AUDIOLOGY TODAY

Bulletin of the American Academy of Audiology July/August 1992 Volume 4, Number 4

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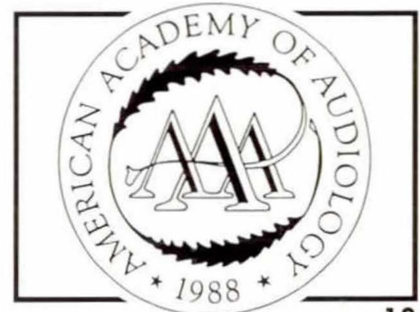

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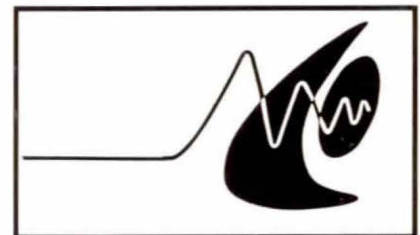
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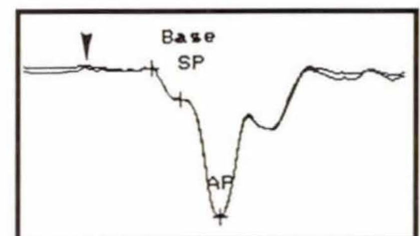

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July/August Volume 4, Number 4

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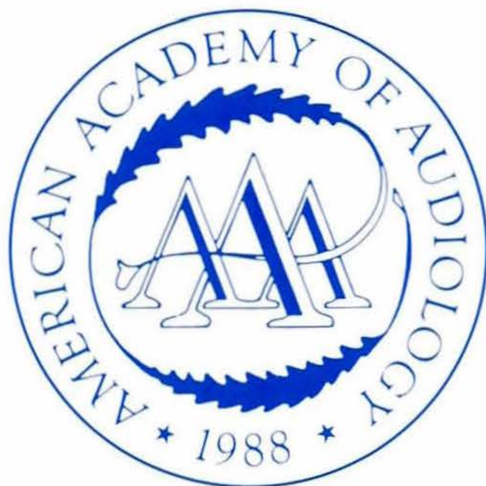

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President's Message

Long-Range Planning

In the last issue of *Audiology Today*, the Mission and Goals of the Academy were reviewed. These goals provide a foundation for the development of a Long-Range Plan that reflects both the basic tenets of the Academy and a focus for activities of importance to its members and the profession at large. A Long-Range Plan provides a metric for assessment of progress and a reference for the day-to-day and year-to-year activities of the Academy.

When the Academy was in it's "formative" stages, the Executive Committee began the process of formulating the specific mission and goals of the Academy. This process was designed to assist the Academy in clarifying its direction, and to evaluate the assumptions upon which the Academy was formed. From this work, the vision and goals of the Academy emerged, priorities were selected and plans of action developed.

Since that time, the Academy has grown into a professional organization representing over 4500 audiologists. With this maturity comes a commitment to serve the diverse needs of its members and to develop and set into action a clear Long-Range Plan. Broad representation of audiologists in many different professional settings requires a cohesive plan to clearly represent the needs of all audiologists.

At the April, 1992, meeting in Nashville of the Board of Representatives, a committee was formed to take the first steps toward development of a Long-Range Plan. Under the direction of committee chair Gretchen Syfert, several areas of potential importance were identified and development of a survey of the Academy membership was initiated.

Information from this survey will be used when the Executive Council and Board of Representatives meet this Fall to work on formulation of the Academy's Long-Range Plan. Your input as a member of the Academy is critical to the development of a Long-Range Plan.

What can the Academy do for You?

This issue of *Audiology Today* contains a survey of members. You are asked to rate several areas as to their importance to our profession in general, to your daily professional practice, and the emphasis that you would like to see the Academy put on them.

The goals of the Academy that accompany its mission statement identify several specific areas of action: improvement of evaluation techniques, promotion of public awareness, leadership in upgrading professional standards, dissemination of research to professionals and information to the public, and provision of an organization serving all audiologists.

There are many issues related to this mission and these goals. The area of professional autonomy encompasses factors such as legislative and regulatory issues, third-party reimbursement, certification and preferred practice standards. These are issues critical to the practice of audiology in many settings and the ability of audiologists to function as independent professionals. With a commitment to training and professional education by the Academy, many issues must be addressed including the area of implementation of the Professional Doctorate in audiology.

Conventions, continuing education programs and dissemination of current research and other information through its journals serve training and education portions of the Academy's mission as well. Professional ethics, marketing support, insurance, general dissemination of information, specialty certification and development of a network of state affiliates are member concerns and consumer-oriented issues include public education, outreach programs and partnership efforts.

These areas represent some of the concerns seen for our profession. As a Long-Range Plan is developed, we must consider those areas of greatest importance to our members and our profession as priorities for the Academy's efforts. This can only be accomplished with your input.

The importance of your participation in returning this survey to us cannot be overemphasized. Add comments and list matters of importance. Returning this survey and voicing your needs and your opinions can be your first step towards involvement in your professional organization!

See page 3 and fill out the survey. Let us know how the Academy can work for you!

Questionnaire

Your Academy is designing a long range planning meeting for the fall. Your Boards need your guidance before they meet! Please take a few minutes to complete this survey and rank the areas **YOU** feel are the most crucial to the Academy. Please add any suggestions in the comments section.

		Priority				
		High		Medium		Low
Area I	**Autonomy**					
	Legislative and Regulatory Issues	1	2	3	4	5
	Third-Party Reimbursement	1	2	3	4	5
	Certification through the Academy	1	2	3	4	5
Area II	**Professional Education**					
	Implementation of Professional Doctorate	1	2	3	4	5
	Continuing Education	1	2	3	4	5
	Call for papers at annual convention	1	2	3	4	5
	Research	1	2	3	4	5
Area III	**Member Issues**					
	Professional Ethics	1	2	3	4	5
Area IV	**Member Services**					
	Marketing Support	1	2	3	4	5
	Insurance — professional and personal liability	1	2	3	4	5
	Electronic bulletin board	1	2	3	4	5
	(employment, equipment, calendar of events, etc.)					
	Journals: *Audiology Today*,	1	2	3	4	5
	Journal of the American Academy of Audiology	1	2	3	4	5
	Specialty Certification	1	2	3	4	5
	Creation of network of state affiliates	1	2	3	4	5
Area V	**Consumer Issues**					
	Public Education	1	2	3	4	5
	Outreach Programs	1	2	3	4	5
	Partnership efforts	1	2	3	4	5

Comments:

____

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Would you be willing to make financial contribution to support specific legislative issues?

What do you see as the more important functions of the Academy?

Should the Academy develop position statements and guidelines?
In what areas?

Please return to: AAA Headquarters By: August 30, 1992
P.O. Box 3676
Washington, D.C. 20007-0176

Forum

Carmen C. Brewer
Contributing Editor

Terms of Endearment

I have been reading the discussion/debate over the Au.D. with great interest. As a university instructor, and clinical supervisor, I support the concept of an advanced degree. As a 34-year old, female member of the profession of audiology, I look forward to the implied respect of the title, "Doctor," but, thinking about my elderly clients, I wonder if they'll still call me, "Honey?"

Kerry Hartman Lyon
Las Cruces, NM

More Than a Master's

After reading "Alternatives to Au.D. Degrees" by Larry Humes and Colleagues, the following comments come to mind:

1. It seems the main thrust of the arguments against adopting the Au.D. is that to support the master's level practitioner, the undergraduate education need only be restructured to a higher scientific level. I wonder why this has not been adopted by optometry, dentistry and medicine. Rather than to prove the Au.D. is superior, can it be shown that the MA/MS model is superior? Can it be shown that the MA/MS model is the finest that can be offered to society?

2. The second point, which must not be ignored, is that the practicing audiologist at the masters level is fundamentally detrimental to the field of audiology. The widespread existence of the MA/MS technician has produced a public and professional image of the audiologist which reduces both the masters as well as the Ph.D. practitioner. Trying to function at the MA/MS level is inconsistent with being truly professional and autonomous. I don't know if any of the authors have tried to operate in a distinct independent private practice, but a doctorate is necessary for basic functioning. The time has come to get on with it.

Stuart Horn
Arcadia, CA

AuD for One and One for AuD

I have written and spoken on behalf of the Au.D. more than I could ever have dreamed would be necessary to bring about not just what I, but an esteemed corps of audiologists, believe is the inevitable and natural progression of our chosen profession.

It is with their words that I wish to comment on Larry Humes and colleagues' recent Point Counterpoint column in the March/April issue of *Audiology Today* (the emphasis added in each quote is my own):

Raymond Carhart, 1976: "It may be reassuring in this time of conflict to consider the American Speech and Hearing Association as a haven and rallying point. ...But careful evaluation of the scientific and educational issues involved makes clear that the person who has achieved certification in audiology from ASHA has emerged as a professional whose recognized competency is defined by the Master's degree and a moderate amount of supervised clinical experience... as long as either ASHA or clinical audiology are satisfied to accept only this definition as describing competence in clinical audiology, **the field cannot expect to be recognized as equal to professionals that hold the doctorate as one of their inviolate requirements."** (Introduction. In M. Pollack (Ed.), *Amplification for the Hearing Impaired.* 3rd Edition Grunne & Stratton, Inc. New York. p.xxxvi.)

James Jerger, 1988: "Why is the doctoral degree so important? It is a fact of life that, in the health-care model, there are two categories of participants; those at the doctoral level (e.g., M.D.s, Ph.D.s, D.O.s) and those at less than the doctoral level (e.g., physical therapists, nurses, radiology techs, etc.,) I strongly believe that we, as audiologists, must function at the first level. We must provide a point of entry into the health care system, and be able to function with relative autonomy, rather than as medical technicians working under the supervision of doctoral level professionals. ...Because of the way in which our society and its health care system is organized, such status requires the doctoral level. There is just no getting around that basic fact of life. **People who are functioning autonomously in the health-care environment, with only a masters degree, are living on borrowed time."** (Report from the President. *Audiology Today*. 1(1), pp. 1-4)

Jay Hall, et al., 1990: Reported that in his AAA survey **82% favored a professional doctorate** (81% for

Master's level respondents and 85% for doctoral level respondents). (1989) American Academy of Audiology Convention Survey of Clinical Practices. *Audiology Today.* 2(1) pp.20-22).

Fred Bess, 1990: "The overwhelming consensus of our membership is that a professional doctorate is important and must be pursued. I suggest to you that it is time to close the debate. It is time for change. **The Academy (AAA) must do what it can to ensure that a professional doctorate is realized."** (President's Message. *Audiology Today.* 2(3), p.6).

Jerry Northern, 1991: "The message for the field of audiology is clear--we can't wait for 42 years for our professional degree programs to take hold. **The American Academy of Audiology has a major directive to reorient the profession from a Master's degree level of entry into the profession to a doctoral entry level."** (President's Message. *Audiology Today.* 3(1),p.3).

D.C. Spriestersbach, 1991: "audiologists (should be) undeterred by the irrelevant discussion that has been swirling around clouding the issue. The bottom line is that traditional Ph.D. programs fail to graduate people with a high level of clinical competence; that the sanctity of the Ph.D. for research purposes must be preserved; that **audiologists holding a professional doctorate will be better equipped to interact with other doctors;"** (The Professional Doctorate: Consensus and Controversy. *Audiology Today,* 3(3), p.24).

Sharon Fujikawa, 1992: "It is significant that the AAA has been one of the most active voices for the Au.D. Many of us have been dragged kicking and screaming to the reality that we need to expand our educational programs. **I have no doubt that the Au.D. will be a reality and feel that the AAA will be a strong force in this difficult transition."** (Position Statement. *Audiology Today,* 3(6), p. 26).

And finally, in a letter to me:

Larry Humes, 1989: "I read the ASHA preprint regarding the Au.D. degree in Audiology with great interest. I sincerely feel that the profession must move in this direction to meet the demands of the public, both now and in the 21st century" (1989).

Let's keep moving forward. Let's make it one degree for all. All for one degree.

David P. Goldstein
W. Lafayette, IN

Dangers of Divorce

There is growing feeling that the professions of audiology and speech-language pathology must inevitably go their separate ways and that there will be two professional organizations — the American Academy of Audiology for audiologists and ASHA for speech-language pathologists. Apart from such issues as certification and political lobbying, I think complete divorce holds some dangers. My reasons are theoretical, historical and clinical.

The speech-hearing link. While the vestibular and auditory systems are, by evolution, intimately related anatomically, they are distinct functionally. Indeed, there is far more evolutionary link functionally between the vocal and auditory organs... In humans, speech and hearing are inextricably wound up in one another as functional halves of the same unit, sound messages uttered and perceived.

Professional origin. It was no quirk of history that audiology grew out of the field of speech communication or that it heavily involved rehabilitation. Our early activities were aimed at both aural and oral abilities. To wit, the Founders' session at the April AAA meeting.

Disorders. In earliest childhood, the only significance of hearing loss is its impact on speech and language. In severe degree, it affects every facet of expressive communication: articulation, language, voice and rhythm. We can do a better job if we have a secure grasp of the entire communication process: speech-language-hearing.

In adulthood, individuals with hearing loss seek us out for help, not because they don't hear, but because they don't hear speech. Therefore, I think it logical to suppose that our ability to use hearing technology effectively is related to our understanding of speech.

In sum, audiologists must have a firm grip on the nature of speech skills. Let us strike out boldly on our own path of professional autonomy, but let us be cautious about how fast and how much we shed the "speech" of "speech and hearing," before we abandon information and organizations concerning speech.

James E. Peck
Jackson, MS

The Economics of It All

Competent service providers need to be affordable. Six years' education to perform routine basic audiometry is overkill. The prohibitive cost of six to eight years' education serves neither the public nor the graduate of an Au.D. program. Developing guidelines for the scope of practice at the bachelor's level, master's level, Au.D. level and Ph.D. level makes economic sense for both the graduate and the consuming public. Let's develop an educational model that serves the needs of the consumer, the educator, and the graduate.

Sheryl Jean Doggett
Ft. Smith, AR

Announcements

Calendar of Events

July

16 - 19, 1992
Auditory Evoked Response Workshop
Nashville, TN
For further information contact:
James W. Hall
Vanderbilt Balance and Hearing Center, Suite 2600
Village at Vanderbilt 1500 21st Ave.
South Nashville, TN 37212-3102
(615) 322-4327

24 - 25, 1992
A Workshop on Practical Aspects of Modern Audiology: Evoked Potentials, Otoacoustic Emissions and Central Tests
For further information contact:
Office of Continuing Education in the Health Sciences
Dartmouth-Hitchcock Medical Center
One Medical Center Drive
Lebanon, NH 03756-0001
(603) 650-1521

29 - August 1, 1992
Second Annual Forensic Audiology Seminar
Ucluelet, BC
For further information contact:
David M. Lipscomb
Correct Service, Inc.
P.O. Box 1680
8715 271st NW, Suite 1
Stanwood, WA 98292
(206) 629-4865, FAX (206) 629-3755

Classified Section

Effective immediately, *Audiology Today* will begin to accept professional classified advertisements from individuals, institutions and manufacturers that pertain specifically to audiologists and the profession of audiology. Initially, there will be two descriptive categories which advertisements may address. They are: 1) **positions available**; and, 2) **positions wanted**. Two forms of professional classified advertising are available: 1) **space ads**; and 2) **line ads**.

Space Ads: All space ads must be camera ready, preferably with the negative of the art work(returned after publication). Two-color ads must include an overlay; the monthly PMS *Audiology Today* color will be used automatically without exception. American Academy of Audiology members will receive a 10% discount from the published rates for **space ads only**.

Size	Dimenensions	Costs	
		B/W	2-Color
1/4 page	3-1/4" w x 4-3/4"d	$250	$350
1/2 page	3-1/4" w x 9-1/2"d(verticle)	$500	$600
1/2 page	7" w x 4-3/4" d(horizontal)	$500	$600
1 page	7" w x 9-1/2" d	$900	$1,000

Line Ads: The cost per ad will run $5.00/complete or partial line as published in *Audiology Today*. A minimum of 5 lines will be billed; each line contains approximately 35 characters. Line ads must be typewritten upon submission. Ads will be edited for consistency.

Specifics: Each ad (space and line) must be submitted with an introductory letter that states the type of ad (position available, position wanted) and the issue(s) (e.g., No. 1, January/February) the ad is to run, and to whom the billing should be sent. Billing will follow the ad publication.

Deadlines: Finalized ads are **guaranteed** to appear in the requested issue if received one month preceding the stated issue. For example, by December 1st for the January/February issue. No exceptions will be made. Send ads to: Classified Section, Phyllis Hawkins, *Audiology Today*, Dept of ENT, 6431 Fannin, MSB 6.132, Houston, TX 77030 or FAX (line ads only with accompaning letter) (713) 792-5399.

The Hearing Loss Testing Act

HR Bill #2089, proposed by Congressman James Walsh of New York, would legislate hearing screening of all infants born in the United states. The proposed Bill would greatly increase the role of the audiologist in early intervention and management of hearing impairment.

To support this important legislative issue, audiologists can write their Congressman or Senator. A sample letter, supplied by Martha Carmen of Rep. Walsh's office, is available. Names of Congressman or Senator in your region are available by calling the Capital operator at (202) 224-3121. Be prepared to supply your zip code.

August

19-23, 1992
Jackson Hole Rendezvous - A Conference for Hearing Health Professionals
Jackson Hole, WY
For further information contact:
Michael W. Marion
Professional Hearing Ventures, Inc.
5800 Santa Rosa Road, #123
Camarillo, CA 93012
(805) 482-3667, FAX (805) 388-2937

31 - September 4, 1992
XXI International Congress of Audiology Annual Meeting
Morioka, Japan
For further information contact:
Secretariat c/o Simul International
Kowa Bldg. Nol 9, 1-8-10
Akasaka, Minato-ku
Tokyo 107, Japan
Phone: 81-3-3586-8691
FAX: 81-3-3583-8336

September

9-11, 1992
Southern Audiological Society 21st Annual Convention
Little Rock, AR
For further information contact:
Robert J. Harrison
446 Alhambra Circle
Coral Gables, FL 33134

18-21, 1992
Human Central Auditory Pathways
New Orleans, LA
For further information contact:
Course Coordinator
Kresge Hearing Research
Laboratory of the South
LSU Medical Center
2020 Gravier Street, Ste. A
New Orleans, LA 70112
(504) 568-4785, FAX (504) 568-4460

24 - 27, 1992
Paediatric Cochlear Implantation
University Hospital, Nottingham, UK
For further information contact:
University of Nottingham
Office for Professional and Industrial Training
University Park
Nottingham NG7 2RD
(0602) 792841, FAX (0602) 501718

16 Personalities Featured on New Poster

Washington, D.C. (April 22, 1992) — A colorful new poster featuring 16 prominent personalities who benefit from available hearing help is now available to hearing health care providers, thanks to a special grant from Duracell U.S.A., manufacturer of Activair and Duracell batteries. Poster celebrities dramatically surround copy headlined, "We Chose Better Hearing," and encourage people with hearing problems to overcome them as they did. They emphasize that most people with hearing loss can now be helped medically, surgically, with hearing aids, or through rehabilitation. The 17" x 26-1/2" poster features newer personalities as well as those traditionally associated with BHI's hearing help information program. They include Norm Crosby, Phyllis Diller, Richard Dysart, Nanette Fabray, Lou Ferrigno, Florence Henderson, Mark Herndon, Bob Hope, Leslie Nielsen, Donald O'Connor, Arnold Palmer, President Reagan, Mike Singletary, Richard Thomas, and Al Unser. Cost is $6.50 per poster, with discounts on larger quantities available upon request. Poster(s) will be shipped unfolded in a protective tube via UPS within 24 hours after receipt of check and order. Call 1-800 EAR WELL for an additional information. Place order with Better Hearing Institute, 5021-B Backlick Road, Annandale, VA 22003.

Easy-to-Understand Guidebook for Hotels & Motels to Comply with the Americans with Disabilities Act (ADA)

Title III of the ADA which covers public accommodations, became effective January 26, 1992. According to this legislation, private industry must make services accessible to people with disabilities. This includes hotels and motels who must provide communication access for people with hearing loss. Hospitality for guests with hearing loss: A guide for Hotel/Motel compliance with the Americans with Disabilities Act (ADA) provides the hotel industry with specific guidelines on how to comply with the law. Published by Self Help for Hard of Hearing People, Inc. with review and input provided by members of the American Hotel & Motel Association, this valuable resource will help facilities ensure that travelers with hearing loss choose their facility. Cost of the book is $50.00 plus $5.00 shipping and handling. Orders of ten or more, and orders from SHHH members, are $35.00 each. For more information or a brochure/order form, contact: SHHH, 7800 Wisconsin Avenue, Bethesda, MD 20814, (301) 657-2248 voice, (301) 657-2249 TT.

NCI's "Captions for Kids" and Community Support to Provide "Reading Vacation" to Houston Students

Washington — The National Captioning Institute (NCI) and Lions Clubs of District 2-S2 have joined together to host a "Captions for Kids" kick-off program which will place 100 TeleCaption 4000 decoders in the homes of deserving deaf and hard-of-hearing students. The Houston Independent School Districts "Captions for Kids" decoder placement program hopes to assist approximately 300 students. The program will also target decoder placements to special education classrooms through local corporate support. Closed-captioned television conveys the audio portion of a program into written text. Viewers simply read what cannot be heard. Over 450 hours of TV programming is captioned each week. Students must know what is happening in the world to compete with hearing peers. Previous programming included captioned coverage of the Gulf War, the historic changes in Europe and the Soviet Union. For more information about captioning call the National Captioning Institute's toll free number: (800) 533-9673 (voice) or (800) 321-8337 (TDD).

October

22, 1992
Little Ears with Big Problems: Medical Audiology for Children
Taunton, MA
For further information contact:
Speech, Hearing & Language Center
Morton Hospital & Medical Center
88 Washington St.
Taunton, MA 02780

30 - November 1, 1992
ENG Test Administration Interpretation and Diagnosis
Chicago, IL
For further information contact:
Joyce Simensen
ICS Medical Corporation
2227 Hammond Dr.
Schaumburg, IL 60173
(800) 289-2150

November

5-7, 1992
The Challenge to Independence: Vision and Hearing Loss Among Older Adults
Dallas, TX
For further information contact:
Martha Bagley
Helen Keller National Center
4455 LBJ Freeway, LB#3, Suite 517
Dallas, TX 75244-5998
Voice & TDD: (214) 490-9677

19, 1992
19th Annual Meeting of the American Auditory Society
San Antonio, TX
For further information contact:
Don W. Worthington
Boys Town National Research Hospital
555 North 30th Street
Omaha, NE 68131
(402) 498-6526, FAX (402) 498-6638

20 - 23, 1992
Annual ASHA Convention
San Antonio, TX
For further information contact:
Conventions
(301) 897-5700

American Academy of Audiology Relocates

Effective immediately the new address and phone number for the American Academy of Audiology is as follows:
P.O. Box 3676
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December

2-6, 1992
Fourth Annual Interdisciplinary Seminar: Diagnostic & Rehabilitative Aspects of Balance and Movement Disorders
Denver, CO
For further information contact:
I. Kaufman Arenberg
300 E. Hampden Ave, Ste. 400
Englewood, CO 80110
(303) 850-9545, FAX (303) 788-4234

3-6, 1992
SENTAC Annual Meeting
Toronto, Canada
For further information contact:
Phillip H. Kaledia
Chair, SENTAC Program Committee
Children's Hospital of Pittsburgh
3705 Fifth Avenue at DeSoto Street
Pittsburgh, PA 15213-2583

American Academy of Audiology

April 15-18, 1993
Fifth Annual Convention
Phoenix, AZ
Noel Matkin, Convention Chair

April 28-May 1, 1994
Sixth Annual Convention
Richmond, VA
Richard E. Talbott, Roger A. Ruth
Co-Chairs

Seventh and Eighth Annual Conventions – In Planning

April 1997
Ninth Annual Convention
Cincinnati, OH

For further information contact:
Wendy Root
American Academy of Audiology
P.O. Box 3676
Washington, D.C. 20007-0176
(202) 687-6997, or (800) AAA-2336
FAX (202) 333-5668

(Upon reading the Academy Profile in *Audiology Today* in which there were no members listed over 70.)

Morte de Marion

O Tempora, O Mores, the times have passed me by;
The AAA has sent me to The Great Sound Room in the Sky!

Et tu, Brad Stach, chief Hit Man, and Fie on Ye Ed, John —
No longer shall I research the hair cell on the phon.

Requiescat Nunc in Pace, Downs: The Trumpet call doth ring —
With great finesse the Audiology Today has done me in.

Wave Fronts

Eugene C. Sheeley
Contributing Editor

People

The New York League for the Hard of Hearing presented its annual awards in May. The Harriet Jonas Award went to **Margaret W. Skinner** (Washington University School of Medicine, St. Louis) for excellence in research in amplification, and the Lehman Award in Administration was given to **Richard G. Stoker** (Central Institute for the Deaf) for outstanding leadership. The Fletcher Award in Technical Applications was presented to **Carl Sandrock** (Phonic Ear) for his work on an FM system for children with profound hearing impairment.

AAA member **Robert W. Keith** (University of Cincinnati Medical Center) will turn over the editorship of *Ear and Hearing* to AAA member **Susan Jerger** (Baylor College of Medicine, Houston). The new editor intends to continue the broad, multidisciplinary focus of the journal, which is published by the American Auditory Society.

Academy member **Donald M. Goldberg** was recently appointed executive director of the Helen Beebe Speech and Hearing Center in Easton, PA. He is also the new editor of Auditory-Verbal International's newsletter, *The Auricle*.

Audiology Co-op, Inc. reelected Academy member **Leo G. Doerfler** (Westmoreland Hearing Associates, Inc., Pittsburgh) as its chair. The corporation functions as a buying group; its members account for 2% of the hearing aid distribution in the U.S.

The National Institute on Deafness and Other Communication Disorders appointed **David J. Lim** (Ohio State University College of Medicine) as its first Director of the Division of Intramural Research. Lim's special interest is in the development of a vaccine to prevent otitis media.

In April, President Bush recognized **Thomas Cooney, Sr.** (Palm Harbor, FL) as the 745th Daily Point of Light for the Nation. Cooney, who is hearing impaired, has volunteered his services in interpreting for deaf people and teaching sign language since he was 15 years old. He is especially interested in youth and regularly conducts two-day school visits to give students a better understanding of deafness and sign language.

T. J. O'Rourke died in January in Silver Springs, MD. He founded T. J. Publications, which publishes a variety of books related to deafness; he was also a writer and advocate for deaf people.

Organizations et al.

The National Society of Dispensing Audiology has changed its name to the **National Society of Hearing Professionals.** According to *The Hearing Journal* (April), the organization of about 130 members has been criticized for using the term audiology when some members were nonaudiologists. AAA member R. David Nelson (Nelson Hearing Aid Service, Spencer, IA), president of the society, said his principal concern is realizing the organization's goals of bringing together audiologist and nonaudiologist dispensers and improving education for dispensers.

The **International Hearing Society** (formerly the National Hearing Aid Society) has accredited the training program of Ensoniq. The two and one-half day course—approved for 11 hours of continuing education—includes fitting practicum, product development, sales, and marketing. For information about the course, call customer service at (800) 942-0096.

For the second year, **Cochlear Corporation** has awarded fellowships in audiology at centers across the country. The fellowships enable audiologists to gain experience in working with people who have cochlear implants. The deadline for applying for future fellowships is next spring. Prospective applicants should call Adrienne Wright, (800) 523-5798, for details.

Pursuant to a federal contract, the **American Academy of Otolaryngology-Head and Neck Surgery**, the **American Academy of Pediatrics**, and the **American Academy of Family Physicians** have formed a panel to develop

guidelines for the diagnosis and treatment of otitis media in children. The panel, chaired by Sylvan E. Stool, is reviewing pertinent literature and receiving oral and written testimony. The third of the panel's four meetings was held in June.

The **Registry of Interpreters for the Deaf, Inc.** will begin a quarterly publication to be called the *Journal of Interpretation*. It will include research articles as well as opinions and reviews.

Recently elected fellows of the **Acoustical Society of America** are Fredericka Bell-Berti (St. John's University, New York) for contributions to the study of normal and deviant speech production, H. Steven Colburn (Boston University), for contributions to theories of sound localization, Douglas O'Shaughnessy (INRS Telecommunications, Quebec) for contributions to speech synthesis and education in speech communication, and Carl E. Williams (Naval Aerospace Medical Research Laboratory, Pensacola) for contributions to speech intelligibility and hearing conservation.

An organization of hearing-impaired federal employees is being formed to address issues of unequal promotion rates, communication barriers, etc. For more information, write Robert de Beck, **National Association of Hearing Impaired Federal Employees**, P.O. Box 33392, Washington, D.C. 20033.

Products

About 1200 readers receive *Hear-Say*, a newsletter for people interested in communication, technology, and special populations. The contributions are largely from readers and the cost of a subscription is the promise to submit something to the publication. To subscribe, write *Hear-Say* Editor Nick Lape, **Southside Virginia Training Center**, P. O. Box 4110, Petersburg, VA 23803.

Intergenerational Issues in Speech, Hearing, and Language is a new publication that will address issues in communication that cut across the divisions of preschool, school-age, and adult levels. Submissions are requested from professionals and students. The Winter-Spring issue has articles on the Americans with Disabilities Act, cochlear implants in children, classroom use of FM systems, AIDS, and private practice. A subscription is $5 from editor Jesse Dancer, Speech Communication 105, **University of Arkansas at Little Rock**, 2801 South University, Little Rock, AR 72204.

In recognition of its 20th year, **Better Hearing Institute** has planned a 10-day tour of England for BHI supporters. AAA member Ross Roeser (Callier Center, Dallas), president of BHI, notes that "accommodations are first class and in good taste" and that the tour will proceed at a comfortable pace to allow time for special interests. For the tour itinerary and registration information, call Janice LoPrinzi at 800-EAR-WELL or Lord Addison Tours at (603) 352-6217.

A guidebook to assist hotels and motels in complying with the Americans with Disabilities Act has been published by **Self Help for Hard of Hearing People, Inc.** The book, Hospitality for Guests with Hearing Loss, includes relevant ADA guidelines, how to provide cost-effective communication access, staff training, equipment suppliers, etc. The book is $50 plus $5 shipping and handling from SHHH, 7800 Wisconsin Avenue, Bethesda, MD 20814 or call (301) 657-2248 (voice), (301) 657-2249 (TDD).

ASHA has prepared two fact sheets describing the communication requirements for the Americans with Disabilities Act. Free copies of the fact sheets, which are in question-and-answer form, are available by calling (800)638-8255.

There are over 2000 AudioLink-compatible facilities in the U.S., according to the **National Captioning Institute**, including most Broadway theaters, the Kennedy Center, the Dorothy Chandler Pavilion, Cineplex Odeon and Loews movie theaters, and Epcot Center. AudioLink uses infrared light to transmit sound from a sound system to the unit worn by a hearing-impaired individual. This allows a theater or the like to comply with the Americans with Disabilities Act, which requires the provision of equal access to people with hearing loss. The NCI found that an infrared system, which is also suitable for use with a home television set, is preferred by hearing-impaired people over other wireless systems. For more information, call NCI at (800) 533-9673.

The current issue of *Alert: Hearing Dog Resource Center Newsletter* deals with what to do when access is denied to a hearing dog. A booklet, *Legal Rights of Assistance Dogs*, is available for $4 from the **Hearing Dog Resource Center** by calling (800)869-6898 (voice and TDD).

Rayovac Corporation announces an increase in the milliampere ratings for two of its zinc-air, hearing-aid batteries: types 312 and 675. The change results in longer life for the batteries.

The **American National Standards Institute** has recently published a new standard, *Maximum Permissible Ambient Noise Levels for Audiometric Test Rooms*, ANSI S3.1-1991,

a revision of ANSI S3.1-1977. The standard specifies the maximum ambient noise levels that would produce negligible masking (2 dB or less) at threshold levels specified by ANSI S3.6-1989. The permissible levels are specified for octave and third-octave bands from 125 to 8000 Hz, and for ears covered and uncovered. The new standard is $36 postpaid from Professional Book Distributors, Inc., ASA Standards Distribution Center, 1650 Bluegrass Lakes Parkway, Alpharetta, GA 30239-6996, telephone (404) 442-8631, fax (404) 442-9742.

Several books previously published by **Pro-Ed, Inc.** are now published by **Allyn & Bacon**. Among them are two 1991 publications by Academy members: *Hearing Assessment* (2nd ed.) edited by William F. Rintelmann, and *Diagnostic Audiology* edited by John T. Jacobson and Jerry L. Northern. The volumes are $45.95 and $51.00, respectively. To order from the publisher, call (800) 848-4400, extension 92.

The ER-25 Musicians Earplugs, recently developed by **Etymotic Research**, have 10 dB greater attenuation than the ER-15 model. Both sets of plugs provide relatively equal attenuation at all frequencies so music does not sound muffled. Etymotic suggests the ER-25 model for use when sound levels exceed 105 dB.

Government

Two audiologists serve in state legislatures according to ASHA's *Government Affairs Review* (April-May). Academy member R. Allen White serves as a representative in the **Kansas** legislature; Elaine Szymoniak, who is also licensed as a speech-language pathologist, is a senator in the **Iowa** legislature.

West Virginia recently became the 41st state to license audiologists.

In February, the U.S. District Court for the Southern District of Ohio ruled in the case of Gandee v. Glaser, a suit brought by two hearing aid dealers against members of the **Ohio** Board of Speech Pathology and Audiology, including Academy member Robert G. Glaser (Audiology Associates of Dayton, Inc.). The court dismissed the claim that the Ohio board wrongfully prohibited the dealers from using the term "audiologist." The court rejected the dealers' claim that their use of the term "audiologist" is protected by the First Amendment to the U.S. Constitution.

Beginning in May, the Federal Communications Commission approved two **new frequency bands** in the 72 to 76 MHz band for use by hearing-impaired people. This increases the number of narrow-band channels from 32 to 40 and wide-band channels from 8 to 10.

James B. Snow, director of the National Institute on Deafness and Other Communication Disorders, announced at a meeting of the NIDCD Advisory Board earlier this year that the Institute was cooperating in a study of deaf children of consanguineous marriages. The children to be studied are from Ichalkaranji, India, where up to 50% of children in schools for the deaf come from these marriages. In order to search for the genes responsible for these hearing impairments, Indian scientists will be trained in **molecular genetics** in NIDCD's Division of Intramural Research.

Health Professions

Governmental Affairs Review (April-May) reported that Medicare may reduce payments to audiologists for **ENG** testing and interpretation by paying for only the technical component and not the professional component. The staff of ASHA's Healthcare Financing Division plans to meet with Medicare representatives to attempt to restore the reduced payments.

In *Otolaryngology-Head and Neck Surgery* (April), researchers reanalyzed previous trials to reconcile conflicting reports of the efficacy of antibiotics for **otitis media with effusion**. Data on more than 1300 children show that antibiotics do play a significant role in recuperation from OME.

Send news items, newsletters, PR releases, etc. to Wave Fronts Editor, University of Alabama, Box 870242, Tuscaloosa, AL 35487. Telephone (205) 348-7131; Fax (205) 348-1845.

Coming Next Issue

Special Issue:

- **Computer Applications**
- **Convention Highlights Continued**

Screening Children *for* Auditory Function

edited by

Fred H. Bess and James W. Hall III

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All of this information is available in one resource — ***Screening Children for Auditory Function***. This book is the most current source of information on early identification and intervention of children with hearing impairment. ***Screening Children for Auditory Function*** is based on papers presented at the International Symposium on Screening Children for Auditory Function. The event took place June 27-29, 1991 in Nashville, Tennessee, and was sponsored by Bill Wilkerson Center and the Division of Hearing and Speech Sciences, Vanderbilt University School of Medicine. Fifty-eight distinguished authors contribute to the thirty comprehensive chapters and three appendixes of this book.

560 pages\6 x 9 hardcover\August 1992\Illustrated\$55.00\ISBN 0-9631439-0-5

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Membership Report: 1992

Academy Membership Up!

The Membership Committee of the American Academy of Audiology initiated a major drive to recruit new members. The overall goal is to increase membership to at least 5000 members by the end of 1992. The new member recruitment plan consists of a series of mailings sent to all audiologists who are not yet members of the Academy.

The initial mailing, to more than 6000 non-members, contained a letter from Academy President Jerry Northern, an Academy information brochure and membership application form. The second mailing to non-members was the Nashville Convention announcement and Convention registration booklet to encourage them to take advantage of the reduced registration fee offered to Academy members. A third mass mailing was the Central Auditory Processing program announcing one-day regional continuing education workshops. The Membership Committee wanted to be sure that non-members were fully aware of the numerous activities of the Academy.

President Jerry Northern established a volunteer recruitment network by appointing a representative from each state. Each state member representative wrote a personal letter to all the non-members in his or her state, encouraging them to join the AAA. The efforts of the state member recruitment network were most successful and stimulated a new flurry of membership applications.

Membership Chairman Gus Mueller notes that the Academy now represents nearly 50% of all audiologists in the United States. Academy members are urged to get involved in the new member campaign and bring in those audiologists who have not yet "joined up".

An award presentation was made to Debbie Armbruster at the National Convention as the 4000th Academy member. The National office reports that the current membership level as of early May 1992 to be almost 4500 members.

According to Dr. Mueller, "Any organization is only as strong as its members, and our voice speaking out in behalf of audiologists from all over the United States will be stronger, louder and more effective, as we represent more and more of the practicing audiologists."

Gus Mueller and Jerry Northern congratulate Debbie Armbruster of Indianapolis as the 4000th Academy Member.

Membership Recruitment Network

State	Representative	State	Representative
AL	Thomas Borton	HI	June Uyehara-Isono
MS	Patricia Jackson	OR	Steven Fausti
AK	David Canterbury	ID	Richard Areitio
MO	Douglas Beck	PA	Robert Asby
AZ	Robert Childers	IL	Gail Gudmundson
NB	Don Worthington	RI	Steve Kasden
AR	James Rippy	IN	Pat Nordstrom
NV	Pat Sakelaris	SC	David Hawkins
CA	Sharon Fujikawa	IA	Ruth Bentler
NH	Karen Kibbe	SD	Jerome Alpiner
CA	Richard Sweetow	KS	John Ferraro
NJ	Emily White	TN	Dan Orchik
CO	Steve Staller	KY	Ian Windmill
NM	Karl Hattler	TX	Mary Sue Harrison
CT	Ken Randolph	LA	Steve Morris
NY	Judy Gravel	UT	Thomas Mahoney
DC	David Resnick	MD	Jim McDonald
NC	Gordon Fletcher	VA	Margaret McElroy
DE	Steve Kasden	MA	Susan Rezen
ND	Stanley Krogh	WI	Jack Kile
FL	Melinda Harrison	MI	Jerry Punch
OH	Debbie Abel	WY	Michael Primus
GA	Jane Seaton	MN	Claudia Hawley
OK	Polly Patrick	CAN	Meredith Halaschuk

FOUNDATION

AMERICAN ACADEMY OF AUDIOLOGY

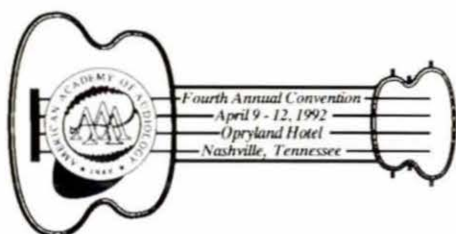
▲The American Academy of Audiology Foundation awarded $500 to each of the six graduate students in Audiology whose presentations of original research were accepted for the Student Research Forum by a Committee chaired by Rieko Darling. Pictured are Cassandra L. Colville, Henry Lew, G. Pamela Burch-Sims, Ossama A. Sobhy, Anne Marie Tharpe, Andrew J. Vermiglio, and Laszlo K. Stein, Chair of the AAAF

◀ *Laszlo Stein acknowledging and thanking the membership at the Academy Reception, Banquet, and Dance for their support of the Foundation. Nearly $900 was raised at the Banquet from the carafe stuffing at individual tables and the impromptu auction of the infamous Gus Mueller watch with the likeness of Fred Bess on the face.*

◀ *John Zei, President of Siemens Hearing Instruments presenting a check for $500 to the Foundation from the Audiology Trivia Bowl III sponsored by Siemens. Accepting for the Foundation is Laszlo Stein.*

▲ *David M. Resnick accepting a plaque and the appreciation of the Foundation for being the first person to send in a pledge in response to the Foundation's inaugural fund-raising campaign. In recognizing Dr. Resnick, Laszlo Stein, Chair of the Foundation Board also acknowledged Darrel Teter as the first major contributor to the Foundation.*

Laszlo Stein with the help of Jerry Northern doing a quick count of the $2400 raised from the Second Annual Open Golf Tournament sponsored by Starkey Laboratories. Organizer of the Golf Tournament and Academy member Jim Curran made the presentation. ▶



Convention Report: 1992

The Fourth Annual American Academy of Audiology Convention held in Nashville, Tennessee, April 9-12, 1992 drew a record number of participants. Registrants included 1333 Academy members and an additional 278 exhibitor attendees. A record number of commercial exhibit booths (103) covered nearly 45,000 square feet in the beautiful Opryland Hotel Exhibit Hall. "Working in Harmony" was the theme in Music City, USA. Special sessions sponsored by affiliated audiology professional groups, and a special historical review of audiology presented by well-known pioneers of our field, highlighted the scientific sessions. The pre-convention Continuing Education Program on "Central Auditory Processing" attracted more than 250 participants who listened to state-of-the-art information presented by James Jerger, Charles Berlin and Linda Hood. Social activities included an outrageous Academy Opening Night Party (sponsored by Starkey Labs), the ever-popular Academy Trivia Bowl Breakfast (sponsored by Siemens Hearing Instruments), and a fun-filled banquet hosted by Master of Ceremonies Jerry Northern, followed by a night of great dancing to the "Nashville Freeway." All seemed to agree that it was the best convention ever — and many attendees and exhibitors were overheard already making plans to attend the April 15-18, 1993 Academy Convention scheduled for Phoenix "Turn Up the Heat", Arizona!

Fourth Annual Academy Convention

Linda Hood and Jerry Northern share a serious moment at the convention registration desk.

Our own Academy music men, Roy Sullivan and Chuck Berlin, entertain at the pre-banquet coctail party.

Jay Hall, the 1992 Academy Convention Chair, welcomes members to Nashville.

1992 Trivia Bowl winning team, the "Seren-Dips" includes Rich Nodar, Laszlo Stein, Margaret Carlin, Barbara Franklin, Elca Swigart, Ann Ross, Brad Stach and team captain Marion Downs.

Marsha and Geary McCandless enjoy the tremendous exhibit area during the Academy Convention.

Trivia Bowl III - A Great Success!

Do you know what Academy member had his or her photo on the cover of Life Magazine? The Academy Trivia Bowl (III), sponsored by Siemens Hearing Instruments, again was a huge success. This breakfast-event sparked over 500 dreary-eyed Academy members into fierce competition for the coveted Trivia Cup.

Awakened and warmed by the enthusiasm and motivational banter of Trivia Bowl Host Jerry Northern, the crowd quickly shook out the cobwebs of the night before and formed spirited groups. Competition was keen among the 55 teams, with considerable positioning and manipulation occurring before the opening whistle. In an unprecedented last second desperation tactic, the *Odd Docs* signed unrestricted free agent Merle Lawrence; a move they believed would assure them a repeat as champions.

Gus "Trivia Guru" Mueller prepared an assortment of questions that was even more trivial than in years past, and added pictorial displays of the answers — this not only provided some well-needed credibility to his answers, but also served to sufficiently embarrass appropriate Academy members.

When all was said and done, only four percentage points separated the top six teams, and a new name was added to the list of champions on the coveted Trivia Cup. The three top teams were as follows:

1992 Trivia Bowl Champions – Seren-Dips; Captain: Marion Downs, Margaret Carlin, Barbara Franklin, Brad Stach, Laszlo Stein, Elca Swigart, Cynthia Jacobs, Rich Nodar, Dawn Koch and Ann Ross.

First Runner-Up – Re-Spondees; Captain: Laura Wilber, Jane Madell, Judy Gravel, Steffi Resnick, Polly Patrick, Margaret McElroy, Pamela Friebig, Mary Watts, and Judith Rassi.

Second Runner-Up – The Odd Docs; Captain: Fred Bess, Noel Matkin, Karen Briskey, George Osborne, Merle Lawrence, Mike Metz, Dennis VanVliet, Wayne Olsen, William Carver and Dee Townsend.

Convention registration runs smoothly as Kathy Saucedo directs continuing education activities.

An outside deck keg party provides conventioneers an opportunity to socialize under the Nashville sun.

Distinguished Lifetime Achievement Award

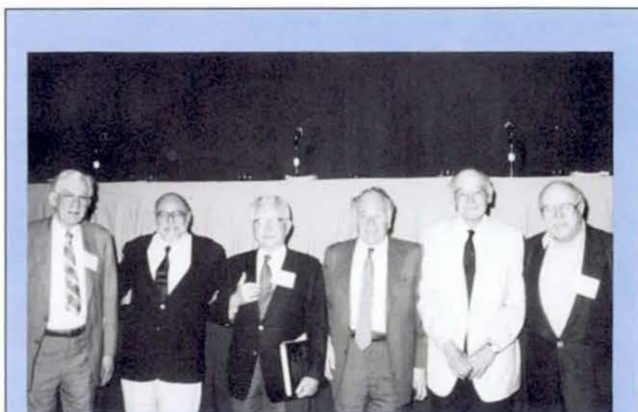
Merle Lawrence, Ph.D. was awarded the American Academy of Audiology's 1992 Distinguished Service Award for his lifetime contributions to auditory research. Dr. Lawrence entertained the capacity crowd at the Convention Membership Meeting with stories from his past while working with other noted auditory scientists including George von Bekesy. Dr. Lawrence conducted the first intraoperative electrocochleography in 1947 while working with J. Lempert, the otologist who developed the fenestration operation for otosclerosis.

Dr. Lawrence received his undergraduate and graduate degrees from Princeton University. In 1941 he received the Ph.D. in physiological psychology under the tutelage of Ernest Glen Wever. He then conducted a postdoctoral fellowship at Johns Hopkins Hospital, where he worked with Samuel Crowe and Stacy Guild to explore the anatomical correlates of high frequency hearing loss. For the next several years he served as a naval aviator in World War II, flew in numerous combat missions and received the purple heart. Following brief periods at Princeton and the Lempert Institute of Otology he went to the University of Michigan to establish and direct the first Kresge Hearing Research Laboratory.

The lifetime accomplishments of Dr. Lawrence are extraordinary, for his research has contributed much to our knowledge of the auditory system. He has been a major contributor to the literature with more than two hundred publications in scientific journals. He is the author of five books, and he has produced several movies and videos. His research has been multifaceted and has ranged from the behavioral assessment of harmonic distortion to a description of the peripheral auditory system through the microphonic potential. He has contributed to our knowledge on the middle ear as a mechanical transformer, the locus of distortion within the ear, the impact of noise and oxygen deprivation on the auditory system, the status of auditory theory, and the blood circulation and blood supply to the ear. His classic textbook ***Physiological Acoustics,*** co-authored with Ernest Wever, published in 1954, has served as a benchmark reference for auditory students and scientists for more than three decades.

In recognition of his many accomplishments, Dr. Lawrence has received the Award of Merit from the American Academy of Ophthalmology and Otolaryngology and from the American Otologic Society. Recently, the University of Michigan established the Merle Lawrence Research Award in the Department of Otolaryngology.

Dr. Merle Lawrence and his wife Bobbi were in attendance at the Academy Convention in Nashville. Dr. Lawrence was recognized with the Academy Distinguished Lifetime Achievement Award for his research contributions in hearing.



A convention highlight was the "Aural History" presentation of Sam Lybarger, James Jerger (session chair), Robert Galambos, Ira Hirsh, H. Richard Silverman and Frank Lassman. A videotape of the session is available from the Academy National Office.

Gretchen Syfert reports on the "Life Is Wonderful" theme of the 1992 Council for Better Hearing Month campaign. Jerry Northern performs Past-Presidential duties holding the 1992 poster.

President-Elect Linda Hood presents plaques of appreciation to retiring Board of Representative members Laszlo Stein, Don Worthington, Anita Pikus and John Jacobson.

James Jerger, Editor of the ***Journal of the American Academy of Audiology*** *extends his appreciation to Siemens President John Zei for the continuing support of the* ***JAAA*** *Student Journal program.*

John Jacobson, Editor of ***Audiology Today*** *presents a plaque of appreciation to Jerome Ruzicka of Starkey Labs Inc. for their sponsorship of the Academy Student* ***AT*** *program.*

Jerry Northern presents a bottle of champagne to Missy Hall as a small token for her support of the time and effort Jay Hall put into convention planning.

President Jerry Northern presents a silver commemorative tray to Merle Lawrence on behalf of the Academy while Past-President Fred Bess and President-Elect Linda Hood stand by.

Special Session

Introduction

Frank E. Musiek

Neuroscience is a relatively new term that refers to the study of various brain functions and structure. This area is undoubtedly the fastest growing area of science. When considering the audiological aspects of neuroscience, one is directed to the work in central auditory function and dysfunction. This area is becoming increasingly popular for people interested in the clinical aspects of hearing. Both electrophysiologic and behavioral assessments are available to study various aspects of brain function, whether it be the brainstem, subcortex or cortical areas of the central auditory nervous system.

There are many areas of neuroscience that can help us to understand the clinical aspects of central auditory function. Conversely, there are various aspects of audiology that provide important information about the central auditory nervous system which can benefit the basic sciences. Therefore, a link between audiology and neuroscience can be established which will profit both areas. This special session at the 1992 AAA meeting attempts to relate clinical and basic aspects of auditory neuroscience for those interested in enhancing their knowledge of hearing and the brain.

"Auditory Neuroscience: Decade of the Brain"

Neuroplasticity of the Adult Primate Auditory Cortex

Mitchell Schwaber, School of Medicine, Vanderbilt University

Introduction

A common feature of sensory cortex is the presence of an orderly, topographic representation of peripheral receptors. This topographic representation undergoes organizational changes in response to sensory deprivation. This is called plasticity and has been demonstrated in the visual, somatosensory and auditory cortices. Neurotologists are primarily interested in auditory neuroplasticity, as this information may relate to the abnormalities and deficits found in patients with a hearing loss.

The vast majority of animal studies in auditory neuroplasticity deal with the changes that occur in the auditory structures of the brainstem following the creation of either a cochlear or conductive hearing loss. In 1989, Robertson and Irvine reported that the primary auditory cortex undergoes changes in frequency organization following the creation of a partial unilateral deafness. In these experiments, a lesion was mechanically created in the cochlea of a guinea pig. The auditory threshold was determined using tone burst stimuli to elicit the compound action potential. In most cases, a narrow band of frequencies was deafened by the mechanical lesion. Between 35 and 81 days after the lesion was created, the contralateral auditory cortex was tonotopically mapped using conventional multicellular mapping techniques. The area of cortex where the lesioned frequency range would normally be represented was found to be responsive to adjacent, intact frequencies. In other words, frequencies represented in the adjacent cortex expanded to occupy the deprived cortex.

In 1991, Recanzone et al. reported that adult owl monkeys were trained to discriminate frequencies, then to perform a tactile task for a reward. After training, the monkeys were anesthetized and the auditory cortex was tonotopically mapped. The area of cortical representation for frequency in the trained monkeys was two to eight times larger than the same area in the control animals.

Harrison et al. (1991) recently reported that newborn kittens were deafened to high frequency tones by using the ototoxic aminoglycoside amikacin. Tone-burst-elicited ABRs were used to determine which frequencies were deafened. After the kittens reached adulthood, the auditory cortex was mapped, and extensive reorganization was found. The deprived cortex became responsive to the highest frequency that remained intact. For example, if 6 kHz was the highest frequency that demonstrated ABR responses, the area in the cortex that would have been responsive to 7 to 30 kHz tones was now responsive to 6 kHz.

We have performed a series of experiments in adult Rhesus monkeys to determine the extent of reorganization of the tonotopic map that occurs in the primary auditory cortex following the development of a high frequency sensorineural hearing loss. The purpose of this paper was to report our studies

and discuss the potential clinical implications of our findings. The tonotopic map of the auditory cortex in adult primates undergoes extensive reorganization following the development of a circumscribed cochlear hearing loss.

Experimental Data and Discussion

Macaque monkeys were used because the auditory cortex of this species closely resembles that of humans. In these monkeys, the auditory cortex was surgically exposed and 15 to 20 penetrations of micro-electrodes were used to characterize the frequency representation of the auditory cortex. This procedure was done before and after the creation of cochlear hearing loss.

The cochlear hearing loss was created by using kanamycin and furosemide resulting in a hearing loss of above 8 kHz. The frequency and the degree of the hearing loss was obtained by using short-latency auditory evoked potentials. Frequency-specific measurements, starting from 500 Hz to 30 kHz, were obtained. After the hearing loss was created, neuroplastic reorganization was allowed to occur during a period of 80 to 90 days. The monkeys were then reanesthetized and tonotopic mapping of the auditory cortex was repeated.

Immediately after the creation of the hearing loss, a region of deprivation occurred that had previously shown activity (approximately 10 to 30 kHz). After allowing neuroplasticity to occur, the region that was in the high frequency band was now responsive to frequencies in the range of 6 to 8 kHz. The reorganized cortex extended approximately 2.25 mm, so that much of the deprived area was responsive to this 6.8 kHz stimulation. The normal or low frequency region of the cortex appeared to be unaffected by neuroplastic reorganization.

Coding in the Primary Auditory Cortex: Relation to Perception and Pathology

Dennis P. Phillips, Dalhousie University

The primary auditory cortex is the central field in a cluster of territories that make up the cortical auditory system. The afferent pathways feeding into the primary field preserve the cochlea's place code for tone frequency. In the cortex, this place code is expressed in the form of strip-like assemblies of nerve cells. Within each strip, neurons derive their most sensitive excitatory input from the same cochlear place (i.e., they are tuned into the same tone frequency). Cells within such an iso-frequency strip differ in their other properties, notably their sensitivity to sound location or signal band width. It is believed that the neural pathways feeding into these strips are largely independent, and therefore they represent frequency-specific processing channels within which the coding of other stimulus dimensions takes place. Thus, cats that have been surgically deprived of a single iso-frequency strip are able to localize sounds of all frequencies except the one that has no cortical representation.

A topic of recent interest concerns the ability of cortical cells to encode the temporal properties of sounds. A useful distinction has been recognized between the steady-state, periodic content of a sound (e.g., periodic modulations or other highly repetitive events) and the transient content (e.g., abrupt, aperiodic discontinuities in the stream of sound). The steady-state periodicities can give rise to a pitch percept that is based largely on glottal pulse rates. The transient content of sounds forms part of the basis for perceptually resolving them as temporally discrete.

Recent studies of cortical neurons have shown that they have a poor steady-state temporal response. They are virtually incapable of encoding any kind of periodicity above the range of 50 to 100 Hz. This response is poorer than that seen in the auditory nerve and brainstem, where neurons can encode periodicities in excess of 2 kHz. In contrast, cortical neurons have an excellent ability to encode time-transient stimulus events; the temporal precision of these responses (i.e., the jitter in response to timing) is usually better than 1.5 ms, and often better than 0.5 ms. This precision is comparable to that seen in the cochlear nerve and probably is sufficient to support perceptual temporal resolution at the limits of behavioral performance.

Because the primary auditory cortex has selectively preserved the coding of transient stimulus times, questions arise about the kinds of auditory perceptual deficits to be expected in patients with cortical pathology. There is encouraging preliminary evidence that the physiological data might map quite well onto the behavioral data from impaired listeners. Thus, patients with lesions of the auditory cortex frequently retain the ability to distinguish male from female voices--a perceptual dimension arising largely from signal periodicity that the cortex can only poorly encode. In contrast, the same patients often show impoverished performance on tasks requiring the coding of transient event times.

A point to emerge from these analyses concerns "temporarily processing." There is a long history of clinical and experimental evidence implicating the temporal lobes of the brain in auditory temporal processing, especially as it pertains to speech reception. There is increasing recognition, however, that the speech signal contains many levels of temporal content (e.g., pitch of the voice, grain of the transient events, intonation contours, temporal order). Perhaps the neural representation of these temporal features of the speech signal occurs in different cortical regions. If this is the case, then focal brain lesions might result in a relatively selective loss of any one of these levels of temporal processing. This is an empirical question which remains to be answered definitively.

Neurotransmitters in the Auditory System

Frank E. Musiek, Dartmouth Hitchcock Medical Center

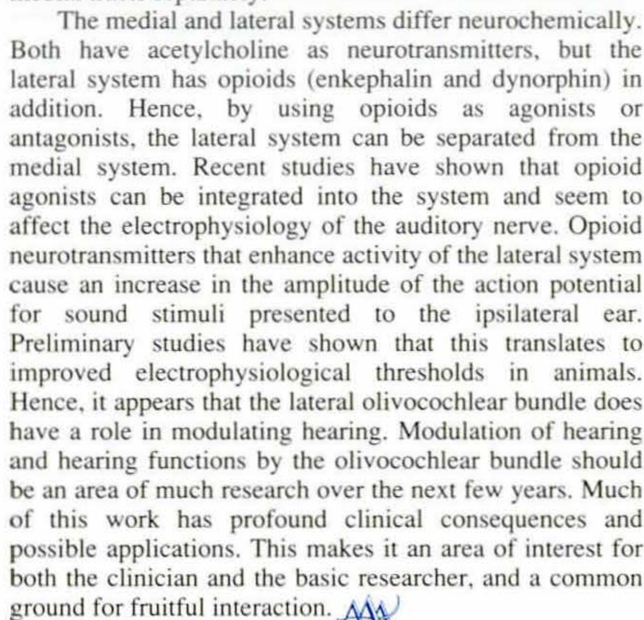
The primary manner of communication in the nervous system involves neurons relaying information to adjacent neurons. This activity, called neurotransmission, is accomplished by neurotransmitters. At one end of the typical nerve cell there are structures called terminal, or synaptic, buttons. These synaptic buttons connect either with dendrites or directly with the cell body of another nerve cell. The synaptic buttons transmit a chemical, called a neurotransmitter, that is released by vesicles located in the synaptic button of the presynaptic neuron. These neurotransmitters bridge the space between the pre- and postsynaptic neurons, the synaptic cleft. The postsynaptic neuron possesses receptors that receive the neurotransmitter once it crosses the synaptic cleft. If the molecular structure of the receptor neurotransmitter is compatible with the neurotransmitter released into the synaptic cleft, then the nerve cell is activated and information is transmitted from one nerve cell to the other. Hence, when the neurotransmitter and receptor match, an agonistic type of activity takes place and results in activation (excitation). However, if a neurotransmitter in the presynaptic terminal does not exactly match the receptor's criteria, then an antagonistic effect results and the transmission is either blocked or extremely reduced. These agonist and antagonistic processes are basic to auditory neurochemistry.

Although knowledge is increasing about particular neurotransmitters in the auditory system, there is more information available about neurotransmission in the musculoskeletal system. In this system, many of the transmitters are well defined; the best known is acetylcholine. In recent years, there have been many advances in the understanding of the neurotransmitters in the afferent and efferent auditory systems. However, it is not clear which neurotransmitter acts in the cochlea, although most of the evidence points to glutamate. The neurotransmitters in the brainstem are better defined and are excitatory and inhibitory. These neurotransmitters provide a basis for neurochemical interactions that enhance or suppress various types of impulses as they ascend the auditory pathways. Recent studies have shown specific types of excitatory and inhibitory responses segregated into ipsilateral and contralateral pathways. This suggests that very specific chemical activities have segregated anatomical correlates in the auditory brainstem.

One of the most interesting areas of auditory neurotransmission involves the olivocochlear bundle. The olivocochlear bundle is one part of a much larger efferent system that starts at the cortex and descends to the hair cells in the cochlea. The olivocochlear bundle, which is divided into two main zones (medial and lateral), is found in the caudal most pons. The medial zone originates around the medial superior olive, and the lateral zone originates around the lateral superior olive. The medial zone is a contralateral pathway leading to the contralateral cochlea and the lateral zone is an ipsilateral pathway. A number of studies have shown that at least one function of the olivocochlear bundle is inhibitory. Either by electrically stimulating the olivocochlear bundle via the fourth ventricle, or by activating it with low-level noise in the contralateral ear, the action potential amplitude of the VIIIth nerve is reduced. There have also been studies showing that an animal's performance for signal in noise detection improves when the olivocochlear bundle is activated.

The connections from the medial track directly to the outer hair cells imply that the motility of the outer hair cells may be receptive to input from this system. This process may influence the mechanics of the basilar of the membrane via this outer hair cell motility. Although theories about the medial olivocochlear bundle exist, little is known or even theorized about the function of the lateral olivocochlear bundle. This efferent pathway connects to the nerve fibers ascending from the inner hair cells. One of the major problems in understanding the function of the lateral bundle is the difficulty of activating the lateral and medial tracts separately.

The medial and lateral systems differ neurochemically. Both have acetylcholine as neurotransmitters, but the lateral system has opioids (enkephalin and dynorphin) in addition. Hence, by using opioids as agonists or antagonists, the lateral system can be separated from the medial system. Recent studies have shown that opioid agonists can be integrated into the system and seem to affect the electrophysiology of the auditory nerve. Opioid neurotransmitters that enhance activity of the lateral system cause an increase in the amplitude of the action potential for sound stimuli presented to the ipsilateral ear. Preliminary studies have shown that this translates to improved electrophysiological thresholds in animals. Hence, it appears that the lateral olivocochlear bundle does have a role in modulating hearing. Modulation of hearing and hearing functions by the olivocochlear bundle should be an area of much research over the next few years. Much of this work has profound clinical consequences and possible applications. This makes it an area of interest for both the clinician and the basic researcher, and a common ground for fruitful interaction.



Suggested Readings

1. Harrison R, et al. Reorganization of auditory cortex after neonatal high frequency cochlear hearing loss. *Hear Res* 54: 11-19, 1991.

2. Musiek F, Hoffman D. An introduction to the functional neurochemistry of the auditory system. *Ear Hear* 11:395-402, 1990.

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Position Statement

The American Academy of Audiology was invited to submit a statement to a public meeting held in Washington, D.C. on May 18, 1992 regarding the development of clinical practice guidelines for the diagnosis and treatment of otitis media in children. The guidelines are under development by a panel nominated by the Consortium (American Academy of Pediatrics, American Academy of Family Physicians, American Academy of Otolaryngology-Head and Neck Surgery) in conjunction and under contract with the Agency for Health Care Policy and Research representing experts and consumers involved in research, treatment, and advocacy relating to otitis media in children. The panel is chaired by Sylvan E. Stool, M.D., a pediatric otolaryngologist from the Children's Hospital of Pittsburgh.

The Academy statement was prepared by a Presidential Advisory Committee, consisting of Marion Downs (Chair), Judith Gravel, and Terese Finitzo. The document was reviewed and critiqued by Noel Matkin, Deborah Hayes and Jerry Northern and approved by the Academy Executive Council. Judith Gravel presented the statement in person on behalf of the Academy.

Public Meeting on Clinical Practice Guidelines for the Diagnosis and Treatment of Otitis Media in Children

May 18, 1992, Washington, D.C. The **American Academy of Audiology,** representing nearly 4,500 audiologists in the United States, appreciates the opportunity to state our position regarding the diagnosis and treatment of otitis media in children.

We are convinced, from careful analysis of the voluminous research available, that a causal relationship does exist between communication disorders and early, recurrent, episodes of otitis media in infants and young children. Accordingly, we feel it is important to participate in this public meeting regarding the development of clinical practice guidelines for the diagnosis and treatment of this pathology and hearing disorder. Our Academy believes that while the disease process itself must be medically and surgically managed by physicians, the identification, assessment and management of any concomitant hearing loss falls within the scope of audiologic practice.

The American Academy of Audiology considers that developmental deficits in communication and behaviorial/attention problems experienced by some children with recurrent otitis media are, for the most part, auditory-based. There is increasing evidence that the age of onset, as well as the nature, degree, and configuration of the peripheral conductive hearing loss which occurs secondary to otitis media, are critical components that place children at risk for developing communication and learning disorders. Early identification and management of hearing loss associated with otitis media is important for optimum developmental outcome. Thus, any Clinical Practice Guidelines developed for the diagnosis and treatment of otitis media in children, must specifically include audiologic assessment and management as integral components.

It is not the degree of hearing loss alone that is an issue, but the intrinsic nature of the conductive hearing loss associated with otitis media and middle ear effusion particularly when it occurs in early life. The hearing deficit is characterized as fluctuant; that is, existing only during the duration of the otitis media episode. At resolution, or between otitis media episodes, hearing presumably returns to the "normal" range. Therefore, hearing sensitivity may vary within the same episode of otitis media, as well as between episodes within the same child; the actual number of episodes the child experiences within a particular time period is an additional consideration. Finally, asymmetries in hearing sensitivity may exist between the child's two ears, thereby potentially disrupting critical binaural auditory processing skills.

The Academy believes that there is sufficient evidence to suggest that the auditory deficits associated with otitis media are far more than what is often termed a "simple problem of attenuation".

Indeed, it is these fluctuations of hearing during sensitive developmental periods which are considered by some to be the root of an insidious process: the lack of development of a stable auditory base which normally serves as the very

foundation of communication and attention behaviors.

Furthermore, we believe that some children with early language delay may not "catch up" with their non-otitis media peers as they mature. We recognize the controversy over the research on language sequelae of otitis media in the child whose potentially best language function may not be just "normal", but should actually be superior. It is possible that if we ignore the potential language sequelae of otitis media in this population, we are condemning to mediocrity a population of children who should be most promising of high attainment.

Through otoscopic inspection alone, or even when otoscopy is supported by tympanometry, it is not possible to ascertain the degree of hearing deficit associated with any given episode of otitis media. Thus, audiometric evaluation is the only means of determining hearing sensitivity. Because hearing sensitivity is directly related to communication ability, routine audiometric assessment is necessary to identify children who require aggressive management to maintain their hearing within normal limits.

Recommended Audiologic Guidelines

Therefore, the American Academy of Audiology recommends the inclusion of the following principles in the Clinical Practice Guidelines:

1. That the **identification** process include screening of hearing, middle ear function, and communication development, particularly in "at-risk" populations. Such groups would include infants who develop otitis media at or before the age of six months, infants and young children cared for in multi-child day care settings, and infants and children with known risk factors such as those with cleft lip or palate, native Americans, or those with Down Syndrome.

Children who have had middle ear effusion which persists for three months despite medical treatment, should be given monitoring hearing screenings, routine tympanometry, and language and speech screening. Those children who fail any of these screening procedures should be referred for complete assessment with in-depth testing. Those children for whom communication skills are found to be delayed or abnormal, may need more assertive medical attention, and possibly appropriate communication therapy from a certified/licensed speech-language pathologist.

2. The **assessment** process should include complete audiologic evaluation to characterize the audiometric profile including the configuration and degree of hearing loss for each ear independently using air and bone-conduction testing. In addition, it would be appropriate to include speech audiometry tests of speech thresholds and word recognition abilities (including higher-order auditory processing capabilities when indicated), acoustic immittance assessment, and a formal language screening of the child's receptive and expressive language abilities. Children failing this screen should be referred to a certified/licensed speech-language pathologist for a formal comprehensive evaluation and for the determination of the need for therapeutic intervention.

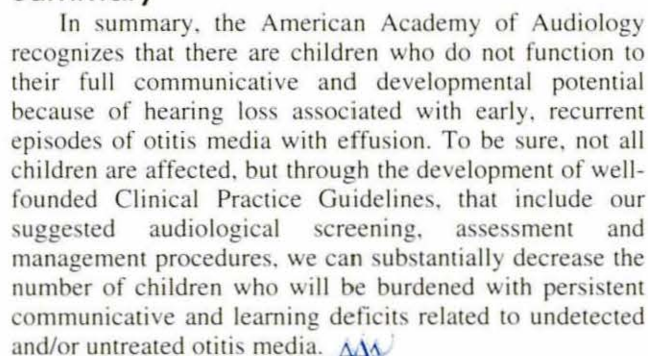
3. Audiometric monitoring of hearing sensitivity should be a routine component of the **management** process. Children having documented histories of otitis media and accompanying hearing loss should receive periodic hearing evaluations by a certified/licensed audiologist even when they appear to be symptom-free. In particular, hearing assessment should be completed at the onset of the school year in pre-school and elementary students, and at least once during the winter months.

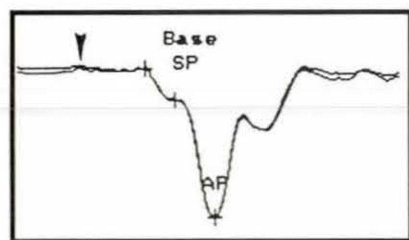
The **management** of infants and young children with otitis media must further include parent/caregiver and teacher awareness of the implications of hearing loss on the communication process. We concur with the 1984 American Academy of Pediatrics position statement that parents should be informed that a child with otitis media may not hear normally. We also agree with the American Academy of Pediatrics statement that any child whose parent expresses concern about whether the child hears, should be referred for behavioral audiometry without delay.

Additional management considerations might include (a) the provision of information on optimizing auditory-based communication strategies during bouts of otitis media when hearing sensitivity might be compromised; (b) the monitoring of auditory behaviors which might signal subsequent episodes of otitis media; and, (c) suggestions for optimizing the classroom environment for all children who might experience "minimal fluctuant hearing loss" through the reduction of classroom noise and/or the provision of soundfield amplification systems.

Summary

In summary, the American Academy of Audiology recognizes that there are children who do not function to their full communicative and developmental potential because of hearing loss associated with early, recurrent episodes of otitis media with effusion. To be sure, not all children are affected, but through the development of well-founded Clinical Practice Guidelines, that include our suggested audiological screening, assessment and management procedures, we can substantially decrease the number of children who will be burdened with persistent communicative and learning deficits related to undetected and/or untreated otitis media.





Techniques

Electrocochleography: What and Why

John A. Ferraro

Electrocochleography (ECochG) - What: the general technique of recording the stimulus-related, electrical responses of the organ of Corti and auditory nerve. Why: because they're there and we can! In addition, and since scientific curiosity is generally an unacceptable rationale to third party payers, the results of ECochG may be very helpful in the diagnosis, assessment and monitoring of certain otologic/neurotologic disorders or conditions.

The evolution of ECochG as a clinical tool in audiology/neurotology exemplifies the old adage "what goes around, comes around." Indeed, attempts to record the electrical responses of the human cochlea to sound date back almost to the time of the discovery of the cochlear microphonic (CM) by Wever and Bray in 1930 (Fromm et al., 1935; Andreev et al., 1939; Perlman and Case, 1941; Lembert et al., 1947; Lempert et al., 1950). In 1960, still prior to the discovery of the Auditory Brainstem Response (ABR), Ruben and his colleagues recorded the whole-nerve action potential (AP) of the human auditory nerve. The summating potential (SP) of the cochlea, first reported by Davis et al. (1950) and von Bekesy (1950) has received comparatively little attention in humans until recently. Despite the knowledge of these potentials and the capabilities to record them from humans, ECochG did not achieve popularity as a clinical tool until the discovery and subsequent development of the ABR in the early-to-mid 1970's. The widespread acceptance and application of the ABR, as well as the relative ease with which it can be recorded, has led to renewed interest in other auditory evoked potentials (AEPs), and those recorded via ECochG are certainly among these. By 1988, approximately one in four audiologists surveyed was using ECochG clinically (Jacobson et al., 1988), and this figure has continued to grow since then.

The early applications of ECochG were restricted primarily to the identification of hearing loss in "difficult-to-test" populations (e.g., Cullen et al., 1972). At about this same time, however, the ABR appeared on the scene and subsequently overshadowed ECochG when used for audiometric purposes. The apparent reason for this was that the ABR was easier to record. That is, there was no evidence that wave V (ABR) was more sensitive than N1 (ECochG), but ECochG recordings were made either from the promontory or the tympanic membrane, while the ABR could be recorded with surface electrodes on the scalp.

The difficulty in recording ECochG components compared to other AEPs, and the choice of recording sites continue to be important factors in the clinical use of ECochG to this day. Ruben, et al. (1960) obtained their recordings either from the round window or directly from the exposed auditory nerve in patients undergoing ear surgery. Although direct nerve recordings are still appropriate for certain ECochG applications, the employment of signal averaging techniques now allow us to measure responses from sites remote to their generator(s). Approaches to achieving non-surgical recordings have evolved along two paths, each with its own advantages and disadvantages. The first of these is the "transtympanic" (TT) approach, which involves penetrating the tympanic membrane (TM) with a needle electrode to record either from the cochlear promontory or the round window. TT techniques were pioneered in the late 1960's in Europe (Aran and LeBert, 1968) and Japan (Yoshie et al., 1967), and continue to be preferred especially by European electrocochleographers. The other general approach involves obtaining recordings from sites peripheral to the middle ear, such as the TM itself, or the external ear canal. Early descriptions of "extratympanic" (ET) approaches to recording cochlear and auditory nerve potentials also appeared in the late 1960's (Sohmer and Feinmesser, 1967). In 1972, Cullen et al. described the use of a wick electrode resting on the TM to record human auditory nerve action potentials, and in 1974, Coats introduced a silver, ball-tip electrode designed to rest on the surface of the ear canal. Throughout the following decade, several varieties of ET electrodes were described/introduced and some of these even became commercially available (including the Coats electrode or "eartrode"). In 1987, 15 years after Cullen's et al. study, Stypulkowski and Staller described a new TM electrode, and this helped to redirect interest back to the TM as the most appropriate site for ET ECochG recordings. Thus, what goes around, indeed comes around. Figure 1. displays four different electrodes which are currently being used for ECochG.

As mentioned above, there are advantages and disadvantages to both TT and ET approaches to ECochG and these tend to be mirror images of each other. That is, the primary advantage of the TT method is that the

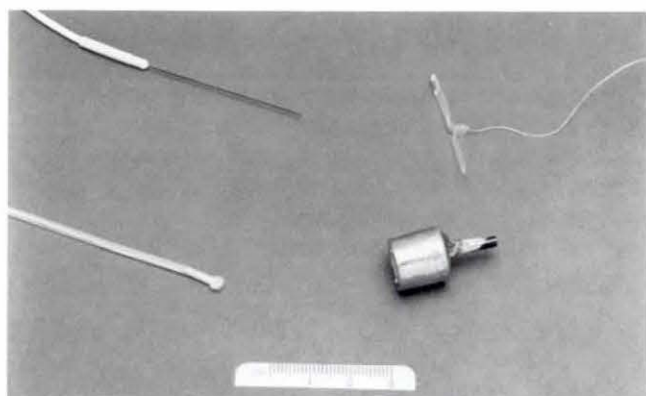


Figure 1. Various electrodes used for ECochG: transtympanic, needle electrode (upper left); ear canal, leaf electrode or "Eartrode" (Coats, 1974) (upper right); tympanic membrane electrode or "Tymptrode" (Stypulkowski and Staller, 1987; Ferraro and Ferguson, 1989) (lower left); ear canal, ear plug electrode or "Tiptrode" (lower right).

electrode is located much nearer to the response generators. This produces a very favorable signal-to-noise ratio (SNR), resulting in large, stable and repeatable responses signal averaged from a relatively small number of samples. On the other hand, the major disadvantage of ET ECochG is that the primary electrode is more remote to the generators, resulting in a much less favorable SNR. ET responses are thus smaller in amplitude and less stable/repeatable than TT responses, and require a larger number of signal averaged samples for adequate definition/resolution of components. The primary disadvantage of TT techniques is that they are invasive, whereas the primary advantage of ET techniques is that they are not. Thus, TT applications are limited to a medical setting and must be performed with the involvement of a physician. In addition, the TM must be anesthetized and perforated, which is not accomplished without at least some degree of patient discomfort. ET recordings can be made by non-medical personnel without medical supervision, there is no need for sedation/anesthetics and, if done correctly, it shouldn't hurt!

The choice of approaches for ECochG depends on several variables, some of which are irrelevant to the actual purpose or outcome of an examination. That is, whether one selects to record ECochG transtympanically or extratympanically may depend more on where you work, and whom you work with/for, than on the nature of the responses obtained from each method. For example, it is generally easier for an audiologist working directly with an neurotologist to routinely use the TT approach. On the other hand, an audiologist in private practice may be limited to the ET approach if the services of a neurotologist are not readily available. In my experience there are indeed applications/conditions where the TT approach offers distinct and undeniable advantages. However, it is often the case where very useful, and sufficient recordings can be obtained from the tympanic membrane or even ear canal — non-invasively and painlessly. The methodology associated with both TT and ET ECochG, and examples of the applications for each technique will appear in this series in subsequent issues of *Audiology Today*.

Certainly the most important factor in the acceptance and application of ECochG as a clinical tool, has been its value in providing relevant and reliable clinical information. This value has been especially well documented for the following applications (i.e., here's really "why" we do it clinically (adapted from Ruth et al., 1988):

1) the objective identification, monitoring and assessment of Méniere's disease and endolymphatic drops;

2) the enhancement of wave I of the ABR to facilitate the identification of the I-V interwave interval in the presence of hearing loss, or less than optimal recording conditions;

3) the monitoring of cochlear and auditory nerve function during surgery to improve the pathologic status of the ear and/or surgery that places the ear at risk for permanent damage. Of the three general applications for ECochG identified above, the first one is currently the most popular in the clinic. A positive electrocochleogram for endolymphatic hydrops is characterized by an amplitude-enlarged SP, especially in comparison to the whole-nerve AP of the auditory nerve. Although this finding is now well-documented, its rationale remains unclear. (Figure 2)

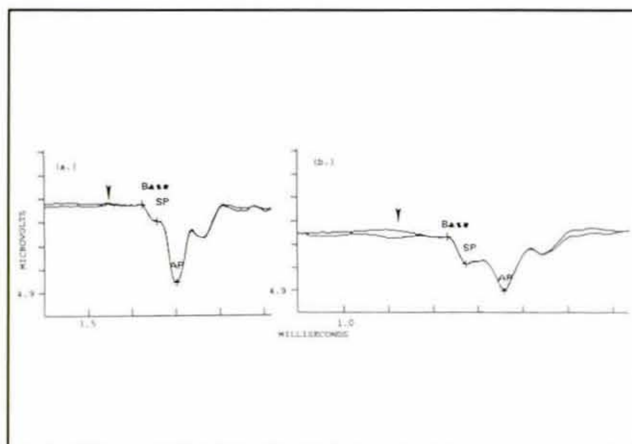


Figure 2. (A) Click-evoked ECochG tracings recorded transtympanically from a normal subject. (B) Electro-cochleogram from a Méniere's patient showing enlarged SP and SP/AP amplitude ratio. SP = Summating Potential, AP = Action Potential. Arrow indicates click onset. Base = reference for measuring SP and AP amplitudes.

So now you have a general idea of what ECochG is and why we do it. In following issues of *Audiology Today*, you'll learn how to acquire and use (even make) ECochG electrodes, and how to perform and interpret an examination. The final article in this series will focus on the clinical applications of ECochG identified above, supplemented with case studies. The purpose here is not only to tell you what, why and how, but also to facilitate continued interest and application of a valuable clinical tool. ECochG gives us a window to the physiology and pathophysiology of the peripheral auditory system. Looking into this particular window may not be very easy compared to others, and we may not always recognize what we see when we do look in, but that shouldn't stop us from learning how and why to keep looking.

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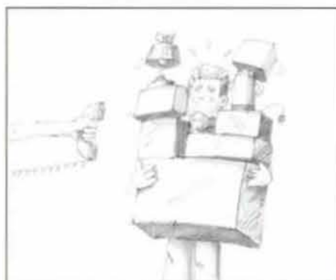

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Update

Fallacies and Foibles in Hearing Conservation

David M. Lipscomb
Contributing Editor

Abstract

A group of commonly held and frequently expressed concepts are listed. The reader is cautioned that all of the cited concepts in hearing conservation can be invalid, at least, in certain important circumstances.

Assumptions form the core of a hearing conservation professional's knowledge. When those assumptions are based upon solid, consistent information and experience, the work of the professional is enhanced. If, however, assumptions are not valid, the misleading idea inhibits appropriate action. The following list of 23 "fallacies and foibles" (F/F) is offered to illustrate the problems we face in proffering hearing conservation activities and services. Some of the erroneous ideas or misapplication of concepts stem from downright wrong information. Others are not inherently invalid – but in certain significant applications, the concept does not work. The intent of this paper is to identify common misconceptions this author has encountered or employed throughout more than three decades of efforts in hearing conservation.

Area I: The hearing conservation program (HCP)

F/F #1: Our HCP is comprehensive.

To meet the test of comprehensiveness, a HCP must:

1 - identify persons who are potentially at risk for noise-induced hearing impairment;

2 - abate noise at the source when economically and technically feasible; and

3 - protect "at risk" employees.

All three of the above steps are integral to a comprehensive HCP. Unfortunately, many HCP's consist of less than the full complement of phases requisite to compliance with applicable regulations.

F/F #2: We have hired outside consultants to assure that our HCP is adequate.

Numerous persons drawn from a multitude of backgrounds have begun to represent themselves as "hearing conservation specialists." In most instances, the vendors are credible and have appropriate training to serve in their stated capacity. When persons have a limited background with no appropriate training or credentials for the work they aspire to accomplish, their contributions will be commensurately limited.

One recommendation: Check the credentials of vendors of hearing conservation services. Depending on the type of consultation or work being offered, the credentials change:

A person offering to "control the noise" should be a certified Professional Engineer (PE).

Hearing testing services should be overseen and coordinated by a person with American Speech & Hearing Association Certificate of Clinical Competence in Audiology.

For one who offers comprehensive services in hearing conservation, full membership in the Acoustical Society of America is an appropriate requisite.

Board certification in an appropriate medical specialty should be held by medical consultants.

It is essential to assure appropriate interface between in-house personnel and vendors. Proper lines of communication and full understanding of the hierarchy of command facilitates the work of all personnel involved.

Area II: Noise exposure analysis

F/F #3: To be effective, one doesn't need to understand dB scaling and manipulation of sound level data.

Competence in acoustical descriptors doesn't require rocket scientist level of mathematical ability. However, grasp of the fundamentals is essential to facilitate services, particularly in regards to assessment of noise exposure conditions. Determination of risk necessitates adequate ability to calculate combined noise exposures and to estimate potential for over-exposure to noise (cfr Lipscomb, 1988, pp. 35-44).

Facility with the dB scale allows one to evaluate and correctly apply results of sound surveys. Further, it increases the acumen of a person reviewing claims and noise control estimates. If, for example, a noise control engineer estimates that for a certain fee, the noise power level will be cut in half, the knowledgeable person will understand that the engineer is estimating merely a 3 dB reduction in the noise.

F/F #4: We'll meet the letter of the law — that way, our employees will be adequately protected from NIPTS.

None of the occupational noise exposure regulations presently in force in America are "protective" of the hearing for all workers. Depending upon the studies cited, 10% or more of the work force is "at risk" (Suter, 1988, p.57). Regulations are promulgated for purposes of enforcement of compliance and have never been advanced as being fully protective of all members of the work force.

F/F #5: Dosimetry gives an accurate index of employee noise exposure.

On the surface, the use of dosimetry appears to be the answer to our concerns for accurate and adequate evaluation of personnel noise exposure. Used appropriately, the anticipated value of dosimetry can be realized. Because the equipment utilized to measure individual dose for noise can be variously adjusted, the accuracy of representations from dosimeter-based noise exposure evaluation is open to question. For example, one can set the threshold for the dosimeter to a 90 dB level. That setting causes the unit to consider all the time sound falls below the threshold to be a "no sound" condition. Other settings such as exchange rate (3, 4 or 5 dB), weighting, and integration instructions for the dosimeters can over- or under-state an exposure condition. Microphone placement, sampling technique, and sabotage are additional potential contributors to erroneous sound exposure dosimetry.

F/F #6: A pre-existing hearing impairment increases a person's susceptibility to NIPTS.

A large data base contradicts this stated assumption. Noise-induced permanent threshold shift (NIPTS) is negatively accelerating with time of exposure (Corso, 1976, p.512). Thus, if there were increased susceptibility to further noise exposure, the progression of NIPTS would be positively accelerating.

F/F #7: Susceptibility to NIPTS is a constant.

Individual susceptibility to NIPTS is highly variable. Sources of variability include: (1) variations between individuals; (2) variations within individuals from time to time (health, attitude, etc. contributes to susceptibility to noise- induced hearing impairment); and (3) susceptibility to NIPTS varies between ears. The latter point will be more fully discussed in F/F #21.

F/F #8: When high level sound exposure is intermittent, there is reduced risk to hearing because the ears have a chance to recoup.

This statement is essentially true – IF – the "resting" sound level is sufficiently low to allow recovery. Ward, et al. (1976) defined "effective quiet" as ". .. The highest SPL of a noise that will neither produce a significant temporary threshold shift (TTS) nor retard recovery from a TTS produced by a prior exposure to a higher level. . ." (p.160). Depending upon the types of measures, Ward and his colleagues identified the range around 70 dB (SPL) as "effective quiet". Thus, an exposure to intermittent very high level sound conditions must fall to approximately a 70 dB interval level between peak conditions in order to allow ears to "rest" and recover from higher level sound experiences. An occasional 110dB sound exposure punctuating an 84 dBA environment cannot, under the definition cited above be considered "intermittent".

Area III: Abate the noise to reduce exposure

F/F #9: We don't need a noise abatement program; HPD's and monitoring audiometry will suffice.

Shortly after promulgating the comprehensive OSHA standard, a DOL instruction (U. S. Department of Labor, 1983) specified that noise reduction was required if the sound level approached 100 dBA, and if the cost of engineering controls or abatement procedures cost less than an effective HCP (Stewart, 1988, p. 211). In that case, HPD's should not be considered a final solution to the noise problem. (See also F/F #22.)

F/F #10: Administrative control of noise exposure as a form of noise exposure abatement doesn't work and isn't practical.

Administrative control of work place noise exposure is faced with a number of problems due to labor philosophies and seniority systems. However, moving workers around the plant during a shift has been found to enhance compliance with employee noise exposure regulations. The key to this comparably inexpensive solution to worker noise exposure is creative planning and a high level of labor/management cooperation.

Area IV: Protect the worker: Sub-part 1 - Hearing testing:

F/F #11: We can get away with the "test-em – file-em" policy.

With no follow up, audiometric testing is rendered useless. Inadequate utilization of warning signals seen in audiometric data heightens the future costs in terms of claim handling and potential for employee compensation awards. Of even greater concern to professionals in the hearing health community is the loss of function sustained by the worker. We grieve when a person enters his or her golden years with tin ears.

F/F #12: We'll test hearing when we get around to it.

Current policy provides for OSHA citations if there is a 15 month lag between "annual" tests.

F/F #13: The "baseline" hearing test is the same as the "pre-employment test."

Strictly applied, the pre-employment evaluation of hearing precedes any work conducted by an employee at the job. Defined in the OSHA guidelines (1983), a "baseline" hearing test is the first one obtained within six (6) months of employment. Clear distinction between these two hearing test definitions is advised. Legal

representatives are certain to make the distinction. Hearing test data obtained some time after a person has begun work decreases the veracity of an employer's assertion that the worker entered employment with a pre-existing hearing impairment.

F/F #14: Baseline or annual hearing tests will not be contaminated by temporary threshold shift (TTS) if the 14 hours waiting period is always invoked.

Depending upon the magnitude of sound exposure preceding the 14 hour "rest period" the TTS may not yet be resolved. According to predictive data summarized by Melnick (1984, p.112), a 20 dB TTS will recover in 16 hours. Recovery from a 25 dB TTS takes up to three days. A 45 dB TTS (with residual permanent component) may not stabilize for a week or longer.

A second consideration is that the 14 hour requirement assumes no between shift sound exposure. Afternoon and evening non-occupational noise exposure, second job noise exposure, or even transit noise en route to work can cause contaminating TTS.

F/F #15: NIPTS and presbyacusis (or other etiologies) are "additive".

By definition, permanent sensory hearing impairment is the result of lost sensory hair cells in the cochlea. Further, multiple factors that destroy hair cells have an "additive" effect upon the cochlear sensory hair cell population. The problem with the concept stated as #15 is that loss of sensory hair cells does not directly translate to impairment as indicated by pure tone hearing test results. There is a sizeable body of research (summarized by Lipscomb, et al., 1977) suggesting that pure tone audiometry cannot be interpreted as a direct indicator of the integrity of units of the sensory neuroepithelium in the Organ of Corti.

Corso (1976) discussed the possible "additive" features of NIPTS and presbyacusis. One of the problematic features of such an attempt, according to Corso, involves the progression of hearing impairment. NIPTS is negatively accelerating with time whereas presbyacusis is positively accelerating with age. Essentially, the "crossover" point for the time course of the two etiologies varies both between and within individuals.

Dobie (1989) suggested a mathematical model for apportioning between the relative contributions to a person's hearing thresholds by NIPTS and by presbyacusis. The method utilizes the 1979 American Academy of Otolaryngology method for calculating hearing impairment. By segmenting the percentage of hearing impairment based upon the weight of contributions by each etiological factor, the total percentage of handicap is divided between the two. The intent of this impressive effort is to assist in adjucating claims for occupationally related NIPTS. For the method to be fully utilitarian, one must accept two assumptions: (1) AAO method of handicap assessment is fully reflective of the scope of handicap due to hearing impairment (see also F/F #18); and (2) NIPTS and presbyacusis are additive, not only at the sensory cellular level, but also in audiometric results. At the present time, there is not much support for either assumption.

One must consider that a preceding etiology "overwhelms" the cochlear structures such that a later etiological process has less of the tissue to attack. In the case of a lifetime of chronic noise exposure with resultant NIPTS, two conditions arise: (1) Due to the hearing impairment from noise exposure, a person's hearing condition reaches levels on the presbyacusis scales decades ahead of their time. e.g. a 50 year-old worker with hearing levels equivalent to that of a person 75 years of age.; and (2) When the forces of presbyacusis do begin to act, the integrity of the sensory tissue has already been seriously degraded. Thus, it is questionable that justification for the commonly utilized "presbyacusis adjustment" can be found. The adjustment is made by subtracting the age-related hearing level from a person's hearing impairment.

One common rationale for making the "presbyacusis adjustment" is a misunderstanding of the OSHA guidelines (1983). Appendix F within the standard provides two tables with age appropriate hearing levels (Table F-1 for males and Table F-2 for females). The appropriate use for these data, however, is only to determine whether a Standard Threshold Shift (STS) is the product of noise exposure or of aging. There are no suggestions within the OSHA standard for use of these tables to reduce the amount of a person's hearing impairment as manifest in pure tone audiometry.

F/F #16: NIPTS maximum is about 45 dB for mid-frequencies and about 75 dB for high frequencies.

This statement is one of eight descriptions of NIPTS published by the American College of Occupational Medicine (ACOM) (1989). There are no data to support this contention. Depending upon the severity and duration of noise exposure, the resulting hearing impairment might be less or more than the statement indicates. In over 2100 claims by workers exposed to extreme levels of noise this author reviewed, a high proportion of the persons demonstrated no hearing at the maximum output limits of the hearing test equipment for frequencies 2000 Hz and higher.

If, for example, an entire region of the cochlear hair cell population has been destroyed, (e.g. lowest 10 mm of the cochlea), there will be no response to hearing test stimuli served by the damaged region of the organ of Corti.

F/F #17: NIPTS is always identified by the "notch" at 4k Hz.

The maximum hearing impairment, signified on an audiogram as a "notch" is not always located at 4k. The maximum NIPTS is commonly found at 6k Hz. On less

frequent occasions, the maximum shift is seen at 2k or 3k Hz. The configuration of a NIPTS audiogram is dependent upon the spectral characteristics of the predominant sound during noise exposure.

The "notch" may not be present at all. Later influence of other etiologies may obliterate the typical noise-related hearing impairment configuration. While not exclusive to noise to the extent enjoyed by the "notch" configuration, precipitous high frequency drop (30-40 dB/octave) is often consistent with NIPTS.

F/F #18: AAO% handicap calculation accurately reflects amount of impact hearing impairment experienced.

There is no doubt that the most widely utilized measure of hearing handicap is that proposed by the American Academy of Otolaryngology (AAO) and published by the American Medical Association (1979). There is growing dissatisfaction with the AAO method of hearing handicap assessment. A report from a physician recently stated: "Mr. __________ was found to have 0% hearing handicap according to the AAO method. We have scheduled him for a hearing aid evaluation next week." The incongruity of the two sentences speaks directly to the problems inherent to the currently established handicap index. Of particular note is the fact that NIPTS is predominant in the test frequencies above 3k Hz, frequencies disregarded by the AAO method. Further, the handicap assessment sponsored by the AAO does not presently account for speech sounds missed, distant conversation & background noise interference w/ speech.

Revisions are currently being proposed and will be published in the near future (Lipscomb, et al.). It must be acknowledged that any change in assessment of hearing handicap can have significant financial impacts. Therefore, it is requisite that revisions must be consistent with a well established body of scientific literature.

F/F #19: Anyone with NIPTS will recognize its presence early.

The insidious nature of NIPTS can cause it to "slip up" on a person. Further, TTS masks one's awareness of developing NIPTS. A person notes hearing is shifted at the end of a work day, but the next morning the hearing appears to have recovered to "normal". Unnoticed is the gradual reduction of the "recovered" sense of hearing.

F/F #20: A standard threshold shift (STS) is due to noise exposure in a given industrial worker.

To confirm the above statement, it is necessary to differentially evaluate cause of hearing shift to determine whether it is due to occupational noise, non-occupational noise, or other etiological conditions. The importance of this concept is that a distinct change in a person's hearing (i.e. average 10 dB shift for the hearing test frequencies 2k, 3k and 4k Hz) signifies an etiological condition that must be identified and arrested if possible.

F/F #21: Occupational NIPTS is always manifest as bilaterally symmetrical impairment.

Bilateral symmetry in NIPTS is another of the points made in the ACOM (1989) statement. The assertion may or may not hold. A person may sustain greater sound exposure at one ear than at the other. In fact, it is difficult to conceive that a person will have exactly equal total (damaging) sound exposure for both ears. In addition, there are no data to suggest that the two ears are equally susceptible to NIPTS. For many pathologies, there appears to be a predisposition to greater impact on one ear rather than on both. Meniere's Disease is much more commonly a unilaterally oriented auditory pathology. Sudden hearing loss typically affects one ear and not both. Hyper-lipoprotienemia (HLP), a metabolic disorder that often causes decreased hearing, is commonly noted to influence one ear more than the other. Metabolic or systemic conditions in the body as well as inherent predisposition can lead to one ear being more significantly damaged by noise even in what is considered to be a diffuse sound field noise exposure environment. Further, previous unilateral exposure to sound may predispose that ear to greater NIPTS. As an example, consider a person who drives to work each day with the driver's window open. The sound of traffic and wind noise can shift hearing in the left ear before the work experience begins for that day.

Sub-part 2: Hearing protectors

F/F #22: HPD's can be used as a final solution in most HCP's.

There are a myriad of problems with proper fit and protection afforded by various HPD's (Berger, 1988). It is well known that field use of HPD's results in lower attenuation than laboratory measures for HPD attenuation. Misapplication or misunderstanding of HPD specifications can lead to inappropriate fitting.

One cannot (or should not) assume that no excessive noise exposure will occur in a group of persons in noisy environments simply because HPD's have been issued.

F/F #23: HPD's don't affect a person's ability to hear speech in noise.

The above statement is generally true if the person using HPD's has normal hearing. According to Suter (1989), under the following conditions, use of HPD's may affect speech communication reception:

1 - If the speech signal is reduced by HPD's to inaudible levels;

2 - If the frequency response of the HPD's causes significant frequency distortion; and/or

3 - If the wearer of HPD's has an appreciable high frequency sensory hearing impairment.

Conclusion

Correct knowledge of myriad facets of hearing conservation will assist in avoiding the pitfalls and pratfalls that the list of fallacies and foibles illustrates. The caution to be advanced herein is that there are few absolutes in this, or in any other application area within the hearing health community.

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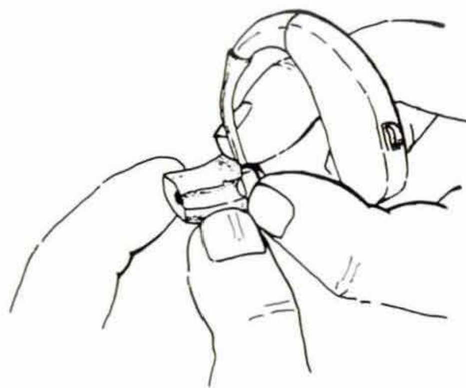

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Tinnitus Maskers

The Incidence of Psychological Dysfunction in a Group of Patients Fitted with Tinnitus Maskers

Martin A. Schechter, John C. McDermott, and Stephen A. Fausti

In the Department of Veteran Affairs' hearing health care delivery system, the issuance of tinnitus masking devices and entry into the formal tinnitus evaluation protocol is restricted to patients who meet service connection standards or other eligibility requirements. It was in attempting to validate these requirements, that an interesting constellation of service-connected disabilities began to emerge. It seemed that in an unusually high percentage of patients undergoing tinnitus masker evaluations, service-connected disabilities for tinnitus were also accompanied by service-connected disabilities for anxiety, neurosis, psychosis, and other confounding conditions of disturbed psychological function, such as Post Traumatic Stress Disorder (PTSD). Of the 35 patients undergoing a tinnitus masker evaluation, 23% were also service-connected for PTSD and 17% for either neurosis, psychosis, or depression.

Summary of *Psychological/ Psychiatric Disabilities Across Groups

	Tinnitus Masker Group N=35	Tinnitus Group N=400	Hearing Loss Group N=400
Number of Patients	14	41	26
Percent	40%	10%	6%

* The range of psychological/psychiatric designations include and are limited to: anxiety neurosis, post-traumatic neurosis, post-stress disorder, schizophrenia, and depression.

Table 1

As a means of elucidating whether this group of patients was unusual in terms of incidence of psychological/psychiatric dysfunction, a comparison was made with a group of randomly selected patients who were service-connected for tinnitus, but had not undergone a tinnitus masker evaluation. Since significant hearing loss is frequently associated with chronic tinnitus, a third group was analyzed which included patients service-connected solely for hearing loss, but with no service connection for tinnitus.

Table 1 summarizes the comparison of the incidence of psychological dysfunction across the three groups of patients. It becomes apparent that the group of patients who received tinnitus maskers displayed a markedly higher incidence of psychological dysfunction when compared with the group service connected for tinnitus and the hearing loss group. Chi-Square analyses were performed which are displayed in Tables 2 and 3. Comparison between the hearing loss group and the tinnitus group revealed no significant differences in the incidence of psychological/psychiatric dysfunction. As displayed in Table 3, when the tinnitus masker group was compared with both the tinnitus and hearing loss groups, however, there appeared a significantly ($p < .001$) higher incidence of PTSD in the tinnitus masker group.

Comparison of concurrent service-connected disabilities for the tinnitus group vs. the hearing loss group.

Service-Connected Disabilities	Tinnitus Group (N=400)		Hearing Loss Group (N=400)		x^2	P
Anxiety Neurosis	17	4.30%	9	2.20%	1.95	≤0.20
Post-Trauma Stress Neurosis	21	5.30%	13	3.30%	1.51	≤0.30
Schizophrenia	3	0.75%	3	0.75%	0	——

Table 2

The question then becomes, why should there be an increased incidence of psychological dysfunction in a group of patients fitted with tinnitus maskers as compared with a group of patients with established histories of tinnitus or hearing loss, who have not been fitted with maskers? Perhaps the perception of tinnitus and its effect on daily life is strongly dependent on an individual's psychological state.

Perhaps the presence of severe tinnitus serves as another negative thread in a dysfunctional emotional tapestry.

Concurrent service-connected disabilities for the tinnitus masker group (N=35) and comparison with the hearing loss (N=400) and tinnitus groups (N=400)

Service-Connected Disabilities	NO.	Percent Of Group	X^2	P (df=2)
Anxiety Neurosis	3	8.57%	3.351	≤0.20
Post-Trauma Stress Neurosis	7	20.00%	16.048	≤0.001*
Schizophrenia	1	2.85%	0.159	0.95

Table 3

Let us assume that two individuals have exactly the same type, degree, and amount of structural pathology within their inner ears. As a logical consequence of this, one might predict that each individual also shares "equivalent sensorineural tinnitus". The term "equivalent sensorineural tinnitus" is used here to describe a theoretical construct of equal neural energy from a dysfunctional or damaged sensorineural source that should result in equivalent perceptions of tinnitus. May one then assume that two individuals with "equivalent sensorineural tinnitus" will perceive their tinnitus in an equivalent manner? It is likely that in many instances the loudness level and the pitch of the tinnitus will be nearly as equivalent as the sensory pathology itself. In other cases, however, there may be a great disparity between two individuals' reports of their tinnitus, although in an objective and as yet unmeasurable way, they possess truly equivalent amounts of "sensorineural tinnitus" or "tinnitus quanta." The degree of annoyance, effect on daily life, and the idiosyncratic perception of tinnitus within a particular psychological context are all separate issues which may prove highly variable from patient to patient.

In an analogical sense, the perception of tinnitus may be very similar to pain perception. Although a pain source may generate equivalent amounts of neural energy, the perception of pain will be mediated or modified by higher level or more central structures. Pain is not viewed within an isolated context, but rather as a response to stimuli, under particular conditions. The response to equivalent stimuli may be highly variable, as in the case of a soldier in battlefield conditions or an anxious individual who focuses on a symptom. Since pain is a subjective experience, it is difficult to extricate the perception of pain from an individual's subjective domain of mood, personality, and cultural influences. Tinnitus may be viewed in a parallel way.

If one accepts the position that chronic pain may be used as a model for chronic tinnitus, the picture of the chronic tinnitus sufferer, may in some cases become clearer.

Consider, for example, an individual who focuses on somatic complaints, or a depressed patient who sees multiple negative forces operating within his daily life. May one not assume, that in some cases, the perception of tinnitus may be amplified by their psychological state? Further, if they can be amplified, perhaps they can be diminished or inhibited by other psychological states. Will tinnitus appear louder, more annoying, and more disabling for the individual who becomes preoccupied or obsessed with the loudness and annoying nature of their tinnitus?

The purpose of this brief retrospective analysis is simply to emphasize the importance of recognizing and assessing the symptom of tinnitus within a complex of individual psychological and social factors which may serve to confound the objective measurement of tinnitus and gauge its impact on daily life.

Although the group of patients who received tinnitus maskers had a higher incidence of psychological dysfunction, it is important to emphasize that the majority of the group had no established psychological/psychiatric disability. It would be grossly inaccurate and unfair to categorize all seekers of tinnitus relief as manifesting some type of psychological disturbance or personality disorder. Additionally, the onset of tinnitus itself may serve as a precipitant of impaired psychological function or increased stress level.

It is also important to note that even in the presence of a specific psychological/psychiatric condition, a particular tinnitus sufferer may respond to the symptom of severe tinnitus in a perfectly "normal" way, which would be to seek tinnitus relief. It is likely the case, however, that there is complex interaction between the perception of the symptom of tinnitus and an individual's pre-morbid (pre-onset of tinnitus) psychological state.

Recognizing the important psychological aspects of both the assessment and ameliorative approach to tinnitus, it may be necessary in some cases, to enlist the support of other disciplines such as psychology, psychiatry, or specialists trained in stress management techniques.

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Phoenix Facts

The 1993 American Academy of Audiology Convention will be held at the Civic Plaza Convention Center in Phoenix, Arizona. To acquaint AAA members with next years meeting site, "Phoenix Facts" will appear in the next four issues of ***Audiology Today****.*

Honky-tonk piano music and gunfights in the streets; jaguars, gorillas and tigers, exotic desert mysteries; the majestic beauty of Arabian stallions...these are just some of the unique attractions Phoenix has to offer. Want to hear more?

If it's the Old West you fancy, step back in time at places like Rawhide where you'll find an authentic re-creation of an 1880's town, complete with gunfights and stagecoach rides.

Discover the wild world of the Phoenix Zoo, the largest non-profit, privately funded zoo in the U.S. Visit the Arizona Exhibit where you'll see mammals, birds and reptiles native to the Southwest. There's also an award-winning 11 acre Children's Zoo on the premises.

You can learn about arid vegetation, including cactus which can survive for as long as 4-5 years without rainfall, when you visit the Desert Botanical Garden. There are 10,000 fascinating desert plants on display. The Garden is a special treat during Arizona's long springtime when the desert produces a dazzling display of colorful blooms.

"Turning Up The Heat"

American Academy of Audiology
Fifth Annual Convention
April 15-18, 1993
Phoenix, Arizona

Sensational visual and performing arts and entertainment abound in the Phoenix area. A sample of what's available would include the Heard Museum (famous for its collection of primitive and modern Native American art), Phoenix Art Museum, Scottsdale Center for the Arts, Phoenix Symphony Hall, Herberger Theater Center, Celebrity Theater, Gammage Center for the Performing Arts (on the campus of A.S.U.), and Blockbuster Desert Sky Pavilion.

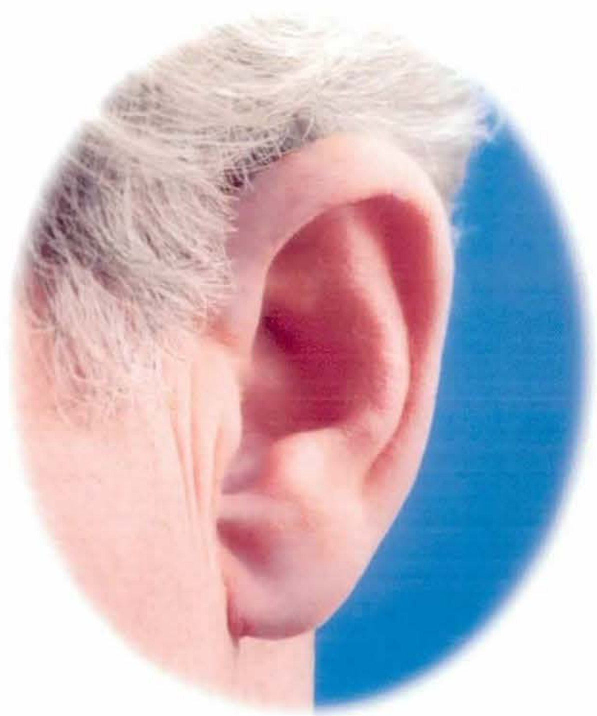
Regarding sports and recreation, year-round sunshine makes outdoor activities a way of life in Phoenix. Professional sports are plentiful throughout the year...The Phoenix Cardinals, Suns, Firebirds, Rattlers, Roadrunners, and A.S.U. Sun Devils all call the Valley of the Sun their home. Major league baseball teams warm up under the Arizona sun during Cactus League spring training. Phoenix International Raceway and Firebird Raceway offer fast track excitement. If it's dogs or horses you prefer, there's Phoenix Greyhound Park or Turf Paradise.

If a shopping spree is on your agenda, the Phoenix area certainly can accommodate! A visit to any one of the following malls is sure to be addicting; Metrocenter, Biltmore Fashion Park, Scottsdale Fashion Square, Scottsdale Galleria, The Borgata, Fiesta Mall, Paradise Valley Mall, el Pedregal.

The next Phoenix Facts column will focus on Arizona attractions, tours and day trips.

Georgine Ray
1993 AAA Convention
Local Arrangements

Beware of programmable hearing aids that offer great technology and too much more.



Others. Trilogy.

Programmable hearing aids represent a big step forward in technology. But when it comes to appearances, some seem to travel backwards in time. Not Trilogy. Besides being the most advanced way to hear well again in a wider variety of listening situations, Trilogy is contained inside virtually invisible canal aids. The type more and more patients are choosing to help discreetly correct a hearing loss. And you'll be pleased at how small the programming task is. Trilogy's simple, intuitive interface is easily learned and fully operational in minutes. When you consider programmable hearing aids, choose the ones that give your patients more of less.

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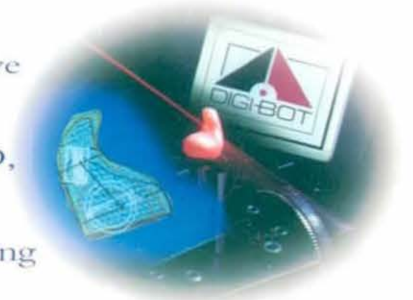

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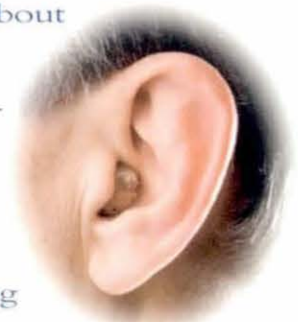

our versatile range of standard instruments and batteries, plus in-house earmold and all-make repair labs. • So if you're tired of hearing lots about breakthroughs and revolutions, try the hearing company that's always more pleased to be hearing from you. **...with the SoftSound™ solution.**

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