age at surgery of 10.8 years (SD, 2.9), ranging from 3 to 16 years.

Interventions: Underlay or overlay tympanoplasty using temporalis fascia grafts.

Main Outcome Measures: Outcome was evaluated in terms of drum healing (healed or perforated), hearing (air-bone gap), and complications.

Results: There was a graft take-rate of 94.6%, with re-perforations occurring in 5.4% with an average follow-up of 16.8 months. Duration of follow-up ranged from 10.8 to 77.5 months. The air-bone gap was completely closed in 53.8%, and was closed to within 15 dB in 89.2%. The incidence of complications was 16.1%. Surgical outcome was not influenced by age, technique, or any of the preoperative factors.

Conclusions: Tympanoplasty of persistent perforations following ventilation tube therapy for recurrent OME can be successfully performed regardless of age, surgical technique, or other preoperative factors.

Warren Otologic Group.

Presented at the 130th Annual Meeting of the American Otological Society, Scottsdale, AZ, May 10–11, 1997.

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DISCUSSION PERIOD VIII
PEDIATRIC OTOLOGY
Papers 38–41

Dr. Joseph C. Farmer Jr. (Durham, NC): These presentations are open for discussion.

Dr. Allan M. Rubin (Toledo, OH): I have two questions for Dr. Zipfel. The first one is: When he was using as a control the one ear vs. the test ear, was he looking at all the controls vs. all the test ears, or was he using within-patient variables? In other words, was he looking at one ear and then looking at the one opposite it? I ask this because the type of fluid might have been different in the two ears. My second question is: When discussing filling the middle ear with ciprofloxacin, Did you do a myringotomy and then pour in the fluid and put in the tube? Is that the technique? I did not quite get that.

Dr. Terrence Zipfel (Cincinnati, OH): In response to your first question, we did group the control ears together. We had 147 patients; one ear was the treatment ear, one ear was the control ear. You are right that in one individual patient, the findings may have been different in one ear as opposed to the contralateral ear. However, I did show that when we actually looked at all of the findings in the middle ear, comparing the control group to the treatment group, there was a striking similarity between mucous, serous, purulent, or absent findings. It was balanced and we feel that it was an adequate control. In response to your second question, a radial myringotomy was performed and the ciprofloxacin was then injected or instilled into the middle-ear space through the myringotomy site; then the tube was inserted.

Dr. Cecil Hart (Chicago, IL): I have a comment on Dr. Te's excellent presentation. It is nice to hear that you can operate on individuals below the age of 6 or 7 with a good degree of success; however, the common belief is that the incidence of middle-ear infections diminishes after the age of 6 or 7, and it has been my custom for many years to tell the patients and the mothers and fathers of the children with holes in the drum that you have essentially a tube in your ear, although there is not a tube in it. Therefore, it is wise not to close it over until a child has outgrown the period for a high incidence of middle-ear problems. Is that still a factor?

Dr. Gabriel Te (Warren, OH): The main indication we had for closing the perforation was to prevent any progression of serious middle-ear disease. Most of the parents who had these children with perforations only wanted to know if it was going to be safe for the children to engage in water sports and such. Another indication was that we wanted to improve hearing at that time.

Dr. Arvind Kumar (Chicago, IL): The insertion of a PE tube is obviously to equalize the pressure between the middle ear and the outside. If the tube falls out and there is a perforation, then that is nature's way of saying that pressures are not equal and therefore there should be a hole. To close such a hole would seem to me to defeat the very purpose with which we started out. I have the privilege of working with Dr. Buckingham at the University of Illinois and his photo documentation is no doubt familiar to most of you. We saw so many of his cases, in which he had done a tympanoplasty in a child who came back with a perforation, an adhesion, or a cholesteatoma. It seems to me that probably it is wiser not to do that even though the results after one year may indicate it is okay. You need to follow these cases for 10 to 15 years, as suggested by Dr. Hart.

Dr. Fred Lassin (Portsmouth, VA): My comment, or question, is for Dr. Zipfel on the cipro. Do you know how much that costs per bottle? Do you allow more than one patient to use the same bottle? I am somewhat concerned because, based on your data, 96% of these patients do not need that medication anyway; 90% do not get otorrhea and half of those who did get otorrhea did not respond to the prophylactic drops.

Dr. Zipfel: The use of ciprofloxacin would be more expensive than cortisporin or the generic equivalent. What we do, though, is a single application, and that is the key point—a single application. We keep a bottle of it in the operating room. It is a multiuse thing, so I think that helps to cut down on the cost.

Dr. Mansfield Smith (San Jose, CA): If you look at the public health aspects of cipro, it is the last drug that we have that you can take orally that is effective for *Pseudomonas,* which is a huge problem. I think to use it prophylactically is a big mistake; just looking at it from the public health standpoint of what is happening with all these various bugs. I am really concerned about that.

Dr. Zipfel: I think that is a point that is well taken and deserves further investigation.

A NOVEL PSYCHOPHYSICAL ILLUSION RESULTING FROM INTERACTION BETWEEN HORIZONTAL VESTIBULAR AND VERTICAL PURSUIT STIMULATION

Vicente Honrubia, M.D., D.M.Sc., and Alan Greenfield, Ph.D.

ABSTRACT

The hypothesis that the perception of an object's motion is made in relation to an internal reference center (IRC) under influence of vestibular receptors was tested. Six subjects were instructed to track a vertically moving visual target (VT) while being rotated in the yaw plane at 14, 28, and 42°/s. All stimuli had a frequency of 0.2 Hz. Eye movements were monitored by EOG electrodes. During visual-vestibular interaction, all subjects perceived a VT moving obliquely while eye movement remained vertical. The subject then tilted the VT trajectory until vertical was perceived. At this time the eye had an oblique trajectory. Horizontal eye velocities from interactive tests were plotted versus corresponding results from rotation in the dark without VT at the same stimuli. A strong positive relationship was found between interactive eye movements and eye movements in darkness (slope = 0.96, r = 0.84, n = 18). Results support the hypothesis of an egocentric sense of orientation whereby velocity of external objects is evaluated in relation to an IRC dependent on the VOR state. This illusion may lead to new techniques for clinical evaluation of vestibular patients.

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Work supported by NIH grant DC01404.

VESTIBULAR DECRUITMENT, HYPERACTIVITY, AND REBOUND CALORIC NYSTAGMUS

Arvind Kumar, M.D., F.R.C.S. (Edin.) , and Aftab Patni, M.D.

ABSTRACT

Objective: To study the collective sensitivities of decruitment, hyperactivity, and rebound caloric nystagmus (RCN) for lesions of the brainstem/cerebellum against the current gold standard of imaging, the contrast-enhanced magnetic resonance imaging (MRI).

Study Design: This study is a retrospective study of patients who underwent a vestibular evaluation and a contrast-enhanced MRI scan.

Setting: Tertiary referral center.

Patients: The patients included in this study were evaluated for investigation of a variety of complaints, including vertigo/dysequilibrium, headache, hearing loss, and tinnitus. Their age range was 13 to 79.

Intervention: Every patient underwent a vestibular evaluation, which included the Torok Monothermal Caloric Test and an MRI scan.

Main Outcome Measures: The results of this caloric test include vestibular decruitment, hyperactivity and RCN. The sensitivity and specificity of these results for MRI confirmed brainstem/cerebellar lesions were determined.

Results: The overall sensitivity of the measures of this caloric test was 90%. The overall specificity was 25%.

Conclusions: As a screening test for brainstem/cerebellar lesions, the Torok Monothermal Caloric Test performs well in terms of its sensitivity. The specificity is low and this is probably a reflection of the fact that MRI looks at morphology rather than function.

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VESTIBULAR AND AUDITORY FUNCTION ABNORMALITIES IN WOMEN WITH SILICONE BREAST IMPLANTS

F. Owen Black, M.D., Steven W. Wade, M.S., and Susan C. Pesznecker, R.N.

ABSTRACT

Objectives: (1) Determine if the prevalence of vestibular and auditory abnormalities in symptomatic and asymptomatic silicone breast implant (SBI) patients differs from a normal population, (2) characterize, quantitatively, abnormalities in symptomatic and asymptomatic control groups, and (3) compare abnormal findings with other types of immune-mediated inner-ear disorders, e.g., Cogan's syndrome and delayed endolymphatic hydrops.

Study Design: This was a population comparison study conducted at a tertiary-care, outpatient neurotologic referral center.

Patients: The study groups were composed of symptomatic patients with ruptured implants and asymptomatic SBI patients who had no history of inner-ear dysfunction. The control group consisted of age-matched normal women who had not undergone silicone implants.

Interventions: Evaluation of the vestibulo-ocular reflex, balance function (computerized dynamic posturography), tests for positional nystagmus, and auditory function tests.

Main Outcome Measure(s): Statistical comparison of patient and control groups.

Results: Sixty-seven percent of SBI subjects had abnormal positional nystagmus (43% of normals), 6% had abnormal Hallpike tests (0% of normals), and computerized dynamic posturography sensory organization tests were abnormal in 100% (17% of normals). Vestibulo-ocular reflex function was comparable to that of normals. Sensorineural hearing loss was documented in 37% of SBI subjects (5% of normals). Electrocochleography (ECoG) was abnormal in 11 (61%).

Conclusions: The prevalence of auditory and vestibular abnormalities in symptomatic patients with a history of silicone gel breast implant rupture was significantly increased relative to age-matched normal controls. Exposure to silica compounds appears to be associated with pathologic changes in vestibular and auditory function.

Department of Neurotology Research, Legacy Portland Hospitals.
Supported in part by NIDCD RO1 DC 00205 and NASA NAGW 3799.
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DISABLING PAROXYSMAL POSITIONAL VERTIGO

J. Douglas Green Jr., M.D., David B. Hawkins, Ph.D., and Florian Matsalla, M.D.

ABSTRACT

Objective: Describe the clinical features and treatment of a newly recognized variant of benign paroxysmal positional vertigo (BPPV), which may be confused with cochleovestibular compression syndrome. We have called this disabling paroxysmal positional vertigo (DPPV).

Study Design: Retrospective history review of pertinent clinical records and vestibular testing. Follow-up data obtained by telephone interview and, when possible, reexamination.

Setting: Ambulatory setting; tertiary referral clinic.

Patients: Five patients were identified who demonstrated a particularly severe form of BPPV. These patients demonstrated daily symptoms of positional vertigo over a minimum of three months that were severely limiting with regard to vocation or daily activities. All patients had experienced intermittent symptoms of positional vertigo for greater than 20 years. A positive and classic Dix-Hallpike test was elicited from all patients. The positive response was bilateral in two patients. During Dix-Hallpike testing, these patients demonstrated extreme rotary nystagmus, frequently accompanied by autonomic symptoms lasting for several days.

Intervention: All patients were treated with the modified canalith repositioning procedure (CRP) as described by Epley.

Main Outcome Measure: All patients were contacted by telephone interview to determine length and degree of vertigo control following treatment. Several patients underwent repeat Dix-Hallpike testing and reexamination at various intervals.

Results: All patients experienced complete control of symptoms at six-month follow-up. Two patients were found to have bilateral BPPV and required a separate CRP for each side. Several patients required multiple CRP treatments often using mastoid oscillation. Dix-Hallpike testing was shown to be negative in all patients following the CRP. All patients undergoing repeat Dix-Hallpike testing at various intervals were normal. At a mean of 14-month follow-up, two patients are asymptomatic with mild recurrent symptoms in the remaining three patients. The three patients with symptoms are not disabled.

Conclusion: Some patients with BPPV will exhibit a particularly severe variant of the disease that we have called DPPV. This form of vertigo should be differentiated from cochleovestibular compression syndrome since these patients respond favorably to the CRP. Recurrent symptoms, however, may occur in some patients.

Department of Otolaryngology-Head and Neck Surgery, Mayo Clinic Jacksonville.
Presented at the 130th Annual Meeting of the American Otological Society, Scottsdale, AZ, May 10–11, 1997.
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DISCUSSION PERIOD IX
VESTIBULAR PHYSIOLOGY AND DYSFUNCTION
Papers 42–45

Dr. Joseph C. Farmer Jr. (Durham, NC): We have time for a few questions.

Dr. Jennifer Derebery (Los Angeles, CA): I have a question for Dr. Black. In 1992 we published a study in which we found that unselected patients with Meniere's disease had an elevated level of circulating immune complexes (which we presumed to be pathologic) when compared to controls. We found in those patients that when they had placement of a silicone shunt there was an overwhelmingly significant decrease in the immune complex level. My question is: By what mechanism do you think the silicone is causing inner-ear disease?

Dr. F. Owen Black (Portland, OR): I wish I could answer that; I am not qualified. I was just presenting the results and I have to defer to our experts in immunology. The patients in our group had quite a large variation in immune complex response to C-reactive protein. Some of them had an elevated ANA and a number of other abnormalities.

Dr. Cecil Hart (Chicago, IL): I have a question for Dr. Kumar. I am familiar with rebound nystagmus as it applies to spontaneous nystagmus, and I am familiar with phase II caloric nystagmus, which is where you get a reversal of the direction, but I have not heard of rebound caloric nystagmus. It seems to me this term is used here to describe essentially phase II caloric nystagmus enhanced by a change in the position of the semicircular canals. I would like to ask if am correct in this assumption.

Dr. Arvind Kumar (Chicago, IL): No, the nystagmus that you are talking about appears after the primary phase of the nystagmus has ended and begins shortly thereafter without changing head position. We tested our patients for that as well. None of them had that kind of nystagmus and that was described by Dr. Kamerer some years ago. Nobody has been able to find out what is the significance of that nystagmus. It was called the "nacht nacht nystagmus" by Dr. Barany; this nystagmus comes on when the plane of the horizontal semicircular canal is changed from vertical to horizontal.

Dr. Brian W. Blakley (Detroit, MI): My question is for Dr. Black. A very interesting study. Are those abnormalities due to the ruptured breast implants or are they due to the Sjogren's disease and all those other findings?

Dr. Black: Good question! We do not know. Not all of them had Sjogren's disease, so we do not know whether they had preexisting disease or were being picked up with the large number of women who had these implants. We have no idea. That is one reason we wanted to do the other group because, theoretically, that group should show if it was due to the breast implant or intermediate levels of abnormalities, but again, we do not know.

Dr. Mohamed Hamid (Cleveland, OH): I have a question for Dr. Green about the vestibular studies. In the patients that were refractory to the canalolith repositioning maneuver, what were the vestibular results and did you consider the Semont maneuver on these patients?

Dr. Douglas Green (Jacksonville, FL): What were the vestibular test results in the patients who did not respond? Well, all of the patients had an initial success with the canalolith repositioning procedure. None of the patients were refractory in the short term. There was a group of three patients who did develop some symptoms of positional vertigo several months down the road, but these were not limiting in any way. There were no distinguishing features on vestibular testing—either computerized posturography or electronystagmography—that distinguished these patients in any way.

SURGICAL TREATMENT OF ACQUIRED EXTERNAL AUDITORY CANAL ATRESIA

*†Samuel Selesnick, M.D., and *Tuyet-Phuong Nguyen, B.S.*

ABSTRACT

Acquired external auditory canal atresia is an important cause of conductive hearing loss and a surgically challenging condition. Six cases of acquired atresia that were treated in a period of three years are presented, and their presentation, surgical treatment, and clinical and hearing outcome are analyzed. These patients were unusual in that they presented with external auditory canal atresia secondary to trauma and prior surgery, not as a result of chronic infection, which is far more common in the literature. Patients were treated with excision of the atresia, canalplasty, and meatoplasty, with or without application of a split-thickness skin graft to the area denuded of epithelium. Results of surgical treatment are presented and suggest that surgery is a necessary and effective treatment of acquired atresia of the external auditory canal, and that the use of skin grafts is integral to a successful outcome.

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Reprint requests: Samuel Selesnick, M.D., Department of Otorhinolaryngology, The New York Hospital–Cornell University Medical Center, Starr Building, Suite 541, 520 E. 70th Street, New York, NY 10021.

IRRADIATED RIB CARTILAGE GRAFT FOR RECONSTRUCTION OF THE TYMPANIC MEMBRANE

Douglas L. Schulte, M.D., Colin L.W. Driscoll, M.D., Thomas J. McDonald, M.D., George W. Facer, M.D., and Charles W. Beatty, M.D.

ABSTRACT

Objective: To present an alternative material into otologic surgery and evaluate its advantages, disadvantages, safety, and results in reconstruction of the tympanic membrane.

Study Design: Retrospective chart review.

Setting: Tertiary referral center.

Patients: All patients with at least six months follow-up who underwent tympanoplasty or tympanomastoidectomy using irradiated rib cartilage graft at our institution from January 1, 1993, to December 31, 1996.

Intervention: Tympanoplasty or tympanomastoidectomy using homologous irradiated rib cartilage as graft material.

Main Outcome Measures: Postoperative speech-reception thresholds, speech discrimination scores, and air-bone gap were compared to preoperative levels. Complications directly related to irradiated rib cartilage tympanoplasty were sought.

Results: Speech reception thresholds did not significantly change. Speech discrimination scores were stable or improved in all patients. Postoperative air-bone gap was ≤10 dB in 43.2% of patients and ≤20 dB in 70.3% of patients. There was a 16% complication rate in regards to tympanoplasty in general. No complications unique to irradiated rib cartilage occurred.

Conclusion: Irradiated rib cartilage is an alternative tympanoplasty material that may save operating time, spares patients an added incision, provides results similar to other grafting material, and is safe.

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ENDOSCOPIC MEDIAL GRAFT TYMPANOPLASTY

Muaaz Tarabichi, M.D.

ABSTRACT

Objective: Describe and evaluate endoscopic medial graft tympanoplasty.

Study Design: Case series.

Settings: Private otolaryngology practice.

Patients: Fifty-seven patients with tympanic membrane perforation, including seven patients with bilateral perforations.

Intervention: Sixty-four endoscopic medial graft tympanoplasty procedures were performed. This included 45 type I tympanoplasty and 19 ossicular reconstruction procedures.

Methods: Pre- and postoperative audiologic and clinical evaluations were performed. The results were compared with a historical group of 50 consecutive microscopic procedures performed by the same surgeon.

Main Outcome Measure: Closure of tympanic membrane perforation and audiometric results at one to two months postoperatively.

Results: There were no significant complications associated with the endoscopic procedures. Closure of perforation was evident in 59 ears (92%); this compared with a closure rate of 88% for the historic group. All 64 endoscopic procedures were transcanal procedures despite the fact that 54% of perforations were partially visualized on preoperative microscopic examination. Postauricular approach for adequate exposure was needed in 21 of 50 patients (42%) undergoing microscopic surgery.

Conclusions: Endoscopic medial graft technique is as effective and safe as microscopic surgery and its application should increase the utilization of transcanal procedures.

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A RANDOMIZED, BLINDED STUDY OF CANAL WALL UP VS. CANAL WALL DOWN MASTOIDECTOMY DETERMINING THE DIFFERENCES IN VIEWING MIDDLE EAR ANATOMY AND PATHOLOGY

Gregory F. Hulka, M.D., and †John T. McElveen Jr., M.D.

ABSTRACT

A significant amount of literature written by individuals and otology group practices is available comparing the advantages and disadvantages of intact canal wall up vs. canal wall down mastoidectomy procedures for approaching middle-ear pathology. In the interest of objectively evaluating the differences between these two approaches, we have studied temporal bones in a prospective randomized, blinded study comparing the two. Twelve bones were used and observed twice, once in each of two sessions. All bones were viewed in two dissections; intact canal wall and canal wall down mastoidectomy. Four points were marked on each temporal bone in three different colors applied in a randomized order to eliminate observer expectation. The four points marked include sinus tympani, posterior crus of the stapes footplate, lateral epitympanum, and eustachian tube orifice. Both intact canal wall and canal wall down bones were randomly provided to the observer at each viewing session. Prior to allowing the observer to see the dissections, those requiring replacement of the canal for the first session of the study had this done in a method utilizing native posterior bony canal. Temporal bones were presented to an expert otologist in a randomized fashion, with each temporal bone being placed in a temporal bone bowl holder and specialized framework allowing for rotation and repositioning approximating the experience in an operating room setting. For each temporal bone, the observer completed a questionnaire describing his observations by denoting both location and color of marks observed.

Analysis of the results demonstrated no significant difference between the number of observations made in the first session compared to the second session, implying good randomization and no "learning curve" for the observer from the first session to the second. In evaluating the ability to observe the four locations with the intact canal wall vs. canal wall down dissection, a significant difference was noted with improved ability to identify the marks in the canal wall down bones. The sinus tympani, the posterior crus of the stapes footplate, and the lateral epitympanum were all more easily identified with the canal wall down approach. There was no significant difference in the ability to observe the marker at the eustachian tube orifice with the canal wall up or the canal wall

down. This study demonstrates the differences in the ability to observe certain locations within the middle ear space that represent common sites of middle pathology such as cholesteatoma. For three of the four sites, the canal wall down procedure clearly demonstrated an increased ability to visualize these regions.

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REVERSIBLE CANAL WALL DOWN TYMPANOMASTOIDECTOMY: AN ALTERNATIVE TO INTACT CANAL WALL AND CANAL WALL DOWN MASTOIDECTOMY PROCEDURES

John T. McElveen Jr., M.D., and †Gregory F. Hulka, M.D.

ABSTRACT

"Canal wall down" mastoidectomy remains a mainstay in the management of chronic ear disease. Although effective in exposing and exteriorizing cholesteatoma, the patient is left with a mastoid cavity requiring long-term care. In order to avoid the limitations of canal wall down surgery yet maintain the exposure provided by this approach, we have developed a completely reversible canal wall down mastoidectomy technique. Although it is premature to compare the effectiveness of this approach with other mastoidectomy procedures, the preliminary data confirm the feasibility of this approach in all but the most constricted mastoid cavities. The surgical steps and instrumentation involved in performing this approach are described and the technique illustrated.

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Study sponsored by Carolina Ear and Hearing Institute.

DISCUSSION PERIOD X
EXTERNAL EAR CANAL, MIDDLE EAR, AND MASTOID SURGERY
Papers 46–50

Dr. Joseph C. Farmer, Jr. (Durham, NC): We now have time for discussion.

Dr. Stephen Harner (Rochester, MN): I would like to congratulate Dr. McElveen on a superb paper. My concern, and I am sure he has thought about this and looked into this, is What happens to that bone? It has been totally devitalized. Where is the blood supply going to come from to keep the bone alive? What kind of long-term follow-up does he have on these pieces of bone?

Dr. John T. McElveen (Raleigh, NC): That is an excellent question. Actually, Dr. Hulka and I are in the process of doing just that study in an animal model—finding out about the longevity of the bone. I think with our experience with intact canal wall procedures, where we really thin that posterior canal wall, there are cases when you go back at a second stage that you see areas of devitalization; my experience has been that this has not been a problem, but I think it warrants looking into. Dr. Hulka and I are planning to do that in an animal model.

Dr. Donald B. Kamerer (Pittsburgh, PA): I have a question for Dr. Tarabichi. I enjoyed your paper and your film was excellent; however, as I understand it, you had to use one hand to hold the endoscope, which seems to me to give you only one hand with which to operate. You cannot suction and use another instrument at the same time, which makes the procedure considerably more difficult and time-consuming. Can you address that issue? For Dr. McElveen: John, you said you only make two cuts, but what about the one that you have to make through the facial recess? That is a third cut.

Dr. Muaaz Tarabichi (Kenosha, WI): You are absolutely right. You do have to hold the endoscope in one hand and operate with the other. I think this is just the beginning. I think there are many ways we could get around this, and I think an answer will be found for that. My present experience, again, given the excellent visualization with the endoscope, is that it has not been more time-consuming for me. Actually, I think that I have shaved off approximately 20% of my operating time using the endoscope. I have been doing it for about five years now and I enjoy working with the endoscope. This is not an invitation to abandon the microscope and go into endoscopic surgery. I think there is a definite future for this and I think as we develop it, it should answer all of your concerns.

Dr. McElveen: The saw is very safe around soft tissue and it does not tend to cut through it. When I make the inferior cut, I actually open the facial recess, take the saw, and go in a medial-to-lateral direction. Again, it minimizes any potential risk of injury to the facial nerve.

Dr. Roger Wehrs (Tulsa, OK): I would like to congratulate Dr. McElveen on his excellent paper. Because with the facial nerve you have to be very careful, and I am sure he noticed this. I wonder, does he open the facial recess when he makes that posterior cut?

Dr. McElveen: I do; I think it is important to maximize your exposure inferiorly so you can get a good view into the upper tympanum and also get a good view of the area of the sinus tympani. We do enlarge the facial recess, maximize exposure inferiorly, and again, make that cut from a medial-to-lateral direction. The other thing that I pointed out in the presentation is that the advantage with the micro saw is that we can angle the cuts so the bony segment will not impact into the external canal by having it larger posteriorly than anteriorly.

Dr. Milton Ingermann (New York, NY): Just to add a little historical perspective to Dr. McElveen. Dr. Irving Schnee did a similar procedure in 1962 and reported it to the Academy. It was much more difficult then, obviously, because the saw was not available. He kept the bony canal wall attached to the overlying periosteum and canal skin and he pushed it anteriorly to get the same exposure; then he replaced it. I would just like to add Dr. Schnee's name to the historical data.

Dr. Ted N. Steffen (Louisville, KY): This procedure was also proposed by Dr. Sabrina Wullstein at the Triologic and Otological Meetings many years ago. I did this on two occasions, 10 or 12 years ago, and the results of this looked great—one for two years and the other one for five years. Then the bone disappeared, which resulted in a recurrent cholesteatoma. This was not residual cholesteatoma; we just watched the bone gradually disappear. So, I think there is some concern whether this bone that you put back really remains viable. It looks like a great technique, but I caution you to look at the long-term results.

Dr. McElveen As far as the technique is concerned we tried techniques with the drill and ended up losing a great deal of bone. I think that with the saw we can really change this thing, and I think also with the saw you are able to make very fine cuts with minimal bone loss. I think it makes a great deal of difference in the procedure. Again, it will be interesting to follow these patients long-term. In the animal studies we will also be looking at devitalization of bone, but I will tell you that with the intact-canal approach, we pretty significantly devitalize that bone when we thin that posterior canal wall. In my experience, going back, we have a nice mucosal lining on both sides and I think, hopefully, that it will not necessarily be a problem using the micro saw.

Dr. John House (Los Angeles, CA): I have a comment. I am glad Dr. Steffen mentioned Dr. Sabrina Wullstein. I had the privilege watching her do the procedure in 1975 in Germany. I have a question to Dr. Hulka regarding the study. Did the surgeon, the observer, have the ability to move the bone around like a surgeon would during an operation? Obviously, the surgeon is moving the microscope back and forth while looking at the facial recess. Did the observer do that also?

Dr. Gregory Hulka (Durham, NC): Yes. We allowed the observer to move the bone within the temporal bone holder. I had mentioned the limitations created by the temporal bone holder, as well as the Trendelenberg and anti-Trendelenberg positions. Because the platform we were using could not go up and down, we allowed the observer to rotate it as much as possible. By using an operating microscope, the observer was able to swing the operating microscope as much as possible. I think one of the numbers that shows the ability to actually observe spots, or the marks, is that the observer was able to see 47 of 48 of the marks correctly when the canal wall was down.

INTRODUCTION OF NEW PRESIDENT: CHARLES M. LUETJE II, M.D.

Joseph C. Farmer Jr., M.D.

It has been a distinct honor to serve as your president over the past year. I now turn the office over to the very capable hands of Dr. Charles Luetje.

REMARKS OF NEW PRESIDENT

Charles M. Luetje II, M.D.

Dr. Farmer, on behalf of the American Otological Society, it is my privilege to thank you for your sincere dedication, hard work, and caring for the Otological Society this past year. I have a certificate I would like to present to you, and this certificate reads: "The American Otological Society, Inc., presented to Joseph C. Farmer, Jr., M.D., President, 1997, in appreciation and recognition of his service to this Society." In addition to that, here is a gold lapel pin for you.

EXECUTIVE SESSIONS

BUSINESS MEETING

MINUTES—MAY 10–11, 1997

Joseph C. Farmer, Jr., M.D., called the meeting to order at 7:00 a.m., Saturday, May 10, 1997. The minutes of the 1996 AOS Annual Meeting, held in Orlando, Florida, May 4–5, 1996, were approved.

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

Active Members

David M. Barrs, M.D., proposed by Dr. David Wilson and seconded by Dr. Antonio De la Cruz; Thomas Haberkamp, M.D., proposed by Dr. Sam Kinney and seconded by Dr. Herbert Silverstein; K. J. Lee, M.D., proposed by Dr. Mansfield Smith and seconded by Dr. Herbert Silverstein; John McElveen Jr., M.D., proposed by Dr. Mansfield Smith and seconded by Dr. Jack Hough; Allan Rubin, M.D., proposed by Dr. Malcolm Graham and seconded by Dr. Herbert Silverstein; Steven Telian, M.D., proposed by Dr. Richard Miyamoto and seconded by Dr. Malcolm Graham; Phillip Wackym, M.D., proposed by Dr. Bruce Gantz and seconded by Dr. Edwin Monsell.

Associate Members

Pawel Jastreboff, Ph.D., proposed by Dr. Clarence Sasaki and seconded by Dr. John House; Brenda Lonsbury-Martin, Ph.D., proposed by Dr. Herman Jenkins and seconded by Dr. Newton Coker.

Corresponding Members

Dr. Soontorn Antarasena of Bangkok, Thailand, proposed by Dr. Eugene Myers and seconded by Dr. Peter Alberti; Dr. Paul Fagan of Darlinghurst, New South Wales, Australia, proposed by Dr. Bruce Gantz and seconded by Dr. Jeffrey Harris; Dr. Ilmari Pyykko of Stockholm, Sweden, proposed by Dr. John Fredrickson and seconded by Dr. Herman Jenkins.

Honorary Members

William Hitselberger, M.D., Los Angeles, California, proposed by the American Otological Society, Inc. Council.

Nominating Committee

A Nominating Committee, consisting of Drs. Bruce Gantz, chairman, Cecil Hart, Herman Jenkins, Sam Kinney, and Richard Miyamoto, was elected to prepare the slate of nominees for AOS officers for 1997–98.

REPORT OF THE SECRETARY-TREASURER

SECRETARY'S REPORT

Report of the present membership:

(NOTE: This count includes the seven new members inducted earlier on this date, May 10, 1997)

Active Members	132
Senior Members	72
Associate Members	40
Honorary Members	10
Emeritus Members	6
Corresponding Members	10
Total Members	270

The Society members were reminded that many Active Members will be moving on to Senior Membership with a vote to be taken at this meeting. Each member was encouraged to look to the otologists in their area to see who might qualify for future membership, and it was suggested that their proposals be submitted as soon as possible.

Members deceased since the last annual meeting:

Harold M.E. Boyd, M.D. (emeritus), Gunnar O. Proud, M.D. (senior), Woodrow D. Schlosser, M.D. (senior), Harold F. Schuknecht, M.D. (senior), Edward Truex, M.D. (senior), and W. Dixon Ward, Ph.D. (associate).

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 to qualify for Senior status. A voice vote for Senior Membership on each of the following candidates was taken and approved: Bobby Alford, M.D., Michael E. Glasscock III, M.D., Brian McCabe, M.D., William Montgomery, M.D., and Max Ronis, M.D.

Robert J. Keim, M.D., James L. Parkin, M.D., and Leonard Proctor, M.D., were approved for Emeritus Membership.

TREASURER'S REPORT

Income Statement and Expense Statement—American Otological Society, April 1, 1996, to March 31, 1997.

Beginning Balance (April 1, 1996)	$ 99,522.05
INCOME:	
COSM Receipts	21,101.44
Membership Dues	52,700.00
Research Fund Reimbursement	22,963.66
Transactions Income	1,499.00
Reimbursement from Miscellaneous	660.00
Interest Income	2,478.28
TOTAL INCOME:	$101,402.38
EXPENSES:	
ACCME	2,740.00
Accounting Fees (includes the Annual Audit AOS & Research Fund)	7,108.00
Legal Fees	300.00
Dues, Donations	2,500.00
26 New Award of Merit Medals	6,530.02
Editor-Librarian Expenses	568.08
Secretarial Annual Stipend	3,000.00
Postage, Printing, Supplies	4,386.06
Staff Travel/Meetings	972.59
Internal Revenue Service (taxes)	16,792.00
New York State Incorporation Fee	250.00
Insurance Premiums	4,703.00
Lippincott-Raven—AJO Subscriptions	10,014.00
1996 Annual Meeting Expense	27,069.95
Midwinter Council Meeting	9,661.24
1997 Annual Meeting Expenses	490.62
President-Elect Travel Expenses	603.58
TOTAL EXPENSES	$ 97,689.14
Balance in AOS Treasury—March 31, 1997	$ 103,235.29

Dr. Julianna Gulya presented the report of the editor-librarian. She stated that the 1995 *Transactions* (Vol. 83) were mailed out to the Active Members and Honorary Members in early April 1997.

The 1996 *Transactions* will use the abstracts in the form submitted to the Secretary-Treasurer's office; this will save future typesetting costs. Hopefully, this volume (84) will be ready for distribution by late fall 1997.

Dr. Gulya noted that the Academy archives is still searching for Volume 2 (1875–79), Volume 15 (1919), and Volume 16 (1924) of the *Transactions*. Please contact Ms. Olivia Cox at the Academy office if you have any of these volumes or know where they might be located.

The American Otological Council voted to delay the proposal of indexing the *Transactions* at this time due to the unforeseen high costs of such a project.

Bids have been obtained for the printing of both the 1996 *Transactions* and *History of the American Otological Society, Inc.*

Members were reminded to pick up their numbers for the annual photograph, which will be taken immediately following the morning session in the Cactus Garden.

Dr. Farmer thanked the following individuals for serving on the 1997 Program Advisory Committee: Drs. Ronald G. Amedee, Karen I. Berliner, Richard Chole, Newton Coker, Jeffery Harris, Timothy Jung, Arvind Kumar, Paul Lambert, William Meyerhoff, and Leonard Rybak.

The Business Meeting was adjourned and the first Scientific Session started at 7:30 a.m. with very brief remarks from President Joseph Farmer. Remarks were presented by the Guest of Honor, Dr. Mansfield F.W. Smith. Finally, the Presidential Citation was presented to the Research Triangle Institute, Center for Auditory Prosthesis Research: Blake Wilson, B.S.E.E., Dewey T. Lawson, Ph.D., Charles C. Finley, Ph.D., and Mariangeli Zerbi, M.S.

The second Business Meeting was held on Sunday, May 11, 1997. Reports were received as follows:

The Report of the Board of Trustees of the American Otological Society Research Fund was given by Dr. Richard Miyamoto. The trustees met in New York City on March 22, 1997. The fund balance on March 18, 1997, was $7,013,359.00. Asset allocation is 64.7% in stocks, 33.9% in bonds, and 1.4% in short-term reserves. Twenty-three grant applications (20 research grants and 3 fellowships) were reviewed for scientific merit and funding decisions. Seven grants were funded (5 research grants and 2 fellowships). Targeted research areas are otosclerosis and Meniere's disease. Dr. Brenda Lonsbury-Martin was elected a consultant.

The Report of the American Board of Otolaryngology was given by Dr. Warren Adkins, the American Otological Society liaison to the American Board of Otolaryngology (ABO). The 1996–97 examination statistics are as follows: 344 candidates took the written examination in September, 1996; 297 of those became eligible for the oral examination in April, 1997. Two hundred eighty-four candidates passed the oral exam and were certified. The three-year process has now been completed to transfer all aspects of exam preparation and development to the ABO. Dr. Eugene Myers is serving his final year as president; Dr. Charles Krause will succeed him. Dr. Robert Cantrell is serving his final year as executive vice-president, and Dr. Gerald Healy has been elected to succeed him. Drs. A. Julianna Gulya and James B. Thompson were elected to the board of directors of the ABO, replacing Drs. John Fredrickson and Robert Kohut. The 1997–98 written exam will be administered in Chicago, Atlanta, and San Francisco on September 21, 1997. The subsequent oral examination is to be conducted at the Palmer House in Chicago, March 22–23, 1998.

The Report of the American Academy of Otolaryngology was given by Dr. Harold Pillsbury. Dr. Pillsbury represents the American Otological Society as governor on

the Academy board of governors. Dr. Pillsbury reported on the AAO–HNS boards' activities over the past year. The Executive Committee of the AAO-HNS Board of Governors recommended allocating $127,000 from its practice assessment fund for the Corning-HTA outcomes project, including a study of the clinical outcomes of otitis and tympanostomy tubes as well as sinusitis and endoscopic sinus surgery. The NIDCD also selected the Academy Foundation for a clinical trial cooperative group award of $800,000 for the study of autoimmune inner ear disease. A task force studying the physician workforce in otolaryngology-head and neck surgery has been developed, headed by Dr. C. Ron Cannon from the Board of Governors.

The Board of Governors has endorsed the Academy's activities in terms of the Patient Access Coalition on Capitol Hill. This coalition of specialty societies advocates patients' rights to have access to and choice of specialists, elimination of financial incentives that discourage referrals, elimination of "gag clauses" in managed-care contracts, a fair and expedited process to settle patient disputes within health plans, and a target of 85% of premium dollars to be used for health care. In addition, the board has supported the opposition to the legislative expansion of scope of practice for audiologists (HR176), which would allow direct reimbursement to audiologists for services provided without physician referral and Medicare physician payment adjustments. An unscientific and unreliable effort to alter practice expenses for complex procedures in OHNS will have a negative effect on reimbursement for skull-base procedures and neurotology procedures and is being challenged. Another resolution supported by the Board involved recommending standardization of credentialing forms for managed-care organizations, hospitals, and other credentialing organizations such that the Academy could work with the American College of Surgeons and the American Medical Association to develop a universal form to ease credentialing for our members.

The Report of the American Academy of Otolaryngology-Head and Neck Surgery, Inc. and Foundation was given by Dr. Michael Maves, the Executive Vice-President of AAO-HNS. Dr. Maves highlighted the receipt of the NIDCD Clinical Trials Grant and thanked Dr. Gulya for the commitment to the Foundation. The Outcome Assessment Tools are available on computer discs for use by practitioners in their own offices for managed care situations. Mr. Charles Birdie is the new Director of Development for the foundation. The AAO-HNS Foundation has recently undergone ACCME review and received a six-year accreditation. A reminder was issued that another United States/United Kingdom conjoint symposium will be held in Boston, July 23–27, 1997, and all are encouraged to attend. Also, the next annual meeting of the Academy will be held in San Francisco from September 7–10, 1997.

Discussions continue concerning the audiologists' scope of practice.

Dr. Maves informed the Society that Dr. James Snow, the director of the National Institute on Deafness and Other Communication Disorders, will be retiring. Several individuals have been recommended by the AAO-HNS to the Search Committee to be the director of the NIDCD.

Dr. Maves noted that a series of patient information pamphlets concerning cochlear implants and other special otolaryngological procedures are being prepared by the Academy. Because the two companies that make the medical products were contacted for possible assistance with printing and distributing costs have not responded, Dr. Maves asked the Society to consider assisting with production costs; the Council of the American Otological Society agreed to assist with the costs.

The Report of the American College of Surgeons was given by Dr. Gregory Matz, ACS governor. Dr. Matz updated the membership on the activities of the ACS, noting that otolaryngology is the third-largest group of new inductees within the College. The College has approved $820,000 for scholarships and fellowships for 1997. In addition, the College is working diligently to assess the relative work values for evaluation and management of bundled surgical services, including E and M services during the global period. Common sense and fairness suggest that some portion of the current relative work values for global services should be raised. A major concern of the College continues to be the issue of managed care. Currently, most fellows perceive that their role in the process of negotiating provisions in contracts is very limited or entirely nonexistent. The College supports legislation to require managed-care programs to support indigent care, graduate medical education, and surgical research. In addition, support is also given to the development of resources to establish the ACS as a resource for outcomes data and practice guidelines. The American College of Surgeons serves as a clearing house for information on and assistance with professional liability issues, and strongly supports limits on attorneys' contingency fees. Another issue of great concern is the private-sector mania for mergers and acquisitions, which are impacting medical education programs.

The Report of the Award of Merit Committee was given by Dr. Robert Jahrsdoerfer, Chairman. Dr. Jahrsdoerfer reported that Drs. Derald Brackmann, Joseph Farmer, Mansfield Smith, and Richard Gacek had served with him in the selection of the 1997 recipient of the Award of Merit. Dr. Michael Glasscock III was the recipient of the award at the banquet held on Saturday evening, May 10, 1997.

The Report of the Audit Committee was given by Dr. Sam Kinney, Chairman. He reported on behalf of himself and his committee members, Drs. Warren Adkins and Paul Lambert. They reviewed the financial records of the Society and collectively found them to be in order. All reported amounts appeared accurate to balance the accounts. The committee questioned the need for a payment to the Internal Revenue Service. It was explained that the income realized from the investments of the Research Fund is taxable income. The monies given out in grants is not always sufficient to impact taxes owed; however, the trustees of the Research Fund believe only meritorious research should be funded. Thus, taxable income remains, and since the Society still maintains private foundation

funded status, taxes are owed. The Society is requesting Public Charity status from the Internal Revenue Service, which, if granted, will lower the taxes owed. In addition, the accounting fees are somewhat high due to the time required to audit the Research Fund of the Society. Seventy-five percent of the auditor's fee is reimbursed to the Society's treasury by the Research Fund.

The Report of the Nominating Committee was given by Dr. Bruce Gantz, Chairman. He presented the following nominations for the slate of officers of the AOS for the 1997–98 year: Drs. Charles M. Luetje, President; Gregory J. Matz, President-Elect; Horst R. Konrad, Secretary-Treasurer; A. Julianna Gulya, Editor-Librarian; and Council Members, Derald E. Brackmann, Joseph C. Farmer Jr., C. Gary Jackson, and Richard A. Chole. There were no nominations from the floor. The nominated slate was elected by the membership. In addition, the following individuals were elected to serve on the Award of Merit Committee for 1998: Drs. Sam Kinney and H. A. Ted Bailey.

The Report of the American Journal of Otology was given by Dr. Robert Jackler, editor-in-chief. He asked the membership for its vote of confidence in seeking additional international affiliates for the journal. He has identified interested groups, and is working with them to develop rules prior to affiliation. Any possible affiliate group would have to be approved by both the AOS and ANS Councils and peer review would be required prior to publication of any manuscripts. The Society agreed to have Dr. Jackler proceed with inquiries, stipulating that all recommendations be referred to the two councils for final decision.

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

REPORT OF THE EDITOR-LIBRARIAN

The 1995 *Transactions* (Volume 83) were mailed out in early April 1997. Please let me know if there were any problems with receiving this volume. According to Society by-laws, Senior, Emeritus, and Associate Members must pay for the *Transactions,* which for the 1995 *Transactions* remains stable at $65.00, including postage and handling. The 1995 *Transactions* includes the abstracts of the presented papers, the ensuing discussions, special presentations, and the transcript of the business meeting.

I am not entirely clear as to why the *Transactions* were delayed so badly this year, for the materials were in the publisher's hands by June. Perhaps (and hopefully) the delay represents a transitory difficulty related to the transition in publishers. I will try to do better this year. With the above-mentioned goal, and with the approval of the council, for the 1996 and subsequent *Transactions* I will use the abstracts in the form submitted to the Secretary-Treasurer's office. It turns out that the logistics of trying to use the abstracts as printed in the *American Journal of Otology* proved to be quite unwieldy and the typesetting costs saved were minimal—certainly not balancing the increased complexity involved. So, I hope to have the materials for the 1996 *Transactions,* Volume 84, ready to go to the publisher by the end of May with distribution in late fall 1997. Stay tuned.

We are still looking for any copies of Volume 2 (1875–79); Volume 15 (1919); and Volume 16 (1924). Our *Transactions* are stored in the Academy Archives. The duties of Mr. Philip Seitz, with whom we had a nice working relationship (he has, by the way, left the Academy to live in Belgium), will be assumed by Ms. Olivia Cox, with whom I already have made contact. We look forward to continuing the same pleasant working relationship we had with Mr. Seitz. As reported last year, it has been suggested that the *Transactions* be indexed in order to make their contents more readily available to researchers. After careful investigation of the various options and their associated costs, the Council elected defer any such project for the time being due to the unexpectedly high cost of such a project. It may be that with advances in technology, either the cost of indexing will come down or an alternative modality of accomplishing the desired accessibility will develop. Bids have been obtained for the 1996 *Transactions.* More information will be distributed to the membership as it becomes available.

I am also pleased to do my annual Joseph Farmer imitation and remind you that we are going to have the annual photograph taken at the close of this meeting. In the past two years I think we have been "on a roll" for these photographs because members have been no longer going incognito; pretty much everybody has been picking up their numbers and doing everything right. I want to maintain this tradition and remind you that, at the end of this meeting, please proceed to Judy Matz's desk, pick up a number, give her your name, make sure your name is listed with the corresponding member, and take that number with you to the Cactus Garden. We all remember the story that Dr. Farmer told us about what happens when we do not use these numbers to identify you. We are going to take the photograph first with everybody holding the number card so both it and your face can be seen by the camera and not obscured by the person standing in front. We will then take another photograph without the number cards, with everybody—and it is important—staying at the same location!

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 Joseph C. Farmer Jr., M.D., met in New York City on March 22, 1997. At that time we had a spectacular fund of actually $7,013,359.00. The stock market fluctuated but we are at about that level once again. The current asset allocation is approximately 65% in stocks and the rest is in fixed-income investments. We have been successful in attracting high-level grant applications. We reviewed 23 applications; 20 of these were research grants and 3 were fellowship requests. Seven grants were funded; of these, 5 are research grants and 2 are fellowships. We continue to have as target research areas otosclerosis and Meniere's disease, although the definitions are quite broad.

Dr. Joseph Farmer was elected to serve a second term as Chairman and we are happy to announce that Dr. Brenda Lonsbury-Martin was elected as a consultant to the group.

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 the following: Six successful examination cycles have now been completed using the new examination format. Candidates must first pass a written or qualifying examination, and then pass an oral examination to become certified. The written and oral examination scores are not combined. Three hundred forty-four candidates took the written examination in September 1996. Of those candidates, 297 became candidates for the oral examination. The oral examination was conducted by 92 guest and associate examiners and 25 American Board of Otolaryngology directors for 330 candidates in April 1997 at the Palmer House Hilton in Chicago. Two hundred eighty-four candidates passed the examination and were certified.

The American Board of Otolaryngology has now completed a three-year process of bringing exam preparation and materials development in-house. This transition began in 1994 when the oral examination materials were transferred to the American Board of Otolaryngology from the American College Testing Service. In 1996, the computer bank of written exam items were transferred in-house. Also in 1996, the American Academy of Otolaryngology-Head and Neck Surgery transferred the administrative aspects of the Task Force on New Materials to the American Board of Otolaryngology and one successful cycle of item writing has now been completed. In 1997, the annual otolaryngology examination, which is administered mainly to residents in training, was transferred from the American Academy of Otolaryngology-Head and Neck Surgery to the American Board of Otolaryngology. Thus, all aspects of exam preparation and development are now handled by the American Board of Otolaryngology staff, with psychometric consultative services provided by Knapp and Associates International.

Dr. Eugene N. Myers is now in the final year of his two-year term as President. Dr. Charles J. Krause is Vice-President/President-Elect and Dr. Robert W. Cantrell is now in his final year as Executive Vice-President. Dr. Gerald B. Healy was recently elected to succeed Dr. Cantrell as Executive Vice-President in 1998.

Drs. A. Julianna Gulya and James B. Thompson were elected to the Board of Directors replacing Drs. John F. Fredrickson and Robert I. Kohut, who were elevated to Senior Counselor status after many years of dedicated service to the American Board of Otolaryngology. Dr. Gulya recently began service as Chief of Clinical Trials Branch at the National Institute on Deafness and Other Communication Disorders in Bethesda, Maryland. Dr. Thompson serves as Professor of Surgical Sciences at Bowman Gray School of Medicine in Winston-Salem, North Carolina. Both Drs. Gulya and Thompson served as Guest Examiners of the ABO on numerous occasions, and were serving as Associate Examiners at the time of their elections.

The position of Associate Examiner was initiated four years ago. To be elected as an Associate Examiner, an individual must have served as an ABO examiner at least twice. He or she must be prominent in the specialty, especially in the areas of patient care and medical education, and must demonstrate an interest and ability in the creation of educational and test materials. The ABO is committed to electing and training new examiners while maintaining consistency in administering the examination. The Associate Examiners are a core group of 36 experienced examiners to fulfill this need, along with the directors. Associate Examiners are elected to a three-year term, and are eligible for re-election to one additional term.

At the March 1997 meeting, Drs. Paul Levine and Jesus E. Medina were elected Associate Examiners. The following were re-elected to a second three-year term: Dr. Robert A. Dobie, Dr. Paul J. Donald, Dr. Ellen M. Friedman, Dr. Jack L. Gluckman, Dr. Herman A. Jenkins, Dr. Douglas E. Mattox, Dr. Michael D. Maves, Dr. Richard T. Miyamoto, Dr. William J. Richtsmeier, Dr. Clarence T. Sasaki, Dr. Nancy L. Snyderman, and Dr. Ernest A. Weymuller Jr., M.D.

The American Board of Medical Specialties (ABMS) is the umbrella organization of the 24 recognized certifying organizations in the United States. Representatives to the ABMS Assembly are Dr. Robert W. Cantrell, Dr. Eugene N. Myers, and Dr. Gerald B. Healy, and alternative representatives are Dr. M. Eugene Tardy Jr., Dr. Michael E. Johns, and Dr. Charles J. Krause. Dr. Byron J. Bailey, a past President of the ABO, just completed his term as Treasurer of the ABMS. Dr. Gerald B. Healy serves on the Committee on Certification, Subcertification, and Recerti-

fication (COCERT), and Dr. Jerome C. Goldstein continues to represent the Council of Medical Specialty Societies to the ABMS assembly. Caryn Wilson, administrator of the ABO, continues to serve as chair of the ABMS Board Staff Council.

The 1997 written examination will be conducted on September 21 in three cities. This is the first time it is not going to be held solely in Chicago. The cities are Chicago, Atlanta, and San Francisco. The subsequent oral examination will be conducted at the Palmer House in Chicago, March 22–23, 1998. That concludes my report.

Respectfully submitted,
Warren Y. Adkins Jr., M.D.

REPORT OF THE REPRESENTATIVE TO THE BOARD OF GOVERNORS OF THE AMERICAN ACADEMY OF OTOLARYNGOLOGY–HEAD AND NECK SURGERY

It has been a great pleasure for me to represent the American Otological Society as its Governor to the Board of Governors of the American Academy of Otolaryngology-Head and Neck Surgery. This report summarizes the activities of the Board of Governors over the past year. Reporting first from the September 1996 meeting, the Executive Committee of the Board of Governors recommended allocating $127,000 from its practice assessment fund for the Corning-HTA outcomes project. This was approved by the Board of Directors of the Academy and included a study of clinical outcomes of otitis media and tympanostomy tubes as well as sinusitis and endoscopic sinus surgery. The NIDCD also selected the Academy Foundation for a clinical trials cooperative group award of at least $800,000 for the study of autoimmune inner ear disease. A task force studying the physician workforce in otolaryngology-head and neck surgery has also been developed and is headed by Ron Cannon and Mike Benninger to examine retirement patterns, the distribution of residents emerging from training into the workforce, the impact of women in otolaryngology, and on future needs within the specialty.

The Board of Governors also has endorsed the Academy's activities in terms of the Patient Access Coalition on Capitol Hill. This coalition of specialty societies advocates patients' rights to have access to and choice of specialists, elimination of financial incentives that which discourage referrals, elimination of "gag clauses" in managed-care contracts, a fair and expedited process to settle patient disputes with health plans, and a target of 85% of premium dollars going to provision of health care. In addition, the Board of Governors has significantly supported the opposition to the legislative expansion of scope of practice for audiologists (HR176), which would allow direct reimbursement to audiologists for services provided without a physician referral, and Medicare physician payment adjustments. An unscientific and unreliable effort to alter practice expenses for complex procedures in OHNS will have a negative effect on reimbursement for skull-base procedures and neurotology procedures and is being challenged. Another resolution supported by the Board of Governors involved recommending standardization of credentialing forms for managed-care organizations, hospitals, and other credentialing organizations such that the Academy could work with the American College of Surgeons and the American Medical Association to develop a universal form to ease credentialing for our members.

In summary, it is clear that the Board of Governors and the Academy leadership have made substantive progress in their efforts to preserve the integrity of each otolaryngologist's practice, focusing on legislative activities as well as on the ENT Outreach Program.

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

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

AAO-HNS Foundation: Dr. Maves noted the NIDCD Clinical Trials Grant and thanked Dr. Gulya for the commitment to the foundation for grants and awards.

The Covance Outcomes Assessment Tools are available on computer discs to practitioners for use in their own offices for managed-care situations.

Mr. Charles Birdie is the new Director of Development for the Foundation.

The Foundation has recently undergone ACCME review and received a six-year accreditation.

Forthcoming meetings of importance are another United States/United Kingdom conjoint symposium, to be held in Boston, July 23–27, 1997, and the Annual Meeting of the Academy to be held in San Francisco, September 7–10, 1997.

Academy: The Academy has been active in efforts to stop the legislation on practice expense coalition (HCVA).

Discussions continue concerning the audiologists' scope of practice.

Dr. Maves noted that a series of pamphlets directed toward patient information concerning cochlear implants and other specific otolaryngological procedures are being prepared by the Academy. Since two companies contacted for possible assistances in the printing and distribution costs did not respond to the request, Dr. Maves asked if the Society could assist with the production costs. The approximate dollar request would be $10,000. The same amount is being requested of the American Neurotological Society. The AOS Council be-

lieves that these would be very effective in generalists' offices. The Council affirmed the motion made by Dr. Jahrsdoerfer that a donation be made to this under the "unrestricted educational grant" category. These funds will be requested from the Research Fund. It was noted that many of the school systems could also be supplied with these pamphlets.

Respectfully submitted,
Michael Maves, M.D.

REPORT OF THE AMERICAN COLLEGE OF SURGEONS

The American College of Surgeons (ACS) will be moving into their new headquarters at 633 North St. Clair St., Chicago, sometime in mid-1997.

The ACS approved $820,000 for scholarships and fellowships for 1997.

The ACS is continuing to lobby Congress to establish a single Medicare fee schedule conversion factor for all physician services.

The ACS is working diligently to assess the work values for evaluation and management. Surgical bundles also include E and M services during the global period. Common sense and fairness suggest that some portion of the current work values for global services should be raised.

The following is a summary of the Board of Governors meetings, October 6 and 9, 1996:

1. The number one concern, as in 1995, is the issue of managed care. It is apparent that most members of the College are adapting to managed care as the method for payment of health care services in the United States. The chief complaint from most, of course, is that opportunities to negotiate these provisions in the contracts are limited or entirely nonexistent. The fellows of the College are concerned about the "deselection" clauses; in other words, there is a fear of being deselected adversely from a managed-care contract without any due process of appeal.

   The College continues to support legislation to require managed-care programs to support indigent care, graduate medical education, and surgical research. The College is providing educational programs to all fellows to negotiate contracts collectively.

   The College is in support of the development of resources to establish outcomes data and evidence-based care. The College is opposed to managed-care programs and other insurance mandates that prohibit or curtail the disclosure of full range of treatment options (gag rules).
2. The second major concern is the issue of professional liability. Michigan, Ohio, Pennsylvania, and Texas were cited as areas of great need for tort reform. Traveling expert witnesses continue to create a problem for the College.

   The College should continue to serve as a clearing house for information and assistance on professional liability and problems, and the College should support limits on attorneys' contingency fees.
3. Reimbursement for services was the third most common concern. Low levels of reimbursement from all payors, the Medicare fee schedule, and payments for assistants in surgery are of major concern.
4. Also of great concern are graduate medical education programs. The private sector mania for mergers and acquisitions has created graduate medical concerns. A number of governors expressed concern that managed-care programs participating in the Medicare program do not support graduate medical education despite the fact that a portion of Medicare is intended specifically for graduate medical education support.

   With the anticipation of the Veterans Administration undergoing a consideration to reduce 20% of the otolaryngology residency slots that they currently pay for, the College is in support of the development and implementation of an "all payor" system for graduate medical education, as well as surgical research support. Also, it is recommended that the College support a loan program for surgeons in training.
5. With the use of utilization review criteria and practice guidelines, it is recommended that the ACS should serve as a resource and clearing house for information on practice guidelines as well as outcomes data.
6. Education and credentialing: there is a great deal of discussion among general surgeons on the issue of stereotactic core-needle biopsies, with major concerns that this will become a field carried out by radiologists instead of general surgeons.

Otolaryngology continues to be the third largest group within the College.

1997 presenters for "What's New in Surgery" included Dr. Paul Levine, Charlottesville.

Dr. Gerry Healy was re-elected to a second, two-year term as Advisory Council Chairman.

The new nominees for the Advisory Council are Paul Levine, M.D., Charlottesville; Frank Lucente, M.D., Brooklyn; and Roy B. Sessions, M.D., Washington, D.C.

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

REPORT OF THE AWARD OF MERIT COMMITTEE

The Award of Merit presentation for 1997 took place on May 10, 1997, at the annual banquet. The recipient was Michael E. Glasscock III, M.D. The award was given "in recognition of his professional integrity, pioneering

innovations, and outstanding clinical achievements." Michael received the award graciously and praised the Society. The Award of Merit Committee for 1997 was comprised of Drs. Derald Brackmann, Joseph Farmer, Richard Gacek, Robert Jahrsdoerfer (chair), and Mansfield Smith.

REPORT OF THE AUDIT COMMITTEE

The Audit Committee of the American Otological Society, consisting of Sam E. Kinney, M.D., Warren Adkins, M.D., and Paul Lambert, M.D., met by conference call on April 21, 1997, to review the finances of the American Otological Society.

The committee had kindly been supplied with a detailed report of the balance sheet of the American Otological Society, Incorporated, including the income/expense statement and a detailed report of the check registry.

The committee reviewed these findings and found them all to be in order. Questions of the committee were answered by Dr. Matz quite completely and we would recommend to both the council and the membership of the American Otological Society that this report be accepted as having been reviewed carefully by the committee.

Respectfully submitted,
Sam E. Kinney, M.D., F.A.C.S.

REPORT OF THE NOMINATING COMMITTEE

The Nominating Committee, consisting of Drs. Bruce Gantz (chairman), Cecil Hart, Herman Jenkins, Sam Kinney, and Richard Miyamoto presents the following slate of officers for the American Otological Society for the 1997–98 year: Drs. Charles M. Luetje, President; Gregory J. Matz, President-Elect; Horst R. Konrad, Secretary-Treasurer; A. Julianna Gulya, Editor-Librarian; and Council members, Drs. Derald E. Brackmann and Richard A. Chole. In addition, the Nominating Committee proposes Drs. Sam E. Kinney and H.A. Ted Bailey serve on the Award of Merit Committee for 1998.

Respectfully submitted,
Bruce Gantz, M.D.

REPORT OF THE *AMERICAN JOURNAL OF OTOLOGY (AJO)*

At the council meeting, the issue of possible affiliation of the *AJO* with other otologic scientific societies was discussed. Otology/neutology is a relatively small field with no more than several thousand participants in the subspecialty worldwide. Nevertheless, we have a dynamic field with a substantial (and ever-growing) creative output. The *AJO* is the only journal dedicated to clinical issues in otology/neutology. It is a strong and well-established publication with a substantial worldwide readership. In terms of academic weight in the field, it has the second-highest impact factor of all ENT journals (N = 16). In recent years, it has become the favored publishing site for the most important contributions in the field. Nearly half of the *AJO*'s subscriptions (both individual and institutional) come from outside the United States. A large (and steadily growing) fraction of manuscripts received are contributed by European authors. The peer review process of the *AJO* is a level playing field with broad multinational participation. Every effort is undertaken to ensure that the sole criterion for publication decisions is the scientific merit of the work.

The community of otology/neutology needs one high-quality journal, which is truly international in scope, and well focused upon topics of interest to the specialty. It is both educationally and fiscally inefficient to dilute our creative output across a broad spectrum of general ENT journals. The *AJO*, which publishes only six times a year, has both the capacity and international composition to grow into this expanded role.

The primary mission of the *AJO* is to publish the highest quality scientific contributions in otology and neurotology. Affiliation with the other societies, by capturing the cream of their otological scholarship, substantially enhances the academic substance of the journal. It ensures that the *AJO* will strengthen its leadership position as the most prestigious journal in the field.

Prerequisites for an Affiliated Society

The AJO will have the right of first refusal for all scholarly material:

- All Society-derived manuscripts will undergo the customary peer review process required of all new submissions to the *AJO*.
- Presenters at scientific meetings should receive the *AJO* "Guidelines for Authors" enclosed along with the letter notifying them of acceptance to the program.
- Society meeting brochures should include a notice that the scientific program will be published in the *AJO*.

Society members must agree to participate actively in the AJO Editorial Board

- Undertake unbiased expert peer review for manuscripts from around the world assigned based upon reviewer expertise, not geography
- Contribute to formulation of the journal's editorial policy
- Contribute editorial and opinion pieces

All Society members must subscribe to the AJO as a membership benefit

- Society members will receive the same discounted rate given to members of the American Societies (AOS and ANS). A small supplement to cover the costs of international postage will be added as required.
- The Society will collect subscription fees as part of its annual dues collection and remit the portion designated for *AJO* subscription costs to the publisher (Lippincott-Raven Press).
- The Society will provide the publishers (Lippincott-Raven Press) with a list of its members and their mailing addresses to facilitate subscription fulfillment.

Respectfully submitted,
Robert K. Jackler, M.D.

Dr. Boyd was elected to the American Otological Society in 1963 and to Emeritus Membership in 1978. Regrettably, no other information is available.

A. Julianna Gulya, M.D., Editor

Harold M. E. Boyd
?–1997

The following obituary and photograph are kindly provided by Dr. Larry A. Hoover. Dr. Proud was elected to the American Otological Society in 1959 and to Senior Membership in 1983.

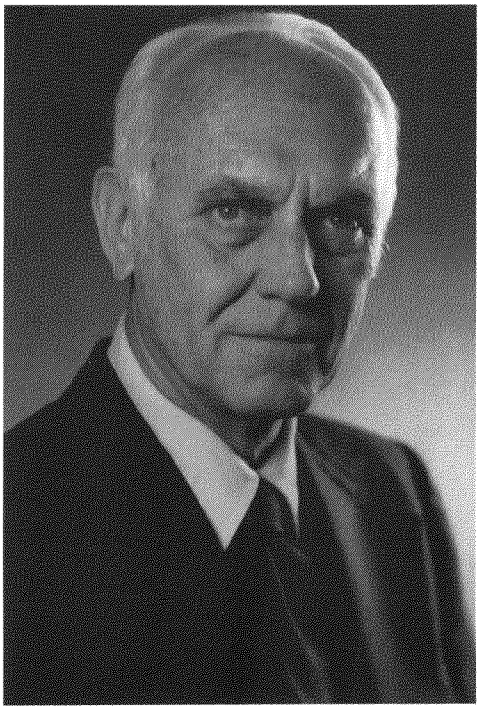
A. Julianna Gulya, M.D., Editor

Doctor Gunnar Proud became the first full-time chairman of the Department of Otolaryngology at the University of Kansas Medical Center in 1950, and was the father of modern otolaryngology training at this institution. He completed his medical school training at Washington University in St. Louis in 1939. He also completed his residency there from 1946 to 1950. Dr. Proud's medical training was interrupted by the Second World War, in which he served on the Good Samaritan Hospital Ship in the Medical Corps of the U.S. Navy. Dr. Proud served with the Marine Corps. during the Battle of Iwo Jima.

During his otolaryngology career, Dr. Proud served on the Board of Directors of the American Board of Otolaryngology. He also served on the Communicative Disorders Research Training Study Section of the National Institutes of Health. In 1962, Dr. Proud was elected Vice-President of the Middle Section of the Triological Society, and in 1981 served as its President. He was Chairman of the Research Committee for the then American Academy of Ophthalmology and Otolaryngology. He also served as third Vice-President and first Vice-President of this organization. Dr. Proud was Secretary and then President of the Otosclerosis Study Group, a founding member of the Association for Research in Otolaryngology, and a member of the Board of Trustees of the Research Fund of the American Otological Society.

In our local area, Dr. Proud served as President of the Greater Kansas City Society of Ophthalmology and Otolaryngology.

Dr. Proud is survived by his wife, Wendy Anderson, and daughter, Jan Proud, both of Leawood, Kansas. A second daughter, Wendy Anderson, and a grandson, Nicholas Green, reside in Bethany and Milford, Connecticut, respectively.



Gunnar O. Proud
1913–1997

We will greatly miss Dr. Proud's keen intellect and ever-present wit. I personally feel honored to have had the opportunity to know Dr. Proud and to have had his friendship and support in continuing the otolaryngology program here at the University of Kansas.

Dr. Schlosser was elected to the American Otological Society in 1966 and to Senior Membership in 1989. Regrettably, no other information is available.

A. Julianna Gulya, M.D., Editor

Woodrow D. Schlosser
?–1996

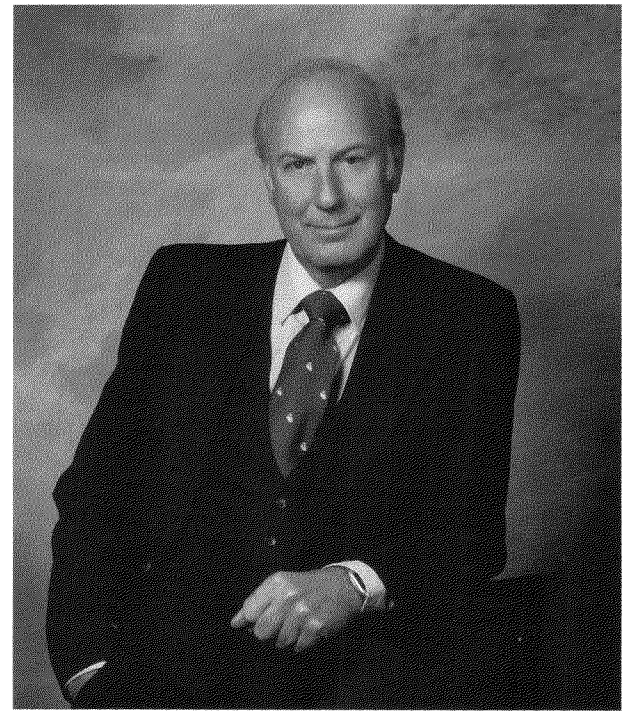
The following obituary and photograph appeared in the *Annals of Otology, Rhinology, and Laryngology*, January 1997, volume 106, and are reprinted with the permission of the author, Joseph B. Nadol Jr., M.D. and the editor of the *Annals of Otology, Rhinology, and Laryngology*, Brian F. McCabe, M.D. Dr. Schuknecht was elected to the American Otological Society in 1957 and to Senior Membership in 1990.

A. Julianna Gulya, M.D., Editor

Harold Frederick Schuknecht, M.D., was professor emeritus of the Department of Otology and Laryngology at Harvard Medical School and chief emeritus of the Department of Otolaryngology at the Massachusetts Eye and Ear Infirmary. Professor Schuknecht was a world-renowned clinical otologist, otopathologist, teacher, and scholar.

He was born on February 10, 1917, in the farming town of Chancellor, South Dakota. He received his undergraduate training at the University of South Dakota and graduated from Rush Medical College at the University of Chicago in 1940. He served a one-year rotating internship at Mercy Hospital in Des Moines, Iowa, where he met his wife, Anne Bodle. Before residency training, he served two years as a general medical officer and two years as a flight surgeon with the 15th Air Force in the Mediterranean theater in World War II. He was awarded the Soldier's Medal for his heroic rescue of a pilot who was trapped in a burning B-24. He completed his residency training in otolaryngology at the University of Chicago Clinics in 1949. It was there that he came under the tutelage and influence of Drs. John Lindsay, Henry Perlman, Heinz Kobrak, and William Neff, who profoundly influenced his subsequent scientific career.

Dr. Schuknecht was an accomplished and innovative otologic surgeon. He started his career as a member of the full-time faculty at the University of Chicago School of Medicine. At that time, his clinical activities were largely confined to head and neck surgery and endoscopy. In 1951, in association with Dr. Robert Appleman, he received first prize for an exhibit on the surgical management of carcinoma of the paranasal sinuses at the annual meeting of the American Academy of Ophthalmology and Otolaryngology. His paper on maxillectomy is still a classic. In 1953 he accepted a position as associate surgeon at the Henry Ford Hospital in Detroit, Michigan, where he concentrated his clinical work in otologic surgery and pursued basic scientific investigations into the pathophysiology of deafness. He was recruited as the Walter Augustus LeCompte Professor and Chair of the Department of Otology and Laryngology at Harvard Medical School and chief of otolaryngology at Massachusetts Eye and Ear Infirmary in 1961, a position he held until retiring from his administrative and clinical activities in 1987. He was among the first surgeons in the United States to perform the modern stapedectomy procedure. He developed and introduced several prostheses for stapes surgery, many of which are still in use worldwide. The innovations and equipment he designed for mastoid tympanoplasty are still in wide clinical use. In 1956 he simplified and perfected transcanal labyrinthectomy for ablating vestibular function in Meniere's disease, and also described the use of intratympanic aminoglycoside therapy for this disorder. He expanded the use of streptomycin by describing its use by intramuscular route for individuals with bilateral Meniere's disease in 1957 and later in 1970.



Harold F. Schuknecht
1917–1996

In addition to his clinical expertise, Dr. Schuknecth was an accomplished and world-recognized investigator in the anatomy, physiology, and pathology of the ear. His early research work in-

cluded the determination of auditory thresholds in experimental animals and the use of behaviorally conditioned animals in a series of classic experiments, including the study of traumatic hearing loss, the behavioral effects of partial section of the auditory nerve and apical lesions of the cochlea. While at Henry Ford Hospital, he and his associate Dr. John Churchill demonstrated that cholinergic nerve fibers were present in the organ of Corti and that these were probably of efferent origin from the olivocochlear bundle. He also demonstrated a system of channels, the "canaliculi perforantes Schuknechtii," in the osseous spiral lamina, by which perilymph comes in direct continuity with the neural supply of the ear and basal poles of hair cells. Other experiments demonstrated the patency of the cochlear aqueduct sufficient to allow passage of red blood cells, the independent origin of endolymph in the auditory and vestibular systems, and the pathologic effects of fistulae of the cochlear duct. At Massachusetts Eye and Ear Infirmary he significantly expanded his research activities. With the collaboration of his good friend Dr. Robert Kimura, the Electron Microscopy Laboratory was developed. In addition, Dr. Schuknecht supported the research efforts of the Eaton Peabody Laboratory, which had very recently been established under the direction of Dr. Nelson Kiang. Dr. Schuknecht's academic accomplishments were described in detail by Beecher and Altschule in their book.[1]

The principal focus of Dr. Schuknect's research work at Harvard, both during his tenure and following professional retirement, was the importance of the underlying anatomy and pathology of the ear to the understanding of disorders of the ear. The clinical problem was underlined by the quote from Joseph Toynbee with which Schuknecth chose to begin the second edition of his text.[2] "If we carefully survey the history of the rise and progress of aural (surgery), as a distinct branch of scientific surgery, one main cause of the disrepute into which it has fallen may be traced to the neglect of the pathology of the organ of hearing."[3] His interest in temporal bone anatomy and pathology began under the tutelage of Dr. John Lindsay. The study of otopathology and his active and innovative clinical practice thus became a logical continuity. It can be said that Dr. Schuknect reestablished the histologic and scientific basis for modern medical and surgical otologic intervention, based on his lifelong study and documentation of human temporal bones. His contributions to this area are many, but of particular interest were studies of otosclerosis, Meniere's disease and other vestibular disorders, and presbycusis. Examples of this fruitful marriage between otopathology and clinical practice were many. In 1962 he described his concept of positional vertigo based on sediment of high specific gravity on the cupula of the posterior semicircular canal. In association with his colleague Dr. Robert Kimura, he demonstrated that obstruction of the endolymphatic sac in experimental animals produces endolymphatic hydrops similar to that seen in human Meniere's disease. In the following years there were several articles describing the effects of Meniere's disease in the human, including rupture and healing of inner-ear membranes and degeneration of the apical spiral ganglion. On the basis of his earlier research experience in Chicago, he was the first to develop an auditory frequency map for the human. This he developed and perfected over the years in conjunction with his logical and convincing categorization of subtypes of presbycusis, namely, sensory and neural degeneration, atrophy of the stria vascularis, and degenerative changes in the supporting structures of the inner ear. As a clinician scholar, Schuknecht was never content with simply descriptive pathology. Instead, he was always searching for clues to the pathophysiology of disease processes. The second edition of his magnum opus, *Pathology of the Ear*[2] was completed in 1993 and will remain a classic in otopathology, and at the same time provides fundamental information for every otologic surgeon. His scholarly career includes the publication of over 300 original articles, editorials, and reviews, and seven books devoted to anatomy, pathology, and surgery of the ear.

In addition to his clinical expertise, Schuknecht was a willing and gifted teacher. His temporal bone collection established at the Massachusetts Eye and Ear Infirmay now contains over 1,500 sets of well-documented specimens. This collection and his willing expert mentorship attracted residents and postgraduate students from many nations. Students honored him in 1973 by the establishment of the International Otopathology Society, also known as the Schuknecht Society. Although originally starting with former research fellows, the society now includes the students of former fellows and others with a serious interest in human otopathology. The society has more than 120 members from 30 countries, who meet in scientific sessions every three years. In his teaching career he quickly distinguished himself as a no-nonsense individual. He required all residents in otolaryngology to attend "Sunday school" for a review of recent otopathologic cases and was among the first chairmen to insist all residents be involved in research projects. Many of his former residents and fellows are now chairmen of departments of otolaryngology worldwide.

During his professional career, Dr. Schuknecht received many prestigious awards, including the Award of Merit from the Association for Research in Otolaryngology, the Shambaugh Prize in Otology from the Collegium Otorhinolaryngologicum Amicitiae Sacrum, the Award of Merit from the American Otological Society, Inc., a Presidential Citation from the American Laryngological, Rhinological, and Otological Society, Inc., and the Distinguished Award for Contributions in Clinical Otology from the American Academy of Otolaryngology-Head and Neck Surgery. He served as president of the New England Otolaryngological Society, the Eastern Section of the American Laryngological, Rhinological and Otological Society, Inc., the American Otological Society, Inc., and the American Neurotology Society. He was a member of the editorial boards of *Acta Oto-Laryngologica; Annals of Otology, Rhinology & Laryngology; European Archives of Oto-Rhino-Laryngology; American Journal of Otolaryngology; Otolaryngology-Head and Neck Surgery;* and *Laryngoscope.* He was a member of 16 professional societies and an honorary member or fellow of many more, including the Royal Society of Medicine of London, the Royal College of Physicians and Surgeons of Glasgow, and the Royal College of Surgeons of Edinburgh.

Although there seemed to be little leisure time, Hal knew how to have fun: traveling, golfing, fishing, videotaping the Boston Marathon, and finding time for his many friends.

Medicine in general and the specialty of otology in particular has lost a giant, and many, many of us have lost a marvelous colleague and good friend. Through his meticulous writings and scientific collections and the training of hundreds of fellows, residents, and students, his clinical and scientific contributions will continue to influence scientific inquiry and the practice of otology.

Joseph B. Nadol Jr, M.D.

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2. Schuknecht HF. Pathology of the ear. 2nd ed. Philadelphia: Lea & Febiger, 1993.
3. Toynbee J. The diseases of the ear; their nature, diagnosis, and treatment. London: HKA Lewis, 1868.

The following obituary appeared in the *Hartford Courant* on December 4, 1996, and is reprinted with the permission of the managing editor, Mr. Cliff Teusch. No photograph is available. Dr. Truex was elected to the American Otological Society in 1946 and to Senior Membership in 1972.

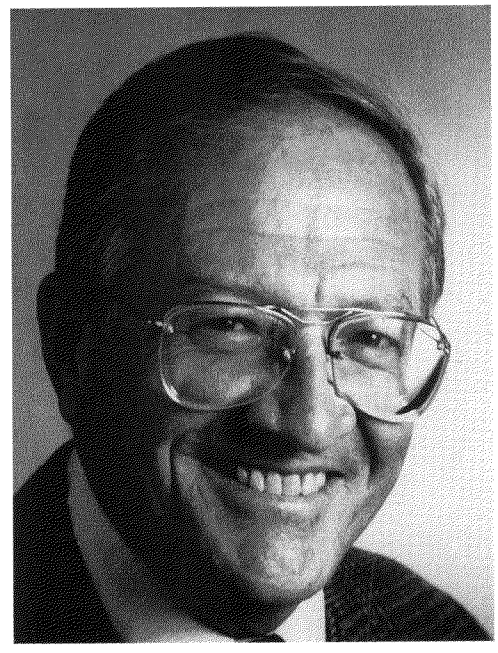
A. Julianna Gulya, M.D., Editor

Edward H. Truex
1911–1996

Edward Hamilton Truex, 85, of Wethersfield, died peacefully at his home Thursday (December 5, 1996). He leaves his beloved wife of 61 years, Ruth (Olmsted) Truex. Born on Jan. 17, 1911, in East Hartford, he was the son of the late Edward H. and Alice H. Truex. He was predeceased by two brothers, William and Steven. Besides his wife Ruth, he is survived by two daughters and sons-in-law, Betsy and Robert Steele of Ledyard, and Joan and Donald Barton of Haddam; two sons and daughters-in-law, Edward and Barbara Truex of Gillford, and Richard and Sharon Truex of Wethersfield; also thirteen granchildren; and two great-grandchildren. He was a graduate of Dartmouth College and Harvard Medical School with internship training at Hartford Hospital and residency at Yale-New Haven Hospital. He served in the U.S. Army from 1941–45 attaining the rank of lieutenant colonel. He was stationed at Walter Reed Army Hospital and Deshon General Hospital in Butler, Pennsylvania, where he headed the rehabilitation service for the deaf and hearing impaired soldiers. After the war, he returned to this private practice in Hartford where he was an ear, nose, and throat specialist. During these years, he was the head of the Hartford Hospital Department of Otolaryngology, the chairman of the Executive Committee of the Hospital Medical Staff for three years and president of the Medical Surgical Staff from 1968–71. He was a member of the Academy of Otology and several regional and national medical societies. He was a member of the Physicians Advisory Committee of the American Hospital Association in Chicago and was instrumental in the founding of the Connecticut Medical Society. He served on the Board of Directors of Blue Cross/Blue Shield. His civic life has been rich and varied as well. He was a pack leader for the Cub Scouts, a founder of the Pine Acres Swim Club, and a volunteer in several town health department programs administering flu shots for 20 years. Since his retirement in 1974, he has been a member of the Advisory Committee of the Jefferson House, a corporator of the Hartford Hospital and the American School for the Deaf, an honorary member of the Hartford Hospital's Medical staff, chairman of the Senior Citizens Advisory Committee for the town of Wethersfield, and a deacon at the First Church of Christ Wethersfield, as well as a member of several church committees. He was an avid woodcarver, tennis player, and fisherman and spent every summer of his life at his beloved second home in the Thousand Islands on the St. Lawrence River surrounded by devoted family.

The following obituary appeared in the *Star Tribune* on December 23, 1996 and is reprinted with the permission of the editor, Mr. Rodger Adams. The photograph is kindly provided by Dr. Marion (Mrs. Bunny) Ward. Dr. Ward was elected to Associate Membership in the American Otological Society in 1971.

A. Julianna Gulya, M.D., Editor



W. Dixon Ward
1924–1996

W. Dixon (Dix) Ward, 72, professor emeritus of communication disorders and otolaryngology at the University of Minnesota, died of heart failure Thursday at his home in St. Paul.

Ward made his own voice heard through frequent letters to the editor at the Minnesota Daily, other writings, and a lifelong, fascination with music.

He was born in Pierre, South Dakota, and earned a degree in physics from the South Dakota School of Mines and Technology in 1944. After serving as a radar technician in the Navy from 1944 to 1946, he enrolled in the graduate program in physics at the University of Minnesota. Later, a friend who was teaching at Harvard University persuaded him to come to Harvard to work on his doctorate in psychoacoustics.

He had a lifelong fascination with music and did his dissertation on the subjective octave and the pitch of pure tones. He received a doctorate in experimental psychology in 1953.

In 1954, he joined the research team at the Central Institute for the Deaf in St. Louis to work on the three-year project for the Navy. The project investigated the auditory and nonauditory effects of high-intensity noise and stimulated his interest in the hazards of noise exposure.

Ward joined the University of Minnesota faculty in 1962. He taught in the departments of Communication Disorders, Otolaryngology, Public Health, and Psychology. Although he had officially retired, he never stopped working and was grading exams up until the week before he died.

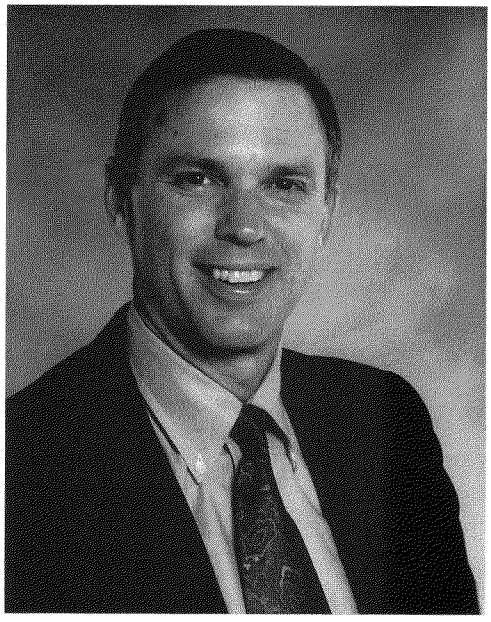
He was a prolific writer and published 112 articles, 40 book chapters, and 22 book reviews. He edited four books. He also was known for writings letters to the editor of the *Daily* at least once a month.

He was active in the Society for Research in Psychology of Music and Music Education, the American Auditory Society, the International Society of Audiology, and the Acoustical Society of America.

Besides his wife, he is survived by daughters Marnie Cushing, Laurie Ward Gardner, Chris Lacey, and Holly Ward, and two grandchildren.

NEW MEMBERS 1997

Active Members



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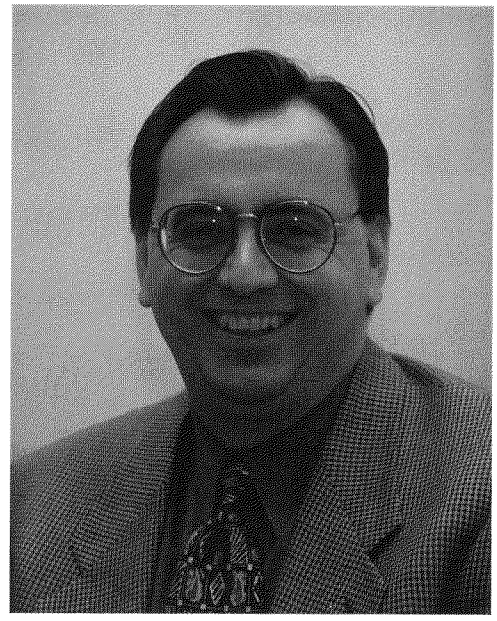

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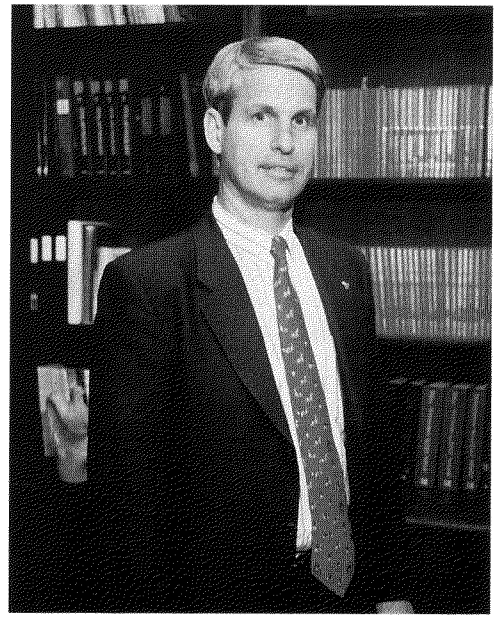

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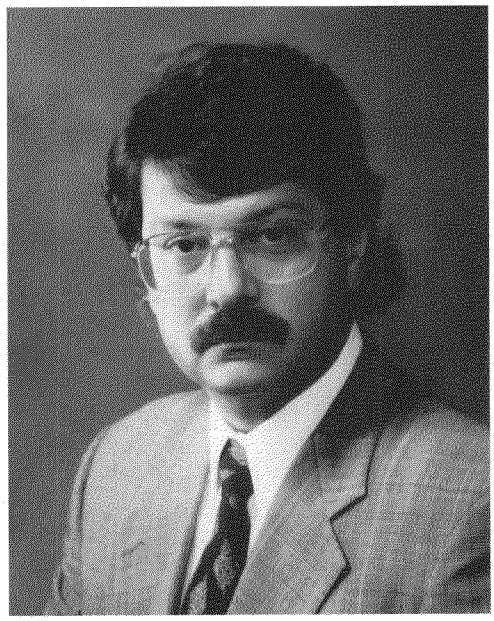

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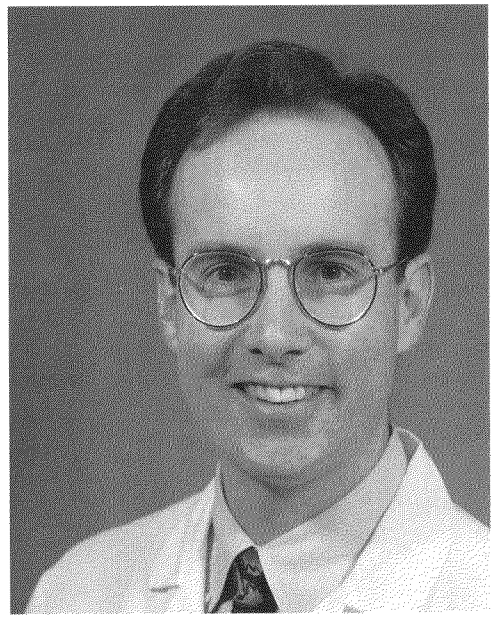

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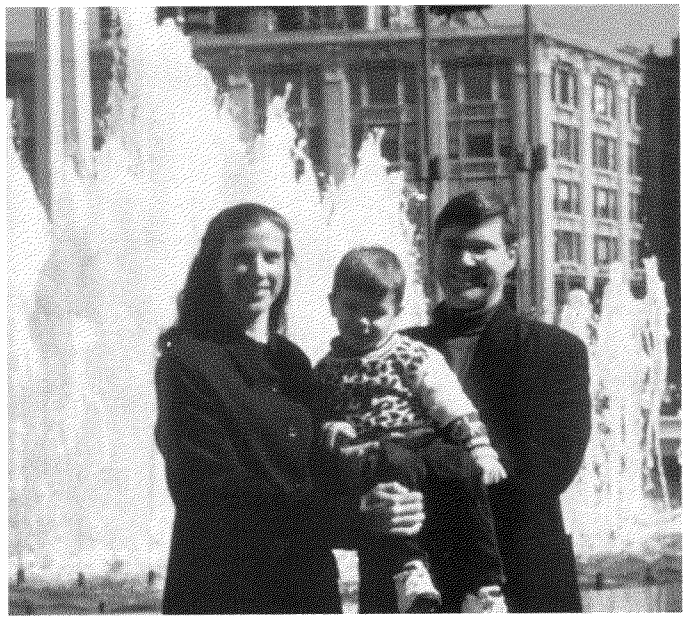

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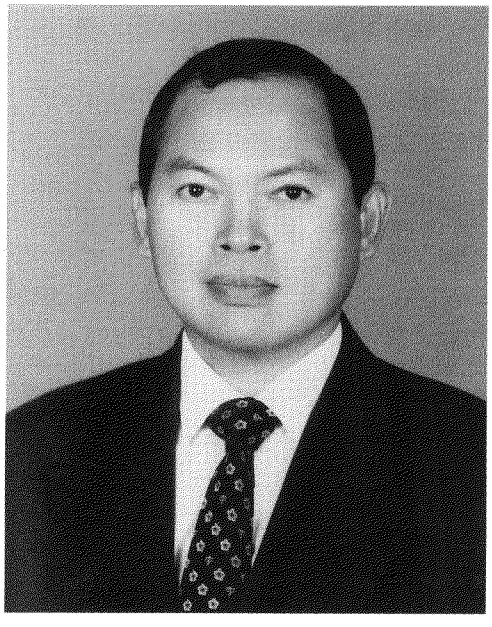

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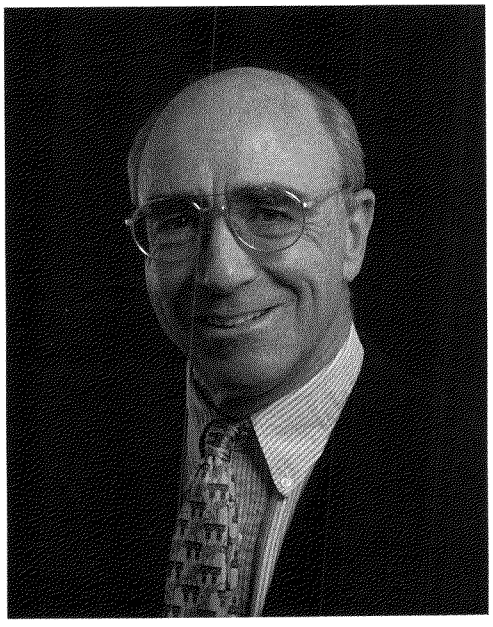

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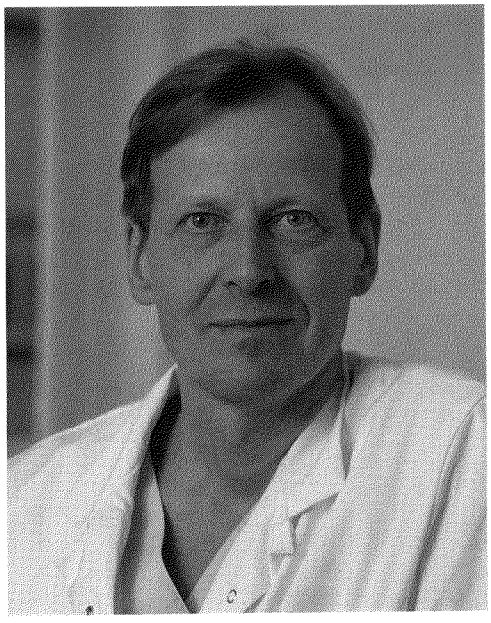

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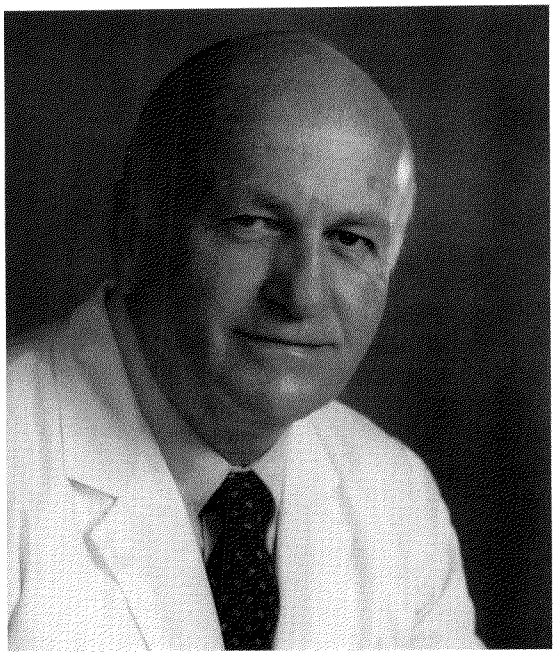

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