# 1998

# TRANSACTIONS
# AMERICAN OTOLOGICAL SOCIETY, INC.
# 1998

VOLUME EIGHT-SIX

ONE HUNDRED THIRTY-FIRST ANNUAL MEETING

THE BREAKERS
PALM BEACH, FLORIDA
MAY 9 AND 10, 1998

LIPPINCOTT WILLIAMS & WILKINS

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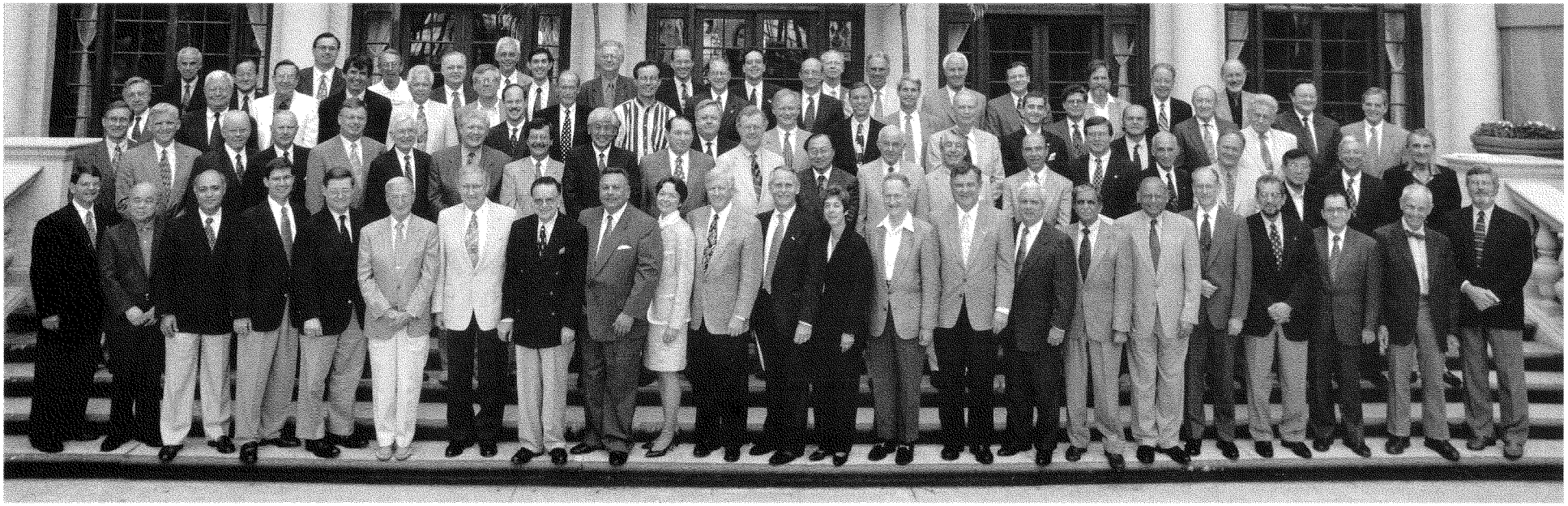

*Row 1:* B. Gantz, E. Yanagisawa, J. Wazen, P. Wackym, W. Todd, R. Bellucci, J. Hough, A. Maniglia, A. De la Cruz, J. Gulya, D. Kamerer, C. Luetje, K. Berliner, W. Rubin, G. Matz, J. Farrior, V. Dayal, A. Kumar, E. Monsell, M. Hamid, A. Katzarkas, R. Ruggles, A. Schuring. *Row 2:* R. Chole, A. Schleuning, S. Kinney, T. Cody, H. Jenkins, J. Snow, J. Fredrickson, A. Rubin, J. Ryu, J. Pulec, G. Gates, R. Miyamoto, R. Kohut, C. Hart, S. Radpour, B. Welling, H. Silverstein, D. Wilson, K.J. Lee, R. Konrad, B. McCabe. *Row 3:* V. Honrubia, J. Emmett, G. Singleton, J. Nedzelski, L. Duckert, T. Eby, P. Brookhouser, C. Beatty, D. Barrs, W. House, A. Sismanis, M. Goycoolea, F. Linthicum. *Row 4:* S. Juhn, R. Dobie, F.O. Black, S. Telian, P. Kileny, D. Brackmann, J. McElveen, D. Mattox, W. Montgomery, J. Farmer, R. Jahrsdoerfer. *Row 5:* W. Lippy, T. Haberkamp, D. Hilding, L. Bartels, J. Thomsen, D. Poe, R. Ruben, W. Meyerhoff, J. Niparko, J. House, P. Daspit, M. Smith, P. Lambert, R. Hoffman, E. Appelbaum, M. Glasscock.

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# INTRODUCTION OF AWARD OF MERIT RECIPIENT MICHAEL M. PAPARELLA, M.D.

*Derald E. Brackmann, M.D.*

The Award of Merit Committee this year was comprised of Charles Luetje, Joe Farmer, Sam Kinney, Ted Bailey, and myself. I am sure you will agree that we have picked a most worthy recipient for the Award of Merit this year. As you know, we try to make this a little bit of a mystery, and fortunately we were able to go way back this time; in fact, the first picture shows the parents of the awardee on their wedding day. Our awardee was born on February 13th, and this photograph shows him at a very young age. Next is his preschool picture, and this photograph shows his home in Michigan. A photograph taken in 1940-something shows our awardee (at age 8) in front of the brand-new family car, and he is looking very proudly at that car! This picture shows him in Detroit, in front of the family home.

Prior to pursuing a career in medicine, our awardee was very keen on having a career in music, but his father talked him out of that, insisting that he go into medicine instead. He always demonstrated a scholastic aptitude and entered college at the age of 16.

The mystery is going to be gone for those of you who are still mystified, because we skip next to a photograph that shows him in his early 30s.

I think everybody recognizes our awardee at this point—Michael Paparella.

Mike, we are all aware of your many contributions: to research with the International Hearing Foundation that trains so many people from all over the world; your textbook, which has been a landmark; and all your clinical work. It was an easy decision for the Committee to select you as our Award of Merit Recipient. I give you this certificate, which reads, "To Michael M. Paparella in recognition of his outstanding research and clinical contribution in Otology." Michael, congratulations!

Michael M. Paparella, M.D.

# RESPONSE OF THE AWARD OF MERIT RECIPIENT

*Michael M. Paparella, M.D.*

This is truly unbelievable and I am totally shocked! What a wonderful surprise! I cannot imagine a more wonderful person than Derald to make this presentation, and Charlie, I certainly thank you, the Committee, and all of you for shocking me in this very wonderful, pleasant way.

It is true that as a little kid I wanted to be an artist. I was quite good as an artist, and I was the

best performer in my grade school. That is why I told my father (who had 3 months of formal education), "Pop, I want to be an artist." In response, he said, "You are going to be a doctor." Later on, when I was in the fifth grade, I was a professional musician, making a couple of dollars (I continued as a professional musician through medical school; that was mostly how I got through school), and I said again, "Pop, I want to be a musician." He again replied, "You are going to be a doctor." We had no doctors in our family, and I did what he told me. I have been grateful ever since.

I am extremely grateful to Derald, to you, Charlie, and to the Committee for this wonderful honor. I thank all of you sincerely from the bottom of my heart. I thank you, Treva, for being an unbelievable wife, and also an unbelievably discreet, private individual!

Again, thank you all very much.

# AWARD OF MERIT RECIPIENTS 1949–1998

1949 George M. Coates, M.D.
1951 Barry J. Anson, Ph.D., and Theodore H. Bast, Ph.D.
1952 Edmund P. Fowler, M.D.
1953 Julius Lempert, M.D.
1954 Stacy R. Guild, M.D.
1957 Georg von Békésy, Ph.D.
1959 E. Glen Wever, Ph.D.
1960 Hallowell Davis, M.D.
1961 John R. Lindsay, M.D.
1962 William J. McNally, M.D.
1965 Anderson C. Hilding, M.D.
1966 Gordon D. Hoople, M.D.
1967 Merle Lawrence, Ph.D.
1968 Lawrence R. Boies, M.D.
1969 Sir Terence Cawthorne
1970 Senator Joseph Sullivan, M.B.
1971 Samuel Rosen, M.D.
1972 Howard P. House, M.D.
1973 Moses H. Lurie, M.D.
1974 George E. Shambaugh Jr., M.D.
1975 Catherine A. Smith, Ph.D.
1976 Harry Rosenwasser, M.D.
1977 Frank D. Lathrop, M.D.
1978 Juergen Tonndorf, M.D.
1979 John E. Bordley, M.D.
1980 Ben H. Senturia, M.D.
1981 J. Brown Farrior, M.D.
1982 William F. House, M.D.
1983 Victor Goodhill, M.D.
1984 Harold F. Schuknecht, M.D.
1985 Wesley H. Bradley, M.D.
1986 John J. Shea Jr., M.D.
1987 Jack V. Hough, M.D.
1988 George T. Nager, M.D.
1989 Brian F. McCabe, M.D.
1990 Eugene L. Derlacki, M.D.
1991 Richard R. Gacek, M.D.
1992 James L. Sheehy, M.D.
1993 James A. Donaldson, M.D.
1994 Fred H. Linthicum Jr., M.D.
1995 D. Thane R. Cody, M.D., Ph.D.
1996 F. Blair Simmons, M.D.
1997 Michael E. Glasscock III, M.D.
1998 Michael M. Paparella, M.D.

# GUESTS OF HONOR 1949–1998

1949 Harris P. Mosher, M.D.
1950 D. Harold Walker, M.D.
1951 John Mackenzie Brown, M.D.
1952 Edmund P. Fowler, M.D.
1953 H. I. Lillie, M.D.
1956 Stacy R. Guild, Ph.D.
1958 Ralph A. Fenton, M.D.
1961 Julius Lempert, M.D.
1962 Philip Meltzer, M.D.
1963 William J. McNally, M.D.
1964 Kenneth M. Day, M.D.
1965 Senator Joseph Sullivan, M.B.
1966 Dean M. Lierle, M.D.
1967 Lawrence R. Boies, M.D.
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1975 John E. Bordley, M.D.
1976 Ben H. Senturia, M.D.
1977 Henry B. Perlman, M.D.
1978 Howard P. House, M.D.
1979 Hallowell Davis, M.D.
1980 Victor Goodhill, M.D.
1981 Harold F. Schuknecht, M.D.
1982 George E. Shambaugh Jr., M.D.
1983 Wesley H. Bradley, M.D.
1984 Brown Farrior, M.D.
1985 Bruce Proctor, M.D.
1986 Merle Lawrence, Ph.D.
1987 Robert M. Seyfarth, Ph.D.
1988 G. Dekle Taylor, M.D.
1989 Eugene L. Derlacki, M.D.
1990 William F. House, M.D.
1991 Michael E. Glasscock III, M.D.
1992 William E. Hitselberger, M.D.
1993 D. Thane R. Cody, M.D., Ph.D.
1994 Cesar Fernandez, M.D.
1995 Richard R. Gacek, M.D.
1996 James L. Sheehy, M.D.
1997 Mansfield F. W. Smith, M.D.
1998 Robert A. Jahrsdoerfer, M.D.

# SCIENTIFIC SESSIONS
# 1998 PRESIDENTIAL ADDRESS

# SUBSPECIALTY CERTIFICATION IN OTOLOGY AND NEUROTOLOGY

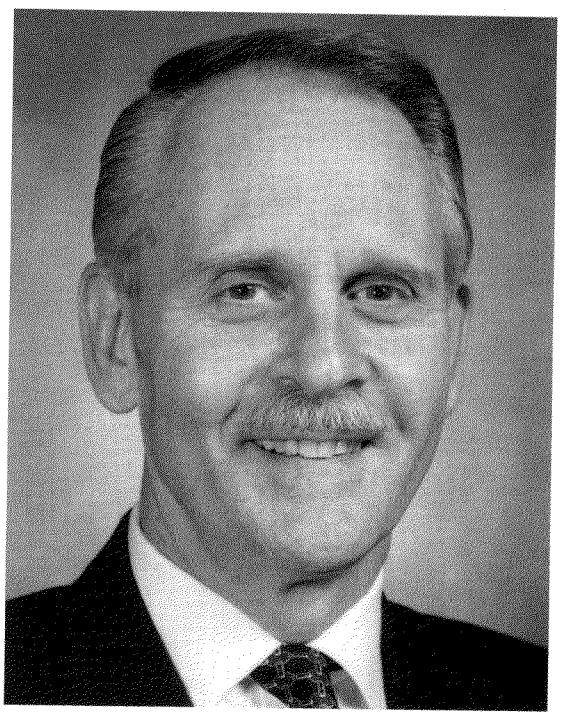
*Charles M. Luetje, M.D.*

In the late 1980s, Dr. Malcolm Graham and others set out to define the subspecialty of neurotology and its relationship to otology. This effort resulted in a draft document (that was subsequently modified) to provide guidelines for fellowship training in neurotology and otology. These guidelines helped determine the curriculum for a 2-year fellowship program in otology/neurotology and were approved by the Accreditation Council for Graduate Medical Education (ACGME). The American Board of Otolaryngology (ABOto) presented the concept of a "certificate of added qualifications" (CAQ) to the American Board of Medical Specialists (ABMS), and in 1992, the ABMS voted its approval.

The purpose of the guidelines for fellowship training was to standardize and strengthen fellowship training in our subspecialty, all in the interest of better patient care. With 30% of graduating otolaryngology residents seeking fellowship training upon completion of their residency, the ABOto favored the idea of CAQ under its auspices rather than formation of an autonomous examining board.

Committees were formed in both the American Otological Society (AOS) and the American Neurotology Society (ANS) to work together to establish an equitable method of adherence to a 2-year fellowship and entrance into the match program. This task was accomplished in 1997, with the first match occurring in April of 1998 for programs beginning in July 1999. Sixteen fellowship programs signed a letter of intent to participate in the match and to seek Residency Review Committee (RRC) approval. To date, three applications have been approved by the RRC.

During 1997, the ABOto, with representation from both AOS and ANS, developed a task force to define the subspecialty of otology and neurotology. In 1998 the ABOto changed the term CAQ to "subspecialty certification." Preliminary plans by the ABOto are to form an ABOto subspecialty board for otology/neurotology consisting of three ABOto Directors, three ABOto Senior Examiners, and four additional members, two selected by each the Councils of the AOS and ANS.



Charles M. Luetje, M.D.

Subspecialty certification by the Board will provide the credentials necessary for hospital privileges and help combat the ever-increasing bureaucracy of governmental interference and third-party reimbursement. The goal is simple—train the best doctors who select a fellowship in otology/neurotology in the best way possible to provide the best patient care.

All this having been said, there is no substitute for clinical patient observation and then the correct treatment based on those observations.

# PRESENTATION OF GUEST OF HONOR ROBERT A. JAHRSDOERFER, M.D.

*Charles M. Luetje, M.D.*

Dr. Robert A. Jahrsdoerfer, born in New York, is a giant in the field of congenital atresia repair. His own personal series of cases exceeds 1,000 patients—an astonishng number! His results have established an international "gold standard," and his publications on atresia are world-renowned.

Bob won the Triological Society's Mosher Award in 1978 for his work on congenital atresia of the ear. He is the author of well over 100 publications, including chapters in textbooks, and has edited a textbook. He is past Vice-President of the Southern Section of the Triological Society and past President of both the American Neurotology Society and our own American Otological Society. In 1995, the Jahrsdoerfer Lectureship was inaugurated in the Department of Otolaryngology at the University of Texas, Houston.

I asked his wife, Carol, for a few photos and discovered that in his earlier years, Bob was an excellent shooting guard (basketball). He joined the Navy during the Korean conflict (after his first undergraduate year) and returned to receive his undergraduate degree from George Washington University and the M.D. degree from the University of Virginia School of Medicine in 1961. After completion of his residency at Yale–New Haven Hospital in 1966, he joined the faculty at the University of Virginia. He moved to Houston to assume the chairmanship of the Department of Otolaryngology at the University of Texas, Houston, from 1982 until 1995, when he returned to the University of Virginia. He has been a visiting professor in countries worldwide throughout his career.

Robert A. Jahrsdoerfer, M.D.

On a personal note, Bob and his lovely wife Carol have that unique knack of making everyone feel comfortable and good about themselves.

And now, members and guests, my Guest of Honor, Dr. Robert A. Jahrsdoerfer.

It gives me great pleasure to present this certificate to you. It says, "The American Otological Society presents the Award of Guest of Honor to Robert A. Jahrsdoerfer, M.D., in 1998 for his worldwide leadership in advancing the treatment of congenital atresia and his dedication to the American Otological Society on the occasion of its 131st Annual Meeting."

# REMARKS OF GUEST OF HONOR

*Robert A. Jahrsdoerfer, M.D.*

Thank you, Charlie. I am immensely proud to have been chosen the Guest of Honor. The American Otological Society is the premiere society, and to be singled out for this honor is very important to me. Why is it important? It is important because you in the audience deserve the respect and admi-

ration of the entire world for what you do in otology and neurotology. The American Otological Society has a sense of family, a sense of fellowship, and a sense of camaraderie that is unequaled anywhere. Thank you very much.

I will keep my comments brief, for I know how it is to try to keep a program running on time. I will show one slide, and I have one comment. I caption this slide, "We've come a long way, baby." It is a drawing by Frank Netter, M.D., artist-physician, circa 1930. I take this slide with me on visiting professorships at training programs, and it is my final slide. I ask the residents to tell me how many things they can find wrong with the drawing. The winner gets a $50 certificate to the restaurant of his or her choice in that town.

Look at this drawing. The cochlea is backward; can you imagine doing a cochlear implant in something like this? The cochlear nerve takes a very circuitous route to the cochlea, and the stapes needs orientation. The tendons are not there. The ductus reuniens is not there either. The vestibular nerve has its own bony canal, and, last but not least, where is the facial nerve? Maybe it wasn't so important in 1930, but it certainly is now!

That concludes my brief remarks. I thank you again for the kind honor, and thank you to the members in the audience, also.

# PRESIDENTIAL CITATION
# JACK VAN DOREN HOUGH, M.D.

*Charles M. Luetje, M.D.*

Dr. Jack Hough was born in Lone Wolf, Oklahoma, the grandson of pioneer grandparents who made the 1889 run into Oklahoma. Jack pioneered early work in otology using rare earth magnets in cochlear implants and other otologic devices.

Among his many honors are the Bronze Star, a Navy Department Citation, and a Presidential Unit Citation for heroism during the battle of Iwo Jima. He is a past recipient of the Harris P. Mosher Award from the Triological Society and the Award of Merit from the American Otological Society. He has over 100 scientific publications.

Over 25 years ago, Jack founded the International Medical Assistance Program, which last year reached 84 countries in the underdeveloped world, providing pharmaceuticals and medical supplies valued at $200 million. On many occasions he has served in mission hospitals in Africa, India, and throughout Asia as a short-term missionary doctor.

In 1996, at the invitation of the Vietnamese Minister of Health, Dr. Hough headed a team of eight Christian otologists who conducted seminars in Hanoi and Ho Chi Minh City for Vietnamese otolaryngologists. They were the first professors allowed in Vietnam since the fall of Saigon in the mid-1970s.

On behalf of the American Otological Society, it is indeed an honor to present Dr. Hough this Presidential Citation. The certificate reads, "The American Otological Society presents this Presidential Citation to Jack V. D. Hough, M.D., for international humanitarian efforts in the advancement of otology and the treatment of otologic disorders on the occasion of the 131st Annual Meeting of the American Otological Society."

# RESPONSE OF PRESIDENTIAL CITATION RECIPIENT

*Jack V. D. Hough, M.D.*

Thank you very much, Charlie.

# SPECIAL PRESIDENTIAL AWARDS GEORGE E. SHAMBAUGH, JR., M.D. HOWARD P. HOUSE, M.D.

*Charles M. Luetje, M.D.*

On June 29, 1998, a unique event in otology will occur: Dr. Howard House will celebrate his 90th and Dr. George Shambaugh his 95th birthday. Both are still active and see patients.

Unfortunately, Dr. Shambaugh had a previous engagement and is speaking at the Well Mind Association meeting in Seattle on the nutritional aspects of mental health. Nonetheless, I would like to call Dr. Howard House to the podium at this time.

Dr. House, on behalf of the American Otological Society, I present this certificate to you. The certificate reads as follows: "The American Otological Society presents this Special Presidential Award to Dr. Howard P. House in 1998, given in the year of your 90th birthday, for your many outstanding contributions to the field of otology."

# RESPONSE OF SPECIAL PRESIDENTIAL AWARD RECIPIENT

*Howard P. House, M.D.*

It is a great privilege and honor for me to be here. Of course, it is a great privilege and honor for me to be anywhere, you know! I am so sorry that my dear friend for many years, George, is not here. We always greeted each other to wish each other happy birthday. These messages have flown back and forth for all these many years. There is one thing that bothers me, and it has not bothered George as much as it bothered me. When you publicize that you are the big "90," it kind of interferes with your social life. Thank you very much.

# PRESENTATION OF THE LIFE ACHIEVEMENT AWARD (ON BEHALF OF THE AMERICAN AUDITORY SOCIETY) HOWARD P. HOUSE, M.D.

*Richard T. Miyamoto, M.D.*

On behalf of the Executive Board of the American Auditory Society, it is a great privilege for me to present to Dr. Howard P. House the Society's highest honor, the Life Achievement Award. The American Auditory Society was founded in 1973 to foster an increase in knowledge and understanding of normal and disordered function of the ear, hearing, and balance. The Society's 2,700 members include otologists, audiologists, hearing scientists, and members of the hearing industry. The Society actively promotes the highest level of interdisciplinary cooperation.

This award to Dr. House is particularly appropriate because he has dedicated his life to the Society's mission. In the forward to Dr. House's wonderful biography, President Ronald Reagan stated, "One of the reasons I am proud to be an American is because our country is so full of wonderful men and women, who, through diligent effort and creative drive, have made a tremendous difference in our world and brought to pass amazing scientific discoveries that have helped countless people everywhere. Dr. House is an outstanding example of what has made America great and it is important that others learn from his experience."

Dr. House founded the Los Angeles Foundation of Otology and Otologic Medical Group, later to be named the House Ear Institute and the House Ear Clinic. His pioneering work in the development of otosclerosis surgery is legendary. He has mentored countless otologic surgeons throughout his illustrious career. I remember in particular his advice to "always listen to anyone with an idea."

The awarding of the Life Achievement Award today is only a reminder of a career that keeps achieving, and achieving, and achieving.

Dr. House, it is with our deepest gratitude that I present to you the American Auditory Society's Life Achievement Award. This piece is a specially commissioned hand-blown glass object of art with an inset of an auricle.

# RESPONSE OF LIFE ACHIEVEMENT AWARD RECIPIENT

*Howard P. House, M.D.*

Thank you very, very much! Well, I am very surprised! I was encouraged to be here at a certain time this morning, and it was difficult, because I am still on California time. To receive this award is a tremendous surprise to me, and a great honor. I appreciate it very, very much. I'd like to make one comment. When I finished my 2-year residency, my father asked me, "What is that piece of paper?" Well, I'd worked so hard for that piece of paper! "Now I'm an ear, nose and throat doctor," I said to him. He said, "Well, Howard, it means that, but it means much more than that; it means nothing more, and nothing less, than a legal license to learn." Truer words were never spoken, for all of us! Thank you very kindly for this wonderful honor!

# OUTCOMES AFTER LASER STAPEDOTOMY WITH AND WITHOUT PRESERVATION OF THE STAPEDIUS TENDON

*Herbert Silverstein, M.D., *T. Oma Hester, M.D., *Daniel Deems, M.D., Ph.D., *Seth Rosenberg, M.D., *Noel Crosby, M.S./C.C.C.-A., and †Terrence Kwiatkowski, M.D.

## ABSTRACT

**Objective:** To investigate the differences in hearing outcomes between patients with their stapedius tendon sacrificed and those with their stapedius tendon preserved during laser stapes surgery for otosclerosis.

**Study Design:** A retrospective review was made using an extensive questionnaire sent to patients operated on from 1994 to 1997. Routine and special audiometric testing was also performed to augment the subjective data.

**Setting:** A private otology/neurotology practice.

**Patients:** Seventy-nine (64%) of 124 questionnaires were returned. Seventy-five patients underwent additional audiometric testing, including tests to evaluate hearing in noise and to determine the uncomfortable loudness level (dynamic range).

**Main Outcome Measure:** Subjective responses from the questionnaire, including measures of quality of life, were statistically analyzed between the two groups.

**Results:** No statistically significant differences were found between the two groups with regard to either their subjective responses or audiologic testing results. The results of the questionnaire indicated that in most cases the hearing was improved by stapes surgery ($P < 0.001$). About 50% of the patients had noise intolerance after surgery, which improved over time. In the tendon-preserved group, there was a nonstatistical trend toward quicker improvement and less trouble hearing in noisy environments (e.g., restaurants).

**Conclusion:** Practical and theoretical reasons for preserving the stapedius tendon exist. This study did not demonstrate any significant differences between patients with stapedius tendon sacrifice or tendon preservation. Since this report only includes short-term follow-up on stapedius tendon preservation patients, we plan to reevaluate this patient group again at 1 year. It is suggested that the stapedius tendon be preserved if possible during stapes surgery if preservation does not jeopardize either the exposure or the result.

*Ear Research Foundation, Sarasota, FL; †University of Pennsylvania, Department of Otolaryngology–Head and Neck Surgery, Philadelphia, PA.

Reprint requests: Herbert Silverstein, M.D., F.A.C.S., Ear Research Foundation, 1901 Floyd Street, Sarasota, FL 34239, (941) 366-9222 (ph.), (941) 365-2269 (fax), earsinus@aol.com (e-mail).

Supported in part by the Ear Research Foundation, Sarasota, FL.

# ANESTHESIA FOR STAPEDECTOMY

*Jack J. Wazen, M.D., Beth Wambach, M.D., and Arlene Markowitz, M.D.*

## ABSTRACT

**Objective:** To evaluate the safety of general anesthesia as compared to local anesthesia in the audiological and clinical outcomes of stapedectomy.

**Study Design:** A retrospective chart review of 154 patients who underwent a stapedectomy between January 1984 and September 1995 was performed.

**Setting:** All patients were operated on at the Columbia-Presbyterian Medical Center, a tertiary referral center in New York City.

**Patients:** The 154 patients reviewed consisted of 93 women and 47 men, 16 to 87 years of age. Seventy-six patients underwent stapedectomy under general anesthesia and 78 under local anesthesia. One hundred thirty-eight procedures were primary, with 16 revisions.

**Intervention:** All stapedectomies were performed with conventional micro-instruments. No lasers were used in this study group. Local anesthesia was achieved with Xylocaine with epinephrine. No nitrous oxide or muscle relaxants were used in the general anesthesia group.

**Main Outcome Measures:** The hospital length of stay and incidences of vertigo, dizziness, nystagmus, nausea and vomiting, residual air–bone gaps, dead ears, or other complications were measured.

**Results:** No statistically significant differences in all the above parameters were observed between the two groups.

**Conclusion:** The type of anesthesia used did not appear to influence the outcome in stapes surgery. General anesthesia did not carry with it any increased risks of otologic complications. Its use may be even more practical in training programs, where longer operating times are expected.

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Department of Otolaryngology, Columbia University College of Physicians and Surgeons, New York, NY.

Reprint requests: Jack J. Wazen, M.D., Director, Division of Otology, Columbia-Presbyterian Medical Center, 630 West 168th Street, New York, NY 10032, (212) 305-1618 (ph.), (212) 305-2249 (fax).

# EXPERIENCE WITH STAPES SURGERY IN A LARGE TEACHING INSTITUTION: RELATION OF THE STAFF SUPERVISING SURGEON TO OUTCOMES

*Peter C. Bondy, M.D., LCDR, M.C., U.S.N., and Lorenz F. Lassen, M.D., CDR, M.C., U.S.N.*

## ABSTRACT

**Introduction:** We examined the residency experience with stapes surgery at a large teaching institution. We compared the results of our residents' stapes experience with that of other major academic institutions and examined what factors affected the success of stapes surgery at our institution.

**Methods:** A retrospective review of 54 otolaryngology department records for stapes surgery done between 1986 and 1996 was undertaken. Air–bone gap and pure-tone average were measured using the frequencies of 500, 1,000, 2,000, and 3,000 Hz. Postoperative closure of the air–bone gap to within 10 dB or less is the yardstick for a successful operative procedure, so a two-tailed $\chi^2$ test was used to compare hearing results among covariants.

**Results:** Thirty-five (65%) of 54 patients who underwent primary stapes surgery had a postoperative air–bone gap closure to within 10 dB. When stapes surgery was supervised by fellowship-trained otologists, 22 (81%) of 27 patients had a successful result. When residents were supervised by general staff otolaryngologists, 13 (48%) of 27 patients had successful outcomes. The difference in successful outcome for primary stapes surgery between residents supervised by fellowship-trained otologists and residents supervised by general otolaryngologists was statistically significant ($P = 0.021$).

**Conclusion:** The best postoperative hearing results are obtained when residents are supervised by fellowship-trained otologists.

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The views expressed in this article are those of the authors and do not reflect the official policy or position of the Department of the Navy, Department of Defense, nor the U.S. Government.

Department of Otolaryngology–Head and Neck Surgery, Naval Medical Center, Portsmouth, VA.

Reprint requests and correspondence: Peter C. Bondy, M.D., Department of Otolaryngology–Head and Neck Surgery, Naval Medical Center Portsmouth, 620 John Paul Jones Circle, Portsmouth, VA 23708, (757) 953-5980 (ph.) (757) 953-7993 (fax).

# STAPEDECTOMY FOR FAR-ADVANCED OTOSCLEROSIS

*†Paul F. Shea, M.D., *Xianxi Ge, M.D., and *John J. Shea, Jr., M.D.

## ABSTRACT

**Objective:** To describe far-advanced otosclerosis, and to present our results with stapedectomy in 85 ears from far-advanced otosclerosis.

**Study Design:** Retrospective case review.

**Setting:** Otology/neurotology tertiary referral center.

**Patients:** Stapedectomy was performed on 85 ears of 65 patients with far-advanced otosclerosis and the results observed over 1 to 21 years (mean, 5.2 years).

**Intervention:** Stapedectomy was performed on all ears with far-advanced otosclerosis.

**Main Outcome Measure:** Hearing for air and bone conduction, speech discrimination, and impedance were tested in all patients before and after operation. The Rinne test was performed on all ears with a 256-Hz magnesium tuning fork. The pure-tone average for air and bone conduction was computed for 500, 1,000, and 2,000 Hz. Hearing improvement was defined as air–bone gap closure to 10 dB or less and/or air conduction improvement of 20 dB or more, with no decline in the speech discrimination score of more than 10%.

**Results:** Hearing improvement was achieved in 58 (68.2%) of 85 ears (all operations). In group 1, with air conduction >90 dB and bone conduction >60 dB, hearing improved in 31 (88.6%) of 35 ears operated on. In group 2, with air conduction >90 dB and no measurable bone conduction, hearing improved in 13 (72.2%) of 18 ears operated on. In group 3, with no measurable air conduction and bone conduction >60 dB, hearing improved in 2 (40%) of 5 ears operated on. In group 4, with no measurable air or bone conduction, hearing improved in 12 (44.4%) of 27 ears operated on. Nonmeasurable bone conduction became measurable in 46.7% of ears and nonmeasurable air conduction became measurable in 75% of ears; all of these became aidable after operation.

**Conclusions:** A negative Rinne test with a 256-Hz magnesium tuning fork proved to be the best test to separate far-advanced otosclerosis from sensorineural hearing loss of other causes. Stapedectomy is of benefit in most ears with profound hearing loss from far-advanced otosclerosis, especially in those ears with some measurable hearing by air conduction.

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# DISCUSSION PERIOD I: STAPES SURGERY
## Papers 1–4

**Charles M. Luetje, M.D.** (Kansas City, MO): These four papers will be open for discussion in a few moments, but we have, as far as I can see, three people in the audience who have done more stapedectomies than anyone else in the world. First I'd like Dr. Jack Hough speak to us about stapedius tendon preservation and his results. Then I'd like Dr. John Shea, Jr., to say something about the early days. Finally, I'd like Dr. Howard House to tell us about his experiences in the early days and how he has seen things change over the years.

**Jack Hough, M.D.** (Oklahoma City, OK): I want to congratulate Herb for bringing up the subject of preservation of the stapedius tendon. I think it received a lot less interest than it should have in the past. I designed a little operation, years ago, where we tried to preserve the tendon by splitting it, doing a tendon-lengthening procedure, and putting it back together. We knew so little about the physiology of the tendon and the stapedius muscle that I gave it up because it was too much trouble to pursue; I am pleased to hear you are working with this again and have some information for us. Thank you, Herb, for that.

**John Shea, Jr., M.D.** (Memphis, TN): Thank you, Charlie, for the opportunity to speak. I really enjoyed what Herb presented. I said to him before he spoke that I was here to learn from him, and I always do! You know, one of the Marx Brothers said, "What are you going to believe? What you see with your own eyes or what I tell you?" I see what you said, Herb, but I find it hard to believe. No offense, but when you disarticulate the footplate from the oval window joint, you totally change the physiology of the stapedius tendon. The evidence is fascinating, and I must say I am going to try it. I also want to say how much I enjoyed hearing my younger son present his paper. He applied to present it without my knowledge. He worked up the data, he wrote the paper, and he constantly said that the English I wanted to put in was not right. It was not grammatically correct, he said. I enjoyed his presentation. Thank you.

**Howard House, M.D.** (Los Angeles, CA): I go back quite a few years and I would say that they have been wonderful years! I started, of course, very early in the game when I first visited Julius Lempert (George Shambaugh preceded me by just a few months). This experience really opened my eyes and targeted me toward restoring hearing. I had a great time because I also went to Stockholm to see Dr. Gunnar Holmgren, who was a professor at the Karolinska Institute. You must remember that all these things—stapedectomy, stapedotomy, stapes mobilization, and the fenestration operation—were done between 1850 and 1900 (I was not there at the time!). In 1900 there was an International World Congress of Otolaryngology, and it was voted at that time to have no more operations for hearing loss. Why? Because they did not have the things we have today, such as the microscope and antibiotics; they had too many facial paralyses, and too many deaths from otitic meningitis, so they voted to stop the operations. It was Gunnar Holmgren at the Karolinska Institute who started the fenestration operation again in 1923. (His assistant had developed a monocular microscope, so that started interest again.) One of his students was Sourdille in Paris. Holmgren had a three-stage operation and Sourdille changed that to a two-stage operation. Then Lempert visited Holmgren and Sourdille and converted it into a single-stage operation, which made it really a practical operation. He also introduced the use of the drill instead of a hammer and chisel. It was a great era, and those men played great roles in the surgeries that we have today. The fenestration operation was a great operation I enjoyed doing, but it was much more complex, of course, than the stapes operation. Sam Rosen (for what reason I do not know and he could never explain it to me), in order to confirm that he had a patient with otosclerosis and a fixed stapes, would routinely elevate the eardrum and palpate the stapes to see if it was fixed. He would then convert the procedure into a fenestration procedure. Then there was the occasion when one of the patients suddenly said, "Gee, I can hear!" and that started the mobilization procedure. I went back and watched him do the surgery. There was another fellow at the University of Columbia who developed the anterior crurotomy. He came out to Los Angeles because we were doing a great number of these cases, and we

set up a week of doing just anterior crurotomies. The history of stapes surgery changed considerably when Rod Perkins came up with the idea of using the laser. The early laser was a great big instrument, and it was down as much as it was up, but we got to do some of the cases with the laser, which was fascinating. It is interesting, too, that he introduced the idea of using a blood clot for the oval window seal with stapedotomy. Those were such fascinating days! I have always done mine under local anesthesia because I always liked to know for sure that things were going well. I had my series of problems, of course, over the years, but it has been a great career, and stapes surgery has been a great part of my life. I want to thank you again for the honor that you have given me today. Thank you.

**Charles M. Luetje, M.D.** (Kansas City, MO): Does anyone have any questions for these four presenters or comments about their papers?

**Howard House, M.D.** (Los Angeles, CA): For history, of course, I should bring up the fact that John Shea came out to Los Angeles (we were doing fenestration surgeries in those days). We were working on some cadavers in the county hospital, and John came up to me and said, "Dr. House, you know, maybe we could do something like take the stapes out and hook it up somewhere with the incus; maybe it would work so we would not have to worry about re-fixation." I said, "John, that is invading the inner ear, that is never, ever, allowed." He said, "Dr. House, you invade the middle ear by making the fenestra." I said, "That is right, but I cover it real quickly with the skin flap." He said, "Well, maybe we could cover the oval window real quickly with some tissue." Now we go to Montreal in 1956: he came up to me while I was moderating a great panel—six on one side for fenestration and six on the other for mobilization. I knew there would be a great deal of discussion! In those days there were great fights, almost fistfights, but not quite. John came up with a slide and said, "I want to tell you that Harry Treace, of Memphis, made a little artificial stapes from Teflon. I took the stapes out and hooked it up with the incus and the patient heard!" (It was just a few days before that this had occurred.) "I would like to discuss this." I said, "John, all those graybeards up there"—I did not mean to point to you fellows!—but all those graybeards in those days would just jump up and criticize anybody with anything new or different. So I said to John, "I'll tell you what we will do. I will say it is a great morning, but we have to conclude by 12:00 noon; there is time for one more discussant." John got up, presented the slide and talked about it; I began to get note after note saying "I have got to discuss this," "Stop this," "Do not stop this," etc. And I said, "I am so sorry, but this meeting is adjourned!"

**Charles M. Luetje, M.D.** (Kansas City, MO): Thank you for your comments. Dr. John House, you came to the podium just a moment ago?

**John House, M.D.** (Los Angeles, CA): I have one question regarding Dr. Wazen's paper. We generally do stapes surgeries under local anesthesia, but there is the occasional patient who does not tolerate local anesthesia. I was interested in what I consider to be a high incidence of dead ears he reported—about four out of 150, which is 3%. I was wondering if you had analyzed the cause of the hearing loss in those four cases?

**Jack Wazen, M.D.** (New York, NY): I know the cause of the one under general anesthesia. It was a labyrinthitis that occurred about 3 or 4 days postoperatively. I am not aware of the cause of the hearing loss in the cases done under local anesthesia.

**Charles M. Luetje, M.D.** (Kansas City, MO): Any further comments?

**William Lippy, M.D.** (Warren, OH): Dr. Shea, I enjoyed your paper; I would like to bring two things to your mind. In the early '60's, I published a paper in the *Transactions* on cases of otosclerosis with advanced hearing loss. I showed that with the use of the 512-Hz tuning fork on the teeth I picked up about an extra 11 or 12 dB of hearing that you cannot detect with mastoid application. About 2 years ago, I published a paper on 67 of your category 3 and 4 patients (with no hearing), and in most of them, the only way you could make any diagnosis, other than history, was by using a 512-Hz tuning fork on the teeth; they heard nothing else. There was one other interesting thing that came out of that paper that I think you should be aware of, and that is, in eight patients in whom I did the first ear, the surgery was unsuccessful. Those same eight patients had an unsuccessful result in the second ear. On the other hand, there were eight patients, totally deaf patients, who had successful stapedectomies done in both ears. So, I would suggest that instead of using a 256-Hz fork, which can sometimes translate into vibration rather than hearing, you try using the 512-Hz fork on the teeth. I think you will find more patients that way, and I would submit to the group that if you do a stapedectomy on an ear with far-advanced otosclerosis and the stapedectomy is unsuccessful, do not do the other ear.

**Paul Shea, M.D.** (Memphis, TN): Thank you for bringing that up. That is actually something that I discussed with my father at some length before I

presented this paper. I am aware of that controversy. In my own residency training I was taught to use the 512-Hz tuning fork, and I am aware of the argument that with the 256-Hz fork what is perceived is vibration. What I have read is if there is any doubt as to whether the patient perceives a vibration or a sound, you can ask the patient to hum the sound. If they can hum the sound then they are hearing it—they are perceiving it through the cochlea. I defer to my father for some further comment, as he has a great deal more experience. All I can say is that his success rate is 93% with the 256-Hz fork, and I think the results speak for themselves. I am aware of the issue and appreciate your comments.

**Charles M. Luetje, M.D.** (Kansas City, MO): Buddy?

**Melton Horwitz, M.D.** (Houston, TX): I would like to make one comment and one observation. Of the stapedectomies that I have revised (which were originally done elsewhere) in the past several years, almost all had been done under general anesthesia.

# EFFECT OF GELFILM IN THE PREVENTION OF FIBROSIS IN THE MIDDLE EAR IN AN ANIMAL MODEL

*Michael A. McGhee, M.D., and John L. Dornhoffer, M.D.*

## ABSTRACT

**Hypothesis:** Gelfilm offers protection against fibrosis in the middle ear when used in combination with Gelfoam.

**Background:** Gelfoam is routinely used as a support structure in the middle ear cleft when ossicular reconstruction and tympanic membrane grafts are performed. It has been recognized that fibrosis may occur in this setting if the middle ear mucosa is denuded. Materials have been used to protect the mucosa in an attempt to prevent scar bands, adhesions, and fibrosis and their potentially detrimental effects on hearing. These materials have included Teflon, Silastic, and Gelfilm. Concerns have arisen regarding this mode of therapy and its benefit.

**Methods:** This study looked at the effects of implanting Gelfoam independently and Gelfoam and Gelfilm concurrently in the bulla cavity of the Mongolian gerbil. The temporal bones were harvested and evaluated histologically using hemotoxylin-eosin staining for fibrosis.

**Results:** The results demonstrated a decrease in the amount of fibrosis in the animals in which Gelfilm was used to protect the denuded mucosa. No evidence of fibroblast ingrowth or scar bands penetrating the Gelfilm was identified.

**Conclusion:** These results suggest that Gelfoam can safely be used in the middle ear cleft to support ossicular prostheses and tympanic membrane grafts when Gelfilm is used to protect denuded mucosa.

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# THE EPITYMPANIC APPROACH: A SINGLE-STAGE TECHNIQUE FOR CHOLESTEATOMA REMOVAL

*John L. Dornhoffer, M.D., and †Konrad A. Schwager, M.D.*

## ABSTRACT

**Objective:** To achieve better results for cholesteatoma removal through a logical synthesis of the canal-wall-up (CWU) and canal-wall-down (CWD) techniques. The epitympanic approach, presented here, combines the advantages of each.

**Study Design:** A computerized otologic database was used to retrospectively identify patients undergoing cholesteatoma removal via the epitympanic approach.

**Setting:** Tertiary referral center.

**Patients:** A total of 70 patients, representing 75 ears operated on (35 pediatric, 40 adult), underwent cholesteatoma removal through the epitympanic approach, with an average 24-month follow-up.

**Interventions:** Surgical intervention involved removal of a portion of the canal wall for exposure and extirpation of the cholesteatoma, followed by reestablishment of the canal wall during the reconstruction phase of the operation.

**Main Outcome Measures:** Surgical results with regard to recurrent and reciditive cholesteatoma, perforation, or effusion, as well as audiometric findings.

**Results:** Recurrent disease occurred in 4% of cases. Hearing improvement was statistically significant, with an average preoperative four-frequency puretone average air–bone gap of 27.2 dB improving to 11.5 dB. No patient had a worsening of hearing.

**Conclusions:** The epitympanic approach is a viable technique for single-stage cholesteatoma removal and ossicular reconstruction.

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# SUPRALABYRINTHINE APPROACH TO THE PETROUS APEX: CASE REPORT AND ANATOMIC STUDY

*Fred F. Telischi, M.E.E., M.D., *†Michal Luntz, M.D., and †Michelle L. Whiteman, M.D.

## ABSTRACT

**Objective:** The case of an 11-month-old infant with a petrous apex abscess drained through the supralabyrinthine air cells prompted an anatomic study of the dimensions of this approach. Of the various approaches to the petrous apex, the supralabyrinthine dissection has been the least described.

**Study Design:** Twenty temporal bones were dissected to completely expose the epitympanum. This required mastoidectomy, exenteration of zygomatic root and epitympanic air cells, and removal of the incus. Measurements were taken from three sides of a triangle described by the tegman tympani (TT), tympanic facial nerve (TFN), and superior semicircular canal (SSCC). Similar measurements were obtained from standard coronal computed tomographic (CT) scans from a random series of 20 patients.

**Results:** Mean lengths of the sides of the triangle were 7.0 mm (TT), 5.3 mm (TFN), and 4.8 mm (SSCC). The superior petrous apex air cells or marrow space were accessible through the supralabyrinthine exposure in all specimens. Mean lengths on the coronal CT images were 4.4 mm (TT), 3.3 mm (TFN), and 8.2 mm (SSCC).

**Conclusion:** The supralabyrinthine approach may provide adequate access to the superior petrous apex for drainage and biopsy in selected cases.

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# ANTERIOR SUBANNULAR T-TUBE FOR LONG-TERM MIDDLE EAR VENTILATION DURING TYMPANOPLASTY

*Timothy O'Hare, M.D., Ph.D., and Joel A. Goebel, M.D.*

## ABSTRACT

**Objective:** We describe a technique to provide long-term ventilation of the middle ear during tympanoplasty. We have applied this technique to 20 patients with chronic ETD.

**Study Design:** Retrospective nonrandomized case review.

**Setting:** Otology clinic in a tertiary referral center.

**Patients:** A series of consecutive patients who underwent tympanoplasty and who had a diagnosis of ETD, adhesive otitis media, or chronic otitis media with perforation.

**Intervention:** All patients had a subannular T-tube placed anteriorly at the time of tympanoplasty in order to ventilate the middle ear space on a long-term basis.

**Main Outcome Measures:** The two main outcome measures were tube position and patency. In addition, we tested hearing pre- and postoperatively in most patients and documented any complications.

**Results:** Twenty patients (14 females, 6 males) and ears received an anterior subannular T-tube at the time of tympanoplasty. Median patient age was 36 (range, 7–72). All 20 patients had ETD. In addition, 7 had adhesive otitis media, 10 had chronic otitis media, 8 had cholesteatoma, and 2 had a cleft palate. All patients had a conductive hearing loss and had undergone prior surgery. All patients underwent tympanoplasty. Eleven patients underwent concomitant ossiculoplasty and 5 underwent mastoidectomy. Follow-up ranged from 8 to 22 months (mean, 13.4 months). One patient was lost to follow-up. One tube extruded at 16 months. Two patients had persistent mild retraction of the tympanic membrane. All other tubes are patent and have not migrated or plugged. There has been no evidence of anterior blunting or ingrowth of epithelium around the tube.

**Conclusions:** Anterior subannular T-tube placement is a simple, safe, and effective alternative for long-term middle ear ventilation when standard transtympanic sites are not available to the otologic surgeon. At the last follow-up visit, all patients but one had a patent tube. All middle ears were aerated. This technique offers the advantage of ease of placement during simultaneous tympanoplasty, mastoidectomy, or ossiculoplasty. Longer follow-up is necessary to confirm these initial findings.

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# DISCUSSION PERIOD II: CHRONIC EAR SURGERY
## Papers 5–8

**Charles M. Luetje, M.D.** (Kansas City, MO): These papers are open for discussion. Dr. Smith?

**Mansfield Smith, M.D.** (San Jose, CA): I have a comment on the paper presented by Dr. John Dornhoffer. You are in luck, Dr. Dornhoffer, because we have in our midst Dr. Sabina Wullstein. I met Dr. Wullstein in 1972 with her husband, who was at Guadalajara for a meeting, invited by Luis Sanchez-Hill. I saw the most elegant osteoplastic approach to the epitympanic space I have ever seen. Yours looks good, but I tell you hers looks a lot better, and you go over and talk to her because she has been doing this for a long time and described the procedure before that professor you showed in the white coat. This is one of the great advantages of having some old people in the audience! My other comment is for Dr. Paul Shea, wherever you are. I agree with you completely, the 256-Hz fork is the way to go; patients can tell the difference between a tactile sensation and sound.

**Michael Seidman, M.D.** (Detroit, MI): I have a question for Dr. McGhee on his Gelfilm study. It is a question about experimental design. John, I am sorry, but it was completely unclear to me why you did not have a Gelfilm-alone group. Also, when you presented the paper you said that group 2 had 25%–50% fibrosis and group 3 had 50%–75% fibrosis. Somebody who read your paper critically might ask, is 50% fibrosis group 2 or group 3? So, group 3 should be 51%–75% fibrosis. I do not mean to be so particular, but . . .

**Michael A. McGhee, M.D.** (Little Rock, AR): The reason we did not have a Gelfilm-only group is because it has been looked at previously, not necessarily in the Mongolian gerbil. Maybe we should have included such a group, but it has been looked at in multiple studies. It was found that Gelfilm itself causes a mucosal reaction but no long-term fibrosis. Your point regarding the grading scale is well taken.

**Arvind Kumar, M.D.** (Chicago, IL): I have comments on two papers. The first is for Dr. Telischi. Fred, I think you did a great job in making the measurements. Unfortunately, all these measurements are made in temporal bones that are pneumatized, and when we perform chronic ear surgery, we have sclerotic mastoids. Therefore, the measurements do not always necessarily apply. I think we have to design the technique, or the approach that we take to the petrous apex, based on the CT scan of the patient that we are dealing with. I have used the cochlear or the anterior cochlear approach that you described. I suspect it is the Ramadier-Lempert approach that was described a long time ago. I have used that approach for controlling CSF leaks, as well as for approaching petrous apex cholesteatomas, and I have used the technique that you have described (without having a name for it), but it all depends on the pneumatization. I would like to know what you think about that. As for the middle ear ventilation presentation by Dr. O'Hare, in the early '80's Dr. Silverstein developed his tube, which is a well-known tube, so there are many ways of doing this procedure. Nearly all tubes get blocked and all tubes get extruded.

**Charles M. Luetje, M.D.** (Kansas City, MO): Responses. Fred?

**Fred E. Telischi, M.D.** (Miami, FL): Thank you Dr. Kumar, that is a good point. The mastoid antrum and the epitympanum are usually pneumatized when other parts of the temporal bone may not be. So, that may be one advantage to this approach when other approaches may not be appropriate. But you are completely right that you have to individualize the approach to the patient. CT, although it does not directly image this approach, is one of the best ways we have for determining which way to approach the petrous apex mass.

**Timothy O'Hare, M.D., Ph.D.** (St. Louis, MO): I agree with your comments on my presentation. Thank you.

**Larry Duckert, M.D.** (Seattle, WA): I have a couple of comments for Dr. Dornhoffer. I was pleased to see Jan Helm's picture up there because I spent some time with him, too, and he taught me a great deal. I always thought of the approach that Dr. Dornhoffer described as an extended atticotomy; it is actually a complete scutectomy. Unless you are using the technique so elegantly described by Dr. Wullstein, replacing the canal wall with the canal wall, then implicit in this technique is recon-

struction of the canal wall. Two years ago I presented a technique that I learned from Dr. Helms, using cartilage as Dr. Dornhoffer presented, and I indicated at that time that if you use a perichondrial graft with the cartilage that you are going to enhance your results. I suggest that if you are going to use this approach, you consider using that type of reconstruction, or flap. I think that you will improve your results with take and survival of the graft.

**Charles M. Luetje, M.D.** (Kansas City, MO): Comments?

**Dr. John L. Dornhoffer, M.D.** (Little Rock, AR): Thank you, Dr. Duckert, that is a good point. Just a little bit about the history. The osteoplastic flap by Dr. Wullstein is an excellent idea and employs the same concept of exposing the epitympanum. It is a beautiful surgery. There are two things about this: you can have osteonecrosis of the bony flap that you put back in, and it can become mobilized. If you are an extremely good, meticulous surgeon you can avoid that, as Dr. Wullstein does. Teaching residents is a little bit more difficult, because if you remove that canal wall and you find cholesteatoma going into the supratubal recess, you have to follow that cholesteatoma a little bit further by more bone removal; then, suddenly, your bone flap does not fit anymore and you have a big space up there above the supratubal recess. So I like to go ahead and create my defect and then reconstruct it with cartilage. I think it is simpler for me and simpler to teach. Dr. Duckert's comment was also very good. It is difficult to go into a technique like this in such a short period of time, but I also leave the perichondrium on the anterior (or canal wall) side and remove the perichondrium on the other side. A lot of recent studies from Japan suggest that if we leave the mucosa in the epitympanum, that area can reaerate, possibly preventing recurrent cholesteatoma in that area. So, leaving the perichondrium on the anterior side of the cartilage, I had very few failures. The one failure in that group was in a girl who was lost to follow-up for 1 year; when she came back, she had an atelectatic drum. I did not have a chance to put a tube in. It pulled the canal wall posteriorly, forming a spontaneous Bondy. She did not have any debris; I ended up revising her, but that was the one complication in this series of patients. Of course, Jan Helms, who was a successor to the late Dr. Wullstein, has used this technique in thousands of cases. But thank you for your comments and the clarifications.

**Charles M. Luetje, M.D.** (Kansas City, MO): We will take two questions in tandem and then have the responses in tandem.

**Neil Sperling, M.D.** (New York, NY): Dr. Telischi, I was curious whether you looked at the pneumatization of the temporal bones, or the imaging studies that you analyzed, and I was wondering whether the dimensional measurements you made were any different in the pneumatized bones versus nonpneumatized bones, since most of the time we're called upon to find the petrous apex in pneumatized areas.

**Charles M. Luetje, M.D.** (Kansas City, MO): Next question.

**Hilary Brodie, M.D.** (Davis, CA): I have a quick comment for Dr. McGhee regarding the use of his animal model, the Mongolian gerbil. The Mongolian gerbil is an excellent animal model for multiple aspects of otologic surgery, but for this particular indication I question its usage. If Gelfoam is placed in the middle ear of the gerbil, even without being abraded, the Gelfoam does not resorb; it causes significant fibrosis and often osteoneogenesis. We do not see that in the human to a degree even close to that seen in the gerbil. The question is whether this is an appropriate model for this type of a study.

**Charles M. Luetje, M.D.** (Kansas City, MO): Responses by Dr. Telischi and Dr. McGhee.

**Fred Telischi, M.D.** (Miami, FL): Thank you for your question. We did not look at the pneumatized versus nonpneumatized bones, but that would be a good study to perform, both in the temporal bone laboratory and also with CT scans.

**Charles M. Luetje, M.D.** (Kansas City, MO): Dr. McGhee, any comment? No comment. While Julie is making her way to the podium, I would like to encourage you to remember the banquet Sunday evening; if you have not purchased your ticket for the banquet, please do so. The internationally famous Acoustics Quartet will be our entertainment. I promise you a wonderfully entertaining group.

**A. Julianna Gulya, M.D.** (Bethesda, MD): Thank you very much, Charlie, for allowing me a few moments here. I will not keep you long. What I am about to ask you to help us with is extremely important, not only to our patients today and tomorrow, but to us as otologists and our greater community as otolaryngologists. So please listen up. You may recall that about a year ago the American Academy of Otolaryngology–Head and Neck Surgery was awarded a 5-year grant by the National Institute on Deafness and Other Communication Disorders to establish a cooperative clinical trials group and to conduct protocols relevant to the mission areas of that institute—namely, hearing, balance, smell, taste, voice, speech, and language. The first of these trials has just opened for patient ac-

crual. It is a study of the relative efficacy of corticosteroids, methotrexate, and cyclophosphamide in the treatment of autoimmine inner ear disease. As I said, the study began actively enrolling patients in March 1998 at a total of five study centers [shown on slide]. As with any clinical trial, patient accrual is the key issue. Just as with real estate it is location, location, location, with clinical trials it is patient accrual. I am making a plea here. If you see any patient who might be appropriate for inclusion in this trial, please think about contacting the study center closest to you. There are yellow informational flyers, which are reprints from the Academy *Bulletin* detailing the entry criteria for this trial, available at the back of the room. Again, I thank you for your attention, and I hope you can help us in this very important endeavor, again, not only for our patients but also for our specialty. Thank you.

**Charles M. Luetje, M.D.** (Kansas City, MO): Thank you, Julie.

# ABR HEARING SCREENING FOR HIGH-RISK INFANTS

*Lori A. Van Riper, M.S., C.C.C.-A. and Paul R. Kileny, Ph.D.*

## ABSTRACT

**Objective:** To determine the outcome of a high-risk newborn ABR hearing screening program at our institution, and to determine the clinical characteristics of the target population, with special emphasis on the relationship between risk criteria and hearing status.

**Study Design:** This study involved the prospective screening of newborns with risk indicators and a retrospective analysis of results accumulated over a 10-year period.

**Setting:** Newborn nursery or outpatient audiology clinic of a tertiary care center.

**Patients:** Patients were 2,103 newborns presenting with one or more risk indicators for significant congenital hearing loss or delayed-onset/progressive sensorineural hearing loss.

**Interventions:** Diagnostic interventions involved auditory brainstem response screening at two intensity levels (25 kB and 65–75 dBnHL).

**Main Outcome Measures:** The main outcome measure was the incidence of significant, non-medically treatable hearing loss in this population. A secondary outcome measure was the incidence of hearing loss in association with different risk indicators.

**Results:** One hundred fourteen (5.4%) infants were diagnosed with bilateral hearing loss. Twenty-three (1%) infants presented with unilateral hearing loss. Sixty-seven infants presented with greater than moderate hearing loss, nine of whom had delayed-onset hearing loss; all nine passed the initial hearing screening and were diagnosed at subsequent appointments. The largest percentage of diagnosed hearing loss was found in patients with craniofacial anomalies.

**Conclusions:** ABR hearing screening of newborns at risk for significant hearing loss is a clinically efficient and cost-effective approach to early detection of significant hearing loss. The calculated cost to diagnose one hearing-impaired infant in this population is $3,000 in our program.

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# SENSORINEURAL HEARING LOSS FOLLOWING OCCLUSION OF THE ENLARGED VESTIBULAR AQUEDUCT

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## ABSTRACT

**Objective:** To report the hearing results of endolymphatic sac occlusion in patients with enlarged vestibular aqueduct (EVA) syndrome.

**Study Design:** Multi-institutional retrospective case series.

**Setting:** Tertiary otologic referral centers.

**Patients:** Ten previously unreported patients with progressive sensorineural hearing loss and vestibular aqueducts greater than 1.5 mm in diameter on computed tomography.

**Intervention:** Occlusion of the EVA via a transmastoid surgical approach. Either intraluminal endolymphatic sac obliteration (five patients) or extraluminal extradural endolymphatic sac obliteration (five patients) was accomplished with temporalis fascia.

**Main Outcome Measures:** The postoperative pure-tone average (PTA) and speech discrimination scores were measured using conventional audiometry and compared with preoperative scores.

**Results:** Nine of ten patients experienced some degree of sensorineural hearing loss. The mean change in PTA was a loss of 22 dB, and 50% of the patients experienced a sensorineural hearing loss greater than 29 dB. The postoperative change in PTA ranged from +10 dB to −59 dB. The mean change in speech discrimination score was a loss of 29%. Only one patient had improvement on both speech discrimination score and PTA following surgery. Patients who underwent extraluminal occlusion had a mean PTA loss of 14 dB and patients who underwent open sac occlusion had a mean PTA loss of 31 dB. The between-group difference was not statistically different by the *t*-test ($P = 0.21$).

**Conclusion:** In this series of ten patients, five had a greater than 29-dB decrease in hearing following occlusion of the EVA. Surgical occlusion of the EVA showed no significant benefit in hearing preservation. The otologic surgeon is alerted to the potential for severe sensorineural hearing loss following occlusion of the EVA.

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# INFLUENCE OF MITOCHONDRIAL METABOLITE SUPPLEMENTS ON AGE-RELATED HEARING LOSS

*Michael D. Seidman, M.D., *Mumtaz J. Khan, M.D., *Uma Bai, Ph.D., *Najeeb Shirwany, M.D., and †Wayne S. Quirk, Ph.D.

## ABSTRACT

**Hypothesis:** Compounds that upregulate mitochondrial function in an aged model will improve hearing and reduce some of the effects of aging.

**Background:** Reactive oxygen metabolites (ROMs) are known products of oxidative metabolism and are continuously generated in vivo. More than 100 human clinical conditions have been associated with ROMs, including atherosclerosis, arthritis, autoimmune diseases, cancer, heart disease, cerebrovascular accidents, and aging. ROMs are extremely reactive and cause extensive DNA, cellular, and tissue damage. Specific deletions within the mitochondrial DNA (mtDNA) occur with increasing frequency in age and presbyacusis. These deletions are the result of chronic exposure to ROMs. When enough mtDNA damage accrues, the cell becomes bioenergetically deficient. This mechanism is the basis of the mitochondrial clock theory of aging, also known as the membrane hypothesis of aging. Nutritional compounds have been identified that enhance mitochondrial function and reverse several age-related processes.

**Objectives:** To describe the effects of two mitochondrial metabolites, α-lipoic acid and acetyl-L-carnitine, on the preservation of age-related hearing loss.

**Methods:** Twenty-one Fisher rats (24 months old) were divided into three groups: acetyl-L-carnitine, α-lipoic acid, and control. Animals received oral supplementation with either a placebo or one of the two nutritional compounds for 6 weeks. Auditory brain stem response testing was used to determine baseline and posttreatment hearing thresholds. Cochlear, brain, and skeletal muscle tissue was harvested to assess for mtDNA mutations.

**Results:** The control group demonstrated an expected age-associated threshold deterioration of 3–7 dB in the 6-week study. Animals in the treatment arms experienced a delay in progression of hearing loss. Acetyl-L-carnitine improved auditory thresholds during the same time period ($P < 0.05$). mtDNA deletions associated with aging and presbyacusis were reduced in the treatment groups when compared with controls.

**Conclusions:** The known decrease in mitochondrial function with age can be delayed by treatment with mitochondrial metabolites. Acetyl-L-carnitine and α-lipoic acid reduce age-associated deterioration in auditory sensitivity and improve cochlear function. This effect appears to be related to the mitochondrial metabolite's ability to protect and repair age-induced cochlear mtDNA damage, thereby upregulating mitochondrial function and improving energy-producing capabilities.

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# PROGRESSIVE SENSORINEURAL HEARING LOSS, SUBJECTIVE TINNITUS, AND VERTIGO CAUSED BY DIABETES MELLITUS

*Jack L. Pulec, M.D., *Marlene B. Pulec, and †Ignacio Mendoza H, M.D.

## ABSTRACT

**Objective:** To determine the incidence of diabetes mellitus as the cause of inner-ear symptoms.

**Study Design:** Prospective study of clinical patients.

**Setting:** Private practice of a neuro-otologist.

**Patients:** All new patients (4,251) seen during an 8-year period were evaluated; of these, 2,332 had complaints of inner-ear disease and are the subjects of this report.

**Interventions:** All patients underwent a complete neuro-otologic examination, appropriate audiometric and vestibular studies and imaging, and laboratory tests, including a complete blood cell count, thyroid studies, liver studies, electrolyte determinations, fluorescent treponemal antibody absorption test (FTA-abs test), lipid phenotype, and a 5-hour glucose tolerance test.

**Main Outcome Measures:** Tinnitus, hearing loss, and dizziness were determined subjectively and objectively before and after treatment.

**Results:** Of 2,332 patients with auditory and vestibular dysfunction, 124 (5.3%) were found to have diabetes mellitus. Of the total, 105 (4.5%) were previously undiagnosed. Vertigo was present in 80 patients, sensorineural hearing loss in 76, and tinnitus in 73. Treatment with diet and vasodilators was successful in 59%, medical treatment and surgery were successful in 23%, and 18% were unchanged despite treatment. A dramatic improvement in hearing occurred in many patients.

**Conclusions:** Diabetes mellitus is the cause of inner-ear disease in a significant (5.3%) group of patients who consult an otologist. In the majority, the condition is undiagnosed. Adequate treatment and strict dietary control yield gratifying results. A properly performed 5-hour glucose tolerance test should be a routine part of the examination of all patients with progressive sensorineural hearing loss, subjective tinnitus, and vertigo of unknown cause.

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# DISCUSSION PERIOD III: SENSORINEURAL HEARING LOSS Papers 9–12

**Horst R. Konrad, M.D.** (Springfield, IL): These papers are now open for discussion. Dr. Duckert?

**Larry Duckert, M.D.** (Seattle, WA): My question is for Dr. Slater. Of the patients whom I have seen with enlarged vestibular aqueduct syndrome, some also suffer from vertigo. I guess I have been lucky because I operated on two of those patients and neither has lost hearing, but their vertigo improved. I wonder, if we are not going to offer them this surgery, is there anything else we can offer them to control their symptoms of vertigo?

**Horst R. Konrad, M.D.** (Springfield, IL): We will take the second question and then go on to responses.

**Dave Wilson, M.D.** (Portland, OR): I must say I am very disappointed in the outcomes Dr. Slater reported. In our study of seven ears, we were able to save hearing in five. We understand that the selection of patients for surgery is very important; indeed, since the publication of our paper we have not found a single individual appropriate for surgery, although we see four to six large vestibular aqueduct patients a year. Also, it is imperative to have a very designed operation for these patients. I am not sure of the type of surgery you are performing. I thought it appropriate at this time to review our seven cases and tell you what our outcomes have been over a period of 40 patient-years. We have had no loss of hearing in five patients and had preservation of hearing. Indeed, we had a 39-dB net improvement in five patients. We had a net worsening of 15 dB in two ears. So, I am a little bit uncertain as to the value of this obliterating procedure. We (my associate, Dr. Hudson, and I) certainly do not feel that this is a dead issue, although we will certainly be very selective about candidacy for this procedure. I wonder if our operative procedures are different from what Dr. Slater reported performing on these ten ears.

**Horst R. Konrad, M.D.** (Springfield, IL): Dr. Slater?

**Patrick Slater, M.D.** (Columbus, OH): First, I will address the issue of vestibular problems in this patient population. They were not thought to be a significant factor but recently have been recognized more frequently. We (Dr. Welling and I) have not noticed vestibular problems to be a significant issue with these patients. We were using the occlusion for that purpose. If they had some unsteadiness, they were treated mostly with conservative measures. I appreciate Dr. Wilson's remark. I myself am at a bit of a loss to explain the exact reason for our outcomes, but if you remember the graph of the patient who had the 22-year history, you will recall the wildly fluctuating pattern of his hearing loss. Many other variables go into this disease process as far as treatment is concerned—the small numbers that we are dealing with, for example. I do not feel it is a dead issue at all. As a matter of fact, I feel it is a very live issue. It is very difficult to watch patients, particularly children, progress with a hearing loss, and parents are somewhat eager for you to do anything if it will help them. I understand your philosophy. There are technical aspects to be considered as well. All of the physicians involved in this review were very meticulous in their handling of the sac.

**Horst R. Konrad, M.D.** (Springfield, IL): I apologize for running out of time. We are going to have to go on to the next speaker.

# HISTOLOGIC CHANGES OF THE COCHLEA AFTER AUTOMOBILE AIR BAG DEPLOYMENT

*Douglas E. Mattox, M.D., †Weihua Lou, M.D., ‡Joel Kalb, Ph.D., and ‡G. Richard Price, Ph.D.

## ABSTRACT

Reports of hearing loss after automobile air bag deployment have been infrequent despite the high sound pressure levels generated by air bags, estimated to be in excess of 170 dB. This resilience of the ear to high-intensity sound exposure is predicted by the Price-Kalb model of the ear, based primarily on the sound pressure wave reaching the elastic limit of the annular ligament.

Anesthetized cats were placed in a truck cabin and exposed to deployment of driver or passenger air bags. The rising time was 20 ms, the duration of the propellant combustion was 80 ms, and total inflation time was 100 ms. Noise impulse waveforms were recorded with a microphone. ABRs at 1, 2, 4, 8, and 16 kHz were performed before, after, and 1 and 6 months after exposure. At 6 months, surface preparations and cytocochleograms were made of the ears.

Compound threshold shift immediately and 1 month after the exposure averaged 60 dB at 4 kHz, and a permanent threshold shift of 35–40 dB remained at 6 months. Most animals showed a threshold shift at all frequencies, which was greatest at 4 kHz. The histologic damage was centered 10–15 mm from the base (total length averaged 24 mm). The inboard ear, closest to the sound source, consistently suffered more hearing loss and histologic damage than the outboard ear, which was protected by head shadow effects.

Based on these experiments, it would appear that anesthetized cats are more susceptible to cochlear injury from air bag deployment than the "average" human.

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# DOES OTOSCLEROSIS OCCUR ONLY IN THE TEMPORAL BONE?

*Pa-Chun Wang, M.D., *Saumil N. Merchant, M.D., *Michael J. McKenna, M.D., †Robert J. Glynn, Sc.D., and *Joseph B. Nadol, Jr., M.D.

## ABSTRACT

**Hypothesis:** Otosclerosis does not occur outside the temporal bone.

**Background:** The widely accepted assumption that otosclerosis is confined to the temporal bone has never been tested. It is important to investigate this issue, particularly in light of evidence that otosclerosis may be a systemic (genetic) disease that might be expected to affect other bones.

**Methods:** Biopsies from 9 to 11 skeletal sites were obtained from two individuals with clinical otosclerosis. A total of 241 nontemporal bone sections were examined by light microscopy.

**Results:** No nontemporal skeletal bone section showed histologic evidence of otosclerosis. The data indicate (with 95% confidence) that the true prevalence of otosclerosis in the extratemporal skeleton of the two individuals examined was less than 3%.

**Conclusions:** Our findings suggest that otosclerosis is unlikely to occur outside the temporal bone. Factors unique to the otic capsule that may predispose it to otosclerosis are lack of bone remodeling and the presence of globuli interossei.

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# OTOLOGICAL ASPECTS OF USHER'S SYNDROME: CLASSIFICATION, HISTOPATHOLOGY, AND MANAGEMENT

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## ABSTRACT

**Objectives:**

1. To report the temporal bone histopathologic findings in a patient with well-documented Usher's syndrome type II.
2. To report the results of cochlear implantation in three prelingually deaf Usher's syndrome children, two of whom belonged to the type I group.

**Study design:** Retrospective case review of Usher's syndrome patients.

**Setting:** Tertiary referral center.

**Patients:** Four patients with Usher's syndrome, three of whom were prelingually deaf.

**Intervention:** The prelingually deaf children received a Nucleus 22 cochlear implant. The fourth patient was evaluated in detail and his temporal bones were harvested for histopathologic study.

**Main Outcome Measures:**

1. Comparison of the histopathologic findings of our type II Usher's syndrome patient with findings previously reported.
2. Hearing and speech function in three prelingually deaf Usher's syndrome patients rehabilitated with a Nucleus 22 cochlear implant.

**Results:**

1. The histopathologic features of inner ear structures in the patient with Usher's syndrome type II were similar to those described in previous reports.
2. The hearing and speech results in the three prelingually deaf patients with Usher's syndrome who received a Nucleus 22 cochlear implant were good.

**Conclusions:**

1. The similarities in histopathologic features between our patient and previously described patients lead us to conclude that all of the patients described earlier had the type II syndrome.
2. Prelingually deaf patients with Usher's syndrome type I probably have an adequate population of spiral ganglion cells, judging from the successful outcome of cochlear implantation in our three patients.

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# GENE DISCOVERY USING A HUMAN ACOUSTIC NEUROMA (VESTIBULAR SCHWANNOMA) cDNA LIBRARY CONSTRUCTED FROM A NEUROFIBROMATOSIS TYPE 2 PATIENT

*Phillip A. Wackym, M.D., David R. Friedland, M.D., Elizabeth H. Y. Toh, M.D., and Marta Troyanovskaya, M.D.*

## ABSTRACT

**Hypothesis:** Gene discovery using a human acoustic neuroma cDNA library will yield novel information about the mechanisms controlling these neoplasms.

**Background:** We constructed a complementary DNA (cDNA) library from human acoustic neuroma (vestibular schwannoma) tissue as part of our ongoing studies of the molecular biology of auditory and vestibular function and dysfunction. Screening a cDNA library by any of several strategies can identify gene sequences expressed in the tissue from which the library was constructed.

**Methods:** For construction of the cDNA library, we obtained approximately 3 mL of fresh tumor tissue removed during the resection of a 4-cm acoustic neuroma in a patient with neurofibromatosis type 2. Poly(A)$^+$ RNA was isolated from total cellular RNA. Oligo(dT) primers were used to synthesize the cDNAs using reverse transcriptase and these were unidirectionally inserted in Uni-Zap XR (Stratagene, La Jolla, CA) bacteriophage vectors.

**Results:** The cDNA library contained 2.4 million primary plaques. Inserts averaged 1.8 kilobases (kb) in length (range, 0.8–3.0 kb). Comparison of the sequence data obtained from the 50 randomly selected clones with all sequences in the GenBank, EMBL, DDBJ, and PDB databases yielded identification of 19 unreported genes and 31 known genes.

**Conclusions:** These data have implications for understanding the molecular mechanisms of acoustic neuroma (vestibular schwannoma) tumor biology. In addition, this line of research may lead to novel applications of gene transfer therapy in the management of patients with hearing and balance dysfunction.

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# ELECTRON MICROSCOPIC STUDY OF CYSTIC VESTIBULAR SCHWANNOMA

*Jens Thomsen, M.D., D.M.Sc., Samih Charabi, M.D., D.M.Sc., Klaus Qvortrop, M.D., Ph.D., and Mirko Tos, M.D., D.M.Sc.*

## ABSTRACT

**Introduction:** The cystic variant of vestibular schwannoma (VS) is sporadically reported. It has been suggested that approximately 2% of VSs develop rapid cystic expansion (Lanser et al., 1992). Cystic elements in VS have been reported to be the result of degenerative changes in type A tissue, especially in large, "ancient" tumors. In a previous histopathological study (Charabi et al., 1994), we demonstrated the presence of cyst membranes or membrane-like structures in cystic VS as well as relatively rapid growth of implanted cystic VS in nude mice. In the current study we performed an electron microscopic study on solid/cystic human VS and the corresponding implants growing in athymic nude mice.

**Material:** VSs from six patients (four solid tumors and two cystic) were obtained and the tumor specimens were formalin-fixed and paraffin-embedded for routine histological examinations. Specimens from the six human tumors were specially fixed in order to perform the electron microscopic study. Tumor tissue was implanted in 25 athymic nude mice.

**Results:** The take ratio was 24/25. One specimen vanished and 24 specimens survived. The specimens from the human cystic VSs grew in the athymic nude mice, producing cystic elements. The ultrastructure of the cystic VSs, studied by electron microscopy, revealed a significantly different cellular structure compared to the solid tumors.

**Conclusions:** The results of the current study add to knowledge concerning the cystic variant of VS and support the theory that the cystic elements in VS are not the result of degenerative changes in large ancient tumors but are due to the ability of distinctive types of Schwann cells to produce cystic elements, as observed in our in vivo growth model.

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# DISCUSSION PERIOD IV: LIGHT MICROSCOPY AND ULTRASTRUCTURE
## Papers 13–17

**Horst R. Konrad, M.D.** (Springfield, IL): We have a little time for discussion. Dr. Chole?

**Rick Chole, M.D.** (St. Louis, MO): My question pertains to Dr. Merchant's study. The lack of lesions of otosclerosis in the rest of the skeleton is a very important contribution. I congratulate you for the work you did to accomplish that. The one question I have is that the bone of the otic capsule is, of course, endochrondal bone. Most of the sites you sampled do not seem to be endochrondal bone. Certainly ribs, calvarium, scapula, and so on, are not endochrondal. Actually, most of the long bones in the adult are not endochrondal. They form by intramembranous bone formation on the surface of the long bone. The only residual of endochrondal bone in the skeleton, outside the otic capsule, is in the heads of long bones—in the head of the femur, for example, or in the calcaneum—bones like that. I wonder, how well did you sample areas that were definitively endochrondal bone?

**Horst R. Konrad, M.D.** (Springfield, IL): Dr. Merchant?

**Saumil Merchant, M.D.** (Boston, MA): Thank you, Dr. Chole. That is a very good point you raised. Before we did the study we consulted a bone pathologist to figure out exactly where to biopsy. We targeted endochrondal bones. The intramembranous bones that we included were things like clavicle and calvarium, which are purely intramembranous. We did that just to make sure we did not miss something else. We targeted the endochrondal parts of the other bones that I showed. This study took quite a long time to complete. We started in 1985, and then we had to recruit the patients, follow them, get permissions when they died, get their bones, etc. So, even though we have data from only two patients, we felt it to be an important question to answer. Thank you.

# PAROXYSMAL POSITIONAL VERTIGO SYNDROME

*Vicente Honrubia, M.D., D.M.Sc., Robert W. Baloh, M.D., Marjorie R. Harris, M.A., and Kathleen M. Jacobson, B.A.*

## ABSTRACT

**Objective:** To investigate the differential diagnosis of patients with benign paroxysmal positional vertigo (BPPV) of different canals' origin.

**Methods:** The eye movements of 292 patients were evaluated with the use of Frenzel glasses and infrared video cameras following positional tests.

**Results:** Two different types of positional nystagmus were observed, corresponding to the presence of otoliths in the lumen of each of the semicircular canals and to the presence of otoliths on the cupula of the horizontal semicircular canal. The posterior canal was involved unilaterally in 250 patients and bilaterally in 23 patients. The anterior canal variety was observed in four patients. In the horizontal canal nine cases were of the cupulolithiasis variety and six of the canalithiasis variety. In eight patients the affected canal converted to a different location. The canal repositioning procedure eliminated vertigo and abnormal eye movements in 88% of the unilateral posterior canal variety. The success rate of the procedure in the other varieties was 50%.

**Conclusion:** Positional vertigo can present with characteristics corresponding to the presence of otolith particles in each of the semicircular canals. Treatment requires different strategies to move the otoliths, depending on their location in the vestibule.

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# PAROXYSMAL POSITIONAL VERTIGO: IDIOPATHIC VERSUS POSTTRAUMATIC

*Athanasios Katsarkas, M.D.*

## ABSTRACT

**Objective:** To investigate differences in patients with idiopathic versus posttraumatic paroxysmal positional vertigo (PPV).

**Study Design:** A retrospective study of patients with PPV assessed and followed up by the author.

**Setting:** The Dizziness Clinic ($N$ = 15,233) at a university medical center.

**Patients:** Patients with PPV ($N$ = 2,523).

**Intervention:** Statistical comparisons calculating confidence levels, if appropriate, and the $t$-test or Mann-Whitney or $\chi^2$ tests, depending on the case.

**Main Outcome Measures:** The age distribution between the two groups; the age distribution between men and women within each group; the prevalence of PPV in men and women between the two groups; the frequency of bilateral involvement; the prevalence of torsional/linear-oblique versus purely linear nystagmus in both groups.

**Results:** Patients were older in the idiopathic group; in this group men were older than women but women were more affected. Men and women were of similar mean age and equally affected in the posttraumatic group. Bilateral involvement was more prevalent in the posttraumatic group. PPV from the posterior was by far more frequent than the horizontal canal variety, with a similar prevalence in both groups.

**Conclusions:** These two groups of patients with PPV represent two different populations. Head injury is presumably a direct cause of PPV in some patients, and pathophysiologic mechanisms as well as outcomes may be different in idiopathic versus posttraumatic cases.

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# DISCUSSION PERIOD V: VERTIGO
## Papers 18 and 19

**Horst R. Konrad, M.D.** (Springfield, IL): We have a little time for discussion.

**Sanjay Bhansali, M.D.** (Atlanta, GA): I have a question for Dr. Honrubia. What kind of repositioning maneuvers did you use? I am specifically interested in the horizontal canal patients that you considered to have cupulolithiasis, because they are very difficult to treat.

**Horst R. Konrad, M.D.** (Springfield, IL): Why don't we have the next question, too? Cecil?

**Cecil Hart, M.D.** (Chicago, IL): I have a comment for Dr. Katsarkas. I do not give up quite so easily and call these patients "idiopathic." I think it is important to try and arrive at a diagnosis. Some of us here, I am sure, are aware of the Lindsay syndrome, in which one-third of the patients who have vestibular neuritis go on to develop BPPV (and of course the vascular cases and all sorts of other patients who have these symptoms and signs). So, I think I would not just call it quits at idiopathic. I think it is worth while making an effort to try to find out just what the cause is, particularly in those cases that do not respond quickly to treatment.

**Vicente Honrubia, M.D.** (Los Angeles, CA): This is a good question, and one for which I do not have a definite answer. About one-third of the patients, I think, were cured. One of them was this remarkable man I mentioned who had had positional vertigo for 18 years. What I do is—the patient is in the supine position—I slowly turn the head so that the cupula rotates to the opposite side, and I put the vibrator to facilitate, if that is possible, the motion of the particles by gravity out of the crus of the posterior semicircular canal. Then I rotate the patient completely—360 degrees. I do this two or three times on the first occasion; one failed, one was cured, and the other two-thirds continued not feeling well. I do not know exactly what the problem is. I think that we need to have more experience with these varieties, which are few in number but still need to be looked at carefully.

**Athanasios Katsarkas, M.D.** (Montreal, Quebec, Canada): Dr. Hart is right. There are patients with Ménière's disease with vestibular neuronitis who develop paroxysmal positional vertigo, but all of these cases were excluded from my report.

**Sanjay Bhansali, M.D.** (Atlanta, GA): I wanted to add a follow-up comment to the repositioning maneuver Dr. Honrubia has mentioned in case other investigators are doing this, because PPV is going to be something that will plague these patients because it persists. Someone—Dr. Herdman, in fact—suggested the Semont maneuver, and I have sent one patient down to her. This maneuver did not help him, so the idea that sudden head movement might dislodge the particles has not worked yet.

**Vicente Honrubia, M.D.** (Los Angeles, CA): I saw Dr. Semont when he was doing this maneuver many years ago. I was not convinced then that the man was using a rational approach. When Epley described his technique, that made sense to me. I think that the pathology is not understood, and that is why we have to resort to this approach. The approach is sensible.

**Horst R. Konrad, M.D.** (Springfield, IL): Last question. Mohamed?

**Mohamed Hamid, M.D.** (Cleveland, OH): It is not a question but a comment about trying to differentiate between cupulolithiasis and canalolithiasis, especially in the horizontal semicircular canal. I think if you do a caloric response test and the caloric response is decreased significantly on that side, the most likely pathophysiology will be canalolithiasis, given the fact that you have a mass of otoliths in the lumen that would impede the thermal conductivity of the endolymph. If you have cupulolithiasis, and the otoconia are presumably on the other side of the cupula, then that would give you a normal—even sometimes hyperactive—vestibulo-ocular response.

# ADVANTAGES OF MASTOIDOTOMY TYMPANOTOMY APPROACH FOR COCHLEAR IMPLANTATION: A MULTICENTER, MULTINATIONAL STUDY

*Marcos V. Goycoolea, M.D., Ph.D., †Santiago Arauz, M.D., ‡Hamlet Suárez, M.D., and *Gloria L. Ribalta, M.D.

## ABSTRACT

The surgical aim in multichannel intracochlear implantation is to place the full array of electrodes in the cochlea in a safe and efficient manner. This aim can be achieved using different surgical methods.

The mastoidotomy (antrotomy) tympanotomy approach was used at three implant centers in three different countries. To date 78 implants (different types) have been placed with this technique. This approach is technically simple, involves less bone drilling, and poses no risk to the facial nerve. The active electrode is covered by a thick layer of tissue throughout its course, and provides a better angle of insertion in the basal turn of the cochlea. A small postauricular incision is made that requires no drains and is associated with less risk of hematoma and faster healing. In addition, it allows direct viewing and work in the round window niche, as well as sculpturing in cases of ossified cochleas (one case is described in detail). Different surgeons might elect different but equally valid approaches to achieve a safe and efficient surgical result. The method described has worked well for the authors and could be useful to others.

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# HEARING RESULTS WITH DEEP INSERTION OF COCHLEAR IMPLANT ELECTRODES

*Annelle V. Hodges, Ph.D., C.C.C.-A., *Eloy Villasuso, M.D., *Thomas Balkany, M.D., *Philip A. Bird, F.R.A.C.S., *Stacy Butts, M.A., C.C.C.-A., †David Lee, Ph.D., and †Orlando Gomez, Ph.D.

## ABSTRACT

**Objective:** To investigate the relationship between electrode insertion length and speech recognition in patients with Nucleus 22 cochlear implants.

**Study Design:** Retrospective review of consecutive clinical series.

**Setting:** Academic medical center.

**Patients:** Thirty-one postlingually deafened adults with at least 6 months' experience with a Nucleus 22 cochlear implant using a Spectra 22 processor and SPEAK strategy.

**Main Outcome Measures:** Open set speech recognition scores for words and sentences.

**Results:** Insertion length ranged from 22 rings (estimated 17 mm) to 32 rings (estimated 25 mm). Mean word recognition score was 35%. Mean sentence score was 69.6%. Statistical analysis showed no correlation between insertion depth and word or sentence scores.

**Conclusion:** Insertion of the Nucleus 22 array beyond 22 rings does not improve performance on speech recognition tasks. This finding cannot be generalized to other electrodes or processing strategies.

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# MULTICHANNEL COCHLEAR IMPLANTATION IN CHILDREN WITH COCHLEAR OSSIFICATION

*Ronald Leif Steenerson, M.D., and Lucinda B. Gary, M.A., C.C.C.-A.*

## ABSTRACT

Meningitis is a common cause of profound deafness in children, and a large percentage of these children develop ossification of the cochlea. The purpose of this study was to examine the success of cochlear implantation in children with ossification of the cochlea from meningitis.

Between June 1990 and July 1997, 88 children with bilateral profound hearing loss not helped by hearing aids received cochlear implants (Nucleus 22) at our facility. Meningitis was the cause of deafness in 27 (31%). Twenty-two (80%) of the children deafened by meningitis had cochlear ossification that was identified by CT and confirmed at surgery. One additional child had ossification of unknown etiology.

For 17 (62%) of the children, a partial drill-out of the basal turn of the cochlea was performed, followed by complete insertion of all electrodes. Six patients (22%) had extensive ossification requiring circumodiolar drill-out (as described by Gantz), with an average insertion of 18 electrodes. There were no minimal insertions.

In our experience, partial or complete drill-out of the cochlea allows the complete or near complete insertion of all electrodes, resulting in a performance that equals or approaches that of patients without ossification. Ossification does not appear to preclude cochlear implantation.

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# MANAGEMENT OF COCHLEAR IMPLANT INFECTIONS

*J. T. Rubinstein, M.D., Ph.D., B. J. Gantz, M.D., and W. S. Parkinson, M.A.*

## ABSTRACT

**Objective:** To critically review the management of cochlear implant infections.

**Study Design:** Retrospective case review.

**Setting:** Tertiary referral center with an associated Veteran's Administration hospital.

**Patients:** Postlingually deafened adults who underwent revision surgery for delayed cochlear implant infections.

**Intervention:** Medical and surgical management of device infection without explantation.

**Main Outcome Measures:** Eradication of infection without loss of speech reception.

**Results:** Infections in four of four patients were successfully managed without explantation of the device.

**Conclusion:** Explantation of an infected but functioning multichannel implant is not mandatory in the absence of systemic sepsis.

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# EARLY RESULTS USING THE NUCLEUS C124M IN CHILDREN

*Noel L. Cohen, M.D., *Susan B. Waltzman, Ph.D., *J. Thomas Roland, M.D., and †Steven J. Staller, Ph.D.

## ABSTRACT

**Objective:** To evaluate early postimplantation speech recognition results in children who received the Nucleus C124M cochlear implant.

**Patients and Setting:** Nineteen congenitally deaf children, ages 20 months to 15 years, received the Nucleus C124M implant and were followed up at New York University Medical Center for a period of 3–12 months.

**Main Outcome Measures:** Speech perception was evaluated preoperatively and postoperatively using the Early Speech Perception (ESP) test, the Glendonald Auditory Screening Procedure (GASP) word and sentence tests, Phonetically Balanced Kindergarten (PBK) monosyllabic word lists, Common Phrases test, the Multisyllabic and Lexical Neighborhood (MLNT, LNT) tests, and the Bamford-Kowal-Bench (BKB) sentence test.

**Results:** One-way analyses of variance revealed significant improvement on open-set speech recognition in children able to perform measurement tasks.

**Conclusion:** The Nucleus C124M cochlear implant provides significant benefit to children following short-term usage.

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# DISCUSSION PERIOD VI: COCHLEAR IMPLANTATION
## Papers 20–24

**Charles M. Luetje, M.D.** (Kansas City, MO): I would like the discussants to come to the stage. I have asked Dr. Bill Luxford, Dr. Simon Parisier, and Dr. Richard Miyamoto to discuss these five papers. I asked them not to pat you on the back and tell you how good your paper is, but to critically analyze these papers, ask questions about the results of the papers, and develop a discussion about them. So, who wants to lead off? Bill?

**William M. Luxford, M.D.** (Los Angeles, CA): My question is for Noel, and I ask it because I need some advice and some help. Let's say I am an individual out in the open market and I have great experience with the Nucleus 22 device, but I am not a clinical investigator; therefore, I can't put in either the Nucleus 24 or the Med-El device, and I have no access to the Clarion device. I have a patient, a 2½-year-old, who needs an implant, and he fits all the protocols that are out there. Do I do an implant now, as soon as possible; do I tell the parents to wait 6 to 12 months for the Nucleus 24 to pass muster and be approved by the FDA; or do I refer the patient to another center where they have access to either the Clarion or the Nucleus 24/Med-El device? I am interested in your answer because I think there are many people out there who have the exact same question.

**Noel L. Cohen, M.D.** (New York, NY): It is a very good question, of course, and we all come up against that ethical problem all the time. I believe, although I do not have the data, that the Nucleus 24, if it is not currently a better system, has the capability of being a better system than the Nucleus 22. My perspective, of course, is skewed because I have access to the 24. I believe that the ethical decision would be not to implant a 22. I think I'd start off with that. Therefore, it comes down to do you have access to another, roughly equivalent device, let us say a Clarion or a Med-El. The Clarion is available on the open market. Access to that should be relatively simple. Med-El is in clinical trials and therefore is as closely held as the 24. I am telling people in New York that I think the Cochlear Corporation will get approval for the 24 this summer. I tell surgeons and parents to hang in there for a couple of months. Unless you have labyrinthitis ossificans staring you in the face, I think a 2½-year-old can wait a couple of months to have the 24 implanted by the same surgeon. Your alternative would be, if the parents are really pushing or if you have labyrinthitis ossificans, to insert the Clarion or send them to someone to have the 24 implanted.

**Richard T. Miyamoto, M.D.** (Indianapolis, IN): Dr. Balkany, I certainly enjoyed your presentation on the deep electrode insertion. We heard earlier at this meeting that we probably have not arrived at the perfect electrode. Recently I was in Europe, and I heard a talk about doing a very deep insertion with the Med-El device that goes all the way around to the cochlear apex. We have seen other presentations where shorter dimensions are probably appropriate. So, where do you see your research going with this? You showed very clearly that inserting the Nucleus electrode deeply did not provide any particular advantage, but I guess the question is, How short can an electrode be and still provide maximum benefit?

**Thomas J. Balkany, M.D.** (Miami, FL): First, thank you very much for the question. I think the first comment ought to direct attention to patients who have the Nucleus 22 device and are using it in the BP+1 mode. We did not look at any other patients besides those. Second, it makes some sense to try to access the lower-frequency areas of the spiral ganglion. So, insertion up to 25 mm logically makes some sense to me, although I do not have any data to show to support that. Insertions greater than 25 mm may also have some benefit because we do not know how the spread of current occurs in the cochlea. We know that bone is resistant to current, but spread may go through dendritic areas from more apical parts of the scala. So, until we have a better understanding, I cannot really answer that question very well. I think it is open to evidence-based research projects at this point.

**Simon C. Parisier, M.D.** (New York, NY): Tom, I enjoyed your presentation. The finding of ganglion cells being restricted and not in the apical areas—is that truly significant? Organs of Corti are innervated by dendrites; would not electrical spread occur through the dendrites?

**Thomas J. Balkany, M.D.** (Miami, FL): As I just

mentioned, we do not know how electricity spreads through the cochlea, but that is a possibility. If that is the case, then, as you just implied, more apical insertions could possibly be of benefit. On the other hand, as Bill House has pointed out, we are doing a lot of monopolar stimulation, in which case we blanket the spiral ganglion. This may be from different directions, and the order of the blanket effect may have a role. As we go to two circles of the spiral ganglion we are talking about very subtle differences in angulation. I do not know the answer, Simon.

**Simon C. Parisier, M.D.** (New York, NY): The question I am really asking is, is it the spiral ganglion or the dendrites that are significant? The presence of ganglion cells as a population is certainly an index of a healthy neuronal population. But can you infer from a healthy neuronal population that you are really stimulating ganglion cells? I think that has implications as to how cochlear implants work.

**Thomas J. Balkany, M.D.** (Miami, FL): I think that is also open a little bit. The presumption at this time by most people that I have spoken to is that the ganglion cells are the residual neural element responsive to electrical stimulation. I presume there is a hierarchical effect, and if dendrites are in fact existing at the time we are stimulating, dendrites may be responsive, too. Bill?

**William M. Luxford, M.D.** (Los Angeles, CA): I have a question for Tom. Did you look at complication rate to see if there was a difference between your so-called short versus longer insertion—like facial nerve stimulation?

**Thomas J. Balkany, M.D.** (Miami, FL): We did. I did not include everything in the short talk. We looked at a number of factors, we analyzed several different factors, and we found no correlation. There was no further complication with the deep insertion in particular.

**Simon C. Parisier, M.D.** (New York, NY): I have a comment on electrode insertion. We are learning more that it is not length, as Tom pointed out, of electrode insertion but perhaps the positioning of the electrode within the cochlea that is important. If you end up with an electrode that hugs the modiolus, your electrical transmission may be superior. In an individual case one does not know exactly where the electrode is located. You know the number of rings that are inserted, but you really do not know what the position of the electrode is, and that may be a more important factor than the length of insertion.

**William M. Luxford, M.D.** (Los Angeles, CA): I have a question for Dr. Goycoolea concerning his surgical technique. You pointed out that you felt your method allowed a better insertion of the electrodes you were using. You mentioned it gave a better path to the basal turn than the so-called typical mastoid–facial recess approach. When I looked at your pictures here, it looked as if you were coming down vertically and then had to make an almost 90-degree turn to get into the basal turn. I wonder how that is a better path than coming from behind and giving a sort of a gentle, banana-type shape to the basal turn?

**Marcos V. Goycoolea, M.D., Ph.D.** (Santiago, Chile): What I referred to was that it provides a better angle of insertion from the standpoint of getting into the round window niche. If you go with a facial recess approach, you go with what Dr. House called a "straight shot." You go in and you hit that lateral wall of the cochlea and then you have to turn 90 degrees. What I am referring to in terms of angle of insertion is, supposing that you have to get to the round window, and to do so you go through the facial recess. At 6 mm, once you have entered the round window, you hit the lateral wall and then you have to turn 90 degrees. So, when you go in with the facial recess approach you have to pull it back and push it forward, and turn it a little bit so it goes around. When you use the mastoid tympanotomy approach, you immediately hit the lateral wall and follow the natural turn of the cochlea, which makes insertion easier. That is what I meant by saying that it is an easier insertion, but I did not have time to go on.

**William M. Luxford, M.D.** (Los Angeles, CA): In that sense, I can see your point. The point is still taken that your electrode is coming down in a vertical fashion and has to make a 90-degree turn to get onto the path you have shown on your diagram.

**Marcos V. Goycoolea, M.D., Ph.D.** (Santiago, Chile): Well, you go in through the antrum and then you pick it up and bring it perfectly in through the round window.

**William M. Luxford, M.D.** (Los Angeles, CA): I agree with the conclusion of your paper that there are many ways to skin a cat and that you do what is best in your own hands. I think there are many ways to do it—there are the better ways and there are the other ways.

**Richard T. Miyamoto, M.D.** (Indianapolis, IN): I just wanted to ask about your approach: it is basically an endaural approach with a tympanomeatal flap. Canals come in different sizes and in different shapes. What happens when you have a very small canal with a marked anterior or posterior overhang? Does that mean you have to do a canaloplasty as part of the procedure?

**Marcos V. Goycoolea, M.D., Ph.D.** (Santiago, Chile): When you do a facial recess there is not only one way to do things.

**Simon C. Parisier, M.D.** (New York, NY): I have a question for Ron Steenerson. I do not want him to feel left out! I enjoyed your comments on ossified cochleas very much. This has been a challenging area. Most of us have been struggling with what is the right amount of surgery to accomplish the goal. A number of reports show that short insertion of the Nucleus electrode will give you fairly comparable results to other alternatives. How frequently have you been able to do your scala vestibuli insertion? I think oftentimes when the scala tympani is totally ossified, the other scala is also ossified. Could you comment briefly on how frequently you can do your scala vestibuli insertion in these cases? What are your thoughts in terms of where "total drill-outs" fit into the grand scheme of things?

**Ronald L. Steenerson, M.D.** (Atlanta, GA): The answer to the scala vestibuli question is that we have done around eight cases, and then in this series there were two or three additional cases. As far as when to do the complete drill-out is concerned, I think you do your standard approach to the facial recess and you drill as far as you can drill comfortably without feeling that you are going to get into the carotid artery. When you cannot access the lumen in that manner, then I think you have to go to the complete cochlear drill-out. I am not comfortable with putting in six to eight electrodes. I do not think that you are going to get good results with that.

**Simon C. Parisier, M.D.** (New York, NY): I enjoyed your presentation. In reviewing the three series, if you looked at the duration of deafness of the three, the children who had no ossification had an average duration of deafness of 5 years plus. The group that had partial ossification, in whom you accessed the perilymphatic space, had been deaf for 4.9 years, but the ones with complete ossification had only 18 months of deafness. I was surprised to see that the last two groups, the one that had insertion after you drilled and the one that had total ossification, did equally well. I was wondering if you had perhaps calculated the duration of deafness as a variable.

**Ronald L. Steenerson, M.D.** (Atlanta, GA): Certainly, those numbers are large as far as the duration of deafness, because there was a backlog when the FDA released the implants. That is why those numbers are so large. I think the numbers are smaller for the complete ossification because I did not start doing that until later on, after some of the backlog had been cleared up. I did not factor in the age. I realize that certainly is a variable here. I did not account for it and I do not know how I'd account for it, but the patients with complete ossifications were not deaf as long.

**Charles M. Luetje, M.D.** (Kansas City, MO): I want to thank the panel for the discussion here and thank you for the papers. I would like to have Bill House go to the microphone and tell us how current spreads through the cochlea and the importance of dendrites and ganglion cells.

**William F. House, M.D.** (Newport Beach, CA): About 35 years ago, as far as I can tell, probably the only person who really studied the flow of current in the cochlea was von Bekesy (he won the Nobel Prize for Medicine in 1962), because he was studying how the cochlear microphonic, which is produced in great amounts in the cochlea, spread through the cochlea and got out of the internal ear. He indicated that there was a combination of a flow of current, as in a cable, and also the spread of current in the fluids, as it would if it were in a drop of fluid. He showed that the current could flow freely through the perilymph. As Dr. Schuknecht showed some years ago, there are openings in the wall of the modiolus, the so-called canaliculi perforantes of Schuknecht, that allow the fluids of the cochlea, the perilymph particularly, to flow all around the spiral ganglion cells, which in many cases are unmyelinated. So, then the current flows out through the internal auditory canal. Now, the work of von Bekesy was very detailed, and some of the research money that we hear about would be extremely well spent repeating those experiments with modern technology. It is a very vital concept in relation to what happens and how cochlear implants work. There is no question in my mind that when you lose the hair cells, as you all know, the cochlear microphonic disappears (this is an AC current that increases with the intensity of sound, up to about 105 dB). I have come to the conclusion that probably what we are doing with cochlear implants is replacing the cochlear microphonic that is lost with an electrical current and letting it spread through the cochlea. In this way it surrounds the spiral ganglion cells. To me, this is the way the cochlear implant works. These spiral ganglion cells do have, in my opinion, tuning capacity and frequency capacity that are characteristic of the characteristic frequencies of the hair cells.

**Charles M. Luetje, M.D.** (Kansas City, MO): Thank you very much, Bill.

# COCHLEAR IMPLANT PERFORMANCE FOLLOWING REIMPLANTATION: A MULTICENTER STUDY

*AnnMarie Henson, M.Ed., William H. Slattery III, M.D., William M. Luxford, M.D., and Dawna M. Mills, M.A.*

## ABSTRACT

**Objective:** To compare auditory performance between original and replacement cochlear implants.

**Study Design and Setting:** Data from 18 U.S. cochlear implant programs were obtained by retrospective chart review. Subjects received and returned subjective questionnaires.

**Patients:** Subjects were 28 adults with a once functioning Nucleus 22 cochlear implant that failed and was subsequently replaced with a second Nucleus 22 cochlear implant in the same ear.

**Main Outcome Measures:** Objective measures included sentence (CID Everyday Sentences or Iowa Sentences) and monosyllabic word (NU-6 Words or CNC Words) speech discrimination tests. Subjects also rated and compared performance using subjective scales.

**Results:** Thirty-seven percent of subjects had significantly higher sentence or word scores with the replacement cochlear implant than with the original device, 26% had no significant change, and 37% had significantly poorer scores. Subjectively, 57% of subjects reported their replacement device was better or the same, and 43% reported it was poorer than the original device. There was no correlation between performance with the replacement cochlear implant and (1) cause of the original device failure, (2) duration of original device use prior to failure, (3) surgical complications with either implantation, (4) changes in electrode insertion depths, or (5) preoperative variables such as age or cause or duration of deafness.

**Conclusions:** Speech recognition ability with a replacement cochlear implant may significantly increase or decrease from that of the original implant. Experienced cochlear implant patients facing reimiplantation must be counseled regarding the possibility of differences in sound quality and speech recognition performance with their replacement device.

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# COCHLEAR IMPLANT MRI COMPATIBILITY

*J. Thomas Roland, Jr., M.D., Andrew J. Fishman, M.D., and Noel L. Cohen, M.D.*

## ABSTRACT

**Introduction:** Magnetic resonance imaging (MRI) is the diagnostic study of choice for many disease entities. Although harmless to normal human tissue, MRI generates magnetic fields and radiofrequency signals that have the potential to damage or displace implanted auditory devices such as cochlear (CI) and auditory brainstem implants (ABIs). Issues of compatibility and potential human harm arise when the CI or ABI candidate or recipient incurs the need for an MRI study.

**Methods:** The patient with a CI and the potential implant candidate requiring an MRI or serial MRIs present the physician with a unique clinical decision. Determination of device compatibility and an algorithmic approach to patient management are discussed for a variety of clinical situations and implant types.

**Results:** With changes in CI composition, it is now possible to obtain useful images, and a growing body of evidence reveals that MRI image acquisition with a 1.5-Tesla or lesser strength magnet is possible without damage to the patient or to currently manufactured magnet-containing devices.

**Conclusions:** Further study is necessary to confirm safety considerations, especially because MRI machines now exist with magnet strengths up to 5 Tesla. The algorithm proposed is designed to consider all the related CI/MRI compatibility issues and to minimize potential human harm and device failure.

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# POSITRON EMISSION TOMOGRAPHY IN COCHLEAR IMPLANT AND AUDITORY BRAINSTEM IMPLANT RECIPIENTS

*Richard T. Miyamoto, M.D., *‡Donald Wong, Ph.D., *§David B. Pisoni, Ph.D., †Gary Hutchins, Ph.D., *Mark Sehgal, M.D., and †Richard Fain, B.S.

## ABSTRACT

**Objective:** To determine whether similar cortical regions are activated by speech signals in profoundly deaf patients who have received a multichannel cochlear implant (CI) or auditory brainstem implant (ABI) as in normal hearing subjects.

**Study Design:** Positron emission tomography (PET), was performed using a variety of discrete stimulus conditions. Images obtained were superimposed on standard anatomic MRI images for the CI subjects. The PET images were superimposed on the ABI subjects' own MRIs.

**Setting:** Academic, tertiary referral center.

**Patients:** Five subjects who had received a multichannel CI and one who had received an ABI.

**Intervention:** Multichannel CI and ABI.

**Main Outcome Measure:** PET images.

**Results:** Similar cortical regions are activated by speech stimuli in subjects who had received an auditory prosthesis as in normal hearing subjects.

**Conclusion:** Neuro-imaging provides a new approach to the study of speech processing in CI and ABI subjects.

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# VARIATIONS IN CENTRAL NERVOUS SYSTEM ACTIVATION BETWEEN COCHLEAR IMPLANT USERS RECEIVING MAXIMAL OR MINIMAL BENEFIT

*‡Peter S. Roland, M.D., *Brian Nussenbaum, M.D., †‡Michael D. Devous, Sr., Ph.D., and *‡Emily A. Tobey, Ph.D.

## ABSTRACT

**Hypothesis:** Regional cerebral blood flow (rCBF) via single-photon emission computed tomography (SPECT) is reduced in magnitude and extent in subjects using multichannel cochlear implants (CIs) relative to control subjects with normal hearing.

**Background:** Considerable variation is observed across individual CI users: some individuals receive considerable benefit while others are able to accomplish only simple detection or discrimination. Factors contributing to this wide variation in performance across individuals and across tasks within the same individuals remain unclear. This study examined the possible contributions of the central nervous system to these differences in performance.

**Methods:** rCBF was examined under two different activation conditions. First, subjects watched and listed to a videotaped story (Full Audio, experimental condition), and second, they watched the video without audio information (Visual only, control condition). Images were acquired using $^{99m}$Tc HMPAO and a PRISM 3000 scanner. Analysis consisted of image normalization, coregistration, and threshold subtraction.

**Results:** Monaural auditory stimulation in normal hearing subjects activated Brodmann areas 41, 42, and 22 bilaterally (contralateral > ipsilateral for area 41 and 42) and area 21 on the left. In CI users who received benefit from their implants, only contralateral primary auditory area 41 was activated, with modest ipsilateral activation of areas 41 and 22. Little auditory system activation was observed in a poor IC user.

**Conclusions:** rCBF activation in primary and association auditory cortex is reduced in magnitude and extent in good CI users relative to normal hearing subjects, despite good speech perception.

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# MIDDLE EAR BIOELECTRONIC MICROPHONE FOR A TOTALLY IMPLANTABLE COCHLEAR HEARING DEVICE FOR PROFOUND AND TOTAL HEARING LOSS

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## ABSTRACT

A bioelectronic middle ear microphone (BMEM) has been developed as a laboratory bench model and successfully tested in fresh human temporal bones. This microphone is an electromagnetic transducer used in a reverse mode. It has been tested in the laboratory, implanted long term in cats, and implanted in humans for a period of 1 year as a driver of a semi-implantable electromagnetic middle ear hearing device (IDE, FDA approved).

**Materials and Methods:** The experiment was divided into two parts: (1) bench testing of the model and (2) testing fresh human temporal bones using an air core electromagnetic (EM) coil and a ferrite core EM coil for comparison. The BMEM is to be powered by an implantable battery.

**Results:**

1. Bench model: The average displacement at 3 kHz was 0.95 microns (peak) for 4 Vpp and 1.65 microns (peak) 10 Vpp. At 5 kHz, the measurements were somewhat higher.
2. Fresh human temporal bones: With the sound source in the ear canal (60 dB HL and 90 dB HL), the result was better when the magnet was implanted on the head of the malleus with the incus removed. The ferrite core EM coil with the magnet implanted on the malleus with the incus removed was compared with the air core EM coil. At 60 dB HL, the ferrite core EM coil yielded more than five times the amplitude than the air core coil.

**Conclusion:** A BMEM has been developed that could be applicable to the construction of a totally implantable cochlear implant. Further research is necessary for development of IC microchips of the speech processor.

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Note: U.S. patent applied for and pending for device described in this abstract.

# DISCUSSION PERIOD VII: COCHLEAR IMPLANTATION Papers 25–29

**Charles M. Luetje, M.D.** (Kansas City, MO): Please come to the stage, Drs. Gantz, Balkany, and Niparko. These five papers are now open for discussion, and I have asked these individuals to discuss these papers as we did the last five papers. I will leave it up to you who will go first. Panelists, take over!

**Bruce J. Gantz, M.D.** (Iowa City, IA): I guess we will start first with AnnMarie Henson's paper, on audiologic performance following reimplantation. I enjoyed reading this paper, and thank you for sending it on. I do have a little bit of a problem with the interpretation of your data, at least from the paper, and I have several points that I would like to see clarified. First of all, the number of patients that you actually have preoperative scores (word and sentence scores) on, and reimplantation data on, is 18 of the 28. That is the first thing. The second thing I would like to know is how you selected the categories of "poorer," the "same," and "better." As I look at your data, you have some patients with improved speech discrimination for words in the poorer category, even though they have a little bit of a decrease in their sentence scores. Third, the questionnaire that you used—was it validated? I think in this era of looking at data and clinical outcomes, it is important to know if the questionnaire was validated.

**AnnMarie Henson, M.Ed., C.C.C.-A.** (Los Angeles, CA): Yes, you are right; I did not, in the presentation, explain all the methods in detail. There were 18 subjects who underwent speech recognition testing with the original device and then with the replacement device. For objective data, 18 subjects had objective data, and that was what I presented: 37% did better, 26% the same, and 37% poorer; that was based just on objective data. When I broke the subjects into three groups, the number one criterion for determining to which group a patient belonged was the presence of objective data. We used significant improvement or decrease in performance based on the Thornton and Raffin binomial model. So, if they had a significant change or had no change, that determined which group they were in. For the other subjects for whom we did not have objective data, we placed them into one of the three groups based on their questionnaire responses. Your third question was about the questionnaire itself. That was modified from the hearing impaired questionnaire that we use.

**John K. Niparko, M.D.** (Baltimore, MD): As we all know, there is a period of training and adaptation that takes place with cochlear implants. What was the length of years with the initial device versus the replacement device in your cohort?

**AnnMarie Henson, M.Ed., C.C.C.-A.** (Los Angeles, CA): With the initial device, the range was from 5 days to 7 years. That was a big range. We did have the one patient who only had the original device for 5 days. He was categorized in the poorer group based on his subjective response because there were no early test data. He was very adamant that the second device did not sound better. We have chart notes from the center showing that he reported on multiple occasions that the first device was better. With the replacement device, all patients had the replacement device for 6 months or greater, except the one patient who was at our center. When he got the patient questionnaire he had had the replacement device for only 5 months. All the others had had it for 6 months or longer.

**John K. Niparko, M.D.** (Baltimore, MD): Are the means comparable, then, between initial and replacement devices? In terms of when people were assessing their device?

**AnnMarie Henson, M.Ed., C.C.C.-A.** (Los Angeles, CA): Previous studies have shown that improvements in performance, especially on the tests that we did (sentence test and word test), plateau at somewhere between 3 and 6 months. I think that doing the comparison with more than 6 months' experience is reasonable.

**Thomas J. Balkany, M.D.** (Miami, FL): This is such an important topic—that is why all the questions about the data. I have just one comment for the final paper. The categorization into improved, the same, or worse may have clinical usefulness, but in evaluating the data it is really a continuous variable that you are dealing with. I think it would be worthwhile to look at it from that perspective as well.

**Bruce J. Gantz, M.D.** (Iowa City IA): I have a

question for Tom. That was a very nice algorithm you presented, and in my hearing of it, you said something about positioning the patient to get the best result and trying to get rid of the artifact. Are you suggesting that for patients who have magnetless implants or are you suggesting that for patients who may have magnets to go ahead and use the MRI with those patients?

**Thomas Roland, M.D.** (New York, NY): For the magnetless devices it is not as much of an issue, but it is like holding a paper clip in a magnetic field. A very simple thing to do would be to take a dummy device with the magnet in place, hold it at the bore of the magnet, and decide which way it turns—orients—itself, and that is what is going to happen in the human head. To reduce torsional forces one would want to try to align the patients so there is minimal torsion. So, perhaps an open MRI might give you more flexibility in patient alignment. That is what I was suggesting.

**Bruce J. Gantz, M.D.** (Iowa City, IA): I guess the ultimate question is, if we do an MRI, is the warranty from the company valid? Do you think we could get our radiologist colleagues to do this for us?

**Thomas Roland, M.D.** (New York, NY): What I envision is that there is lot more to be done and all these tests need to be done in very controlled settings. A few patients had MRIs in Europe with magnets in place and did not have any untoward effects. I envision perhaps a manual that might be distributed in the event that an MRI is absolutely necessary, deemed necessary, or maybe even on an urgent basis for a patient with another medical problem. This would ensure that attention is paid to everything from radiofrequency stimulation to magnet strength, to field gradient pulse sequencing, and to imaging time; perhaps you could minimize any risks by paying attention to all those aspects.

**Thomas J. Balkany, M.D.** (Miami, FL): You mentioned in the paper that there were at least two patients with magnet-containing devices who have had an MRI performed and you mentioned the Vienna experience. Have there been others? Also, how many patients have had a magnet removed and then have had an MRI? How did they function afterward?

**Thomas Roland, M.D.** (New York, NY): I tried to obtain information on the number of patients who have had an MRI with a magnet-containing device in Europe; because that paper has been submitted for publication, I did not have access to that information. We probably will see it very soon in one of the journals. I do not know the exact number of patients who have had magnets removed. In our institution it was only one.

**John K. Niparko, M.D.** (Baltimore, MD): Tom, what was the requirement for an MRI in that particular case?

**Thomas Roland, M.D.** (New York, NY): Intracranial pathology not that far away in the brain, close to the implant, but still outside the range of the susceptibility artifact.

**Thomas J. Balkany, M.D.** (Miami, FL): I have one last question. I understand that MRI technology is going into the direction of less powerful magnets with better software and imaging protocols. Do you think that that is going to lead to the point where we can just do MRIs on our patients with the magnets in place?

**Thomas Roland, M.D.** (New York, NY): I think that to give blanket approval for something like that across the country might be dangerous. I think maybe in very select places that really pay attention to all the details, yes. I envision that someday either MRI or some other technology will allow us to image these patients without cause for concern.

**John K. Niparko, M.D.** (Baltimore, MD): I am moving on to the next paper, which was on PET scanning. Dr. Miyamoto, does this technique offer the resolution that would allow us to determine whether we are providing good tonotopic, differential stimulation of the cochlea? That seems to be the direction the field is going in right now.

**Richard T. Miyamoto, M.D.** (Indianapolis, IN): At this point, I would say no. But I think we will get there. Our first goal is that we wanted to make sure all of our subjects could do the task that we were trying so that we could get images. We did some preliminary work in this direction but it needs to be refined considerably before we get to that level.

**Thomas J. Balkany, M.D.** (Miami, FL): Rich, I enjoyed your paper very much and I would like to ask if you see using this technique in patient selection in the future, possibly with preoperative electrical stimulation of the cochlea? Could you focus your answer a little bit on postmeningitic children?

**Richard T. Miyamoto, M.D.** (Indianapolis, IN): There is a real disadvantage of the PET scan. We actually have to do the study while they are in the scanning unit, and that limits us. I think Peter's study, where he can do some of the audiometrics outside, may be more amenable to that type of testing.

**Bruce J. Gantz, M.D.** (Iowa City, IA): Did you do any studies in which you did the study initially, when they were just hooked up, followed them over a period of time, and then repeated the scan to see if there were any changes in the areas?

**Richard T. Miyamoto, M.D.** (Indianapolis, IN): No, we have not. Actually, the cost (for those of you who do not know) of the PET scanner is $5 million, and they charge us each time we do one of these studies. We are being very selective. We have not done longitudinal work yet.

**Bruce J. Gantz, M.D.** (Iowa City, IA): We studied two patients in that manner and we did not see any change. We are very discouraged because of all the things that you said. I hope that that is not too discouraging because I think neuroimaging is improving and I think they are working at it at the NIH and other centers around the world. I am hopeful that this will give us some information about central processing in the future. Congratulations!

**Thomas J. Balkany, M.D.** (Miami, FL): Peter, I enjoyed your paper very much. You used a very clever technique of subtracting levels of data to come up with the conclusions that you did! Would you tell us how you plan to use that in the future in a more practical way for patients with implants?

**Peter S. Roland, M.D.** (Dallas, TX): We have a bunch of things going on. We are also looking at hearing aid patients and we are looking at an intermediate condition called "degraded audio" in which they get some sound but it is not recognizable speech. It is something like the garbled speech stimuli that Rick brought up, and Dr. Gantz has already mentioned the use of pure tones. We are going to start doing pre- and postsurgical imaging. Our first preoperative patient is scheduled. What we are most interested in is doing imaging during promontory stimulation, or shortly after promontory stimulation, with the idea of being able to predict who may in fact be a good user and perhaps even be able to select the better hearing ear. So, if you got better responses on promontory stimulation from one ear than from the other, that might help in ear selection.

**Bruce J. Gantz, M.D.** (Iowa City, IA): I guess, Peter, I would like to know, you had only one patient who did not do very well. You did not have as much enhancement in that patient. Is there a variability in patients such that the standard deviation would account for that one patient who did not do so well?

**Peter S. Roland, M.D.** (Dallas, TX): If you look at the data table, it looks like that patient is below the standard deviation for the three normals, but there is obviously an absence of data. In order to get really statistically meaningful results we will have to image a lot more patients. We ran into some of the same barriers that Dr. Miyamoto did, except probably SPECT scanning is not quite as expensive. It costs us about $300 per patient for isotopes, and right now everyone else is throwing in their time free.

**Charles M. Luetje, M.D.** (Kansas City, MO): I want to thank the panel, but before they step down, and before everybody leaves, I have a couple of things to say. One has to do with data that will never be published. Prior to the auditory brainstem implant (available through the Cochlear Corporation), on the second-side tumor of an NFII patient we placed a standard cochlear implant with several of the electrodes on the cochlear nucleus at the lateral recess of the fourth ventricle and tied them to the pia arachnoid; this patient had pitch percept for a few days until this thing slipped. About 7 or 8 years later, because of a huge meningioma (superiorly), we explanted this cochlear implant and identified Heschl's (the temporal transverse) gyrus; we implanted that device with the electrode array coiled into the gyrus so it was adjacent to Heschl's gyrus. We stimulated it after surgery to see if it would be of any benefit to the patient. Unfortunately, all she got was nonauditory percepts. I do not know what this has to do with your PET scans and SPECT scans and all that, but the data on this patient will not be published, for obvious reasons. I think that is a frontier we might want to explore sometime in the future. Now, I would like Dr. Linthicum to come to the microphone and tell us about ganglion cells and the function of cochlear implants.

**Fred H. Linthicum, Jr., M.D.** (Los Angeles, CA): I heard a remark earlier today that perhaps we were stimulating dendrites. In looking at the temporal bones of totally deaf people, including those who had implants, 30% do not have dendrites. That does not mean that those who do have them might be having their dendrites stimulated, but at least 30% of the patients do not have any. I have analyzed four Nucleus temporal bones now, and we have a fifth one coming; I cannot find anything in the cochlea to explain the variation in patient response. That is, neither the number of ganglion cells nor the depth of insertion is related, and I think the PET scans are going to tell us why some patients perform better than others. Probably the number of ganglion cells really is not all that significant. Thank you.

**Charles M. Luetje, M.D.** (Kansas City, MO): We have time for one short statement. Bruce?

**Bruce J. Gantz, M.D.** (Iowa City, IA): I just want to make one comment on Tony Maniglia's paper. I thought that was an extremely elegant solution to the implantable microphone problem, and I wish you luck in continued development!

# DYSAUTONOMIA AS A CAUSE OF MÉNIÈRE'S SYNDROME: A REVIEW OF 74 CASES

*Dennis G. Pappas, Jr., M.D., *Dennis G. Pappas, Sr., M.D., and †Phillip C. Watkins, M.D.

## ABSTRACT

**Objective:** To characterize the presentation, evaluation, treatment, and treatment results of Ménière's syndrome associated with dysautonomia.

**Study Design:** Retrospective review of the records of 74 patients with Ménière's syndrome associated with dysautonomia.

**Setting:** All patients were evaluated and followed up at the Pappas Ear Clinic, a tertiary referral center.

**Patients:** The records of 74 patients with clinical history and findings consistent with inner ear dysfunction and dysautonomia were reviewed.

**Interventions:** Patients underwent otological evaluation, including pure-tone and speech audiometry. Electrocochleography was performed when symptoms were consistent with the diagnosis of endolymphatic hydrops. Patients were referred for cardiologic workup when dysautonomia symptoms remained poorly controlled. Cardiologic evaluation typically included echocardiography and exercise testing.

**Main Outcome Measures:** Patient symptoms (otologic and autonomic), test results (audiologic, echocardiographic, exercise testing), and subjective improvement with regard to otologic symptoms.

**Results:** Patients described episodic vertigo (84%), tinnitus (89%), aural fullness (82%), and hearing loss (35%). Vertigo worsened with prior diuretic therapy in 79%. The most common dysautonomia-associated symptoms were palpitations and chronic fatigue. Orthostatic changes were demonstrated in 13% of cases. Pure-tone and speech audiologic evaluation was normal in all but two cases. Electrocochleography was suggestive of endolymphatic hydrops in 40%. Echocardiography demonstrated mitral valve prolapse in 89%. Exercise testing was abnormal in 72%. The majority of patients reported improvement in otologic symptoms (aural fullness, 63%; tinnitus, 64%; and vertigo, 85%) with fluid loading and aerobic exercise.

**Conclusion:** A subgroup of patients with Ménière's disease and poor autonomic regulation respond to expansion rather than contraction of body fluid compartments.

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# SALT-LOAD ELECTROCOCHLEOGRAPHY

*Bradford A. Gamble, M.D., William L. Meyerhoff, M.D., Ph.D., Angela G. Shoup, Ph.D., and Nathan D. Schwade, Ph.D.*

## ABSTRACT

**Objective:** To introduce a new protocol for diagnostic electrocochleography using a pretest oral salt load to improve test sensitivity in patients with suspected inner ear fluid imbalance.

**Study Design:** A retrospective review of patients with the sole complaint of vertigo that, by history, was suggestive of an inner ear fluid imbalance. The patients received a complete audiovestibular evaluation that included a baseline electrocochleogram. Despite the incapacitating nature of their vertigo, there were no signs, symptoms, or electrophysiologic abnormalities that would isolate an etiologic ear. Following the baseline studies, patients received 4 g of sodium chloride daily for 3 days prior to repeat electrocochleography. A control group of 13 healthy volunteers with normal baseline results on electrocochleography and pure tone audiometry were tested under like conditions.

**Setting:** An ambulatory care clinic associated with a tertiary referral medical center.

**Intervention:** Electrocochleography was performed using alternating polarity clicks presented at a rate of 9.7 per second at 95 dB nHL by an extratympanic TIPtrode electrode and recorded with a Nicolet Spirit (Nicolet Instrument Corp., Madison, WI). Responses were averaged for 1,000 sweeps using a 10-millisecond time base with bandpass filtering from 5 to 1,500 Hz. An SP/AP ratio of 0.37 was considered the upper limit of normal.

**Main Outcome Measures:** Enhancement in the SP/AP ratio from a normal baseline value to over 0.37 following oral salt loading was indicative of a positive test.

**Results:** None of the ears from control subjects had a positive salt load electrocochleogram, while 38% of the patients in the study group with normal baseline SP/AP ratios and symptoms of inner ear fluid imbalance converted to abnormal in one or both ears. The mean SP/AP ratio of the control group for the pre- and post-salt load conditions was not statistically different ($P = 0.48$) while the difference in the mean SP/AP ratio in the study group following salt loading was statistically significant ($P = 1.329 \times 10^{-5}$).

**Conclusions:** A group of patients with the specific complaint of vertigo and no localizing abnormalities had a statistically significant increase in the mean SP/AP ratio following ingestion of a large quantity of sodium chloride. Additionally, a modest percentage had elevation of the AP/AP ratio above the upper limit of normal for our audiovestibular lab. Identifying a "salt-sensitive" ear could assist the clinician in managing these difficult patients with long-term medical therapy or surgical treatment when alternative measures fail.

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# METHOTREXATE MANAGEMENT OF BILATERAL MÉNIÈRE'S DISEASE

*Jefferson K. Kilpatrick, M.D., *Aristides Sismanis, M.D., *Robert F. Spencer, Ph.D., and †Christopher M. Wise, M.D.

## ABSTRACT

**Objective:** To evaluate the effectiveness of low-dose oral methotrexate (MTX) in the management of bilateral Ménière's disease of suspected immune-mediated origin.

**Study Design:** Retrospective clinical trial.

**Setting:** Tertiary care referral center.

**Patients:** Eighteen patients (10 men, 8 women) with longstanding bilateral Ménière's disease unresponsive to traditional conservative medical management. Sixteen patients had steroid-responsive disease. Two patients had contraindications to steroids, but their histories and laboratory tests were consistent with an immune-mediated disease.

**Interventions:** Patients were treated with 7–20 mg/wk of oral MTX. The mean duration of treatment was 16.7 months (range, 8–35 months), with a mean follow-up time of 24 months (range, 9 months–5 years).

**Main Outcome Measures:** Changes in symptoms (vertigo, hearing loss, tinnitus, and aural fullness) and side effects of therapy were evaluated.

**Results:** Vertigo resolved in 14 patients (77%), improved substantially in three patients (17%), and remained unchanged in one patient (6%). Hearing improved in eight patients (44%) and stabilized in four patients (22%). Tinnitus and aural fullness resolved or improved in 65% and 93% of the patients, respectively. Side effects were minimal.

**Conclusions:** Low-dose oral MTX is a safe and effective treatment for steroid-responsive bilateral Ménière's disease. In the majority of patients, MTX alleviated vertiginous symptoms and stabilized or improved hearing. MTX is an appropriate therapeutic regimen for patients with suspected immune-medicated bilateral Ménière's disease when a long-term treatment regimen is required or when steroids and/or cyclophosphamide are contraindicated.

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# USE OF MIDDLE EAR SUSTAINED-RELEASE VEHICLES TO MORE APPROPRIATELY TARGET INNER EAR DISEASE

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## ABSTRACT

Transtympanic gentamicin therapy has become a popular treatment for vertigo associated with Ménière's disease. Despite the increasing use of this modality, a number of questions remain unanswered. The appropriate total dose, dosing frequency, and the optimum end point of therapy have not been established. More important, little is understood about the basic properties of gentamicin when administered transtympanically. To help address these issues we have been investigating a number of sustained-release devices. These devices allow us to control for many of the variables that are present in simple transtympanic administration. The device under investigation is placed in the middle ear of Chinchilla laniger. At set time points samples of perilymph are taken to determine gentamicin level and the inner ear is fixed for morphological analysis. Functional hearing assessment is performed with evoked potentials and the animal's balance is assessed.

Using a variety of different devices, we have constructed inner ear kinetics curves that are specific to the device and drug dose. By correlating these curves with animal function and inner ear damage patterns we have learned a great deal about the basic properties of gentamicin. These findings have immediate implications for our patients. Since many of these devices are available for use in humans, it is important that physicians understand the properties of the devices. As we move beyond gentamicin and begin to use medicines to cure inner ear diseases rather than simply ablate inner ear function, a basic understanding of the different classes of sustained-release devices and the properties of the devices will become essential.

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# SELECTIVE LABYRINTHECTOMY IN EXPERIMENTAL ENDOLYMPHATIC HYDROPS

*P. Scott Bennett, M.D., *†Melanie Adamczyk, M.D., and *Patrick J. Antonelli, M.D.

## ABSTRACT

Selective labyrinthectomy (SL) techniques allow for hearing preservation in the treatment of BPPV, but its feasibility in ears with endolymphatic hydrops is unknown. In this study, the guinea pig model was used to assess the cochlear effects of SL in newly induced and chronic hydrops. Animals were randomized to undergo a hydrops procedure with (1) a sham single canal ablation (SCA) after 10 days, (2) SCA after 10 days, (3) SCA after 4 months, or (4) sham hydrops procedure with SCA after 10 days. Animals in groups 1, 2, and 4 showed similar increases in electrocochleographic threshold over the study period. Animals in group 2 (late hydrops) showed a significant elevation in threshold after canal ablation. These findings suggest that SL may be performed early in the course of hydrops with reliable hearing preservation but SL in chronically hydropic ears is more likely to result in significant hearing loss.

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# DISCUSSION PERIOD VIII: ENDOLYMPHATIC HYDROPS
## Papers 30–34

**Charles M. Luetje, M.D.** (Kansas City, MO): Before we discuss these papers, let me remind you about your evaluation forms. Turn these in to the back desk so you can get your CME credit. These papers are now open for discussion. Jack?

**Jack L. Pulec, M.D.** (Los Angeles, CA): I have two comments. Dennis Pappas had some interesting data and I was pleased to hear that he talked about "Ménière's-like" or Ménière's "syndrome" for this phenomenon. Fifty-five cases is a lot of cases, and I was interested in his comments regarding postviral pandysautonomia. There are about 50 cases in the world literature of that type, and you are talking about a more liberal group of cases; I wonder if you would like to differentiate that. I would like to remind Dr. Kilpatrick that the endolymphatic subarachnoid shunt has been a good, conservative procedure for bilateral or only-hearing-ear Ménière's, and that should be considered.

**Charles M. Luetje, M.D.** (Kansas City, MO): The second question is from Mohamed Hamid.

**Mohamed Hamid, M.D.** (Cleveland, OH): My question is for Dr. Gamble and Dr. Meyerhoff. I think this is an excellent paper on trying to do a stress test for the inner ear. My question is, did you notice any audiometric variation with the patient who responded and who had an abnormal electrocochleogram?

**Charles M. Luetje, M.D.** (Kansas City, MO): Let's address those two questions first. Dr. Gamble?

**Bradford A. Gamble, M.D.** (Dallas, TX): Only a small percentage of the patients had audiograms done in the pre- and post-salt conditions. I think there were approximately 10, and none of those showed any variation in their pure-tone averages with the salt load.

**Charles M. Luetje, M.D.** (Kansas City, MO): Thank you. Dennis?

**Dennis G. Pappas, Jr., M.D.** (Birmingham, AL): I am addressing Dr. Pulec's question. This is more of a systemic condition, and that is the point I was trying to make. This is something that we see in patients with more of a hypovolemic state. These patients are in your practice, if you could just identify them. They are the ones who do not get better with conventional treatment. Their symptoms are usually bilateral, and they are usually young, slender females for the most part. They are there—just look for them.

**Charles M. Luetje, M.D.** (Kansas City, MO): Dr. Hart, and then Dr. Derebery.

**Cecil W. J. Hart, M.D.** (Chicago, IL): I have a question for Dennis also. I liked your paper very much. You are dealing, apparently, with a population that is primarily young and female. I see many patients who are elderly diabetics who have dysautonomia. You did not really address the differential causes of dysautonomia. I wonder, do you see the same adult-onset diabetic patients, or what other types of patients do you see with this disorder?

**Charles M. Luetje, M.D.** (Kansas City, MO): Dr. Derebery?

**M. Jennifer Derebery, M.D.** (Los Angeles, CA): I have a question for Dr. Kilpatrick. That was an excellent paper on methotrexate, which really does seem to be a useful drug for bilateral Ménière's disease. We have a large number of patients with Ménière's disease secondary to allergy, and 40% of those have bilateral disease. I am curious, do you do allergy evaluation and testing before you put these patients on immunomodulating drugs like methotrexate or cytoxan?

**Dennis G. Pappas, Jr., M.D.** (Birmingham, AL): We do see hypovolemia-induced vertigo in some of our elderly patients as well, but here the etiology or mechanism is less clear. There are other etiologies, certainly, that could come into play—perhaps arthritis and other conditions that are associated with elderly patients' imbalance. So, the situation in regard to the elderly patient population and diabetics is less clear. Some of our patients were a little bit more advanced in age than just being young females. Again, you have to have a high index of suspicion, and certainly, we see it in some elderly patients too.

**Jefferson Kilpatrick, M.D.** (Richmond, VA): Allergy testing is a valid consideration. We take a history to determine whether or not, and which, patients should undergo further allergy testing, but we do not have results on any allergy testing done on those 18 patients. To address Dr. Pulec's com-

ment, one patient in our group did undergo endolymphatic sac decompression. We talked about that in our paper.

**Charles M. Luetje, M.D.** (Kansas City, MO): I will allow two more questions.

**Paul R. Kileny, PhD.** (Ann Arbor, MI): My question is for Dr. Gamble. How many of your patients actually reached your SP/AP criterion after the challenge?

**Thomas J. McDonald, M.D.** (Rochester, MN): Charlie, I liked all those papers. I would like to make a comment on Dr. Kilpatrick's excellent presentation on methotrexate. Chuck Beatty and I, in Rochester, Minnesota, with one of our immunologists (or rheumatologists, I should say) had an identical experience. Very valuable: 7.5 mg a week, about 14 patients, terrific control of their dizziness and at least sustaining their hearing levels and not progressing. The only difference is that we can't ever get an abnormal sed rate, ANA, or rheumatoid factor. The only thing that is going on is negative imaging, negative FTA/ABS, the usual workup; we have never been able to correlate it as well as Dr. Kilpatrick with his abnormal tests. There is one other advantage over cyclophosphamide, and that is that we have had one or two young women, teenagers, who obviously might want families, hopefully, and we have not interfered with anything with the methotrexate, whereas I think cyclophosphamide is a little bit more toxic. I enjoyed Dr. Kilpatrick's paper enormously. Thanks, Charlie.

**Charles M. Luetje, M.D.** (Kansas City, MO): Thank you for your comments. Dr. Gamble?

**Bradford A. Gamble, M.D.** (Dallas, TX): In answer to your question, we had 43 patients; 17 of them had conversion to an abnormal SP/AP ratio in at least one ear following oral salt challenge.

# OTOTOXICITY RESULTING FROM COMBINED ADMINISTRATION OF METRONIDAZOLE AND GENTAMICIN

*Landon C. Riggs, M.D., ‡William P. Shofner, Ph.D., †Anil R. Shah, *M. Rita Young, Ph.D., §Timothy C. Hain, M.D., and *Gregory J. Matz, M.D.*

## ABSTRACT

The hypothesis that metronidazole can augment the ototoxicity of gentamicin was tested. Groups of guinea pigs were given various doses of gentamicin alone, various doses of gentamicin in combination with metronidazole, or metronidazole alone. Auditory damage was determined electrophysiologically by measurement of the compound action potential and alternating-current cochlear potential. Hair cell damage was quantified by immunofluorescent microscopy. Electrophysiologic data revealed an augmented ototoxic effect when metronidazole was given with both a moderate and a high dose of gentamicin. This effect was evident histopathologically by increased cochlear hair cell damage. These data support the clinical observation of augmented ototoxicity in patients receiving combined gentamicin and metronidazole.

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# RECOVERY FROM AMINOGLYCOSIDE VESTIBULAR OTOTOXICITY

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

## ABSTRACT

**Objective:** To determine whether patients with documented aminoglycoside vestibular ototoxicity recover vestibular function, and if so, the recovery dynamics.

**Study Design:** Prospective, repeated measure.

**Setting:** A clinical research and technology center.

**Patients:** Twenty patients with normal horizontal canal vestibulo-ocular function at baseline who received aminoglycoside antibiotics were followed up for at least 1 year from initiation of antibiotic treatment.

**Controls:** Age- and sex-matched hospitalized patients who did not receive aminoglycoside antibiotics served as controls.

**Interventions:** Patients received aminoglycoside antibiotics for life-threatening infectious diseases. The choice of antibiotic and dosage was under the independent control of the patients' treating physicians. Most of the patients received gentamicin.

**Main Outcome Measures:** Tests of horizontal canal vestibulo-ocular function. Auditory and vestibular symptoms were recorded.

**Results:** Eight of 20 patients demonstrated a statistically significant drop in vestibulo-ocular function consistent with aminoglycoside ototoxicity. In seven of these eight subjects, partial recovery of response gain relative to baseline occurred at 1 year, but time constants did not recover to within normal limits. Reduced vestibular function with no recovery occurred in only one patient (who received neomycin) in this study.

**Conclusions:** Partial recovery of vestibular function occurred in seven of eight ototoxic patients followed up for 1 year, most of whom received gentamicin. There was no relation between cumulative gentamicin dose and transient or permanent ototoxicity. Three of the more severely affected patients demonstrated complete or partial recovery of response gain (amplitude) relative to baseline, with minimal or no recovery of response time constant. The dynamics of recovery were highly variable between individuals.

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Work was supported in part by NIH grants nos. RO 1 NS 19221 and RO 1 DC00204 and by NASA grant no. NAGW-3799.

# INTRACOCHLEAR PERFUSION WITH NO DONATORS AND NOS INHIBITORS IN GUINEA PIGS

*Katrin Gosepath, M.D., Ulrich Ecke, M.D., and Wolf J. Mann, M.D., Ph.D.*

## ABSTRACT

**Introduction:** Nitric oxide (NO) is synthesized by three different isoenzymes of NO synthase (NOS I–III). Immunoreactivity for neuronal-type NOS I and endothelial-type NOS III has been demonstrated in the cochlea of the guinea pig. NOS I immunoreactivity was seen in inner and outer hair cells, spiral ganglion cells, basal and intermediate cells of the stria vascularis, spiral ligament cells, and the media of vessels near the modiolus. An antibody to NOS III stained primarily vascular endothelial cells and, less intensely, certain ganglion cells.

**Method:** We tested the effects of the NO donator *S*-nitroso-*N*-acetylpenicillamine and the NOS inhibitors *N*-nitro-L-arginine and *N*-nitro-L-arginine methylester on sound-evoked responses of the cochlea. They were applied in different concentrations by intracochlear perfusions.

**Discussion:** The expression pattern of NOS in the cochlea is suggestive of various potential functions of NO in the inner ear. One could be the regulation of intracellular $Ca^{2+}$ concentrations in the inner and outer hair cells, which could influence both the mechanical properties of the hair cells as well as neurotransmission at synapses of the auditory nerve. Unimpaired blood supply is of major importance for cochlear function. NO is a vasodilator, and inhibition of NOS could specifically decrease cochlear blood supply. The results of cochlear perfusion with NO donator and NOS inhibitor are presented.

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# DISCUSSION PERIOD IX: INNER EAR FLUIDS, OTOTOXICITY Papers 35–37

**Charles M. Luetje, M.D.** (Kansas City, MO): These papers are now open for discussion.

**Cecil W. J. Hart, M.D.** (Chicago, IL): I have a comment for Owen Black. You go back 10 years in your observations, but Dr. Cesar Fernandez (who in the late '50s was at the CID at Washington University in St. Louis) studied patients with tuberculosis who were given streptomycin to the point of extinction of the Hallpike caloric test. He observed that at the end of 3 months he could then elicit a cold caloric response in these patients, and at the end of 6 months he could elicit a hot response as well. He demonstrated at that time that there was recovery from streptomycin toxicity.

**Charles M. Luetje, M.D.** (Kansas City, MO): Dr. Hamid?

**Mohamed Hamid, M.D.** (Cleveland, OH): My question is also for Dr. Black. Regarding the time constant of the patients who had partial or transient toxicity—they preserved the time constant? Second, assuming there is a relationship with velocity storage, what would be the long-term implication, particularly when it comes to vestibular rehabilitation in these patients?

**Charles M. Luetje, M.D.** (Kansas City, MO): Dr. Black?

**F. Owen Black, M.D.** (Portland, OR): In response to your first question, you are quite right. It is difficult to estimate the phase, so we did the phase estimation from both the single frequency and the curve fit to the pseudorandom response. I did not have time to go into details but they match very, very well, unless they wiped out the response, which, of course, makes it impossible to calculate the gain and phase. In response to your second question, the significance for rehabilitation is twofold. First, if the subject can maintain enough gain constant at high enough frequencies of normal head movements until 1 Hertz, then they can compensate reasonably well—they lose their oscillopsia. But if the gain constant does not recover enough, then they will not be able to get normal visual-vestibular interactions and they will be oscillopsic.

**Horst R. Konrad, M.D.** (Springfield, IL): Owen, I have a question also. Did you look at frequency? In other words, did you look at whether high frequency was lost more than low frequency?

**F. Owen Black, M.D.** (Portland, OR): Well, we did not in the entire population. Later on, we looked at active head movement responses with Dennis O'Leary's technique and we confirmed his observations. What appears to happen is that the midranges tend to be preserved—the high frequencies drop and the low frequencies drop, but the midranges tend to be preserved functionally. Again, we have not completed that study, but that looks like what is happening.

# EFFECTS OF SYSTEMIC EPINEPHRINE ADMINISTRATION ON PERILYMPH ELECTROLYTE CONCENTRATION

*S. K. Juhn, M.D., J. Y. Kim, M.D., and R. M. Odland, M.D.*

## ABSTRACT

The inner ear maintains a delicate homeostasis necessary for proper auditory and vestibular function. Homeostasis disturbance is thought to cause certain diseases such as Ménière's disease. The pathophysiology of Ménière's disease is not completely understood. The discovery of endolymphatic hydrops in temporal bones of Ménière's patients and the development of an animal model have enhanced understanding of the pathophysiology of this disease; however, the mechanisms leading to disturbance of inner ear homeostasis have not been elucidated. Several factors, such as stress-related hormones, may be involved in disruption of this delicate balance. Perilymph osmolality changes and functional disturbances have been reported following systemic epinephrine infusion.

This study investigated the short- and long-term effects of epinephrine administration on perilymph electrolyte concentrations and auditory function. Preliminary studies showed elevations in perilymph sodium and potassium levels after systemic infusion of epinephrine (6.3 μg/min for 3 hours). Administration of epinephrine (500 μg/kg/d) for 30 days using an Alzet osmotic pump resulted in a 30 dB ABR threshold shift. Other biochemical changes in perilymph after long-term epinephrine administration will also be presented.

There is good evidence to suggest that stress-related hormones such as epinephrine can alter inner ear fluid homeostasis and auditory function. The present study confirmed this hypothesis and illuminated the process of alteration by demonstrating specific changes in perilymph composition and auditory function following acute and chronic epinephrine administration. These studies provide a stronger basis for further research to clarify the mechanisms of inner ear disturbances that lead to disease states such as Ménière's disease.

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# BIOCHEMICAL MARKERS FOR THE IDENTIFICATION OF HUMAN PERILYMPH

*Steven A. Telian, M.D., ‡Michael J. Disher, M.D., †Quan Sun, Ph.D., and †Phillip C. Andrews, Ph.D.

## ABSTRACT

**Hypothesis:** Apolipoprotein D and $\beta_2$-transferrin are enriched in perilymph. Highly sensitive assays were developed to identify these two proteins, with a view toward their use in the diagnosis of perilymph fistula. It was hypothesized that a more sensitive assay for $\beta_2$-transferrin might decrease the false negative rate seen in earlier studies. In addition, the study hypothesized that apolipoprotein D might be superior to $\beta_2$-transferrin as a marker for perilymph fistula.

**Background:** Although $\beta_2$-transferrin assays have successfully confirmed cerebrospinal fluid (CSF) leaks, they have not been reliable when used to identify perilymph. Less sensitive assays previously reported have a high false negative rate, primarily due to the limited and highly variable enrichment of $\beta_2$-transferrin in perilymph relative to CSF. Human apolipoprotein D is an alternative potential protein marker for human perilymph.

**Methods:** Highly sensitive Western blot chemiluminescent immunodetection assays for $\beta_2$-transferrin and apolipoprotein D were developed. Detection of these proteins in human perilymph, CSF, and serum was studied. Samples containing either microliter amounts of perilymph or random middle ear fluids were collected and tested blindly using the apolipoprotein D assay.

**Results:** Although the assay detected $\beta_2$-transferrin in all perilymph samples, some barely reached the threshold of detection. The assay also detected trace amounts of this protein in 75% of serum samples. The assay for apolipoprotein D identified 15 of 20 perilymph samples, with no false positive results among negative controls. Gross contamination with blood may account for the five false negative results.

**Conclusions:** $\beta_2$-transferrin appears to be an unsatisfactory marker for perilymph. Assays for apolipoprotein D show promise for assisting in the clinical diagnosis of perilymph fistula.

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Work was supported by research grant no. 5 RO1 DC 01285 from the National Institute on Deafness and Other Communication Disorders, National Institutes of Health (S.A.T.).

# $\beta_2$-TRANSFERRIN ASSAY IN THE IDENTIFICATION OF PERILYMPH

*Craig A. Buchman, M.D., †William M. Luxford, M.D., ‡Barry E. Hirsch, M.D., ‖Michael J. Fucci, M.D., and §Robert H. Kelly, Ph.D.

## ABSTRACT

**Hypothesis:** Western blot assay for $\beta_2$-transferrin protein is a clinically useful method for the detection of human perilymph and thus should be used for the diagnosis of perilymph fistulas.

**Background:** Considerable controversy exists regarding the diagnosis of perilymph fistula. Recent studies suggest that the detection of $\beta_2$-transferrin protein may be useful in the identification of perilymph.

**Methods:** In an effort to evaluate the utility of the $\beta_2$-transferrin assay for identifying human perilymph, we collected paired perilymph samples and negative control samples on Gelfoam pledgets from 20 patients undergoing surgery that opened the inner ear. Immunoelectrophoretic assay (Western blot) for $\beta_2$-transferrin was performed on each specimen in a blinded fashion.

**Results:** Only one (5%) of the known perilymph samples and none (0%) of the control specimens were definitely positive for $\beta_2$-transferrin. Combined with historical data, this assay has a 29% sensitivity, 100% specificity, 100% positive predictive value, and a 31% negative predictive value.

**Conclusions:** These findings suggest that the $\beta_2$-transferrin protein assay may not be a reliable method for detecting human perilymph when performed using this technique.

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# DISCUSSION PERIOD X: INNER EAR FLUIDS, OTOTOXICITY Papers 38–40

**Charles M. Luetje, M.D.** (Kansas City, MO): These papers are now open for discussion.

**Isolde Thalmann, Ph.D.** (St. Louis, MO): I have a comment for Dr. Telian. I am glad to see that you are confirming our results. We identified apo D a number of years ago, but more significantly, we also quantitated it, and our numbers agree quite well. This is a somewhat artificial situation because you have a very pure and large perilymph sample from your controls. We have to remember that, while there is a steep gradient for this protein between perilymph and plasma, we have a steep gradient between the total protein in perilymph and plasma, which almost balances out the two. This is somewhat difficult to comprehend, but what it all boils down to is that if you have, let's say, a half a microliter of perilymph and half a microliter of plasma, the signal will be very similar. So, my question is, because your antibody does not seem to distinguish between the perilymph and the serum protein, because it seems to be the same molecule and not an isomer, how would you distinguish? We have looked at about 50 perilymph samples from perilymph fistula patients (they were supplied by the distinguished members of the American Otological Society); I must add that practically all the samples were extremely small, definitively under 1 microliter, and heavily contaminated with plasma. The only way I could tell that they were contaminated was by having reference proteins—by analyzing others, which is something you are masking by doing a Western blot. Do you see a solution to this problem?

**Steven A. Telian, M.D.** (Ann Arbor, MI): Your points are well taken. The differential concentration is about two orders of magnitude greater than in plasma, but there is about 10 times more total protein in plasma than in perilymph.

**Isolde Thalmann, Ph.D.** (St. Louis, MO): What are your protein concentrations in perilymph versus plasma? How do you get 10 times?

**Steven A. Telian, M.D.** (Ann Arbor, MI): It is 10 to 20 times as I understand it.

**Isolde Thalmann, Ph.D.** (St. Louis, MO): At least 35 times, and the difference is 80 times, maybe 70 times. So it is only a 50% difference.

**Steven A. Telian, M.D.** (Ann Arbor, MI): There is only a slight difference if you take a pure sample of fluid, and that is the hindrance at this point. We have to take matched amounts of total protein, which is the major thing that prevents us from doing a rapid assay. I think that pure samples are probably easier to obtain in a round window exploration via exploratory tympanotomy than during cochlear implant surgery, for example; however, it continues to be a hindrance in developing the assay. The thought would be to see if the sample collected has a higher optical density for apo D than the control sample of the patient's own serum tested simultaneously, and if it has an enhancement, that would suggest that there is perilymph present in the specimen. But all of the points you raised are valid and certainly hindered the progress of this work.

**Charles M. Luetje, M.D.** (Kansas City, MO): Thank you, Steve. Owen?

**F. Owen Black, M.D.** (Portland, OR): This is a follow-up to Izzy's question. I think the studies are well done, so I do not mean to criticize them, but from a practical standpoint, when you are sitting there sucking the perilymph out, the criterion for identification of a perilymph fistula is repeated accumulation of perilymph from the depths after you have dried out the mucosa surrounding it. Just pure volume considerations make it very unlikely that the fluid we are seeing is perilymph. It is most likely cerebrospinal fluid, in my opinion. What is the control that we are going to use to make sure that it is actually perilymph that we are sampling, and not simply CSF? It seems to me that is one of the controls we need to have in a clinical situation.

**Charles M. Luetje, M.D.** (Kansas City, MO): Steve?

**Steven A. Telian, M.D.** (Ann Arbor, MI): I think both $\beta_2$ concentration or apo D concentration could theoretically be used to study and identify whether

that fluid is perilymph or CSF. Certainly, if the samples were all negative, one would assume that the fluid was in fact anesthetic fluid or other non-specific tissue transudate, and neither perilymph nor CSF. I think that the clinical implications of CSF leaking from the ear or perilymph leaking from the ear are pretty similar, and you would want to correct both. The problem may not be as large as it seems.

# INTRODUCTION OF NEW PRESIDENT: GREGORY J. MATZ, M.D.

*Charles M. Luetje, M.D.*

In closing, I would like to wish any mothers here happy Mothers Day! I'd like to thank the audiovisual people for doing a spectacular job. I'd also like to thank Dr. Konrad for his help as Secretary-Treasurer this year, and also Shirley Gossard, who has helped him. They have been invaluable in putting together this program! Finally, I would like to thank you, the American Otological Society, for allowing me the honor of serving this year as your President. It is an honor that I will never forget and always cherish. So, thank you very much!

I would like to present Dr. Greg Matz something that he doesn't know that he is getting! Greg, it's a little bit late in coming, but this plaque reads, "Presented to Gregory J. Matz, M.D., in grateful appreciation for your five years of dedicated service as Secretary-Treasurer, American Otological Society, 1992–1997." That was a long five years, Greg, but congratulations!

My last order of business is the pleasure of turning over this gavel to your incoming President, Dr. Matz. Greg?

# REMARKS OF NEW PRESIDENT

*Gregory J. Matz, M.D.*

Thank you for the recognition plaque, Charlie.

Like Charlie, I consider it a great honor to be President of this Society. I will work hard to make next year's program at Palm Desert, California, interesting and educational. I am sure that we will have a good basic science and clinical program. Congratulations are due to Charlie Luetje for the outstanding program he put together this year.

Now, I'd like Dr. Konrad to come to the podium.

**Horst R. Konrad, M.D.:** Thank you, Greg. Dr. Luetje, on behalf of the Society, I'd like to present you with a certificate of our appreciation, which reads, "In appreciation and recognition of his service to the Society, 1998."

**Charles M. Luetje, M.D.:** Thank you very much!

**Gregory J. Matz, M.D.:** Charlie, you will be a hard act to follow. I feel like the coach that followed Vince Lombardi at Green Bay!

I hope to see you all next year. My first order of business as President is to adjourn this meeting.

# EXECUTIVE SESSIONS

## BUSINESS MEETING

### MINUTES—MAY 9–10, 1998

President Charles M. Luetje, M.D., called the Business Meeting to order at 12:30 p.m., Saturday, May 9, 1998. The minutes of the 1997 Annual Meeting of the American Otological Society, Inc., held at the Scottsdale Princess Resort, Scottsdale, Arizona, May 10–11, were approved.

The following new members were introduced to the Society by their respective proposers:

*Active Members*

D. Bradley Welling, M.D., proposed by Richard Gacek, M.D., and seconded by Shokri Radpour, M.D.

*Corresponding Members*

Chong-Sun Kim, M.D., proposed by Eugene N. Meyers, M.D., and seconded by Michael M. Paparella, M.D.

*Nominating Committee*

A Nominating Committee consisting of Drs. Herman Jenkins, Chairman, Robert Dobie, Alexander Schleuning, Shokri Radpour, and Peter Smith was elected to prepare the slate of nominees for AOS officers for 1998–1999.

## REPORT OF THE SECRETARY-TREASURER

The present membership totals 266 and includes the induction of new members on May 9, 1998, as follows:

| | |
|---|---|
| 130 Active | 10 Honorary |
| 68 Senior | 6 Emeritus |
| 41 Associate | 11 Corresponding |

Dr. Konrad encouraged the membership to seek out qualified candidates who would be worthy of proposal for membership in the Society. The Society is particularly interested in proposing candidates for active membership.

Members deceased since the last annual meeting are Robin P. Michelson, M.D. (Senior), Jules Waltner, M.D. (Senior), Claude C. Cody III, M.D. (Senior), F. Blair Simmons, M.D. (Senior), and Cary N. Moon, Jr., M.D. (Senior).

Members requesting transfer to Senior status are Richard R. Gacek, M.D., Shokri Radpour, M.D., John J. Shea, Jr., M.D., and Robert I. Kohut, M.D.

**INCOME AND EXPENSE STATEMENTS**

The following Income and Expense Statements were presented to the membership.

| | |
|---|---|
| **INCOME** | |
| Beginning Balance (July 1, 1997) | $68,040.92 |
| Transfer from Maywood | $19,926.78 |
| Membership Dues | 54,400.00 |
| Research Fund Income | 13,930.00 |
| Transactions | 1,235.00 |
| Interest | 3,399.19 |
| Miscellaneous (Lapel Pins) | 40.00 |
| TOTAL INCOME (July 1, 1997–March 31, 1998) | $92,930.97 |
| **TOTAL** | $160,971.89 |
| **EXPENSES:** | |
| ACCME | $990.00 |
| Accounting Fees | 7,136.00 |
| Secretarial 1/2 Yearly Stipend | 3,500.00 |
| Office Expenses | 5,732.92 |
| Staff-Council Travel/Meetings | 1,313.79 |
| Internal Revenue Service | 11,530.00 |
| New York Incorporation Fee | 250.00 |
| Insurance Premiums | 4,639.00 |
| Lippincott-Raven-AJO | 11,603.14 |
| Midwinter Council Meeting | 7,274.36 |
| 1998 Annual Meeting | 4,135.19 |
| Other Expenditures (Legal Notice) | 14.00 |
| **TOTAL EXPENSES** | $58,118.40 |
| **BALANCE ON HAND (July 1, 1997)** | $68,040.92 |
| **DEPOSITS:** | 92,930.97 |
| | $160,971.89 |
| **DISBURSEMENTS:** | –$58,118.40 |
| **BALANCE ON HAND (March 31, 1998)** | $102,853.49 |

Dr. A. Julianna Gulya reported all 1996 active members should have received a copy of the 1996 *Transactions* (Vol. 84). Dr. Gulya stated they are currently working on the 1997 *Transactions* and are very close to having that ready for the publishers.

Dr. Luetje thanked the following individuals for serving on the 1998 Program Advisory Committee: Drs. Ronald G. Amedee, Karen I. Berliner, F. Owen Black, Richard Chole, L. Gale Gardner, Jr., Jeffrey Harris, Timothy K. Jung, Arvind Kumar, Paul R. Lambert, William L. Meyerhoff, Jack Pulec, and Leonard P. Rybak.

The Business Meeting was adjourned and the first Scientific Session started at 1:00 p.m. President Charles M. Luetje, M.D., called the second Business Meeting to order at 7:00 a.m., Sunday, May 10, 1998.

Richard Miyamoto, M.D., reported that the Trustees of the Research Fund of American Otological Society, Inc., chaired by Dr. Joseph Farmer, met in New York on March 28, 1998. The Research Fund experienced another excellent year with growth of its market valuation to $8,131,387 on March 5, 1998. The asset allocation is 65% stocks and 35% fixed income investments.

A total of 19 grants (including two renewal applications and four fellowship applications) were reviewed. Eight grants and one fellowship were funded. The total budget of the funded proposals was $320,998. Douglas Mattox, M.D., was installed as the new Secretary-Treasurer and Richard T. Miyamoto, M.D., will serve as Chairman for the coming year. Joseph B. Nadol, Jr., M.D., was elected a Trustee for a six-year term. Bruce Gantz, M.D., was elected Alternate Trustee.

Warren Adkins, M.D., AOS liaison to the ABOto, reported on the 1997–1998 examination statistics: 351 candidates took the written examination in September 1997. Of those candidates, 297 became candidates for the oral examination. The oral examination was conducted by 93 Guest and Senior Examiners and 25 ABOto Directors for 334 candidates in April 1998 at the Palmer House Hilton in Chicago. Two hundred eighty-two candidates passed the examination and were certified.

The ABOto has now conducted two complete item-writing cycles to produce written examination questions, prepared and independently administered two written examinations, and most recently prepared and conducted the Otolaryngology Training Examination (previously the Annual Otolaryngology Examination) in more than 100 locations, including several overseas sites. ABOto worked with Knapp & Associates International, and with Dr. Mary Lunz of Measurement Research Associates for psychometric services. Charles J. Krause, M.D., was elected President of the Board and Michael E. Johns, M.D., was elected Vice-President/President-Elect. Dr. Gerald B. Healy succeeded Dr. Robert W. Cantrell as Executive Vice President and Dr. H. Bryan Neel, III succeeded Dr. D. Thane Cody as Treasurer. Drs. Cantrell and Cody, along with Dr. Warren Y. Adkins, were elevated to Senior Counselor status.

Drs. Wayne F. Larrabee, Jr., and Paul A. Levine were elected to the Board of Directors. Drs. Dean M. Toriumi, Randal S. Weber, and Steven M. Parnes were elected as Senior Examiners.

The 1998 written examination will be conducted on September 19 in five cities: Chicago, Atlanta, New York, Houston, and San Francisco. The subsequent oral examination will be conducted at the Westin O'Hare in Chicago on April 18–19, 1999.

Michael Maves, M.D., reported on a variety of AAO-HNS/F activities that have occurred since the last annual meeting.

Activities of the Health Policy and Government Affairs Department have centered on proposed changes in the practice expense component of the Medicare fee schedule. The AAO-HNS has successfully lobbied Congress for a one-year delay in the implementation of any changes. The Practice Expense Coalition (PEC) has continued to point out the fallacy of the Health Care Financing Administration methodology for determining practice expense values and has lobbied Congress for action in view of the lack of response from HCFA. The Academy has taken an active role in the Patient Access to Specialty Care Coalition in its efforts to pass managed care legislation.

Legislative Briefing Day occurred Tuesday, March 3, 1998. Dr. Ira Papel, AAO-HNS Coordinator for Governmental Affairs, presented the legislative agenda for the Academy, which included practice expense changes to the Medicare fee schedule, increased funding for the NIH and NIDCD, audiology scope of practice, and managed care patient protection. Other issues included the FDA draft proposed rule on hearing aid sales and dispensing, the Walsh universal infant hearing screening legislation, Medicare private contracting, and the proposed tobacco settlement.

The 500-page Stark II Proposed Rule has been released and a three-page summary article appeared in the March 1998 AAO-HNS *Bulletin*.

Practice Management: A sample survey of otolaryngology practices prepared with the assistance of the Practice Management Department has been completed.

The Academy, in concert with the Specialty Care Coalition, is in the process of preparing a new practitioner program for residents that will be televised later this year.

The hottest issue for the Practice Management Department has been the Evaluation and Management Guidelines as issued by HCFA and the American Medical Association. The Academy has requested that the cardiac, respiratory, neurologic, and lymphatic portions of the guidelines be deleted (except for examination of the cervical lymphatics). It is the intent of staff, in consultation with Dr. Gary Turner, AAO-HNS Coordinator for Practice Affairs, to have an instrument ready for the membership as soon as our request has been answered.

The ENT Outreach Program continues now in its fourth year. The rhinosinusitis initiative has been added as a focus of this campaign. The AAO-HNS is working with the American Academy of Otolaryngic Allergy and the American Rhinology Society to respond to moves in

this area by the American Academy of Asthma, Allergy and Immunology.

The Membership Department is now part of the Board of Governors/Membership/Society Relations Department.

International outreach continues to progress under the leadership of Dr. Eugene Myers, AAO-HNS Coordinator for International Affairs. The Spanish Society of Otolaryngology–Head and Neck Surgery has become the first Corresponding Society of the AAO-HNS.

The NIDCD Otolaryngology Clinical Trials Cooperative Group has been in operation for a year. This multi-institutional cooperative alliance received a $7.2 million grant from the NIH in early 1997. The initial trial, "Autoimmune Inner Ear Disease," under the direction of Dr. Jeffrey Harris is ready for the accrual of patients. Dr. George Gates will direct the planned second trial, "Diuretics in Ménière's Disease."

The Covance COGENT Outcomes Initiative has progressed nicely since its initial demonstration at the September 1997 annual meeting. Dr. Edwin Monsell, AAO-HNSF Coordinator for Research, is leading an effort to assemble an office-based outcomes tool which can be used by the individual member.

Fifty Foundation grant applications were received at headquarters in response to the call for applications published in the November 1997 AAO-HNS *Bulletin*. This year, $135,000 has been budgeted to provide the seed money for the successful applicants. More money will be available next year for head and neck research, as the AAO-HNSF accepted an offer from the American Society for Head and Neck Surgery to match $45,000 in research funds.

Gregory Matz, M.D., ACS Governor representing the AOS, updated the membership on the activities of the College of Surgeons.

The ACS will be developing a scientific journal. Otolaryngology most likely will present a journal article in the year 2000. The proposed topic of this article is the carcinogenesis of smoking. The article will be submitted in the fall of 1999.

Paul Levine, M.D., was elected President of the Advisory Council for Otolaryngology.

Clinical trials in head and neck cancer most likely will be funded through a central agency in Washington, D.C., probably the National Cancer Institute. The contact person at ACS for this effort will be Lynn Meyer (phone: 312-202-5310).

The focus of the ACS this year will be an evaluation of the E&M Coding for Medicare and Medicaid reimbursement.

The American College of Surgeons is still actively working on tort reform.

The Advisory Council has been active in putting together programs for the ACS Scientific Meeting.

Antonio De la Cruz, M.D., reported on the activities of the Board of Governors. The main issue of discussion concerned the Audiology Scope of Practice. The Academy is being tremendously proactive at the level of Congress. Whenever something happens in the individual states, the Academy would like to know immediately. Each local society, city society, and state society must have a good relationship with the State Medical Society. In each state there is a key contact person who acts as a liaison with the lobbyists, who monitor all the bills. Dr. De la Cruz emphasized the importance of being active in one's state society, lobbying for your otology members, and sending information to the Board of Governors.

Derald Brackmann, M.D., Chairman, reported that he had conferred with committee members Drs. Ted Bailey, Charles Luetje, Sam Kinney, and Joseph Farmer for the selection of the 1998 recipient of the Award of Merit. Dr. Michael M. Paparella received the award at the banquet held on Sunday evening, May 10, 1998.

Sam Kinney, M.D., Chairman, reported on behalf of himself and his committee members, Drs. Myles Pensak and Stephen Harner. They reviewed the financial transactions of the society and found all the transactions to be appropriate and the consolidated balance sheet of the American Otological Society to be in order. The committee recommended that the council and the membership accept this report as indicating that the financial status of the American Otological Society, Inc., is excellent and is being maintained appropriately.

Herman Jenkins, M.D., Chairman, presented the following nominations for the slate of officers of the AOS for the 1998–99 year: Drs. Gregory J. Matz, President; C. Gary Jackson, President-Elect; Horst R. Konrad, Secretary-Treasurer; A. Julianna Gulya, Editor-Librarian; and Drs. Joseph C. Farmer, Jr., Charles M. Luetje, Richard A. Chole, and Sam Kinney as Council Members. There were no nominations from the floor. The nominated slate was elected by the membership.

In addition, the following members were elected to serve on the Award of Merit Committee for 1999: Dr. Robert A. Jahrsdoerfer and Dr. Michael E. Glasscock.

The business meeting was adjourned at 7:45 a.m., to be followed by the Scientific Program.

Respectfully submitted,
*Horst R. Konrad, M.D.*
*Secretary-Treasurer*

## REPORT OF THE EDITOR-LIBRARIAN

The 1996 *Transactions* (Vol. 84) were mailed out in late March 1998, a little bit earlier than last year. Please let me know if there were any problems with receiving this volume. Remember, according to the Bylaws of the Society, Senior, Emeritus, and Associate members must pay for the *Transactions*, which for the 1996 *Transactions* remains stable at $65.00, including postage and handling.

The 1996 *Transactions* includes the abstracts of the presented papers, the ensuing discussions, special presentations, and the transcript of the business meeting.

I am happy that the *Transactions* arrived a little earlier this year. I shall strive to improve yet further on the timeliness of delivery of next year's volume.

We are still in search of three volumes of the *Transactions* to complete the set owned by the Society and housed in the archives of the American Academy of Otolaryngology–Head and Neck Surgery. The missing volumes are: Volume 2 (1875–1879), Volume 15 (1919), and Volume 16 (1924).

Finally, I remind you that we will have the annual photograph of the membership taken at the close of this session. I am aiming for three times in a row that we have avoided having individuals remain incognito, and I plan to do all I can to make sure it happens! So, immediately at the close of this session, proceed directly to Shirley Gossard's registration desk, pick up a number, and make sure that you name is correctly recorded along with that number by Shirley. Then go to the central courtyard for the photograph.

Thanks for your cooperation!

Respectfully submitted,
*A. Julianna Gulya, M.D.*

## REPORT OF THE BOARD OF TRUSTEES OF THE RESEARCH FUND

The Trustees of the American Otological Society Research Fund, chaired by Joseph Farmer, M.D., met in New York on March 28, 1998. The Research Fund experienced another excellent year with growth of its market valuation to $8,131,387 on March 5, 1998. The asset allocation is 65% stocks and 35% fixed income investments. A total of 19 grants (which included two renewal applications and four fellowship applications) were reviewed. Eight grants and one fellowship were funded. The total budget of the funded proposals was $320,998. Douglas Mattox, M.D., was installed as the new Secretary-Treasurer and Richard T. Miyamoto, M.D., will serve as Chairman for the coming year. Joseph B. Nadol, Jr., M.D., was elected a Trustee for a six-year term. Bruce Gantz, M.D., was elected Alternate Trustee.

Respectfully submitted,
*Richard T. Miyamoto, M.D.*

## REPORT OF THE AMERICAN BOARD OF OTOLARYNGOLOGY

The American Board of Otolaryngology (ABOto) is pleased to report the following:

### EXAMINATION STATISTICS

The ABOto continues to administer a two-part examination. Candidates must first pass a written (qualifying) examination, and then pass an oral examination in order to become certified. The written and oral examination scores are not combined.

Three hundred fifty-one (351) candidates took the written examination in September 1997. Of those candidates, 297 became candidates for the oral examination. The oral examination was conducted by 93 Guest and Senior Examiners and 25 ABOto Directors for 334 candidates in April 1998 at the Palmer House Hilton in Chicago. Two hundred eighty-two (282) passed the examination and were certified.

### EXAMINATION MATERIALS AND PREPARATIONS

As noted last year, the ABOto recently completed a three-year process of bringing examination preparation and material development in-house. The ABOto has now conducted two complete item-writing cycles to produce written examination questions, prepared and independently administered two written examinations, and most recently prepared and conducted the Otolaryngology Training Examination (previously the Annual Otolaryngology Examination) in more than 100 locations, including several overseas. ABOto worked with Knapp & Associates International and Dr. Mary Lunz of Measurement Research Associates for psychometric services.

### ELECTIONS

In April, Dr. Charles J. Krause was elected President of the Board, and Dr. Michael E. Johns was elected Vice-President/President-Elect. Dr. Gerald B. Healy succeeded Dr. Robert W. Cantrell as Executive Vice President, and Dr. H. Bryan Neel III succeeded Dr. D. Thane Cody as Treasurer. Drs. Cantrell and Cody, along with Dr. Warren Y. Adkins, were elevated to Senior Counselor status after many years of dedicated service to the ABOto.

Drs. Wayne F. Larrabee, Jr., and Paul A. Levine were elected to the Board of Directors. Dr. Larrabee is a Clinical Professor at the University of Washington and Dr. Levine is Chair of the Department of Otolaryngology at the University of Virginia. Both Drs. Larrabee and Levine served as Guest Examiners of the ABOto on numerous occasions and were serving as Senior Examiners at the time of their election.

**SENIOR EXAMINERS**

The position of Associate Examiner was initiated five years ago; the name was recently changed to Senior Examiner. The ABOto is committed to electing and training new examiners while maintaining consistency in administering the examination. Senior Examiners serve as the core group of experienced examiners, along with ABOto Directors. Senior Examiners are elected to a five-year term, and are eligible for reelection to one additional term after a hiatus of three years. To be elected as a Senior Examiner, an individual must have served as an ABOto 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. At the April 1998 meeting, Drs. Dean M. Toriumi, Randal S. Weber, and Steven M. Parnes were elected Senior Examiners, bringing the total group to 36.

**AMERICAN BOARD OF MEDICAL SPECIALTIES**

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 this year were Drs. Robert W. Cantrell, Eugene N. Myers, and Gerald B. Healy, and alternate representatives were Drs. M. Eugene Tardy, Jr., Michael E. Johns, and Charles J. Krause. Dr. Gerald B. Healy served on the Committee on Certification, Subcertification and Recertification (COCERT), and Dr. Jerome C. Goldstein represented the Council of Medical Specialty Societies to the ABMS assembly. Dr. Krause will represent CMSS this year. Caryn Wilson, Administrator of the ABOto, recently completed her term as Chair of the ABMS Board Staff Council.

The ABMS assembly recently authorized the ABOto to issue a subspecialty certificate in Plastic Surgery within the Head and Neck. ABOto examination committees are now developing time lines, examination materials, and processes for the issuance of subspecialty certificates in this area, as well as the previously approved areas of Pediatric Otolaryngology and Otology/Neurotology.

**1998–99 EXAMINATION DATES**

The 1998 written examination will be conducted on September 19 in five cities: Chicago, Atlanta, New York, Houston, and San Francisco. The subsequent oral examination will be conducted at the Westin O'Hare in Chicago on April 18–19, 1999.

Respectfully submitted,
*Warren Adkins, M.D.*

## REPORT OF THE AWARD OF MERIT COMMITTEE

The Award of Merit Committee, comprised of Drs. Charles Luetje, Joseph Farmer, Sam Kinney, Ted Bailey, and myself as Chairman, has met and determined a worthy recipient for the Award of Merit. As usual, you will have to come to the banquet this evening and endure the suspense of the development of the awardee presentation! I assure you that the selection was made democratically and the honoree is very worthy recipient of the award!

Respectfully submitted,
*Derald E. Brackmann, M.D.*

## REPORT OF THE AMERICAN ACADEMY OF OTOLARYNGOLOGY–HEAD AND NECK SURGERY, INC., AND THE AMERICAN ACADEMY OF OTOLARYNGOLOGY–HEAD AND NECK SURGERY FOUNDATION

Many activities have occurred at the AAO-HNS/F since the annual meeting. The list below highlights some of the most important activities. I will be happy to comment further on any of the items below.

**AAO-HNS (ACADEMY)**

**Health Policy and Government Affairs:** The activities of the Health Policy and Governmental Affairs Department have largely centered on proposed changes in the practice expense component of the Medicare fee schedule. The AAO-HNS, as a member of the Practice Expense Coalition (PEC), has successfully lobbied Congress for a one-year delay in the implementation of any changes. Unfortunately, the primary care lobby was able to secure a $390 million "down payment," financed by cuts in CPT codes where the practice expense component for that code exceeds the work value by more than 110%.

The $390 million would be redirected to the most frequently billed evaluation and management services. This down payment has disproportionally affected some of the specialties in the PEC, such as ophthalmology, cardiac surgery, and orthopedics, but has caused little disruption to otolaryngology overall. This is due to the fact that most of our members spend a significant time in the office and have a favorable mix of procedural and office-based services.

The PEC has continued to point out the fallacy of the Health Care Financing Administration (HCFA) methodology for determining practice expense values and has lobbied Congress for action owing to the lack of response from HCFA. Representatives from AAO-HNS appeared at a series of HCFA validation panels in November, and Dr. Charles Koopmann was our representative to a cross-specialty panel in December 1997. The GAO recently released a report to Congress criticizing HCFA for its failure to seek alternative methodologies or to obtain new, physician-specific data on which to base its calculation

for the primary care down payment, which, if altered, could significantly alter the impact of such a budget change.

The Academy has also taken an active role in the Patient Access to Specialty Care Coalition in its efforts to pass managed care legislation. In response, there has been a backlash from the managed care community, as well as from House Republicans.

Legislative Briefing Day occurred Tuesday, March 3, 1998, giving our members an excellent opportunity to make their voices heard on Capitol Hill. A first-rate series of speakers assembled for this meeting, highlighted by Chris Matthews of CNBC. Dr. Ira Papel, AAO-HNS Coordinator for Governmental Affairs, presented the legislative agenda for the Academy, which included practice expense changes in the Medicare fee schedule, increased funding for the NIH and NIDCD, audiology scope of practice, and managed care patient protection. Other issues of importance include the FDA draft proposed rule on hearing aid sales and dispensing, the Walsh universal infant hearing screening legislation, Medicare private contracting, and the proposed tobacco settlement.

The 500-page Stark II Proposed Rule has been released. A three-page summary article appeared in the March 1998 AAO-HNS *Bulletin*, and a fifteen-page abstract is available for the membership on request to the Health Policy Department. This extremely complex regulation attempts to clarify the ambiguous Stark statute, which was passed in 1993 and went into effect in 1995. This rule may affect your practice, and will demand that many Academy members review their practice protocols with their counsel. We have already had a number of questions concerning this area directed to staff and have begun to assist members.

**Practice Management:** A sample survey of otolaryngology practices, prepared with the assistance of the Practice Management Department, has been completed. This survey is an initial attempt to capture demographic and practice-specific data that have not been available to the AAO-HNS in the past. Our intent is to repeat this process periodically to obtain better, more accurate, and more detailed information concerning the practice patterns of our members and to assess changes in services and delivery mode longitudinally.

The Academy, in concert with the Specialty Care Coalition, is in the process of preparing a New Practitioner Program for residents that will be televised later this year. Dr. Willard Moran, AAO-HNS Coordinator for Socioeconomic Affairs, is the Academy representative to this project and will be a speaker on the program. This program will be made available to multiple university sites through academic medical centers and will help to better prepare our residents to enter the job market.

The hottest issue for the Practice Management Department has been the Evaluation and Management Guidelines as issued by HCFA and the American Medical Association (AMA). We have received numerous complaints from members regarding this issue. The Academy has requested that the cardiac, respiratory, neurologic, and lymphatic portions of the guidelines be deleted (except for examination of the cervical lymphatics). In addition, we have examined a number of templates and algorithms for use by our members. It is the intent of staff, in consultation with Dr. Gary Turner, AAO-HNS Coordinator for Practice Affairs, to have an instrument ready for the membership as soon as our request has been answered. Additionally, the AMA and HCFA called a meeting of the Federation for April 17, 1998, in Chicago to address the problems with these guidelines.

In addition, the Practice Management Department coordinated a successful Otolaryngology Medical Office Management Course, which was held in early November in Houston, Texas.

**Board of Governors/Membership/Society Relations:** The Physician Resources Committee, working in close collaboration with the leadership of the AAO-HNS Board of Governors, prepared and forwarded a request for proposals concerning a workforce study to be completed by the AAO-HNS within the fiscal year. The Henry Jackson Foundation was chosen to perform this study.

The ENT Outreach Program, the successful public relations program of the Academy, continues to march along, now in its fourth year. Of particular note, a rhinosinusitis initiative has been added as a focus of this campaign. The AAO-HNS is working with the American Academy of Otolaryngic Allergy and the American Rhinology Society to respond to moves in this area by the American Academy of Asthma, Allergy, and Immunology.

The Membership Department is now part of the Board of Governors/Membership/Society Relations Department. This amalgamation of closely associated areas of our organization has provided an economy of scale, along with a reinvigoration of the membership area. Several major areas of policy compilation, review, and consolidation have taken place under the direction of Dr. Frank Lucente, AAO-HNS Vice President and Chair of the Committee on Committees.

**Executive Services:** The Nominating Committee, under the direction of Dr. Charles Krause, AAO-HNS Immediate Past President, met in Orlando, Florida, in early January to name the slate of candidates for election to the Academy offices in 1998. The nominees are:

*President-Elect:*
John Campbell, M.D.
Paul Wills, M.D.

*Vice President:*
Michael Benninger, M.D.
Lee Eisenberg, M.D.

*Board of Directors:*
Charles Koopman, Jr., M.D.
James Suen, M.D.
Regan Thomas, M.D.
Richard Trevino, M.D.

*Coordinator for Socioeconomic Affairs:*
Willard Moran, M.D. (incumbent)

*Audit Committee:*
Charles Gross, M.D.
Arthur Hengerer, M.D.

*Nominating Committee:*
Morton Boyette, M.D.
Karen Calhoun, M.D.
Darrell Hunsaker, M.D.
Fred Owens, M.D.
Fred Stucker, M.D.
Neil Ward, M.D.

**International Outreach:** International outreach continues to progress under the leadership of Dr. Eugene Myers, AAO-HNS Coordinator for International Affairs. The Spanish Society of Otolaryngology–Head and Neck Surgery has become the first Corresponding Society of the AAO-HNS; the national societies of several more countries are expected to follow in the near future. In addition, an Academy exhibit and staff person were sent to national otolaryngology meetings in France, Spain, Chile, and Argentina in October and November 1997.

**AAO-HNSF (FOUNDATION)**

**Research:** The Research Department has focused on a number of projects simultaneously. The NIDCD Otolaryngology Clinical Trials Cooperative Group (OCTCG) has been in operation for a year. This university-based, multi-institutional cooperative alliance received a $7.2 million grant from the NIH in early 1997. After the challenge of starting a new venture, the integration of multiple clinical sites, and the use of potentially life-threatening medications in the treatment of autoimmune ear disease, the initial trial, "Autoimmune Inner Ear Disease," under the direction of Dr. Jeffrey Harris, is ready for the accrual of patients. A number of marketing pieces in the AAO-HNS *Bulletin* and elsewhere will provide members with the information necessary to enroll patients in this trial.

A second trial, "Diuretics in Meniere's Disease," is being developed. Dr. George Gates will direct this effort. In addition, Dr. James Battey, the newly appointed Director of the NIDCD, met with the OCTCG Executive Policy Board for over one hour and delivered a most enlightening, informative, and positive appraisal of the Institute and his plans for future initiatives.

The Covance COGENT Outcomes Initiative has progressed nicely since its initial demonstration at the September 1997 Annual Meeting. Dr. Edwin Monsell, AAO-HNSF Coordinator for Research, is leading the effort to assemble an office-based outcomes tool that can be used by the individual member. This program will be ready for a formal launch later this year. Several options regarding the length of the outcome questionnaire, the platform (computer, paper forms, scannable forms, personal digital assistants) and the cost/financing of the final project are currently under discussion. We have spoken with several corporations concerning funding the initial 275 member sites that have expressed an interest in being involved in this initiative.

Fifty Foundation grant applications were received at headquarters in response to the call for applications published in the November 1997 AAO-HNS *Bulletin*. This year, $135,000 has been budgeted to provide seed money for the successful applicants. More money will be available next year for head and neck research, as the AAO-HNSF accepted an offer from the American Society for Head and Neck Surgery to match $45,000 in research funds.

In addition, work has progressed with the Agency for Health Care Policy and Research on a joint evidence-based report on sinusitis.

**Continuing Education:** The Renewal of Certification Study guide will be available shortly. Over 200 members have placed prepublication orders! Dr. Jack Gluckman piloted this project flawlessly to an on-time and on-budget product launch. Other new projects being prepared by the Continuing Education Advisory Committee (CEAC), chaired by Dr. Jonas Johnson, AAO-HNSF Coordinator for Continuing Education, include "Otolaryngology for the Primary Care Physician." Additional new products from the CEAC include our first color monograph entitled *Microvascular Free Flaps in Head and Neck Reconstruction*, an expansion of the Slide Lecture series, two new CD-ROMs, and the planned production of a sequel video, "Endoscopic Sinus Surgery—Management of Complications." Product sales have remained strong due to the number of new products and the efforts of our marketing program.

**Development:** The Development Department, with Dr. Frank Lucente, Chair of the Development Committee, has worked diligently to establish the framework for a successful fund raising effort. A three-pronged approach has been outlined. The first will be an All-Member Campaign. The funds generated from such an effort will be used to enhance further the Foundation's mission in research, publication, continuing education, international outreach, and the preservation of our historical heritage. The second prong of the development effort will be directed to Corporate Affiliates dealing in otolaryngology. We have traditionally enjoyed support from corporate otolaryngology for our activities at the annual meeting, research, and the museum. Finally, our Planned Giving Program will be reinvigorated and made more active.

**History and the Archives:** Plans are being made to create a "virtual museum," to be placed on our web site, to bring our museum, the John Q. Adams Center, to the membership. A process has been outlined whereby the inventory of the museum can similarly be catalogued on the Internet for use by researchers within and outside of otolaryngology. In addition, the Foundation and the John Q. Adams Center were honored by being featured in an exhibit, "Senses and Sensitivity: Neuronal Alliances for Sight and Sound," sponsored by the Howard Hughes Medical Institute Holiday Lectures on Science.

**Meetings:** The 101st Annual Meeting, held September 7–10, 1997, in San Francisco, California was extremely successful, both in attendance levels and in the view of meeting participants, who completed scientific session evaluation forms. The total attendance of 8,702 is the largest attendance in our history. We are proud that of respondents to the scientific sessions evaluation, 85% rated the overall educational quality of the scientific sessions as excellent or outstanding.

Preparations for the 102nd Annual Meeting, to be held September 13–16, 1998, in San Antonio, Texas, are proceeding well. Information on the meeting was available one month earlier than in the past, with the publication of the April 1998 *Bulletin*, also known as the Annual Meeting "One Book." The earlier publication was possible thanks to herculean efforts made by the AAO-HNSF staff, Dr. Robert Maisel, AAO-HNSF Coordinator for Instruction Courses, and Dr. William Davis, AAO-HNSF Coordinator for Program.

Guest speakers for the 1998 Annual Meeting include the Reverend Robert Schuller, M.D., who will deliver the John Conley Lecture on Medical Ethics, and NIDCD Director, James Battey, M.D., Ph.D., who will deliver the Neel Research Lecture.

**Communications:** In addition to publishing the monthly *Bulletin,* which increasingly is being looked to for authoritative information and fact sheets regarding otolaryngology–head and neck surgery, the Communications Department coordinates marketing and media relations within the AAO-HNS/F. Our impact in both of these areas continues to grow, thanks to the efforts of this department. A new catalogue was mailed in December 1997 to all members and to select otolaryngologists internationally. This publication has increasingly been a primary vehicle for stimulating sales of continuing education products and other services offered by the AAO-HNS/F.

The Foundation's scientific journal, *Otolaryngology–Head and Neck Surgery,* is under the direction of Dr. Richard Holt, Editor. With the move of annual meeting instruction course abstracts from the May *Journal* to the May *Bulletin,* eleven issues of the journal annually are now devoted to science. (The annual meeting scientific abstracts remain in the August journal.) The *Journal* continues to become more international in its scope: Dr. Eugene Myers has been appointed International Editor; 561 manuscripts from 45 separate countries were processed in 1997; and of the total paid subscriptions of 11,908, almost 20% go outside the United States.

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

## REPORT OF THE AMERICAN COLLEGE OF SURGEONS

I have been your representative to the American College of Surgeons for the past seven years. There are a number of new things with the College. We are going to have a scientific journal (one journal issue will rotate among specialties), and in the year 2000 one issue will be devoted to otolaryngology. We are thinking about the topic "the carcinogenesis of active and passive smoking in all its forms" for the issue, but that has not been fully decided.

Our new President of the Advisory Board is Dr. Paul Levine of the University of Virginia.

Regarding media relations (for the American College of Surgeons), anything that has to do with our specialty will be referred to the Academy's Media Relations Department, so we will speak with one voice instead of many.

Currently, the College is interested in setting up clinical trials for cancer. It appears that this will be done under the aegis of one group—most likely an NIH group—instead of the multiple groups that exist now.

Almost all of our energy, time, and effort last year, and again this year, is being devoted to the evaluation and management (E & M) coding mess that we have had to deal with. We were somewhat successful in delaying the implementation of these codes, and we will continue to work extremely hard. This effort, again, occupies about 90% of our time.

Tort reform for many of you is an oxymoron. For me it was an oxymoron for a long time, but we did make some progress in Illinois. We are following the example of the Texas local group in this matter. In Illinois we focused on Appellate Court judges. We were able to elect two Appellate Court judges in the last election (one of our electees was the number one defense attorney for our State Malpractice Group). The Appellate Court judges are important to us because they will be, eventually, the Supreme Court judges. In Illinois, in about two years, we will have a golden opportunity. We think the entire Supreme Court is going to be replaced, based on its ruling in an extremely unpopular decision two years ago, called the Baby Richard case. Baby Richard was a four-year-old child adopted by a lovely couple; the Supreme Court took the child away from this couple and returned him to the biological father, who left a lot to be desired in terms of his personal life and so forth. It was an extremely unpopular ruling by the Supreme Court of Illinois, and I am almost sure every one of those judges is going to be going down to defeat in the upcoming elections. So, stay tuned!

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

## REPORT OF THE AUDIT COMMITTEE

The Audit Committee, appointed by President Charles Luetje, M.D., comprised Sam Kinney, M.D., Chairman, Myles Pensak, M.D., and Steven Harner, M.D. The members of the Audit Committee met by telephone conversation, having been forwarded the records of the American Otological Society from Horst R. Konrad, M.D., by approximately April 10, 1998.

The members of the committee were supplied the entire check register plus a consolidated balance sheet of the American Otological Society. We reviewed the transactions of the society and found all of the transactions to be appropriate and that the consolidated balance sheet of the American Otological Society appeared to be in order. The committee recommends that the Council and the membership accept this report as indication that the financial status of the American Otological Society, Inc., is excellent and being maintained appropriately.

Respectfully submitted,
*Sam E. Kinney, M.D.*

## REPORT OF THE NOMINATING COMMITTEE

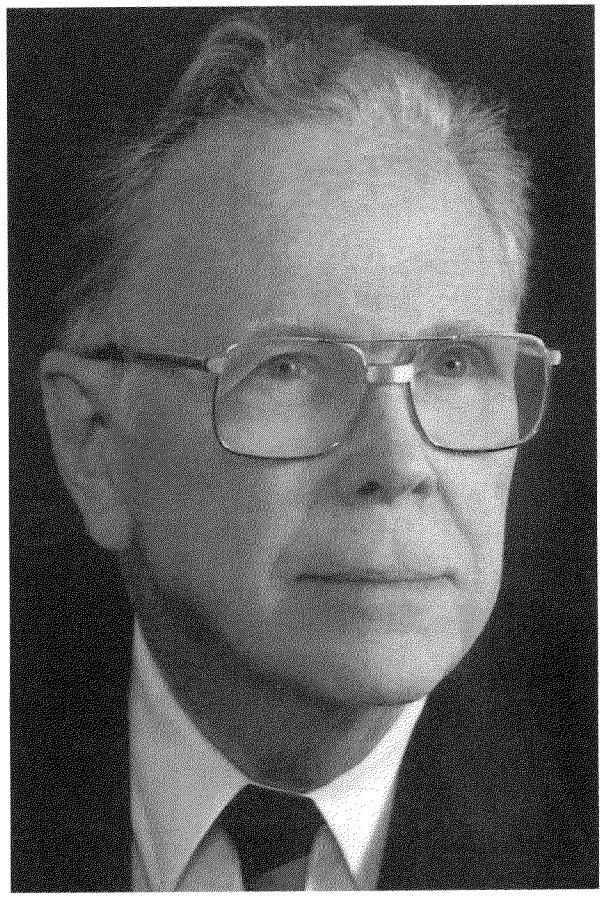
The Nominating Committee consisted of Dr. Peter Smith, Dr. Shokri Radpour, Dr. Robert A. Dobie, and Dr. Alexander Schleuning, and I served as Chairman. A majority of this group met after the meeting yesterday and would like to present the following slate of officers to the membership for consideration: for President, Dr. Gregory J. Matz; for President-Elect, Dr. C. Gary Jackson; for Secretary-Treasurer, Dr. Horst R. Konrad; and, for Editor-Librarian, Dr. A. Julianna Gulya. We also present Dr. Richard Chole to continue to serve on the Council and Dr. Sam Kinney as a new member of the Council. We nominate Drs. Jahrsdoerfer and Glasscock to the Award of Merit Committee.

Respectfully submitted,
*Herman A. Jenkins, M.D.*

The following photograph and obituary appeared in *The Houston Chronicle* and are reprinted with the permission of Muriel Cody (Mrs. Claude C. Cody). Dr. Cody was elected to the American Otological Society in 1958 and to Senior Membership in 1990.

A. Julianna Gulya, M.D., Editor

Dr. Claude Carr Cody, III died Friday, November 14, 1997 after an extended illness. Born December 10, 1915, the son of Judge Thomas Hughes Cody and Gladys Lockett Cody. He attended Rice Institute and the University of Texas where he received a B.S. Degree. He received his medical degree at the University of Texas Medical Branch in Galveston and interned at Ann Arbor, Michigan and Portland, Oregon. In 1946, Dr. Cody moved to Houston where he joined the Houston Eye, Ear, Nose & Throat Clinic, was appointed a Professor at Baylor University College of Medicine and later served as Chairman of the ENT Department. For over forty years, he practiced medicine in Houston and was recognized both nationally and internationally for his research, surgical skills, and practice in his field. He was published extensively from 1946 to 1985 regarding treatment and surgical procedures. He was a member of the Texas Society of Ophthalmology and Otolaryngology, the American Otological, Laryngological and Rhinological Society, the American Bronchoesophalogical Association, the American Academy of Otolaryngology. During this period he served as Chairman of the Ear, Nose and Throat Section at Memorial Hospital as well as the President of the Houston Otolaryngological Society, the Texas Ophthalmological and Otolaryngological Society, the Breakfast Club, the Doctor's Club, the Knife & Fork Club of Houston. With all these accomplishments, he was a caring, loving man who practiced medicine with a gentle hand and a kind heart. Dr. Cody was a member of St. Luke's United Methodist Church, the River Oaks Country Club, the Rice Associates, the Kiwanis Club, and a founding member of the Texas Children's Hospital, the Doctor's Club, the Museum of Medical Science, and Friends of the Jesse Jones Medical Library. He is survived by his loving wife and travel companion of 48 years, Muriel Furst-eneau Cody, his brother Thomas Hughes Cody, Jr., sister Anne Cody Nold, and sister-in-law Barbara Cody Greenwood. He was preceded in death by his brother Dr. Melville Lockett Cody. In addition, he leaves a son, Claude Carr Cody, IV and his wife Anne, their sons Claude Carr, V, and Braxton Turpin, and a daughter, Carol Cody Herder and her husband Charlie, their children Sarah Elizabeth and Charles Henry, III.



Claude C. Cody III, M.D.
December 10, 1915–November 14, 1997

The following obituary derives from a biography that appeared in *The Presidents Book: A Brief History of the Triological Society* and is partly reprinted with the permission of the editors, Drs. Patrick J. Doyle and Roger Boles, and the publisher, The American Laryngological, Rhinological and Otological Society, Inc. Supplemental information was graciously provided by Dr. Roger Boles. Dr. Michelson was elected to the American Otological Society in 1974 and to Senior Membership in 1991.

A. Julianna Gulya, M.D., Editor

Dr. Michelson was born in New York City and raised in the San Francisco Bay area. He received his M.D. from Stanford University and served in the U.S. Army Medical Corps in the Aleutian Islands during World War II. He studied otolaryngology at the Veteran's Hospital in San Francisco after the war as the first resident under Walter Work, M.D., his guest of honor in 1983.

In *The Presidents Book,* Dr. Michelson is quoted as saying, "My fondest recollection during my term of office was the duty of introducing new members at the Annual Meeting. To me, these fine young men and women, having demonstrated their ability by writing an acceptable thesis and other professional attributes, were the cream of the crop and the future of the Triological Society. Long live the Thesis requirement!"

Dr. Michelson's uncle was the first American to win the Nobel Prize for Physics. His nephew is also a biophysical innovator. Dr. Michelson himself pioneered the first successful cochlear implant in the U.S. and held patents for the device as well as for the procedure to implant it in humans. He later gifted both patents to the University of California.

Dr. Michelson was in private practice throughout his career and served on the faculties of both Stanford and the UCSF Schools of Medicine. He was a member of many of the most prestigious national otolaryngological societies and served as President of the Triological Society.

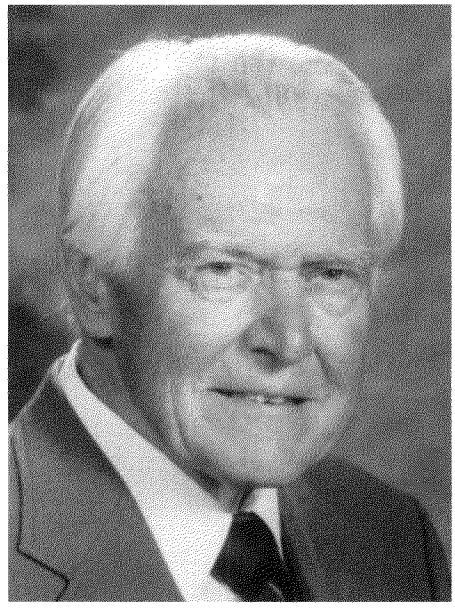
Robin P. Michelson, M.D.
December 19, 1914–June 27, 1997

Dr. Michelson is survived by his wife, Alberta, and their four children.

The following obituary appeared in the *Richmond Times-Dispatch* and is reprinted with the permission of the Executive Editor, Mr. William H. Millsaps, Jr. Mrs. Mary Moon kindly provided the photograph. Dr. Moon was elected to the American Otological Society in 1965 and to Senior Membership in 1989. Dr. Moon served as Secretary-Treasurer of the Society from 1977 to 1982 and as President of the Society in 1984.

A. Julianna Gulya, M.D., Editor

Cary Nelson Moon Jr., son of the late Cary Nelson Moon and Florence Few Moon, died Monday, May 19, 1997. He was born in Scottsville, Va. at Shirland Farm and was educated in the county schools. Dr. Moon is survived by his wife of 53 years, Mary Dear Moon and by his children, Mary M. Holladay and Douglas S. Holladay of Atlanta, Ga., Ridie M. Otey and David Otey of Williamsburg, Cary N. Moon III and Leigh G. Moon of Charlottesville, Richard D. Moon and Elizabeth Y. Moon of Mooresville, N.C., James B. Moon and Sharon M. Moon of Richmond, and Page W. Moon and Elizabeth C. Moon of Alexandria; and by ten grandchildren. Dr. Moon was a graduate of the University of Virginia College of Arts and Sciences and of the Medical School. He served as a lieutenant in the US Navy during World War II. Dr. Moon practiced medicine as an ear, nose and throat specialist in Charlottesville for over 40 years. Dr. Moon was active in many professional organizations. He served as President of the Albemarle County Medical Society, of the Virginia Society of Ophthalmology and Otolaryngology, and of the American Laryngological, Rhinological and Otolaryngological Society. He was Secretary of the American Otological Society and Vice-President and Chairman of the Southern Section of the Triological Society. Dr. Moon was a clinical professor of Otolaryngology at the University of Virginia Medical School and at one time chaired the Medical Alumni Advisory Committee. Dr. Moon served as Chairman of the Medical Staff of the Martha Jefferson Hospital and President of its Board of Trustees. Funeral services will be held Wednesday, May 21 at the Christ Church Glendower at 11 a.m. The family suggests that in lieu of flowers, friends may contribute to the Deafness Research Foundation, 55 East 34th Street, New York, N.Y. 10016 or to the Martha Jefferson Hospital Building Fund, The Development Office, Martha Jefferson Hospital, 459 Locus Avenue, Charlottesville, VA 22902. Hill and Wood Funeral Home is in charge of arrangements.



Cary N. Moon, M.D.
June 25, 1921–May 19, 1997

The following photograph and obituary appeared in the *Ear, Nose and Throat Journal* (Volume 77, Number 5 , May 1998) and are republished with the permission of the author, Dr. Richard L. Goode, and the Editor, Dr. Jack Pulec. Dr. Simmons was elected to the American Otological Society in 1973 and to Senior Membership in 1995.

A. Julianna Gulya, M.D., Editor

F. Blair Simmons, M.D., died of a heart attack on February 13, 1998, while skiing. He was 67 years old. Blair was born in Los Angeles, California, on November 13, 1930, and attended Hollywood High School. He graduated cum laude from Transylvania College in Lexington, Kentucky. He went on to attend the University of Louisville School of Medicine, receiving his M.D. in 1956. He interned at Madigan Army Hospital and then spent two years as a research associate at the Walter Reed Institute of Research, working in neurophysiology and auditory phsyiology with Robert Galambos. In 1959 he began his residency in otolaryngology at Stanford University Medical School. While a resident he was the principal investigator for an NIH research grant study of the function of the middle ear muscles. Upon completion of his residency in 1962 he remained on the Stanford faculty, becoming head of the Division of Otolaryngology in 1965. He continued in that position until 1980, and served as a professor in the Division until his death.

F. Blair Simmons, M.D.
November 13, 1930–February 13, 1998

Blair was one of the most innovative individuals this specialty has known, both in the clinic and research laboratory. In recognition of his research accomplishments the NIH selected him for a Javits award, an extremely prestigious honor given to only a few in the field of hearing science.

His work with middle ear muscle physiology is a major source of our current knowledge of middle ear muscle function. Blair is best known for his research on electrical stimulation of the auditory nerve in animals and humans; this was the primary focus of his research for most of his career. Today's cochlear implants began with the work of Blair Simmons.

In addition, Blair initiated the first electronystagmography test facility in Northern California. This resulted in many publications, including a textbook. He was active in developing the technique of electrocochleography as well as infant hearing testing, which resulted in the "Crib-o-gram," an automated neonatal hearing screening test.

During his career he also studied the problem of sudden hearing loss, making many contributions with respect to its cause and treatment, including the problem of perilymph fistulas. He also was renowned for his work in the treatment of snoring and obstructive sleep apnea, publishing several papers on uvulopalatopharyngoplasty indications and techniques.

Blair and his wife Shirley loved to travel, visit their children and grandchildren, and were active skiers and whitewater rafters. Individuals with the talent of Blair Simmons are only rarely found in our field. He was a giant, he accomplished much, and he will be missed.

The following obituary is printed with the permission of the author, Dr. Bruce W. Weissman. Unfortunately, no photograph is available. Dr. Waltner was elected to the American Otological Society in 1962 and to Senior Membership in 1981.

A. Julianna Gulya, M.D., Editor

Dr. Jules Waltner was my Professor of Otolaryngology at Columbia Presbyterian Medical Center in New York. He specialized in ear surgery and had a special interest in Ménière's disease. He did many hundreds of ultrasonic obliterations of horizontal semicircular canals via mastoidectomy. At the time (the early seventies), there was a great interest in ultrasonic ablation of the vestibular end-organ. He was a meticulous surgeon who had a keen mind for investigating problems that he encountered during his practice. He had patience working with the residents. Personally, he would allow me to open the mastoid and make a blue line on the horizontal semicircular canal, but only after hours of mastoidectomies. He allowed me to progress slowly through the procedure until he felt I was proficient.

Dr. Waltner encouraged residents to take part in research and made his laboratory available for us. With his help and encouragement, many of the residents wrote their first published journal articles (myself included).

In addition, he was a wine connoisseur. He had a home in the Adirondack Mountains with a wine cellar. It was a yearly event to visit with him, sit on the porch overlooking the mountains, and enjoy wine, good food, and good company.

Dr. Waltner was from the old school. He believed in honesty with his patients and with his research, and expected the same from the physicians and residents with whom he worked. He was a man greatly respected and honored.

# NEW MEMBERS 1998

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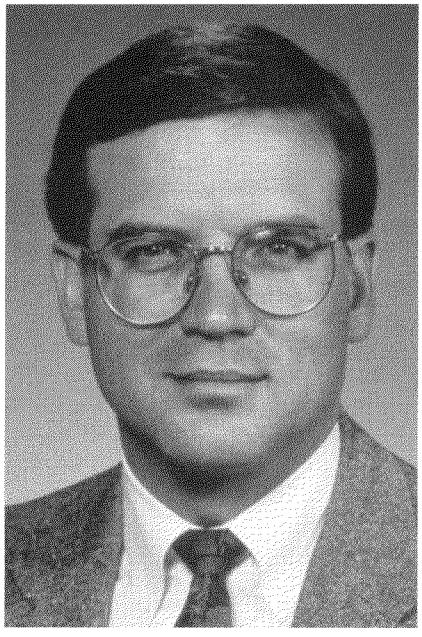

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