

1994

TRANSACTIONS
AMERICAN OTOLOGICAL SOCIETY, INC.

1994

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≈

ONE HUNDRED TWENTY-SEVENTH ANNUAL MEETING

THE BREAKERS HOTEL
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MAY 7 AND 8, 1994

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- Row 2: Joseph Nado Jr., Julian Nedzelski, Bruce Ganitz, Jay Fariior III, Rinaldo Canalis, Stephen Harner, Isamu Sando, Donald Kamerer, Larry Duckert, Richard Ruggles, Francis Catlin, Cecil Hart, Jack Pulec, Raul Hinojosa, Vijay Dayal, John Dickens, Jack Wazen, Herbert Silverstein, Ruediger Thalmann, Marcos Goycoolea
- Row 3: Simon Parisier, Pedro Albernaz, George Facer, James Parkin, James Snow, Aristides Sismanis, Cary Moon Jr., John House, Vincente Honrubia, Robert Sataloff, Shokri Radpour, Robert Goldenberg, William Lippy, James Pappas, Robert Jackler, C. Gary Jackson, Carol Jackson, Arnold Schuring, Brown Fariior
- Row 4: Derald Brackmann, Charles Lueije, Salvatore Iurato, Dennis Pappas, William House, Newton Coker, Anthony Maniglia, John Fredrickson, Paul Ward, Sam Kinney, Richard Wiet, Arvind Kumar, Patrick Brookhouser, Warren Adkins, John Emmett, Gale Gardner Jr., George Singleton, William Saunders

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INTRODUCTION OF AWARD OF MERIT RECIPIENT FRED H. LINTHICUM JR.

Michael E. Glasscock III, M.D.

It is with great pleasure that I present the 1994 American Otological Society Award of Merit, which is the highest compliment that the American Otological Society can bestow on one of its own. As you know, we try to present something of the life of our honoree in picture form, and here we have him being held as an infant by his father who was an otolaryngologist in Southern California.

The next slide shows the honoree at about 18 months, in a dress, looking out of the window with visions of the future.

At age two, he seems to have that self-assured attitude that has carried him so far in his outstanding career.

Then, we see him in 1927 at age 6, happy, confident, and relaxed sitting on a wagon pulled by a goat.

This high school picture shows him as a very attractive Southern Californian young man.

And here he is, on his wedding day making a lifetime commitment to a very beautiful lady who has shared his life for many, many years. An interesting side note is that our honoree had a little mishap on his motorcycle on his way to the beach the day after graduation from medical school. Since it was his right hand, he couldn't write his histories and physicals and asked a pretty young nurse, who later became his wife, to do that for him.

Then, we see a picture of our honoree marching in the Spring Festival in Zurich, Switzerland, where he was spending time on a 6-month exchange during his residency. It was in Professor Rudy's laboratory that our honoree first was introduced to temporal bone histopathology.

Then, we see him in 1952 after he had gone into practice with his father, who very soon after had a stroke. Thus, our honoree ended up being a solo practitioner in Los Angeles, until he was asked by Howard House to join the original Otologic Medical Group.

You all know by now that we are talking about Fred Linthicum, who has distinguished himself as a pediatric otologist and as a temporal bone histologist for the last 40 years.

Here, we see Fred and Jean Linthicum with their young family;

Fred and Jean on a fishing trip in Northern California;



Fred H. Linthicum Jr., M.D.

Fred in his beloved temporal bone lab.

This is Fred in fishing gear—his two great passions being histopathology of the temporal bone and fishing.

Here we see Fred and Jean together, the way I always think of them, side by side.

Fred's many accomplishments are too numerous to mention. He is currently Director of Otologic Research at the House Ear Institute.

He has been Guest of Honor of numerous societies and has been a member of the Collegium since 1975.

He has published in excess of 150 scientific papers on all aspects of otology and histopathology of the temporal bone.

It is with great pleasure that I present this award to Fred Linthicum—an outstanding physician, surgeon, and researcher.

RESPONSE OF AWARD OF MERIT RECIPIENT

Fred H. Linthicum Jr., M.D.

I sincerely thank the Society for this honor.

AWARD OF MERIT RECIPIENTS 1949–1994

- | | |
|--------------------------------------------------------|----------------------------------|
| 1949 George M. Coates, M.D. | 1975 Catherine A. Smith, Ph.D. |
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| 1968 Sir Terence Cawthorne | 1989 Eugene L. Derlacki, M.D. |
| 1969 Gordon D. Hoople, M.D. | 1990 William F. House, M.D. |
| 1970 John R. Lindsay, M.D. | 1991 Michael E. Glasscock III, M.D. |
| 1971 E. Glen Wever, Ph.D. | 1992 William E. Hitselberger, M.D. |
| 1972 Frank D. Lathrop, M.D. | 1993 D. Thane R. Cody, M.D., Ph.D. |
| 1973 Moses H. Lurie, M.D. | 1994 Cesar Fernandez, M.D. |
| 1974 Harry Rosenwasser, M.D. | |

SCIENTIFIC SESSIONS

1994 PRESIDENTIAL ADDRESS

REVIEW OF THE FORMATIVE YEARS— A GUIDE FOR THE FUTURE

Robert I. Kohut, M.D.

Welcome to the 127th meeting of the American Otological Society. Thank you for the privilege of being your President. I want to give thanks to the council, the program advisory committee, and special thanks to our Secretary-Treasurer, Dr. Matz. With the guiding support of his wife, Judy, who has had the responsibilities of the Secretary's Secretary; helping her, Linda Hedberg; and still at the helm, Ruth Parks, Greg has done a wonderful job making my life easy.

I propose to give a short review of the first 27 formative years of our Society with hopes that it will allow us to gain a prospective of and a guide for our current status and activities. The world was in an interesting period of change. I believe you will find similarities between these formative years and our current situations, socially, governmentally, and scientifically.

Claude Bernard clearly determined that scientific biologic questions could be answered through experiments. His thesis was that the body resists alterations of homeostasis.

William Sharpey had identified the cilia of the mucous membrane and their function. Ivan Pavlov's work continued. Frederick Wöhler had synthesized urea—the beginning of organic chemistry. The work of Rudolph Virchow established the field of histopathology. Interestingly, Virchow made little of the role of microorganisms. This disagreement, as we still have disagreements, was troubling for Semmelweis. In 1861 Prosper Ménière published his seminal paper.

Politically and economically the world was active. In 1846 Sir Robert Peel repealed England's protective corn laws, which had adversely affected Ireland during the potato famine of 1845. The Cobden treaty of 1860, with France, established trade reciprocity with England. In 1867 Gladstone established free trade by the removal of protective duties. These efforts remind us of today's tariff discussions with Japan and the European market activities.

Classic style was replaced by Romanticism. Remember Victor Hugo; his *Les Misérables* is with us today on Broadway and in London.

Certainly the world's activities of today reflect Benjamin Disraeli's activities of 1867. As leader of the conservative party, he saw to the passage of the second great reform bill. This gave the vote to all house holders and substantive lodgers. Two years prior to this only one in five had a vote.

The next year, in 1868, only a few years after the War between the States, society was in reconstructive



disarray. At Newport, Rhode Island, in July, a group of nine members of the American Ophthalmological Society met to form the world's first medical society that focused its purposes to otology. This whole concept was new. Only 4 years previously the American Ophthalmological Society patronizingly considered for the first time the inclusion of discussions of "aural" subjects.

By the end of this initial meeting, the American Otological Society (AOS) was formed. To the initial nine gentlemen were added 12 others, for a total membership of 21. Of these original 21 members, who all practiced ophthalmology, there was one who also practiced general surgery. What a time it was for these gentlemen and their colleagues. Lister's experiments regarding sterilized ligatures were but 1 year old.

The Constitution and Bylaws of the AOS offered no limitations as to sex, color, or creed. They had a jump of about a century on the Supreme Court of the United States.

The Society formed a committee called the "Progress in Otology Committee," who's responsibility it was to review the world's literature annually and prepare a report. This report on the "Progress of Otology" was read to the Society at each annual

meeting. These reports were also recorded in the *Transactions of the American Otological Society*, which has existed since the first annual meeting. The reports grew in length, from 24 pages to 55 pages, to 74 pages in three parts, and so on. With this growth rate it is not surprising that at the twelfth meeting the Society decided to dispense with such reports. Had such an action not taken place you might today have been subjected to a reading from several hundred pages.

As we do today, these originators of our Society sometimes faced confusion concerning the location of their annual meetings. One set of facts leads me to believe that either we are like them or they were like us. At the conclusion of the eighth meeting (seventh annual meeting) in 1875 it was resolved that the next meeting, the ninth meeting, should not be held in the East but should be held at Put-in-Bay, Ohio. This pleased everyone because there had been the impression that those members from the East had been favored, and the Western states felt themselves somewhat neglected. Now the humorous confusion: the ninth meeting in 1876 resolved to be at Put-in-Bay, Ohio, was held in Chickering Hall, New York City.

During the eleventh meeting in 1878 there was a discussion of auditory nerve vertigo including the proposals by Golz, Mach, and Brewer that this was attributable to variations in the pressure of endolymph. It is interesting to note that these discussions antedated by 60 years the histologic descriptions of endolymphatic hydrops by Yamakawa, in Japan, and Hallpike and Cairns, in Great Britain. Also discussed were the possible applicability of the "electric telephone ... for measuring hearing power" and the use of dental drills for mastoid surgery.

We've done wonderful things with new approaches since then, but we're still, in effect, using dental drills, notwithstanding current activities with laser. I notice also that we are still devising ways to measure "hearing power" and remain faithful to our task to understand the dynamics of endolymphatic hydrops.

One hundred and thirteen years ago at the fourteenth meeting, among the subjects was one type of sudden deafness and the use of words of logographic value for testing. It appears that these good members identified some of today's goals, as recently defined by the National Institute on Deafness and Other Communication Disorders; again very prophetic.

At the sixteenth meeting, there were those who spoke against mastoid operations and others did not. It was agreed that these operations should only follow leeching and "Wilde's incision," which was post-auricular, enhancing leech activity. It was indicated that this last-resort measure, mastoid surgery, allowed 70 percent to heal, and no more than 10% died. Therefore, it was concluded that the operation "was not dangerous" and that arms and hands should not be "thrown up against it."

As I recall current events, the thread of ultraconservative measures for which some spoke at the sixteenth meeting still appear to weave their way into

otology—witness the recent *JAMA* article regarding the inadvisability of tympanostomy tubes in children.

At the nineteenth meeting, the forerunners of fibrin glue and fistula testing were described respectively by Drs. Prout and Theobald in their presentations of an adhesive plaster for tympanic membrane perforations and an apparatus for rarefying and condensing air in the external meatus. It has been 108 years, and the glue is finally catching on; however, fistula testing does not yet seem routine.

Ninety-eight years ago Dr. Blake had hurt his right hand and Dr. F.L. Jack took over the greater part of the operative work. This provided a large number of cases. He reported the feasibility of stapedectomy with improvement in hearing in a larger number of cases than had been elsewhere recorded.

The next year there were discussions on "pathological specimens," "... middle ear operations," and further, "surgical treatment of so-called Meniere's disease (aural vertigo)."

On May 24, 1894, a few days short of 100 years ago, "surgical relief of Meniere's disease ..." and "mastoid operations with complications" were discussed. It was also the sense of the Society that "at each institution for the deaf there should be a competent aurist who should evaluate the condition of the ears ..."

With these thoughts in mind, I believe if you peruse this year's program that you will find some familiar topics.

My purposes of this review were certainly not to belittle the strides that otology has made in the past 100 years since the twenty-eighth meeting. On the contrary, there have been great leaps forward, which continue as we further our understanding at an increasing rate. You are aware of them. On the other hand, it appeared worthwhile to applaud and hold noble the efforts by our Society's members of the past. We should recognize that they initiated and supported focused research in otology, which, among other things, later led to the development of the Research Fund of the American Otological Society. They searched, they reported, and they researched.

This history and progress of otology through more than a century and a quarter is not unbiasedly reported in the peer-reviewed journals. It is within the *Transactions of the American Otological Society* that free debate and new ideas concerning otology have been recorded. I recommend it for your reading.

To our new members, welcome. You have just received a copy of the *History of the American Otological Society*. You will find that it contains accounts that are truly amazing. Those members that preceded us did so much with so little.

Let not any confusion caused by social or governmental activities dim the path to or blur the goals for new information. These goals and paths were established by our predecessors, and it is from them that we benefit. They represent over a century and a quarter of effort.

PRESENTATION OF GUEST OF HONOR CESAR FERNANDEZ, M.D.

Robert I. Kohut, M.D.

It is a pleasure for me to introduce Dr. Cesar Fernandez, the American Otological Society's Guest of Honor for 1994.

You all know Dr. Fernandez for his distinguished research concerning the auditory and vestibular system. I'm sure you will find interesting the development of his career and his devotion to teaching.

Dr. Fernandez began his career as a practicing otolaryngologist. He practiced the broad field of otolaryngology and was known for his expertise, among other things, as a bronchoesophagologist. According to his colleague and friend, Dr. R. Santiago Riesco-MacClure, he had one of the most prominent practices in Santiago, Chile. He and Dr. Riesco-MacClure joined in their activities as neurotologists at the Neurological Institute, Santiago, Chile. They were scientific in their clinical approaches, having found that the clinical dogmas in the literature were at times incorrect and misleading. They based their neurotologic activities on physiologic principles and clinicopathologic correlations. This was probably the beginning of Dr. Fernandez's devotion to sensory neurophysiology and neuroanatomy.

In 1948, after 12 years of practice, Dr. Fernandez was awarded a Fellowship in the Physiology of Hearing, with Dr. Hallowell Davis, at the Central Institute for the Deaf. He studied with Dr. Davis for 4 years, followed by 2 years of Research in Otolaryngology at the Institute of Cardiology, Mexico City, Mexico. (Otolaryngology laboratories were located within the Institute of Cardiology.)

In 1952, he joined Dr. John Lindsay at the University of Chicago as a Research Associate and was appointed Assistant Professor 2 years later. Four years later he was promoted to Associate Professor. Within a few years he was Professor of Physiology and Surgery. He continues as Professor Emeritus since 1975.

During this time at the University of Chicago he has been a most dedicated and enthusiastic teacher of Otologic Research. He had the capability, because of his background, to weave into the ongoing experiments clinical relevance. He was a task master. The aseptic technique he developed was without fault. He taught students personally how to perform surgery and to prepare materials, such as stimulating and recording electrodes, and with this instruction, he expected perfection in subsequent performance. Even the experiment records had to be dated with different colored pencils: blue for pre-op; red for

post-op. (Dr. Fernandez forgive me if my recollection has this backwards.)

The surgery and surgical techniques that were necessary for these experiments many times were far more demanding than those required for human surgery. His teaching thereby extended to the hospital operating room. The rigorous physiologic evaluation techniques required by the experiments enhanced his students' future clinical activities.

Many have studied and worked with Dr. Fernandez, some are members of the American Otological Society. Let me mention a few who I suspect are in attendance at this meeting: Ugo Fisch, Vincente Honrubia, Leonard Proctor, Paul Ward, John Fredrickson, Raul Hinojosa, Steve Highstein, G. Baird, Robert Butler, and of course his current and long-time colleague Jay Goldberg. Those with whom he collaborated and those he taught are now teachers, so his influence goes on for generations.

Dr. Fernandez is devoted to music, never missing the Chicago Symphony. He is knowledgeable of good art, a regular visitor to the Chicago Art Institute, among others. Neither did he lead a dull young life. Once when discussing the sport of fishing with him, he mentioned that he too had gone fishing in his younger years. When asked what kind of fish were caught, he answered, "With a good boat, guitar, good wine, and señoritas, who needs fish!"

On his curriculum vitae are listed but three societies: The Barany Society, The Collegium Oto-Rhino-Laryngologia Amicitiae Sacrum, and the American Otological Society. We are honored that he is our member. In 1978, the King of Sweden bestowed on Dr. Fernandez the gold medal of the Barany Society on behalf of the Society for his outstanding scientific contributions to the understanding of the vestibular system. Today, we have the privilege of having him as the Guest of Honor of the American Otological Society, out of admiration for his work and gratitude for his teaching and his friendship. His devotion to research is unsurpassed.

His enthusiasm, teaching, and hard work still abound. As I consider this, I believe it is true that although 83 chronologically, he is 65 physically, and 26 mentally.

Dr. Fernandez, I have the privilege to introduce you as the Guest of Honor of the American Otological Society.

REMARKS OF THE GUEST OF HONOR

THE NEED FOR RESEARCH IN OTOLOGY

Cesar Fernandez, M.D.

Thank you sincerely for the privilege of being singled out as your Guest of Honor. I would like to make only a few remarks about the need for research in otology.

When we look at the evolution of the specialty in the past 60 years, it becomes clear that otology developed a solid scientific foundation that was provided by researchers in the clinical, applied, and basic sciences. The auditory and vestibular systems are a subject for research that attracts investigators from many fields. The most illuminating example is Békèsy, a physicist who, in the process of improving the quality of the telephone in the 1920s, found that the ear was much more interesting to him than the telephone. He dedicated the rest of his life to studying the biophysics of sound transmission from air to the sensory hair cells in Corti's organ. His contributions on the dynamics of the inner ear are outstanding, and so is his rigorous application of the scientific method.

The contributions of many investigators have led to substantial knowledge about the basic sciences related to neuroanatomy, physiology, behavior, molecular biology, and other aspects of the auditory and vestibular systems. Similarly, applied and clinical research carried out by many clinical investigators has provided magnificent improvement in the diagnosis and treatment of auditory and vestibular disorders as we know it today.

Yet, in spite of all this progress, as Stacy Guild would say, we still do not know how we hear. We can add that neither do we know how we maintain equilibrium. And, for that matter, we don't know the nature of the mechanisms underlying auditory and/or vestibular disturbances. Here is just an example to illustrate this remark. One of the first experimental studies on the function of the semicircular canals was done by Flourens in 1824, by ablation of the labyrinth. He put forward the view, on that occasion, that, in order to understand the function of an organ such as the vestibular system, the obvious procedure is first to ablate it and then to observe the consequences. Today, 170 years later, we are still ablating the organ and studying the consequences from many angles with the most sophisticated technology; and yet we do not know the nature of the mechanisms underlying the dizziness and dysequilibrium associated with the ablation; neither do we know how we recover, in due time, from these disorders. This vestibular compensation is, however, a valuable observation of practical importance, because it is the basis for practicing labyrinthectomy or



vestibular nerve section in patients for whom this is indicated.

In spite of the gaps in our knowledge, we recognize with admiration the outstanding accomplishments of otologic research, and we must continue to encourage and promote it, as stated in the Bylaws of this Society, because so much needs to be done.

In this regard I would like briefly to comment on the current population of researchers and the cost of research. We hope that the vital support of basic research from government agencies will be continued and properly supported in the future. This is essential for otology. The number of investigators in clinical and applied otologic research is restricted because of limited training and/or funding. It is a promising sign that increasing numbers of M.D.-Ph.D. applicants enter residencies in otolaryngology and that there are programs that supplement the resident with one or more years of training in research. These policies may increase the present population of otologists who are trained to approach research in the specialty scientifically. The question, however, is whether the research of these investigators can be funded properly.

It is well known that the search for knowledge in the past 10 years or so has become tremendously expensive, whereas the necessary resources are growing at a slow rate; indeed, at the present time, we may say that they are stagnant. And the future does not look too bright. The support for clinical and applied studies by otologists is limited to small funds from their own departments and from foundations such as that of our Society and the Deafness Research Foundation. Perhaps, with some imagination and flexibil-

ity, the Society and others may improve the current state of funding for the new generation of research otologists.

In summary, I want to repeat what has been said in this Society a number of times. We need, in addition to basic research, more research in all aspects of otology, more training of clinical researchers, and more funding of the search for answers to otological problems.

Thank you again for honoring me.

PRESIDENTIAL CITATION JAMES B. SNOW JR., M.D.

Robert I. Kohut, M.D.

It is a privilege to have with us Dr. James B. Snow Jr., an American Otological Society Presidential Citation recipient on the occasion of the Society's 127th meeting. Throughout Dr. Snow's distinguished career, he has had many titles, some more than once: Son, Student, Husband, Father, Doctor, Captain, Professor and Head, Professor and Chairman, Principle Investigator, Author, Regent Award Recipient, Consulting Professor, Honorary Fellow, Golden Award Recipient, Member of the Society of Scholars, Distinguished Achievement Award Recipient, Editor, Scientific Council Member, Regent, Board of Direc-

tors, Society Member, and Society President.

Today we recognize Dr. Snow's outstanding contributions to otology and its sister disciplines as the first and current Director of the National Institute on Deafness and Other Communication Disorders. His abilities and the depth of his experience gained by his previous responsibilities allowed the Directorship to be filled by one of the most eminent persons in medicine today.

I present to Dr. James B. Snow Jr., on behalf of the American Otological Society, his Presidential Citation.

PRESIDENTIAL CITATION C. GARY JACKSON, M.D.

Robert I. Kohut, M.D.

It is my privilege as President of The American Otological Society and with the concurrence of the Council, to present to Dr. C. Gary Jackson, a Presidential Citation from the American Otological Society on the occasion of its 127th meeting.

Dr. Jackson is a devoted family man and father, an astute physician, an expert, innovative surgeon, and author. His clinical and surgical abilities are recognized worldwide.

Today we cite his excellence as an editor. For more than a decade Dr. Jackson has been the Editor-in-Chief of *The American Journal of Otology*. His lexi-

graphic ability serves him well in his responsibilities. His forthrightness and fairness are exemplary and documentable. Witness the fact that as editor he distributes for review manuscripts from which all author identification has been removed. This is a practice that others may wish to emulate.

As a colleague and friend, he is always ready to compliment yet not hesitant when criticism is appropriate. He never wavers from his principles.

I present to Dr. C. Gary Jackson, on behalf of the American Otological Society, his Presidential Citation.

CHRONIC EAR DISEASE

SAFETY OF SILVER OXIDE-IMPREGNATED SILASTIC TYMPANOSTOMY TUBES

Richard A. Chole, M.D., Ph.D., Robert E. Brummett, Ph.D.,†
and Steven P. Tinling, M.A.**

ABSTRACT

Otorrhea occurs after the insertion of tympanostomy tubes in as many as 50% of ears. Although topical antibiotic solutions minimize otorrhea in the immediate postoperative period, recurrent otorrhea is sometimes a clinical problem. The antimicrobial effects of silver oxide when impregnated into a tympanostomy tube may decrease the incidence of recurrent otorrhea. This study demonstrates that silver oxide-impregnated silicone elastomer is well tolerated within the middle ear of gerbils when implanted for 1 year, and the tissue reaction is no more than silicon elastomer without silver oxide. When applied directly to the round window of guinea pigs, there was no evidence of ototoxicity of silver oxide as measured by electrocochleography (N-1 thresholds) and cytochleography (hair cell counts). These animal studies indicate that silver oxide-impregnated silicone elastomeric tympanostomy tubes may be used safely in clinical trials to determine efficacy.

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TYMPANIC MEMBRANE PERFORATIONS IN CHILDREN WITH SHORT-TERM AND LONG-TERM VENTILATING TUBE PLACEMENT

*Richard M. Bass, M.D., F.A.C.S.,**
and Kathleen M. Faloon, M.S.

ABSTRACT

Short-term and long-term ventilation tubes for the treatment of refractory serous otitis media have been used since the mid 1950s. This retrospective study examines the complication of permanent perforations following short-term and long-term tube placement. Subjects included 103 children (192 ears) with no previous history of middle ear surgery. This study revealed a 19% perforation rate in children with T-tube placement (Goode style), whereas no perforations were found in those receiving short-term tubes only. These findings suggest that short-term tube placement is preferential for first time use in treatment of middle ear effusion, and that long-term tube placement should be reserved for refractory cases in which multiple short-term tubes have become necessary.

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MIDDLE EAR MECHANICS OF TYPE IV AND TYPE V TYMPANOPLASTY: I. MODEL ANALYSIS AND PREDICTIONS

John J. Rosowski, Ph.D.,†‡ Saumil N. Merchant, M.D.,*†
and Michael E. Ravicz, M.S.*‡*

ABSTRACT

An analysis of type IV and type V tympanoplasty procedures was performed using a quantitative model of the acoustic and mechanical properties of the stapes, cochlea, round window shield, and cavum minor air space. Realistic values for the impedance of these structures were determined from anatomic and functional measurements in normal ears. These model values lead to predicted type IV hearing results that match well with the best surgical results over a broad frequency range (125–4000 Hz). A parametric study of alterations in the model impedances reveals that a good hearing result depends on a mobile stapes, proper aeration of the cavum minor air space, and a sufficiently stiff graft shield. Intersubject variations in the cochlear impedance also can have a significant effect on the postsurgical hearing response.

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MIDDLE EAR MECHANICS OF TYPE IV AND TYPE V TYMPANOPLASTY: II. CLINICAL ANALYSIS AND SURGICAL IMPLICATIONS

Saumil N. Merchant, M.D.,† John J. Rosowski, Ph.D.,*†
and Michael E. Ravicz, M.S.*†*

ABSTRACT

Type IV and type V tympanoplasty operations are simple, robust, and well-established techniques to reconstruct middle ears that have been severely altered by chronic otitis media. In a previous paper, the authors developed a simple four-block physiologic model to describe hearing results after these procedures. This paper presents a comparison of model predictions to hearing results obtained from a detailed retrospective clinical review of 30 type IV and type V procedures. Audiograms predicted by the model and those observed clinically show good agreement over a wide frequency range (500–4000 Hz) and for many different clinical conditions. Thus, this model reliably predicts postsurgical hearing results. The application of quantitative analyses provided by this model permits the formation of a few simple surgical rules that may improve postoperative hearing results. (1) The footplate should be left as mobile as possible (e.g., by covering it with a very thin split-thickness skin graft, as opposed to a fascia graft, which will tend to stiffen it). If the footplate is ankylosed, it should be removed and replaced with a compliant tissue graft, such as fat. (2) The round window acoustic graft shield should be made as stiff as possible. If the shield material used is temporalis fascia, then one should consider using more than one layer, or reinforcing it with cartilage. (3) An attempt should be made to create an aerated cavum minor containing at least 0.03 cc of air.

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COMPOSITE AUTOGRAFT "SHIELD" RECONSTRUCTION OF REMNANT TYMPANIC MEMBRANES

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

ABSTRACT

The authors present their combined experience with large cartilage-perichondrial composite grafts used to reconstruct total tympanic membrane perforations in 294 ears. Patients chosen for this procedure had failed earlier tympanoplasty surgery or were identified as poor candidates for conventional fascial tympanoplasty because of the perforation size. Successful perforation closure was achieved in 97% of ears with chronic otitis media characterized by absence of the tympanic membrane, including portions of the anterior annular ligament. Hearing results in general were good, considering the advanced stage of the disease, which required the use of alloplastic ossicular prostheses (PORP and TORP) in 76% of ears. Hearing improvement was maximal at 2000 Hz regardless of the method of ossicular reconstruction. Closure of the air-bone gap at this frequency to within 10 dB was achieved in 87% of type I tympanoplasties, 73% of type III (PORP), and 70% of type III (TORP) tympanoplasties. Although cartilage autografts have also been promoted to reverse tympanic membrane atelectasis, the authors believe that the above preoperative conditions are strong indications for this grafting technique, which is described in detail.

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SINUS TYMPANI: ANATOMIC CONSIDERATIONS, COMPUTED TOMOGRAPHY, AND A DISCUSSION OF THE RETROFACIAL APPROACH FOR REMOVAL OF DISEASE

Bradley P. Pickett, M.D., Wayne S. Cail, M.D.,†
and Paul R. Lambert, M.D.‡*

ABSTRACT

Surgical access to the sinus tympani remains a challenge for otologic surgeons. Usually, the retrotympanum is approached through the middle ear in an anterior to posterior direction during chronic ear surgery. Whether this is via a posterior tympanotomy or after canal wall down tympanomastoidectomy, visualization of the most posterior recess of the sinus tympani is often inadequate. The purpose of this investigation is two fold: (1) to describe the highly variable anatomy of the posterior tympanic cavity and (2) to review the retrofacial approach to the sinus tympani. Histologic sections, cadaver dissections, and diagrammatic illustrations are combined with computed tomographic (CT) imaging to provide a three-dimensional understanding of the sinus tympani and adjacent labyrinthine structures. Viewed from the mastoid, the anatomic structures that define the boundaries of the retrofacial approach include the facial nerve and stapedius muscle laterally, the lateral semicircular canal superiorly, the posterior semicircular canal posteromedially, the vestibule anteromedially, and the jugular bulb inferiorly. When the sinus tympani is well developed, saucerization within these boundaries gives wide access into the sinus and round window niche. The authors suggest that preoperative imaging can select patients who are candidates for a retrofacial approach to expose and remove disease in the sinus tympani. Contraindications to this approach include axial CT image measurements showing a contracted space between the posterior semicircular canal and the medial aspect of the facial nerve, lack of posterior expansion of the sinus tympani, and in cases where these measurements are marginal, the presence of a high jugular bulb or anteriorly positioned sigmoid sinus.

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OSSICULOPLASTY USING THE BLACK HYDROXYLAPATITE HYBRID OSSICULAR REPLACEMENT PROSTHESES

John D. Macias, M.D., Michael E. Glasscock III, M.D.,† F.A.C.S.,
Mark H. Widick, M.D.,‡ David G. Schall, M.D.,§ F.A.C.S.,
David S. Haynes, M.D.,# and Anne F. Josey, M.S., C.C.C.A.†*

ABSTRACT

The problems of ossicular reconstruction in chronic ear surgery have led to the development of new ossicular replacement prostheses. Improvements in biocompatibility and design led to the development of hydroxylapatite hybrid (HaH) ossicular replacement prostheses. The senior author's (M.E.G.) experience with the Black HaH prostheses is reviewed. Sixty cases are grouped by procedure and prosthesis (19 TORPs and 41 PORPs) with a minimum follow-up of 1 year. Audiometric data are analyzed to determine the success rate in air-bone gap closure. Complication and extrusion rates are reviewed. These results are compared against those obtained using other prostheses using similar criteria, and this report serves as a follow-up on a previous paper on this subject by the senior author.

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BIOMECHANICAL ASSESSMENT OF A NEW ADHESIVE BONE CEMENT FOR OTOLOGIC SURGERY

John W. Werning, M.D., D.M.D., Anthony J. Maniglia, M.D., F.A.C.S.,* and
James M. Anderson, M.D., Ph.D.†*

ABSTRACT

The adhesion of metallic prostheses to bone is a major problem in otologic surgery. Conventional bone cements lack significant adhesive strength, which predisposes the cemented prosthesis to loosening. The advent of surgically implantable hearing devices is one example where an adhesive cement to secure metal to bone would be useful. The biomechanical properties of a new cement, 4-META/MMA-TBB opaque resin, were evaluated in an animal model. The cement is composed of 4-methacryloyloxyethyl trimellitate anhydride (4-META) and methyl methacrylate (MMA) as monomers and tri-n-butyl borane (TBB) as an initiator. Titanium disks were cemented to the tibias of rabbits, which were sacrificed at 0 and 90 days. Tensile and shear bond strengths between bone and metal were tested at both times. The mean baseline tensile and shear bond strengths were 8.92 MPa and 11.96 MPa, respectively. Adhesive failure occurred at the bone-cement interface. The decrease in bond strength at 90 days was minimal. Thus, 4-META/MMA-TBB cement is a promising new metal-to-bone adhesive that may be useful for the surgical fixation of metallic prostheses in otologic surgery.

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CHRONIC OTITIS MEDIA AND SENSORINEURAL HEARING LOSS: IS THERE A CLINICALLY SIGNIFICANT RELATION?

J. Pieter Noordzij, M.D., Edward E. Dodson, M.D.,* Roger A. Ruth, Ph.D.,*
H. Alexander Arts, M.D.,† and Paul R. Lambert, M.D.**

ABSTRACT

Previous investigations into the possible relation between chronic otitis media (COM) and sensorineural hearing loss (SNHL) have resulted in differing results and conclusions. A retrospective study was conducted to examine the relation between COM and SNHL, using strict selection criteria for cases so as to eliminate co-variables. In addition, various COM parameters were studied to determine if a correlation with the severity of the SNHL existed. At the University of Virginia, charts of all patients undergoing chronic ear surgery from September 1983 to March 1993 were reviewed. Sixty-nine patients met the following criteria: unilateral COM and no history of head trauma, meningitis, post-traumatic tympanic membrane perforation, labyrinthine fistula, or coexisting otologic condition of either ear. From these charts, audiograms were then analyzed for evidence of SNHL, defined as the difference in preoperative bone conduction thresholds between diseased and control (normal contralateral) ears. Mean bone conduction differences were small: -0.5 dB at 500 Hz, 0.9 dB at 1000 Hz, 4.4 dB at 2000 Hz, and 3.6 dB at 4000 Hz. There were nonsignificant bone conduction threshold differences that trended toward greater SNHL with diseased mucosa and cholesteatoma at 2000 and 4000 Hz. There was no consistent correlation between severity of SNHL and presence of otorrhea, degree of ossicular erosion, or duration of disease. The authors conclude that COM may cause SNHL, but in the vast majority of patients this loss is not clinically significant.

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REPORTING OPERATIVE HEARING RESULTS: DOES CHOICE OF OUTCOME MEASURE MAKE A DIFFERENCE?

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ABSTRACT

Choice of outcome measure in reporting hearing results following otologic surgery, including the frequencies used and use of pre- or postoperative bone thresholds, varies from author to author. In this study, data from 550 ossicular reconstruction and pediatric tympanoplasty surgery patients were used to generate a variety of outcome measures, including pure-tone thresholds for frequencies from 0.5 kHz to 8 kHz and different frequency combination pure-tone averages (PTAs) and air-bone gaps. There were no significant differences between mean pre- and postoperative bone conduction thresholds for any of the frequencies from 0.5 to 4 kHz nor for a PTA of 1, 2, and 4 kHz. Mean postoperative air-bone gap differed by no more than 2 dB across six different frequency combination PTAs. If "success" is defined as a postoperative air-bone gap of less than 20 dB, the largest *difference* in success rate across the six frequency combinations was 5%. There was also little difference in mean postoperative air conduction PTAs for any of the combinations that include frequencies through 4 kHz. Choice of a more conservative or more liberal definition of success was more important than whether air-bone gap or air conduction PTA was used. The authors recommend that a standard reporting procedure be adopted that ensures presentation of the results in a format such that more direct comparisons can be made within the published literature.

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HERNIATION OF THE TEMPOROMANDIBULAR JOINT INTO THE EXTERNAL AUDITORY CANAL: A COMPLICATION OF OTOLOGIC SURGERY

Samuel H. Selesnick, M.D., John F. Carew, M.D.,*
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ABSTRACT

Herniation of the temporomandibular joint into the external auditory canal has been reported as a result of trauma, neoplasia, infection, inflammatory processes, or developmental malformations. This paper reviews the intimate relation of the temporomandibular joint to the temporal bone as well as the literature describing temporomandibular joint herniation into the external auditory canal. Four cases of temporomandibular joint herniation into the external auditory canal resulting from otologic surgery are presented. Their characteristic location, clinical and radiographic findings are described and contrasted to previously reported cases. Despite striking displacement of the temporomandibular joint into the external auditory canal, there were no clinical symptoms referable to this finding. The absence of symptoms distinguished this postoperative etiology of temporomandibular joint herniation from other etiologies mentioned above.

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PANEL DISCUSSION

COMPLICATIONS IN OTOLOGIC SURGERY: PARALYSIS, DIZZINESS, DEAFNESS, AND DEATH

Moderator: George T. Singleton, M.D.

Panelists: James R. E. Dickens, M.D., A. Julianna Gulya, M.D., F.A.C.S., Jay B. Fariior III, M.D., and Richard J. Wiet, M.D.

Dr. George Singleton (Gainesville, Florida): The first patient is M.C., a 59-year-old white female with chronic otitis media. In 1982 she underwent a canal wall up tympanomastoidectomy for cholesteatoma. She had two subsequent transcanal ossicular reconstructions with removal of cholesteatoma on each occasion. In 1990 she underwent an open mastoid with the canal wall down and a type IV tympanoplasty. She now has a maximum air-bone gap; she has chronic ear pain; her ear periodically drains. She has an ossified neotympanum and, if you will look carefully, you can see that there is a malleus handle right here, and the rest of this is an ossified membrane that stays wet. What do we do with this? Who would like to begin?

Dr. Jay Fariior (Tampa, Florida): Is the drum intact or is that a perforation up in the top?

Dr. Singleton: It is intact.

Dr. Fariior: Okay. So it is a mucositis or weeping type ear—that's basically what you are saying?

Dr. Singleton: Actually, the drum has become essentially ossified.

Dr. Fariior: What I find very helpful is using acetic acid or boric acid, alcohol irrigations at both 70% and 90% solution, and then having the patient dry it with a hair dryer as suggested by Mansfield Smith. That will usually dry them up. More recently I have been adding some aspirin to the 90% solution so it is about a 1% or 2% salicylic acid. Ten aspirins in a 4-ounce bottle of 90% solution makes it roughly a 2% salicylic acid-boric acid solution.

Dr. Singleton: In other words, toughen the epithelium up good.

Dr. Fariior: It will dry it up. It takes about 2 months to do that, but it will usually dry it up and you get no more epithelium.

Dr. Singleton: Dr. Gulya, given that this is an ossified membrane and that there is a maximum air-bone gap, would you take this out and start over with some sort of a new graft?

Dr. Julianna Gulya (Washington, DC): I think if one could get the ear dry, one could fit the patient with a hearing aid. There is obviously underlying pathology, but this patient is likely not going to tolerate revision surgery. I think you would be pushing your luck. If it were possible to dry the ear I think I

would be happy with that and recommend a hearing aid evaluation.

Dr. Singleton: Dr. Dickens, would you remove that drum?

Dr. James Dickens (Little Rock, Arkansas): No, I would not remove that drum, but I would probably request magnetic resonance imaging (MRI). We have somebody who has been operated on a multitude of times for cholesteatoma; we have a drum we cannot see through that is draining, and we have pain. You can have post-traumatic, for lack of a better term, neuralgia or pain in an operated ear. I think that since you are seeing this person for the first time, you have got to find out why she is hurting. Is there something somewhere that has not been observed. Either an MRI or computed tomography (CT) may help. With that much damage I might do an MRI looking for cholesteatoma.

Dr. Singleton: The CT on this patient failed to reveal anything other than the ossification of the drum as anything abnormal. Well, let's move on.

This is an ear that has been repaired, has perfect hearing, and periodically winds up with this bit of granulation tissue and mucositis on the drum head here. This ear hears well; it has a closed air-bone gap and continues to weep from time to time. Dr. Wiet.

Dr. Richard Wiet (Hinsdale, Illinois): Are you talking about a localized myringitis of some type?

Dr. Singleton: Yes.

Dr. Wiet: I would probably treat that patient with acetic acid irrigations in the beginning and then switch to Chloromycetin powder over a period of time to try and dry it up.

Dr. Singleton: Dr. Dickens?

Dr. Dickens: Again, assuming there is no other pathology going on, localized mucositis can be difficult to manage. I would do what Rich said. Ted Bailey taught me to use a little Ichthyol or ichthammol, which is a drying cream. I can't tell you what is in it, but it seems to help this type problem. I think you are trying to tell us that ear is okay. I am trying not to fall into a trap.

Dr. Singleton: The ear is all right. This is an ear that works well, it just periodically drains.

The next patient is a 73-year-old white female with lifelong chronic otitis media who has had oblit-

eration of the posterior middle ear bilaterally with collapse of the eardrum. She had an aerated anterior segment. On the left middle ear anteriorly there was a blue appearance to the ear. The surgeon thought it was slightly bulging. There was a maximum air-bone gap in each ear. The surgeon decided that the left ear should be explored for a glomus tumor. No scans or radiographic studies of any sort were obtained. During surgery it was noted that there was no ossicle in the back part of the ear. The surgeon dissected things off of the promontory posteriorly. He found a scar band that was over the footplate area. He tried to remove this and biopsied it. He got a perilymph gusher from the oval window at that point. He sealed the gusher with Gelfoam and then he packed the ear with Gelfoam soaked with antibiotics. When the patient awakened, she had a complete facial paralysis. She was dizzy and throwing up, and she had lost all of her hearing in the involved ear. She was started on cephalosporin and prednisone. The pathology reported indicated a cholesterol granuloma and scar tissue. When this scar tissue was stained with a silver stain, it was found to be nerve. This patient is now seen by you, 5 days postoperatively. Who would like to tackle this one? What would you do with this, for the work-up of this one? Dr. Gulya?

Dr. Gulya: I think I would like to get an idea of what the underlying bony anatomy is first of all. Clearly the facial nerve has gotten traumatized in the surgery, and probably in the middle ear segment, since it seems that he was working around the stapes footplate. I think it would be nice to get a better anatomic definition of the bony canal and the facial nerve. I think CT scanning would be best.

Dr. Singleton: We got CT scans. This is the good side; it helps us a bit. We can see the footplate, and we can see the facial nerve overhanging the footplate on the good side. If we go to the bad side, the footplate is depressed down to here. The facial nerve is overhanging there. The footplate is in the vestibule at this point.

Dr. Gulya: There is just a footplate in the vestibule and not the whole stapes?

Dr. Singleton: There wasn't any suprastructure.

Dr. Gulya: That's very interesting. If you look at temporal bones that have a facial nerve dehiscence, about 83% are going to have the dehiscence in the oval window region, and of these, about 26% are going to be overhanging. So, that is not an uncommon situation, and that's where you would expect the facial nerve injury to have occurred concomitant with the surgery. I think that having a depressed footplate without any sort of suprastructure to work with is similar to the situation of a depressed footplate when you are doing a stapedectomy. On occasion, if you can have a little bit of a trap-door type of defect, you may be able to use a small pick and get the footplate out. If you have a really depressed footplate, I think you are more likely to cause more extensive damage trying to dig around and fish it out, and I would tend to leave it there; but, you are going to have to seal

that oval window.

Dr. Singleton: Would you delay, Dr. Farrow? This is 5 days old when the patient comes to your office. If so, how long?

Dr. Farrow: This patient also has facial paralysis; correct?

Dr. Singleton: Yes.

Dr. Farrow: I assume the patient has a complete electrical paralysis; is that correct?

Dr. Singleton: That's correct.

Dr. Farrow: I think first of all you need to evaluate the facial nerve and see whether the surgeon did a little biopsy or a big biopsy, and then resect a section of that facial nerve and be prepared to graft that or to do whatever reconstruction is necessary. I think it is also important to be sure that there is a tissue seal in that oval window, since Gelfoam is notorious for not working in perilymph gushers.

Dr. Singleton: The ear, by the time you see it, has got a little bit of purulence in it.

Dr. Farrow: That's another reason to place the patient on intravenous (IV) antibiotics, but I think you need to go on and manage the underlying complications as soon as possible.

Dr. Singleton: Dr. Dickens, would you do anything different?

Dr. Dickens: I would almost be inclined to give IV antibiotics and observe the patient for a few days. You are between a rock and a hard place if you go in and there is active granulation tissue and you are trying to sort out what has been done. The nerve may be overhanging, or it may be more diffusely splayed out across the oval window. You have to decide whether you have, as Jay said, a small injury to the facial nerve, in which case you probably would do nothing but allow it to try and recover, versus a substantial injury, which might cause you to reroute the facial nerve and do a more extensive procedure. I think I would have to look at that ear before I would say whether I would charge in tomorrow or whether I would wait on IV antibiotics for 4 or 5 days and try to settle down the infection before I went in. My initial reaction is that I would wait for a few days.

Dr. Singleton: We did what you suggest, and we waited. We gave the patient IV antibiotics and I am not sure whether you can see this projected picture very well. The facial nerve is humped up right here. The pick is pointing to the area where it was biopsied. It simply is a divot removed from the nerve. The oval window is right here and seems to be sealed over with no further leak. We waited about 5 or 6 days with IV antibiotics in the hospital on this patient. Now, with these findings on exploration, Dr. Wiet, what would you do with this nerve?

Dr. Wiet: If, on exploration, there appears to be just a minor injury of the facial nerve, say less than a third, it just looks like a bruise or a small biopsy, I would leave well enough alone. I wouldn't resect that nerve. It should have enough axons to regenerate the nerve completely.

Dr. Singleton: Would you decompress it?

Dr. Wiet: I would decompress it on both sides to ensure there was normal nerve on the opposite side. If the other extreme were there, this is, if there were multiple injuries of the facial nerve, it would be necessary to consider a graft, if there was a clean cut. However, very light injuries of the facial nerve usually will regenerate themselves.

Dr. Singleton: Would any of you resect this nerve and anastomose it? I take it no. We did not either. We simply slit the sheath. The patient, thank goodness, has recovered. She recovered her balance and about 60% discrimination score afterwards. Dr. Wiet has another facial nerve problem to let us take a look at.

Dr. Wiet: Let me describe this. You are looking at a patient who has had an intact canal wall procedure, and we are pointing at the facial nerve in the vertical section and now at the tympanic section. In addition to that, this individual had a fenestration of the lateral semicircular canal, very similar to the previous case. This patient had a preoperative SRT of 40 with a bone conduction level of 20, and now he has a dead ear. So we have an injury to the facial nerve at the tympanic segment at the geniculate ganglion (to which the instrument is pointing) and another laceration down here near the stylomastoid foramen. So there are two injuries in that facial nerve in an intact canal wall procedure. The point of this is to present a case where there is an obviously sclerotic mastoid and the surgeon is slavishly trying to keep the wall intact. Here is the facial nerve—the injuries. This is just into a little filament at this point; then there is a secondary injury here. This is an entry into the lateral semicircular canal. So, preoperatively the patient had a pretty decent hearing level, and there you can see about a 75% injury of the nerve and a second injury of the geniculate. I would like to ask the panel how they would handle this dead ear.

Dr. Singleton: Who would like to kick this one off? Dr. Farrior?

Dr. Farrior: First of all, a number of years ago Malcolm Graham presented at the Shambaugh-Shea Workshop one of the causes of facial nerve injury, which was the limited exposure, particularly in a small sclerotic mastoid. As Rich pointed out, you have somebody who is committed to saving the intact canal wall in a case that perhaps might have been done better as a cavity. Assuming there is a significant injury at the geniculate ganglion or near the geniculate ganglion as well as in the vertical segment, you probably have to remove that segment and then graft it, probably with a greater auricular nerve graft.

Dr. Wiet: The problem, Jay, is that it goes down into the internal auditory canal (IAC), and because of that injury at the geniculate, you have to get a lot lower.

Dr. Farrior: Okay. So you had to do a middle fossa then on top of that?

Dr. Wiet: We actually had to do a translabyrinthine approach to it.

Dr. Farrior: A translab—that would be fine with a dead ear. I didn't think it was medial to the geniculate or over the geniculate, I thought it was just lateral

to it.

Dr. Singleton: Would any of you handle this differently? John?

Dr. Dickens: The only other question would be, as opposed to going translab, and that would depend purely on how badly traumatized the geniculate was, whether to remove the ear canal and basically close off the ear and go straight from the stump at the geniculate to the stylomastoid foramen, if that could have been done. Otherwise, if you needed to get to the labyrinthine segment by doing the translabyrinthine approach, I think the decision has to be made at the time of surgery. We can't see whether it is the lateral end of the geniculate that is injured or the medial end. You said you ended up having to go translab, Rich?

Dr. Wiet: Yes.

Dr. Dickens: What did you do to the ear canal? Just close it off or did you . . .

Dr. Wiet: Closed it off.

Dr. Singleton: Could we turn that off now and turn the slides back on, please. Let's get to the stapes now at this point. This is a drum that has a wire prosthesis that is extending out through the drum. It is a shepherd's crook type of prosthesis. The patient has been a little bit unsteady; the ear has been weeping a little bit. Do you pull this out in the office? Dr. Gulya?

Dr. Gulya: Well, you know, the Clinton Health Care Plan really wants you to go the cheapest way, and that would certainly eliminate the ear as far as I can tell for further medical problems. But seriously, no. Clearly yanking that out in the office is not a good idea. I think what you need to do first of all is to try and see if you can get that area of infection settled down because it is going to complicate any kind of further management of that protruding prosthesis that you have.

Dr. Singleton: When you get the patient to the operating room after you have quieted down the infection, are you going to raise a flap—the usual stapedectomy flap—or how are you going to approach this thing?

Dr. Gulya: I actually had a case like this several years ago. As I recall, what I tended to try to do was to minimize the palpation and movement of the prosthesis. As I recall, I took out a little bit of drum that was surrounding that prosthesis, so I could get the drum up without mobilizing the prosthesis. Then I was able to section the prosthesis, get rid of the part that was protruding through the drum, and then deal with the remainder that was in a membrane in the oval window with minimal manipulation. Then I grafted the rest of the drum.

Dr. Singleton: Would any of you handle that any differently?

Dr. Dickens: What was the hearing?

Dr. Singleton: Maximum air-bone gap.

Dr. Singleton: Here is another stapes. This patient has lost the hearing, has a big conductive hearing loss, a maximum air-bone gap. When the ear is open it is a nice ear except the whole end of the incus

and lenticular process has been eroded by the wire prosthesis. The wire prosthesis goes into a graft down below. There is a bit of an overhang of the facial nerve, so that if one lined up the tip of the cut-off or partially amputated incus to where the wire ends in the footplate area, you've got a nerve in the way. Dr. Wiet?

Dr. Wiet: I presume you have a good bone threshold?

Dr. Singleton: Yes.

Dr. Wiet: There is a normal bone level and good discrimination. I routinely get a CT scan to evaluate these prosthetic devices in revision cases. In this situation, if the patient understood there was a higher risk of complications, and that has to be clearly put forward, I would probably trim the wire and not remove it, because there is a higher risk of neurosensory loss if you take that wire out. I would do a malleus-to-oval window prosthesis.

Dr. Singleton: What kind of prosthesis would you use with that wire stump in the way?

Dr. Wiet: Well usually these wires are a little bit lateralized to one side or the other; usually you can get around it because they are so narrow. I would put a graft over the neomembrane, and I would use either a TORP prosthesis or a malleus-to-oval window prosthesis. I use a Causse prosthesis to do that. Another technique is by Scheer who wrote about a direct implant from the malleus to the oval window.

Dr. Singleton: Dr. Dickens? Would you do anything different with this?

Dr. Dickens: Well, I am looking at that, and it doesn't look like you are going to be able to get anything to come down from that incus, at least anything that I use very much. I would be, quite honestly, pretty pessimistic to the patient about getting a great result. There is a significant risk if you remove that wire. I would have, following the CT scan, offered a hearing aid. Offer them a hearing aid. Otherwise I think you are stuck with a malleus-to-oval window prosthesis.

Dr. Singleton: All right. Let's move ahead. Now we have a case in which the wire has just dented the incus lenticular process. It is a little bit long. It is sticking up above it slightly. We have about a 30-dB air-bone gap in this patient. Dr. Gulya?

Dr. Gulya: Has this patient been able temporarily, in the past, to improve the hearing with autoinflation? It almost sounds like the patient had a loose wire syndrome first, then this evolved into this situation.

Dr. Singleton: Yes. The patient could inflate and improve the hearing.

Dr. Gulya: And the prosthesis looks like it is in an oval window seal there. Is my impression correct?

Dr. Singleton: That's correct. The facial nerve is in good position; the incus is in pretty good shape. It is grooved, and the prosthesis is pushed up slightly.

Dr. Gulya: And the patient originally had good hearing at the first stapedectomy?

Dr. Singleton: Yes.

Dr. Gulya: I don't know; I could be wrong, but I

would be really tempted to try and just crimp that thing into position and see if that improves things. Again, there is a substantial risk to removing the wire prosthesis. It looks like it is in pretty good position. There is no scarring of that distal end?

Dr. Singleton: No.

Dr. Gulya: Okay. I would be tempted to try that.

Dr. Singleton: Dr. Farris?

Dr. Farris: First of all it looks like the wire is displaced to the upper portion of the oval window, so it may be on a bony lip, which could explain part of your 30-dB conductive loss. I think you need to be prepared to go down and at least find the footplate or the level of the vestibule where the tissue seal is, not removing the wire. If it is on a bony lip, you might want to try and mobilize it, to the more central portion of the oval window and then pack tissue around it and resecure it to the incus, but without removing it from the vestibule.

Dr. Singleton: Would you bend the prosthesis to make it get up further on the incus away from the area of notching?

Dr. Farris: The shepherd's crook is open there, and so you could move that very easily either superior or inferior, preferably more proximal on the malleus or incus and probably resecure it to a higher level.

Dr. Singleton: Now the last of the things relative to stapes. You try to put a hole in the footplate of the stapes with your nice little drill or laser and suddenly the speculum fills up with fluid. Where do we go from here? Dr. Dickens?

Dr. Dickens: Is that clear or is that blood?

Dr. Singleton: It is clear.

Dr. Dickens: I just wanted to clarify, George; I don't trust you! I would apply a suction trip laterally in the speculum; I would elevate the head; and I would sit there until it quit, until the gusher calmed down and the pressure equalized. Then I would put a tissue seal. Hopefully this was discovered while the arch was still in place, and then the tissue seal could be placed in the arch of the stapes to hold it in place.

Dr. Singleton: Well, let's say that your arch is gone and you've knocked it off inadvertently, so now you've got a hole in the footplate; you've got no arch. What are you going to do with it?

Dr. Dickens: I would go ahead and get a tissue seal down on it and put a prosthesis on primarily hoping to hold that in place. If I was going to go that far, I probably would make sure my hole was big enough so I would have done a stapedotomy, but I think you probably have already lost the ear in this situation. Nevertheless, you need to act as though you hadn't.

Dr. Gulya: What's the history on this patient? Is this a congenital stapes footplate abnormality or not?

Dr. Singleton: No. Just stumbled into it. You are just lucky.

Dr. Gulya: Some individuals would suspect that a perilymph gusher by definition means that the footplate fixation is congenital. Basically there are two ways to handle a footplate gusher. One, as John

Dickens said, is to go ahead and place the prosthesis with a soft tissue seal. Another way is to place a soft tissue seal over the oval window membrane, put some silk packing over that, and pack the ear, then have the patient keep a head-of-bed up position for a few days. Then remove the packing. The packing, of course, is put in place with the tympanomeatal flap reflected anteriorly. At the second-stage operation the packing is removed, and the tympanomeatal flap is returned to the usual position. Generally, these things are bad news for the hearing.

Dr. Singleton: When these happened when we were using the prosthesis like Dr. Farrow Sr. used, where you tied tissue on to wire, those worked very well to stop a gusher. Also, Dr. Schuknecht used a prosthesis with tissue tied onto wire. A gusher is much easier to control with this prosthesis than having to get a loose piece of tissue in place and a prosthesis down on top of it.

Let's move along and get to one or two other things. J. B. is a 35-year-old Hispanic male. He had headaches with a draining sinus tract behind his right ear. At age 6 he underwent a Rambo procedure—that's a complete obliteration of the mastoid and ear canal—for cholesteatoma. In 1986 he underwent a right temporal craniectomy for removal of a large cholesteatoma from the right temporal lobe. In 1990 he had a right revision mastoidectomy and a meato-plasty in an attempt to drain this to the outside. He, at the same time, had drainage of a temporal lobe abscess. When he comes to you, this time he has a draining sinus behind the ear again. On CT scan you can see that there are bits of bone shoved up into the middle fossa. Most of the temporal bone has been damaged or destroyed. Here is another view to show that there is a little air or gas out in the middle of this infected mess. What do you do with this sort of a thing? Dr. Wiet?

Dr. Wiet: It is a mess. The patient does not have an active cerebrospinal fluid (CSF) leak?

Dr. Singleton: Does not.

Dr. Wiet: And he has an open cavity now?

Dr. Singleton: No, he has an obliterated cavity; he has an ear canal that's grown back shut in spite of the fact that he underwent attempted meato-plasty. He has a draining sinus tract over the mastoid behind.

Dr. Wiet: Okay. I would start with a very careful imaging evaluation of this patient. I would start out with CT to evaluate the bone detail with an infused study. Make sure he doesn't have any hint of another abscess forming. Abscesses go through different stages; they can have a fibrous capsule in which they are most mature.

Dr. Singleton: This patient did have an MRI with gadolinium in addition to this. There was no sign of an abscess. It seemed to be a cholesteatoma, confined to the underside of the temporal lobe and to the temporal bone.

Dr. Wiet: I think you are going to have to end up in a case like this with some type of exteriorization

procedure, because you have been trapped before with the closed cavity. It has just contained itself and festered for so many years; so, I would be in favor, probably in the long-term, of taking that all down and doing an exteriorization.

Dr. Singleton: Would any of you do anything different from that? We did just that, and you can see all the way out to the middle of his head through the hole. From the side he really looks quite good. We simply skin-grafted that.

Let's look at one final case. This is a case where you are drilling in an infected mastoid and your drill catches a piece of bone, flips up against the dura, and you now have a CSF leak and an infected mastoid. You can see the clear fluid. This is the area of the exposed dura where the pick is lying over it. Dr. Farrow?

Dr. Farrow: I think first of all, you would place the patient on IV antibiotics. I use Claforan usually in these.

Dr. Singleton: I'm sorry, you use what?

Dr. Farrow: Claforan is what I usually use in this situation. Copiously irrigate the wound and then go on and complete the surgery. I think that is the important thing, so that you are not leaving disease so that you have to come back in there. The defect can be repaired with fascia or bone paste wedge or bone wedge. There are a number of ways of repairing a CSF tegmental defect. One should do that in conjunction with the completed surgery.

Dr. Singleton: Which technique do you prefer? Would you elevate the dura from the bone around it and then tuck the bone graft under?

Dr. Farrow: Usually that is what I do. I repair it from the mastoid side, not necessarily going at it from the top.

Dr. Singleton: Would any of you put a graft through the opening inside the dura and spread it out?

Dr. Farrow: Yes. That is what I am talking about, that is coming through the . . .

Dr. Singleton: You would go through the dura or would you put it between the dura and the skull?

Dr. Farrow: Between the dura and the skull base, but through the tegmental defect.

Dr. Singleton: Right. Would any of you go through the defect in the dura and try to place one inside the dura? Any other thoughts? Dr. Dickens?

Dr. Dickens: Well, I think there are two ways to handle it, and it depends on the size of the defect. If the size and shape fits itself well, I take a little piece of cartilage with perichondrium and tuck it in through the defect I have created. If it is a little bigger, you can do what Gail Neely has described and that's just come out laterally and expose the dura and then from that side elevate the dura back past your defect and insert a larger piece of fascia or something that gives a real nice closure if you have a little bigger defect. That works well.

Dr. Singleton: Panelists, thank you.

COCHLEAR IMPLANTS

RESULTS OF MULTICHANNEL COCHLEAR IMPLANTS IN CONGENITAL AND ACQUIRED PRELINGUALLY DEAFENED CHILDREN: FIVE-YEAR FOLLOW-UP

Bruce J. Gantz, M.D., Richard S. Tyler, Ph.D.,* George G. Woodworth, Ph.D.,†
Nancy Tye-Murray, Ph.D.,* and Holly Fryauf-Bertschy, M.A.**

ABSTRACT

Postlingually deafened children, using multichannel cochlear implants, have achieved substantial improvement in their speech perception abilities and, in many instances, the results are better than in postlingually deafened adults. It has been suggested that children with prelingually acquired and congenital deafness children would not receive similar benefits, since they have not developed an auditory memory. The purpose of this study is to analyze the speech perception and production performance over time of prelingually deafened children who have been using a multichannel cochlear implant for 1–5 years. Preliminary results comparing the effects of age at implantation and etiology of deafness on performance are also be examined.

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LONG-TERM RESULTS OF EARLY COCHLEAR IMPLANTATION IN CONGENITALLY AND PRELINGUALLY DEAFENED CHILDREN

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ABSTRACT

Cochlear implants have been shown to improve the speech perception and production skills in children. Data are available on congenitally and prelingually deafened children who were implanted at an older age, but data on children implanted below the age of 3 years are scarce. The present study examines the benefits obtained with early implantation of the young deaf child. Fourteen congenitally or prelingually profoundly hearing impaired children were implanted before the age of 3 years, with the Nucleus multichannel cochlear prosthesis, and followed for 2–5 years. Results indicate an overall improvement in the perception of all aspects of the speech signal in the auditory-only condition with the cochlear implant. All the children use oral language as their primary mode of communication and attend regular schools. Based on the results of this investigation, the authors conclude that implantation of the young deaf child is beneficial to the development of auditory perceptual skills.

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COCHLEAR IMPLANTATION IN THE ELDERLY

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ABSTRACT

The purpose of this study was to compare the audiologic and surgical results of elderly patients receiving cochlear implants with other adult patients, and to evaluate the benefit of cochlear implantation in the geriatric population. Twenty-eight patients, aged 60 to 80 years, who received the Nucleus 22 channel cochlear implant were studied retrospectively. Mean audiologic test scores increased significantly after implantation. Postoperative audiologic test scores of this elderly population are comparable to those of a matched group of younger adult patients. The surgical procedure was well tolerated in all elderly patients, and there were two postoperative complications requiring revision procedures. A questionnaire was used to assess implant use and the impact of cochlear implantation on the quality of life in this elderly population. Average implant use per day was 13.8 hours, and 65% of patients were able to recognize voices over the telephone. More than 80% of patients believed that their quality of life had improved significantly, that their self-confidence had increased, and that their decision regarding implantation was correct. The results of this study indicate that elderly patients with bilateral, profound, sensorineural hearing loss should not be denied consideration for cochlear implantation based on age alone.

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This study was supported with funds from the Denver Ear Institute.
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EVALUATION OF A NEW SPECTRAL PEAK CODING STRATEGY FOR THE NUCLEUS 22 CHANNEL COCHLEAR IMPLANT SYSTEM

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ABSTRACT

Sixty-three postlinguistically deaf adults from four English-speaking countries participated in a 17-week field study of performance with a new speech coding strategy, Spectral Peak (SPEAK), and the most widely used strategy, Multipeak (MPEAK), both of which are implemented on wearable speech processors of the Nucleus 22-Channel Cochlear Implant System; MPEAK is feature-extraction strategy, whereas SPEAK is a filterbank strategy. Subjects' performance was evaluated with an experimental design in which use of each strategy was reversed and replicated (ABAB). Average scores for speech tests presented sound-only at 70 dB SPL were higher with the SPEAK strategy than with the MPEAK strategy.

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COMPARISON OF MULTICHANNEL TACTILE AIDS AND MULTICHANNEL COCHLEAR IMPLANTS IN CHILDREN WITH PROFOUND HEARING IMPAIRMENTS

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ABSTRACT

Speech perception skills of prelingually deafened children who used the multichannel Tactaid 7 (n = 10) were compared to those of a matched group of children who used the Nucleus 22 channel cochlear implant (n = 10). Group scores were compared on a closed-set test of word recognition and on an open-set test of phrase recognition in the pre-device condition and at a post-device interval after an average of 1.5 years of multichannel device use. The results revealed that the scores of the implant users improved significantly between the pre- and post-device intervals on all measures. Moreover, the scores of the implant users were significantly higher than those of the tactile aid users on all measures. In contrast, the scores of the tactile aid users showed negligible change over time, except on a test that evaluated open-set recognition of phrases with both auditory and visual cues. The results suggest that children can learn to recognize words and understand speech without lipreading with a multichannel implant, whereas children who used the multichannel tactile aid demonstrate limited speech recognition skills only if auditory/tactile cues are combined with lipreading.

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VESTIBULAR EFFECTS ASSOCIATED WITH IMPLANTATION OF A MULTIPLE CHANNEL COCHLEAR PROSTHESIS

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ABSTRACT

This study revealed that some patients with cochlear implants have symptoms of vertigo and imbalance following implant surgery. Although most experience a resolution of these symptoms, some patients have more persistent disturbances of balance. A total of 52 patients were implanted with a Nucleus 22 channel cochlear implant device between September 1988 and February 1994. Preoperatively, all but five of the patients received a vestibular evaluation. Twenty-two of the 52 patients received both pre- and postoperative vestibular evaluation. The cochlear implant was worn and activated during the postoperative vestibular assessment. The vestibular assessment included electronystagmography, computerized dynamic posturography, and harmonic acceleration testing. Five of the 22 patients demonstrated bilateral vestibular weakness preoperatively; that is, no response to caloric stimulation or a total of less than 30 degrees per second for the four irrigations. These patients were not included in the caloric analysis portion of the study. The remaining 17 were divided into groups under 60 years of age (7 patients) and over 60 years of age (10 patients). Analysis of the pre- and postoperative caloric response of the implanted ear showed a significant drop in output for the group over 60 years of age. The difference for the group under 60 years of age was not significant. Forty percent of the patients in the over 60 age group and 43% of those in the under 60 age group developed a peripheral vestibular weakness postoperatively. However, younger individuals in general did not seem to have balance complaints and did not require vestibular rehabilitation as frequently as the older group. Potential cochlear implant candidates should be advised of the possibility of postoperative vestibular effects following cochlear implantation. Most of the symptoms are transient; however, there may be persistent symptoms of imbalance that may be benefited by vestibular rehabilitation.

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COCHLEOSTOMY IN LABYRINTHITIS OSSIFICANS: ANATOMIC, HISTOLOGIC, AND RADIOGRAPHIC DIMENSIONS

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ABSTRACT

Ossification within the basal turn of the cochlea secondary to meningitis or otosclerosis usually precludes cochlear implantation using the standard cochleostomy technique. Various methods have been described for drilling out the basal turn of an ossified cochlea and obtaining partial insertion of the electrode array. However, anatomic landmarks for guiding safe placement of the cochleostomy and the depth to which a channel can be drilled have not been thoroughly investigated. To establish safe dimensions for creating a cochleostomy, distances from the round window niche to various structures were recorded from direct anatomic measurements on 10 adult cadaver temporal bones. Similar measurements from pediatric temporal bone histologic sections and temporal bone computed tomography scans also were recorded. The mean distances from the round window niche to the depth of the basal turn and to the beginning of the petrous apex air cells were 9.8 mm and 11.8 mm, respectively. Based upon these measurements, a cochleostomy can be drilled to a depth of 10.5 mm, thus avoiding entrance into the petrous apex air cells. A channel created in this fashion would accommodate 10 to 14 electrodes of the Nucleus 22 channel array, which should allow satisfactory functional performance.

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USE OF DISTORTION PRODUCT OTOACOUSTIC EMISSIONS TO ASSESS MIDDLE EAR TRANSDUCERS IN RHESUS MONKEYS

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ABSTRACT

Distortion product otoacoustic emissions (DPOAEs) can provide an objective and noninvasive assessment of the peripheral cochlear function. Auditory brainstem responses measured from implanted rhesus monkeys have shown that middle ear transducers, coupled directly to the incus, are capable of delivering the signals to the central auditory system. The DPOAEs were used as a noninvasive method of assessing the frequency specificity of this mechanical transduction. In two rhesus monkeys implanted with the middle ear transducers, one primary stimulating tone (f_1) was presented acoustically, and the other primary tone (f_2) was presented by the transducer, which converted the signal into a mechanical motion of the probe tip attached to the body of the incus. The nonlinear characteristics of the cochlea produced the distortion product responses at the expected frequencies ($2f_1 - f_2$). This demonstrates the fidelity of the middle ear implant signal transduction in vivo. The DPOAEs also indicate minimal changes in the post-implant middle ear transmission. This study demonstrates that the DPOAEs can be used to assess the function of implanted middle ear transducers objectively and noninvasively.

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HIGH RESOLUTION TWO-DIMENSIONAL ELECTROPHORESIS: TECHNIQUE AND POTENTIAL APPLICABILITY TO THE STUDY OF INNER EAR DISEASE

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ABSTRACT

Technologic progress in two-dimensional polyacrylamide gel electrophoresis (2-D PAGE), in combination with immunoblotting, amino acid sequencing, and computer-assisted image analysis, allowed establishment of human body fluid and tissue "reference maps," which in turn enabled meaningful comparison of data from various clinical and research centers. Altered protein profiles have been observed in plasma/serum, cerebrospinal fluid, urine, and other body fluids in numerous systemic or localized pathologic entities. Human perilymph, obtained during ear surgery or post mortem, exhibits a protein profile differing from plasma in several ways. Most interesting are the extremely high levels of high density lipoprotein-associated proteins, a group of proteins thought to play a role in atherosclerosis, nerve damage/regeneration, chronic inflammation, and Alzheimer's disease, among others. A technique is described for collection and analysis of human perilymph, using a state-of-the-art standardized 2-D PAGE technique. It is expected that, as in other body fluids, disease-specific protein patterns will be identified. With the possible exception of presumed perilymphatic fistula, it is not envisioned that analysis of perilymph will be used for diagnostic purposes but rather as an aid for the elucidation of the mechanisms underlying inner ear disease, whether localized or as part of systemic alterations.

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NEOPLASTIC DISORDERS

FIBROUS DYSPLASIA OF THE TEMPORAL BONE: TEN NEW CASES DEMONSTRATING THE SPECTRUM OF OTOLOGIC SEQUELAE

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ABSTRACT

Fibrous dysplasia involving the temporal bone is unusual. The most common initial findings are stenosis of the external auditory canal and conductive hearing loss. The frequency of sensorineural hearing loss and facial paresis as complications of fibrous dysplasia have been poorly documented in the past. Forty-three cases of fibrous dysplasia of the temporal bone previously published in the otolaryngologic literature are reviewed, and 10 new cases are reported. In addition to age, sex, and frequency of various presenting complaints, the audiometric, radiographic, and surgical data are evaluated in both groups to better describe the manifestations of disease, degree and type of hearing loss, and success of surgical intervention. In nearly 70% of cases in this study, fibrous dysplasia was monostotic. Although most patients had a conductive hearing loss, 17% of patients demonstrated profound sensorineural hearing loss ascribable to the lesion, and facial nerve sequelae were noted in nearly 10% of cases. Cholesteatoma complicated almost 40% of cases, usually in the form of a canal cholesteatoma. Ten new cases of temporal bone fibrous dysplasia are described not only to further clarify the spectrum of otologic sequelae but also to help illustrate available treatment options. In addition, this report documents, in three new cases, the previously undescribed progression of conductive hearing loss to profound sensorineural deafness secondary to fibrous dysplasia.

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PRESERVATION OF AUDITORY AND VESTIBULAR FUNCTION AFTER SURGICAL REMOVAL OF BILATERAL VESTIBULAR SCHWANNOMAS IN A PATIENT WITH NEUROFIBROMATOSIS TYPE 2

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ABSTRACT

The outcome of acoustic neuroma (vestibular schwannoma) surgery continues to improve rapidly. Advances can be attributed to several fields, but the most important contributions have arisen from the identification of the genes responsible for the dominant inheritance of neurofibromatosis types 1 (NF1) and 2 (NF2) and the development of magnetic resonance imaging with gadolinium enhancement for the early anatomic confirmation of the pathognomonic, bilateral vestibular schwannomas in NF2. These advances enable early diagnosis and treatment when the tumors are small in virtually all subjects at risk for NF2. The authors suggest that advising young NF2 patients to wait until complications develop, especially hearing loss, before diagnosing and operating for bilateral eighth nerve schwannomas may not always be in the best interest of the patient. To the authors' knowledge, this is the first reported case of preservation of both auditory and vestibular function in a patient after bilateral vestibular schwannoma excision.

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RADIATION THERAPY IN THE MANAGEMENT OF PARAGANGLIOMAS OF THE TEMPORAL BONE

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ABSTRACT

The use of radiation therapy for the treatment of paragangliomas of the temporal bone remains controversial. Few studies exist that provide sufficient information on staging and long-term follow-up to clarify this issue. A retrospective study was undertaken of 38 patients with temporal bone paragangliomas treated with radiation therapy between 1956 and 1991. All patients received radiation therapy, either as a primary modality (14 patients), in combination treatment with surgery (13 patients), or as salvage therapy (11 patients). Mean disease stage (Fisch classification system) for each group was C₂, B, and C₁, respectively. The follow-up period ranged from 1 to 27 years (median 11.5 yr). Local control was achieved in 79% of the primary radiation therapy group, 100% of the combined treatment group, and 91% of the salvage therapy group. Complications resulting from radiation therapy were few and minor. This study demonstrates that the use of radiation therapy for temporal bone paragangliomas offers effective local control as a primary treatment modality, in combination with surgery, and as salvage therapy with few long-term complications.

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ADENOMATOUS LESIONS OF THE TEMPORAL BONE IMMUNOHISTOCHEMICAL ANALYSIS AND THEORIES OF HISTOGENESIS

E. Luke Bold, M.D., Ph.D., John R. Wanamaker, M.D.,* Gordon B. Hughes, M.D.,*
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ABSTRACT

Adenomatous lesions of the temporal bone represent a diverse group of neoplasms. At least three histopathologic patterns have been described: glandular; ribbon-like, or "festooning;" and aggressive papillary. Combinations of glandular and ribbon-like histologies in the same lesion are not uncommon. The glandular and ribbon-like histologies have been associated with carcinoid tumors, and the aggressive papillary tumor has been considered a separate entity. Recently, the endolymphatic sac has been proposed as the site of origin of the aggressive papillary lesions. Previous reports have described neuroendocrine properties with characteristics embracing the three histologic types. The authors postulate that the neural crest is the site of origin of this unusual group of neoplasms. Immunohistochemical analysis on the pathologic specimens of patients with adenomatous lesions of the temporal bone was performed to test this hypothesis. From 1975 to 1992 seven patients were treated at the Cleveland Clinic Foundation with a diagnosis of middle ear adenoma. A panel of special stains for neuroectodermal markers, including synaptophysin, chromogranin, neuron specific enolase, calcitonin, and serotonin was used on the paraffin-embedded formalin-fixed specimens. Three lesions were also evaluated by electron microscopy, all demonstrating dense core, intracytoplasmic granules. Three ribbon-like tumors were positive for synaptophysin and chromogranin, and two of these were positive for serotonin. One glandular tumor was positive for synaptophysin, and an aggressive papillary tumor was positive for synaptophysin and neuron specific enolase. An additional papillary tumor was referred following a third recurrence without accompanying immunohistochemical data. Cholesteatoma-like material was identified with a few glandular cells interspersed, all negative by immunohistochemical evaluation. The seventh specimen, initially diagnosed as papillary adenoma on light microscopy, was not studied by the aforementioned stains, and was later identified as a papilloma of sinonasal origin. The neural crest gives rise to pluripotential stem cells with widespread anatomic distribution, including the temporal bone. Because immunomarkers used in this study are specific for neuroectodermal differentiation, results suggest that temporal bone adenomas have neuroendocrine characteristics and could be derived from the specialized neuroectoderm of the neural crest.

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EFFICACY OF AUDITORY BRAINSTEM RESPONSE AS A SCREENING TEST FOR SMALL ACOUSTIC NEUROMAS

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ABSTRACT

Auditory brainstem response (ABR) has been advocated as a high sensitivity screening test for acoustic neuroma. With the advent of magnetic resonance imaging (MRI), smaller size acoustic neuromas are now detectable. A prospective trial was performed to determine the sensitivity of ABR in diagnosing small acoustic neuromas. One hundred five randomly selected patients with surgically proved acoustic neuromas underwent preoperative ABR tests within 2 months of their surgery. Patients with a histologic diagnosis other than acoustic neuroma were excluded from this study. A test was considered abnormal when the interaural wave I-V latency difference was greater than 0.2 ms, the absolute wave V latency was abnormally prolonged, or there was abnormal or absent waveform morphology. Of the 105 patients tested 92 (87.6%) had abnormal ABR tests, and 13 (12.4%) had completely normal waveforms and wave latencies. Eighteen patients had tumors over 2 cm in total diameter. Of these, 12 were 2.5 cm or larger and 6 were between 2.1 and 2.4 cm. All of these 18 patients had abnormal ABR tests. Of the 29 patients with tumors 1.6–2.0 cm in size, 25 (86%) had abnormal ABRs. In the 1.0–1.5 cm diameter range there were 45 patients who underwent a preoperative ABR. Of these, 40 (89%) had abnormal ABRs. Of 13 patients with tumors 9 mm or smaller, only 9 (69%) had abnormal ABR tests ($p < .05$). Thus, it appears that ABR sensitivity decreases with tumor size and is particularly inadequate for tumors of less than 1 cm in diameter. The authors conclude that ABR is not a good screening test for smaller acoustic neuromas and recommend MRI for patients with suspected acoustic neuroma.

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FLOW-SENSITIVE MAGNETIC RESONANCE IMAGING IN THE EVALUATION OF CEREBROSPINAL FLUID LEAKS

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Steve W. Davis, M.D.,* Denis LeBihan, M.D., Ph.D.,* Sunder S. Rajan, Ph.D.,*
and Dieter Schellinger, M.D.**

ABSTRACT

Cerebrospinal fluid (CSF) leaks involving the skull base are associated with considerable morbidity and mortality, and often present a diagnostic challenge. Current diagnostic methods are invasive and cumbersome and involve substantial radiation exposure of the patient. The authors identified seven patients with clinically suspected CSF leaks and evaluated them with a flow-sensitive magnetic resonance imaging (MRI) sequence in addition to more conventional studies. In cases with active CSF leakage, flow characteristics were documented with slow-flow and diffusion-weighted MRI. Unlike current approaches, MRI offers the advantages of rapidity, non-invasiveness, and absence of ionizing radiation. Preliminary results suggest that flow-sensitive MRI may have a role in the evaluation of CSF leaks involving the skull base and temporal bone.

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PANEL DISCUSSION

COMPLICATIONS OF NEUROTOTOLOGIC/SKULL BASE SURGERY: STROKE, NUMBNESS, PARALYSIS, DIZZINESS, DEAFNESS, AND DEATH

Moderator: C. Gary Jackson, M.D.

Panelists: Derald E. Brackmann, M.D., Bruce J. Gantz, M.D.,
and Peter G. Smith, M.D.

Dr. C. Gary Jackson (Nashville, Tennessee): Allow me to convene our panel of experts: Dr. Bruce Gantz, Dr. Derald Brackmann, and Dr. Peter Smith, all well known to you as recognized authorities in the field. Gentlemen, I don't propose this to be any bizarre form of Singapore caning. I would like to lead you through a few scenarios proposed to elaborate your collective experiences. Nothing fancy; no fancy slides or horrific hand-grenade pictures. No potholes, pitfalls, or traps. All are real cases, but some are quite special. I think your experience is the key thing we are trying to access today. As surgeons we continuously attempt to solve old and new problems with new solutions. These solutions obviously involve decisions. Goethe said that making decisions without risk is akin to victory without glory. As skull base surgeons we certainly get our share of the glory, but some decisions we make result in maximum impacts on patients' quality and quantity of life. This constitutes the risk and the reality of neurotologic/skull base surgery. These cases and scenarios I would like to present constitute a real dose of reality, and we will attempt to derive some solutions. We also recognize that we have as many experts in the audience as we do on the panel, so if we say something you don't like, by all means speak up.

Gentlemen, the first case is pretty typical. It is a 35-year-old white female with a large glomus jugulare tumor. This is a prototypical lesion: the patient presented with pulsatile tinnitus, hearing loss, cranial nerve paralysis, and no intracranial extension. She passed all tests and balloon occlusion studies preoperatively. Catecholamines were normal preoperatively, so the patient is a non-secretor. Intraoperatively, we are approaching this lesion through the infratemporal fossa, and we have gotten distal control of the internal carotid artery in the mid-petrous portion. There is plenty of room to work with. Blunt sharp dissection of the tumor off the internal carotid artery goes nicely; it is successful. But (there is always a but), as we are mobilizing the internal carotid artery to resect the anterior medial section of the glomus jugulare tumor, the artery goes into intense spasm. So you have carotid artery spasm intraoperatively

right before your eyes. The dimension of the artery is about a third its original size. Peter, what do you think caused this?

Dr. Peter G. Smith (St. Louis, Missouri): I want to begin by saying that on a screen saver that I just purchased up came a quote, and it said, "Experience is something you don't get until just after you need it." This is very apropos to today's discussion. Gary, in that particular setting, I think dissection in a longitudinal fashion along the internal carotid artery or exposure to significant blood that is associated with taking out a glomus jugulare tumor causes spasm.

Dr. Jackson: So there is an intrinsic myogenic response to mechanical stimulation?

Dr. Smith: Exactly.

Dr. Jackson: Bruce or Derald, anything else that you know? What about circulating catecholamines in this kind of circumstance? Do you think there is any importance to that? Bruce?

Dr. Bruce J. Gantz (Iowa City, Iowa): No, I don't have any experience with that.

Dr. Jackson: There have been some reports that connect sympathomimetics to this issue. This is an unusual complication. Bruce, what would you do with this?

Dr. Gantz: Papaverine. I would get a vial of . . .

Dr. Jackson: What is going through your mind. Let's go through your decision process.

Dr. Gantz: The first thing you want to do is to be concerned about the flow. You want to do two things to increase the flow: (1) you want to tell the anesthesiologists that you have some problems and ask that they consider increasing the blood pressure to try and cross-perfuse; and (2) at the same time you want to try to relieve the spasm. Probably the easiest thing to relieve that spasm would be to get some papaverine and put it on the vessel.

Dr. Jackson: Derald, any other solutions?

Dr. Derald E. Brackmann (Los Angeles, California): Just be pro-active for this. When you are dissecting on the internal carotid artery you don't wait for it to go into spasm. I like to take plain Xylocaine almost immediately and just bathe the wound in plain Xylocaine, which has very little other effect. Then, if

I begin to see spasm, that is when I use the papaverine. However, if you bathe it in plain Xylocaine first I think you can prevent that.

Dr. Jackson: Any other options, Peter?

Dr. Smith: Well, I am carrying it a little step forward. I have papaverine on hand in a cottonoid (3% papaverine solution), and I put it on the artery as I am dissecting. Much like one would in the posterior cranial fossa. The only problem is that it changes the color of the tissue around it. I have seen spasm enough that it makes me very concerned. It is amazing how small the internal carotid artery can become secondary to spasm.

Dr. Jackson: Anything systemic?

Dr. Smith: You mean at the time or preoperatively?

Dr. Jackson: Either.

Dr. Smith: Unfortunately, I had a patient, on whom we reported in 1981, who died of spasm, and so I am a little sensitive to this. Our review of the literature suggested that systemic therapy preoperatively as with nifedipine really is not that effective in preventing spasm, so I don't generally use it.

Dr. Jackson: Anyone in the audience have any unique solutions to this problem? Pharmacologic solutions. Well, we have done that.

Dr. Brackmann: I was just going to comment here. This can be a problem that can, as Peter has reported, be disastrous.

Dr. Jackson: Hold on. We are going to get there.

Dr. Brackmann: I was going to comment that I think it is important that you do all of the tumor—remove the tumor before you work on the carotid. Don't make that the first part of your operation. Make that the last part of your operation. So that if you do have to abort the surgery, you have already done the majority of the work in removing the tumor, then take care of the carotid artery last, not first.

Dr. Jackson: When President Kohut gave us this title for this panel, I recognized he was serious, so we are going to get there. Well, you do the papaverine, you do the lidocaine. You get a preliminary response. Things look good for a few minutes, and all of a sudden things go bad. The spasm recurs; the distal artery is blue, starting to discolor. It is now pulseless, and you risk peripheral infarction—substantial neurologic sequelae, damage to the arterial media, intima, intimal sloughing. What is going through your mind, Dr. Brackmann? Let's work through this decision. How are you going to deal with it? What are your options?

Dr. Brackmann: Well, first of all, what I am going to do is do the things we have talked about. You might try some intravenous Xylocaine as a desperate thing. Bathe it in papaverine and don't do anything. Sit tight and just wait. Because, even though it may look terrible, that could still be reversible, and, as Bruce has already mentioned, make sure the patient is perfused, make sure the patient is normotensive, and just wait.

Dr. Jackson: Let's just talk about that for one

second. Let's divert. How do you manage cerebral ischemia? Now you are obviously in a cerebral ischemic situation; now you are in trouble. You have a major problem as Peter testified to earlier. What are some of the things that you like to do, Bruce?

Dr. Gantz: Well, like I said, I think you have to make sure that the anesthesiologist is aware of the problem, and you want to try and cross-perfuse as much as you can by increasing the blood pressure.

Dr. Jackson: Show of hands. Steroids? Mega-dose steroids?

Panel: Yes.

Dr. Jackson: Mannitol, dextran?

Panel: No.

Dr. Jackson: Mild hypertension?

Panel: Yes.

Dr. Jackson: Certainly hydration to increase the oxygen levels; decrease PCO₂; hypocarboxemia; CSF drainage. You are working with your anesthesiologist to do everything you can to maximize cross-perfusion. You are still in trouble. Derald, how long are you going to wait?

Dr. Brackmann: I don't know. Fortunately, I have not been in this situation, but I would guess that I would probably sit tight 15 minutes, 20 minutes, and see if it were going to reverse. I think that the problems you mentioned with the intimal sloughing and sludging and embolization are real significant concerns. The point at which you give up and occlude that artery to prevent those complications—that is really the decision. At what point do you say it is irreversible, and we had better do something to prevent an embolus from occurring—thrombosis and embolus? I am guessing, 15 to 20 minutes.

Dr. Jackson: Well, let's just talk shop. Let's try to solve this problem, obviously because it is a problem we might not walk away from. It is a pretty significant one. What are your options? Bruce, give me an option. How are you going to deal with this problem? Let's just blatantly say it is irreversible.

Dr. Gantz: Irreversible?

Dr. Jackson: You are really in trouble. You have got an adynamic segment of the artery that is pulseless, blue, and occluded.

Dr. Gantz: Well, I think if it is irreversible then you make a decision on whether to resect that artery and graft it, and if you have mobilized the carotid artery, you can resect that section and mobilize it enough so it can be resected.

Dr. Jackson: You have plenty of room to do that. There are no technical constraints; you have it all exposed.

Dr. Gantz: If that is the case, then you would resect it and reanastomose it primarily.

Dr. Jackson: Peter, what is another option? What other things could you think of? I am not saying this is what you would do. Let's think through; let's make the decision.

Dr. Smith: I think it is important to understand this is a very uncommon complication. Listening to Derald and Bruce talk, I was thinking, it is really

important to have an understanding of what is going on distal to the clotted segment. I think most of us have available today intraoperative angiography. That's the first thing I would do, and I certainly would leave the artery alone because, like Derald says, the biggest complication is secondary to embolism.

Dr. Jackson: How about shunting the segment?

Dr. Smith: No. I think my initial mode of therapy if it is irreversible is to go ahead and ligate the artery up in the petrous segment.

Dr. Jackson: So you just distally bypassing and taking . . . ; what is the risk of ligating it?

Dr. Smith: The same thing as having a . . .

Dr. Jackson: All your preoperative tests occlusion studies are normal. What's the risk?

Dr. Smith: Pretty low—relative to an embolism.

Dr. Jackson: Bruce, what's your risk?

Dr. Gantz: Well, we have had situations where we have had preoperative angiography normal, and we've occluded the carotid artery, and we still have gotten a stroke.

Dr. Jackson: The risk is about 20%. How about arteriotomy, mechanical dilation, thrombectomy?

Dr. Smith: I have seen it described, but my major fear in doing that in this particular situation is shoving a clot up in the distribution of the cerebral circulation. How do you know how far up to do the embolectomy without risking the chance of literally shoving a clot up pass the circle of Willis? I think John Leonetti has a question or a statement.

Dr. Jackson: John.

Dr. John Leonetti (Chicago, Illinois): Two things you want to do: (1) massage *your* brain and (2) massage the patient's brain. One thing you didn't mention is what kind of monitoring you have to help you make a decision as to what your next move is.

Dr. Jackson: Cranial bloodflow is less than 18 mL per 100 mg per minute.

Dr. Leonetti: Electroencephalogram (EEG): if the patient has significant EEG changes during the time of the spasm, then you have to make the decision of what maneuvers you could possibly be able to take to help preserve brain tissue. Other issues would be not to use mannitol, but to give the patient additional fluids and blood to prevent hypertension, and decrease the O₂ consumption of the brain by cooling the body temperature as well. You can do that without placing the patient on cardiopulmonary bypass. You can drop the core body temperature significantly enough to decrease brain oxygen consumption. If the spasm continues, this is based upon our neurosurgical literature, you do not want to resect an artery because the length of the spasm can expand up and down the vessel. So the amount of blood vessel you need to resect is really difficult to determine. Another option is to perform an arteriotomy. Stick an angiocatheter within the lumen, and break the spasm mechanically, although there is the risk of this dislodging an embolus with the arteriotomy and the angiocatheter. That's another way to break the spasm when mechanical and chemical issues don't help.

The reason the catheter may not work is that you have an intimal disruption of the carotid artery that the catheter does not go through, and there may be spasm below and above the level of the tumor attachment.

Dr. Jackson: Thank you, John. Another option is to bypass the segment. Do a carotid artery to middle cerebral bypass, which is an option as well.

John, are you doing EEG monitoring in such cases?

Dr. Leonetti: Not for every glomus tumor, but it sounded like he described more significant arterial involvement, and if we see medial extensions, medial to the vertical petrous portion of the carotid, medial to the horizontal segment, we perform EEG and balloon occlusion tests. Three years ago that was the hot issue. The current literature suggests it is not very helpful.

Dr. Brackmann: Gary, let me tell you my experience. Preoperatively technetium and PET scans on this patient would have provided a fairly good indication of what that perfusion is. And if that happened to me, I would have taken out 90% of that tumor before I was at this point. At that point, I would do a distal ligation, occlude that artery, close the wound, and put that patient on heparin immediately. Because the tumor wasn't extending intracranially, you can afford to have a little bleeding in the neck. You drain the neck, and heparinize that patient. We have done that now on several occasions, I think seven, and we have had no complications related to that. So based upon that experience, that's what I would do.

Dr. Jackson: I would like to take this case just a step forward because Dr. Brackmann used the word heparinization. Derald, if there was a significant posterior cranial fossa involvement and you had that widely opened, would that change your . . .

Dr. Brackmann: It would change it considerably. Without intracranial extension, you would have a much greater leeway in terms of heparinization.

Dr. Jackson: Well, I think that discussion exposes the tragedy of the circumstance in this very difficult issue and several different problems which we have not really solved yet. Dr. John Leonetti of Chicago, we certainly appreciate your comments. The outcome in this case was tragic. The surgeon decided, in the face of spasm, to just abort the case. A massive cerebral infarction occurred, and the patient died on day five.

Let's proceed to something I would like to call "How I Do It," or "Technical Moment," otherwise known as "I Hate It When It Does That." We have a 25-year-old male with an unusual lateral skull base tumor, benign tumor not a malignancy, involving the petrous apex. Our approach is postauricular, transcochlea, requiring extensive facial nerve mobilization. As if possessed by some demonic intention of its own, the facial nerve mysteriously translocates to become wrapped around the shaft of your burr, turning at about 40,000 rpm. Generally regarded as harmful, you hear the solitary sentinel from the facial

nerve monitor as the nerve is avulsed from the brain stem. The only sound you hear is that of your perspiration hitting the floor. What do you do, Dr. Brackmann?

Dr. Brackmann: The tumor was what, Gary?

Dr. Jackson: Benign with skull base lesion; not a malignancy, not a cancer.

Dr. Brackmann: Well, you would go ahead at that point, and you would do whatever you needed to do . . .

Dr. Jackson: There is no proximal stump.

Dr. Brackmann: You do whatever you needed to do to cure the problem. I mean in terms of taking care of the lesion, and then you assess the facial nerve problem.

Dr. Jackson: Let me just divide this into two things. What is going through your mind about the trauma? Then let's talk about reanimation. Is there any effect on the brain stem from this trauma?

Dr. Brackmann: No, that wouldn't be likely. I have never seen an acoustic where the facial nerve comes off right at the brain stem, etc. The brain stem itself I don't think would be injured, so I wouldn't be concerned about that.

Dr. Jackson: Well, you are usually dissecting and you are usually transecting—you are not pulling at 40,000 rpm.

Dr. Brackmann: I have not had that experience. But I suspect that it would just come off and not cause significant injury there. I wouldn't think it would.

Dr. Jackson: Bruce, are you worried about that?

Dr. Gantz: Well, if there is not a lot of edema and hemorrhage at the site, I don't think I would be worried about it, but I think the facial nerve—if there is a tumor there, and it has been compressed and thinned—it is going to be fragile. I think it is going to give before the brain stem. The brain stem is pretty tough; it is amazing how tough it is.

Dr. Jackson: I think everybody pretty much accepts that as consensus. Derald, you have had some experience with facial nerve reimplantations and grafts, etc.; how would you approach this reanimation problem?

Dr. Brackmann: Well, as many people have experienced, and as Charlie Luetje, others, and we all have written about, the absolute best way to rehabilitate the facial nerve is to reestablish its continuity. In this case, you would have to put in a graft. If you can find even a suggestion of a stump at the brain stem, it is amazing how that nerve will find that graft. If you have anything at all that you can anastomose from the brain stem, that's the preferred method. In a case like this, I mean if there is nothing there, there is nothing there. In that case I would probably stop at that point and then in the immediate perioperative period, depending on what the other circumstances were, do a 12-7 anastomosis.

Dr. Jackson: Suppose, Peter, you do have a stump, a proximal stump of the facial nerve. Is it usable?

Dr. Smith: Boy, this is going to bring up a little controversy. I disagree with Derald in terms of a

facial-facial at the level of the brainstem, particularly when you have a shred of the facial nerve there. I consider myself a reasonable surgeon. I have tried it a number of times, and it is exceedingly difficult unless you have some arachnoid to sew to. In this setting, I doubt very seriously whether you would. I would favor a facial-hypoglossal anastomosis in the early perioperative period. A facial-facial (Charlie, I love you to death wherever you may be) is a difficult operation. It may be as you said in your editorial that I should be referring those patients, but I don't think I will.

Dr. Jackson: Any other discussion on that issue?

Dr. Gantz: I think you can get a couple of sutures down on the brain stem through most of the approaches that we use and with some special instrumentation, using long microvascular instruments; it is time consuming, it is frustrating. You pull the stump or the graft off of the stump a couple of times, but, like Derald says, take your beating in the operating room and really try it. You don't have anything to lose here by trying to do that anastomosis.

Dr. Jackson: Would you identify yourself, sir?

Unidentified Speaker: I don't agree that you don't have anything to lose. You have a lot to lose potentially because you are waiting around to see if that nerve comes back. You wait 3 months, and you wait 6 months, and it doesn't come back, and now you do a 12-7, and that result isn't going to be anywhere near as good as if it had been done first. That is one of the problems with the 7-7. If you have a stump you can identify, as Derald has suggested, that's one thing. But if you don't have an identifiable stump, I tell you, if you sit around waiting, hoping, the results are going to be much less good.

Dr. Gantz: No, I disagree with that; I'm sorry. I think there are a number of people who have a lot of experience putting 7-7 nerves back together and very, very few failures. I think you can wait around. When you do a 12-7, most of the time you get too much activity with that twelfth nerve if you do it end-to-end. If you do what Mark May does and jump graft it, you have a little less activity with the 12-7, which is a little more pleasing. If you put a gold weight in the eye and sit there and wait, I don't think you are going to have that much difference. If you wait for 6 months, and you see that there is no activity there, or 8 months, then go ahead and do the 12-7.

Dr. Jackson: Let's present another scenario, which constitutes another opportunity for solutions. You are relaxing one day with a day of surgery, a typical Peter Smith day, of four stapedectomies, a myringoplasty, and to break the tedium a difficult cholesteatoma . . .

Dr. Smith: I wish.

Dr. Jackson: Between cases, as you are on your second donut, you're emergently summoned to the operating room of the Head and Neck Surgical Team. A 30-year-old black female, you encounter, with a glomus vagale tumor, most of which is "out," but it extends "high." In a blind high dissection an

uncontrollable rent high in the internal carotid artery has occurred. There is no possibility of distal control. They need a neurologic skull base surgeon to see what they can do. All cranial nerves are intact except cranial nerve X. There is no preoperative internal carotid artery test balloon occlusion data. Blood is dripping from the OR lights and your Head and Neck colleague looks ashened. What's your solution, Dr. Smith?

Dr. Smith: The patient is bleeding, is that correct? Well, the first thing I would do is get some vaginal packing and pack off the area at the level of the skull base. And believe it or not, this is probably a real case because this is not uncommonly seen.

Dr. Jackson: It is a real case.

Dr. Smith: You need to control the bleeding. The ABCs of resuscitation.

Dr. Jackson: That's under control.

Dr. Smith: All right. Get that controlled. I should wish you had some preoperative studies. I think I probably would consider some form of exposure to the artery above the site of injury. I think the fastest way to do that is via a middle cranial fossa approach. The horizontal segment of the petrous carotid is often dehiscence, and I think you can probably get access to that in around 20 minutes under the best of circumstances. What you do at that juncture then is another story. Your options are ligation or revascularization with an interpositional graft. That takes a little longer. Obviously you can put in some balloon to stop the bleeding above the site where you are working.

Dr. Jackson: Derald, it has obviously hit the fan. How are you going to solve this problem?

Dr. Brackmann: I would try to estimate where the ophthalmic artery is and then put in an intraoperative balloon to control the bleeding without putting a lot of pressure on the artery. The injury is going to be right at the skull base.

Dr. Jackson: A detachable balloon?

Dr. Brackmann: No. I would put in a temporary balloon occlusion just to temporarily control it. The shorter the dead space you can make, the less likely you are to have a clot that is going to propagate. So even intraoperatively, rather than have a big pack up there while you are exposing the artery, it is better to have a balloon up there with a short dead space. Try to estimate how far you could put it and then you will have the distal control—then you will have a controlled situation. There is still a risk of thrombosis and embolism and stroke. At that point, that risk is already there and you are not going to increase it; you just want to minimize it. Then I would go through the mastoid and intratemporal fossa and expose the artery. That will take a couple of hours to do. You probably have to sacrifice the conductive hearing mechanism to do it, but that is a small price to pay. Hopefully, you would be able to repair that artery at the base of the skull.

Dr. Jackson: But all the while you are still occluded.

Dr. Brackmann: All the while you are occluded. You might even be able to give the patient low heparinization, mild heparinization during it.

Dr. Jackson: So even though you are occluded for 2 hours, you would go back and repair it?

Dr. Brackmann: I think that is the best option. There are no good options; I think that is the best option.

Dr. Jackson: We have already discussed cerebral ischemia and risk of stroke; we are concerned about the exposure problem. Bruce?

Dr. Gantz: Well, I have been in this situation. The problem is that you have the packing at the skull base, and every time you remove the packing, you lose three units of blood trying to find where the carotid artery/carotid canal is. So, in my situation, the quickest thing that I did was to remove the eardrum with a large diamond burr and to go down to the turn of the carotid artery as it turns into the petrous apex and take a Kittner and occlude the internal carotid artery to get control. So that was the first thing. We lost probably 15 units of blood trying to get control, and the anesthesiologist put in two lines and increased the blood pressure again for cross-perfusion. Once you have control, then you can start dissecting under more controlled conditions and find where the artery is cut, and in this case it was cut, transected very sharply right at the skull base. We were then able to put bull-dog clamps distally, get control of the artery, and do a primary anastomosis. Fortunately, that patient did not develop a stroke. That's where your major concern is. I would say there is a 50/50 chance of developing a stroke.

Dr. Jackson: The only good outcome—so now the Head and Neck surgeon pays your child's tuition for the next 4 years. Let's go back to another technical moment or "I Hate It When It Does That." You are doing a large, lateral skull base tumor, quite destructive within the confines of the temporal bone. It is a very pneumatized temporal bone as well. In the course of the dissection between the extent of the dissection and the extent of the bone destruction and the pneumatization of the temporal bone, a large bone fragment breaks free and is attached to the carotid artery. I mean, I have it happen to me all the time. It is right in the way. You have got to dissect the tumor off of that section. You have a loose bone fragment attached to the artery. We will talk about the facial nerve and the jugular bulb and other structures in a minute or two. But, what do you do with that? How do you solve it? I mean, a technical moment—how do you deal with that problem? Anybody?

Dr. Smith: Sharp dissection.

Dr. Jackson: Derald?

Dr. Brackmann: As with any complication, the best management is to avoid it; this occurs more often on the facial nerve. You know where you are trying to mobilize the facial nerve and all of a sudden you have a big segment . . .

Dr. Jackson: Let's talk about that while we are there, too. That's the next issue.

Dr. Brackmann: I think it is important when you

are dissecting on the carotid or the facial nerve to do it sort of from the top, away from it rather than all around it and then have that big chunk of bone. Once you have it there that's a real problem because when you are drilling on it, if you have a big piece of bone there, you are going to have to manage it, and I think you have to very gingerly with diamond burrs try to thin that bone down until you can fragment it and remove it.

Dr. Jackson: Any special solutions from Iowa, Dr. Gantz?

Dr. Gantz: No.

Dr. Jackson: How about on the jugular bulb; you know the facial nerve has a little bit of tensile strength, and the carotid certainly has some tensile strength; the jugular bulb has none. Any special solutions there? I usually just pack off the jugular bulb and have at it. This is one issue I am sure all experienced surgeons have encountered. In a well-pneumatized temporal bone doing this dissection, all of a sudden the entire labyrinth appears to be just free-floating. Does that have a negative effect on hearing or balance? What do you do with that? I have seen it in trauma a number of times—a well-pneumatized temporal bone and you just palpate the labyrinth—the bony labyrinth—it is just floating back and forth. Don't all jump at once.

Dr. Gantz: Is there still hearing there?

Dr. Jackson: Well, this happens intraoperatively; you are "smack dab" in the middle of it.

Dr. Smith: I have never seen that intraoperatively. The only setting I have seen it in is in trauma, and you leave it alone.

Dr. Jackson: The only one I have seen has been in a dead ear. Well, let's move on. We are getting very, very short of time.

This is a 28-year-old female with a large glomus vagale extending from the midneck into the temporal bone and infratemporal fossa. This is a big deal. I am going to condense it; again, there are no tricks, no pitfalls. Intraoperatively the tumor is successfully dissected off of the carotid artery, so it is free. It is now involving the foramen magnum and cervical vertebrae and as you drill and dissect the tumor, all of a sudden you get arterial bleeding just north of C1, south of the mastoid tip, medial toward the foramen magnum. After you get everything under control, you recognize you have a vertebral artery injury. What goes through your mind, Dr. Gantz?

Dr. Gantz: Help! This is a real problem. You have to make sure that you don't have a major brainstem stroke at this point if you have injured that vessel.

Dr. Jackson: My neurosurgeon gets real antsy when we are around the vertebral artery; unlike the carotid artery, it is really not very forgiving. It hasn't been forgiving in our experience. Any other experiences? Well, again in the interest of time, we were able to do an arteriotomy repair on this one and successfully get a pulse distally. Do you abort or do you continue?

Dr. Brackmann: So you were able to repair the

artery, Gary? There was an injury to the vertebral artery?

Dr. Jackson: There was an injury to the vertebral artery. We repaired it and went on. What do you do? Do you abort the procedure now? See how the patient is neurologically? Do you continue?

Dr. Brackmann: I would probably abort the procedure. We just heard a paper about x-ray therapy, I think for glomus tumors, particularly when you have done major bulb resection of the tumor; I think salvage x-ray therapy has a lot of merit. I think you don't treat these like you do a malignancy where you have to remove every last bit of it. If you encounter a major complication, you take out the majority of the tumor before you get to the carotid or vertebral artery, so you have 90% of it out, and then if things are not going well, you can stop and watch them. Don't irradiate them until you watch them because a lot of them won't grow without radiation either. Then see what happens. I would stop.

Dr. Jackson: Peter?

Dr. Smith: Before I answer that question, just like we assess the carotid and protect the carotid in removing some of these lesions, when the vertebral artery is at risk, in a similar fashion I think it is important to mobilize that artery in relation to the tumor, and it can be easily done. There are techniques available for doing so. I am trying to be as practical as I can in this situation. You have the posterior cranial fossa open; you have already repaired the arterial rent, so you probably have mobilized this tumor effectively. I probably would go ahead and take the rest of it out. It is probably a chip shot relatively speaking.

Dr. Jackson: Well, we did. Good pulses distally. The extent of the dissection then of this tumor renders the occipital condyle portion of C1 gone. You are really concerned about the stability of the spine or at least I am. Bruce, have you encountered that?

Dr. Gantz: When you are doing a large tumor on the lateral skull base involving the craniocervical junction, if you are removing a large portion of C1 in the occipital condyle, my neurosurgeon usually puts those patients in traction and comes back and does a posterior cervical fusion in a few weeks.

Dr. Brackmann: If there is any of it left, we usually just observe the patient, but if it is all gone that's what we do, too. Even a part of the occipital condyle and C1 will seem to provide adequate support.

Dr. Smith: I agree with Derald. In that setting, as opposed to putting him in a collar for a temporary thing, I just go ahead and do a rigid fixation at the time of surgery.

Dr. Jackson: Well, that was the outcome in this patient. That's exactly what we did. We did put him in fixation. Flexion and extension CTs revealed a craniocervical instability. Fusion then occurred, and the patient has done well.

President Kohut, we will put the program back on schedule. As usual in dealing with you gentlemen, I have learned an awful lot. I appreciate your cordiality and thank you all.

CONGENITAL DISORDERS

TRANSPOSITION OF THE FACIAL NERVE IN CONGENITAL AURAL ATRESIA

Robert A. Jahrsdoerfer, M.D.

ABSTRACT

It is generally recognized that surgery for congenital aural atresia is difficult. The success or failure of the operation is often directly related to the degree of development of the middle ear. In poorly developed middle ears, the facial nerve may overhang and conceal the oval window niche, making this area inaccessible to inspection, let alone manipulation. The criteria for transposing the facial nerve are: (1) the atresia must be bilateral, (2) there must be preoperative imaging evidence of a stapes and/or patent oval window, (3) there must be no large blood vessels feeding or draining the facial nerve, and (4) facial nerve monitoring must be available. Over the past 2 years, 6 of 94 patients undergoing surgery for atresia were operated with an intent to transpose the facial nerve in order to access the oval window. In all patients, it was impossible to see the oval window niche due to a displaced nerve. In four of six cases, the facial nerve was transposed. The ossicular chain was reconstructed with a total ossicular replacement prosthesis. In no case was there a postoperative facial paralysis or paresis. Facial nerve transposition allows a final chance of achieving serviceable hearing through surgery. The lack of facial nerve injury and the potential for hearing restoration make this procedure feasible in otherwise marginal or poor surgical candidates.

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SURGERY OF CONGENITAL AURAL ATRESIA

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and Elizabeth Garrido, M.D.‡*

ABSTRACT

The treatment of congenital aural atresia has changed in recent years. Better imaging capabilities, the development of tympanoplasty techniques, modification of mastoid dissection, and facial nerve monitoring have resulted in greater patient benefit with less patient risk. Success rates continue to be high, and the incidence of complications has decreased. A series of cases was reported in 1985, and now the authors review 92 congenital aural atresioplasties performed over the following 9 years. Closure of the air-bone gap to less than 30 dB was achieved in 60% of primary surgeries and 54% of revisions. The most common complications were external auditory canal stenosis and lateralization of the tympanic membrane. External auditory canal stenosis due to bony regrowth was seen in 12% of primary cases and 11.5% of revisions; soft tissue stenosis was seen in 10% of primaries and 4% of revisions. Tympanic membrane lateralization was seen in 9% of primary surgeries and in 15% of revisions. Carbon dioxide and argon lasers (HGM Medical Laboratories, Salt Lake City, Utah) and Merocel stenting wicks with split-thickness skin grafting were used to try to improve long-term hearing outcome and decrease postoperative external auditory canal stenosis. With meticulous surgical technique by an experienced otologic surgeon and appropriately selected patients, this problem can be managed effectively.

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HEARING LOSS IN PAGET'S DISEASE OF BONE: EVIDENCE OF AUDITORY NERVE INTEGRITY

Edwin M. Monsell, M.D., Ph.D., Henry G. Bone, M.D.,† Dianna D. Cody, Ph.D.,‡
Gary P. Jacobson, Ph.D.,§ Craig W. Newman, Ph.D.,# Suresh C. Patel, M.D.,**
and George W. Divine, Ph.D.††*

ABSTRACT

Auditory brainstem responses (ABRs) were recorded in 64 ears with radiographically confirmed Paget's disease involving the skull. Responses were absent in eight ears, all of which had elevated high pure-tone thresholds. Auditory brainstem responses were interpreted as normal in 56 ears; none were abnormal. Computed tomography and digital image analysis were used to quantify internal auditory canal (IAC) dimensions. The midlength diameter and minimum diameter of the IAC of 68 temporal bones from subjects with Paget's disease were found to have no statistically significant relation to hearing thresholds. Increased IAC length showed a limited relation to reduced hearing level in pagetic subjects, possibly consistent with bossing adjacent to the porus acusticus. Findings support the principle that hearing loss in Paget's disease of bone is generally associated with intact auditory nerve function and also support a cochlear site of lesion.

*Head, Division of Otolaryngology and Neurotology, Department of Otolaryngology—Head and Neck Surgery, †Bone and Mineral Division, Bone and Joint Specialty Center, ‡Division of Radiologic Physics and Engineering, Department of Diagnostic Radiology, §Director, Division of Audiology, Department of Otolaryngology—Head and Neck Surgery, and Department of Neurology, #Division of Audiology, Department of Otolaryngology—Head and Neck Surgery, **Head, Division of Neuroradiology, Department of Diagnostic Radiology, ††Division of Biostatistics and Research Epidemiology, Henry Ford Health Sciences Center, Henry Ford Hospital, Detroit, Michigan

Presented at the Annual Meeting of the American Otological Society, Palm Beach, Florida, May 7–8, 1994.

Reprint requests: Dr. Edwin M. Monsell, Department of Otolaryngology—Head and Neck Surgery, Henry Ford Hospital, 2799 West Grand Blvd. K-8, Detroit, MI 48202

MONITORING COCHLEAR FUNCTION INTRAOPERATIVELY USING DISTORTION PRODUCT OTOACOUSTIC EMISSIONS

*Fred F. Telischi, M.E.E., M.D., Michael P. Widick, M.D.,
Brenda L. Lonsbury-Martin, Ph.D., and Marcy J. McCoy, M.S.*

ABSTRACT

Distortion product otoacoustic emissions (DPOAEs) elicited by a bitonal stimulus complex are low-level sounds that are generated within the cochlea, and are easily measured by a miniature microphone system placed in the external auditory canal. Under conditions of rapid measurement, DPOAEs have been shown in an animal model to be exquisitely sensitive to interruption of the blood supply to the inner ear. Currently, there is no real-time procedure available for monitoring hearing function intraoperatively during neurotologic surgery. The goal of the present study was to determine the utility of DPOAEs in monitoring cochlear status intraoperatively, particularly during procedures commonly used to remove acoustic neuromas. Distortion product otoacoustic emissions were measured pre- and intraoperatively in 11 patients, who were under general anesthesia for a variety of otolaryngologic procedures, including acoustic neuroma resection. High frequency emissions (i.e., ≥ 4 kHz) were less affected by the elevated levels of acoustic noise present in the operating-room environment, thus permitting emitted responses to be updated as quickly as every 2 seconds. However, a number of technical problems were encountered and addressed during development of the emission monitoring technique. Despite these difficulties, overall, DPOAEs appear to be a promising adjunct to the intraoperative monitoring of auditory function.

Department of Otolaryngology, University of Miami Ear Institute, Miami, Florida
Presented at the Annual Meeting of the American Otological Society, Palm Beach, Florida, May
7-8, 1994.

This work was supported by grants from the Deafness Research Foundation and the Public Health
Service (DC00613, ES03500).

Reprint requests: Dr. Fred F. Telischi, University of Miami Ear Institute, Department of
Otolaryngology (D-48), P.O. Box 016960, Miami, FL 33101

CHARACTERIZATION OF DNA EXTRACTED FROM ARCHIVAL CELLOIDIN-EMBEDDED HUMAN TEMPORAL BONE SECTIONS

Phillip A. Wackym, M.D., F.A.C.S., Caroline T. Chen, M.S.Ed.,†
Marc M. Kerner, M.D.,‡ and Theodore S. Bell, Ph.D.**

ABSTRACT

The focus of the present investigation was to study, via molecular biology techniques, the character of the DNA present in individual archival celloidin-embedded human temporal bone sections. Polymerase chain reaction (PCR) amplification of 92 base pair (bp), 121 bp, and 471 bp regions of mitochondrial DNA (mtDNA) extracted from a single archival celloidin-embedded human temporal bone section was used to assess the length of the template DNA extracted. The effects of digestion time and sample motion during the extraction method on DNA concentration was also studied. These data are crucial to determine the limits of applying PCR technology to amplify specific genomic DNA targets located within the human inner ear. Further development of these methods will allow additional molecular temporal bone pathologic studies to be completed and, more specifically, hypotheses regarding the molecular etiopathogenesis of many auditory, vestibular, and facial nerve disorders, such as autoimmune hearing loss, congenital hearing losses, Meniere's disease, otosclerosis, or Bell's palsy could be tested. The results described should be of great value to those investigators extracting DNA from archival individual human temporal bone sections for PCR assays of specific genetic alterations or infectious agents associated with temporal bone pathologies.

*Assistant Professor of Surgery, †Staff Research Associate, ‡Postdoctoral Scholar, Laboratory of Molecular Biology, Goodhill Ear Center, Section of Otology and Neuro-Otology, Division of Head and Neck Surgery, Department of Surgery, UCLA School of Medicine, Los Angeles
Presented at the Annual Meeting of the American Otological Society, Palm Beach, Florida, May 7-8, 1994.

Reprint requests: Dr. Phillip A. Wackym, Assistant Professor and Director, Temporal Bone and Molecular Biology Laboratories, Goodhill Ear Center, UCLA School of Medicine, 31-24 Rehabilitation Center, 1000 Veteran Avenue, Los Angeles, CA 90024-1794

VESTIBULAR DISORDERS AND INNER EAR DISORDERS

STREPTOMYCIN PERFUSION OF THE LABYRINTH THROUGH THE ROUND WINDOW PLUS INTRAVENOUS STREPTOMYCIN

John J. Shea Jr., M.D., Xianxi Ge, M.D.,* Daniel J. Orchik, Ph.D.,*
and Charles H. Norris, Ph.D.†*

ABSTRACT

The objective of this study was to relieve the dizzy spells, fullness, and low frequency tinnitus of Meniere's disease without making the hearing worse. All patients of the senior author with unilateral stage II and stage III Meniere's disease were subjected to streptomycin perfusion of the labyrinth through the round window and intravenous streptomycin for 3 consecutive days. The results were observed from 1 month to 1 year later. Fifty-six patients, with the usual signs and symptoms of Meniere's disease, were confirmed to have this diagnosis by abnormal transtympanic electrocochleography, ice water caloric tests, and rotation tests. On each of 3 consecutive days, approximately 0.5 mL of hyaluronan containing streptomycin, 120 mg/mL, was placed in the round window niche, with that ear remaining up while 1 g of streptomycin was given intravenously. The relief from dizzy spells, fullness, and low frequency tinnitus, plus changes in hearing, were observed and monitored by changes in the electrocochleogram and ice water caloric and rotation tests. There was good relief from dizzy spells in 55 of 56 patients (98%). The hearing was improved in 17 of 56 (30%), the same in 36 of 56 (65%), and worse in 3 of 56 (5%). Fullness and low frequency tinnitus were reduced in most patients with relief from dizzy spells. With streptomycin perfusion of the labyrinth through the round window plus intravenous streptomycin it is possible to stop dizzy spells, to reduce endolymphatic hydrops, fullness, and low frequency tinnitus in most patients, and to improve hearing in about 30% of patients, usually without making the hearing worse. This procedure is easy to perform, safe, and reasonable, and it is the authors' treatment of choice for stage II and stage III unilateral Meniere's disease.

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†Tulane University School of Medicine, Department of Otolaryngology—Head and Neck Surgery, New Orleans, Louisiana

Presented at the Annual Meeting of the American Otological Society, Palm Beach, Florida, May 7-8, 1994.

Reprint requests: Dr. John J. Shea Jr., Shea Clinic, 6133 Poplar Pike, Memphis, TN 38119

TEMPORAL BONE HISTOPATHOLOGY OF CISPLATIN OTOTOXICITY

Raul Hinojosa, M.D., Landon C. Riggs, M.D.,† Melvin Strauss, M.D.,‡
and Gregory J. Matz, M.D.†*

ABSTRACT

Cisplatin (cis-diamminedichloroplatinum II) is a potent chemotherapeutic agent that is useful in the treatment of a variety of malignancies. Ototoxicity is a well-known adverse side effect of this drug and has been widely described in reports on clinical and animal studies. Few human temporal bone studies, however, have been performed for cisplatin ototoxicity. This report presents four cases of cisplatin ototoxicity in patients from whom temporal bone specimens with minimal post-mortem autolysis were obtained at autopsy. All patients received between 1 and 6 cycles of cisplatin with doses ranging from 100 to 165 mg/M² per cycle. None of the patients received significant amounts of aminoglycosides or loop diuretics. Histopathologic changes included loss of inner and outer hair cells in the basal turn of the cochlea, degeneration of the stria vascularis, and a significant decrease in spiral ganglion cells predominantly in the upper turns.

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Presented at the Annual Meeting of the American Otological Society, Palm Beach, Florida, May 7-8, 1994.

Reprint requests: Dr. Raul Hinojosa, University of Chicago Hospital, 5841 S. Maryland Avenue, MC 1035, Chicago, IL 60637

ULTRASTRUCTURAL FINDINGS IN THE VESTIBULAR END-ORGANS OF AIDS CASES

Dennis G. Pappas Jr., M.D., J. Thomas Roland Jr., M.D.,* Jessica Lim, M.D.,*
Andrew Lai, B.S., and Dean E. Hillman, Ph.D.*†*

ABSTRACT

Neurotologic manifestations are apparent in human immunodeficiency virus (HIV) infection, but are poorly understood. Symptoms related to the vestibular system include episodes of vertigo, imbalance, ataxia, and nausea. Although patients present more often with hearing impairment, vestibular complaints are described and electrophysiologic studies indicate vestibular dysfunction in HIV-infected patients. Whether the disease involvement includes the central, or the peripheral nervous system has not been established. Ultrastructural analysis of vestibular end-organs obtained from HIV autopsy cases revealed pathologic changes in the labyrinth wall, the epithelial lining, and the receptor maculae and cristae. Cytologic changes in hair cells included inclusion bodies, viral-like particles, and hair bundle malformations. Epithelial lining cells, supporting cells, and connective tissue cells had inclusions and viral-like particles. These findings are consistent with those of a previous cochlear study demonstrating intracellular viral-like particles with the morphologic characteristics of HIV. Further cytologic evaluation of decalcified temporal bones and immunohistochemical analysis of freshly harvested HIV-infected temporal bones may provide further insight into the pathogenesis of viral-induced hearing loss and vestibular impairment.

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Presented at the Annual Meeting of the American Otological Society, Palm Beach, Florida, May 7-8, 1994.

Reprint requests: Dr. Dean E. Hillman, NYU Medical Center, 550 First Avenue, New York, NY 10016

CORRELATION OF BETA-2 TRANSFERRIN AND MIDDLE EAR ABNORMALITIES IN CONGENITAL PERILYMPHATIC FISTULA

Peter C. Weber, M.D., Charles D. Bluestone, M.D.,† Margaret A. Kenna, M.D.,‡
and Robert H. Kelley, Ph.D.§*

ABSTRACT

Congenital perilymphatic fistula (PLF) as a diagnosis for progressive, fluctuating, or sudden sensorineural hearing loss with or without vertigo is still controversial. Beta-2 transferrin is a protein that is unique to cerebrospinal fluid, aqueous humor, and perilymph. A recent pilot study demonstrated that beta-2 transferrin may be an objective test to determine the existence of a congenital PLF. The authors prospectively evaluated and recommended surgery for 43 children with suspected PLF over the past 3 years. A prospective, blinded study was performed by having the attending otolaryngologist evaluate the middle ear at the time of surgery for a PLF and any middle ear abnormalities. Samples of fluid were collected from the oval and round windows and were tested for beta-2 transferrin. Of 16 patients undergoing tympanoplasty or tympanomastoidectomy who served as controls, none were positive for beta-2 transferrin. Of the 43 patients undergoing exploratory tympanoplasty for PLF, 20 (46.5%) were considered to be negative for PLF on microscopic visualization; 23 (53.5%) were found to be positive. Of the 20 patients thought to be negative for PLF, 18 (90%) tested negative for beta-2, but 2 of these patients were positive for beta-2, and both had a congenital middle ear abnormality. Of the 23 patients found to have a PLF at surgery, 6 (26.1%) tested positive for beta-2, and all of these 6 had middle ear abnormalities. Of the 17 patients negative for beta-2, 9 had normal anatomy; 6 had middle ear abnormalities, and 2 had erosive changes. The authors conclude that beta-2 transferrin, an objective test, confirms the existence of congenital PLF in children, which is associated with middle ear abnormalities.

*Assistant Professor of Otolaryngology—Head and Neck Surgery, Director, Center for Hearing and Balance Disorders, Medical University of South Carolina, Charleston, South Carolina

†Professor, Department of Otolaryngology, University of Pittsburgh School of Medicine; Director, Department of Pediatric Otolaryngology, Children's Hospital of Pittsburgh, Pittsburgh, Pennsylvania

‡Associate Professor, Department of Otolaryngology, University of Pittsburgh School of Medicine; Co-Director, Department of Pediatric Otolaryngology, Children's Hospital of Pittsburgh, Pittsburgh, Pennsylvania

§Associate Professor, Department of Central Immunopathology, University of Pittsburgh School of Medicine, Presbyterian University Hospital, Pittsburgh, Pennsylvania

Presented at the Annual Meeting of the American Otological Society, Palm Beach, Florida, May 7-8, 1994.

Reprint requests: Suzanne K. Stewart, M.L.S., Department of Pediatric Otolaryngology, Children's Hospital of Pittsburgh, 3705 Fifth Avenue, Pittsburgh, PA 15213

LOSS OF PERILYMPH AFFECTS ELECTROCOCHLEOGRAPHIC POTENTIALS IN THE GUINEA PIG

Mohamed Badr-El-Dine, M.D., George M. Gerken, Ph.D.,*†
and William L. Meyerhoff, M.D., Ph.D.**

ABSTRACT

Alterations of electrocochleographic (ECoG) potentials recorded from guinea pig cochleae have been reported to occur following round window (RW) membrane perforation (perilymphatic fistula). To further evaluate the pathophysiology of perilymphatic fistula, a study was conducted of the short-term effects of acute RW membrane perforation on the amplitude of the summing potential (SP) and the action potential (AP), and the SP:AP ratio. Acute RW membrane perforation was produced in 15 Hartley guinea pigs. The animals were placed in a head dependent position, so that some perilymph would drain from the inner ear following RW perforation. For both click and low frequency tone burst stimuli (2 kHz), the mean AP amplitudes showed variable but progressive deterioration with time following RW membrane perforation. Action potential latencies showed a significant increase with time for both click and tone burst stimuli. Summing potential amplitudes for click and tone burst were typically stable or slightly decreased. Interanimal variability of all measures was typically high. However, AP and SP amplitudes in the same animal were consistently and differentially affected by perforation of the RW membrane. There also were differential effects on the positive and the negative components of the SP, suggesting the interplay of several generator mechanisms. The authors conclude that AP amplitude and, consequently, the SP:AP ratio are sensitive to the creation of a perilymphatic fistula. These results provide support for the use of ECoG tests in the diagnosis of perilymphatic fistula.

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†Callier Center for Communication Disorders, University of Texas at Dallas, Dallas, Texas
Presented at the Annual Meeting of the American Otological Society, Palm Beach, Florida, May
7-8, 1994.

Reprint requests: Dr. William L. Meyerhoff, Department of Otorhinolaryngology, University of
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AEROSPACE OTOLOGY

Sam J. Marzo, M.D., Gregory J. Matz, M.D.,* Andrew H. Hotaling, M.D.,*
and Dan Woodard, M.D.†*

ABSTRACT

Modern otology deals well with problems in the 1-G, 1-atmosphere environment of the earth's surface. Ascent into the upper atmosphere and space environment poses new, unique problems with regard to otology and the neurovestibular system. Pressure changes in these environments are matched in the middle ear and can cause vertigo and middle ear pathology. The 0-G environment of space can have adverse effects on the neurovestibular system, resulting in space motion sickness. If man is to travel in and adapt to such an environment, the future otologist must be familiar with aerospace physiology and its impact on the middle ear and neurovestibular system. This article describes the physiology, pathophysiology, and treatment of otologic disorders of aircraft flight and space flight. Whereas barotrauma is the most common otologic problem of the atmospheric environment, space motion sickness is one of the most serious obstacles in human space flight. Other issues, such as decompression sickness and surgery in space, also are discussed.

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†National Aeronautic and Space Administration, Kennedy Space Center, Florida

Reprint requests: Dr. Sam J. Marzo, Department of Otolaryngology—Head and Neck Surgery, Loyola University of Chicago, 2160 South First Avenue, Maywood, Illinois 60153

TO ABANDON OR NOT TO ABANDON: ANTESIGMOID CRANIOTOMY WITH RETRO- LABYRINTHINE VESTIBULAR NERVE SECTION

Charles M. Luetje, M.D., C. Keith Whittaker, M.D.,*
and Patricia Gentner, R.N.†*

ABSTRACT

Increasing popularity of the retrosigmoid approach would have one believe this is the preferred posterior fossa approach for a vestibular nerve section. The authors take issue with this. The antesigmoid, posterior lateral retrolabyrinthine approach is a gentle craniotomy, easily performed and with low morbidity. A review of 70 consecutive cases revealed no procedural alteration because of surgical exposure, absence of meningitis, no seventh nerve weakness, minimal headache, average hospital stay of 5 days, and only one patient with significant cerebrospinal fluid leakage. Hyperventilation anesthesia, patients undergoing delicate eighth nerve exposure, incorporation of abdominal fat into dural closure sutures, and prophylactic antibiotics have made this operation easy for the patient—and the surgeon. Don't abandon it!

*University of Missouri, Kansas City, Missouri

†Otologic Center, Inc., Kansas City, Missouri

Presented at the Annual Meeting of the American Otological Society, Palm Beach, Florida, May 7-8, 1994.

Reprint requests: Dr. Charles M. Luetje, Otologic Center, Inc., 3100 Broadway, Suit 509, Kansas City, MO 64111

PAROXYSMAL POSITIONAL VERTIGO: AN OVERVIEW AND THE DEPOSITS REPOSITIONING MANEUVER

Athanasios Katsarkas, M.D.

ABSTRACT

In a retrospective live study, electronystagmographic (ENG) recordings in patients (n = 526) suffering from paroxysmal positional vertigo (PPV) of the posterior semicircular canal were divided into group I (n = 425) and group II (n = 101), depending on whether the vertigo could or could not be elicited at the time of recording. There was no statistical difference between the two groups for (1) the ipsilateral (fast phase toward the affected side) or the contralateral positional nystagmus (excluding the nystagmus recorded during the paroxysm) or (2) the bithermal caloric labyrinthine or directional preponderance; nor within each group for (1) the ipsilateral versus the contralateral positional nystagmus or (2) the ipsilateral (on the affected side) versus the contralateral labyrinthine and/or directional preponderance. In a prospective study, the deposits repositioning maneuver (DRM) was attempted in 41 patients. One day post-treatment patients felt no change, better, or free of vertigo. Most patients, who developed nystagmus in the final DRM head position similar to the nystagmus observed in the provocative head position had a better outcome. It is concluded that ENG recordings do not contribute to the diagnosis of PPV. The type of observed nystagmus in the final DRM head position is frequently an outcome predictor. Following the DRM, failures and/or recurrences are to be expected.

Professor, Department of Otolaryngology, McGill University, Montreal, Quebec, Canada
Presented at the Annual Meeting of the American Otological Society, Palm Beach, Florida,
May 7-8, 1994.

Reprint requests: Dr. A. Katsarkas, Royal Victoria Hospital, #E4.48, 687 Pine Avenue West,
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AMERICAN OTOLOGICAL SOCIETY AND AMERICAN NEUROTOLOGY SOCIETY SURVEY OF VESTIBULAR REHABILITATION

*Mohamed A. Hamid, Ph.D., M.D., Gordon B. Hughes, M.D.,
and Sam E. Kinney, M.D.*

ABSTRACT

The authors surveyed members of the American Otological and American Neurotology Societies to assess the use and effectiveness of vestibular rehabilitation. A list of 11 questions was mailed to 366 members, and 157 completed responses (43%) were returned. Fifty percent of respondents used vestibular rehabilitation, particularly in patients with positional dizziness, motion sickness syndrome, and postoperative recovery. Patients were selected based on history, examination, and vestibular and postural testing. Vestibular rehabilitation programs were home or clinic based and used standardized or customized exercises. Treatment lasted weeks or months, or until symptoms resolve. Ninety percent of programs used adjunct pharmacologic therapy. Sixty percent of patients expressed satisfaction with the outcome, based on self-monitoring (20%), or by physician estimates (80%). Questionnaire surveys are limited because of selection and respondents' bias. Nevertheless, this survey suggests that vestibular rehabilitation is helpful in managing selected patients with dizziness.

The Cleveland Clinic Foundation, Cleveland, Ohio

Presented at the Annual Meeting of the American Otological Society, Palm Beach, Florida, May 7-8, 1994

Reprint requests: Dr. Mohamed A. Hamid, The Cleveland Clinic Foundation, 9500 Euclid Avenue, Cleveland, OH 44195

EFFECT OF VESTIBULAR REHABILITATION ON POSTOPERATIVE DYSEQUILIBRIUM FOLLOWING TRANSMASTOID LABYRINTHECTOMY

Alan W. Langman, M.D., and Roger C. Lindeman, M.D.

ABSTRACTS

Persistent dysequilibrium develops postoperatively in a number of patients who undergo ablative vestibular surgery. The mechanism for this persistent dysequilibrium is thought to be incomplete compensation by the central nervous system for the loss of the peripheral vestibular system input. Vestibular rehabilitation exercises have been shown to be effective treatment for patients with dysequilibrium attributable to a variety of vestibular disorders. These exercises are thought to enhance the adaptive and compensatory mechanisms already present in the central nervous system. This study investigates the effectiveness of vestibular rehabilitation exercises in reducing the development of persistent dysequilibrium following unilateral vestibular ablation. The incidence of postoperative dysequilibrium was determined retrospectively, in 47 individuals following transmastoid labyrinthectomy. Subjects were divided according to those who received vestibular rehabilitation exercises postoperatively ($n = 13$) and those who received no specific postoperative treatment ($n = 34$). Persistent dysequilibrium developed in 15.4% of the group that received rehabilitation and in 29.4% of the group that did not. This difference was not statistically significant. The results from this study suggest that postoperative vestibular exercises may be beneficial in reducing the incidence of persistent dysequilibrium following unilateral ablation.

Section of Otology, Neurotology and Skull Base Surgery, Virginia Mason Medical Center, Seattle, Washington

Supported by a grant from the William G. Reed Fund for Research in Otolaryngology

Reprint requests: Dr. Alan W. Langman, Division of Otology, Neurotology and Skull Base Surgery, Virginia Mason Medical Center, 1100 Ninth Avenue, Seattle, WA 98111

DEVELOPMENT OF A DIZZINESS DISABILITY SCALE

Vicente Honrubia, M.D., Ronald S. Reiter, Ph.D.,* Theodore S. Bell, Ph.D.,**
*Marjorie R. Harris, M.A.,† Robert W. Baloh, M.D.,**
and Diane Y. Petersen, M.D.†*

ABSTRACT

A prospective study was conducted to develop a dizziness disability scale. Patients attending an outpatient clinic were provided with a five-part lexical questionnaire ranking the magnitude of their dizziness by frequency, severity, and impact on daily activities. Patients also responded to standardized questionnaires to evaluate their degree of anxiety and depression. The impact of these attributes on the patients quality of life and fear of becoming dizzy were also self-rated by the patient. The patient's score on quality of life was compared with that provided by the physician in a blind questionnaire. The dizziness disability scale that was developed addresses the physical, functional, and emotional impact of dizziness and can be considered a promising scale for the evaluation of the degree of disability in vestibular patients.

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†Bay Shores Medical Group, Torrance, California

Presented at the Annual Meeting of the American Otological Society, Palm Beach, Florida, May 7-8, 1994.

Supported by NIH-NIDCD Research Training Grant 01404, NIH-NIA Grant AG09693, and National Medical Enterprises, Inc.

Reprint requests: Dr. Vicente Honrubia, 62-129 CHS, UCLA School of Medicine, Los Angeles, CA 90095-1624

INTRODUCTION OF NEW PRESIDENT: ROBERT A. JAHRSDOERFER, M.D.

Robert I. Kohut, M.D.

I have a very distinct pleasure now, and that is to introduce your new President. It has been a privilege for me to work for you this year, and you are going to have a better year with Bob. He is a winner—Dr. Robert Jahrsdoerfer.

REMARKS OF NEW PRESIDENT

Robert A. Jahrsdoerfer, M.D.

Thank you, Bob. I also have a distinct pleasure. I have a certificate from the American Otological Society to Bob Kohut. It says, "Presented to Robert Kohut, President, in appreciation and recognition of his service to the Society." I simply want to say that if I can do half the job that he has done, the Society will be in good shape. Next year the meeting is going to be at the Marriott's Desert Springs Resort in Palm Desert, California, and we hope to see you there.

Dr. Kohut: Thank you. We are adjourned.

EXECUTIVE SESSIONS

BUSINESS MEETING

MINUTES — MAY 7-8, 1994

Robert I. Kohut, M.D., President, called the meeting to order at 12:30 PM, Saturday, May 7, 1994. The minutes of the 1993 AOS Annual Meeting, held in Los Angeles, California, April 17-18, 1993, were approved.

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

Active Members: George W. Facer, M.D., proposed by D. Thane Cody, M.D. and seconded by Charles M. Luetje, M.D.; Carol A. Jackson, M.D., proposed by Antonio De la Cruz, M.D. and seconded by William F. House, M.D. Associate Members: Salvatore Iurato, M.D., proposed by Joseph Nadol, M.D. and seconded by Harold F. Schuknecht, M.D.; Paul R. Kileny, Ph.D., proposed by Malcolm Graham, M.D. and seconded by Robert T. Sataloff, M.D.

A Nominating Committee, including Drs. Patrick E. Brookhouser, Jack Kartush, Robert J. Keim, Charles M. Luetje, and Eugene N. Myers, was elected to prepare the slate of officers for the 1994-95 year.

REPORT OF THE SECRETARY-TREASURER

SECRETARY'S REPORT

Report of the present membership:

(NOTE: This count includes the four new members inducted earlier on this date May 7, 1994.)

Active Members	135
Senior Members	61
Associate Members	39
Honorary Members	9
Emeritus Members	3
Total Members	247

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

Deaths since last meeting:

- Luzius Ruedi, Ph.D., Zurich, Switzerland, elected to Honorary Membership in 1952, died July 1993.
- Maurice Schiff, M.D., LaJolla, California, elected to Active Membership in 1967 and Senior Membership in 1988, died November 1993.
- J. William Wright Jr., M.D., Indianapolis, Indiana, elected to Active Membership in 1978 and Senior Membership in 1991, died February 1994.

Candidates for Senior Membership of the Society were announced. A candidate must have reached the age of 70 or have been a member of the Society for 20 years. A voice vote for Senior Membership on each of the following candidates was taken and approved: A.H. Ted Bailey Jr., M.D., Richard A. Buckingham, M.D., J. Ryan Chandler, M.D., James A. Donaldson, M.D., Eugene N. Myers, M.D., George T. Nager, M.D., James L. Sheehy, M.D., Paul H. Ward, M.D., and Robert J. Wolfson, M.D.

Donald W. Goin, M.D., was approved for Emeritus Membership.

TREASURER'S REPORT

Income Statement—American Otological Society, July 1, 1993-March 31, 1994

Balance brought forward \$76,044.60

Income:

COSM Payment (1993) 4,745.10

COSM Payment (1994)	11,740.00
Membership dues	48,800.00
Initiation fees	2,100.00
Banquet fees (not pre-registered)	400.00
Transactions	3,140.00
Research Fund transfer	
Insurance & Bonding	221.00
Research Fund transfer	
Taxes	1,300.00
Interest	1,511.08
Tax return (1991)	111.86
Total Income	74,069.04

Balance..... 150,113.64

Expenses:

ACCME	700.00
Accounting Fee	5,000.00
Decker Periodicals	
1992 AOS Transactions	\$15,095.40
1993 AJO	8,130.00
1994 AJO	7,980.00
Total	31,205.40
Donations	
Deafness research	1,000.00
Hearing Institute	500.00
Total	1,500.00
Fall Council Meeting	239.60
Insurance	
Travel insurance	285.00
Dishonesty bond	390.00
Liability	
Directors'/Officers'	3,257.00
Total	3,932.00
Midwinter Meeting	11,450.43
Membership dues	800.00
Miscellaneous	
Deposit box	10.00
Bank charges	22.48
Kohut-ACS Meeting	1,267.62
Kohut-COSM Meeting	610.48
Total	1,910.58
Postage	293.93
Printing	566.94
Secretarial Expense	
Secretary-Treasurer	2,000.00
President	1,500.00
Editor-Librarian	938.32
Total	4,438.32
Spring Meeting	2,617.00
Total Expenses	64,654.20

Balance..... \$85,459.44

Dr. Joseph Farmer reported that the *The Journal* had shown an increase in profits, even though subscriptions had decreased; but, he expressed the belief that this was due to an increased number of papers. He noted that *The Journal* is in search of a new Editor (the term of which is 5 years). The person chosen for this position would work with Dr. C. Gary Jackson from January 1995 until Dr. Jackson retires from the position in January of 1996. Advertisements for this position will be placed in all of the scientific journals, and announcements will be made at the various business meetings. The deadline for submission of an application for this position is September 1, 1994.

Dr. Farmer requested that the minutes of this meeting note the exemplary performance that Dr. Jackson has given to enhance the quality of *The Journal* during the past 10 years as Editor. The Society heartily agreed with this commendation.

Dr. Farmer noted that the Editor-Librarian office was near completion of an entire set of *Transactions*. He hoped that the collection will be duplicated on microfilm in the near future for reference at the Academy Museum.

Dr. Kohut called the Society members' attention to the proposed Bylaw on Corresponding Membership. The Society voted to approve the addition of this Bylaw:

- 3.1.0.f. Corresponding
- 3.2.0.f. Corresponding Members
 - i. Shall be those who are ineligible for Active Membership but are considered worthy of membership in the Society because of their contributions to clinical otology.
 - ii. May participate in business and scientific sessions and may serve on committees. Corresponding Members may not vote, propose new members, or serve as a Member of the Council.
 - iii. Shall pay the initiation fee, meeting and registration fees, and fees for social events, but shall be exempt from payment of annual dues.
- 9.1.0.h Shall be recommended by two Active or Senior Members and voted on by the Council.

The Society was presented the following proposed Bylaw change, which will be voted on at the 1995 Annual Meeting in Palm Desert.

- 9.1.0.d. "Any candidate vetoed by eight percent of the eligible voting members shall be eliminated from the list of applicants for membership."

Dr. Kohut thanked the members of the Program Advisory Committee: Drs. John Dickins, Robert A. Dobbie, George Gates, Julianna Gulya, Maureen Hannley, Stephen G. Harner, Robert Jackler, Gary Jackson, Jack Kartush, Douglas Mattox, and John McElveen.

The Business Meeting was adjourned and the first Scientific Session started at 1 PM with remarks presented by Dr. Robert I. Kohut, President. Remarks were then presented by the Guest of

Honor, Dr. Cesar Fernandez. President Kohut presented the Presidential Citations to Drs. James B. Snow and C. Gary Jackson.

The Scientific Session was adjourned at 5:30 PM with all members staying for the group photograph.

The second Business Meeting was held on Sunday, May 8, 1994. Reports were received as follows:

- Report of the Board of Trustees of the Research Fund of the American Otological Society, given by Dr. Richard Miyamoto.
- Report of the American National Standards Institute, submitted by Dr. Ralph Naunton.
- Report of the American Board of Otolaryngology, given by Dr. Warren Adkins.
- Report of the Award of Merit Committee: Dr. Michael Glasscock chaired this committee consisting of himself, Drs. Mansfield Smith, Robert Kohut, John Fredrickson, and Patrick Doyle. The Award will be presented at the Sunday evening dinner/dance.
- Report of the American College of Surgeons Board of Governors to the American Otological Society, given by Dr. Gregory J. Matz: Dr. Matz reported that the topics of interest included the need to schedule the surgical forum at a time when more attendance can be generated, because this forum encourages younger physicians to submit papers. It was noted that the specialty may be pulling out of the surgical forum; however, the AOS Council hopes to reinstate its backing of the surgical forum, since this is of such great value to young investigators.
- Report of the American Academy of Otolaryngology—Head and Neck Surgery, given by Dr. Harold Pillsbury.
- Report of the COSM, given by Dr. Jerry Goldstein.
- Report of the Audit Committee, given by Dr. Robert Jackler.
- Report of the Nominating Committee: The Nominating Committee, chaired by Dr. Robert Keim, presented the slate of officers for the 1994–95 year. They are as follows: Drs. Robert Jahrsdoerfer, President; Derald Brackmann, President-Elect; Gregory J. Matz, Secretary-Treasurer; Joseph Farmer, Editor-Librarian; and new Council Member, C. Gary Jackson. The Society voted on the above nominations.

The Business Meeting was adjourned and the second session of the Scientific Program began at 7:45 AM. Following the Scientific Program, Dr. Kohut turned over the gavel to the incoming President, Robert A. Jahrsdoerfer, M.D. Dr. Jahrsdoerfer thanked Dr. Kohut for the excellent program he had organized and presented him with a certificate for his presidential year. The meeting was adjourned at 12:15 PM.

The President's reception and dinner/dance was attended by 200 persons. President Kohut introduced the newly inducted members of the Society and their spouses. Dr. Michael Glasscock presented the Award of Merit to Dr. Fred Linthicum.

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

REPORT OF THE EDITOR-LIBRARIAN

All of the materials for Volume 81, the 1993 edition of the *Transactions* should be in the hands of the publisher by June 1, 1994. Copies should be available for distribution in early fall.

As previously noted, the Society Bylaws require that Senior, Emeritus, and Associate Members pay the cost of the *Transactions*. This year the cost will remain at \$65 per issue, including postage. Announcements of the availability of the 1992 issue were sent to each member; a similar announcement will be sent when the 1993 issue is published. Any Senior, Emeritus, and Associate Members who desire to purchase the 1992 or the 1993 *Transactions*, when available, should send payment to my office. The 1992 *Transactions* is one of the larger issues and contains all of the panel discussions presented at the meeting in Desert Springs in addition to all the papers. The 1993 *Transactions* will contain the transcribed panel discussions plus the papers presented at the meeting in Los Angeles.

The Editor-Librarian's office has been working with Mr. Phillip Seitz, Historian at the American Academy of Otolaryngology—Head and Neck Surgery Museum, to ensure that a complete set and

backup copies of the *Transactions* is available at the Museum in Alexandria, Virginia. As regards a complete set, we have sent to each Senior and Emeritus Member a listing of the current and missing volumes and requested their assistance in locating the missing copies. I hope that we will receive assistance and be able to locate several issues that we are missing, notably any copies of Volume 2, 1875–1879, Volume 15, 1919, Volume 16, 1924, and Volume 46, 1958.

As regards ensuring that backup copies of the *Transactions* are available, Mr. Seitz has assisted us in approaching the National Library of Medicine, specifically the History of Medicine Division, which has a program to microfilm decaying medical periodicals and those needed for research by other libraries. To get a periodical filmed, a specific request must be issued for a microfilm copy. If none exists, the library will place the copy on a queue for filming and if a series of volumes is incomplete they will make an attempt to locate and borrow the missing volumes for microfilming a complete set. The AOS *Transactions* from 1869 through 1921 have

already been filmed and copies can be purchased at \$18.65/reel. If anyone is interested in a microfilm copy, one can ask a medical center library for such a copy of any volume of the *Transactions* through an interlibrary loan request. We are in the process of asking the National Library of Medicine to microfilm all volumes of the *Transactions* from 1921 on and will place copies in the Museum. This will probably require about 1 year.

Extra copies of more recent issues of the *Transactions* are being kept by the Editor-Librarian in a climate-controlled, pest-free environment at Duke University. All but one of these copies can be offered for sale at cost.

Finally, I wish to present to the members the photographic results of our annual group portrait of last year's meeting. These identification legends are again available to be used this year. They were initially introduced in 1992 in Duke blue and white to celebrate the National Basketball Championships. They were used last year in spite of the fact that the championship was won by our rival colleagues from UNC. They return this year to celebrate Duke reaching the finals and being in the Final Four for 8 years out of the past 10.

REPORT OF THE BOARD OF TRUSTEES OF THE RESEARCH FUND

The March 17, 1994, valuation of the Research Fund was \$5,286,046. The Board of Directors voted to continue with Mr. Arthur Schweithelm of Chemical Bank as manager of the fund investments. The investment mix remains 60% equities and 40% fixed income investments.

This year the Trustees reviewed 19 grant applications and 2 fellowship applications. Six grants and one fellowship were funded. The total funding was just under \$175,000.

Seriously, the value of these photographs and this method of identifying individuals, originally suggested by Mansfield Smith, cannot be underestimated.

When we assemble for the photograph, each member must report to the Secretary's desk where Judy Matz, Greg's better half, ably assisted by others, including Linda Hedberg and Ruth Parks, will give each member a card that contains a number. Your name and number must be recorded before you leave the desk. We will then take one photograph with each member holding the card under the chin so that it can be seen by the camera. Again, please hold your number so that the head of the individual standing in front does not obscure the camera's view. We will then collect the cards and take another photograph, hopefully with everyone remaining in the same position. Please bear with us. The numbering system does help to bring about greater accuracy and completeness for future generations.

Respectfully submitted,
Joseph C. Farmer Jr., M.D., F.A.C.S.

In response to a request from the Friends of NIDCD, a \$10,000 grant to that organization was awarded. The American Otological Society has once again taken a leadership role in supporting the efforts of the NIDCD.

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

REPORT OF THE AMERICAN NATIONAL STANDARDS INSTITUTE, INC.

The American Otological Society continues its membership in and support of the American National Standards Institute (ANSI). The Society has input to and collaborates with ANSI Committees of Bioacoustics (S3) and Noise (S12). These two Committees have approximately 40 to 50 working groups drafting new, or revising existing standards. The working groups are expected to provide progress reports at the biannual committee meetings. It is proposed that two new working groups be established, one on sound field audiometry and a second on methods for using sound quality.

Each complete ANSI standard must be reviewed at least every 5 years to determine whether it should be re-affirmed, revised, or withdrawn.

Standards published by ANSI since my last report to you deal with the Specification of Noise from New Machinery (ANSI S12-16-1992), Description and Measurement of Environmental Sound

(ANSI S12-9-1992/Part 2), and the Measurement of Sound Emitted by Portable, Stationary, and Fixed Electric Power Tools, and Gardening Appliances.

A number of new or revised standards are now in draft form on topics including: Acoustical Terminology, Criteria for Evaluating Room Noise, Calculation of the Speech Intelligibility Index, and Method for Measuring Speech Levels.

A variety of International Standards Organization (ISO) and International Electrotechnical Commission (IEC) documents have been circulated for review; their topics include Audiometric Test Methods (Speech Audiometry) (ISO), Equipment for High Frequency Audiometry (IEC), and Determining the Physical Performance of Hearing Aids (IEC).

Respectfully submitted,
Ralph F. Naunton, M.D., F.A.C.S.

REPORT OF THE REPRESENTATIVE TO THE BOARD OF GOVERNORS OF THE AMERICAN COLLEGE OF SURGEONS

The American College of Surgeons (ACS) 1993 Fall Meeting was held in San Francisco. The Board of Governor's meeting addressed several important issues. Health-care reform appeared in 90% of the Governor's reports. With the separate Medicare Volume Performance Standard (MVPS) for surgical services, the surgical specialty again came under its target value and in the coming year will receive an 8.6% increase. The College has established an 800 hot line number for problems with CPT coding that the membership can use to receive assistance. Seminars and regional managed care meetings of ACS CPT will give information regarding negotiation and contract review with managed care programs.

In educational activities, the College is pushing for full funding of surgical residents at a graduate medical education level. It is anticipated that there will be a 12% short fall in general surgery by the year 2000. The College is also asking for no differential in

funding between primary and surgical specialty residents. The national trauma registry is operational and seems to be an early success.

The College announced that the *Surgery, Gynecology, and Obstetrics* will now become the *Journal of the American College of Surgeons*. The bulletin continues to be the main source of information transfer to the membership, and there will be a page devoted to health care reform updates.

The membership desires to have reform of legislation that prohibits collective bargaining by physicians and also wishes to have patient choice as a major component of any health care plan. Identification of surgical specialties as points of entry into the program was recognized and discussed. The lack of any meaningful tort reform in the President's policy was noted.

The AIDS committee reported that there had been 37 health care workers having work-related HIV acquisition. Two had been surgeons, none involved solid needle injury, and 32 were acquired through hollow needle sticks. The College's position is that surgeons should treat all AIDS patients, and use universal control measures. There had been no evidence of transmission from surgeon to patient. The College concludes therefore that surgeons with AIDS should be able to continue to work in the OR. It was recommended that the determination of continuation of surgical practice be made by the patient's physicians (surgeons) and local panel decisions.

The ambulatory surgery committee has developed guidelines for administration, quality assurance, etc., regarding ambulatory surgery and will make these guidelines available to the membership by a publication that will be mailed to the membership.

The impaired physicians committee is developing guidelines related to impairment by aging. The professional liability committee indicated that there was no relief expected from the current federal administration. Essential activities are encouraged at the state level. It was pointed out that there are currently already 300 residents listed as unsuccessful defendants in malpractice cases. It is felt that many of these stem from city/country hospital claims where the hospital has had poor coverage and has settled quickly,

rather than fight the suit. It was recommended that the College should support defense efforts on behalf of these residents.

All of the specialty councils have agreed to accept a young surgeon representative on their councils. Most of the councils have indicated plans to continue multiple disciplinary scientific programs. Neurosurgery and otolaryngology both indicated the concerns of their membership regarding certificates of added qualification (CAQs). General surgery reported that they will be having a head and neck symposium at the 1995 Spring Meetings that will be a joint activity with the Society of Head and Neck Surgery. The Advisory Councils were informed that the College has developed a more simplified application method.

The new business of the College included discussions of how to develop a policy to keep young surgeons involved in College activities. A presentation, Health Care Reform: A Proactive Perspective, was delivered by the San Diego chapter. There was good attendance and interest in this topic. The format for this dynamic program is available to State chapters by written request, from the San Diego chapter.

Respectfully submitted,
Robert I. Kohut, M.D.

REPORT OF THE AMERICAN BOARD OF OTOLARYNGOLOGY

The American Board of Otolaryngology (ABO) is pleased to report the following: Three successful examinations cycles have now been completed using the new examination format. Candidates must first pass a written (qualifying) examination, and then pass an oral examination to become certified. The written and oral examination scores are not combined. Candidates who successfully complete the written examination have up to three consecutive opportunities to take the oral examination. If a passing score is not achieved after three examination cycles, the candidate must re-apply to take the written examination, and must again achieve a qualifying score to be permitted to retake the oral examination.

In September 1993, 345 candidates took the written examination. Of those candidates, 13% failed; the remaining 87% became candidates for the oral examination. The oral examination was conducted for 337 candidates in April 1994 at the Palmer House Hotel in Chicago; 297 individuals were certified as a result of this examination, for an overall pass rate of 77%.

At the April 1994 Business Meeting, Dr. M. Eugene Tardy Jr. was elected President, and Dr. Eugene N. Myers was elected Vice-President/President Elect. Dr. Robert W. Cantrell was re-elected to a third term as Executive Vice-President, and Dr. D. Thane Cody continues to serve as Treasurer.

Dr. Herbert C. Jones and Dr. Gayle E. Woodson were elected to the Board of Directors, replacing Dr. Frank N. Ritter and Dr. Paul H. Ward, who were elected to Senior Counselor status after many years of dedicated service to the ABO. Dr. Jones is in the private practice of Otolaryngology—Head and Neck Surgery in Atlanta, Georgia, and Dr. Woodson is Professor of Otolaryngology at the University of Tennessee in Memphis.

The position of Associate Examiner was initiated last year. To be elected as an Associate Examiner, an individual must have served as an ABO examiner at least twice. He or she must be prominent in the specialty, especially in the areas of patient care and medical education, and must demonstrate an interest and ability in the creation of educational and test materials. The ABO is committed to electing and training new examiners while maintaining consistency

in administering the examination. The Associate Examiners are a core group of experienced examiners to fulfill this need, along with the Directors. Associate Examiners are elected to the 3-year term, and are eligible for re-election to one additional term.

The Associate Examiners are:

Elected in 1992: Edward L. Applebaum, M.D., Hugh F. Biller, M.D., Nicholas J. Cassisi, M.D., A. Julianna Gulya, M.D., Lauren D. Holinger, M.D., Jonas T. Johnson, M.D., Herbert C. Jones, M.D., Frank E. Lucente, M.D., Dale H. Rice, M.D., James Y. Suen, M.D., and Gale E. Woodson, M.D.

Elected in 1993: Robert A. Dobie, M.D., Paul J. Donald, M.D., Ellen M. Friedman, M.D., Jack L. Gluckman, M.D., G. Richard Holt, M.D., Herman A. Jenkins, M.D., Douglas E. Mattox, M.D., Richard T. Miyamoto, M.D., Robert H. Ossoff, M.D., William J. Richtsmeier, M.D., Clarence T. Sasaki, M.D., Nancy L. Snyderman, M.D., and Ernest A. Weymuller Jr., M.D.

The American Board of Medical Specialties (ABMS) is the umbrella organization of the 24 recognized certifying organizations in the United States. Representatives to the ABMS Assembly are Drs. Robert W. Cantrell, Gerald B. Healy, and M. Eugene Tardy Jr. Alternate representatives are Drs. Charles W. Cummings, Michael E. Johns, and Neil O. Ward.

Dr. Byron J. Bailey was recently re-elected to a second term as Treasurer of the ABMS, and Dr. Gerald B. Healy was recently appointed to the Committee on Certification, Subcertification, and Recertification (COCERT). Dr. Jerome C. Goldstein continues to represent the Council of Medical Specialty Societies to the ABMS assembly.

1994–1995 Examination Dates: The 1995 written examination will be conducted on September 25, and the subsequent oral examination will be conducted April 9–10, 1995. Both examinations will be given at the Palmer House Hotel in Chicago.

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

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

As the representative of the American Otologic Society to the Board of Governors of the American Academy of Otolaryngology—Head and Neck Surgery, I am submitting a report of a busy year. Two areas of significant interest to otology that have been addressed

by the Academy are (1) the study of the efficacy of pressure equalization (PE) tubes in children with uncomplicated serous otitis media, and (2) the study on the presumed overuse of PE tubes in the entire pediatric population. Both of these have appeared in the

Journal of the American Medical Association (*JAMA*). The Academy's opinion on both these issues has been in line with what the American Otologic Society would support. In terms of the second study, the Academy has generated several strong letters to the editor of *JAMA* indicating a conflict of interest between the individuals who authored the paper on tympanostomy tubes in the pediatric population and their employer, who had a vested interest in diminishing the frequency of these procedures in medicine.

On a broader front, the Academy's focus on socioeconomic activities has been extremely important to the American Otologic Society, and we all owe the Academy a debt of gratitude for their

vigilance. Educationally, the Academy's offerings, at both the Annual Meeting and the Cherry Blossom Festival, have been outstanding, with the Cherry Blossom Festival this past year being dedicated to the discussion of hearing aids.

In summary, I am pleased to report that the American Academy of Otolaryngology—Head and Neck Surgery has been hard at work in support of the research, clinical, and socioeconomic well-being of the specialty, most specifically in the field of Otology.

Respectfully submitted,
Harold C. Pillsbury, M.D.

REPORT OF THE AUDIT COMMITTEE

The audit committee of the American Otological Society, consisting of Dr. Richard Wiet, Dr. Eugene Derlaki, and myself, has reviewed the financial report of the Society for the fiscal period (July 1, 1993–March 31, 1994). Financial totals appear correct according to the data provided:

Beginning bank balance	\$76,044.60
Income during audit period	\$74,069.04
Expenses during the audit period	\$64,654.20
Bank balance as of 03/31/94	\$85,459.44

The cash disbursement register shows consecutive cheques except where voided. We identified no unusual expenditures. All money dispersed to council members was appropriately justified as expenses incurred through travel to official Society functions. The Society maintains an admirable level of financial reserves.

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

REPORT OF THE NOMINATING COMMITTEE

The Nominating Committee met yesterday and presents for your consideration the following slate of officers for the 1994–95 year: Drs. Robert Jahrsdoerfer, President; Derald Brackmann, President-

Elect; Gregory J. Matz, Secretary-Treasurer; Joseph C. Farmer Jr., Editor-Librarian; and new Council Member, C. Gary Jackson.

Respectfully submitted,
Robert J. Keim, M.D.

COMBINED OTOLARYNGOLOGICAL SPRING MEETING REPORT

Dr. Jerry Goldstein briefed the Society on current registration, which was approximately 1,175 persons for this meeting. He noted that it was an all time high registration for an Annual Meeting. He also commented on the excellent ongoing efforts of the staff of the home office with respect to the responsibilities incurred in overseeing this meeting.

Dr. Goldstein reported that future meeting sites chosen thus far for both the Combined Otolaryngological Spring Meetings (COSM) and the Academy meetings are:

- 1994: Academy—San Diego, California
- 1995: COSM—Palm Desert, California
- Academy—New Orleans, Louisiana

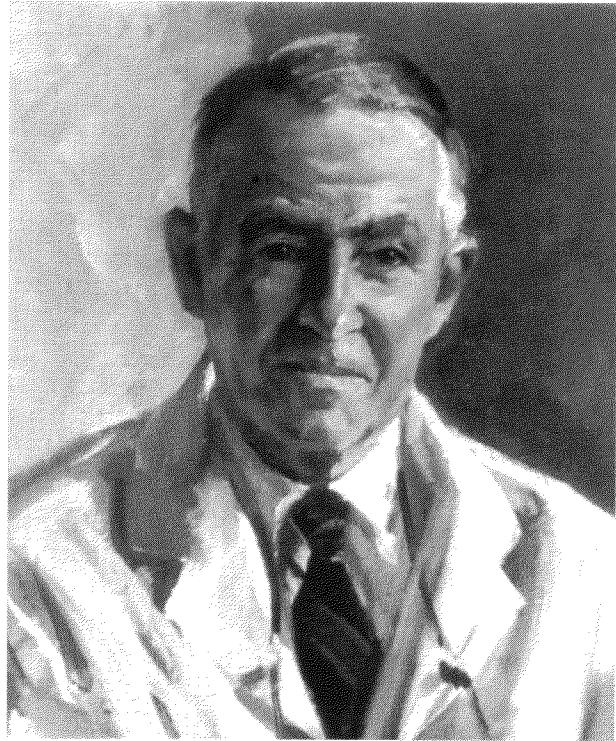
- 1996: COSM—Orlando, Florida
- Academy—Washington, DC
- 1997: COSM—Scottsdale, Arizona
- Academy—San Francisco, California
- 1998: COSM—(undecided)
- Academy—San Antonio, Texas
- 1999: COSM—Desert Springs, California
- Academy—(undecided)

Respectfully submitted,
Jerry Goldstein, M.D.

Editor's Note: The following obituary appeared in *The American Journal of Otology*, Volume 16, Number 2, March 1995, and is reprinted with permission of the editor of *The Journal*, C. Gary Jackson, M.D., and the author, William J. Richtsmeier, M.D., Ph.D. Dr. Bordley was elected to the American Otological Society in 1955 and to Senior Membership in 1986.

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

Dr. John E. Bordley was Professor and Director of Laryngology and Otology at Johns Hopkins Hospital in 1952 and Andelot Professor and Director, Department of Otolaryngology at Johns Hopkins Hospital from 1962 to 1969. He had a life-long clinical and research interest in the study of hearing disorders and communication disabilities. He was particularly interested in these problems as related to children, and established the Hearing and Speech Clinic at the Johns Hopkins Hospital, the institution in which he was born. This clinic was the first of its type affiliated with a medical center. His contributions to otolaryngology and resident training, research, and clinical work were immense. He published over 130 medical and scientific papers, setting the standards in the field by delineating previously unknown and poorly understood conditions. Among them was a study on German measles in the early 1960s, identifying prenatal rubella syndrome and its association with infection in the first trimester. He remained strongly committed to Johns Hopkins throughout his life, and in 1972, he helped establish a facility for disadvantaged youth in Omaha, Nebraska. At Boys Town National Research Hospital, he helped form a center similar to the hearing and speech clinic that he created at Hopkins. He was described as being meticulous with his examinations and history taking in the clinic and as having an extremely delicate touch in the operating room. He received numerous awards and honors for his accomplishments. As stated at the instalment of the John E. Bordley Chair in Otolaryngology—Head and Neck Surgery, he was a teacher, scientist, published author, and tireless advocate of otolaryngology. A gentle, caring physician, Dr. John Bordley



John E. Bordley
1902–1993

gave selflessly to his profession. He remains a model of excellence and an inspiration to all who knew him. Dr. Bordley died on July 12, 1993. He is missed by his many students and colleagues.

Editor's Note: The following obituary represents a translation, with significant modifications by Professor George Nager of Johns Hopkins Hospital, Baltimore, Maryland, and a Senior Member of the American Otological Society, from an obituary written by Professor Ugo Fisch of Zurich, Switzerland, and Honorary Member of this Society, which appeared in the *Swiss Medical Journal* 1993; Volume 39, page 123. Dr. Ruedi was elected to Honorary Membership of the American Otological Society in 1952. It should be noted from this obituary that Dr. Ruedi was trained by Dr. George Nager's father, Professor Felix Nager. In 1948, Dr. Ruedi succeeded his professor as Chairman and Director of Otolaryngology at Zurich University and Hospital. In 1970, Professor Ugo Fisch succeeded Dr. Ruedi as Chairman and Clinical Director at this institution. Professor George Nager was highly influenced to go into Otolaryngology by Dr. Ruedi.

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

Luzius Ruedi died on July 19, 1993, at the age of 93, at his home in Zurich, Switzerland. He was one of Europe's foremost otolaryngologists, highly regarded by his colleagues in the United States, and a treasured friend of many members of the American Otological Society, of which he was an Honorary Member.

Born in Thusis, Switzerland in 1900, he grew up in Davos, where his father was an esteemed otolaryngologist. It was during those formative years that he was first exposed to the powerful attraction, challenges, and glamour of a surgical specialty to which his future contributions would eventually earn him an international reputation.

After graduation from Zurich University School of Medicine in 1925, he began his postgraduate training in otolaryngology in Vienna with Professor Otto Meyer. He received his residency education in Zurich with Professor Felix Nager. After a few years of a very successful private practice, he joined the faculty and staff of Zurich University School of Medicine and Hospital in 1937, and in 1941 assumed the Chairmanship of Otolaryngology at the University of Bern. In 1948, he succeeded his former teacher F. R. Nager as Chairman and Director of Otolaryngology at Zurich University and Hospital, a position he held for 22 years, until his retirement in 1970.

Luzius Ruedi was an excellent clinician, very skillful and innovative surgeon, gifted clinical investigator, and very talented and enthusiastic teacher. His clinical astuteness reflected a vast knowledge accumulated from careful observations and insight during his postgraduate education and private practice. As a brilliant surgeon with a foresight to pursue the new developments in surgical techniques, he had the aptitude of recognizing immediately their potential significance. In 1939, he was one of the first Europeans to visit and work with Julius Lampert and to observe George Shambaugh Jr. and Howard House to acquire the technique of microsurgery for the management of otosclerosis, which he then introduced in Switzerland. His method of the two-stage fenestration operation for stapes ankylosis was most successful, and his modification of John Shea's and Michael Portmann's stapedectomy procedure with



Professor Luzius Ruedi
1900–1993

the use of a vein graft and interposition of the modified stapes, enabled over 2000 patients, between 1959 and 1970, to regain normal hearing. He also made valuable contributions to the surgical treatment of dysplasias of the external and middle ear.

Luzius Ruedi was a very accomplished clinical investigator. Early in his career he had directed his interests toward the understanding of mechanisms involved in the pneumatization of the mastoid process and in its influence on the developing middle ear cleft and its relation to chronic middle ear disease. His over 150 contributions to the literature covered many aspects of otolaryngology, but the most impor-

tant were related to otology. Several were concerned with the etiology, development, and local behavior of the middle ear cholesteatomas, and with the surgical management and the prevention of their complications. Another of his special interests was in otosclerosis, especially its location and regional behavior in the cochlear capsule, and in the possible mechanisms involved in the development of sensorineural hearing loss in certain locations of the disease process. Other publications dealt with the mechanisms involved and the effects of high-level noise exposure upon the organ of Corti, and with the prevention of noise-induced hearing in professional life and during military service. The monograph on acoustic injuries, in collaboration with Professor W. Furrer from the Swiss Federal Institute of Technology, became a classic.

Luzius Ruedi had all the qualifications of a great teacher. The high quality, the art of presenting a particular subject, and the enthusiasm that characterized his formal lectures and less formal discussions on ward rounds, fascinated medical students and had a decisive influence on many in the selection of their future medical specialty.

As was to be expected, several of his trainees assumed important positions in academic and other medical institutions in Switzerland and Europe. One of his students was Professor Ugo Fisch who became his star pupil and succeeded him as Chairman and Clinical Director in 1970. Ugo Fisch since earned his institution the all-time highest international recognition and reputation in clinical practice, surgical management of disease involving the ear and skull base, education of students, and training of the most quali-

fied otologic surgeons all over the world.

Promotion of a team spirit, fairness, encouragement, and support distinguished Luzius Ruedi's leadership as Departmental Chairman and was characteristic of his relation to his associates and professional and supporting staff. His cheerful, trustful, and reassuring personality was a great comfort to his patients. He had the gift and intuition to help and to stand by them in an admirable way through very difficult situations.

Luzius Ruedi was the recipient of innumerable academic honors and awards while always remaining very modest—an attribute of true greatness.

Shortly after his retirement, a tragic accident bereaved him suddenly of his physical strength and left him totally dependent. He tolerated and endured the progressive loss of muscular control with the most admirable self-discipline, sacrifice, and equanimity. The serenity with which he accepted the enormous burden of his fate without ever a hint of complaint left a profound impression with all who knew him during that period. All his life, his wife Lotti, in her legendary modest and indulgent way, was his strongest and most loyal support. With the assistance of members of her family, she took care of him in a manner of magnificent devotion and unselfishness, never leaving his side for two decades, that earned her the highest admiration of everyone.

The composure with which Luzius Ruedi mastered his physical handicap while maintaining his brilliant mental faculties, will always be remembered as will be his valuable contributions as a great physician, investigator, and teacher.

Editor's Note: The following obituary and photograph appeared in the *Annals of Otolaryngology, Rhinology, and Laryngology*, May 1994, Volume 103, Number 5, Part 1, and is reprinted with permission of the author, Dennis G. Pappas Sr. M.D., and the editor of *Annals of Otolaryngology, Rhinology, and Laryngology*, Brian F. McCabe, M.D. Dr. Schiff was elected to the American Otological Society in 1967 and to Senior Membership in 1988.

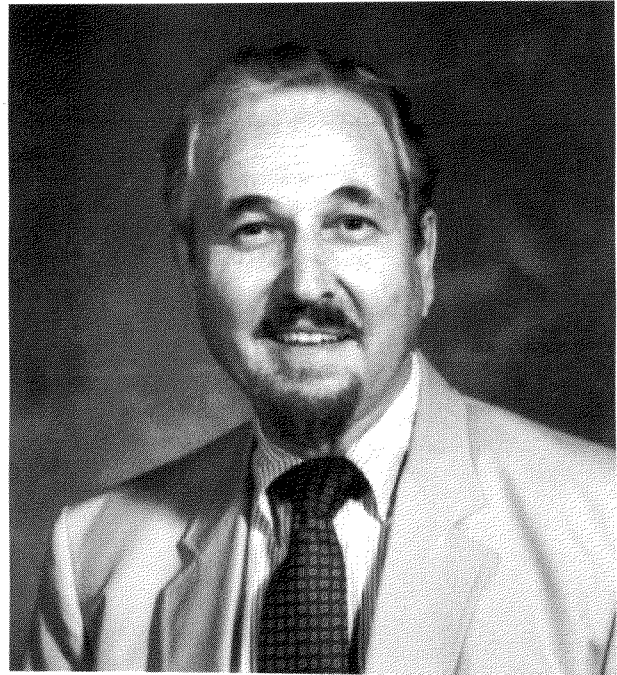
Joseph C. Farmer Jr., M.D., Editor

Maurice Schiff, M.D., was a colleague and true friend. Although I am very saddened by his death, I am honored to write this memorial. The greatest challenge it presents is to, in very few words, describe the person we all grew to love and, above all, respect. No aspect of Maurice's life was average. He worked diligently to achieve perfection. His energy was remarkable, his astuteness and perceptions unmatched, and his enthusiasm contagious. Maurice was, and will remain, greatly admired by his peers.

The depth and scope of Maurice's knowledge and talents were exceptional and extended beyond the scientific arena. He could more than adequately discuss Russian art treasures or present biographical descriptions of the scientists at Los Alamos and, if the occasion called for it, do so in one of several languages. Music was an integral part of his life and visitors would often find him musing in the surroundings of an opera or symphony.

Another of Maurice's interests was the history of medicine. He took great pride in owning *Das Gehörorgan der Wirbelthiere*, Gustav Retzius's two-volume work. Knowing of my interest in the history of otology, he called me some 4 years ago to see if I could provide him biographical and other information about Retzius. From that time on, when we met at meetings he would share his amazement of how much knowledge of microscopic anatomy was revealed in Retzius' books, and his own personal delight in discovering this. Learning and sharing were two of Maurice's most engaging attributes.

The Retzius incident was indicative of Maurice's intellectual curiosity, and his scientific works echoed this. In the early 1950s, he became interested in otologic disorders that could not be explained on the basis of etiologic factors known at that time. His search for explanations, for which he sacrificed his otology practice, was a pioneering effort in identifying the otologic manifestations of such conditions. I have recently reviewed several of his articles and was consistently impressed by his scholarly and thorough approach to problem-solving. He was never content with just reviewing the otologic literature applicable to a study he was involved in, but pursued the roots of all of its actual or implied components. His early work on facial nerve response after decompression led him to the Nobel Prize work on the nature of neural transmission done in the early 1950s by Hodgkin and Hassle.¹ Another of Maurice's early articles reported an animal study of evoked vertical eye movement and was the original study for the use of dimenhydrinate (Dramamine) to suppress them.²



Maurice Schiff
1917-1993

The talents of an imaginative, authoritative, scrupulous investigator are apparent throughout his work.

Maurice's academic background is available from many sources. What may be lacking from them is the esteem of the scientific community reflected in his appointment to the Medical Advisory Board of the Nobel Prize Committee and the honor bestowed upon him by his colleagues at the University of California, San Diego, who dedicated their otolaryngology library to him when he retired in 1993.

A tribute to someone of Maurice's caliber should be of poignant interest to a broad audience. Aside from his professional contributions, the loss of his cosmopolitan knowledge, which he shared with such charisma, will be difficult to compensate. Maurice will truly be missed socially, professionally, and academically. Our condolences to his wife, Norene, and his family.

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1. Schiff M, Langgaard H. Connective tissue and potassium in facial nerve injury. *Arch Otolaryngol* 1969; 90:437-444.
2. Schiff M, Esmond WG, Himwich HE. Forced circling movements (adversive syndrome). Correction with dimenhydrinate ("dramamine"). *Arch Otolaryngol* 1950; 51: 672-677.

IN MEMORIAM

Editor's Note: The following obituary is written from material provided by Dr. Gregory J. Matz. The photograph was kindly provided to us by Mrs. Wright. Dr. Wright was elected to Active Membership in 1978 and to Senior Membership in 1991.

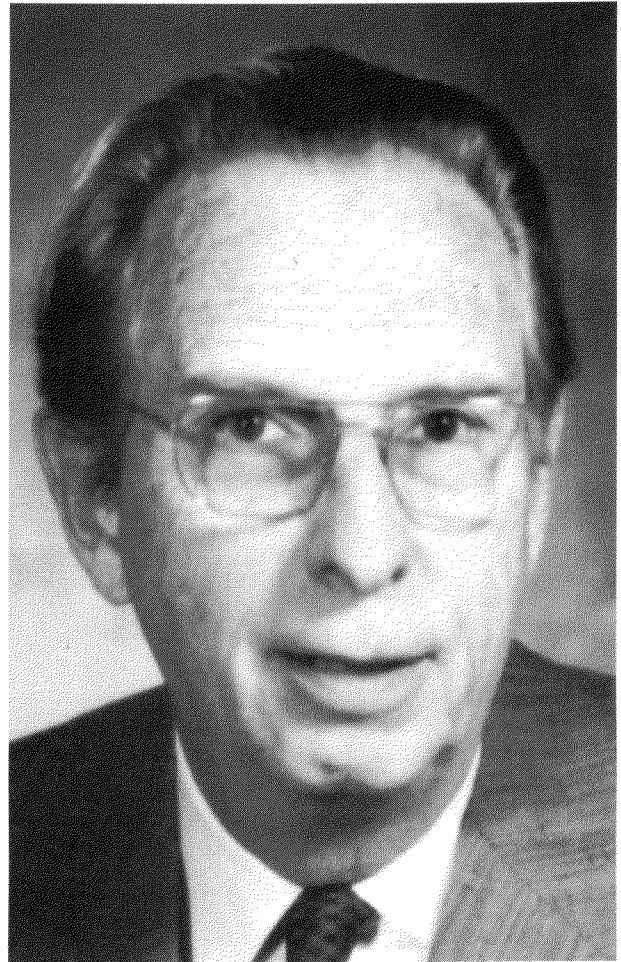
Joseph C. Farmer Jr., M.D., Editor

Dr. J. William Wright Jr. died on February 14, 1994, at age 77, in Indianapolis, Indiana.

Dr. Wright completed his undergraduate degree in 1938 at the University of Michigan, and received his medical degree in 1942 from the University of Michigan School of Medicine. He served in the Army Air Force during World War II. He subsequently established a long-term practice in Indianapolis. His 48-year career in this city included service on the medical staffs of Community Hospitals, Indianapolis, Honorary Consultant on the staffs of St. Vincent and Winona Memorial Hospitals, and Associate Professor in the Department of Otolaryngology at Indiana University School of Medicine. He also served as President of the Indiana Academy of Otolaryngology and Ophthalmology, the Indiana Medical Federation, the Wright Institute of Otology, and the National Hearing Association. In addition, he served on the Indiana State Hearing Commission, the Malpractice Advisory Commission of the Indiana State Medical Association, and the Presidential Advisory Committee of the American Academy of Otolaryngology. He was also a member of the Boards of Directors of the Indianapolis Speech and Hearing Center and the Indianapolis Community Hospitals.

Dr. Wright is survived by his wife, Audrey Westfall Wright; a daughter, Lisa M. Wright; sons J. William III, Michael W., J. Bruce, and Andrew W. Wright. His stepdaughters include Susan Keller-Lewis, Kathryn Oldwitz, and Elizabeth Flynn. He also is survived by two grandchildren and seven stepgrandchildren.

Joseph C. Farmer Jr., M.D.
Editor
American Journal of Otology

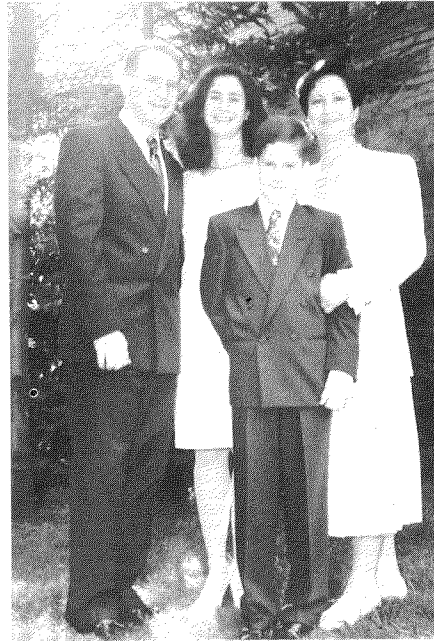


J. William Wright Jr.
1917-1994

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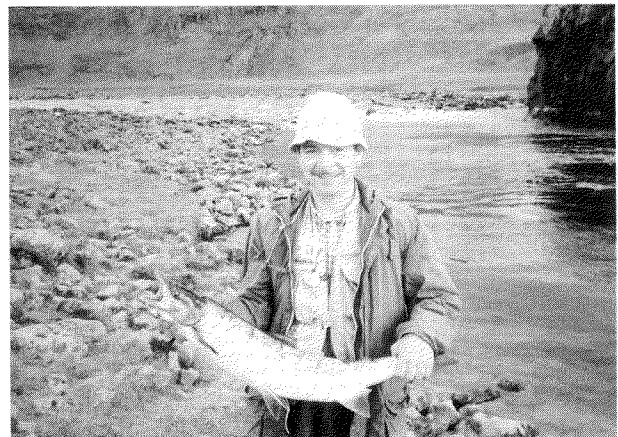
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