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1999



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LIPPINCOTT WILLIAMS & WILKINS

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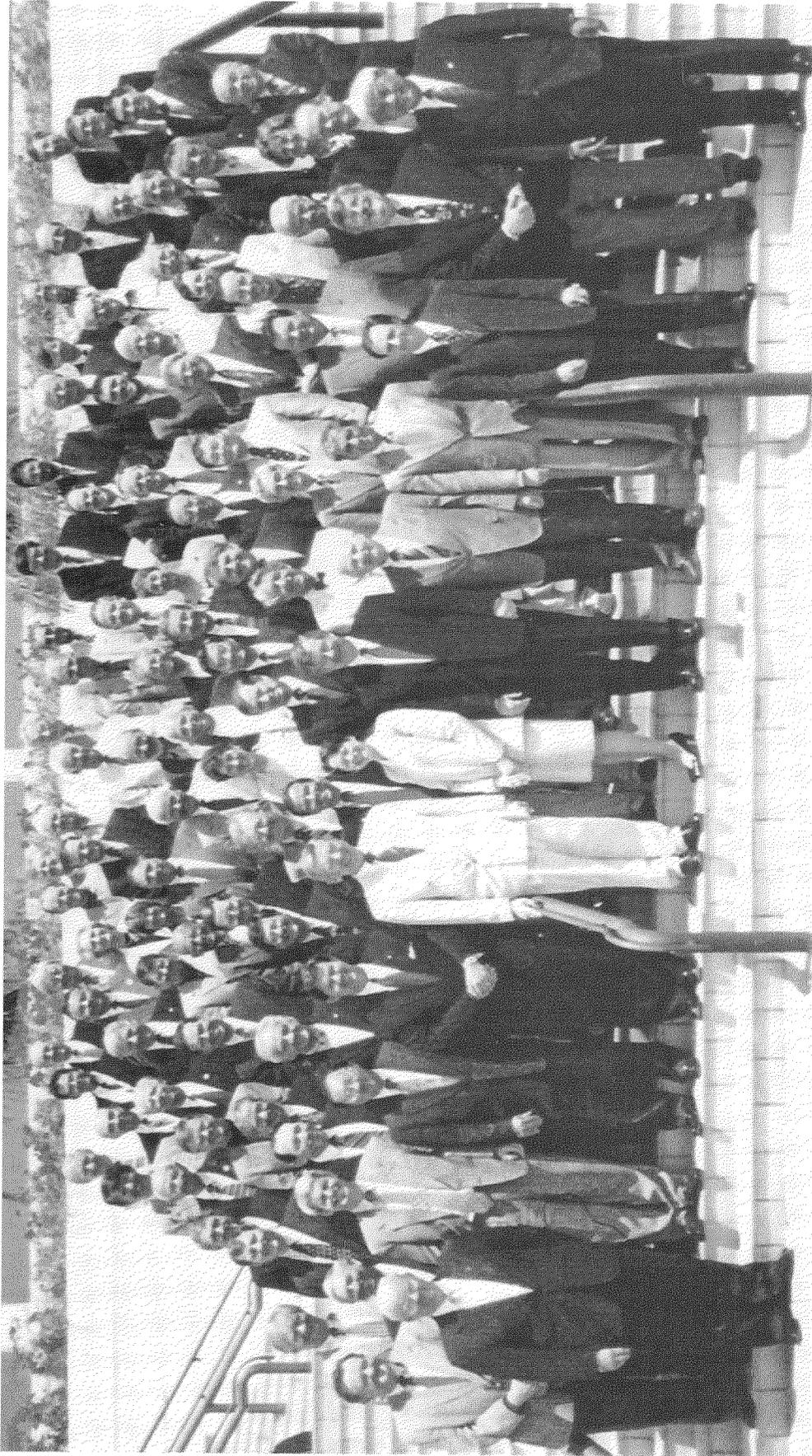
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INTRODUCTION OF AWARD OF MERIT RECIPIENT: MANSFIELD F. W. SMITH, M.D., M.S.

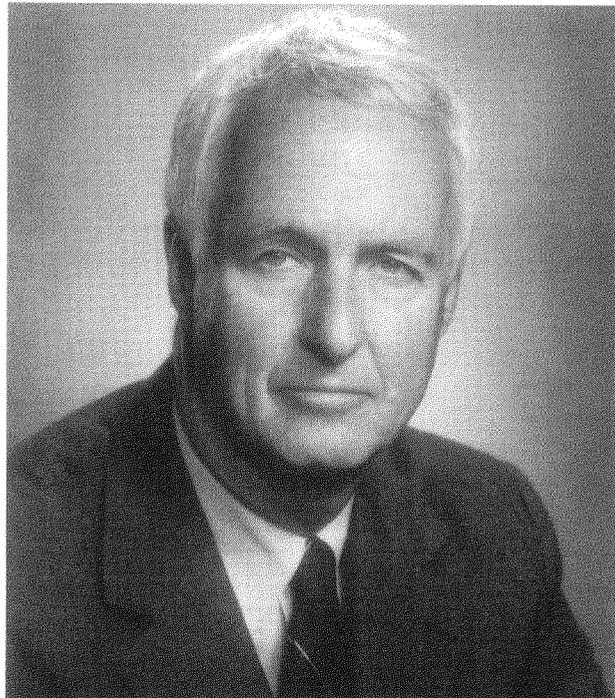
Joseph C. Farmer, Jr., M.D.

The Award of Merit honoree this year is one of the most well known individuals in medicine. He has played a major role in leading organizations in our specialty. His contributions are widely recognized and he is a well known person who has a kind and good word for everyone and who has trained notable people, many of whom are in this room. I am going to show some slides depicting his background, but I am afraid that many of you will know who he is before I have shown many slides.

The beautiful lady in this photograph from the 1960s was his mother. A handsome obstetrician and gynecologist, who was his father, is seen here, also photographed in 1960. They made a very handsome couple at their wedding in 1920. Two sons were born in 1929. I do not know which one is our honoree in this very early photograph. The two sons, who were twins, are shown here with their mother (our honoree is the one on the right). The boys grew and at age 7, in 1936, are shown here (our honoree is again on the right). A year has passed, and here they are at age 8 (our honoree is still on the right!).

Our honoree is depicted in this wonderful picture made in 1937. This photograph is his wife's favorite and we can certainly see why! This portrait of the family, with an older brother and the two twins, is from 1939 (our honoree is still on the right). This is the 1947 baseball team at Flint Ridge Academy; at this time they were two and two, with more games to be played. Our honoree is kneeling on the left side of the picture. Our honoree was also a lacrosse player at the Governor Drummond Academy, as shown in this 1949 slide; he is number 14 and is in the middle of the second row. The next slide is going to give away the honoree, if you haven't already guessed who he is—the winner is Mansfield F. W. Smith! Don't get up yet, Mansfield; I'm not done!

This is the annual picture of the 1956 senior class of the George Washington University of School of Medicine (and yes, our honoree is on the right!). You will note (although you might not be able to read this) that our honoree has already become a politician—he has been class president for two years and already has expressed a surgical specialty pref-



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

erence. Here he is with another notable individual from the west coast, Roger Boles (who is on the left); our honoree is in the middle. This is Captain Mansfield Smith as an intern at Madigan Army Hospital at Fort Lewis-Tacoma in 1957. This photograph was taken in 1960; you will note that he is a "Jack of all trades" and has a concentration that establishes a discipline to every task. This photograph is from 1970 and our honoree is the person in the background on the left; the other individuals are Hill Britton and Richard Goode. Mansfield always has been an athletic individual. Here he is in 1980 competing for an all-ENT team for a "ski-to-the-sea" race in Bellingham, Washington. This team was called the "oto-rooters" (sounds like a plumbing firm!). Here is the busy doctor, and he has to rest whenever he can! This is a special photograph (taken in 1985), and everybody knows who this is dancing with Mansfield—his wonderful wife, Linda.

This is a marvelous picture of Mansfield with his first grandson, Carson, taken in 1993.

One of Mansfield's most important attributes is a well-deserved international reputation. This picture was taken after his presentation at the British Academy in Nottingham, England, in 1994. Mansfield, as you can tell, enjoyed himself a great deal! You should know that there is a village in England called Mansfield in which there is an establishment known as the Mansfield Pub where they serve Mansfield ale.

This photograph was taken in 1995, and at the far left there is a border patrol official who has stopped Mansfield's beloved 1969 Chevy 4 × 4 truck for suspicion of transporting illegal aliens! Three of the individuals in the back of that truck were former medical school deans, and one is a former AMA President. I said former—that is why they may have been paying Mansfield to get them out of the country! He is truly a man of many talents.

This photograph was taken in 1996 and depicts our honoree with Dave Wilson and John Treace; they look like they have been hiking. Indeed, Mansfield is a hiker, and I have also learned he is a wildflower expert. This wonderful slide depicts Mansfield and Linda with proliferating grandchildren. They include twins—Claire and Lainie—and boys Carson and Wyndham.

This picture was taken of Mansfield in 1997; he is an avid fisherman and this photo shows him enjoying this hobby in Colorado.

I wanted to quickly review his outstanding CV so that those of you who have not had the opportunity to know him, as some of us, may learn of his many accomplishments. He was educated at the University of Virginia, Cal-Berkeley, and the George Washington University. His residencies were at the University of Michigan (he also got a Master of Science degree there). He served as an instructor at Michigan, directed the Temporal Bone Laboratory at Stanford, and was Clinical Professor of Surgery at Stanford. Amongst his numerous titles and honors he is an Honorary Member of the Royal Society

and a member of Alpha Omega Alpha. He is the founder and past chairman of the Northern California Transplant Bank. He has served as the vice-president of the Western section of the Triological Society, and, for many years, on the councils of the Triological and the American Otological Societies. He was nominated as one of the best doctors in America. He was Visiting Professor at Harvard, amongst many visiting professorships, including my institution (Duke) and the Burroughs-Wellcome Visiting Professor at the Royal Society. I think most notable are his presidencies of groups in our specialty, including: the California Otolaryngology-Head and Neck Surgery Society (of which he was not only the president but also the founder); the Board of Directors of the *American Journal of Otolaryngology*; our Academy; the American Otological Society; the Pulitzer Society; and, this year, the National Triological Society. He is distinguished as the founder and editor of *Otolaryngology-Head and Neck Surgery* and is still a member of the Editorial Board of this journal. He is a member of the Editorial Board of the AJO, and also has served as the Editor-Librarian of the AOS. He has edited two books (one with my friend and colleague John McElveen), has written ten medical textbook chapters, and is the author or senior author of 42 papers in the critically reviewed literature.

It is with great pleasure that I ask Dr. Mansfield Smith to come forward to receive the Award of Merit of the American Otological Society at its 132nd Annual Meeting!

The American Otological Society bestows upon you, Mansfield, the Award of Merit medal. Dr. Gregory J. Matz, President of the American Otological Society, joins me in presenting this certificate which reads: "The American Otological Society has bestowed upon Mansfield F. W. Smith, M.D., M.S., the Award of Merit for outstanding service to the world as a scholar, teacher, and leader of Otolaryngology, Neurotology, and Otolaryngology on the occasion of the 132nd Annual Meeting of the Society."

RESPONSE OF THE AWARD OF MERIT RECIPIENT

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

I believe this is the most wonderful thing that has ever happened to me. I can think of one time, when my mother looked at me and said "Mansfield, you are either going back to prep school in New England or reform school! And here I am to-

day with this absolutely great group—great friends—unbelievable! I cannot thank you enough; this is the greatest honor I have ever had. Nothing else in my life compares to this. I tell you this is wonderful and I thank you all!

AWARD OF MERIT RECIPIENTS 1949–1999

- | | |
|--|--|
| 1949 George M. Coates, M.D. | 1977 Frank D. Lathrop, M.D. |
| 1951 Barry J. Anson, Ph.D., and
Theodore H. Bast, Ph.D. | 1978 Juergen Tonndorf, M.D. |
| 1952 Edmund P. Fowler, M.D. | 1979 John E. Bordley, M.D. |
| 1953 Julius Lempert, M.D. | 1980 Ben H. Senturia, M.D. |
| 1954 Stacy R. Guild, M.D. | 1981 J. Brown Farrior, M.D. |
| 1957 Georg von Béskésey, Ph.D. | 1982 William F. House, M.D. |
| 1959 E. Glen Wever, Ph.D. | 1983 Victor Goodhill, M.D. |
| 1960 Hallowell Davis, M.D. | 1984 Harold F. Schuknecht, M.D. |
| 1961 John R. Lindsay, M.D. | 1985 Wesley H. Bradley, M.D. |
| 1962 William J. McNally, M.D. | 1986 John J. Shea Jr., M.D. |
| 1965 Anderson C. Hilding, M.D. | 1987 Jack V. Hough, M.D. |
| 1966 Gordon D. Hoople, M.D. | 1988 George T. Nager, M.D. |
| 1967 Merle Lawrence, Ph.D. | 1989 Brian F. McCabe, M.D. |
| 1968 Lawrence R. Boies, M.D. | 1990 Eugene L. Derlacki, M.D. |
| 1969 Sir Terence Cawthorne | 1991 Richard R. Gacek, M.D. |
| 1970 Senator Joseph Sullivan, M.B. | 1992 James L. Sheehy, M.D. |
| 1971 Samuel Rosen, M.D. | 1993 James A. Donaldson, M.D. |
| 1972 Howard P. House, M.D. | 1994 Fred H. Linthicum, Jr., M.D. |
| 1973 Moses H. Lurie, M.D. | 1995 D. Thane R. Cody, M.D., Ph.D. |
| 1974 George E. Shambaugh, Jr., M.D. | 1996 F. Blair Simmons, M.D. |
| 1975 Catherine A. Smith, Ph.D. | 1997 Michael E. Glasscock III, M.D. |
| 1976 Harry Rosenwasser, M.D. | 1998 Michael M. Paparella, M.D. |
| | 1999 Mansfield F. W. Smith, M.D., M.S. |

GUESTS OF HONOR 1949–1999

- | | |
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| 1949 Harris P. Mosher, M.D. | 1977 Henry B. Perlman, M.D. |
| 1950 D. Harold Walker, M.D. | 1978 Howard P. House, M.D. |
| 1951 John Mackenzie Brown, M.D. | 1979 Hallowell Davis, M.D. |
| 1952 Edmund P. Fowler, M.D. | 1980 Victor Goodhill, M.D. |
| 1953 H. I. Lillie, M.D. | 1981 Harold F. Schuknecht, M.D. |
| 1956 Stacy R. Guild, Ph.D. | 1982 George E. Shambaugh, Jr., M.D. |
| 1958 Ralph A. Fenton, M.D. | 1983 Wesley H. Bradley, M.D. |
| 1961 Julius Lempert, M.D. | 1984 Brown Farrior, M.D. |
| 1962 Philip Meltzer, M.D. | 1985 Bruce Proctor, M.D. |
| 1963 William J. McNally, M.D. | 1986 Merle Lawrence, Ph.D. |
| 1964 Kenneth M. Day, M.D. | 1987 Robert M. Seyfarth, Ph.D. |
| 1965 Senator Joseph Sullivan, M.B. | 1988 G. Dekle Taylor, M.D. |
| 1966 Dean M. Lierle, M.D. | 1989 Eugene L. Derlacki, M.D. |
| 1967 Lawrence R. Boies, M.D. | 1990 William F. House, M.D. |
| 1968 Sir Terence Cawthorne | 1991 Michael E. Glasscock III, M.D. |
| 1969 Gordon D. Hoople, M.D. | 1992 William E. Hitselberger, M.D. |
| 1970 John R. Lindsay, M.D. | 1993 D. Thane R. Cody, M.D., Ph.D. |
| 1971 E. Glen Wever, Ph.D. | 1994 Cesar Fernandez, M.D. |
| 1972 Frank D. Lathrop, M.D. | 1995 Richard R. Gacek, M.D. |
| 1973 Moses H. Lurie, M.D. | 1996 James L. Sheehy, M.D. |
| 1974 Harry Rosenwasser, M.D. | 1997 Mansfield F. W. Smith, M.D., M.S. |
| 1975 John E. Bordley, M.D. | 1998 Robert A. Jahrsdoerfer, M.D. |
| 1976 Ben H. Senturia, M.D. | 1999 Barbara A. Bohne, Ph.D. |

SCIENTIFIC SESSIONS 1999 PRESIDENTIAL ADDRESS

ACADEMIC MEDICAL HISTORY-1998

Gregory J. Matz, M.D.

I have two hobbies; they are sailing and the study of American history. For the most part, my sailing activities are associated with my hometown of Chicago. Shown here, with my 33-foot sailboat *Narnia*, is yours truly at the bow, wearing the red hat. However, I am not here to discuss my sailing activities, since they would not support an appropriate CME activity consistent with the educational mission of this 132-year-old Society.

Thus, let's move on to my second hobby and take you through what I believe a historian might say if he or she reviewed the medical history of this past academic year.

As we all know, in November of 1998, Beth Israel Hospital in New York ascertained that it could not cooperate with the federal government's recommendations to reduce graduate medical education (in other words, residency programs). The government touted this plan as a panacea for both the skyrocketing GME costs of Medicare and for the potential oversupply of specialists. The state of New York realized that it would not be possible to reduce any of these residency programs, since the state law mandates and limits the number of hours the residents are allowed to work.

In May of last year, a federal judge dismissed a lawsuit which sought to end the controversial audit of Medicare Part B physician billings at teaching hospitals. The judge labeled the legal action premature. This suit was initiated by the AMA and Association of American Medical Colleges. The PATH audit focused on physician supervision rules and allegations of upcoding and overbilling between 1990 and 1995. Under the government's False Claim Act, it can collect double or triple damages plus \$5,000 to \$10,000 per false claim. The position taken by the AMA and others is that these claims are not fraudulent, but result from the confusing rules that the federal government has imposed upon us.

Later in the year, many health care plans, after



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signing a one-year contract with HCFA for Medicare reimbursement, such as an HMO insurer like ANTHEM of Ohio, decided to pull out of unprofitable Medicare markets in rural areas.

This action has been repeated in other areas of the country, such as California, Florida, New York, Ohio, and Virginia.

However, interestingly enough, a number of court cases have gone against the HMO industry. One such suit occurred in Kentucky against Humana for their decision not to pay a \$14,000 hysterectomy fee in 1995 for a woman with preinvasive cervical cancer. This suit was won by the plaintiff. At the time, according to the American Association of Health Plans, this award was considered the sec-

ond largest judgment against a managed care company. The plaintiff's attorney stated that the HMOs cannot be second-guessing when the physician "has examined the patient, read the medical records, and has an idea of the history."

In Texas, a patient's death prompted a lawsuit against NYLCare of Texas. This suit, filed in Fort Worth, charged that a decision by NYLCare reviewers, which ended hospital coverage for a suicidal patient, led to his death, despite the objections of the patient's psychiatrists. A lawsuit such as this might spark interest in many states to pass laws protecting patients' rights.

One of our own American Otological Society members, Dr. George Shambaugh, who recently passed away at the age of 95, wrote an interesting editorial on the prostitution of medical care. He noted that the loss of physician esteem probably began when the Federal Trade Commission decreed that medicine is a business and that physicians could advertise. In addition, he stated that the financial aspects of medicine, which was once a secondary interest to doctors, has increased with the enormous cost of medical education. He later lamented the onset of managed care gate-keeper models.

An insightful editorial by Dr. Gerald Healy, appearing in the *Archives*, questioned whether physicians can be faithful to the Hippocratic Oath in the era of managed care. He stated that—and I quote—"The past few years have produced monumental changes in the American health care system. With those changes, questions of ethical conduct now challenge every physician practicing in the United States."

Basically, many are asking if it is possible to uphold the precepts of the Hippocratic Oath in the world of managed care—the term Healy prefers to use is "managed costs."

We are all aware that, in an attempt to keep Medicare solvent, we physicians are footing the bill. New actuarial data indicates that Medicare will stay solvent, possibly until the year 2008. HCFA, like many insurance companies, has directed its carriers and intermediaries to pay claims less frequently and to route physicians and other providers inquiring about claims through their voice mail system.

In August of last year, we also saw the very unlikely event of a medical school going bankrupt.

Allegheny in Pennsylvania, which was part of a nine-hospital consortium, filed for bankruptcy.

A month later, there were questions about the misuse of Allegheny endowment funds. One of my old roommates, Dr. Julian Katz, is quoted as saying: "It certainly did not make the faculty happy, nor the people who endowed the funds."

In addition, our largest organized medical society, the American Medical Association, became entangled in an awkward situation when they signed an endorsement with Sunbeam. This, as we all know, resulted in bad publicity and extensive legal fees.

Likewise, last spring, a union activity was proposed in Florida, Washington state, and California to organize physicians to deal with managed-care companies. Physicians in Illinois also considered this, but later rejected it.

The Physicians' Benefit Trust, an entity sponsored by the Chicago Medical and Illinois State Medical Societies, was formed and is described as "managing a health care plan that has no managed care restrictions, including free choice of physician, choice of medical facility or hospital anywhere in the country, and receipt of any treatment one's physician recommends without preapprovals or second opinions. SOUNDS LIKE UTOPIA! George Orwell, in his classical book, *1984*, was concerned about the state's intrusion into the private affairs of individuals.

Even though most of us live in these United States, several states have moved to restrict such activity as payment for drugs in order to reduce the cost of medical care.

These are some of the events that occurred in the past year. Like a historian, I tried to present them somewhat objectively.

Personally, I do not believe the world will end at this millennium. I am optimistic about our future, and encourage all of you to be likewise, because I am sure that each of us has the unique opportunity to deliver the best medicine the world has ever seen.

Before closing, I wish to acknowledge my mentor, Dr. John Lindsay. Dr. Lindsay served as my surrogate father, teacher, and friend. He also served as the president of this great society in 1957.

Personally, I wish to THANK YOU for the honor and privilege of serving as your president this past year.

INTRODUCTION OF GUEST OF HONOR: BARBARA A. BOHNE, Ph.D.

Gregory J. Matz, M.D.

It is with great pleasure that I introduce Dr. Barbara A. Bohne, the 1999 American Otological Society's Guest of Honor. Barbara has performed distinguished research in the area of noise and hearing for well over thirty years.

She is a native of St. Louis, where she attended Washington University and from which she received a degree in Zoology in 1967. Four years later, under the tutelage of Drs. Catherine Smith and Donald Eldredge, she received a Ph.D. in Neurobiology.

Barbara is currently a Professor of Otolaryngology at Washington University and a Senior Research Scientist at the Central Institute for the Deaf.

Her teaching responsibilities are many and varied. She has trained over 55 students in her field of cochlear physiology and pathology. She has served on numerous editorial boards, including the *Laryngoscope*, *Annals*, *The American Journal of Otolaryngology*, and others. Her bibliography lists numerous articles published in refereed journals as well as invited publications. She has lectured widely at local, national, and international levels. She has received significant funding for the past thirty years from the National Institutes of Health, the Deafness Research Foundation, and the American Academy of Otolaryngology-Head and Neck Surgery.

Another talent of Barbara's, to which I can personally attest, is her outstanding ability on the basketball court. Back in the early 1970s, I spent some time in her laboratory and had an opportunity to join her and some of her colleagues for a noontime pickup game of basketball. I thought that I was a reasonably skilled high school and college intramural player; however, I only managed to score four points against her—she scored what the profession-



Barbara A. Bohne, Ph.D.

als would call a "triple double." In other words, she scored well over thirty points against me!

I now have the distinct privilege to introduce to you Dr. Barbara Bohne, who will speak to us concerning degenerative changes in the cochlea after noise damage.

REMARKS OF GUEST OF HONOR DEGENERATION IN THE COCHLEA AFTER NOISE DAMAGE: PRIMARY VERSUS SECONDARY EVENTS

Barbara A. Bohne, Ph.D.

INTRODUCTION

Being chosen as the Guest of Honor for the 132nd Annual Meeting of the American Otological Society is a humbling experience. I would like to take this opportunity to thank Dr. Matz and the members of the council for this distinct pleasure. I would especially like to acknowledge my mentors Drs. Orozimbo A. Costa, Walter P. Covell, Donald H. Eldredge, Hallowell Davis, Ben H. Senturia, Catherine A. Smith, and Ruediger Thalmann. Thanks also to Dr. Joseph H. Ogura, Lindburg Professor and Head of Otolaryngology at Washington University, who hired me for my first professional position. Thus, for this honor, I owe a debt of gratitude to Washington University, my first and only employer, and to the faculty in Otolaryngology for instilling in me a passion for otological research. I am using this opportunity to summarize some of the major findings in my laboratory over the past 25+ years on the deleterious effects of noise on hearing and the inner ear. Colleagues and students who have contributed significantly to this body of work include Gary W. Harding, M.S.E., and Drs. Robert S. Bahadori, William W. Clark, Stanley E. Dudek, Marvin P. Fried, John H. Mills, Amy S. Nordmann, John C. Sun, and Charles J. Tseng.

Magnitude of the noise problem: The National Institute on Deafness and other Communication Disorders estimates that at least 30 million Americans (i.e., 11% of the population) are exposed to hazardous levels of noise on a daily basis, including working adults, retirees, children, and teens. About 10 million Americans have noise-induced hearing loss (NIHL), impairment which is the result of prolonged and repeated exposure to noise.¹

Why hasn't NIHL been eliminated? Despite exten-

sive noise research since World War II, the incidence of NIHL has not diminished.² There are several reasons for this. First, although federal regulations exist to protect the hearing of workers in many industries,³ these regulations do not cover all workers⁴ and are not uniformly enforced.⁵ Other people, including children, are routinely exposed to potentially hazardous levels of noise during leisure activities.^{6,7} Second, local and national campaigns about the hazards of noise have not been very effective.⁸ Finally, although there are several hypotheses about how noise damages hearing and the structure of the inner ear, the pathogenesis of NIHL is still unknown.

Hypotheses of the pathogenesis of NIHL: Current hypotheses include: (1) reduced blood flow during exposure^{9,10} resulting in hypoxia and, perhaps, the generation of reactive oxygen species¹¹; (2) metabolic exhaustion of the stimulated sensory cells¹²; (3) excessive release of neurotransmitter during the exposure leading to excitotoxic damage of afferent nerve fibers and terminals¹³; (4) intermixing of cochlear fluids through the damaged reticular lamina.¹⁴ Data in support of each hypothesis have been published, but conflicting data also exist.

Why conflicting hypotheses about NIHL pathogenesis? Different species were used for earlier noise studies, and exposure parameters and analysis techniques were quite variable. It is well known that there are large inter- and intraspecies variations in susceptibility to noise. This variability has led to conflicting interpretations of research findings. Finally, most earlier noise studies failed to distinguish between primary noise damage (changes that are a direct result of the exposure) and secondary events (pathological changes that follow by hours or days the occurrence of primary noise damage).

Approach to noise research in our laboratory: There are two major requirements for noise studies conducted in our laboratory. First, the noise exposures must be realistic in terms of the sound pressure levels to which noise-exposed humans are generally subjected. Thus, our animals are exposed to moderate-intensity noise for hours or days before

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their hearing and inner ears are permanently damaged. Second, the techniques used to analyze the auditory system must permit examination of the entire cochlear duct so that the pattern(s) of hearing loss and organ-of-Corti damage can be determined from apex to base.

MATERIALS AND METHODS

One- to three-year-old chinchillas were continuously exposed to an octave band of noise (OBN) with a center frequency of either 0.5 or 4 kHz and a sound pressure level (SPL) of 57–95 dB for 2–432 days. Using behavioral techniques or auditory brainstem responses, the hearing ability of the animals was measured prior to, during, and after their exposures to noise. At various intervals post-exposure, the chinchillas were anesthetized, and their cochleas were surgically exposed and preserved by perfusing fixative (buffered solution of osmium tetroxide) through the perilymphatic spaces. This *in vivo* fixation technique virtually eliminates the possibility of post-mortem artifacts in the sensory epithelium.¹⁵

The cochleas with most of the cochlear bone intact were dehydrated and embedded in Durcupan, a plastic which is compatible with transmission electron microscopy (TEM). After the plastic polymerized, the bone was removed and the cochlear duct was divided into 16–24 segments which ranged in length from 0.5 to 1.5 mm. This dissection technique preserves the entire cochlear duct—including the basilar membrane, osseous spiral lamina, stria vascularis, Reissner's membrane, and contents of scala media—and minimizes the chances of producing artifactual damage in the soft tissue.^{15,16} The dissected segments of the cochlear duct were first examined as flat preparations by phase contrast microscopy so that losses of inner (IHC) and outer (OHC) hair cells and inner (IP) and outer (OP) pillar cells could be counted and myelinated nerve fiber (MNF) loss in the osseous spiral lamina could be estimated. For each cochlea, a graph (cytococholeogram) was prepared showing the percentage loss of IHC, OHC, and MNF, and regions of stria vascularis (SV) degeneration as a function of percentage distance from the apex of the organ of Corti (OC). The structural damage was correlated with functional measures of hearing using the frequency–place map for the chinchilla cochlea.¹⁷ After collecting quantitative data, selected OC segments were semithick- and thin-sectioned at a radial or tangential angle and examined by bright-field and TEM, respectively.

RESULTS

One major finding was that the patterns of cell loss following a damaging noise exposure are quite distinct in the apical and basal halves of the cochlea¹⁸ and have a different relation to functional measures of hearing.^{19–21} Exposure to a 4-kHz OBN at 86 dB SPL for two days produced acute primary damage, which consisted of one to several focal losses of OHC, and beginning loss of OP, IP, and IHC in the 4–8-kHz region of the cochlea (Figs. 1 and 2). With nine or more days of exposure to the 4-kHz OBN, the damage progressed to total loss of the organ of Corti (i.e., OC wipeout) in one or more regions of the basal turn (Figs. 3 and 4). When at least six adjacent IHC were missing, secondary degeneration of MNF in the adjacent region of the osseous spiral lamina could be detected within a few days post-exposure.²² MNF degeneration gradually extended medially toward Rosenthal's canal adjacent to all regions of OC wipeout. These chronic lesions were always associated with a permanent elevation of auditory thresholds for one or more high-frequency tones.^{19–21}

In contrast, exposure to a 0.5-kHz OBN at 95 dB SPL for two days resulted in 7–10% primary loss of OHC scattered over a broad area in the 0.25–1-kHz region of the cochlea (Figs. 5 and 6). Lengthening the exposure to nine or more days increased the loss of OHC in the low-frequency region while most IHC, IP, OP, and MNF remained intact (Figs. 7 and 8). The broad, scattered loss of OHC in the apical half of the chinchilla cochlea was not associated with a decrement of thresholds for low-frequency tones until the OHC loss exceeded 30%.^{19,20}

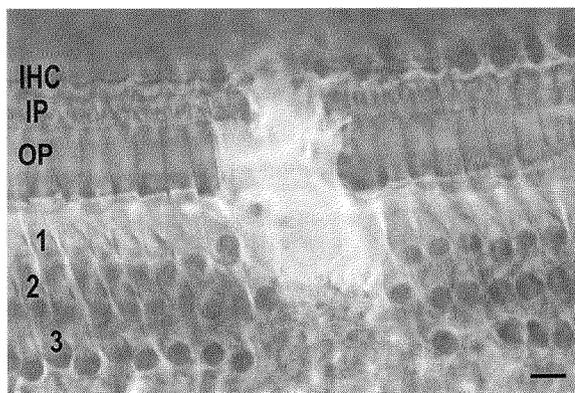


Fig. 1. Basal turn shortly after exposure to 4-kHz OBN at 86 dB SPL for two days. In the center, there is a defect in the reticular lamina involving focal loss of OHC (1, 2, 3), OP and IP, and a few IHC. Bar = 10 μ m.

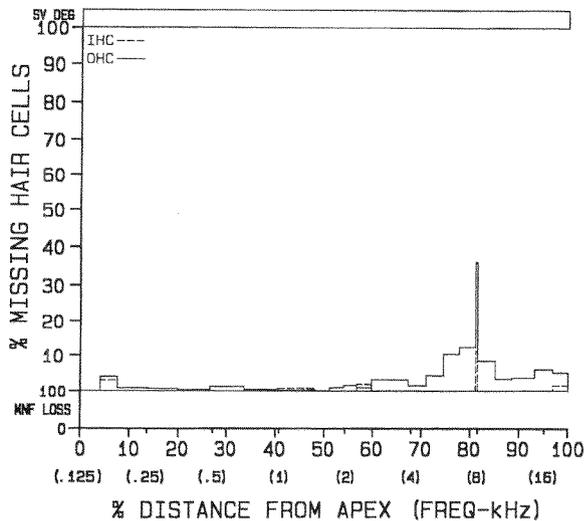


Fig. 2. Cytochleogram of ear in Figure 1. At 70–83% distance (4–8 kHz), there is beginning noise damage consisting of about 10% OHC loss and a narrow IHC lesion.

Exposure to the 0.5-kHz OBN for nine or more days created an additional lesion in the cochlea near the 4-kHz region (see Fig. 8)²³. The basal-turn lesions which resulted from exposure to the 0.5-kHz OBN were indistinguishable from those caused by exposure to the 4-kHz OBN.¹⁸ Once basal-turn damage appeared following prolonged exposure to the 0.5-kHz OBN, the damage grew more rapidly than that in the low-frequency region.²⁰

A second major finding was that cell loss and

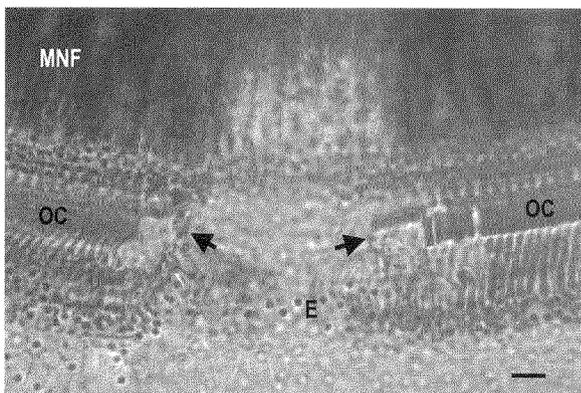


Fig. 3. Basal turn shortly after exposure to 4-kHz OBN at 86 dB SPL for 36 days. An OC wipeout is present in the center (between arrows), along with the degeneration of adjacent nerve fibers (MNF). Undifferentiated epithelium (E) covers the basilar membrane and seals the open ends of the tunnel. Bar = 50 μ m.

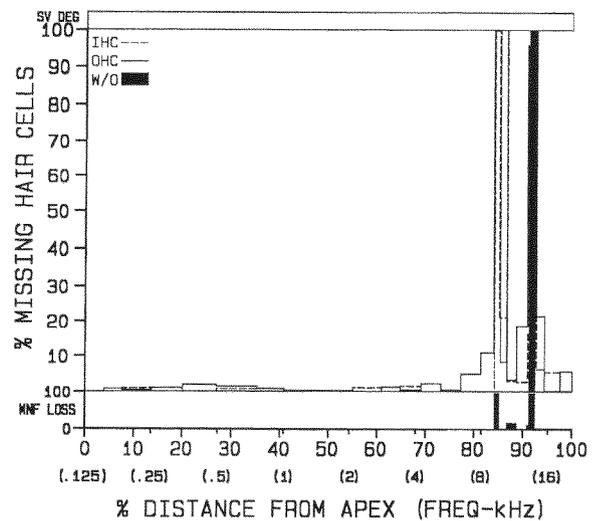


Fig. 4. Cytochleogram of ear in Figure 3. At 84–93% distance (8–12 kHz), there is an OC wipeout (tall black bar) and a region of 100% loss of IHC and OHC, each with an associated loss of nerve fibers (MNF loss) in the osseous spiral lamina (short black bars).

structural damage became progressively worse in the organ of Corti during a long-duration (e.g., days to months), moderate-intensity exposure, and also in the days and weeks following termination of a short-duration (e.g., minutes to hours), intense exposure. Noise damage began as scattered loss of OHC. With short-duration, moderate-level exposures, the damage did not appear to spread to adjacent cells. Degenerated hair cells were replaced by phalangeal scars (e.g., Fig. 5) which were formed by

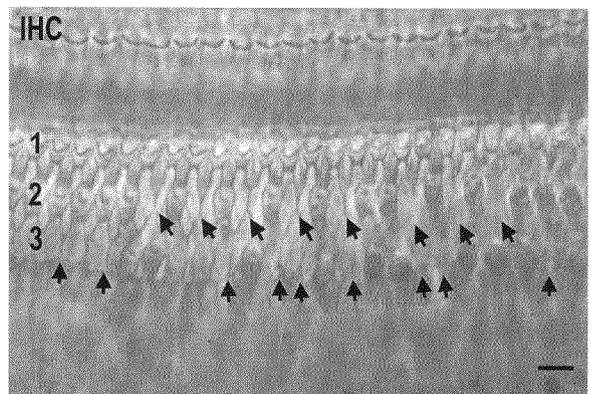


Fig. 5. Apical turn shortly after exposure to 0.5-kHz OBN at 95 dB SPL for two days. Scattered OHC are missing in rows 2 and 3 and were replaced by phalangeal scars (arrows). First row OHC, along with IHC and pillar cells, are intact. Bar = 20 μ m.

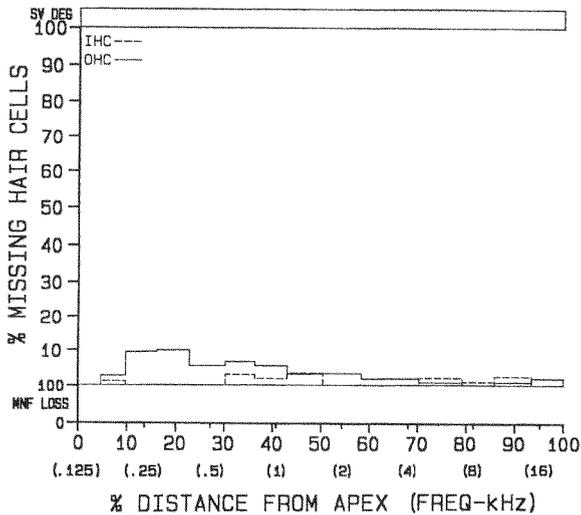


Fig. 6. Cytochleogram of ear in Figure 5. OHC loss averages about 7% in the apical cochlea (0.25–1 kHz). Most IHC are present and all MNF are intact.

enlarged processes from outer pillar cells, Deiters' cells, or inner phalangeal cells. When the OHC initially degenerated, defects or holes were left in the reticular lamina for a period of time before the phalangeal scars formed. These holes provided a route for endolymph to enter the fluid spaces of the organ of Corti.^{14,24} When most OHC degenerated in a focal region, the intermixing of endolymph and Cortilymph produced secondary loss of adjacent supporting cells and other sensory cells (e.g., Fig. 1). With the appearance of large defects in the reticular lamina, additional sensory and supporting cells and nerve fibers underwent progressive degeneration until an entire region of the organ of Corti had

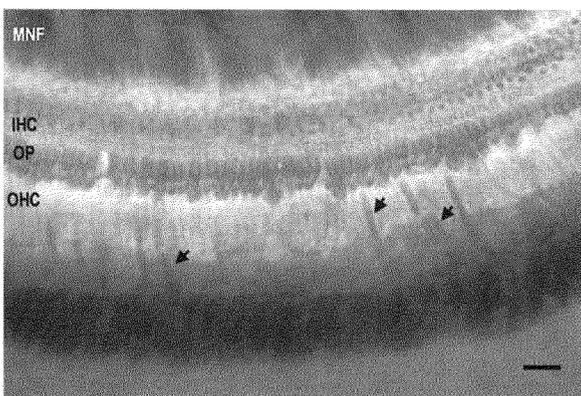


Fig. 7. Apical turn shortly after exposure to 0.5-kHz OBN at 95 dB SPL for 36 days. Only a few OHC (arrows) remain while the remaining OC (e.g., IHC, OP) and MNF are intact. Bar = 50 μ m.

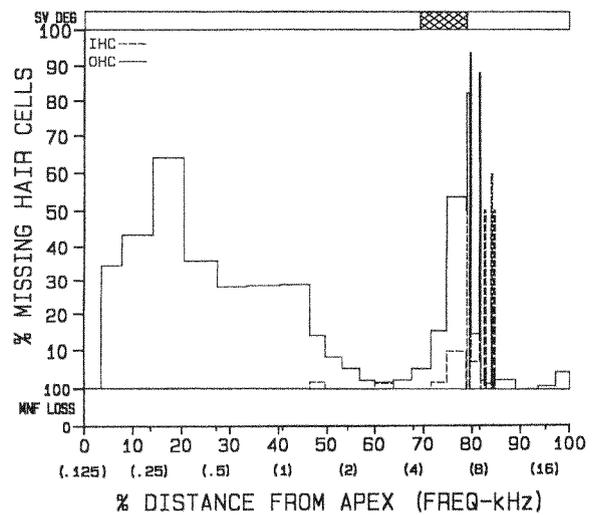


Fig. 8. Cytochleogram of ear in Figure 7. OHC loss averages about 35% in apical portion (0.15–1.5 kHz) of cochlea while all IHC and MNF are intact. At 75–85% distance (6–10 kHz), there are multiple focal losses of IHC and OHC and an area of stria vascularis degeneration (cross-hatched bar at top).

been lost (e.g., Fig. 3). The intermixing of endolymph and Cortilymph terminated when the boundary between scala media and the fluid spaces of the organ of Corti was re-established. Within OC wipeouts, the endolymph boundary included a single layer of squamous epithelium on the basilar membrane and inner sulcus, Claudius', Hensen's and Deiters' cells sealing the open ends of the tunnel and Nuel spaces (e.g., Fig. 3).

DISCUSSION

Choice of animal: Chinchillas are excellent animals for the study of noise damage for several reasons. First, the audibility curve of the chinchilla^{25,26} is similar to that of humans,^{26,27} both in the range of audible frequencies and in the frequencies (i.e., 1–4 kHz) at which the animals are maximally sensitive. Second, the chinchilla has a life span of 15–20 years. Thus it can be used in experiments involving prolonged exposures (i.e., more than 1 year) to moderate-intensity noises, exposures which more closely resemble industrial noise. Finally, the chinchilla's middle and inner ears are surgically accessible so that one inner ear can be protected from noise by disarticulating the ossicular chain,²⁸ thereby providing an internal control for each animal.^{29–31}

Choice of histological preparation technique: A number of different histological techniques are available for examining the normal and damaged inner ear. These include celloidin or paraffin-embedding of

the decalcified temporal bone followed by serial sectioning,³² "wet dissection" of the cochlea and examination of organ of Corti samples as flat preparations,^{33,34} scanning electron microscopy,³⁵ and the plastic-embedding technique described here. Each technique has positive and negative features. The plastic-embedding technique is used almost exclusively in our laboratory because: (1) it minimizes dissection artifacts in the delicate cochlear epithelia; (2) it permits cell loss/damage to be evaluated throughout the entire organ of Corti and related to distance along the basilar membrane; and (3) it allows TEM examination of cytological changes that were quantified in the flat preparations.

Patterns of hearing loss and underlying histopathology in the noise-damaged cochlea: In chinchillas subjected to long-duration noise exposures, cell loss in the low-frequency region of the cochlea is generally limited to OHC. In contrast, once damage begins in the high-frequency region, it grows more rapidly than that in the low-frequency region and generally involves losses of OHC, IHC, and afferent nerve fibers. The first functional manifestation of damage in the noise-exposed chinchilla, regardless of the frequency content of the exposure, is a permanent hearing loss for one or more high-frequency tones. The same phenomenon occurs in noise-exposed humans.³⁶ With continued exposure, the threshold at 4 kHz worsens, and the hearing loss spreads to involve higher and lower frequencies. It should be noted that the "4-kHz audiometric notch" has been found to occur anywhere between 2.5 and 8 kHz.³⁷ Histopathological explanations for noise-induced hearing loss beginning at high frequencies include the early loss of IHC and MNF in the high-frequency region compared to OHC loss only in the low-frequency region, and prolonged exposure to low-frequency noise damaging both the low- and high-frequency regions. However, further research is needed to determine why the basal turn of the cochlea sustains a different pattern of damage than the apex.

Examination of noise-damaged human temporal bones has shown that lesions in the high-frequency region consist of near total loss of the organ of Corti and its afferent innervation,^{33,38} while damage in the low-frequency is largely confined to the OHC.³⁷ Our findings in noise-exposed chinchillas with respect to the patterns of cochlear damage and their relation to functional measures of hearing agree quite well with data from humans. On this basis, the noise-exposed chinchilla can serve as an excellent model for investigating the mechanisms of degeneration and repair in noise-exposed humans.

CONCLUSIONS

The noise-exposed cochlea undergoes histopathological alterations which can be separated into primary and secondary events. Primary events consist of degeneration of hair cells, especially OHC. Secondary events follow primary events and consist of progressive degeneration of supporting cells, afferent nerve fibers, and additional hair cells. Currently, the best way in which to minimize primary damage is to limit a person's cumulative exposure to loud noises. Many secondary effects develop after termination of a noise exposure. Thus, treatments that increase the rate of healing of the organ of Corti after primary noise damage may reduce the severity of NIHL in the general population.

ACKNOWLEDGMENTS

The efforts of many mentors, colleagues, students, and technicians who contributed to both the intellectual and technical aspects of these studies over the past 25 years are sincerely appreciated.

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PRESENTATION OF PRESIDENTIAL CITATION: ROBERT I. KOHUT, M.D.

Gregory J. Matz, M.D.

It is truly a privilege to present Dr. Robert I. Kohut the American Otological Society's 1999 Presidential Citation.

I have known Bob for my entire professional life. I first met him in 1962, when I was an intern at the University of Chicago. Bob, along with John Fredrickson, served as my senior resident in John Lindsay's program. They, together with Paul Ward, were very influential in my career change from internal medicine to otolaryngology.

Bob is a native Chicagoan. After serving as an enlisted man in the United States Air Force, he attended Wittenburg College in Springfield, Ohio, where he graduated *cum laude* in 1956. Thereafter, Bob attended the University of Chicago, where he received his degree in medicine and went on to serve his internship and residency in otolaryngology.

Bob's teaching activities include two very successful chairmanships in otolaryngology: the first at the University of California at Irvine and the latter at the Bowman Gray School of Medicine at Wake Forest University. He has probably trained well over 50 residents who now serve as leaders in our specialty.

Bob has had a lifelong interest in temporal bone

histopathology, as indicated by his numerous publications. He is considered a national expert in the study of an extremely difficult topic: the perilymphatic fistula—clinical and pathological correlates.

Bob's contributions to this Society are considerable. He was a member of our Council for well over seven years, served as our Secretary-Treasurer for five years, and was President in 1994.

He has served many other organizations in our specialty; he has been active in the American Board of Otolaryngology and the National Institutes of Health, and has served on numerous committees of the National Institute on Deafness and Other Communication Disorders.

He has been on the editorial boards of most of the specialty journals in otolaryngology. His publication record is extensive and would be envied even by someone doing full-time research.

On the personal side, Bob is the devoted father of four sons, a doting grandfather, and an avid fisherman.

It gives me great pleasure to present this Presidential Citation certificate to Bob Kohut for his lifelong work in the histopathology of the temporal bone and for his significant contributions to teaching and administration in medicine and health care.

RESPONSE OF PRESIDENTIAL CITATION RECIPIENT

Robert I. Kohut, M.D.

Thank you very much, Greg.

PULSATILE TINNITUS IN PATIENTS WITH MORBID OBESITY: THE EFFECTIVENESS OF WEIGHT REDUCTION SURGERY

**[†]Elias M. Michaelides, M.D., *Aristides Sismanis, M.D., F.A.C.S.,
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ABSTRACT

Background: Morbid obesity (45 kg above ideal body mass) is increasing in the U.S. population. Many morbidly obese patients suffer from disabling pulsatile tinnitus (PT) secondary to pseudotumor cerebri syndrome and often present to otolaryngologists because of this symptom.

Objective: To determine the effectiveness of weight reduction surgery for relief of PT in patients with morbid obesity.

Study Design: This is a retrospective study of morbidly obese patients with associated PT.

Setting: Academic tertiary referral center.

Patients: Sixteen female patients with morbid obesity and associated PT who underwent weight reduction surgery.

Results: Median age was 34 years (Range 24–45 years). Average pre-operative body mass index was 45 kg/m² (Range 33–70 kg/m²). Average weight loss was 45.4 ± 16.8 kg (range 25–99 kg). Average post-operative weight was 75.2 ± 14.1 kg (range 57–105 kg). The average pre-operative CSF pressure was 344 ± 103 mm of water (range 220–520 mm of water). Post-operative CSF measurements were obtained on 4 patients with average decrease in pressure of 180 mm of H₂O (range 120–220 mm of H₂O). Thirteen patients experienced complete resolution of their PT (81%). Three patients continued to have PT despite significant weight reduction.

Conclusions: Weight reduction surgery was found very effective in relieving PT in morbidly obese patients with associated pseudotumor cerebri syndrome and should be considered when conservative management has failed.

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LABYRINTHINE FISTULA IN CHRONIC OTITIS MEDIA WITH CHOLESTEATOMA

Chong-Sun Kim, M.D., Sun O Chang, M.D., Seung Ha Oh, M.D., Byeong-Ho Song, M.D., Jung-Hun Hah, M.D., and Weon-Jin Seong, M.D.

ABSTRACT

Objectives: This study aimed to evaluate the efficacy of preoperative tests for predicting fistulas and postoperative hearing results according to surgical management.

Study Design: A retrospective study of the clinical records of 1,593 patients who underwent operations for chronic otitis media with cholesteatoma from January 1979 through July 1998.

Setting: University hospital, a tertiary referral center.

Patients: Patients who were proved to have labyrinthine fistulas during operation for cholesteatoma.

Main Outcome Measures: The results of the pre- and postoperative bone conduction pure tone average and pure tone threshold at 4 kHz were examined. The temporal bone CT scan and intraoperative findings were evaluated.

Results: Labyrinthine fistulas were found in 8.2% or 131 patients in this study. Fistulas were most commonly found in the lateral semicircular canal (92.4%). Positive fistula tests and positive temporal bone CT findings in labyrinthine fistula cases were recorded in 35.1% and 73.9% of cases, respectively. Canal wall down mastoidectomy procedures were applied in 125 ears (95.4%). The cholesteatoma matrix was removed in 121 ears (92.4%). The average bone conduction threshold showed no significant difference between pre- and postoperative evaluations. The change in bone conduction was not significantly different between the matrix-removed and matrix-maintained groups.

Conclusions: The high-resolution temporal bone CT scan is highly recommended for detection of labyrinthine fistulas. The postoperative hearing results are not affected by the type of mastoidectomy procedures or by the management of cholesteatoma matrix in this study.

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ANALYSIS OF EUSTACHIAN TUBE FUNCTION BY VIDEO ENDOSCOPY

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and [§]Juha Silvola, M.D., Ph.D.

ABSTRACT

Objective: Human eustachian tubes (ET) were inspected *in vivo* endoscopically, and video recordings made for careful slow motion analysis of normal physiological function.

Setting: Ambulatory office in a tertiary referral center.

Subjects: Thirty-four adults, 17 with no history for ET dysfunction [two of whom had tympanic membrane (TM) perforations], 17 with known ET dysfunction.

Interventions: Transnasal endoscopic examination of the nasopharyngeal opening of the eustachian tube during rest, swallowing, and yawning. Two patients with a perforated TM were examined microscopically and endoscopically after india ink was placed onto the anterior promontory.

Main Outcome Measures: Video analysis of ET opening movements and mucociliary flow.

Results: Normal ETs had four consistent sequential movements:

1. Palatal elevation causing passive, then active rotation of the medial cartilaginous lamina.
2. Lateral excursion of the lateral pharyngeal wall.
3. Dilation of the lumen due primarily to tensor veli palatini muscle movement beginning distally and inferiorly, then opening proximally and superiorly.
4. Opening of the tubal valve at the isthmus due to dilator tubae muscle contraction. Dysfunctional ETs had intraluminal edema, polyps, or minimal muscle movement. India ink studies demonstrated flow directed to the inferior ET mucosa.

Conclusions: Slow-motion endoscopic video analysis may be a useful new technique for the study of eustachian tube physiology. Consistent muscle movement patterns were demonstrated in normals but absent in abnormal. Mucociliary flow may aid in the dependent drainage pattern of the ET. More studies of normal and abnormal patterns are needed to establish useful clinical correlates.

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SURGICAL MANAGEMENT OF THE ATELECTATIC EAR

John L. Dornhoffer, M.D., F.A.C.S.

ABSTRACT

Objective: The surgical management of the atelectatic ear is controversial as the natural course toward cholesteatoma development cannot be predicted, and hearing remains normal until later in the disease course. Consequently, surgery is often delayed until there is a clear indication, such as hearing loss or frank cholesteatoma development, but such delay often necessitates more extensive surgery. As earlier intervention appears to be in the best interest of the patient, but is often avoided due to near normal hearing levels at this stage, we propose a staging system for classification and management of the atelectatic ear. Hearing results and complications in patients undergoing tympanoplasty with or without ossicular reconstruction are reported for patients with Type III and IV retractions.

Study Design: This retrospective study used a computerized otologic data base to identify patients meeting the inclusion criteria.

Setting: Study was performed at a tertiary referral center.

Patients: A total of 55 patients (63 ears) aged 5–78 years underwent cartilage tympanoplasty with or without ossicular reconstruction.

Interventions: Elevation of the ear drum, followed by cartilage reconstruction of the tympanic membrane, with ossicular reconstruction as indicated.

Main Outcome Measure(s): Postoperative pure tone average air–bone gap for 4 frequencies (500, 1000, 2000, 4000 Hz) compared to preoperative levels.

Results: There was a statistically significant improvement in hearing ($p < 0.05$).

Conclusions: Our staging system offers an effective treatment algorithm for *part tensa* retractions, and management of type III and IV retractions via cartilage tympanoplasty with or without ossicular reconstruction is a proven treatment modality.

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DISCUSSION PERIOD I: MIDDLE EAR AND INNER EAR

Papers 1–4

Dr. Horst R. Konrad (Springfield, IL): These papers are now open for discussion. Dr. Smith?

Dr. Mansfield Smith (San Jose, CA): I have a question for Dr. Poe. That was a terrific paper—great presentation—but I cannot help asking you about the patulous eustachian tube. You were going to tell us just a few ideas about what you think the future holds for the patulous eustachian tube, which is a terrible problem, I think, for most of us.

Dr. Dennis S. Poe (Boston, MA): Thank you, Dr. Smith. The patulous tube is a terrible problem. I experienced it myself when I was exercising too much. I think what we are seeing here is an ability to start distinguishing some of the different types of pathology. For instance, with the patulous tube, if you can really see what the lesion is, then perhaps we can develop some tools to get up in there. That makes it possible to deliver something like a collagen injection that may work temporarily, or somewhat permanently. This is actually something we are working on right now. I know collagen injection has been done, but never with actually visualizing exactly where the problem was. I am hopeful that this can change some of the results with that.

Dr. Antonio De la Cruz (Los Angeles, CA): Dennis, don't go too far from that microphone! That was a beautiful paper that you presented. I wonder if you have had a chance to look at the influence of surgery, particularly in an ear with a perforation. Probably the worst thing that can happen to the eustachian tube is the presence of the perforation itself will prevent the negative pressure necessary for the tube to open. So what happens if you close the perforation, have a good result from surgery, and you look at the eustachian tube—let's say six months or a year later?

Dr. Dennis S. Poe (Boston, MA): Thank you, Dr. De la Cruz. That is a very good question. We currently are looking at that very issue. We want to set it up so that we can see all the patients both preoperatively and postoperatively, and compare these results of the dysfunctional tubes with our chronic ear surgery results. I am hoping to present that in the next year or two.

Dr. Robert Goldenberg (Dayton, OH): Dennis, this was an elegant paper, and as I was watching

the photography I wondered if you have studied any of the active insufflation maneuvers, for example, Politzerization or the Valsalva—any active maneuver that would change eustachian tube function. Were you able to study that, or is that next year's paper?

Dr. Dennis S. Poe (Boston, MA): That is in fact something that we want to look at. We are hoping to set this up so we can do some of the typical tests—Toynbee's, forced response testing, and other pressure ventilation testing—while we are doing these endoscopic examinations. I think this will be invaluable information, but it will take a while to put all these things together.

Dr. Richard Buckingham (Park Ridge, IL): I have a question for Dr. Dornhoffer. I just wonder what I can tell our residents and medical students about the physiology of the tympanic membrane. As we know, sound waves have very little energy, and when we place a bit of cartilage to replace the tympanic membrane, I cannot understand how the patients hear so well.

Dr. John L. Dornhoffer (Little Rock, AR): That's a good question! I cannot understand it either. We presented a paper a couple of years ago looking at cartilage and other materials, such as perichondrium and fascia, and found no difference in the hearing results. This was interesting to me. When I went to the University of Wurzburg to study under Dr. Jan Helms, I was amazed at how much cartilage was used and how good the hearing results were. When I came back to the United States, I began looking into that paradox. I am working on answering that question, but I cannot give you an answer yet. I am not sure how important the waveforms in the eardrum are versus the ratio of the surface area of the drum at 55 mm² to the 3-mm² area of the footplate. I really cannot answer that question, but it is a question I have asked many, many times!

Dr. Dudley Weider (Lebanon, NH): I have a question for Dr. Michaelides. I would like to say that we have had similar experiences with pseudotumor cerebri. The only additional comment I would like to make is that we have seen a few patients who were not overweight. We also managed a few patients who did not have positive eye signs.

Fundamentally, we found this in patients with recurrent perilymphatic fistula; now I send patients to neurosurgery and have them do a lumbar puncture. Many times the tinnitus and other symptoms immediately go away (for 48 hours), and this has become a preoperative test for me.

Dr. Elias Michaelides (Richmond, VA): Several reports have indicated that papillaedema is not necessarily seen with pseudotumor. That is true, and we have also found that doing a lumbar puncture can diagnose these patients right away, because their pulsatile tinnitus immediately resolves—temporarily at least.

Dr. Jack Pulec (Los Angeles, CA): I also have a question for Dr. Michaelides. Would you please

comment on whether or not treatment with steroids (which is often used for pseudotumor) helps the tinnitus? Have you investigated the possibility of pseudotumor being caused by food allergies? Many of these people have food allergies, and they are obese, so that might be involved.

Dr. Elias Michaelides (Richmond, VA): We have not used steroids to treat these patients, in general, and we have not examined allergy as a cause. We think that, at least in patients with morbid obesity, the pathophysiology of the pressure being transmitted to the intracranial cavities is the main cause. There are some theories about female hormone imbalances and so forth as a potential cause, but we have not looked at allergy.

OSSICULAR CHAIN RECONSTRUCTION USING A NEW TISSUE ADHESIVE

Jennifer L. Maw, M.D., and Jack M. Kartush, M.D.

ABSTRACT

Hypothesis: A new medical-grade cyanoacrylate tissue adhesive will improve the results of ossicular chain reconstruction in a rat model.

Background: An ideal tissue adhesive has long been awaited by otologists. Studies examining the older cyanoacrylates have demonstrated variable efficacy and toxicity. Octylcyanoacrylate is a new tissue adhesive that has many properties ideal for otologic surgery.

Methods: Thirteen female C-D rats were anesthetized and preoperative ABR was performed. A left antrotomy was performed and the incus was removed. In the adhesive group, the incus was dipped in octylcyanoacrylate and interposed between the tympanic membrane and the stapes; no adhesive was used in the control group. At 8 weeks, postoperative ABR was performed, the integrity of the ossicular chain inspected, and histopathological analysis of the temporal bones was performed. Statistical comparison of ABR results was done using the Mann-Whitney test.

Results: Seven rats were randomized to the adhesive group and 6 to the control group of which 4 survived. There were no histopathological differences in the temporal bones of the animals other than the presence of mild foreign body reaction around the ossicular chain of the adhesive group animals. The ossicular chain was not intact in two of the controls, while the rest were intact at 8 weeks. The postoperative air conduction ABR (mean dB SPL) (62.5 control vs. 34.3 adhesive, $p = 0.010$) and air-bone gap (47.5 control vs. 18.9 adhesive, $p = 0.008$) was significantly better in the adhesive group.

Conclusions: This new medical-grade tissue adhesive improves the hearing results of ossicular chain reconstruction based on ABR with no apparent histotoxicity in this animal model.

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THE OTHER EAR—FINDINGS AND RESULTS IN 3600 BILATERAL STAPEDECTOMIES

**Robert L. Daniels, M.D., †Larry W. Krieger, M.D., and ‡William H. Lippy, M.D.*

ABSTRACT

Objectives: To determine the incidence of middle ear abnormalities in patients with bilateral otosclerosis that could potentially impact successful stapedectomy and the rates of success in these cases, including the chance of overclosure in the second ear.

Study Design: Retrospective case review of operative and audiological records.

Setting: Private otology practice.

Patients: 1,800 patients who had 3,600 primary stapedectomies for bilateral otosclerosis.

Intervention: Analysis of perioperative and follow-up audiograms with associated operative findings including: obliterative otosclerosis and solid footplates, dehiscent or overhanging facial nerve, narrow oval window niche, promontory overhang, and ossicular fixation or malformation.

Main Outcome Measures: Audiologic stapedectomy success as defined by: overclosure or closure of preoperative, air–bone gap to less than 10 dB at 1 year or greater follow-up.

Results: The rate of finding any abnormality was 25%. Abnormalities present bilaterally were found in 135 patients (7%), with otosclerosis requiring an oval window (OW) drillout as the most common finding (41%), followed by dehiscent or overhanging facial nerves (25%). Success in patients with abnormalities was 78% overall with bilateral overclosure in 40%.

Conclusions: Abnormal middle ear findings during stapedectomy occur in a significant percentage of patients. Reasonable rates of success and overclosure can still be expected in these ears, but this is somewhat finding-specific. The predictive value of these findings and the associated rates of success with potential impact on surgical counseling and planning for the “other ear” are discussed.

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OUTCOMES AND QUALITY OF LIFE IN CONDUCTIVE HEARING LOSS

**Michael G. Stewart, M.D., M.P.H., †Newton J. Coker, M.D., *Herman A. Jenkins, M.D., *Spiros Manolidis, M.D., and *Marilyn H. Bautista, M.P.H.*

ABSTRACT

Objective: To measure quality of life (QOL) and hearing-specific functional status before and after treatment of conductive hearing loss (CHL).

Study Design: Prospective longitudinal outcomes-based study.

Setting: Tertiary academic medical center.

Patients: Adult patients with conductive hearing loss (at least 20 dB conductive component). Mean age = 49.0 years, $n = 89$.

Interventions: CHL treated with surgery in 71%; amplification in 18%, and not treated further in 11%.

Main Outcome Measures: Global QOL was measured using the MOS SF-36 instrument, and hearing-specific functional status was measured using the Hearing Satisfaction Scale (HSS)—both are well-validated health status instruments. Audiometric outcome was measured using guidelines from the Hearing and Equilibrium Subcommittee of the AAO-HNS.

Results: Mean QOL scores in CHL patients at study entry were comparable to the general population. Although there was no significant improvement in mean global QOL scores after successful treatment of CHL, there was little room for improvement in QOL since the baseline QOL was so high in these patients. The hearing-specific functional status instrument did demonstrate significant improvements in emotional and social/situational hearing status after treatment, and the hearing-specific instrument was much more sensitive to change in clinical status than the global QOL instrument. The subgroup of patients who were treated with hearing aids tended to have poorer baseline QOL and hearing status than patients who were treated with surgery, and tended to show declines in QOL and only partial improvement in hearing-specific functional status after treatment. Audiometric studies indicated significant improvements in hearing threshold in all treated patients.

Conclusions: Treatment of CHL results in significant improvement in hearing-specific functional status, although these changes are difficult to detect using a global QOL instrument. Further study is needed to delineate the differences in outcome between patients treated with hearing aids and surgery.

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DISTORTION PRODUCT OTOACOUSTIC EMISSIONS IN CHILDREN WITH MIDDLE EAR EFFUSION

Neil M. Sperling, M.D., Manoj Kantu, M.D., Jeffrey N. Cousin, M.D., Mahesh Bhaya, M.D., and Joseph R. McPhee, Ph.D.

ABSTRACT

Objective: To measure the presence of distortion-product otoacoustic emissions (DPOAEs) in children with middle ear effusion (MEE) using equipment having enhanced diagnostic sensitivity. This information may improve diagnostic and prognostic capabilities in this common disease.

Study Design: Prospective, controlled.

Setting: Private office and hospital department of communicative disorders.

Patients: Children under 15 years of age without prior ear surgery, perforation, or sensorineural hearing loss.

Interventions: Established otitis media index used to differentiate subject ears (with MEE) from control ears (without MEE). All ears underwent pure-tone audiometry and DPOAE recordings.

Main Outcome Measures: Present, reduced and absent DPOAE responses at 7 frequencies were recorded for subject and control ears. Subject and control ears were examined for responses in 2 frequency ranges: low—0.5 kHz to 2 kHz, and high—4 to 10 kHz.

Results: Seventy-four ears in 39 children were studied. Twenty-five of 49 subject ears (51%) demonstrated 1 or more high-frequency range DPOAEs, compared to 25 of 25 (100%) control ears. Eight of 49 (16%) subject ears recorded low-frequency range DPOAEs versus 22 of 25 (88%) controls. A subject ear was more than twice as likely to demonstrate a high-frequency range DPOAE versus a low-frequency range response ($p = 0.19$, chi square test).

Conclusions: We report the detection of DPOAEs in a significant number of ears with MEE. This may lead to useful applications in the diagnosis and prognosis of children with MEE.

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DISCUSSION PERIOD II: MIDDLE EAR AND INNER EAR

Papers 5–8

Dr. Horst R. Konrad (Springfield, IL): These papers are now open for discussion. Dr. Nadol?

Dr. Joseph B. Nadol, Jr. (Boston, MA): I have a question for Dr. Maw. As you correctly pointed out, the limitations of adhesives are: (1) biocompatibility and (2) toxicity, either local—that is, ototoxicity—or more systemic. Along that line, I wonder if you could answer three questions. Have you evaluated ototoxicity by a more proximal application of the glue, say to the footplate? Was a postmortem done on the animal with the CSF leak in which you used the adhesive against the dura? Have you studied other animals in which you applied the adhesive to uninterrupted dura? Thank you.

Dr. Jennifer L. Maw (San Jose, CA): Thank you for the question, Dr. Nadol. In this particular study we did not assess the effect of placing glue on the footplate; however, tomorrow I have another paper in which I will discuss filling the middle ear of the guinea pig with the adhesive, and the ototoxicity associated with that. In this particular study, I tried to avoid getting the glue on the footplate. I placed the animal that died from the CSF leak in the freezer, but the animal care people disposed of it. I was very disappointed not to be able to do the postmortem because I had planned to do that. It would have been interesting to see what the dura looked like histopathologically. We plan further studies looking at this application.

Dr. F. Owen Black (Portland, OR): I have a couple of questions for Dr. Kantu. You presented a very interesting study! Did you compare tympanograms? Specifically, did you look at the resonant frequency of the ear and correlate it with your results (that is, the resonant frequency of the middle ear)?

Dr. Manoj Kantu (Brooklyn, NY): We did correlate tympanograms with subject ears and control ears. All control ears had type A tympanograms and all subject ears had type B tympanograms. Using the gold standard of the pure-tone audiogram we were correlating frequencies in pure-tone averages with whether or not subject ears actually had emissions. We did find that subject ears with emissions, on average, had better hearing than subject ears with reduced or absent emissions.

Dr. Joseph B. Nadol, Jr. (Boston, MA): I have a question for Dr. Stewart. I congratulate you for doing outcome studies. It is no longer acceptable just to look at morbidity, mortality, and success rates as defined by audiograms; however, you presented two groups in which you implied that the group treated with hearing aids had a poorer self-perception in their response. Of course, that is attractive to surgeons in general, but I wondered if the two groups were comparable. In other words, was the conductive loss, and even more importantly, co-existent sensorineural loss and speech discrimination in the two groups comparable?

Dr. Michael G. Stewart (Houston, TX): Thank you, Dr. Nadol, for that question and comment. In fact, the patients who were in this nonrandomized study, those who ultimately were treated with hearing aids, did turn out to have worse audiometric thresholds at baseline; however, they had a very similar conductive component to their hearing loss. There was no statistically significant difference in the conductive component compared to those patients who had undergone surgery. Audiometrically, when they were treated, the aided audiogram and the postsurgical audiogram showed the same closure. However, the patients who were treated with hearing aids did not show—and when they filled out their questionnaire, they did not perceive—that their hearing status had improved as much as the patients who had had surgery. Again, other factors may have been involved. The patients with hearing aids still had worse thresholds because they had more sensorineural hearing loss to begin with. In fact, the surgery group showed a statistically significant improvement, while the hearing aid group showed virtually no improvement, and even some worsening in some respects. We do not know what to make of this either, and it certainly deserves further study. The other issue is that we studied this long-term. Some of the other studies that have been done in sensorineural hearing loss patients have been relatively short-term; the patients are given hearing aids, and then, two or three weeks later, they are asked to complete a questionnaire about what their hearing status is right after they got the aid. We did this several

months later because we wanted to know what the long-term results were. At that point they may not have been using the hearing aid regularly; and when they filled out the questionnaire, they were measuring their real life use of the hearing aid and how much it improved their life versus the surgery patients whose lives theoretically were improved every day. That is another hypothesis and I am not sure if that is true or not.

Dr. Jeffrey P. Harris (San Diego, CA): I have a comment on Dr. Maw's paper that is a word of advice. A neurosurgeon in our institution used, in an "off label" fashion, the Toronto (Canadian-approved) hystacryl. The patient had a foreign-

body reaction to the glue which was placed against the dura for repair of a CSF leak. The patient ultimately had a debridement of the skull base, and this resulted in a significant lawsuit at our institution. So, if the glue is used "off label," I would be very careful about it.

Dr. Jennifer L. Maw (San Jose, CA): Thank you for your comment. We look forward to working with the industry in developing adhesives that eventually, or hopefully, will be approved for insertion into the body. This is obviously an issue. We believe that octylcyanoacrylate has a lot less toxicity than butylcyanoacrylate, and I will be discussing issues of toxicity tomorrow in my paper.

SQUAMOUS CELL CARCINOMA OF THE EXTERNAL AUDITORY CANAL: AN EVALUATION OF A STAGING SYSTEM

Stephanie A. Moody, M.D., Barry E. Hirsch, M.D., F.A.C.S., and Eugene N. Myers, M.D., F.A.C.S.

ABSTRACT

Objective: The study was conducted to review a staging system proposed by the University of Pittsburgh for temporal bone cancer and to evaluate survival status according to stage, treatment, and certain prognostic factors.

Study Design: The study was a retrospective case review.

Setting: The study was conducted at a tertiary care medical center and specialty hospital.

Patients: Thirty-two patients with primary squamous cell carcinoma of the external auditory canal were studied.

Intervention: All patients underwent surgery of the temporal bone. Radiotherapy was given depending on tumor stage and histopathologic findings.

Main Outcome Measures: The two-year survival of patients undergoing surgical resection with or without adjuvant radiotherapy.

Results: The two year survival for primary squamous cell carcinoma of the temporal bone were T1 lesions = 100%; T2 = 80%; T3 = 63%; T4 = 7%. Survival for T3 tumors was 80% with postoperative radiotherapy compared to 33% with surgery alone.

Conclusions: The 2-year survival data directly correlated with the staging system. The use of adjuvant radiotherapy increased survival rate in patients with a T3 lesion.

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THE NIDCD'S CLINICAL TRIALS COOPERATIVE GROUPS: A BRIEF OVERVIEW

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

ABSTRACT

The National Institute on Deafness and Other Communication Disorders (NIDCD) embarked upon the establishment of (two) clinical trials cooperative groups (CTCGs) in October, 1996 in response to a perceived research need. It intended that the CTCGs design and implement clinical trial protocols capable of addressing the efficacy of therapeutic interventions for diseases and disorders of human communication. Most commonly, owing to the substantial numbers of patients required, the trials are expected to involve multiple study sites, with each study site adhering to a uniform study protocol, standardized treatment regimens, and prescribed data collection procedures.

A complex administrative structure is required to coordinate the activities of the CTCGs and to assure compliance with myriad government regulations. Similarly, participating study sites must meet stringent requirements, including leadership by an individual experienced in clinical trials. Currently, there is a relative dearth of experienced clinical trialists dedicated to research in human communication.

This presentation will detail the complexities involved in the conduct of multicenter clinical trials and the NIDCD's efforts to promote clinical trials activities and to develop clinical trials training opportunities.

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DISCUSSION PERIOD III: MIDDLE EAR AND INNER EAR Papers 9–10

Dr. Horst R. Konrad (Springfield, IL): Questions to the previous papers? Go ahead, Dr. Kinney.

Dr. Sam E. Kinney (Cleveland, OH): I have a question for Dr. Moody. Actually, I have both a comment and a question. I was one of the authors to whom she alluded that initially did not think that we could develop a real staging system for squamous cell carcinoma of the ear. I now feel that the Arriaga system probably is the best we have, and I would encourage everybody to try to apply that to their studies. Secondly, my frustration in the beginning was due to the fact that very often the staging was changed intraoperatively as we cut across cancer and that was a problem. My question is that you alluded to subtotal temporal bone resection and total temporal bone resection. Does your group attempt to do this in an “*en bloc*” fashion, or have you come to use some other approach? How frequently do you think you actually cut across cancer in an attempt to try take it out in one piece? This has been my problem all along.

Dr. Stephanie A. Moody (Pittsburgh, PA): Thank you, Dr. Kinney. My experience is extremely limited, but from my understanding of what they actually do, the total temporal bone resection is done mostly *en bloc*, with additional drilling. So, if you are drilling through cancer, then you are obviously going through it, but I think that is the way they try to do it—to *en bloc* it as much as possible with taking additional tissue by drilling, if necessary.

Dr. Antonio De la Cruz (Los Angeles, CA): I have a question for Dr. Moody. I have similar concerns to Sam’s, because in the medial cut there is really not a medial layer; you are in the venous lake of the petrous apex at the cavernous sinus. It is almost impossible with the medial cut to make it a cancer operation. I have two concerns. One is with the sleeve resection for the lesion that involves the bony external auditory canal. Do you have any margins? I mean, there is nothing! Having a little squamous cell carcinoma is almost like being a little pregnant—there is no such thing! When you have squamous cell carcinoma and you do a sleeve resection with no bony excision, you do not have even one millimeter of margin. I think the minimal operation for that disease is a lateral temporal bone

resection. I cannot discuss your 100% survival at two years without radiation therapy, but I would be extremely concerned about leaving with that concept. Secondly, in your T₃ and T₄ lesions—the T₄s particularly—resection of the facial nerve did not seem to improve survival. So, those of us who have tried it for a few years do not like to sacrifice the facial nerve unless it is directly involved, because you have a patient dying of the disease with a total facial nerve paralysis, and I do not think it increases survival. I wonder if you would comment on this. It does not seem to make any difference, so why take it if we can give the patient the opportunity of having a functional facial nerve until the end of their days?

Dr. Stephanie A. Moody (Pittsburgh, PA): Thank you. Those are very good comments. As for the sleeve resection, I did not use that terminology because we do not do sleeve resections. The sleeve resection, from my understanding, implies that you remove just the soft tissue of the canal. Actually, in the modified lateral temporal bone resection that I described, we remove the temporal bone lateral to the tympanic membrane, which includes, sometimes, the bony canal.

Dr. Antonio De la Cruz (Los Angeles, CA): I think that if you do not include the whole external canal, you have no margins. All you have is skin over bone. Unless you take the whole bony external canal, like in a lateral temporal bone resection, your margin is less than 1 mm. That is not a cancer procedure as far as I can tell.

Dr. Barry Hirsch (Pittsburgh, PA): I would like to address Tony’s issue. I agree completely, but we are just trying to establish the name of the procedure. The sleeve resection, to me, implies that it is strictly soft tissue, and we do not do that. We had isolated lesions that are way lateral, near the meatus, and we feel that we can then take the bony canal lateral to the tympanic membrane. But the bony canal is always taken. It is never taken as just skin; we always take bone.

Dr. Stephanie A. Moody (Pittsburgh, PA): As for your second question, Dr. De la Cruz, I agree. With the T₄ cancers, the survival is poor no matter what we do. That is one of the reasons I pointed out that

some of them had a lateral temporal bone resection, some had a subtotal resection, and some had a total temporal bone resection. The survival was no different among any of those groups. I did not really allude to whether we had taken the facial nerve or not, but I agree, the survival is very poor no matter what, so maybe we should use a less aggressive approach in those patients.

Dr. Arvind Kumar (Chicago, IL): My first question is, if there is an extension of the tumor through the anterior wall entering into the glenoid fossa—how many such cases did you have, did you remove the condyle, and did you do a parotidectomy? My second question is, in your T₃ and T₄ groups, how many patients had no evidence of disease at two years? Obviously, two years is a short follow-up period, but be that as it may. How many had no evidence of disease?

Dr. Stephanie A. Moody (Pittsburgh, PA): Of the patients who are listed as two-year survivors, all had no evidence of disease at two years. All the patients, except one patient, who did not survive two years died within 14 months (or at least died before two years). So, any patient that survived the two years, except for one patient, had no evidence of disease. I also have to point out this is overall survival and that some of these patients died because of some other reasons like a postoperative MI, or an MI four months later, something like that.

Dr. Arvind Kumar (Chicago, IL): And you judged “no evidence of disease” with MRIs or CTs, I take it?

Dr. Stephanie A. Moody (Pittsburgh, PA): Yes, MRI or CT follow-up. They would present with symptoms if they were going to have further disease. Some of the follow-up was not just two years—it was way out to 14 years, so I made the assumption

that if they survived 14 years and on the follow-up exams in the clinic charts it was written “n.e.d.,” that there were no evidence of disease.

Dr. Rick Friedman, (Los Angeles, CA): I have another question for you. Do you have any experience with some of the more innovative approaches, especially for the T₄ lesions? Is anybody at your institution using radiation and/or chemotherapy prior to surgery? I would like to hear of your experience, and maybe Dr. Kinney’s as well.

Dr. Stephanie A. Moody (Pittsburgh, PA): That is an interesting question. I think the T₄ patients are very interesting patients. There have been other studies that have looked at the T₄ patients. I did not look directly at that issue. We do not use preoperative radiation very often at our institution. Some of the patients had previous surgeries, had previous radiation, and had chemotherapy. But those T₄ patients, no matter what they had, had such poor outcomes anyway, that I did not actually look specifically into that.

Dr. Rick Friedman, (Los Angeles, CA): I guess my point is that there probably is room for innovation. I agree with the idea that depriving someone of their facial nerve—really, maiming them—is not indicated in a disease that is likely to be lethal. I know that there have been some good initial results with the “rad-plat” protocol for these extensive temporal bone lesions, and I think that is another thing to consider in these far advanced cases.

Dr. Stephanie A. Moody (Pittsburgh, PA): I think that is a very good comment. One of the points that we can make is that maybe with a more limited surgery that is not as destructive, with the addition of radiation and with the addition of chemotherapy, maybe their outcome would be better.

EXTERNAL OPENING OF THE VESTIBULAR AQUEDUCT IN MÉNIÈRE'S DISEASE

**Xianxi Ge, M.D., *John J. Shea, Jr., M.D., †Ronnie M. Warner, M.D., and
Daniel J. Orchik, Ph.D.

ABSTRACT

Objective: To study the relationship of the length of the external opening of the vestibular aqueduct and the ratio of the summating potential and action potential (SP:AP) in Ménière's patients.

Study Design: Retrospective case study.

Setting: Neurotology referral center.

Patients: Fifty-four patients with Ménière's disease and nine non-Ménière's disease controls.

Intervention: The external opening of the vestibular aqueduct was measured from a three-dimensional surface reconstruction CT scan. Trans-tympanic electrocochleography was performed on all Ménière's disease patients.

Main Outcome Measure: The length of the external opening of the vestibular aqueduct in the Ménière's disease ears was related to SP:AP ratio in the Ménière's disease ears and compared to controls.

Results: The average length of the external opening was 3.79 ± 2.92 mm in Ménière's disease ears and 5.35 ± 1.73 mm in non-Ménière's disease control ears ($p < 0.05$). An elevated SP:AP ratio was found in 95% of ears in the group with nonvisible external opening of vestibular aqueduct, 91% of ears in <5 mm group, 58% of ears in 5–7 mm group, and 29% of ears in >7 mm group (chi-square = 24.814, $p = 0.000$).

Conclusions: The length of the external opening of vestibular aqueduct in Ménière's disease patients is significantly shorter than in those without Ménière's disease. Endolymphatic hydrops, evidenced by an elevated SP:AP ratio, was related to the length of the external opening of the vestibular aqueduct. The shorter the external opening, the more often the SP:AP ratio was enlarged. Three-dimensional CT scan is a valuable aid in the differential diagnosis of Ménière's disease. A short or nonvisible external opening of the vestibular aqueduct is a predisposing factor to the development of Ménière's disease.

Key Words: External opening of vestibular aqueduct, Three-dimensional surface reconstruction CT scan, Electrocochleography, Summating potential and action potential ratio, Ménière's disease.

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THE PRESENCE OF AUTOANTIBODIES IN THE SERA OF MÉNIÈRE'S DISEASE

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ABSTRACT

Objective: To examine the presence of antibody in the sera of Ménière's disease patients against eight inner ear antigens by enzyme-linked immunosorbent assay (ELISA).

Main Design: Prospective double blind study.

Setting: Tertiary referral center.

Patients: One hundred thirteen patients with Ménière's disease and 28 normal persons.

Intervention: Review patients' medical history of Ménière's disease. Examine the antibodies against chicken type II collagen, bovine type II collagen, their cyanogen bromide-cleaved peptide II, types IX and XI collagen, C-raf-1, and β -tubulin by ELISA.

Main Outcome Measure: Ménière's disease and result of ELISA.

Results: The sensitivity of each antigen was between 37% and 60% individually, 91% when all eight inner ear antigens were combined, while the specificity of each antigen was between 89% and 100%, 79% when all eight inner ear antigens were combined. These results showed that 91% of Ménière's disease sera have antibody activities to one or more of these inner ear antigens.

Conclusions: The results suggest that the ELISA test to these eight inner ear antigens was useful as a diagnostic tool for Ménière's disease, and further study is required to elucidate the role of these antigens in the pathogenesis of Ménière's disease, which eventually might result in better therapy.

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INCREASING DIAGNOSTIC SENSITIVITY IN TRANSTYMPANIC ELECTROCOCHLEOGRAPHY

Matthew Ng, M.D., Hiroshi Shimizu, M.D., and John K. Niparko, M.D.

ABSTRACT

Objective: To correlate the results of transtympanic electrocochleography with symptom patterns reflecting "classic" and "possible" Ménière's disease.

Study Design: Retrospective study.

Setting: Academic otologic-neurotologic clinic.

Patients: Ninety-five patients fulfilling the 1995 AAO-HNS Committee of Hearing and Equilibrium diagnostic criteria for "definite" or "possible" categories of Ménière's disease.

Intervention: Transtympanic electrocochleography using click and tone-burst acoustic stimuli.

Main Outcome Measure: Rate of abnormality of SP/AP ratio and SP amplitude in two groups classified as "classic" and "possible" Ménière's disease.

Results: In the "definite" Ménière's group, the sensitivity of transtympanic electrocochleography in detecting abnormality using tone-evoked SP amplitude was 73.5%, compared to 38.1% using click-evoked SP/AP ratio using values of SP/AP ratio > 40% and SP amplitude > 1.43 microvolts. The lower sensitivity rate using SP/AP ratio resulted from the inability to positively identify the SP on the waveform in up to 25% of the patients. When the tone-evoked SP amplitude was abnormal, 92% of the patients in the "definite" Ménière's group and 86% of the "possible" Ménière's group demonstrated abnormal responses to the 2 KHz tone burst stimulus. Testing the "possible" Ménière's group revealed electrocochleographic abnormalities less frequently compared to the "definite" group.

Conclusion: Transtympanic electrocochleography is a sensitive near-field recording technique that likely indicates the presence of endolymphatic hydrops. We found a high concordance between transtympanic electrocochleographic abnormality and "definite" Ménière's disease symptom patterns and observed optimal diagnostic sensitivity associated with tone-burst stimuli, particularly the 2 KHz tone burst to measure SP amplitude.

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INTRATYMPANIC GENTAMICIN THERAPY OF UNCONTROLLED VERTIGO ASSOCIATED WITH MÉNIÈRE'S DISEASE

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ABSTRACT

Objective: To evaluate the efficacy and ototoxicity of intratympanic gentamicin therapy in the treatment of intractable vertigo secondary to unilateral Ménière's disease.

Study Design: A retrospective case review.

Setting: A tertiary referral center.

Patients: The study consisted of 28 patients with intractable vertigo secondary to unilateral Ménière's disease who were refractory to medical therapy. Eligibility for review required a minimum follow-up period of 2 years after intratympanic gentamicin therapy.

Intervention: Intratympanic gentamicin solution was administered to the affected ear on a weekly basis with an endpoint of 3 treatments or the first sign of cochleotoxicity.

Main Outcome Measure: Vertigo control and hearing preservation outcomes following intratympanic gentamicin therapy were determined using the American Academy of Otolaryngology–Head and Neck Surgery 1995 guidelines for the reporting of treatment results in Ménière's disease.

Results: Complete vertigo control without relapse was achieved in 64% of patients. An additional 18% of patients experienced initial control of vertigo with subsequent relapse within 1 year of treatment. The overall failure rate was 18%. The overall rate of hearing preservation was 79%. Six patients experienced a 20% or greater decline in speech discrimination following treatment. Four patients experienced pure tone average threshold shifts of 20 dB or more.

Conclusions: Intratympanic gentamicin therapy is an effective treatment for intractable vertigo secondary to unilateral Ménière's disease. Eighteen percent of patients in our series, however, ultimately failed and required surgical intervention. The overall safety of intratympanic gentamicin was excellent with a hearing preservation rate of 79%.

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DISCUSSION PERIOD IV: MÉNIÈRE'S DISEASE

Papers 11–14

Dr. Gregory J. Matz (Maywood, IL): These four papers on Ménière's disease are now open for discussion. Dr. Hirsch?

Dr. Barry Hirsch (Pittsburgh, PA): Dr. Zipfel, I enjoyed your paper. We have had some similar experience and success. I ask you, though, were you able to look at when hearing loss occurred with gentamicin? Did you see that happen relatively close to the time of the injection, or was this at your hearing assessment two years later? The reason I am asking is that it is our impression that in the natural course of Ménière's disease, if you look at a controlled study, those patients will continue to lose hearing with similar magnitudes of loss both for PTAs and discrimination scores.

Dr. Terrence E. Zipfel (Danville, PA): That is true, Dr. Hirsch. In our study, the hearing results that we reported were the last audiogram that was available. Three patients developed significant hearing loss that was temporally related to the gentamicin therapy. In one case it followed the second injection. In another case it followed the third injection. One other patient experienced a significant loss that developed several months following the primary series of injections. In some of the other patients, the hearing loss that occurred was more of a gradual process, which may be more consistent with the natural history of the disease.

Dr. John Shea, Jr. (Memphis, TN): I would like to add a comment. I would like the audience, and the otologic fraternity in general all over the world, to accept a different mindset about the treatment of Ménière's disease. I just attended the International Symposium on Ménière's Disease in Paris and about half of the papers there were about gentamicin perfusion. It is interesting that the results are rather similar to yours, except they are using much smaller doses of gentamicin and staging them. What I want to say is that I think we have to change our mindset about what we call an acceptable result. I have had, for the last four to five years, intermittent attacks of atrial fibrillation; the internist who treats me has made me understand that one or two episodes that happen during the course of each year is the normally accepted, good medical result. I have had to take extra therapy to get my rhythm

back to normal. I think we ought to think the same way about the treatment of Ménière's disease. I believe aminoglycoside therapy is an excellent therapy, and I think, over time, will ultimately be the best therapy and will be widely accepted throughout the world. But we have to have a different mindset; if we require that everybody be totally dizzy-free after these therapies, I think we are going to make too many people's hearing worse. This is a disease the natural history of which is pretty awful. Some of these people end up at late middle age (and I call that 55) with severe hearing loss. We ought to be doing something that is not going to make the hearing any worse. So, I am for accepting one, maybe one and a half episodes a year as a good result. I think your results here today at 82% control of dizziness is a marvelous result! It is a different mindset that I want to try to urge on our people doing this work.

Dr. Ilmari Pyykkö (Stockholm, Sweden): I have a comment for Dr. Yoo. I think he made an important contribution by showing the antibody responses in the inner ear. I have noticed the same in the circulating antibodies we use, but the weakness is we cannot specify a patient with these because they are weak signs. Therefore I would like to ask you, if you had just two of those antibodies, what would you measure specifically in Ménière's cases?

Dr. Tai J. Yoo (Memphis, TN): What I would have done in the past is what Dr. Jeff Harris will say "the 68-kD antibody." But now I say, "C-raf and β -tubulin" because it has the highest incidence. I cannot tell because I have not done extensive studies with Jeff Harris's protein. I could only buy it before, but now we have in our laboratory a genetic engineer who can produce it. For me, if we have two antigens—C-raf and β -tubulin.

Dr. Ilmari Pyykkö (Stockholm, Sweden): We have a high amount of positivity but the cortisone response is very limited in these cases. Do you think that these antigens that you measure are primary, or are just a reflection of what is going on in the cochlea?

Dr. Tai J. Yoo (Memphis, TN): Nobody knows because the autoimmune disease *per se*, even lupus, nobody knows how they have antibody against

ANA. I mean, is it the chicken or the egg? I do not think anybody knows, but at least you have some antigen/antibody that can be measured. I guess after maybe 10 years or 20 years—after we all die—the people will know a little bit better, but I have been messing around with this stuff for 20 years. I do not know why I did ENT; I am not an ENT surgeon, but I guess ENT is very interesting to me now. With C-raf I can produce a lupus-like picture if I immunize. This is an exciting new approach, but I guess there is a lot of room to improve. I guess we need a lot of international collaboration/cooperative studies. Now we are developing some kit. Any practicing doctor can test with one drop of serum. I think it will be coming up in two years.

Dr. Paul Kileny (Ann Arbor, MI): I have a comment and couple of questions regarding the paper on transtympanic electrocochleography. The comment is this difference that we see in electrocochleography with rarefaction/condensation clicks is not necessarily an artifactual difference. There should be an N1 latency difference using rarefaction and condensation clicks; that difference seems to be increased in patients with hydrops, and one of the reasons that the difference seems to be increased is probably because of the temporal relationship between an increased summing potential and the action potential. So, when you sum them and you look at the average you see a summing potential that is large and it sort of lines up with the seeming latency of the AP. That is not necessarily artifactual—that actually may be real and diagnostic. The question I have is the following: Obviously the difference between transtympanic electrocochleography and so-called electrocochleography obtained with these tetrodes (which are earplugs wrapped in foil) is expected to be very large. Have you compared transtympanic electrocochleography to electrocochleography obtained with TM surface recordings with the hydrogel electrodes that are now available?

Dr. Matthew Ng (Baltimore, MD): Thank you for your comments, Dr. Kileny. Regarding the issue of the latencies, I did not mention that is actually a typical finding in patients with Ménière's disease. It is discussed in the manuscript. Yes, there are latencies that have been noted to occur in Ménière's disease. It may just be a phenomenon and I did not want to convey that it is artifactual or false. Latency differences do occur and this is basically a manifestation of what we see on the electrocochleographic waveform. In answer to your question, Dr. Niparko has compared the signals from transtympanic electrocochleography to those obtained with the gel-contact electrode on the tympanic membrane. His

experience is that the signals received are 10 times greater in amplitude.

Dr. Paul Kileny (Ann Arbor, MI): I have one last, quick question. What was the profile of your tone burst—duration, rise time, gating, and so forth?

Dr. Matthew Ng (Baltimore, MD): The plateau was 6 and the rise time was 1, I believe.

Dr. George Gates (Seattle, WA): I want to congratulate Dr. Ng and his colleagues on a beautiful study. I have two comments. We agree fully that the transtympanic method is the most accurate one, and it is so easy to do one wonders why it has not been more popular. But, note that 13.5% of your normal subjects had an abnormal test, which is not unusual, but it is still about one in seven. We have been seeking a way to refine this further and we have been using distortion-product otoacoustic emissions with glycerol administration. It is a very easy and very sensitive way to look at the hydroptic ear versus the nonhydroptic ear. My question is—have you also been using distortion products in your evaluation?

Dr. Matthew Ng (Baltimore, M.D.): Thank you, Dr. Gates. We have not been using distortion-product otoacoustic emissions for evaluation, but I am sure we will add this useful information.

Dr. Jeffrey Harris (San Diego, CA): I have a question for Dr. Yoo. T.J., you presented a lot of data there in a short time. It looked like four studies, perhaps! I was curious, since there are many patients who have multiple problems and various ear diseases, and normal patients that have antigens that you can measure antibody to in their serum. We have found several times, and have published in several publications, that when we look at the normal patient there is a certain percentage of very predictable, positive responses that you will find in their serum. Many of the Ménière's patients and bilaterally progressive sensorineural hearing loss patients also exhibit those same antibodies. The problem is that when you do the statistical tests, if you do it enough times, with enough patients that are age-matched, many of those antibodies, and antigens that these antibodies are reacting to, fall away as being insignificant. You presented eight antigens. I was wondering, could you tell me what is the rate of positive responses in controls?

Dr. Tai J. Yoo (Memphis, TN): Yes, I showed the specificity. There were about 28 persons and about 5 or 6 patients showed one of the antigens. It is not that bad.

Dr. Jeffrey Harris (San Diego, CA): You mean 28% false positives?

Dr. Tai J. Yoo (Memphis, TN): No, 22%. Tubulin

is none of the positives. Type IX and XI is none of the positives. Some of the C-raf, one out of the 20. This is very specific. I have to tell you this is a very good antigen.

Dr. Jeffrey Harris (San Diego, CA): When you have evidence of a positive antibody response to, say two of those as you showed—how does that impact on the treatment of the patient who is positive?

Dr. Tai J. Yoo (Memphis, TN): I have no idea. All I can say is that in Ménière's patients, a very large

number manifest positive responses. If I test the 68-kD protein and PO protein I think it might reach 100%. Of course, a normal person has a high antibody titer to type II collagen. But, you know, as time goes, they might develop some diseases. We have like two out of 28, type II, things like that, so I can just show you the detailed paper, but overall it is a very good test; I want you guys to do that. I am tired to keep asking you to do that, but it is for your benefit. Thank you.

AIR AND WATER CALORIC TESTING: VARIABILITY OF TEST-RETEST RESPONSES

**Arvind Kumar, M.D., F.R.C.S. (Edin), and †Roy Amir, M.D.*

ABSTRACT

Objective: To statistically compare the test-retest responses of normal subjects to air and water caloric stimulations.

Main Design: Cross-sectional study of 20 normal subjects at a tertiary care hospital.

Patients: Healthy volunteers between the ages of 20 and 40, with no history of otologic disease.

Intervention: Each ear was irrigated twice with air and twice with water, both at 20°C, for 20 seconds. The flow rate of the air was 5 L/min.

Main Outcome Measure: Induced nystagmus was measured in terms of maximum slow-phase velocity (SPV_{max}) and culmination frequency (CF). Test-retest variability was calculated and statistically analyzed.

Results:

- average CF (water): 38.5 (SD 9.7)

- average CF (air): 15.3 (SD 6.5)

This difference is statistically significant ($p < 0.01$).

- average SPV_{max} (water): 13.1° (SD 7.3)

- average SPV_{max} (air): 1.9° (SD 1.6)

This difference is statistically significant ($p < 0.01$).

- average test-retest variability for water (CF) : 9.7% (SD 7.8)

- average test-retest variability for air (CF): 24.8% (SD 28.3).

This difference is statistically significant ($p < 0.01$).

- average test-retest variability for water (SPV_{max}): 32.3 % (SD 24.95)

- average test-retest variability for air (SPV_{max}): 51.5% (SD 28.8).

This difference is statistically significant ($p < 0.01$).

The differences between average test-retest variabilities measured in terms of CF versus SPV_{max} , for both air and water, are significant ($p < 0.01$).

Conclusions:

- Air and water are not equivalent stimuli when the temperature and duration of application are the same.
- Variability of responses to water stimulation are significantly less than for air.
- The variability of CF is significantly less than that of SPV_{max} , for both air and water stimuli.

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OUTCOME ANALYSIS OF INDIVIDUALIZED VESTIBULAR REHABILITATION PROTOCOLS

F. Owen Black, M.D., Colette R. Angel, Susan C. Pesznecker, R.N., and Claire Gianna, Ph.D.

ABSTRACT

Objective: Determine outcome of vestibular rehabilitation protocols in subjects with peripheral vestibular disorders compared to normal and abnormal controls.

Study Design: Prospective study using repeated measure, matched control design. Subjects were solicited consecutively according to these criteria: Vestibular disorder subjects who were abnormal on computerized dynamic posturography (CDP) sensory organization tests (SOTs) 5 & 6 and underwent rehabilitation; vestibular disorder subjects who were abnormal on SOTs 5 & 6 and did not undergo rehabilitation; and normal subjects (normal SOTs).

Setting: Tertiary neurotology clinic.

Subjects: (1) Males and females over age 18 with chronic vestibular disorders and chief complaints of unsteadiness, imbalance and/or motion intolerance; (2) control subjects.

Interventions: Pre- and post-rehabilitation assessment included CDP, vestibular disability, and activity of daily living questionnaires. Individualized rehabilitation plans were designed and implemented to address the subject's specific complaints and functional deficits. Supervised sessions were held at weekly intervals and self-administered programs devised for daily home use.

Main Outcome Measures: CDP composite and SOT scores, number of falls on CDP, and self-assessment questionnaires.

Results: Subjects who underwent rehabilitation (group A) showed statistically significant improvements in SOTs, overall composite score, and reduction in falls compared to abnormal (group B) control groups. Their performances after rehabilitation were not significantly different from the normals (Group C) in SOTs 3-6, and close to normal on SOTs 1 and 2. Subjects in the rehabilitation group also reported statistically significant symptomatic improvement.

Conclusions: Outcome measures of vestibular protocol physical therapy confirmed objective and subjective improvement in subjects with chronic peripheral vestibular disorders. Our findings support results reported by other investigators.

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LONG-TERM EFFICACY OF A VESTIBULAR REHABILITATION THERAPY PROGRAM

Marian Girardi, M.A., Horst R. Konrad, M.D., and Larry F. Hughes, Ph.D.

ABSTRACT

Objective: To determine whether customized vestibular rehabilitation therapy (VRT) provides long-term improvement in dizziness and balance symptoms.

Main Design: A retrospective study of 200 randomly selected individuals from a 1500-patient base population, treated for dizziness and balance disorders with individually tailored VRT exercises, was performed. A control group with similar diagnoses who did not receive VRT was also utilized. Subjects' anonymity was maintained.

Setting: Tertiary referral center.

Patients: Urban/rural Midwesterners referred for dizziness and balance dysfunction excluding BPPV.

Intervention: A VRT program customized for each patient. Exercises were specifically designed to address distinct vestibular deficits as determined by an initial assessment of the patient.

Outcome Measures: The Dizziness Handicap Inventory (DHI) was administered prior to starting VRT and 2 or more years following the completion of VRT. An investigator-designed questionnaire was also administered post-therapy. A control group who did not receive VRT was also surveyed using the DHI.

Results: One hundred twenty-three individuals participated in the study; 62.5% showed a decrease in DHI total score, 68.8% a lower functional score, 53.1% a decreased emotional score, and 78.1% a reduced physical score. ANOVA showed significant ($p < 0.01$) reductions in all four DHI measures following therapy. Additionally, 75.8% of the individuals reported having symptoms less frequently and 80.0% stated symptoms were less severe. Over 90% of the respondents would recommend a similar VRT program to family/friends with comparable symptoms.

Conclusion: Customized VRT provides long-term improvement in balance symptoms as measured by the DHI. A majority of patients treated with VRT continue to demonstrate long-term improved balance following cessation of treatment.

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A COMPARISON OF TREATMENT OPTIONS FOR NON-SPECIFIC DIZZINESS.

Brian W. Blakley, M.D., Ph.D., F.R.C.S.C.

ABSTRACT

Objective: To contrast two methods of treating patients with non-specific dizziness.

Study Design: Retrospective review of 230 patients who presented with non-specific dizziness.

Patients: Patients presented with complaints of dizziness but did not meet recognized criteria for a specific otologic or organic medical cause of their dizziness. All patients reported that their symptoms had been bothersome for at least 3 months. Normal ENG and imaging studies (CT or MRI) were required for inclusion.

Interventions: Ninety-three patients were treated with vestibular rehabilitation and 137 were treated with antidepressant therapy.

Main Outcome Measure: If the patient and physician felt that the symptoms of dizziness had either gone away or improved enough so that no further treatment was needed, treatment was considered successful.

Results: Of 93 patients treated with vestibular rehabilitation 61 (66%) reported improvement at their 1-month follow-up. Of 137 patients treated with antidepressants 110 (80%) reported improvement. The follow-up time for antidepressants was 8 ± 2.3 weeks. Follow-up was different than for vestibular rehabilitation because the antidepressant method requires adjustment of the dose of medication every 2 weeks.

Conclusions: While differences between the two groups in this study do not permit direct, valid comparison, it appears that use of antidepressants has a significant role in treatment of non-specific dizziness. The results of vestibular rehabilitation therapy were less impressive.

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EFFECTS OF NITRIC OXIDE ON MORPHOLOGY OF ISOLATED COCHLEAR OUTER HAIR CELLS: POSSIBLE INVOLVEMENT IN SENSORINEURAL HEARING LOSS

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ABSTRACT

Hypothesis: The inflammatory mediator (IM) of otitis media, nitric oxide (NO) can cause cochlear insult and damages outer hair cells (OHCs).

Background: Free radicals including nitric oxide have been detected in the middle ear effusion. Increasing evidence implicates free radicals in the pathogenesis of otitis media and possibly in the development of sensorineural hearing loss.

Methods: Isolated OHCs from adult chinchilla cochlea were exposed to standard bathing solution (SBS) (Control Group 1) or the NO. Producing compounds: S-nitroso-N-acetyl, L-penicillamine (SNAP, 1–1.5 mg/ml, Experimental Group 1) or 3-morpholinosynonimine (SIN-1, 1–1.5 mg/ml, Experimental Group 2). Since NO is readily converted to nitrite (NO_2^-) and nitrate (NO_3^-) *in vivo*, a second control group utilizing sodium nitrite (NaNO_2) was employed to separate potential effects of NO from NO_2^- . All experiments were performed at an osmolality of 305 ± 5 mOsm, room temperature, and with exposure time up to ninety minutes. The cells were observed using an inverted microscope, and the images recorded and analyzed on the IMAGE Pro-plus program.

Results: OHCs exposed to either SBS or NaNO_2 (Control Groups 1 and 2) showed no significant change in cell shape or length. Cells superfused with SNAP or SIN-1 exhibited ballooning and significant shortening in mean cell length ($P < 0.01$). In contrast to SNAP, SIN-1 caused irreversible changes in the cell structure.

Conclusions: This study demonstrates that exposure to NO causes irreversible morphologic changes in isolated OHCs suggesting possible involvement of NO radical in the development of sensorineural hearing loss as a sequelae of chronic otitis media.

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PATHOLOGY OF BELL'S PALSY

**[†]Jack L. Pulec, M.D., and [†]Michael J. Patterson, Ph.D.*

ABSTRACT

Objective: Since few patients die while they suffer Bell's palsy, little information is available about the pathology of the nerve. This study is to learn about the pathology.

Study Design: Surgical techniques were developed to perform biopsies of different parts of the facial nerve without the production of additional morbidity for the patient.

Setting: A tertiary referral private practice of a neurotology and teaching hospital in a large metropolitan area.

Patients: Patients with Bell's palsy requiring surgical decompression.

Intervention: All patients had complete diagnostic evaluation including topographic, electrodiagnostic, audiometric, vestibulometric, and imaging tests before the edematous portion of the facial nerve was surgically decompressed. Fragments of the facial nerve were removed during surgery for the treatment of Bell's palsy in more than 100 patients. The nerves were studied using electron microscopy.

Main Outcome Measures: A variety of pathologic changes were identified. The histopathological findings were correlated with the preoperative history and physical findings, topographic and electrical tests and eventual amount of recovery.

Results: Previously undescribed morphologic changes, varying degrees of degeneration and possible viruses were observed.

Conclusions: The results demonstrate that the completeness of facial recovery can be predicted by the degree of pathology present at decompression.

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DISCUSSION PERIOD V: VESTIBULAR DISORDERS AND HISTOPATHOLOGY

Papers 15–20

Dr. Gregory J. Matz (Maywood, IL): These papers are now open for discussion. Dr. Odkvist?

Dr. Lars Odkvist (Stockholm, Sweden): Dr. Black, I think your communication is a very important one. It's very difficult to find groups of untreated patients, especially those with vestibular disorders. We happened to have run across a group—I have been using gentamicin for Ménière's disease for 20 years, and I have always stressed the importance of vestibular rehabilitation. On a follow-up study we found that some of these people admitted that they had not gone through with the rehabilitation program. Upon testing, they performed not as well as those who had completed the rehabilitation program. My question to you is—You have a group of normals who fell (on dynamic posturography) on sensory organization tasks 5 and 6. How common is that in your experience?

Dr. F. Owen Black (Portland, OR): I am sorry to have misled you. The normal subjects did not fall. Only the abnormal groups fell.

Dr. George A. Gates (Seattle, WA): I'd like to comment on the paper by Dr. Kumar and Dr. Amir. Thank you for bringing this to our attention, but before we give up our air caloric stimulators, I'd like to point out a bias in the paper. As you pointed out, air is a less effective heat transfer medium than water, yet you used the same stimulus (temperature and duration) for the two groups. In clinical practice, the air caloric stimulator uses a colder/warmer (as the case may be) stimulus for a longer duration so that the stimulation of the labyrinth is comparable, generally, to water. In those situations, we don't see the high degree of variability that you pointed out. I would stress it's not so much the air as the fact that you understimulated the labyrinth. I would suggest that if you repeated the study using more equivalent stimuli, so that you got comparable eye velocities out of the two stimuli, you would find that the variability would be quite comparable.

Dr. Arvind Kumar (Chicago, IL): Thank you, Dr. Gates, for your comments. Yes, we did not use the same stimulus, but one of the objectives also was to

show that it is not equivalent and many laboratories across the country use equivalent measures to stimulate the ear. What would be equivalent with the stimulus that we used will have to be worked out. And for the temperatures that we used—we used the Torok monothermal test—then we would have to set new standards and try to compare the two. But, as things stand, this is a principle that we are looking at, even if they are equivalent or not equivalent, I think there is variability with the air caloric stimulation.

Dr. Cecil Hart (Chicago, IL): I think there is other literature bearing out the fact that there is more variation in the air caloric stimulus, although I think that Dr. Gates's comments are valid. You took two criteria for the input to the caloric stimulus, and then you took two criteria for the output of the caloric stimulus. I wouldn't want the audience to leave with the impression that of the two outputs, one should prefer one over the other. There are many possible outputs you can measure: you can measure the fast-phase eye velocity as well as the slow-phase eye velocity; you can measure the interbeat intervals, and so on. Just because one parameter has more variation than the other doesn't mean that it is preferable. I think, as you know, all these parameters are subserved by different neurological systems; the slow-phase eye velocity happens to be a key one because of a relationship with the horizontal semicircular canals.

Editor's note: Unfortunately, the tape recorder failed to capture the subsequent reply by Dr. Kumar, as well as comments, questions, and replies from Drs. Conrad Proctor, Brian Blakley, Vijay Dayal, Joseph Nadol, and F. Owen Black, and Ms. Girardi. Taping resumed during Dr. Hamid's comments.

Dr. Mohamed Hamid (Chagrin Falls, OH): About 10 years ago, we published a paper on intra-subject variability and showed that slow-phase eye velocity has more than one mechanism, and that we don't know when you put water or air in the ear how the system picks up which population it chooses from. So, I would reiterate the fact that we have to be very careful when we talk about caloric

variability and we should use the appropriate equations to measure it.

Dr. Arvind Kumar (Chicago, IL): Mohamed, thank you for your comment. As to the statistics, I cannot answer very well, because I am not a statistician; but we did run this by our statisticians, and they seemed to be happy. I am happy to agree with you, or to disagree with you, whatever way you wish it! But, as for measuring the slow-phase eye velocity, and what different populations are affected—all those points may be valid—the fact of the matter is, that is what is commonly measured, and that is the common measure that we are going to use to express vestibular sensitivity in some numbers. If that is what we are going to do, then we had better be sure that it gives us consistent answers. If there is variability because of something going on, whatever it is, we just have to include that in our analysis.

Dr. David Lim (Los Angeles, CA): I have a question, and a comment, for Dr. Jung and his associates. I'd like to congratulate them on this attempt. I think that this type of study has great importance in advancing our understanding of the cellular mechanisms involved in cell injury. I think it is very important also in other areas, like in determining hepatotoxicity or kidney toxicity. Cells are being used to determine those things. So, in that line, I think it is a very important contribution. My questions to you are as follows. Is it very specific to hair cells—have you tried other cells as a control (because in most of the sensorineural hearing loss in the inner ear the hair cell is the target)? Can you use a blocker to prove it is really the pathway you are thinking about?

Dr. Raymund Llauro (Loma Linda, CA): With regard to your first question, we haven't looked specifically at other cells, but we have applied SNAP and SIN (the nitric oxide-producing compounds) to the round window membrane and have observed loss of ABR thresholds in chinchillas. So,

that implies at least functional loss, but we have not looked at cells other than outer hair cells, or support cells, in the cochlea. In regard to your second question, we have not tried blockers specifically.

Dr. Timothy T. K. Jung (Loma Linda, CA): Let me just interject that we are actually trying the blockers in our studies right now.

Dr. Cecil Hart (Chicago, IL): Dr. Blakley, I admired your paper very much! You made a very good point. We did a study many years ago of dizzy patients, and we found about 70 different diseases. However, 30% of our patients were patients with psychological diseases as their primary complaint, of which the majority had depression. As a result, in our questionnaire we use three sets of questions—one set for depression, one set for anxiety, and one set for panic attacks. We have found that patients will very often express their concerns in a questionnaire, whereas they might be intimidated when they face the doctor. So, a questionnaire to pick up this very important, largest category of dizzy patients is very useful. Personally, I prefer to leave the treatment of the psychiatric diseases of these patients to the experts—the psychiatrists.

Dr. Brian Blakley (Winnipeg, Manitoba, Canada): Thank you, Dr. Hart. I think you're right. There's lots of psychiatric pathology, and actually lots of literature of its relationship to the symptom of dizziness. I think it's very difficult to find a psychiatrist who is interested, or understands, or thinks that dizziness is worthy of treatment. The same is true of primary care physicians, and so, particularly when I was in Detroit, I found it necessary for me to become involved if I wanted to help these people. I realize that many of us would say, "I don't want to prescribe antidepressants, I don't know anything about them." That's fine, but I think if we don't do it, a lot of patients will go untreated. That's why my philosophy is to treat it—these are not risky drugs, and in low doses they are relatively safe to use.

PREOPERATIVE COCHLEAR IMPLANT IMAGING: IS MRI ENOUGH?

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and †H. Ric Harnsberger, M.D.*

ABSTRACT

Objective: This study was designed to investigate the accuracy of MRI as a preoperative imaging technique for cochlear implant candidates.

Study Design: Retrospective, blinded.

Setting: Tertiary medical center.

Patients: Thirty-one cochlear implant candidates with various etiologies of hearing loss.

Intervention: Cochlear implant patients received preoperative high-resolution temporal bone CT scanning, and high-resolution fast spin echo T2 (FSE) MRI.

The images were read independently of each other and blindly by two neuro-radiologists. The imaging results were also correlated with intraoperative findings.

Main Outcome Measures: Lack of agreement between the findings for either imaging technique. Also, lack of agreement between imaging findings and intraoperative findings.

Results: FSE-MRI is equal to CT imaging in the detection of abnormalities of cochlear patency. FSE-MRI is better than CT imaging for the detection of cochlear dysplasia and large vestibular aqueducts, and to determine the presence of the cochlear nerve.

Conclusion: We find that FSE-MRI is accurate in predicting inner ear anomalies and obstruction of the cochlear lumen. It also adds information not gathered from CT imaging, such as the presence and size of the cochlear nerve.

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THE STABILITY AND UTILITY OF NEURAL RESPONSE TELEMETRY (NRT) IN CHILDREN USING THE NUCLEUS CI24M COCHLEAR IMPLANT: PRELIMINARY FINDINGS

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

ABSTRACT

Objective: The CI24M cochlear implant features a bidirectional NRT system which allows for the measurement of electrical action potentials from within the cochlea. The data obtained provides information regarding the response of the auditory nerve to stimulation, integrity of aspects of the prosthesis and possible prognostic and device programming indicators. The clinical utility of this technique may be inferred by its stability and relationship to psychophysical measures over time.

Study Design: The study group consisted of 12 children in whom the decision to be implanted had already been made.

Patients and Setting: Twelve deaf children were implanted with the Nucleus CI24M (N24) and followed at NYU Medical Center.

Interventions and Main Outcome Measures: To date, NRT measurements were recorded intraoperatively, at initial stimulation, 2 weeks, 3 months and 6 months post-stimulation. At each session, EAP thresholds and impedances were recorded from E5, E10, E15, and E20. Psychophysical measures were obtained at each postoperative interval.

Results: Correlation coefficients were calculated among measures and analyses of variance were performed independently. Results show significant changes in EAP and behavioral thresholds over time with no correlation between electrical and behavioral thresholds. No significant shifts were found for electrode impedance measures.

Conclusions: EAP and behavioral thresholds in children show a similar pattern of variation over time which may provide assistance with device programming.

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THE INFLUENCE OF AGE AT IMPLANTATION ON PERFORMANCE WITH A COCHLEAR IMPLANT IN CHILDREN

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ABSTRACT

Objective: This study involved the assessment of speech recognition abilities as a function of age at implantation and length of cochlear implant use in children implanted with the Nucleus Mini 22 cochlear implant.

Study Design: Two separate analyses were performed. The first analysis involved the assessment of speech recognition performance as a function of length of time with a cochlear implant in 48 patients evaluated at 7 years of age. The second analysis involved the assessment of speech recognition performance as a function of age at implantation in 53 patients evaluated at 36 months post-implantation. Patients were divided into four groups based on length of implant use or age at implantation and results were analyzed using a repeated measures analysis of variance.

Setting: This study was carried out at a tertiary academic medical center.

Patients: Patients consisted of children implanted with the Nucleus 22 mini implant programmed with the SPEAK encoding strategy. Their ages at the time of evaluation ranged from 5.5 to 7.8 years. Age at implantation ranged from 2.4 to 14.5 years.

Interventions: All patients were implanted with a Nucleus Mini 22 cochlear implant programmed using the SPEAK encoding strategy. Word and sentence recognition tests were administered at various ages and several post-implantation intervals.

Main Outcome Measures: Performance as a function of length of cochlear implant use and as a function of age at implantation.

Results: Patients performed significantly better as length of cochlear implant use increased and age at implantation decreased. When tested at a fixed post-implantation time interval (36 months), there was an overall trend for patients implanted at a younger age to perform better in spite of being younger at the time of evaluation. However, these effects were not statistically significant for all speech recognition tests that were administered.

Conclusions: These results confirm previous findings indicating continued improvement of speech recognition with time in implanted children. Furthermore results do support the notion of the advantage of a younger age at implantation.

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COCHLEAR IMPLANT ELECTRODE MIGRATION IN ADULTS AND CHILDREN

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ABSTRACT

Objective: A possible complication of cochlear implant surgery is electrode array extrusion or migration. Factors that may contribute to electrode movement after placement include skull growth in the young patient, intracochlear fibrosis or ossification, trauma, and uncoiling forces created by the elastic properties of the electrode array. The purpose of this study is to determine the frequency and consequences of electrode migration in child and adult implantees.

Study Design: A prospective serial radiographic analysis of electrode position was performed.

Patients and Setting: Seventy patients, 37 children and 33 adults, with multichannel cochlear implants were followed at a major cochlear implant center.

Interventions and Outcome Measures: Plain film radiographic analysis, with computer enhancement of images when necessary, of electrode intracochlear position was performed. Changes in position over time, from 1 to 8 years post-implantation, were recorded. Clinical performance changes were also evaluated.

Results: No electrode extrusion or migration was found in children. Electrode migration was identified in three adults. Only one adult had significant clinical performance changes, requiring reoperation and repositioning.

Conclusion: This study of a representative sample of our cochlear implant population confirms the stability of the electrode array over time.

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THE EFFECT OF FREQUENCY ALLOCATION ON PHONEME RECOGNITION WITH THE NUCLEUS 22 COCHLEAR IMPLANT

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ABSTRACT

Hypothesis: Phoneme recognition performance in patients implanted with the Nucleus 22 cochlear implant is affected by the frequency-to-electrode assignment.

Background: Multiple electrodes in modern cochlear implants are intended to deliver frequency-specific information to different tonotopic locations along the cochlea. However, the relation between the electrode locations, distribution of frequency information, and performance has not been thoroughly explored.

Methods: Ten listeners were tested on vowel and consonant identification tasks immediately after receiving each of fifteen speech processors. Experimental processors were created with 4, 7, and 20 activated electrodes. Five different frequency allocations were tested with all electrode conditions.

Results: For 7- and 20-electrode maps, best vowel recognition performance was obtained with frequency tables 7 and 9, with subjects showing best performance with the table with which they were most familiar. With 4-electrode maps, no change in vowel recognition performance was observed as a function of the frequency allocation. Consonant scores showed only a small effect of frequency allocation across all processors. Results were similar across listeners with different insertion depths.

Conclusion: The allocation of frequency ranges to electrodes in the Nucleus 22 cochlear implant can affect vowel recognition when more than four electrodes are used, but is less important for consonant recognition. The allocation of frequency to electrode is an important factor in multichannel implants with more than four electrodes. The similarity of results across implant listeners with different electrode insertion depths implies that the optimal frequency allocation is one that best matches the allocation to which they have become accustomed, rather than one that matches the tonotopic location of the electrodes.

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COMPARISON OF A SIMULTANEOUS AND A NON-SIMULTANEOUS SPEECH PROCESSING STRATEGY IN NEWLY IMPLANTED ADULTS

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ABSTRACT

Objective: This study consisted of a within subjects comparison of two cochlear implant speech processing strategies currently available with the Clarion device: Simultaneous Analog Stimulation (SAS), and Continuous Interleaved Sampling (CIS).

Study Design: This was a multi-center study that employed a within-subjects balanced crossover design. Experience with the two strategies was replicated in each patient using an ABAB design. Order of strategy use was balanced across all patients.

Setting: The study was carried out at several cochlear implant centers affiliated with tertiary medical centers.

Patients: Patients consisted of 20 postlingually deafened adults who received a Clarion cochlear implant.

Interventions: Total patient involvement lasted 14 weeks. Speech perception testing and sound quality assessments were performed following use with each strategy.

Main Outcome Measures: Primary outcome measures include speech perception data and patient responses to questionnaires regarding speech and sound quality.

Results: When analyzed as a group, no significant differences were noted between speech perception scores obtained with the CIS and the SAS strategies. When individual subjects data was analyzed, only six subjects demonstrated a significantly better strategy: 3 subjects performed best when using CIS and 3 subjects performed best when using SAS.

Conclusions: This study demonstrates that it is optimal to offer patients the ability to use more than 1 strategy, even if only a minority of patients demonstrate better performance with or prefer the less popular strategy.

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LESIONS OF THE INTERNAL AUDITORY CANAL AND CEREBELLOPONTINE ANGLE IN AN ONLY HEARING EAR: IS SURGERY EVER ADVISABLE?

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ABSTRACT

Objective: To define the indications for surgery in lesions of the internal auditory canal (IAC) and cerebellopontine angle (CPA) in an only hearing ear.

Study Design: Retrospective case series.

Setting: Tertiary referral center.

Patients: Four patients with lesions of the IAC and CPA who were deaf on the side opposite of the lesion. Two patients had vestibular schwannoma (VS) and one each meningioma and progressive osseous stenosis of the IAC. The opposite ear was deaf due to three different causes: VS (neurofibromatosis Type 2), sudden SNHL, and idiopathic IAC stenosis.

Intervention(s): Middle fossa removal of VS in two; retrosigmoid resection of meningioma in one, and middle fossa IAC osseous decompression in one.

Main Outcome Measure: Hearing as measured on pure tone and speech audiometry.

Results: Preoperative hearing was class A in all four patients. Postoperative hearing is class A in three patients and class D in the patient with neurofibromatosis Type 2.

Conclusions: While the vast majority of neurotologic lesions in an only hearing ear are best managed nonoperatively, in highly selected cases surgical intervention is warranted. Surgical intervention should be considered when one or more of the following circumstances is present: (1) Predicted natural history of the disease is relatively rapid loss of the remaining hearing; (2) substantial brainstem compression has evolved (e.g., large acoustic neuroma); and (3) operative intervention may result in improvement of hearing or carries relatively low risk of hearing loss (e.g., CPA meningioma).

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Reprint requests: Colin L. W. Driscoll, M.D., Department of Otolaryngology, University of California San Francisco, 400 Parnassus Avenue, A-730, San Francisco, CA 94143-0342, (415) 476-0757 (ph.), (415) 502-0289 (VM), (415) 476-3591 (fax). E-mail: clwdriscoll@orca.ucsf.edu.

ACOUSTIC NEUROMA SURGERY: USE OF COCHLEAR NERVE ACTION POTENTIAL MONITORING FOR HEARING PRESERVATION

Lance E. Jackson, M.D., and Joseph B. Roberson, Jr., M.D.

ABSTRACT

Objectives: Compare the hearing preservation results obtained with use of two intraoperative eighth-nerve monitoring methods, cochlear nerve action potential (CNAP) and auditory brainstem response (ABR), during complete acoustic neuroma (AN) resection.

Study Design: Retrospective.

Setting: Tertiary referral center.

Patients: Twenty-two consecutive patients who underwent hearing-preservation AN surgery.

Interventions: Intraoperative monitoring by CNAP and/or ABR during AN resection.

Main Outcome Measure: Postoperative hearing. Hearing preservation was considered achieved for pure tone average ≤ 50 dB and speech discrimination $\geq 50\%$.

Results: Twenty-one patients met inclusion criteria for the study. Monitoring was successfully performed in 14/15 patients (93%) who underwent attempted CNAP monitoring and 7/17 (41%) who underwent attempted ABR monitoring. When tumor size was ≤ 20 mm in greatest dimension, hearing preservation was achieved in 8/11 patients (73%) monitored with CNAP, versus 2/6 patients (33%) not monitored with CNAP ($p = 0.12$). ABR monitoring did not improve hearing-preservation rates compared to those not monitored with ABR (50% versus 64%). At the completion of surgery, the presence or absence of CNAP predicted the presence or absence of hearing preservation in 12/14 cases (86%), whereas ABR successfully predicted hearing results in 7/7 cases (100%).

Conclusions: When comparing CNAP and ABR monitoring techniques during AN surgery, CNAP was more frequently obtainable. CNAP monitoring was associated with a higher chance of hearing preservation. ABR monitoring did not have a positive influence on hearing preservation results. Both ABR and CNAP were useful for predicting postoperative hearing.

California Ear Institute at Stanford, Division of Otolaryngology, Stanford University Medical Center, Palo Alto, CA.

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AUDIOMETRIC FINDINGS IN ACOUSTIC NEUROMA PATIENTS

Stephen G. Harner, M.D., David A Fabry, Ph.D., and Charles W. Beatty, M.D.

ABSTRACT

Objective: Hearing loss remains the most common symptom associated with acoustic neuroma. This study documents the audiometric findings from 721 acoustic neuroma procedures.

Study Design: This is a retrospective study. The preoperative audiometric data are compiled. They were analyzed by patient age, gender, tumor size, time of surgery and neurofibromatosis type 2 (NF 2). Postoperative audiometric data was arranged and compiled in the same way. The hearing classification proposed by the AAO-HNS was applied to all preoperative and postoperative cases.

Setting: Tertiary referral center.

Patients: Surgically confirmed acoustic neuroma patients who had no prior surgical or radiosurgical therapy. Patients had surgery utilizing the retrosigmoid approach.

Intervention: Surgical removal of an acoustic neuroma.

Main Outcome Result: Provides pure tone and speech data from a group of acoustic neuroma patients including application of the recently accepted AAO-HNS hearing classification system.

Results: There is preoperative audiometric data from 694 of 721 cases (96%). Six hundred nineteen had measurable hearing. Postoperative audiometry was performed on 606 patients, 152 have useable data. The combined preoperative audiometric data reveals a high frequency sensorineural hearing loss. Word recognition is serviceable. The postoperative pure tones and word recognition scores are worse than preoperative. Age, gender, tumor size and time of surgery had some impact on the preoperative hearing, and the postoperative result. NF 2 did not.

Conclusions: Confirms that hearing alteration is almost universal in acoustic neuroma patients. Hearing preservation is possible in a significant number of cases, however the postoperative auditory function tends to be worse.

Key words: Acoustic neuroma, Audiometry, Hearing Results, Hearing preservation.

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SPONTANEOUS INVOLUTION OF ACOUSTIC TUMORS

Charles M. Luetje, M.D.

ABSTRACT

Objective: To determine spontaneous involution of unilateral acoustic tumors in untreated patients.

Study Design: Outcome of prospective study 1982 to present.

Setting: Private tertiary otology/neurotology referral center.

Patients: Patients with unilateral acoustic tumors for whom interval imaging was selected as opposed to surgery or gamma knife radiation, 1982 to present.

Intervention: Interval imaging with computerized axial tomography and/or magnetic resonance imaging.

Main Outcome Measure: Occurrence of spontaneous involution of acoustic tumors.

Results: Forty-seven patients with unilateral acoustic tumors were untreated and followed with interval imaging ranging from one to 12.5 years. Six patients (13%), whose ages ranged from 59 to 74 years and who were followed from 4.3 to 12.5 years demonstrated imaging evidence of spontaneous acoustic tumor involution. Involution varied from 3.4 mm to 15 mm.

Conclusions: Spontaneous involution of acoustic tumors does occur. Long term follow-up is necessary to determine this potential.

Otologic Center, Inc., Kansas City, MO.

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COCHLEAR ISCHEMIA INDUCED BY CIRCULATING IRON PARTICLES UNDER MAGNETIC CONTROL: AN ANIMAL MODEL FOR SUDDEN HEARING LOSS

John M. Schweinfurth, M.D., and Anthony T. Cacace, Ph.D.

ABSTRACT

Hypothesis: Some cases of sudden hearing loss are cochlear ischemic events.

Background: Sudden hearing loss (SHL) is a controversial topic for which no definitive practical guidelines exist. Studies employing agents directed at improving cochlear blood flow have shown no improvement over the rate of spontaneous recovery. At present, there is insufficient evidence to support medical treatment for SHL, except steroid therapy in select patients. Distortion-product otoacoustic emissions (DPOAEs) are sensitive to cochlear disorders, are absent in ischemic injury to the cochlea, but can persist in cochlear neuritis. In a previous study, we have shown that patients who present with SHL and have measurable emissions are much more likely to recover hearing than patients who do not. The underlying cause for the loss of emissions is uncertain, but is believed to be secondary to cochlear ischemia.

Methods: In an effort to explain this loss, an animal model of cochlear ischemia was created. Six rabbits underwent unilateral cochlear embolization through the use of circulating iron particles under magnetic control. Cochlear function was monitored through the measurement of DPOAEs.

Results: A rapid decrease in emissions was noted which fluctuated but largely resolved with return to baseline within 2 hours to 3 weeks after embolization, leaving no measurable residual defects. Higher doses of iron with a stronger magnetic field led to the elimination of DPOAEs within 3 hours.

Conclusion: The mechanism of sudden hearing loss may be an ischemic phenomenon and may be acutely reversible.

Albany Medical College, Albany, NY.

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HEARING PROBLEMS IN MEXICAN-AMERICAN ELDERLY

**Zoreh Davanipour, D.V.M., Ph.D., *Nicole M. Lu, M.S., †Michael Lichtenstein, M.D.,
and †Kyriakos S. Markides, Ph.D.*

ABSTRACT

Objective: To investigate hearing problems in a sample of elderly Mexican Americans.

Study Design: A longitudinal field study of a cohort of 3050 subjects with in-person baseline and a 2-year follow-up. Population-based, cross-sectional, weighted data were analyzed.

Settings and Subjects: Hispanic EPESE (Established Populations for Epidemiologic Studies of the Elderly) consisting of Mexican Americans aged 65 and over provided basic health data using area probability sampling in five southwestern states during 1993–1994.

Main Outcome Measures: Information was collected on demographics, medical conditions, smoking and alcohol consumption. Hearing problems were identified through a series of self-perceived hearing problem questions, hearing aid use, and inability to hear a normal voice.

Results: A hearing problem was identified in 24.5% of this cohort (weighted 748/3,050). Statistical analysis using a multiple logistic regression model was performed to identify factors jointly associated with hearing problems. Age group (odds ratio (OR) = 2.7, $p < 0.0001$), male sex (OR = 1.9, $p < 0.0001$), hypertension (OR = 1.4, $p < 0.001$), arthritis (OR = 1.5, $p < 0.001$), significant depressive symptomatology (OR = 1.4, $p < 0.002$), and ever having consumed alcohol (OR = 1.4, $p < 0.005$) were jointly statistically significantly associated with hearing problems. Number of cigarettes smoked daily (e.g., 0, 1–10, 11–20, etc.) was nearly significantly associated with a hearing problem in the multivariate model (OR = 1.1 for each increased in category, $p < 0.07$).

Conclusions: Hearing problems are common in this population. Control of hypertension, an amelioration or arthritis, and lowering the consumption of alcohol and cigarettes might lower the likelihood of development of a hearing problem. Initial depressive symptomatology may have occurred subsequent to the hearing loss. A longitudinal study would allow determination of the direction of causation.

*House Ear Institute, Los Angeles, CA; †University of Texas Health Science Center, San Antonio, TX; ‡University of Texas School of Medicine, Galveston, TX.

Reprint requests: Zoreh Davanipour, D.V.M., Ph.D., Clinical Studies Department, House Ear Institute, 2100 West Third Street, Los Angeles, CA 90057-1922, (213) 273-8015 (ph.), (213) 413-0950 (fax).

This study was supported by National Institute on Aging (NIA), NIA-NIH grant RO1 AG109390.

PROFOUND HEARING LOSS ASSOCIATED WITH HYDROCODONE/ACETAMINOPHEN ABUSE

*Rick A. Friedman, M.D., Ph.D., John W. House, M.D.,
William M. Luxford, M.D., Stuart Gherini, M.D., and Dawna Mills, M.S.*

ABSTRACT

Objectives: To describe rapidly progressive, bilateral, profound hearing loss associated with hydrocodone/acetaminophen overuse and the successful rehabilitation of these patients with cochlear implantation.

Study Design: This is a retrospective review.

Setting: A tertiary otologic referral center.

Patients: Twelve patients presenting with rapidly progressive hearing loss and a concurrent history of hydrocodone/acetaminophen overuse.

Interventions: Comprehensive medical histories, physical findings, audiometric tests and, in those cases undergoing cochlear implantation, post-implantation performance data were reviewed.

Main Outcome Measures: Clinical characteristics of hydrocodone/acetaminophen related hearing loss and open set word and sentence performance in those patients undergoing cochlear implantation.

Results: Hydrocodone/acetaminophen overuse was associated with rapidly progressive sensorineural hearing loss in twelve patients. In four patients the initial presentation was unilateral and two of the patients experienced vestibular symptoms. None of the twelve patients experienced improved thresholds after high dose prednisone. Seven of the eight patients undergoing cochlear implantation have demonstrated early success with their devices. The eighth patient has not had postoperative testing, but is able to use the telephone with her device.

Conclusions: Hydrocodone/acetaminophen is frequently prescribed in combination with acetaminophen for the relief of pain with a side-effects profile similar to other medications in its class. Although not described previously, overuse or abuse can be associated with a rapidly progressive sensorineural hearing loss. These patients can be successfully rehabilitated with cochlear implantation.

House Ear Clinic, Los Angeles, CA.

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CHILD AND FAMILY FACTORS ASSOCIATED WITH DEAF CHILDREN' S SUCCESS IN AUDITORY-VERBAL THERAPY

**Susan R. Easterbrooks, Ed.D., *Colleen M. O'Rourke, Ph.D., and †N. Wendell Todd, M.D.*

ABSTRACT

Objective: The objectives of this study were: (1) to identify the general demographics of children who had Auditory-Verbal Therapy, and (2) to identify child and family factors associated with differences between those children for whom Auditory-Verbal Therapy led to success and those for whom it did not.

Setting: The study was conducted on the results of treatment at a private, tertiary care facility.

Population: Children who had hearing losses ranging from mild to profound.

Intervention: Intervention was Auditory-Verbal Therapy, a therapeutic intervention designed to teach parents to educate their young deaf and hard of hearing children to use residual hearing and to speak.

Main Outcome Measures: Clinic files, parent questionnaires, and parent report of current success were used to determine efficacy of treatment.

Results: Fifty-seven percent of the clients who remained in this program for over one year were fully integrated into regular education with no services from a teacher of the deaf. The population was affluent, with more females than expected. Those who left dissatisfied tended to be males with greater degrees of hearing loss who left the program soon after a year.

Conclusions: Auditory-Verbal Therapy provides successful intervention to students with a particular set of demographic characteristics.

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EXTRATYMPANIC ELECTROCOCHLEOGRAPHY: DIAGNOSTIC AND PREDICTIVE VALUE

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

ABSTRACT

Objective: The study is performed to define the clinical value of extratympanic electrocochleography (ECoG) in the diagnosis of Ménière's disease.

Study Design: The study is a retrospective case review.

Setting: The study was conducted in an otology/neurotology referral center.

Patients: A group of 252 patients with symptoms consistent with Ménière's disease were examined as well as 20 normal hearing, control patients.

Intervention: All patients underwent audiologic testing and extratympanic ECoG at the time of initial evaluation and, when possible, following treatment.

Main Outcome Measures: Audiologic thresholds, summating and action potential ratios (SP:AP).

Results: Patients were classified into definite, probable, possible and bilateral Ménière's disease groups, according to AAO-HNS guidelines. The definite Ménière's group demonstrated an elevated SP:AP ratio in 74% of cases, the possible Ménière's group in 64%, and the bilateral group demonstrated elevated ratios in both ears in 66%. Contralateral ears produced elevated ratios in 42% for unilateral cases, while 40% of these ears reported at least one contralateral symptom. All 40 control ears were normal (SP:AP < 0.50). Results statistically correlated ($P = .004$) with the Ménière's staging system set forth in the 1995 AAO-HNS guidelines. No correlation was found between ECoG results and disease duration. Although 72% of the 86 follow-up patients reported complete or substantial vertigo control, changes from initial ECoG results did not specifically correlate to vertigo, tinnitus or aural fullness improvement.

Conclusions: Extratympanic ECoG can be useful in the diagnosis of Ménière's disease, lending promise to possible cases where objective audiologic data is lacking. Each testing center should study its own results to establish meaningful parameters and confidence levels.

Pappas Ear Clinic, Birmingham, AL.

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HIGH STIMULUS RATE AUDITORY EVOKED POTENTIALS (ECoG AND ABR)

Mohamed A. Hamid, M.D., Ph.D., and Hesham M. Sami, M.D.

ABSTRACT

Objective: Combined auditory brainstem response (ABR) and electrocochleography (ECoG) are of clinical value in evaluation of hearing loss.

Study Design: Prospective study.

Setting: Private office.

Intervention: All patients underwent combined ABR and ECoG at rates of 7.1–97.1/sec.

Patients: Patients with Ménière's disease.

Main Outcome Measures: Audiometric thresholds, action potentials, ABR waveform, morphology, and latencies.

Results: Results showed expected increase in SP magnitude and increased AP latencies at high stimulus rates. ECoG AP waveform was preserved at higher stimulus rate, allowing for accurate determination of wave I in the corresponding ABR signal.

Conclusion: These results demonstrate that combined ABR and ECoG recording at high stimulus rates saves time and provides more comprehensive auditory information for neurotological diagnosis.

Cleveland Hearing and Balance Center, Chagrin Falls, OH.

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INTRODUCTION OF NEW PRESIDENT: C. GARY JACKSON, M.D.

Gregory J. Matz, M.D.

It has been a rare honor and privilege to have served as the President of the American Otological Society. I thank you all for placing your confidence

in me. I now cede to Dr. C. Gary Jackson, our incoming President.

REMARKS OF NEW PRESIDENT

C. Gary Jackson, M.D.

Thank you, Dr. Matz. You have done an outstanding job as President of our Society and organized an excellent program. I have for you a lapel pin and a certificate to commemorate your Presidency. The Certificate reads "To Gregory J. Matz,

M.D., in recognition of his service to the American Otological Society as its President, 1998 to 1999."

I look forward to seeing you all in Orlando next year! This meeting is adjourned!

EXECUTIVE SESSIONS

BUSINESS MEETING

MINUTES—APRIL 24–25, 1999

President Gregory J. Matz called the Business meeting to order at 7:00 A.M.

APPROVAL OF MINUTES: The minutes of the May 9–10, 1998, Annual Meeting of the American Otological Society, Inc., held at The Breakers, Palm Beach, Florida, were approved.

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

Active Members

Anil K. Lalwani, M.D., proposed by Robert K. Jackler, M.D., and seconded by Robert A. Schindler, M.D.; Samuel C. Levine, M.D., proposed by Michael M. Paparella, M.D., and seconded by Michael E. Glasscock, M.D.; Michael J. McKenna, M.D., proposed by Joseph B. Nadol, Jr., M.D., and seconded by William W. Montgomery, M.D.; William H. Moretz, Jr., M.D., proposed by Harold C. Pillsbury, M.D., and seconded by John W. House, M.D.; Franklin M. Rizer, M.D., proposed by Robert K. Jackler, M.D., and seconded by John W. House, M.D.; and Samuel H. Selesnick, M.D., proposed by Robert K. Jackler, M.D., and seconded by Simon C. Parisier, M.D.

Associate Members

Charles G. Wright, Ph.D., proposed by William L. Meyerhoff, M.D., and seconded by Peter S. Roland, M.D.; and Sabina R. Wullstein, M.D., proposed by George E. Shambaugh, Jr., M.D., and seconded by John J. Shea, Jr., M.D.

Corresponding Members

Bernard Gil Fraysse, M.D., proposed by Mansfield F. W. Smith, M.D., and seconded by Antonio De la Cruz, M.D.; and Lars M. Odkvist, M.D., Ph.D., proposed by John M. Fredrickson, M.D., and seconded by Robert I. Kohut, M.D.

Nominating Committee

A Nominating Committee composed of Drs. John McElveen (Chairman), Derald Brackmann, Mansfield F. W. Smith, Clough Shelton, and David Wilson was elected to prepare the slate of nominees for AOS officers for 1999–2000.

REPORT OF THE SECRETARY-TREASURER

The present Membership totals 268 and includes the induction of new members on April 24, 1999, as follows:

126 Active	10 Honorary
70 Senior	6 Emeritus
43 Associate	13 Corresponding

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

Members deceased since the last Annual Meeting are

John F. Daly, M.D. (Senior), George E. Shambaugh, Jr., M.D. (Senior), David Myers, M.D. (Senior), John F. Tolan, M.D. (Emeritus), Aram Glorig, M.D. (Senior), Edwin Stuart, M.D. (Senior), and William K. Wright (Senior).

Members requesting transfer to Senior status are Kedar K. Adour, M.D., Roger Boles, M.D., A Eviator, M.D., and William H. Lippy, M.D.

Requesting transfer to Emeritus status is Anthony J. Maniglia, M.D.

INCOME AND EXPENSE STATEMENTS

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

TRANSACTIONS 1999 / AMERICAN OTOLOGICAL SOCIETY

INCOME

July 1, 1998 to March 31, 1999

Beginning Balance (July 1, 1998)	\$66,858.71
Membership Dues	49,400.00
COSM	19,524.00
Research Fnd. Income	17,793.00
Transactions	1,170.00
Dividends	3,073.51
AJO	7,500.00
Miscellaneous	336.45
TOTAL INCOME	\$98,796.96

EXPENSES

July 1, 1998 to March 31, 1999

ACCME	990.00
Accounting Fees	7,318.00
Secretarial ½ Yearly Stipend	3,500.00
Office Expenses	4,687.70
Internal Revenue Service	9,300.00
New York Incorp. Fee	250.00
Insurance Premiums	4,481.00
Lippincott-Raven-AJO	10,948.00
Midwinter Council Mtg.	9,588.67
1999 Annual Meeting	5,502.70
Other Expenditures	1,074.16

TOTAL EXPENSES \$57,640.23

FINANCIAL STATEMENT

July 1, 1998 to March 31, 1999

BALANCE ON HAND (July 1, 1998)	\$ 66,858.71
DEPOSITS: Income 98,796.96	+ 98,796.96
	<u>\$ 165,655.67</u>
DISBURSEMENTS	- 57,640.23
BALANCE ON HAND (March 31, 1999)	<u>\$108,015.44</u>

EDITOR-LIBRARIAN REPORT: Dr. Julianna Gulya reported the 1997 Transactions, Volume 85, were mailed out in early January 1999, considerably earlier than last year. The 1997 Transactions included the abstracts of the presented papers, the ensuing discussions, special presentations, and the transcript of the business meeting. A bid for the 1998 Transactions is still in negotiation.

Due to escalating costs of printing, the Transactions may require some compromises in the external appearance of the volume, but the contents will retain their high quality. Dr. Gulya reported the Editor-Librarian's office is still in search of three volumes of the Transactions to complete the set owned by the Society, and housed in the archives of the American Academy of Otolaryngology-Head and Neck Surgery. The missing volumes are: Volume 2 (1875-1879); Volume 15 (1919); and Volume 16 (1924).

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

PROGRAM ADVISORY COMMITTEE: Dr. Matz thanked the following individuals for serving on the 1999 Program Advisory Committee: F. Owen Black, M.D., L. Gale Gardner, M.D., Jeffrey P. Harris, M.D., Ph.D., Her-

man A. Jenkins, M.D., Paul R. Kileny, Ph.D., Arvind Kumar, M.D., Paul R. Lambert, M.D., John P. Leonetti, M.D., Brenda Lonsbury-Martin, Ph.D., Jack L. Pulec, M.D., Leonard P. Rybak, M.D., Ph.D.

PRESIDENT'S REMARKS, INTRODUCTION OF GUEST OF HONOR, PRESIDENTIAL CITATION, SPECIAL PRESIDENTIAL AWARDS, April 24, 1999:

The Business Meeting was adjourned and the first Scientific Session started at 7:30 A.M. with very brief remarks from President Gregory J. Matz. The President introduced the Guest of Honor, Barbara A. Bohne, Ph.D. The Presidential Citation was presented to Dr. Robert I. Kohut.

Sunday, April 25, 1999

REPORTS OF COMMITTEES:

Board of Trustees of AOS Research Fund: Dr. Douglas Mattox reported that the Trustees of the Research Fund of American Otolaryngological Society, Inc., chaired by Dr. Richard Miyamoto, met in New York on March 13, 1999. The Research Fund experienced another excellent year, with growth of its market valuation to \$8,806,652 on 3/5/99. The asset allocation is 65% stocks and 35% fixed income investments.

A total of 22 grants and 3 fellowship applications were reviewed. Ten grants including one fellowship were funded. The total budget of the funded proposals was \$359,106. Dr. Leonard P. Rybak was elected as Chairman of the year 2000 meeting. Dr. Bruce Gantz was elected as Trustee for a term starting in the year 2000-2007.

American Board of Otolaryngology: Dr. Julianna Gulya reported on the American Board of Otolaryngology 1998-99 examination statistics. Three hundred and forty-two (342) candidates took the written examination in September 1998, which was offered in five locations: New York, Chicago, Atlanta, Houston, and San Francisco. Of those candidates, 302 became candidates for the oral examination. The oral examination was conducted by approximately 120 individuals, including ABOto Directors, Senior Examiners, and Guest Examiners, on April 17-18, 1999, at the Westin O'Hare Hotel in Chicago. Three hundred and forty-eight (348) candidates were examined; results are not yet known.

The Otolaryngology Training Exam (previously the Annual Otolaryngology Exam) was conducted on March 27, 1999, in more than 100 locations, including several overseas. More than 1200 residents and practitioners participated in the exam.

Dr. Charles J. Krause (President), Dr. Michael E. Johns (Vice President/President-Elect), Dr. Gerald B. Healy (Executive Vice-President), and Dr. H. Bryan Neel III, all continue their respective terms of office in 1999.

Drs. Jack D. Kerth, Eugene N. Myers, and Robert J. Ruben were elevated to Senior Counselor at the conclusion of the 1999 Annual meeting, after many years of dedicated service to the ABOto.

Drs. Patrick E. Brookhouser, Bruce J. Gantz, Richard T. Miyamoto, and Dean M. Toriumi were elected to the

Board of Directors. All served as Guest and/or Senior Examiners prior to their election as Director.

The 1999 written examination will be conducted on Monday, October 4, in five cities: Chicago, Atlanta, New York, Houston, and San Francisco. The subsequent oral examination will be conducted at the Westin O'Hare Hotel in Chicago on April 8-9, 2000. The next OTE will be on Saturday, March 4, 2000.

American Academy of Otolaryngology: Dr. Michael Maves reported on a variety of activities that have occurred at the AAO-HNS/F since the last Annual Meeting.

The Academy continues to work on the scope of practice in audiology and has made very substantive progress with ASHA. With regard to the Walsh Bill, the Academy has done a tremendous amount of work to keep that from happening. Dr. Maves reported he had gotten Congressman Walsh to support a new bill with language in it that is not only good for audiology but good for otolaryngology that promotes infant screening for hearing.

Dr. Maves reported the American Academy of Audiology (AAA) is going to be a challenge. Scope of practice is a big issue. In Bill 1068 the AAA would like to have the same language in Medicaid that they have in Medicare. Audiologists want autonomous primary access to patients and to be able to dispense aids, remove ear wax, look at the ears, and decide when a doctor can see a patient. The points the Academy is making are: (1) Audiologists are not qualified by training, scope of practice, or licensing to do any of that—they are Masters-level people as opposed to education of doctor; (2) doctors and audiologists have had a tradition of working together, and it has worked for many years; (3) audiologists do not have the experience and background that physicians do to appropriately order tests, and that would end up costing the system more. The Walsh Bill limits scope of practice so they cannot be primary care providers.

Dr. Maves reported he had received a draft revision of the E&M Guidelines and would be sending it out for comment.

American College of Surgeons: Dr. Gregory Matz, ACS Governor representing the AOS, updated the membership on the activities of the College of Surgeons.

The American College of Surgeons Development Program reported that the 1998 philanthropic contributions to the college amounted to just over one million dollars.

The College has reviewed the final 1999 Medicare Fee Schedule to the Health Care Financing Administration (HCFA). The College continues to be disturbed by HCFA's failure to address its comments with regard to continued redistribution of Medicare payments away from specialty care and with HCFA's decision to adjust the share of RVUs allocated to malpractice expenses without addressing the issue first in their proposed Rule.

The ACS 1999 Congress will offer a hands-on course in Sentinel Node Biopsy. In addition, the fifth biennial Young Surgical Investigators Workshop will be held in March of 2000.

Nearly 15,000 copies of the Graduate Medical Educa-

tion Committee's Guide for Medical Students and PGY 1 Surgical Residents have been distributed.

Formation of a Resident Surgeon Association within the College of Surgeons is being proposed. In addition, a new surgical course will be offered to senior and chief residents entitled "Surgical Residents as Teachers." Both of these proposals are expected to be approved by the Board of Regents at their June 1999 meeting.

The Board of Regents has approved a number of clinical trials. At present, 24 such protocols are in progress. Three to open soon include: melanoma, a randomized phase III trial of hyperthermic isolated limb perfusion and melphalan with or without tumor necrosis factor in patients with localized advanced extremity melanoma; a prognostic study of sentinel node and bone marrow in micrometastases in women with clinical stage T1 or T2 breast cancer; and a randomized trial of mediastinal lymph node sampling versus complete lymphadenectomy during the conduct of pulmonary resection in patients with N0 and N1 non-small cell carcinoma.

Award of Merit: Dr. Joseph C. Farmer, Jr., Chairman, reported that he had conferred with his committee members, Drs. Gregory J. Matz, Charles M. Luetje, Robert A. Jahrsdoerfer, and Michael E. Glasscock III, for the selection of the 1999 recipient of the Award of Merit. Dr. Mansfield F. W. Smith was the recipient of the award at the banquet held on Saturday evening, April 24, 1999.

Audit Committee: Dr. Stephen G. Harner, Chairman, reported on behalf of himself and his committee members, Drs. Myles Pensak and Richard J. Wiet. They reviewed the transactions of the Society and found all of the transactions to be appropriate and that the consolidated balance sheet of the American Otological Society appeared to be in order. The Committee recommended that the council and the membership accept this report as an indication that the financial status of the American Otological Society, Inc., is excellent and being maintained appropriately.

Report of the Nominating Committee: Dr. John McElveen, Chairman, presented the following nominations for the slate of officers for the 1998-2000 year: Drs. C. Gary Jackson, President; A. Julianna Gulya, President-Elect/Editor-Librarian; Horst R. Konrad, Secretary-Treasurer; Sam E. Kinney, Editor-Librarian Elect; and Council Members Drs. Charles M. Luetje, Gregory J. Matz, Richard A. Chole, and Jeffrey P. Harris. There were no nominations from the floor. The nominated slate was elected by the membership.

In addition, the following were elected to serve on the Award of Merit Committee for 1999: Drs. Owen Black and Paul Lambert.

ADJOURNMENT: The Business meeting was adjourned at 1:00 p.m. and Scientific Program continued until 5:00 P.M.

Respectfully submitted,
Horst R. Konrad, M.D.

REPORT OF THE EDITOR-LIBRARIAN

The 1997 *Transactions* (Volume 85) were mailed out in early January 1999, considerably earlier than last year. Please let me know if there have been any problems in receiving your copy of this volume. Remember, according to the bylaws of the Society, Senior, Emeritus, and Associate Members must pay for the *Transactions*. The price for the 1997 *Transactions* remains stable at \$65.00 per copy, including shipping and handling.

The 1997 *Transactions* contain the abstracts of the presented papers, the ensuing discussions, special presentations, and the transcript of the Business Meeting.

I am happy that the *Transactions* came out earlier this year, and I shall strive to improve yet further on the timeliness of delivery of next year's volume. We have just negotiated a bid with Lippincott, Williams & Wilkins, and will busily get to work submitting the manuscript to them for publication.

As we have been for a number of years now, we are still in search of three volumes of the *Transactions* to complete the set owned by the Society, which is housed in the Archives of the American Academy of Otolaryngology-Head and Neck Surgery. The missing volumes are: Volume 2 (1875-1879), Volume 15 (1919), and Volume 16 (1924).

Finally, we will take the annual photograph at the close of this session. We will hand out numbers to each of you, and direct you to the "Grove," where the photograph will be taken. Please return the numbers to me after the photograph!

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

REPORT OF THE BOARD OF TRUSTEES OF THE RESEARCH FUND

The Trustees of the Research Fund of the American Otolaryngological Society, chaired by Richard Miyamoto, M.D., met in New York City on March 13, 1999. At that time, March 1, 1999, the market valuation of the Fund stood at \$8,600,000, up from \$8,100,000 at the same time the previous year. The Fund asset mix remains at 66% equities, 33.2% fixed income, and 0.8% short-term reserves; Mr. Art Schweithelm continues to manage the Fund. Administrative expenses were down \$8,560 over the fiscal year 1998-1999 to \$106,002.59.

The Trustees reviewed 22 grant and 3 fellowship applications, of which 10 grant and 2 fellowship applications received priority scores permitting funding.

Dr. Miyamoto received a certificate of appreciation recognizing his service to the Fund as Secretary-Treasurer. Dr. Leonard Rybak was unanimously elected Chairman for the 1999-2000 fiscal year. Dr. Bruce Gantz was unanimously elected Trustee for the term 2000 to 2007. Two consultants, Drs. Thomas van de Water and Kyle Rarey, will be retiring after the March 2000 meeting. A search for their replacements is currently ongoing.

Respectfully submitted,
Douglas E. Mattox, M.D.

REPORT OF THE AMERICAN BOARD OF OTOLARYNGOLOGY

The American Board of Otolaryngology is pleased to report the following.

QUALIFYING/CERTIFYING EXAMINATIONS

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

Three hundred and forty-two (342) candidates took the written examination in September 1998, which was offered in five locations: New York, Chicago, Atlanta, Houston, and San Francisco. Of those candidates, 302 became candidates for the oral examination. The oral examination was conducted by approximately 120 individuals, including ABOto Directors, Senior Examiners, and Guest Examiners on April 17-18, 1999, at the Westin O'Hare Hotel in Chicago. Three hundred and forty-eight (348) candidates were examined; results are not yet known.

OTOLARYNGOLOGY TRAINING EXAM (OTE)

The Otolaryngology Training Exam (previously the Annual Otolaryngology Exam) was conducted on March 27, 1999, in more than 100 locations, including several overseas. More than 1200 residents and practitioners participated in the exam.

ELECTIONS: Dr. Charles J. Krause (President), Dr. Michael E. Johns (Vice President/President-Elect), Dr. Gerald B. Healy (Executive Vice-President), and Dr. H. Bryan Neel III all continue their respective terms of office in 1999.

Drs. Jack D. Kerth, Eugene N. Myers, and Robert J. Ruben were elevated to Senior Counselor at the conclusion of the 1999 Annual meeting, after many years of dedicated service to the ABOto.

Drs. Patrick E. Brookhouser, Bruce J. Gantz, Richard T. Miyamoto, and Dean M. Toriumi were elected to the Board of Directors. Dr. Brookhouser is Director of the Boystown National Research Center in Omaha, Ne-

braska. Dr. Gantz is Director of the otolaryngology training program at the University of Iowa in Iowa City. Dr. Miyamoto chairs the department of otolaryngology at the Indiana University Medical Center in Indianapolis, Indiana; and Dr. Toriumi is Assistant Professor of Facial Plastic Surgery at the University of Illinois/Chicago. All served as Guest and/or Senior Examiners prior to their election as Director.

SENIOR EXAMINERS: The ABOto is committed to electing and training new examiners while maintaining consistency in administering the examination. To accomplish this goal, the position of Senior Examiner was established a number of years ago. Senior Examiners serve as the core group of experienced examiners, along with ABOto Directors. Senior Examiners are elected to a five-year term, and are eligible for re-election to one additional term after a hiatus of three years. To be elected as a Senior Examiner, an individual must have served as an ABOto examiner at least twice. He or she must be prominent in the specialty, especially in the areas of patient care and medical education, and must demonstrate an interest and ability in the creation of educational and test materials. After the 1999 Annual meeting, Drs. Hugh F. Biller, Nicholas J Cassisi, Lauren D. Holinger, Jonas T. Johnson, Frank E. Lucente, Dale H. Rice, and James Y. Suen completed their terms as Senior Examiner. Drs. James A.

Hadley, Robert A. Sofferman, K. Thomas Robbins, Patrick J. Gullane, James L. Netterville, Elliot Abemayor, John K. Niparko, Richard A. Chole, Lawrence P. Burgess, and Ted A. Cook were elected as their successors.

AMERICAN BOARD OF MEDICAL SPECIALTIES: The American Board of Medical Specialties (ABMS) is the umbrella organization of the 24 recognized certifying organizations in the United States. Representatives to the ABMS Assembly this year were Drs. Gerald B. Healy, Michael E. Johns, and Jerome C. Goldstein. Alternate representatives were Drs. A. Julianna Gulya, Robert H. Ossoff, and Robert H. Miller. Dr. Gerald B. Healy recently completed his term on the Committee on Certification, Subcertification and Recertification (COCERT). Dr. Charles J. Krause represents the Council of Medical Specialty Societies to the ABMS assembly.

1999-2000 EXAMINATION DATES

The 1999 written examination will be conducted on Monday, October 4, in five cities: Chicago, Atlanta, New York, Houston, and San Francisco. The subsequent oral examination will be conducted at the Westin O'Hare on Chicago on April 8-9, 2000. The next OTE will be on Saturday, March 4, 2000.

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

REPORT OF THE AMERICAN ACADEMY OF OTOLARYNGOLOGY-HEAD & NECK SURGERY, INC., & FDN.

I am pleased to have the opportunity to update you regarding the activities of the AAO-HNS, Inc., and Fdn., over the past year. The year has been a busy one, and Academy staff has been engaged in a wide range of endeavors.

The Walsh Bill (the infant hearing screening bill) in its original formulations was not supported by the Academy owing to a lack of a physician/medical component. These versions did not pass, and I am glad to be able to report to you that Academy lobbying has been successful in developing an infant hearing screening bill that we can support, as we believe it will serve the best interests of our patients, as well as otolaryngology and audiology.

Audiology scope of practice remains a prominent issue on the Academy's radar screen. We believe that, over the past year, we have made substantial progress, and will continue to work, with ASHA (the American Speech-Language-Hearing Association).

The American Academy of Audiology (AAA), on the other hand, presents a challenge to us, especially in the scope of practice arena. AAA supports H.R. 1068 (The Medicaid Audiology Act of 1999) which would change the definition of an audiologist used by Medicaid to the definition used by Medicare (relies on state licensure/registration to identify audiologists qualified to participate). We believe H.R. 1068 represents a step to giving

audiologists what they want—autonomous, primary access to patients; the ability to examine the ear; the ability to remove cerumen; the ability to dispense hearing aids independently; and the ability to decide when a patient needs to be seen by a doctor. The Academy is arguing against this bill, on the basis of the following points: (1) audiologists are not qualified, either by training, licensing, or scope of practice, to perform any of the services mentioned above (they are Masters-level individuals and do not complete a medical education); (2) the many-year tradition of doctors and audiologists working together has served our patients well; and (3) having audiologists serve as the access point for hearing care would cost the health care system much more. Of note, the Walsh Bill the Academy supports limits audiology scope of practice so that they cannot act as primary care providers. We will continue to work on this issue and keep you informed.

Finally, we have received a draft version of the Evaluation and Management (E&M) guidelines, and will be sending them out for comment.

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

REPORT OF THE AMERICAN COLLEGE OF SURGEONS

The American College of Surgeons Development Program reported that the 1998 philanthropic contributions to the College amounted to just over one million dollars.

The College has reviewed the final 1999 Medicare Fee Schedule to the Health Care Financing Administration (HCFA). The College continues to be disturbed by HCFA's failure to address its comments with regard to continued redistribution of Medicare payment *away* from specialty care and with HCFA's decision to adjust the share of RVUs allocated to malpractice expenses without addressing the issue first in their proposed Rule.

The ACS 1999 Congress will offer a hands-on course in Sentinel Node Biopsy. In addition, the fifth biennial Young Surgical Investigators Workshop will be held in March of 2000.

Nearly 15,000 copies of the Graduate Medical Education Committee's Guide for Medical Students and PGY 1 Surgical Residents have been distributed.

Formation of a Resident Surgeon Association within the College of Surgeons is being proposed. In addition, a

new surgical course will be offered to senior and chief residents entitled "Surgical Residents as Teachers." Both of these proposals are expected to be approved by the Board of Regents at their June 1999 meeting.

The Board of Regents has approved a number of clinical trials. At present, 24 such protocols are in progress. Three to open soon include: melanoma, a randomized phase III trial of hyperthermic isolated limb perfusion and melphalan with or without tumor necrosis factor in patients with localized advanced extremity melanoma; a prognostic study of sentinel node and bone marrow in micrometastases in women with clinical stage T1 or T2 breast cancer; and a randomized trial of mediastinal lymph node sampling versus complete lymphadenectomy during the conduct of pulmonary resection in patients with N0 and N1 non-small cell carcinoma.

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

REPORT OF THE AWARD OF MERIT COMMITTEE

Over the preceding year, I conferred with my committee members, Drs. Gregory J. Matz, Charles M. Luetje, Robert A. Jahrsdoerfer, and Michael E. Glasscock III, to select this year's Award of Merit recipient. As you learned last evening, we selected Dr. Mansfield

F. W. Smith to be this year's Award of Merit Recipient.

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

REPORT OF THE AUDIT COMMITTEE

The members of the Audit Committee—Stephen G. Harner, M.D., Myles Pensak, M.D., and Richard J. Wiet, M.D.—reviewed the financial statements of the American Otolological Society, which were provided by Hoffmann and Hoffmann, CPAs Limited of Chicago, Illinois. Their statement began July 1, 1997, and went through June 30, 1998. The Committee also reviewed the financial data provided by Dr. Horst Konrad, the Secretary-Treasurer.

This covered July 1, 1998, through March 31, 1999. The Committee believes the reports to be appropriate. They feel that the monies are being well handled in a responsible manner.

Respectfully submitted,
Stephen G. Harner, M.D.

REPORT OF THE NOMINATING COMMITTEE

The Nominating Committee, consisting of myself as Chairman, Derald Brackmann, M.D., Mansfield F. W. Smith, M.S., M.D., Clough Shelton, M.D., and David F. Wilson, M.D., met yesterday, and proposed the following slate of officers for 1999–2000: President—Dr. C. Gary Jackson; President-Elect/Editor-Librarian—Dr. A. Julianna Gulya; Secretary-Treasurer—Dr. Horst R. Konrad; and Editor-Librarian-Elect—Dr. Sam E. Kinney. We pro-

pose, for the Council, Drs. Charles M. Luetje, Gregory J. Matz, Richard A. Chole, and Jeffrey P. Harris. Lastly, we propose Drs. F. Owen Black and Paul R. Lambert for the Award of Merit Committee.

Respectfully submitted,
John T. McElveen, M.D.

The following photograph and obituary appeared in the *Bulletin of the American Academy of Otolaryngology-Head and Neck Surgery* (December 1998) and are reprinted with the permission of the author, Dr. Noel L. Cohen, and the Editor, Dr. Michael D. Maves. Dr. Daly was elected to Active Membership in 1961 and to Senior Membership in 1981.

A. Julianna Gulya, M.D., Editor

John F. Daly, M.D., who in 1979 was President of the American Academy of Ophthalmology and Otolaryngology (AAOO), passed way at the age of 86 on October 21, 1998, after a long illness.

Dr. Daly was founder of the modern Department of Otolaryngology at New York University School of Medicine and served as chair of the department from 1949 to 1980. While at NYU he played a critical role in the planning of the Medical Center and in particular of the University Hospital, where he served as chair of the Medical Board.

Dr. Daly was born in Jersey City and graduated from Fordham University in 1933. He received his

M.D. from what is now Downstate Medical Center of the State University of New York and did his training in otolaryngology at Manhattan Eye, Ear, and Throat Hospital and Harvard University. During World War II, he served in the Army Air Corps as a medical officer.

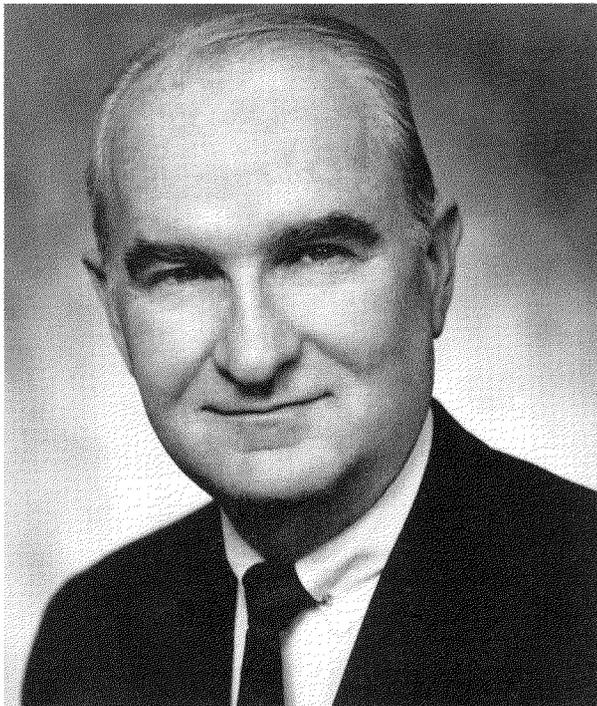
John Daly was one of the founders of the American Society for Head and Neck Surgery and served as president in 1966-67. He was also President of the Society of University Otolaryngologists the same year, as well as President of the American Laryngologic Society in 1978. In addition, Dr. Daly was the Vice President of the Eastern Section of the Triological Society in 1971-72 and a member of the American Otological Society, the ABEA, and numerous other local, national, and international societies of our specialty.

He was an active participant in the separation of the AAOO and the formation of the American Academy of Otolaryngology-Head and Neck Surgery, as well as the incorporation of the American Council of Otolaryngology into the Academy. He served on the Residency Review Committee for Otolaryngology from 1964 to 1972, and a Senior Councilor from 1977 to 1980.

As chair of the Department of Otolaryngology at the NYU Medical Center and Director of the service at Bellevue Hospital Center, Dr. Daly trained generations of otolaryngologists, many of whom became chairs, both in the United States, as well as abroad. He was a superb and innovative surgeon, not only in head and neck oncology, for which he was best known, but literally in all other branches of our specialty.

Dr. Daly is survived by his wife of 57 years, Annette O'Mealia Daly; a daughter, Sharon Ann Butler; three grandsons; and a great-granddaughter.

The NYU Department of Otolaryngology plans a memorial for Dr. Daly in the spring of 1999, at which alumni and former faculty will join in paying tribute to one of the giants of our field.



John F. Daly, M.D.
1912-1998

IN MEMORIAM

The following photograph and obituary appeared in *Otolaryngology–Head and Neck Surgery* (Volume 119, Number 4, October 1998) and are reprinted with the permission of the author, Dr. Howard P. House, and the Publisher, Mosby–Year Book, Inc. Dr. Glorig was elected to Active Membership in 1953 and to Senior Membership in 1973.

A. Julianna Gulya, M.D., Editor

Aram Glorig had a most unusual career, and it was my privilege to have him as a dear and close friend for the past 50 years.

Aram was born in Manchester, England, in 1906 and soon after moved with his parents to Massachusetts. He received his M.D. degree from Loma Linda University Medical School in 1938 and took residency in pediatrics at the Willard Parker Hospital in New York.

Through that pediatric residency, Aram was confronted with the significant role that ear problems play in many children's health. It was the beginning of his keen interest in the ear, which soon prompted him to take a second residency in ear, nose and throat at Emory University in Atlanta, Georgia. After this residency, Aram joined the army as captain. He was stationed at a London hospital, where his study of the ear continued in a new direction.



Aram Glorig, M.D.
1906–1998

In London, Dr. Glorig began seeing hospitalized soldiers with severe tinnitus and hearing loss related to bomb blasts. This stimulated his interest in the effects of noise exposure on hearing and encouraged him to learn more about audiology, especially the clinical diagnostic science that determines the level of hearing and subsequent rehabilitation of hearing impairment. Dr. Glorig established a study to test the hearing of hospitalized soldiers and to follow their progress. Unfortunately, an officer with a higher rank stopped his testing, but no one could stop Aram's continued interest in noise-induced hearing loss.

I first met Aram in 1946, soon after his return to the United States. He had joined Dr. Norton Canfield at the Department of Ear, Nose and Throat at Yale, and he came to Los Angeles to attend my first course in fenestration surgery, offered by the new Los Angeles Foundation of Otology. At the conclusion of the course, Aram surprised me by saying, "That kind of surgery is not for me because it is simply a mechanical procedure, over and over again." It was a comment that would set the course for his unique future.

A year later the Surgeon General recruited Dr. Glorig to Walter Reed Army Hospital to develop a care center for military personnel returning with noise-induced hearing loss. Aram accepted the challenge but insisted he be made a major general so that no one with a higher rank could again interfere with his care and research plans for these soldiers. The promotion was granted, and Major General Glorig became director of the Audiology and Speech Correction Center of the Veterans Administration, a superb facility that was later duplicated nationwide in other veterans hospitals. As director of the army's technical research in hearing, he also worked with hearing aid manufacturers to develop smaller and more efficient devices.

Aram left Walter Reed in 1952 to join the newly created Subcommittee on Noise of the Conservation of Hearing Committee of the American Academy of Ophthalmology and Otolaryngology. Through a grant to the academy from the Casualty Insurance Companies, the subcommittee employed him full-time to carry out research. The funds were funneled

through the House Ear Institute, which provided space for Aram and his staff in Los Angeles to conduct scientific surveys of noise in industry. Data from these surveys became the basis for the Occupational Safety and Health Administration rules for conservation and protection of hearing in the workplace.

As a committee member of the National Association of Hearing and Speech Agencies, Aram also played a pivotal role in developing international standards for calibrating hearing-testing equipment. Moreover, Aram's interest and influence had an international impact through his work with the American Standards Association and the International Standards Organization. He served as chairman and member of committees and subcommittees of both organizations from 1950 to 1970.

In 1964 the work of the subcommittee on noise was largely complete. Aram was then recruited by the mayor of Dallas to establish a hearing center for children and adults that would carry out research and care for those with hearing impairment. He moved to Dallas and founded the world-renowned Callier Center for Communicative Disorders. The beautiful auditorium in the center was given to the University of Texas at Dallas, where Aram continued as the center's head and also held the position of Dean of the School of Human Development until he reached the mandatory retirement age of 70 years.

At this point, Aram decided to retire to a cottage on a Texas lake. When I heard this, I knew it was not the life for Aram Glorig. I suggested he instead come back to Los Angeles and join us at our clinic. My colleague Dr. James Sheehy decided that Aram should have an identifiable specialty and created a new title and a new field to match his talents—forensic otology. From then on, Aram was very busy with litigation cases of all types involving injury to the ear on the job, and he provided guidance

to numerous national corporations and insurance companies pertaining to noise-induced hearing loss.

In 1974 Aram crated the American Auditory Society, which now has a growing membership of more than 3000. The society's convention met in Los Angeles this spring and honored Dr. Glorig. After he spoke, Aram received a long standing ovation for his many accomplishments. The British Association of Audiology was established with the help and interest of Dr. Glorig based on a model similar to that of the American Auditory Society.

Meanwhile, Aram heard many residents attending the American Academy of Ophthalmology and Otolaryngology meetings complain that they had no forum or invitation to present their numerous research activities. He suggested to the academy that this be corrected. The result was a new organization, now known as the Association for Research in Otolaryngology, which boasts a rapidly growing annual attendance and excellent presentations from the next generation in our specialty.

A hearing aid user himself, Aram also had a great interest in hearing aid research. In 1980 he asked Dr. Sheehy to place a metal chip on his malleus to drive it with a magnetic source inserted into his ear canal. The power source was not adequate, but enhanced power sources today have given this concept new vitality; it will influence the hearing aids of the future.

Looking back over the past 50 years, I can honestly say that my only difficulty with Aram was his ability to beat me regularly at golf!

All those privileged to know Aram Glorig loved and respected him as a devoted father, gentleman, researcher, educator, and forensic otologist. His contributions to the area of hearing problems were many, and the world is a better world for his having been a part of it. We congratulate and salute you, Major General Dr. Aram Glorig.

IN MEMORIAM

The following photograph and obituary are printed courtesy of Dr. David Myers' son, Dr. Eugene N. Myers. Dr. Myers was elected to Active Membership in 1957 and to Senior Membership in 1978.

A. Julianna Gulya, M.D., Editor

My father, Dr. David Myers, died on Sunday, May 3, in Buffalo, New York. He was a long-time member of the American Otological Society and cherished his relationship with the AOS during his years in the active practice of medicine. He was a graduate of the University of Pennsylvania and the Temple University School of Medicine. While he did not take a residency, he was a diplomate of the American Board of Otolaryngology. He served in the United States Army from 1941 to 1945 and served in New Guinea and Japan during the last two years of his military service. Most of this time was spent taking care of the soldiers with maxillo-facial injuries.

Following his wartime activities, he returned to Philadelphia where he spent most of his time practicing otology. He served as Chairman of the Department of Otolaryngology at Temple University School of Medicine and later was Chairman of the department at the Graduate School of the University of Pennsylvania School of Medicine. He had a long and distinguished career and would no doubt be best remembered for his ability to attract medical students into the specialty of otolaryngology and the very personal way that he undertook the training of specialist in our field.



David Myers, M.D.
1906–1998

The following photograph and obituary appeared in the *Chicago Tribune* (February 11, 1999) and are reprinted with the permission of the Editor, Mr. Howard A. Tyner. Dr. George E. Shambaugh was elected to Active Membership in 1950, President in 1968, and to Senior Membership in 1975.

A. Julianna Gulya, M.D., Editor

Dr. George Shambaugh Sr. never dreamed he would introduce a major pioneer to his field when he casually suggested his son, George Jr., consider a career in medicine rather than economics. But following his father's advice, George Shambaugh Jr. gave medicine a try, and eventually became one of the world's leading ear surgeons, helping to restore hearing to scores of patients who had suffered from hearing loss for years.

Dr. George Shambaugh Jr., 95, who adored his practice so much that he was still seeing patients in his Hoffman Estates clinic until last week, died Sunday in his home in Sandwich, Ill.

Dr. Shambaugh introduced the operating microscope to delicate ear surgery in the 1950s. He also helped develop the fenestration technique to treat otosclerosis, a common genetic disorder that causes hearing loss. Previously, surgery had not been considered an option for many patients suffering from the disorder, but Dr. Shambaugh helped change all that, said Dr. David G. Hanson, professor and

chairman of the Department of Otolaryngology/Head and Neck Surgery at Northwestern University Medical School.

"Dr. Shambaugh was a very important figure in introducing the use of the operating microscope to medicine in the U.S. It was a major breakthrough in operative technique and he was a pioneer in it," Hanson said. "Because of his work, Dr. Shambaugh was known by every otologist in the U.S. and maybe in the world."

A native of Chicago, Dr. Shambaugh attended Amherst College and Harvard Medical School. He was a professor of otolaryngology—the study of ear, nose and throat disorders—at Northwestern from 1951 to 1972, when he became an emeritus professor. He also served as department chairman from 1951 through 1964, and while there, wrote a classic medical textbook, *Surgery of the Ear*, which is in its fifth edition. In the 1960s, he also introduced the use of fluoride to help harden inner ear bones and improve hearing.

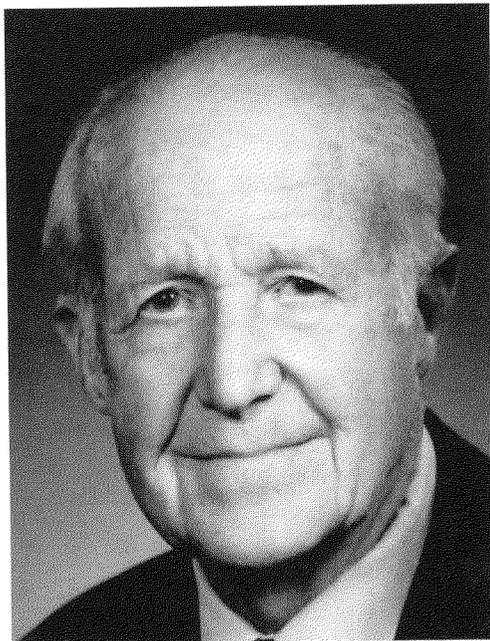
Dr. Shambaugh opened an office in Hinsdale in 1971, where he remained until more than a year ago. For the past year, he continued to see patients twice a week at the Randolph-Shambaugh Clinic in Hoffman Estates. "His statement always was 'I love my work.' That was his life," said Karel Titone, who helped run his office for 25 years.

In his later career, Dr. Shambaugh stopped doing surgical work and devoted much of his time to environmental and holistic medicine. He felt that by listening to patients better, he could help cure many of their problems through diversified diets and mineral supplements such as zinc, said his son David. He used the holistic medical approach to treat patients suffering from chemical allergies and food allergies, among other problems.

"He just hated orthodoxy," his son said. "He felt there was a big medical establishment link to the drug companies that won't allow people to move into new directions."

Throughout his career, Dr. Shambaugh was considered a maverick who was unafraid to experiment with new options for treating medical problems, colleagues said. It was that ability to take risks that led to much of his success, they said.

He also influenced the careers of many ear spe-



George E. Shambaugh, M.D.
1903–1999

IN MEMORIAM

cialists who considered him a mentor. Among them was Dr. Richard J. Wiet, head of the ear, nose and throat department for Evanston-Northwestern Healthcare and a Northwestern University professor.

"He really gave me my start in this career. He had a tremendous impact on me. He was a very youthful person, a humble man and a real innovator," he said.

Despite many accolades and honorary degrees, Dr. Shambaugh remained a simple, humble man, friends said. He commuted 120 miles to his clinic in Hinsdale for decades because he enjoyed living on

a remote farm in Sandwich, where he kept a large flower garden. To personalize his services, he frequently mailed letters to his patients.

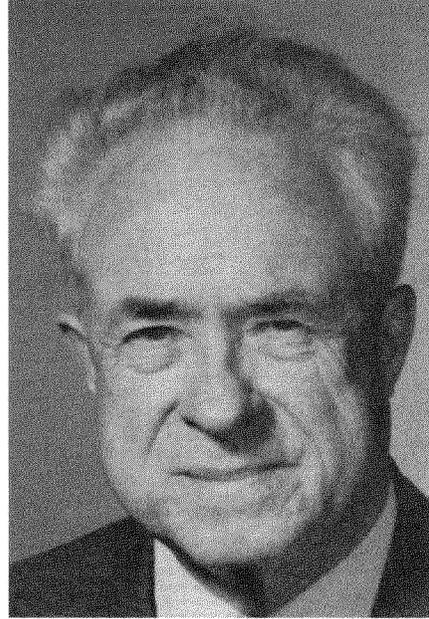
"He was just an ordinary, fine gentleman who turned the world around in the field of otology," said Dr. Howard House, chairman emeritus of the House Ear Institute in Los Angeles and a longtime friend.

Besides his son David, survivors include another son, George III; ten grandchildren; and six great-grandchildren. A memorial service will be held Monday at 1 P.M. at the Emmanuel Episcopal Church, 203 Kensington Ave., La Grange.

The following photograph and obituary are printed courtesy of Dr. Edwin A. Stuart's nephew, Mr. Allan W. Stuart. Dr. Stuart was elected to Active Membership in 1947 and to Senior Membership in 1971.

A. Julianna Gulya, M.D., Editor

Edwin A. Stuart, son of Henry H. and Bertha Stuart, was born in Fredericton Junction, New Brunswick. He completed his undergraduate course work at the University of New Brunswick and earned his M.D. at McGill Medical School, graduating in 1933. He practiced at the Royal Victoria Hospital, Montreal, with service during World War II in the Royal Canadian Army Medical Corps. His wife, Katherine Somerville Winfield Stuart, predeceased Edwin Stuart by a few years. He is survived by his brother, Henry, as well as several nephews (including Allan W. Stuart) and nieces. Edwin Stuart passed away on May 21, 1998, in Halifax, Nova Scotia.



Edwin A. Stuart, M.D.
1903–1998

IN MEMORIAM

The following photograph and obituary are reprinted with the permission of the Virginia Mason Medical Center Communications Department. Dr. John F. Tolan was elected to Active Membership in 1957 and to Emeritus Membership in 1973.

A. Julianna Gulya, M.D., Editor

John F. Tolan, M.D., died on March 16, 1999, at the age of 91. He was born in Ironwood, Michigan. His schooling was in that state and he received an



John F. Tolan, M.D.
1908–1999

M.D. from the University of Michigan in 1933. Post-graduate education was at the University of Michigan Affiliated Hospitals.

In 1938 he joined the King County Medical Society after coming to Seattle to be Chief of Otolaryngology and the twelfth doctor to join the Mason Clinic. He practiced there until his retirement in 1973. He also was a consultant at Children's Orthopedic Hospital, U.S. Public Health Service Hospital, the U.S. Naval Hospital in Bremerton, and was Clinical Professor of Medicine at the University of Washington School of Medicine. He was one of the founders of the Seattle Hearing and Speech Center.

Dr. Tolan was certified by the American Board of Otolaryngology; he was also a member of the American Academy of Ophthalmology, American Laryngological Rhino.&Oto. Society, American Broncho-Esophagological Association, American Otological Society, American Laryngological Association, Seattle Surgical Society, and served as Past President of the Pacific Coast Oto-Ophthalmological Society.

We extend our condolences to his wife, Margaret, his daughters and granddaughters.

The following eulogy was kindly provided by, and printed with the permission of, its author, Bob Alford, MD, who also kindly provided the photograph. Dr. Wright was elected to Active Membership in 1964 and to Senior Membership in 1987.

A. Julianna Gulya, M.D., Editor

Today, we are gathered here to celebrate the life of William K. Wright and to highlight the legacy he created. All of us assembled here today know that he was a highly respected and compassionate physician, an innovative and talented surgeon, a revered colleague, a devoted husband and doting father, a trusted friend, and by his example, a role model to which others should aspire.

He was the consummate physician. To say that he was meticulous and a perfectionist actually understates his skill as a surgeon and the high standard of care that he demanded for his patients. Many of us remember that Bill epitomized what Sir William Osler described as an ideal quality of a physician and surgeon—that of imperturbability. Bill could not be perturbed from doing his best for his patients.

I had an unusually special professional relationship with Bill. First as a medical student of his in the '50s; then as a resident; later as a fellow; next as a fellow faculty member; still later as the Chairman of the medical school department in which Bill served

as an active teacher and surgeon for at least 38 years—from 1950 to 1988; and, finally, as his Dean, as well as Department Chairman, during his Emeritus years this past decade. In all, William K. Wright served on our faculty at Baylor for 48 years, a remarkable time during which the college and the department grew and became world class. He helped make that possible because he made numerous contributions during those years that advanced surgery of the ear and facial plastic surgery, especially rhinoplasty and esthetic surgery of the face.

Bill progressed through the Clinical Faculty ranks from Clinical Instructor to Clinical Professor. He was well known for his tireless energy and enthusiasm for discoveries to benefit his patients. Many of us have fond memories of going with him to the anatomy laboratory, after a full day in which he had performed surgery and had seen patients in the office, in order to perform dissections and to study the functional anatomy and architecture of the nose and face. He had a passion for solving problems and teaching others, and did so here at Baylor and throughout the United States. He developed many new surgical instruments that are used throughout the world today. Bill promoted outcomes studies and metrics long before they became the popular things they are today. He was frequently asked to be a speaker for scientific programs in his chosen field of interest.

Bill Wright gave countless hours to teaching residents, fellows and fellow specialists through lectures, seminars, demonstrations, publications, and assisting others at the operating table. For all of the teaching he did those 48 years on the faculty, Bill never received any remuneration. He generously gave of his time to help others be better surgeons. He was forever true to the Hippocratic oath he took as a physician.

In thinking back over Bill's life's work and the many contributions he had made, I asked our librarian for a literature search of his writings. His first paper was published in 1947. From that time until he retired he published 67 scientific papers in peer-reviewed journals, a remarkable record for someone in the private practice of medicine! Among his published articles was a landmark paper on the repair of central perforations of the tympanic membrane, published in 1957, which helped



William K. Wright
1916–1998

IN MEMORIAM

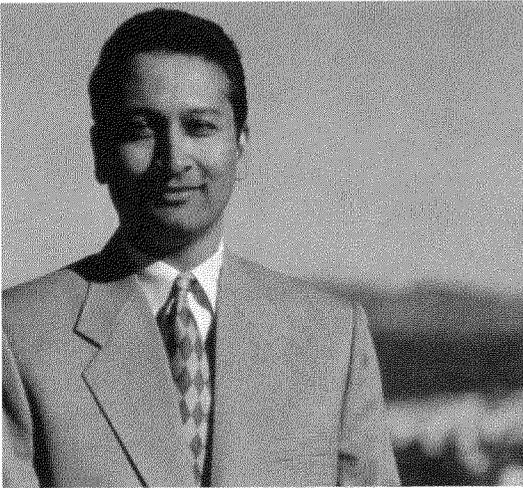
launch the modern era of successful surgery for repair of the tympanic membrane.

In closing, Bill was a wonderful person from whom one never heard criticism of a colleague. Bill was serious about his work. He was always accommodating, patient, and constructive in his interactions with others. William K. Wright truly reflected the three personal ideals espoused by Osler: one—to do the day's work well and not to bother about

tomorrow. The second—to act the golden rule toward his professional brethren, and toward his patients. And the third—to cultivate such a measure of equanimity as would enable him to bear success with humility and the affection of his friends without pride, and to be ready when the day of sorrow and grief came to meet it with the courage befitting a man. William Kemp Wright will forever be missed, but never forgotten.

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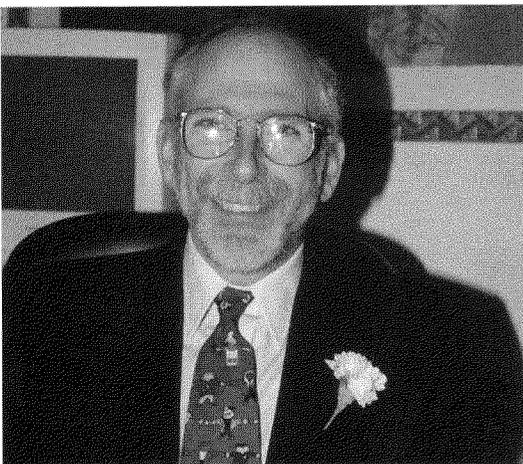
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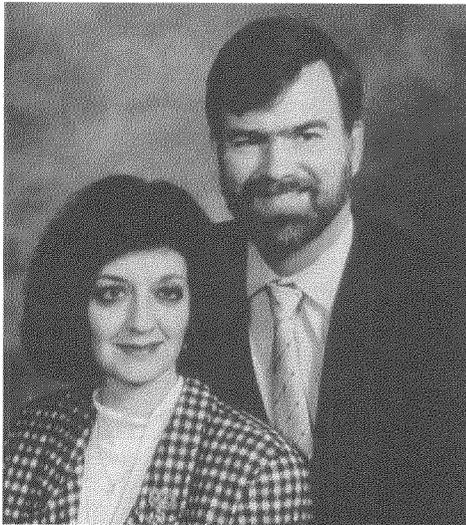


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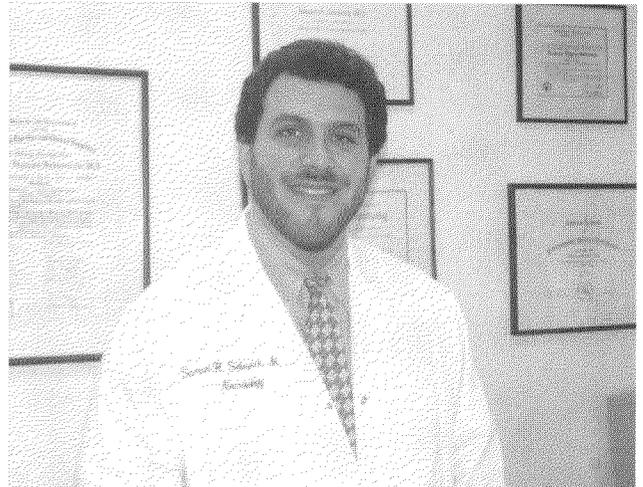


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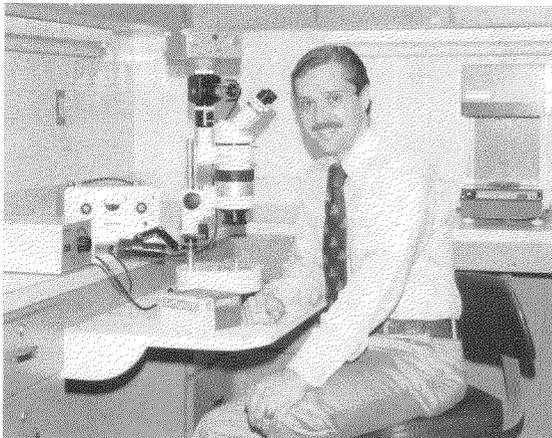


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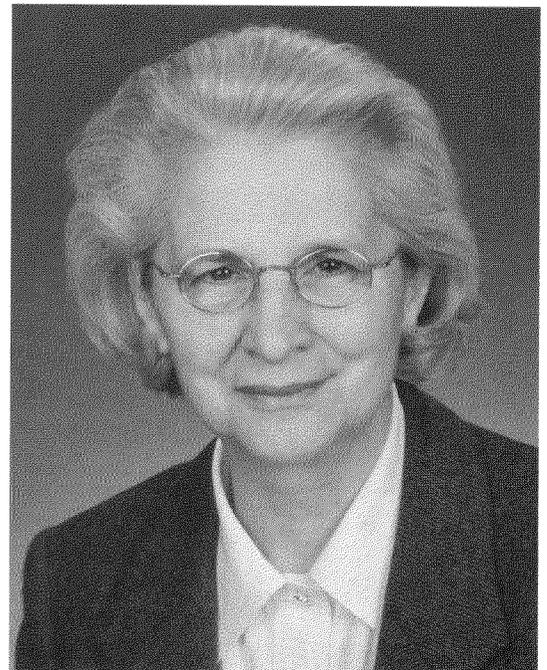


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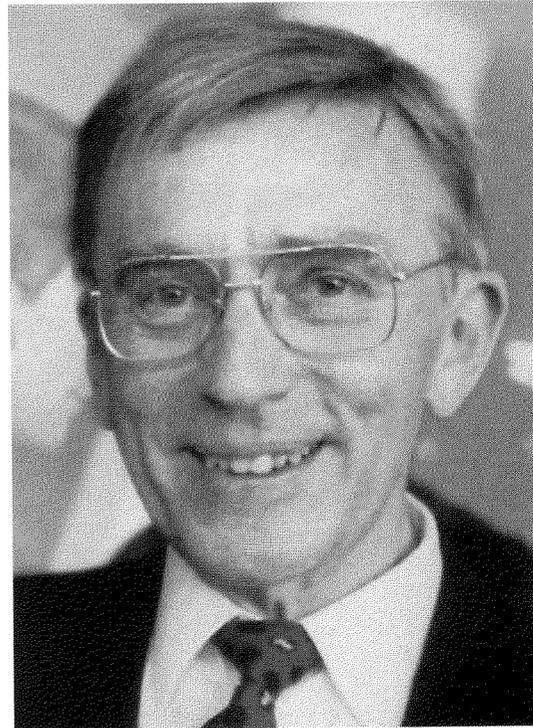


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