

NATIONAL HEARING CONSERVATION ASSOCIATION

31ST Annual Hearing Conservation Conference



Hear the Waves Tampa

February 16-18, 2006

Hyatt Regency Tampa

SPONSORS

**3M Occupational Health & Environmental Safety Division
Bilsom © E-A-R © Howard Leight © Peltor
Quest Technologies, Inc.**

AFFILIATES

**American Academy of Audiology (AAA) • Acoustical Society of America (ASA)
American Industrial Hygiene Association (AIHA) • American Speech-Language-Hearing Association (ASHA)
Benson Medical Instruments • Council for Accreditation in Occupational Hearing Conservation (CAOHC)
National Institute for Occupational Safety and Health / Centers for Disease Control (NIOSH/CDC)**



Spectrum Supplement

CONTENTS

Welcome	3
Committees	3
Outstanding Hearing Conservationist Award	4
Michael Beal Threadgill Award	6
Sponsors and Affiliates	7
Committee & Allied Meetings	8
Exhibit Schedule	8
Silent Auction	8
Sponsors, Affiliates and Exhibitors	10
Conference Program	15
Conference Abstracts	18
Poster Abstracts	23
Conference Presenters	26

THANK YOU TO...

Aearo Company

Student Conference Award Sponsor

American Industrial Hygiene Association

Student Conference Award Sponsor

Bilsom / Howard Leight Industries

Student Conference Award Sponsor
Opening Cocktail Reception Sponsor
Awards Luncheon Sponsor

Bio-logic Systems Corp.

Conference Break Sponsor

E-A-R

Student Conference Award Sponsor
Conference Tote Bag Sponsor

Eckel Industries

Student Conference Award Sponsor

House Ear Institute

Friday Luncheon Sponsor

Quest Technologies, Inc.

Student Conference Award Sponsor

Sonomax

Student Conference Award Sponsor

Westone Labs

Student Conference Award Sponsor

Copyright 2006 by the National Hearing Conservation Association. All rights reserved. No part of the publication may be reproduced or utilized in any form or by any means, electronic or mechanical, including photocopying, recording, or by any information storage and retrieval system, without permission in writing of the publisher, ISSN 1083-7388.

Spectrum is a quarterly publication of the National Hearing Conservation Association, 7995 E. Prentice Avenue, Suite 100, Greenwood Village, CO 80111-2710. The information contained herein is designed to promote action and discussion among members. The information has been obtained from sources believed reliable, and the editors have exercised reasonable care to assure its accuracy. However, the NHCA does not guarantee that the contents of this publication are correct, and statements published do not necessarily reflect the opinion or official position of the NHCA.

Spectrum is available without charge to NHCA members in all categories. Anyone interested in publishing in Spectrum should contact Karen Wojdyla at the national office, or David Byrne or Kevin Michael, Co-Editors.



The National Hearing Conservation Association

7995 E. Prentice Avenue. • Suite 100

Greenwood, Village, CO 80111-2710

303.224.9022 (v)

303.770.1614 (f)

e-mail: nhca@gwami.com

www.hearingconservation.org

WELCOME TO TAMPA

On behalf of the NHCA Executive Council, our Management Firm, and especially, all members of the Program Task Force, I am pleased to welcome you to the greatest annual event in hearing loss prevention. Whether you are here for the first time or the 31st time, we know you will experience a renewed sense of commitment and enthusiasm to carry you through the coming year.

The activities of the next three days include presentations of the latest in hearing loss prevention research and practical tools, and allow opportunities to exchange ideas and business cards with your colleagues. Take advantage of time in the Exhibit Hall, which is replete with products, services, and company representatives, to provide essential information for effective hearing loss prevention program delivery.

In spite of a full schedule of activities, the best resource at this conference is *you*. NHCA's strength is the camaraderie and dedication of its members. Because of this event, information is exchanged, business relationships formed and friendships kindled. *If you aren't yet a member, please accept our invitation to join us.*

Thank you for being here, contributing to yet another successful NHCA conference. And please join me in giving special recognition to all of those who have worked throughout the year to make it happen.

Hear we go again!



Laurie Wells, President

PROGRAM TASK FORCE MEMBERS:

Theresa Schulz - Director of Education, Brian Fligor - Program Chair, Christine Perneti, David Mayou, Elliot Berger, Greg Flamme, Jerry Jensema, Jim Jerome, Lee Hager, Mary McDaniel, Nancy Vause, Rick Neitzel, Sandra MacLean Uberuaga, Steve Eberle, Susan Megerson, Ted Madison, Vickie Tuten, Tressie Waldo

COMMITTEES

■ 2005 – 2006 EXECUTIVE COUNCIL

President: Laurie Wells
President-Elect: John Casali
Immediate Past-President: Ted Madison
Secretary/Treasurer: Vickie Tuten
Director of Communication: Rick Neitzel
Director of Education: Theresa Schulz
Director of Membership: Bob Millier
Member Delegates: Susan Griest,
Michael Santucci
PSO Member Delegate: Orland Purcell
Commercial Member Delegate: Cliff Wolcott
Associate Delegate: Karen Turner
Student Member Delegate: Rachel McArthur

■ EXECUTIVE DIRECTOR

Karen Wojdyla

■ ASSOCIATION ADMINISTRATOR

Sheryl McLandsborough

■ LEADERSHIP ADVISORY TEAM

Ted Madison: Chair
John Casali
James Lankford
Laurie Wells
Elliott Berger – Ex-Officio

■ HISTORIAN

Elliott Berger

■ EDITORIAL STAFF

*David Byrne and
*Kevin Michael, Co-Editors
Ann Anderson
Alberto Behar
*Elliott Berger
John Franks
*Rena Glaser
*Lee Hager
Tom Jaeger
Iris Langman
*Mary McDaniel
Rob Pluta
Carolyn Tolley
Randy Tubbs
*Laurie Wells

*Editorial Board

■ TASK FORCE/LIAISONS

LEGISLATION: Randy Tubbs
NOMINATIONS: John Casali
PROGRAM: Brian Fligor
PUBLIC RELATIONS: David Mayou
PUBLICATIONS: David Byrne
and Kevin Michael

LEADERSHIP ADVISORY TEAM:

Ted Madison

MEMBER SERVICES COUNCIL:

Bob Millier, Chair
Susan Griest
Rachel McArthur
Orland Purcell
Michael Santucci
Karen Turner
Cliff Wolcott

OSHA LIAISON: Carol Stephenson

AAA LIAISON: Mark Stephenson

WEBSITE LIAISON: Rick Neitzel

TASK FORCE ON CHILDREN

AND NOISE: Deanna Meinke

TASK FORCE ON MUSIC-INDUCED

HEARING LOSS: Brian Fligor

ANSI S12: Kevin Michael

ANSI S3: Theresa Schulz

NHCA SCHOLARSHIP

FOUNDATION BOARD

President: James Lankford

Secretary: Rena Glaser

Treasurer: Mary McDaniel

Director: John Casali

Director: Vernon Larson

Student Member: Deanna Meinke

OUTSTANDING HEARING CONSERVATIONIST AWARD

Established in 1990, the Award for Outstanding Contributions to the Field of Hearing Conservation is given to a person whose work is exemplary in our field. It is a pleasure to announce that this year's recipient is Dr. Donald Henderson for his contributions to the evaluation of the effects of noise on hearing and to hearing-loss prevention.

I first met Don Henderson, Director of the Center for Hearing and Deafness, State University of New York at Buffalo, Buffalo, New York some 20 years ago, as an applicant to the doctoral program that he directed. Talking to someone as accomplished as he could have been intimidating, particularly to a young student like me, but he treated me with genuine respect and put me at ease. I ended up studying elsewhere, but we have kept in contact ever since and I never forgot that he, the Director, the Professor, the author of numerous peer-reviewed articles and landmark books on noise-induced hearing loss, recipient of prestigious grants and awards, the super big shot, was interested in what I, an aspiring student and a nobody from Brazil, had to say.

Don Henderson is truly inquisitive. Many more adjectives and superlatives are needed to write about Don and his contributions, but having to start from somewhere, I chose to mention this characteristic that probably helped him get to where he is today. Accomplished and knowledgeable as he already is, still today you cannot fail to notice the spark in his eyes when he is asking you about a new issue, or when he is telling you about something he just learned about physiology, the ear, about the effects of noise, about a country, a movie, about life. Like a child, he is constantly seeking new knowledge. As much as he has to teach, he is also genuinely interested in learning; learning about hearing science as much as about things outside of his job, especially different cultures and their approach to life, their philosophy, their science, and their cuisine.

Being brilliant, poignant, respectful and fun, he has associated himself and collaborates



with the most brilliant peers from all over the world, not only from cognate areas of knowledge, but from other more removed areas, which make his contributions uniquely interdisciplinary. Moreover, he takes the time to teach us the link between his findings in the lab and the real world of hearing health. His contributions usually give us a broad and complete picture of the issues he examines. Let me take some time to talk about those. He obtained degrees in psychology (B.A.) at Western Washington State College in Bellingham, Washington and sensory psychology (Ph.D.) at the University of Texas in Austin; and a Post-Doc at the Central Institute for the Deaf in St. Louis, Missouri. Early in his career, with Drs. Roger Hamernik and Richard Salvi, his closest peers for more than 30 years, Don conducted pioneering research on the physiology of the ear and biological basis of the auditory effects of both continuous and impulse noise. He made the extra effort to educate us and have scientific findings influence policy and regulations through numerous publications, presentations, and his willingness to offer information and advice when asked for help.

In 1975, to try to better understand the advances in the knowledge of the auditory effects of noise and expedite research progress, he organized a symposium on the Effects of Noise on Hearing that brought together leading scientists, clinicians and engineers to Cazenovia, NY. The symposium was so productive that a consensus emerged to reconvene every 5 years. Since then, 6 other meetings were held in the United States, France, Sweden, Italy, England and Canada, and a book containing the presentations followed each of them. Collectively these comprehensive books illustrate the evolution of the understanding of the auditory hazards of noise. No other publications are as essential as these for the hearing loss prevention professional. Don also edited other books on the auditory system that are of equal high quality.

His efforts in examining the effects of high-level noise on the cochlea and the resulting hearing loss led him in the past 10 years to focus on oxidative stress associated with acquired hearing loss and developing techniques and drugs to prevent hearing loss. He and partners share credit for two fundamental discoveries: 1. high-level noise exposure causes oxidative stress which leads to cochlear pathology; and 2. the death or loss of cochlear hair cells is primarily mediated by a highly regulated cell death process—apoptosis. These discoveries have already led to potential pharmacological strategies for preventing noise-induced hearing loss (NIHL) and treating acute acoustic trauma. The research program he directs has already generated three licensed patents, and clinical trials are being conducted by the military for both prevention and treatment of noise-induced hearing loss.

Don's professional experiences include having held the following positions: Professor of the Department of Otolaryngology and Communication Sciences, State Univ. of New York Upstate Medical Center, Syracuse, New York; Acting Dean, School of Human Development, University of Texas at Dallas, Dallas, Texas; Professor and Director, Callier Center for Communication Disorders, Dallas, Texas; Professor and Chairman, Communicative Disorders and Sciences, State University of New York at Buffalo, Buffalo, New York, where he is also the Director of the Center for Hearing and Deafness. There, he also had luck on his side, to be able to count on the help of Carol Altman, who is the behind-the-scenes administrative help that makes it all work.

Throughout the years, Don has shared his knowledge and expertise with numerous organizations, including the Acoustical Society of America; the American

Association for the Advancement of Science; the American Speech, Language and Hearing Association; the Association for Research in Otolaryngology; the National Science Foundation Committee on Bioacoustics; the New York Academy of Science, the Council for Accreditation in Occupational Hearing Conservation (CAOHC), and the National Hearing Conservation Association (NHCA).

As he did in his professional life, in his personal life he associated with the best, brightest and the most caring. Again he was lucky, this time to meet his wife, Terri Henderson, now a retired audiologist who spent most of her career working with hard of hearing/deaf children and their families. She is a lot of fun and shares many of his passions, most importantly the one for life. Don is also very devoted to and proud of his daughter and two sons.

RADM Kenneth P. Moritsugu, M.D.,
Deputy Surgeon General of the United

States once said that "The true measure of a person's life is not merely what he or she accomplished during his brief time on this earth, but rather the manner in which it was done." All that Don has and is accomplishing is done with genuine kindness, humbleness, and respect. For all that, and much more that I was not able to include here, the National Hearing Conservation Association is extremely happy to bestow the Outstanding Hearing Conservationist Award to Donald Henderson, who so thoroughly deserves it.

By Thais C. Morata

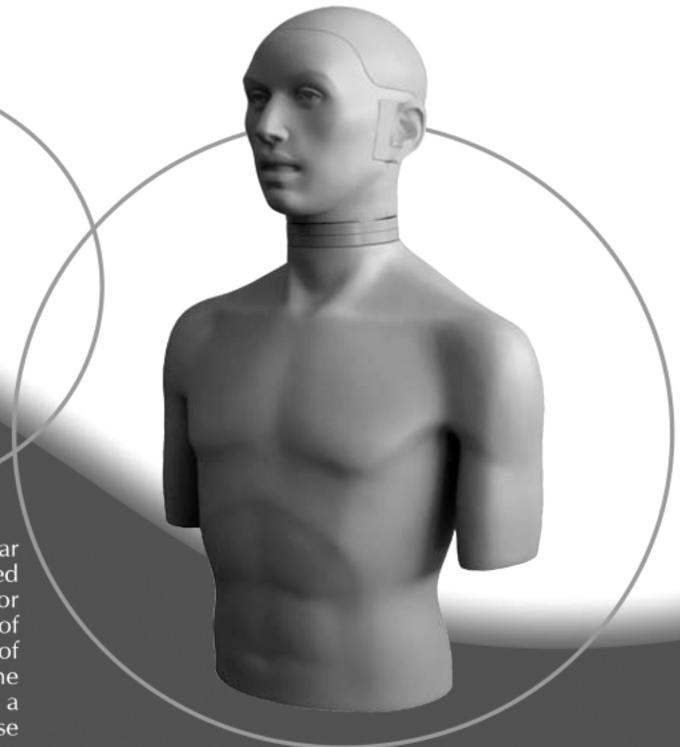
KEMAR MANIKIN

G.R.A.S. Sound & Vibration is pleased to announce the acquisition of the **KEMAR**® product line also known as Knowles Electronics Manikin for Acoustic Research. **KEMAR** is a tool which permits reproducible measurements of hearing instrument performance on the head, and of stereophonic sound recordings as heard by a human listener. **KEMAR** simulates the changes that occur to sound waves as the sound passes a human head and torso, such as the diffraction and reflection heard at each ear. **KEMAR** meets ANSI S3.36/ASA58-1985.

When used with the G.R.A.S. IEC 711 ear simulator it accepts the sound from an external source, such as a hearing instrument or head phones. The 40AG/40AO microphone is used in place of the ear drum to convert the sound to an electrical signal.



The G.R.A.S. IEC 711 ear simulator can also be used without a manikin for pressure response tests of hearing instruments and of hearing instrument earphone receivers. G.R.A.S. offers a range of accessories for these applications.



G.R.A.S.
SOUND & VIBRATION

GRAS NA Inc.
23621 Lorain Road · North Olmsted OH 44070
Toll Free Tel: 800.579.GRAS
Tel: 440.779.0100 fax: 440.779.4148
e-mail: sales@gras.us · www.gras.us

MICHAEL BEALL THREADGILL AWARD

The Michael Beall Threadgill Award was established in 1985 to honor those individuals who have contributed in a significant way to the growth and continuing excellence of the National Hearing Conservation Association by their outstanding commitment of time and effort. In 2006, the NHCA is proud to present this prestigious award to Dr. Randy L. Tubbs.



Whether you call him “Captain,” “Dr.” or just “Randy,” nearly everyone involved in NHCA over the past 20 years has witnessed Randy Tubbs’ dedication to and impact upon our organization. Randy, who holds the rare distinction of having both the titles of “Captain” (in the Public Health Services [PHS] Corps) and “Dr.” (from his Ph.D. at Miami [Ohio] University), is the epitome of a service-oriented NHCA member. After joining NHCA in 1984,

Randy began making technical contributions through his platform lectures, roundtable discussions, and poster presentations. At eight annual NHCA conferences to date, Randy has authored many such contributions, and he is also known as one who offers candid and timely comments during discussions from the floor of the conference. Drawing upon his skills and experiences as a NIOSH Research Scientist, Randy has much to offer the members of NHCA, through his technical expertise and practical experience in hearing hazard risk evaluations.

Going well beyond his technical contributions, Randy has performed yeoman service to NHCA through his efforts in administrative appointments and standing committees. He first became involved with the Executive Council in 1996, when he was elected as Member Delegate. He worked vigorously in that position, promoting the benefits needed by NHCA members and also offering strategies for increasing membership. After serving in that capacity for two years, he was appointed to the NHCA Steering Committee for a three-year stint. And for the past six years, he has served as Legislation Chair, a position in which he continues at present. Throughout all of these service roles, Randy has carried out his responsibilities with professionalism, skill, and a healthy dose of humor. Spanning his tenure on Executive Council, Randy has become known, perhaps singularly, for always submitting a well-written report in advance of the meeting. He also holds the unofficial title of “humorist” for this group, which sometimes takes itself much too seriously in its day-long deliberations.

In his current position at NIOSH, Randy Tubbs has management responsibility for supervising industrial hygienists as well as office personnel. His leadership skills are indeed evident, as his Unit received the 2002 and 2005 citations for the PHS Commissioned Corps Outstanding Unit. Furthermore, in 2002, ACGIH presented his branch (the Industrial Hygiene Section of the Hazard Evaluation and Technical Assistance Branch) with its Meritorious Achievement Award. Based on these leadership accolades in his professional

position, as well as his demonstrated dedication to NHCA through his technical presentations and committee work, there is little doubt that if Randy’s PHS-NIOSH position allowed him to seek officership in professional societies, he would be nominated for the role of President of NHCA. However, there is perhaps some solace in expecting that Randy will have the opportunity to lead NHCA once he ultimately retires from an outstanding career at NIOSH, which now numbers 27 years.

It is particularly noteworthy that Randy’s work has recently been lauded for its accomplishment in ensuring public health and safety. Accompanying his honors and awards from the PHS, example citations include: “exemplary teamwork and scientific evidence in the investigation and control of SARS during the acute public health response, March 14 - July 25, 2005,” “outstanding service to the people of the U.S. in responding to terrorist attacks,” “support of the NIOSH effort in responding to the World Trade Center disaster and the anthrax attack,” and the list goes on. Clearly, this man has worked behind the scenes for many years, quietly helping to establish and maintain a safe public environment.

In the area of hearing conservation, Randy’s work has spanned many occupations and applications, including heavy industry, agriculture, construction, transportation, and disaster response. In fact, in regard to the prominent issue of hearing hazard risks to firefighters and other emergency response personnel, Randy Tubbs, through his seminal research and publications, is essentially the “brand name” to consult. In more recent work, he led the noise exposure evaluations for commuter airline flight attendants in turboprop and regional aircraft, as well as the exposure evaluations for Transportation Security Administration’s baggage screeners at major international airports. The sheer volume of his health hazard risk reports, technical research papers, and presentations on hearing risks and other hazards is quite impressive, numbering over 50 in the past five years alone. Many NHCA members have benefited from these references as resource material in their own research and practice. And anyone who has contacted Randy for assistance with a hearing hazard problem knows that they are met with a friendly voice, a caring attitude, and an offer to share information.

Dr. Randy Tubbs is indeed an asset to NHCA, both through his steadfast service and his technical research contributions. Much of his service has been “behind the scenes,” but the impact has benefited the organization tremendously.

In closing, there is an interesting sidebar to draw upon. In his curriculum vitae, Randy Tubbs has a succinct statement under the heading of *Professional Interests and Goals*. It is as follows: “A goal of mine is to continue to increase my knowledge of industrial hygiene while continuing to pursue research opportunities in occupational noise and vibration.” Randy, we are grateful that you have continued in this vein, since your many contributions to NHCA, and thus to the science and practice of hearing conservation, are commendable and of great professional benefit to your colleagues in our organization. You are most deserving of the Threadgill Award for 2006, and you have our most sincere congratulations.

By John G. Casali

SPONSORS & AFFILIATES



AMERICAN
SPEECH-LANGUAGE-
HEARING
ASSOCIATION



Bilsom[®]



AIHA

The Essential Source



COMMITTEE & ALLIED MEETINGS

WEDNESDAY, FEBRUARY 15

<i>Time:</i>	<i>Group</i>	<i>Room</i>
8:00 a.m. – 10:00 a.m.	Leadership Advisory Team	Channelside 1
8:00 a.m. – 10:00 a.m.	Member Services Council	Channelside 2
1:00 p.m. – 3:00 p.m.	Program Committee	Garrison 1-2
3:00 p.m. – 9:00 p.m.	Executive Council	Ybor Room

THURSDAY, FEBRUARY 16

1:00 p.m. – 3:00 p.m.	Task Force on Children & Noise	Channelside 1
4:15 p.m. – 5:15 p.m.	New Council Member Orientation	Channelside 2
5:15 p.m. – 6:00 p.m.	Music-Induced Hearing Loss	TBD
5:15 p.m. – 6:00 p.m.	Publications Committee	TBD
5:15 p.m. – 6:00 p.m.	Scholarship Foundation	Channelside 1

FRIDAY, FEBRUARY 17

4:30 p.m. – 5:30 p.m.	OSHA/NIOSH/NHCA Alliance	Garrison 1-2
-----------------------	--------------------------	--------------

SATURDAY, FEBRUARY 18

5:15 p.m. – 6:00 p.m.	Program Committee	Garrison 1-2
6:00 p.m. – 9:00 p.m.	Executive Council	Ybor Room

SUNDAY, FEBRUARY 19

8:30 a.m. – Noon	ANSI S12/WG11 Hearing Protector	Garrison 1-2
------------------	---------------------------------	--------------

EXHIBIT SCHEDULE – REGENCY 1

THURSDAY, FEBRUARY 16

Exhibit Set-up and Registration
11:00 a.m. – 4:00 p.m.

Exhibits Open
Opening Reception in Exhibit Hall
5:30 p.m. – 8:30 p.m.

FRIDAY, FEBRUARY 17

Continental Breakfast/Exhibits Open
7:30 a.m. – 8:30 a.m.

Break/Exhibits Open
10:00 a.m. – 10:45 a.m.

Luncheon with Exhibitor
Introductions
12:00 noon – 1:30 p.m.

Break/Exhibits Open
2:25 p.m. – 3:10 p.m.

SATURDAY, FEBRUARY 18

Exhibits Open/Break
10:00 a.m. – 11:00 a.m.

Exhibit Dismantling
12:00 noon – 4:00 p.m.

SILENT AUCTION

Participate in NHCA's Silent Auction and bid on items to help support the NHCA Scholarship Foundation. Bring your item(s) or a certificate to the conference registration desk. The Silent auction is being held in the exhibit hall all day Friday and Saturday morning.

2006 STUDENT TRAVEL AWARDS

The NHCA Scholarship Foundation is pleased to announce the recipients of this year's Student Conference Travel Award. This award is available to students who are actively pursuing a degree in a discipline related to hearing conservation and who are enrolled at least half-time in an accredited educational institution. Recipients receive complimentary conference registration and partial reimbursement of travel expenses. Members of the Foundation review committee are: **John Casali, Rena Glaser, James Lankford, Vern Larson, and Mary McDaniel.**

Please welcome this year's award winners to *Hear the Waves* in Tampa:

Lovejoy Muchenje

1st year MS student in Human Factors/Industrial & Systems Engineering
Virginia Tech
Advisor: John Casali, Ph.D.

Jeremy Slagley

3rd year PhD student in Occupational Health & Safety/Industrial & Systems Engineering
West Virginia University
Advisor: Steven Guffey, Ph.D.

Andrea Wagner

4th year AuD student
Central Michigan University
Advisor: Michael Stewart, Ph.D.

Special thanks go to our 2006 sponsors for making this program possible: **The American Industrial Hygiene Association Noise Committee, Howard Leight/Bilsom, E-A-R Company (Aero), Eckel Industries, Peltor Company (Aero), Quest Technologies, Sonomax, and Westone Laboratories.**

SATURDAY MORNING BREAKFAST CHAT SESSIONS

Regency 2-3 • 7:45 a.m. – 8:45 a.m.

TOPIC

Childhood Noise Induced Hearing Loss
Educating Children in Hearing Conservation
Specialized and Electronic HPDs
Noise Level Assessment
Hearing Aids in Noise
Website Design
Auditory Warning Signals
Military Hearing Conservation Programs
PSO Professional Issues
HIPPA & Date Transfer Ethical Issues
Tinnitus
Mobile Unit Issues
CAOHC Issues Ahead
ASHA Construction Standard
Musicians and Hearing Loss
Real World HPD Attenuation
Fitting Employees with HPDs
Marketing HCP Services
Professional Audiogram Review
Best Practices
HCP Assessments
Training Techniques
Workplace Communication Assessment

LEADER

Brian Fligor
Deanna Meinke
Elliott Berger
Lee Hager
Nancy Green
Rick Neitzel
John Casali
Vickie Tuten and Tressie Waldo
Carolyn Tolley
Richard Stepkin
Billy Martin
David Stern
Dick Danielson
Carol Stephenson
Michael Santucci
Kevin Michael
Dianna Konik
Tim Rink and Merlyn Lubiens
Andy Stewart
Mark Stephenson
Randy Tubbs
Beth Cooper
Sandy MacLean Uberuaga

SPONSORS, AFFILIATES AND EXHIBITORS

❖❖ 3M OCCUPATIONAL HEALTH AND ENVIRONMENTAL SAFETY DIVISION

The 3M approach to hearing protection is simple; maximize the comfort and convenience of 3M™ Brand Hearing Protectors in order to achieve longer wear time and greater protection. *New in 2006* is the 3M Foam Ear Plug Dispenser which makes it easier than ever to supply foam ear plugs to people working in high noise areas. The ear plug dispensing funnel is designed for simple, one-handed operation. This convenient, low-cost dispenser holds up to 700 pair of 3M Foam Ear Plugs, model 1100-R, or 3M Soft Foam Ear Plugs, model 1120-R. 3M's durable, lightweight plastic dispenser mounts easily on the wall wherever protection from loud sounds is needed. An optional, weighted base is available to hold the dispenser securely for use on tables, benches and other flat surfaces. Stop by our exhibit at the NHCA Conference or visit us online (www.3M.com/occsafety) to learn about this new dispenser and the rest of 3M's full line of lightweight, comfortable, and easy-to-use hearing protectors. You'll see why 3M is the global leader in personal protective equipment.

Representatives:
Ted Madison and Bruce Penning
3M
3M Center Building 0235-02-E-91
Saint Paul, MN 55144-1000
651.575.5575 (phone)
651.736.7344 (fax)
tkmadison@mmm.com
www.3M.com/occsafety

❖ ACOUSTICAL SOCIETY OF AMERICA (ASA)

The Acoustical Society of America <<http://asa.aip.org>> is the world's premier society devoted to the science and technology of sound and for developing standards in acoustics. Any person or corporation interested in acoustics is eligible for membership. Members are involved in the study of noise, its measurement, its effects, ways of reducing noise to improve the human environment, and standardization to achieve that end. The ANSI standard on classroom acoustics is now available online at no cost.

Representatives:
Mark Stephenson and Les Blomberg
ASA contact: Elaine Moran
Suite 1N01, 2 Huntington Quadrangle
Melville, NY 11747-4502
516.576.2360 (phone)
516.576.2377 (fax)
asa@aip.org
<http://asa.aip.org>

❖ American Academy of Audiology (AAA)

The American Academy of Audiology represents over 10,000 audiologists and is dedicated to providing quality hearing care services through professional development, education, research, and increased public awareness of hearing and balance disorders. To learn more about the audiology profession and how audiologists are helping the 28 million Americans who experience hearing loss, please visit the Academy's web site at www.audiology.org.

Representatives:
Dick Danielson and Dan Ohama
AAA contact: Sydney Davis
11730 Plaza America Dr., #300
Reston, VA 20190
703.790.8466 (phone)
703.790.8631 (fax)
sdavis@audiology.org
www.audiology.org

❖ American Industrial Hygiene Association (AIHA)

Founded in 1939, the American Industrial Hygiene Association (AIHA) is the premier association of occupational and environmental health and safety professionals. AIHA's 12,000 members play a crucial role on the front line of worker health and safety every day. Members represent a cross-section of industry, private business, labor, government and academia.

Representatives:
Jeremy Slagley
Bob Anderson
AIHA contact: Aimee O'Grady
2700 Prosperity Ave., Ste. 250
Fairfax, VA 22031-4307
703.849.8888 (phone)
703.207.3561 (fax)
aogrady@aiha.org
www.aiha.org

❖ American Speech-Language-Hearing Association (ASHA)

ASHA is the professional, scientific, and credentialing organization representing over 115,000 audiologists, speech-language pathologists, and hearing and speech scientists who provide hearing conservation, diagnostic, rehabilitative, and consultative services and conduct research for children and adults who are at risk for or have hearing, balance, speech, language, and/or swallowing disorders.

Approximately 45 percent of ASHA's audiologists provide hearing conservation services for industry. For more than a decade, ASHA coordinated the efforts of the Coalition to Protect Workers' Hearing, which addresses federal regulatory initiatives from OSHA, NIOSH, MSHA, and agency reform efforts by Congress. ASHA has a Special Interest Division on Hearing Conservation.

Representatives:
Bobbi Aungst and Les Aungst
ASHA contact: Pam Mason
10801 Rockville Pike
Rockville, MD 20852
301.897.0135 (phone)
301.897.7354 (fax)
pmason@asha.org
www.asha.org

❖ Benson Medical Instruments Co.

Benson Medical Instruments manufacturers a full line of industrial audiometers, hearing conservation software, and accessories with advantages in testing speed, quality, ease of use, and data handling. We offer solutions for small clinics up to multi-station mobile testing.

Representatives:
David Mayou and Steve Benson
Benson Medical Instruments Co.
310 Fourth Avenue South, Ste. 6000
Minneapolis, MN 55415
612.827.2222 (phone)
dmayou@bensonmedical.com
www.bensonmedical.com

❖❖ Bilsom

Bilsom® leads the industry in developing innovative sound management technologies and products that are used in some of the most challenging environments in the world. Bilsom's range of earmuffs raise the bar on innovative design,

❖❖ CONFERENCE SPONSOR

❖ CONFERENCE AFFILIATE

performance and comfort, with features like padded wire headbands, unique sound management acoustics and multi-level attenuation options.

Bilsom is a part of the Bacou-Dalloz™ Hearing Safety Group. Combining the innovation and expertise of Bilsom Earmuffs and Howard Leight Earplugs, the Bacou-Dalloz Hearing Safety Group is a world leader in hearing safety.

Representatives:

Brad Witt, Ed Woo, Vern Larson, Renee Bessette
Bilsom Contact: Renee Bessette
Howard Leight / Bilsom
10 Thurber Blvd.
Smithfield, RI 02917
401.757.2265 (phone)
401.757.2912 (fax)
rbessette@bacou-dalloz.com
www.hearingportal.com

Bio-logic Systems Corp.

Bio-logic Systems Corp, a leading manufacturer of hearing screening and diagnostic equipment for over 25 years, also offers the Hint Pro. Hint Pro provides a method for evaluating the functional hearing of individuals in hearing-critical jobs, such as law enforcement, emergency assistance, factory work, heavy equipment operating, etc. Hint Pro tests can be performed with hearing aids, hearing protection and communication headgear to assess functional hearing in noisy environments.

Representative:

Laura Phelps
One Bio-logic Plaza
Mundelein, IL 60060
800.323.8326 (phone)
847.949.8615 (fax)
www.blsc.com

Centers for Disease Control and Prevention; National Institute for Occupational Safety and Health (CDC/NIOSH)

The National Institute for

Occupational Safety and Health (NIOSH) is the federal agency responsible for conducting research, disseminating information, and issuing recommendations regarding prevention of work-related disease injury. NIOSH is part of the Centers for Disease Control and Prevention (CDC) and also investigates potentially hazardous working conditions when requested by employers or employees. Headquartered in Washington, D.C., NIOSH has offices in Atlanta, Georgia, and research divisions in Cincinnati, Ohio; Morgantown, West Virginia; Bruceton, Pennsylvania, and Spokane, Washington.

Representative:

Carol Stephenson
4676 Columbia Pkwy., C-10
Cincinnati, OH 45226
513.533.8581 (phone)
513.533.8560 (fax)
cem3@cdc.gov

Council for Accreditation in Occupational Hearing Conservation (CAOHC)

CAOHC is dedicated to the establishment and maintenance of training standards for those who safeguard hearing in the workplace. CAOHC has been a leader in providing standards for occupational hearing conservation programs since its inception in 1973. CAOHC offers national recognition by training and certification to the highest standard for: 1) the certified occupational hearing conservationist (COHC); 2) the Course Director conducting hearing conservation training courses; and 3) the Professional Supervisor of the Audiometric Portion of a Hearing Conservation Program (CSP/A). All hearing conservation team members will find the 4th Edition *Hearing Conservation Manual*, by Alice Suter, PhD vital in the front-line defense

against hearing loss in workers. More information is available about CAOHC on the worldwide web at: www.caohc.org

Representatives:

Vickie Tuten and Thomas Hutchison
CAOHC Contact: Barbara Lechner
555 E. Wells St., Ste. 1100
Milwaukee, WI 53202.3823
414.276.5338 (phone)
414.276.2146 (fax)
info@caohc.org
www.caohc.org

E-A-R®

E-A-R, leading the advancement of hearing protection worldwide, provides truly innovative products including foam, premolded and push-in foam earplugs. Products include the Classic®, E-A-Rsoft®, SuperFit®, UltraFit® and our latest innovation, Push-Ins™. E-A-R also sells specialized devices such as the noise-activated flat-attenuation Ultra 9000® earmuff, the clear-sounding UltraTech® earplugs, the ARC Plug™ for arc blast protection, and the Eartone® insert audiometric earphones. Visit our Web Site at: www.E-A-R.com.

Representatives:

Brian Myers, Marc Santoro, Allan Gross, Theresa Schulz, Elliott Berger
Aearo Technologies (E-A-R & Peltor)
Contact: Marc Santoro
5457 W. 79th St.
Indianapolis, IN 46268
317.692.6974 (phone)
317.692.6604 (fax)
marc_santoro@aearo.com
www.E-A-R.com

EI, Inc.

EI is excited about the opportunity to showcase our web-based software for managing audiometric test data - AudioAssessor®. Whether testing in an industrial or clinical setting, this exciting product will revolutionize the way your audiometric test data is managed. No more software to buy or upgrade; no more hand

calculations or threshold shifts, no more waiting for employee reports to be mailed back! Your data is uploaded, processed and stored on EI's secure servers, employee reports are available for printing at the time of the test, and you can access your facility data any time for record entry and management reporting. All it takes is an Internet connection and a computer. Data can additionally be uploaded automatically from a microprocessor audiometer for even greater time saving. Visit AudioAssessor® at <http://assessor.ei.com>.

Representatives:

Adam Underwood and Dr. Tom Cameron
2101 Gateway Centre Blvd., Ste. 200
Morrisville, NC 27560
919.657.7500 (phone)
919.544.2199 (fax)
aunderwood@ei1.com
www.ei1.com

Eckel Industries of Canada Limited

Eckel audiology rooms provide the correct solution for precise noise control environments for the medical profession, meeting all prevailing standards. Eckel, over the last five decades, has developed a range of standard audiology booths, rooms and suites, with a custom engineered audiology room design, fabrication and installation service. Eckel's audiology products have been used around the world to meet demanding standards.

Representatives:

Blake Noon and Bruce Alan
P.O. Box 776, 15 Allison Ave.
Morrisburg, Ontario, K0C 1X0
CANADA
800.563.3574 (phone)
613.543.4173 (fax)
bnoon@eckel.ca
www.eckel.ca

❖❖ Howard Leight

From our beginnings as a one-man operation more than 30 years ago, Howard Leight® has grown into one of the largest manufacturers of in-ear hearing protection in the industrial market and the recognized innovator in protection and fit. Our complete line of Single-Use, Multiple-Use, Detectable and Banded earplugs includes options that provide a unique Comfort Profile for every user, every environment. Since 2001 we've been part of the Bacou-Dalloz™ Hearing Safety Group. Combining the innovation and expertise of Howard Leight earplugs and Bilsom Earmuffs, the Bacou-Dalloz Hearing Safety Group is a world leader in hearing safety.

Representatives:

Brad Witt, Ed Woo, Vern Larson, Renee Bessette

Howard Leight Contact: Renee Bessette
Howard Leight / Bilsom
10 Thurber Blvd.

Smithfield, RI 02917

401.757.2265 (phone)

401.757.2912 (fax)

rbessette@bacou-dalloz.com

www.hearingportal.com

G.R.A.S. Sound & Vibration

A broad range of standard measurement microphones, preamplifiers, transducers and accessories. Sound intensity microphones, outdoor monitoring microphones, artificial ears, ear & mouth simulators, CP preamplifiers, calibrators, etc. The microphone-preamplifier combinations feature built in TEDS, microphone arrays. Microphone systems for measurement of low noise levels below the threshold of hearing.

Representatives:

Barbara Schustrich and Rob Schustrich
23621 Lorain Rd.

North Olmsted, OH 44070

440.779.0100 (phone)

440.779.4148 (fax)

barbara@gras.us

www.gras.us

Hearing Components

Hearing Components is a leading R&D company in the field of ear canal research. Please stop at our booth for a demonstration of our commercialized research efforts, our complete Comply™ and Ad•hear product lines. We will be featuring our new Comply Platinum Soft Tips and Comply NR-1 Earphones.

Representatives:

Tim Hedlund and Bill Maass

420 Hayward Ave. N.

Oakdale, MN 55128

800.872.8986 (phone)

651.735.2790 (fax)

info@hearingcomponents.com

www.hearingcomponents.com

Larson Davis Inc.

Larson Davis is a leading supplier of Noise and Vibration measurement instrumentation since 1981. Products include Audiometric Calibration systems, Personal Noise Dosimeters, Type 1 Sound Level meters, Octave Band, and Real-time analyzers, and a Hand – arm / Whole Body Vibration monitor for evaluating human exposures to ISO 2631 and 5349.

Representatives:

Rob Brauch

1681 West 820 North

Provo, UT 84601

888.258.3222 (phone)

716.926.8215 (fax)

info@larsondavis.com

www.lardav.com

Maico Diagnostics

Maico's hearing conservation products include the MA790 and MA800 automatic microprocessor audiometers that are designed to meet demanding testing requirements. Customize your test parameters, print results or easily transfer data to a data management software program. The MA800 includes internal storage for 500 baseline exams and 500 annual tests.

Representative:

David Adlin

7625 Golden Triangle Dr.

Eden Prairie, MN 55344

888.941.4201 (phone)

952.903.4200 (fax)

info@maico-diagnostics.com

www.maico-diagnostics.com

Moldex-Metric, Inc.

Moldex is one of the most recognized names in hearing and respiratory protection in industry and healthcare. Comfort, quality and value are all synonymous with a Moldex product. Moldex has a strong history of perpetual innovation. We strive to design and engineer products that provide comfort and style for workers. Products they want to wear. This focus is backed up with over fifty patents for innovative and unique products like our EZ-ON® and HandyStrap® respirators as well as our Plug Station® earplug dispenser. Moldex has manufacturing facilities in the United States and Europe, plus sales offices and warehouses in all major markets worldwide and distribution in over fifty countries.

Representatives:

Jeffrey Birkner, James Gallegos,

Rick Marques

10111 W. Jefferson Blvd.

Culver City, CA 90232

800.421.0668 (phone)

310.842.8671 (fax)

www.moldex.com

Occupational Marketing, Inc. (OMI)

OMI has been a leader in the occupational health and safety field for over twenty years. Our product line includes hearing conservation data management software, audiometric instruments and audiological review services. In addition OMI offers CAOHC certification courses throughout the United States.

Representatives:

Micky Sullivan and David Rosenfeld

19424 Park Row, Ste. 110

Houston, TX 77084

281.492.8250 (phone)

281.492.0036 (fax)

msullivan@occupational.com

www.occupational.com

❖❖ Peltor®

Peltor, preferred by professionals everywhere, has long been considered the leader in protective communication headsets and earmuff hearing protectors. All Peltor products are designed to provide the optimum attenuation, maximum comfort, and the most sophisticated technology available. Innovative designs include the dual-shell Optime™ 105 earmuff, the PTL™ (Push to Listen) earmuff, and the Tactical 6-S electronic "listening" earmuff. The PowerCom™ two-way UHF radio headset has a transmission range of up to 2 miles. The newest communication device is the Hearplug™ featuring communications abilities through popular E-A-R® style hearing protectors. Visit our Web Site at www.peltor.com.

Representatives:

Brian Myers, Marc Santoro, Allan Gross,

Theresa Schulz, Elliott Berger

Aearo Technologies (E-A-R & Peltor)

Contact: Marc Santoro

5457 W. 79th St.

Indianapolis, IN 46268

317.692.6974 (phone)

317.692.6604 (fax)

marc_santoro@aearo.com

www.Peltor.com

❖❖ Quest Technologies, Inc.

Quest Technologies Incorporated is one of the most widely recognized and respected names worldwide for safety & industrial hygiene instrumentation and software. Our customers credit us with providing remarkably rugged and reliable products and exceptional customer care both before and after the sale. It is through our lifelong commitment

to continuous quality improvement, product innovation and a mission to delight our customers that we have achieved this status. We are a 100% employee-owned company marketing our products through select independent distributors in over 50 countries worldwide. Our customers use our products to monitor and assess occupational & environmental noise, hand-arm & whole body vibration, heat stress & thermal comfort, indoor air quality and toxic/combustible gases. Our products are used extensively in military, mining, research, regulatory enforcement, insurance, consulting, educational, manufacturing, pharmaceutical, petrochemical, and sports medicine markets. Our Quest line delivers "The System Solution" to all your monitoring and data analysis requirements, while our Metrosonics line offers a broad array of "Simple Solutions at Affordable Prices." For more

information about the Quest and Metrosonics product lines and associated support services such as calibration, rental and educational seminars, please visit www.Quest-Technologies.com and www.Metrosonics.com.

Representatives:
Tim Bailey, Cliff Wolcott, Jim Banach
1060 Corporate Center Dr.
Oconomowoc, WI 53066
800.245.0779 (phone)
262.567.4047 (fax)
tbailey@quest-technologies.com
www.quest-technologies.com

ResultGroup, Inc., The Internet Occupational Hearing Test Analysis Company

This online program is accessible from any computer with Internet connection. No additional software required, program updates automatic on Internet service, program customized to meet client's needs. Excellent tech. support. For overview visit: www.resultgroup.com or call ResultGroup, Inc. 865.680.6331, email: info@resultgroup.com.

Representatives:
Jack Ferrell and Karl Dittrich
8502 Old Towne Court
Knoxville, TN 37923
865.680.6331 (phone)
info@resultgroup.com
www.resultgroup.com

Tremetrics

Tremetrics is your source for hearing testing solutions including equipment service and calibration. Our complete OSHA-compliant line includes microprocessor and digital audiometers, mobile testing systems, hearing test booths and comprehensive hearing/health data management software. NEW! HT Wizard interactive, touch-screen audiometer provides innovative features never before offered in a stand-alone audiometer.

Representatives:
Jack Foreman and Ron Perl
7625 Golden Triangle Dr.
Eden Prairie, MN 55344
800.825.0121 (phone)
952.903.4100 (fax)
info@tremetrics.com
www.tremetrics.com

US Army Healthcare

Military career and educational opportunities with the Medical Department of the US Army and US Army Reserve.

Representatives:
1LT Chastice Steele, SFC Derek Wilson,
CPT Leanna Cleveland
4210 37th Place, Ste. 700
Gainesville, FL 32606
352.376.0408 (phone)
352.376.8156 (fax)

JOIN US FOR THE
32ND ANNUAL
HEARING CONSERVATION CONFERENCE
FEBRUARY 15 - 17, 2007
HYATT REGENCY SAVANNAH
SAVANNAH, GA

Savannah
GEORGIA'S FIRST CITY

NEW E·A·R® ARC PLUG™

THE ONLY ARC PROTECTION EARPLUGS WITH
PATENTED HEAR-THROUGH™ DESIGN



Insert Yellow End
for Hear-Through
and Instant Protection.

Insert Red End
for Protection Against
Constant Hazardous Noise.

Washable and Reusable.

THE POWER TO HEAR.

CLEAR HEARING WITH INSTANT PROTECTION — E·A·R ARC Plug earplugs allow workers to hear conversation, signals and other critical sounds clearly — without impairment. If an arc flash occurs, the calibrated noise filter activates immediately to suppress the noise to a safer level — without dangerous delay — reducing the chance of hearing damage and concussive disorientation.

Plus, with double-end versatility, workers just have to insert the plug's red end for protection against extended exposures to continuous hazardous noises.

Specify the new ARC Plug from E·A·R. The best of both worlds.

VISIT WWW.EARARCPLUG.COM FOR MORE INFORMATION.



HELPS MEET NFPA 70E REGULATION

PROGRAM

Thursday, February 16

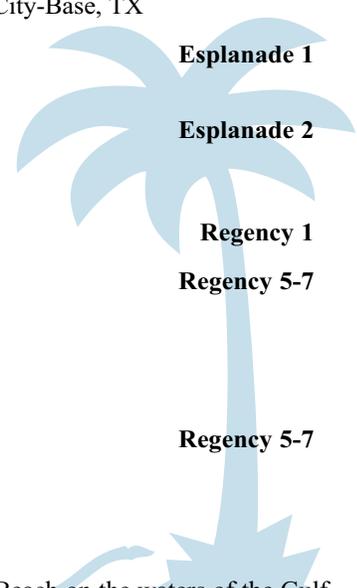
7:30 a.m. – 5:30 p.m.	Registration and Information	Galleria B
7:30 a.m. – 8:30 a.m.	Continental Breakfast	Galleria B2-3
8:30 a.m. – 11:30 a.m.	Morning Workshops (Select one of the following workshops. You must pre-register for each session – available on a first-come, first-served basis until full)	
A.M. or P.M.	1. Hearing Loss Prevention for Musicians: Strategies and Devices Michael Santucci, MS, F-AAA, Sensaphonics Hearing Conservation, Chicago, IL Thom Fiegle, Shure Inc., Chicago, IL	Regency 5
A.M. or P.M.	2. Field Verification of HPD Attenuation Brad K. Witt, MA, Howard Leight Industries / Bacou-Dalloz, San Diego, CA Kevin L. Michael, Ph.D., Michael & Associates, Inc., State College, PA Sigfrid D. Soli, Ph.D., House Ear Institute, Los Angeles, CA Lee D. Hager, Sonomax Hearing Health Great Lakes, Portland, MI	Regency 3
A.M. or P.M.	3. Meet the Media Aaron Patnode, Dept. of Public Affairs, Children’s Hospital Boston, Boston, MA	Garrison Suite
A.M. only	4. Bettering Your Business: a short course in Analyzing your Business and Developing a Business Growth Plan for PSOs and Consultants Jeffrey Goldberg, Custom Protect Ear, Inc., Surrey, BC, Canada	Regency 6
P.M. only	5. PSO Professional Issues Timothy L. Rink, Ph.D., HTI, Inc., Worthington, OH Richard Stepkin, MS, CCC-A, Enviromed Corp., Lindenwold, NJ Carolyn Tolley, MS, CCC-A, ASI Health Services, Dallas, TX Merlyn Lubiens, President, Center for Hearing Health, San Ramon, CA	Regency 6
8:30 a.m. – 4:00 p.m.	All Day Seminar – Hearing Loss Prevention: The Basics Effective Hearing Protection - Elliott H. Berger, MS, E-A-R/Aearo Company, Indianapolis, IN The Audiogram – How to Use It – James Jerome, MA, CCC-A, Hearing Safety-Midwest, Inc., Indianapolis, IN Hearing Loss Recordability Issues – Susan C. Megerson, MA, CCC-A, University of Kansas, Shawnee Mission, KS Noise Measurement - Rick L. Neitzel, MS, CIH, University of Washington, Seattle, WA Hot Topics Q&A - COL Nancy L. Vause, Ph.D., USA Medical Research & Materials Command, Frederick, MD Education & Motivation - Laurie Wells, MS, FAAA, Associates in Acoustics, Inc., Loveland, CO	Regency 7
9:45 a.m. – 10:15 a.m.	Workshop & Seminar Break with Refreshments	Galleria B2-3
11:30 a.m. – 1:00 p.m.	Lunch (on your own)	
1:00 p.m. – 4:00 p.m.	Afternoon workshops – see workshops listed above	
2:15 p.m. – 2:45 p.m.	Workshop & Seminar Break with Refreshments	
4:00 p.m. – 5:30 p.m.	Free Networking Time	
4:30 p.m. – 6:30 p.m.	Public Workshop: Prevention of Noise-Induced Hearing Loss and Tinnitus Charley Fankhauser, Ph.D., MEDI, Benecia, CA Susan Griest, MPH, OHSU, Portland, OR Linda Howarth, B.A., OHSU, Portland, OR William Hal Martin, Ph.D., OHSU, Portland, OR	Esplanade 2
5:30 p.m. – 8:30 p.m.	Opening Reception in the Exhibit Hall	Regency 1

Friday, February 17

7:30 a.m. – 5:30 p.m.	Registration and Information	Galleria B
7:30 a.m. – 8:30 a.m.	Continental Breakfast in the Exhibit Hall	Regency 1
8:30 a.m. – 8:40 a.m.	Opening Remarks Laurie Wells, MS, FAAA, Associates in Acoustics, Inc., Loveland, CO NHCA President Brian J. Fligor, ScD, CCC-A, Children’s Hospital, Boston, MA Program Chair Poster Introductions Greg A. Flamme, Ph.D., Western Michigan University, Kalamazoo, MI	Regency 5-7
8:40 a.m. – 9:40 a.m.	Noise and Military Service, Findings from the Institute of Medicine Elliott H. Berger, MS, E-A-R/Aearo Company, Indianapolis, IN Richard W. Danielson, Ph.D., National Space Biomedical Research Institute and Baylor College of Medicine, NASA Johnson Space Center, Houston, TX Mark R. Stephenson, Ph.D., NIOSH Taft Laboratories, Cincinnati, OH	Regency 5-7
9:40 a.m. – 10:00 a.m.	Testimonial from the Warriors Perspective Military Audiologist	Regency 5-7
10:00 a.m. – 10:45 a.m.	Break – Exhibits, Silent Auction, Posters	Regency 1
10:45 a.m. – 11:15 a.m.	Keynote Speaker Gail M. Whitelaw, Ph.D., President, American Academy of Audiology Ohio State University, Columbus, OH	Regency 5-7
11:15 a.m. – 11:25 a.m.	Pop-Up	Regency 5-7
11:25 a.m. – 11:55 a.m.	NHCA Business Meeting	Regency 5-7
12:00 Noon – 1:30 p.m.	Luncheon – Insect Hearing Dr. David D. Yager, Department of Psychology, University of Maryland, College Park, MD	Regency 2-3

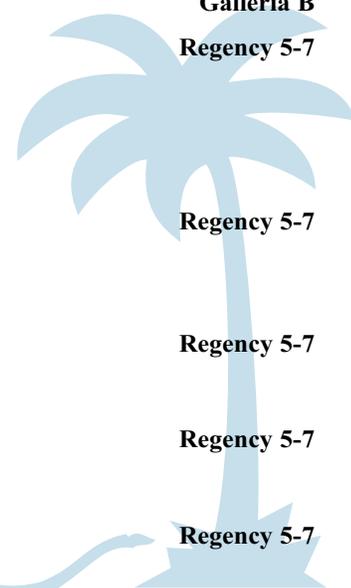
CONCURRENT SESSIONS

1:40 p.m. – 2:25 p.m.	Media Theater Christine Perneti, MA, CCC-A, St. Luke’s Hospital/Hearing Conservation Services, Cedar Rapids, IA	Buccaneer D
1:40 p.m. – 2:25 p.m.	U.S. Air Force HCP Data Report Major Rob Pluta, Air Force Institute for Occupational Health, Brooks City-Base, TX	Esplanade 3
1:40 p.m. – 2:25 p.m.	New Web-Based Resources Available to YOU! William Hal Martin, Ph.D., OHSU, Portland, OR	Esplanade 1
1:40 p.m. – 2:25 p.m.	Evidence For Loud Music Dependency Disorder Dr. Mary Florentine, Northeastern University, Boston, MA Dr. Linda Welsh, Brown University, Providence, RI	Esplanade 2
2:25 p.m. – 3:10 p.m.	Break – Exhibits, Silent Auction, Posters	Regency 1
3:10 p.m. – 3:30 p.m.	Effect of Training Modality on Earplug Attenuation Antony R. Joseph, AuD, Ph.D., U.S. Navy, FPO AP Mark R. Stephenson, Ph.D., NIOSH Taft Laboratories, Cincinnati, OH Jerry L. Punch, Ph.D., Michigan State University, East Lansing, MI William J. Murphy, Ph.D., CDC/NIOSH, Cincinnati, OH	Regency 5-7
3:30 p.m. – 4:30 p.m.	Ethics – Point-Counterpoint: Who Are You Working For? Orland Purcell, Audio Acoustics Hearing Centers, Inc., Midland, TX	Regency 5-7
4:30 p.m. – 5:30 p.m.	Networking Time, Committee Meetings, PSO Meeting	
6:00 p.m. – 10:30 p.m.	Special Event: Beach Party Enjoy an evening of food, fun and lots of entertainment at Clearwater Beach on the waters of the Gulf of Mexico. The buses will depart the hotel beginning at 6:00 p.m. Return to the hotel is scheduled for 10:30 p.m.	



Saturday, February 18

7:30 a.m. – 5:30 p.m.	Registration and Information	Galleria B
7:45 a.m. – 8:45 a.m.	Chat Sessions – Breakfast Coordinated by Sandra C. MacLean Uberuaga, MA, CCC-A, Alaska Occupational Audiology & Health Services, Inc., Anchorage, AK	Regency 2-3
9:00 a.m. – 9:20 a.m.	Considerations for Active Noise Control in Ducts Using Splitting Vanes for Multiple Duct Channels Jeremy M. Slagley, U.S. Air Force, Morgantown, WV	Regency 5-7
9:20 a.m. – 9:40 a.m.	Do Earphones for Music Reproduction Provide Hearing Protection? John G. Casali, Ph.D., CPE, Virginia Tech, Blacksburg, VA Jeffrey A. Lancaster, Ph.D., Virginia Tech, Blacksburg, VA Scott Grinker, Shure, Inc., Niles, IL	Regency 5-7
9:40 a.m. – 10:00 a.m.	Attitudes Towards Noise and the Use of Hearing Protection in Young Adults in Sweden and the USA Alice E. Holmes, Ph.D., University of Florida, Gainesville, FL Stephen E. Widen, Goteborg University, University of Trollhattan, Uddevalla, Sweden Soly I. Erlandsson, Goteborg University, University of Trollhattan, Uddevalla, Sweden	Regency 5-7
10:00 a.m. – 11:00 a.m.	Break – Last Chance for Exhibits, Silent Auction, Attended Posters	Regency 1
11:00 a.m. – 11:20 a.m.	Recordable Hearing Loss in the US: 2004 Lee D. Hager Sonomax Hearing Healthcare, Inc., Portland, MI	Regency 5-7
11:20 a.m. – 11:50 a.m.	Can You Hear Flat? Brad K. Witt, MA, Howard Leight Industries / Bacou-Daloz, San Diego, CA	Regency 5-7
11:50 a.m. – 12:10 p.m.	Estimating Noise-Induced Permanent Threshold Shift from Audiometric Shape Robert Dobie, MD, UCDCM, Sacramento, CA	Regency 5-7
12:10 p.m. – 1:30 p.m.	Awards Luncheon <ul style="list-style-type: none"> <li style="width: 50%;">• Michael Beall Threadgill Award <li style="width: 50%;">• Outstanding Hearing Conservationist Award <li style="width: 50%;">• 2005 Outstanding Lecture Award <li style="width: 50%;">• 2005 Outstanding Poster Award <li style="width: 50%;">• 2005 Golden Lobe Awards 	Regency 2-3
1:40 p.m. – 2:00 p.m.	Gasaway Lecture COL Nancy L. Vause, Ph.D., USA Medical Research & Materials Command, Frederick, MD	Regency 5-7
2:00 p.m. – 2:20 p.m.	Best Practices, International Standards and Legislations Regarding Chemical Exposure in the Workplace and the Risk of Hearing Loss Thais Morata, Ph.D., NIOSH, Cincinnati, OH	Regency 5-7
2:20 p.m. – 2:40 p.m.	Break	Galleria B
2:40 p.m. – 3:10 p.m.	NIOSH Study: Comfort and Personal NRR in a Longitudinal Study of Highly Experienced Earplug Users Rickie R. Davis, NIOSH, Cincinnati, OH CDR William J. Murphy, Ph.D., NIOSH, Cincinnati, OH David Byrne, NIOSH-Taft Laboratories, Cincinnati, OH John R. Franks, Ph.D., NIOSH, Cincinnati, OH	Regency 5-7
3:10 p.m. – 3:40 p.m.	A High-Tech Hearing Protector to Maximize Attenuation and Speech Understanding King Chung, Ph.D. Purdue University, West Lafayette, IN Kyle N. Acker, MA, Purdue University, West Lafayette, IN	Regency 5-7
3:40 p.m. – 4:00 p.m.	Insert Passive Noise Reduction Bob Oliveira, Ph.D., Hearing Components, Oakdale, MN Mike Venem, MS, Hearing Components, Oakdale, MN	Regency 5-7
4:00 p.m. – 4:50 p.m.	The Best Reason to Stay for the End of the Conference Win a Free Conference Registration for 2007 in Savannah, GA NHCA Directors and Officers	Regency 5-7
4:50 p.m. – 5:00 p.m.	Closing Remarks Laurie Wells, MS, FAAA, Associates in Acoustics, Inc., Loveland, CO NHCA President Theresa Y. Schulz, Ph.D., James H. Quillen VA Medical Center, Mountain Home, TN Director of Education	Regency 5-7



CONFERENCE ABSTRACTS

THURSDAY, FEBRUARY 16

Hearing Loss Prevention for Musicians: Strategies and Devices

Michael Santucci, M.S., F-AAA, President, Sensaphonics Hearing Conservation, Chicago, IL

Thom Fiegle, Associate Manager-Technology / Shure Inc. Chicago, IL

With increased interest in hearing protection among performers and technical personnel in the music industry, audiologists are faced with decisions of choosing the appropriate hearing protection strategy and device. Strategies include case history, audiometric evaluation, education, sound level measurements and selection of ER Musician's plugs will be discussed. Selection and safe use of in-ear monitoring devices and case studies of applications will also be presented. Thom Fiegle, a sound engineer at Shure Incorporated and part of the Shure PSM (Personal Monitoring System) will be co-presenting and will be giving a hands-on demonstration of in-ear monitoring for all attendees.

Field Verification of HPD Attenuation

Brad K. Witt, M.A., Howard Leight Industries / Bacou-Dalloz, San Diego, CA

Kevin L. Michael, Ph.D., Michael & Associates, Inc., State College, PA

Sigfrid D. Soli, Ph.D., House Ear Institute, Los Angeles, CA

Lee D. Hager, Sonomax Hearing Health Great Lakes, Portland, MI

Recent developments in the field verification of HPD attenuation help bridge the gap from laboratory to workplace. A variety of methods are now available that allow us to accurately estimate — and even measure — the personal attenuation of HPDs in the field. This workshop reviews four systems in detail, each unique in its approach and measurement of real-world attenuation. A hands-on demonstration of each system will allow attendees to evaluate their application and usefulness.

Meet the Media

Aaron Patnode, Dept. of Public Affairs, Children's Hospital Boston, Boston, MA

In this workshop, attendees will learn the ins-and-outs of working with the popular media, including live or recorded television and radio, as well as print. Learn how to get the media's attention for a story, and how to maximize your message in this age of quick soundbytes! Topics range from preparing for the on-camera interview (learn why it's not a good idea to wear a white shirt on camera!) to how to manage an inappropriate or leading question from the interviewer.

Bettering Your Business: PSO Business Management Workshop

Jeffrey Goldberg, Custom Protect Ear, Inc., Surrey, BC, Canada

If you have taken a personal development course (or wanted to), if you find you enjoy your work and your life better when you do it well, if you think you could be happier, make more money, and be less frustrated by running your business and your life with a plan, then perhaps this course is for you. This session will deal with how to analyze your current situation and make plans for growth and change that can succeed. It will provide you with the what to, who to, and how to plan for change and growth in your business whether you are a consultant or company. No previous business planning experience is necessary.

PSO Professional Issues

Merlyn Lubiens, President, Center for Hearing Health, San Ramon, CA

Richard Stepkin, M.S., CCC-A, Enviromed Corp., Lindenwold, NJ

Carolyn Tolley, M.S., CCC-A, ASI Health Services, Dallas, TX

Tim Rink, Ph.D., Moderator, HTI, Inc. Worthington, OH

This workshop is a guided open forum – come listen to, share and become involved with the presenters and other participants as they discuss: Consistency: Mobile, On-Site Testing; HCP Team – The Weakest Link; Data Sharing – Who's is it anyway?; Retesting, Persistence and Recordability; Consistency: Data Analysis; HCP Compliance Checklist; Baseline Revision (Old vs. New Method); HIPPA and Confidentiality Revisited

All Day Seminar – Hearing Loss Prevention: The Basics

This workshop will feature experts in the field of hearing loss prevention discussing the essential elements of an effective hearing loss prevention program. The seminar is designed to provide information that is useful to the audiometric technician as well as the professional supervisor. Whether you're new to the field or have been practicing hearing conservation for years, this workshop is guaranteed to offer something of interest. The interaction that is encouraged with audience participation, between rookies and veterans, makes this exchange all the more valuable.

Effective Hearing Protection

Elliott Berger, M.S., E-A-R/Aearo Company, Indianapolis, IN

As hearing conservationists we can measure, assess, document, and counsel, but when it comes to effective intervention, our primary tool, sometimes our only tool, is a hearing protector. Therefore it behooves us to become knowledgeable about the specification of hearing protection devices and their use in hearing conservation programs. This presentation will focus on hearing protector function, how they are tested and rated (with particular reference to the NRR), the performance gains available from the use of dual hearing protectors, the effects of hearing protectors on speech communications, and useful tips on fitting today's popular products. The attendee will also learn about current developments such as flat and moderate attenuation hearing protectors, and earmuffs with active noise reduction (ANR) circuitry.

The Audiogram - How to Use It

James Jerome, M.A. CCC-A, Hearing-Safety Midwest, Inc., Indianapolis, IN

The audiometric test is essentially the report card for the hearing loss prevention program. No worker's hearing has ever been preserved or protected because he or she took a hearing test. How we use that hearing test, how we convey the information, how we track the data becomes critical to the program. This session will go beyond just looking for standard threshold shift. It will provide the technician with information about obtaining a valid result, and will offer the professional supervisor insight into follow-up strategies.

Hearing Loss Recordability Issues

Susan C. Megerson, M.A., CCC-A, University of Kansas, Shawnee Mission, KS

Identification of work-related hearing loss has long been one of the most complicated and controversial areas of government-mandated injury/illness recordkeeping. Effective in 2000, MSHA provided a new definition of "reportable" hearing loss in its revised noise standard, Part 62. OSHA also defined new criteria for recording occupational hearing loss with its recent revision to 29 CFR 1904 (effective in 2003, with a separate Form 300 column in effect January 1, 2004). This workshop presentation will focus on the basic requirements of MSHA and OSHA recordkeeping regulations, as well as implications for professional review of audiograms and determination of work-relatedness. Although compliance with recordkeeping rules is important to the ultimate goal of tracking incidence of work-related hearing loss, emphasis will also be placed on best practices for an effective hearing loss prevention program.

Noise Measurement

Rick L. Neitzel, M.S., CIH, University of Washington, Seattle, WA

In this segment, Rick will provide an overview of the measurement of noise, including an introduction to that dear friend/archenemy of hearing loss prevention (the decibel), the equipment we use to measure noise (sound level meters, dosimeters, octave band analyzers, oh my!), and how all this relates to protecting people's hearing.

FRIDAY, FEBRUARY 17

Noise and Military Service, Findings from the Institute of Medicine

Elliott H. Berger, M.S., E-A-R/Aearo Company, Indianapolis, IN
Richard W. Danielson, Ph.D., National Space Biomedical Research Institute and Baylor College of Medicine, NASA Johnson Space Center, Houston, TX
Mark R. Stephenson, Ph.D., NIOSH Taft Laboratories, Cincinnati, OH

Since World War II, the human and financial costs associated with hearing loss among military veterans have repeatedly drawn attention to noise and the need for hearing conservation in military settings. In recent years, noise-related tinnitus has also emerged as a significant concern. In 2002, Congress directed the Department of Veterans Affairs to contract with the National Academies for a study of noise-induced hearing loss and tinnitus associated with military service from World War II to the present. The Institute of Medicine of the National Academies convened a 13-member committee to conduct this study and to review: (1) available data on hearing loss that could be expected in the armed forces; (2) sources of hazardous noise exposure during military service; (3) levels of noise exposure necessary to cause hearing loss or tinnitus; (4) the time course, including possible delayed onset, of hearing loss following noise

exposure; (5) risk factors for noise-induced hearing loss and tinnitus; and (6) compliance with requirements for audiometric testing and the adequacy of the services' hearing conservation programs. The report issued in September 2005. The findings, summarized herein, include evidence suggesting that the use of hearing protection was and still is inadequate, that incomplete reporting or unsatisfactory compliance with audiometric testing requirements has impaired the usefulness of the military audiometric databases, and that military hearing conservation programs have not been adequate since World War II. The report cites efforts to address noise exposure among military personnel, but observes that *more must be done* to make the programs effective.

U.S. Air Force HCP Data Report

Major Rob Pluta, Air Force Institute for Occupational Health, Brooks City-Base, TX

The Defense Occupational and Environmental Health Readiness System (DOEHRS) Data Repository contains upwards of 14 million audiometric records. A significant portion of these records are from US Air Force employees. Operational aspects of the Air Force hearing conservation program will be presented in addition to metrics from past and current data collections.

New Web-Based Resources Available to YOU!

Presenter: William Hal Martin, Ph.D., OHSU, Portland, OR
Authors: William Hal Martin, Susan E. Griest, Linda Howarth, and Baker Y-B. Shi

Three new free resources will be demonstrated. They are now available for you to use in research and/or education regarding noise induced hearing loss prevention the Dangerous Decibels® website (www.dangerousdecibels.org). These include a database and research

The *Next* Generation

The *Next* stand-alone audiometer cost-effectively combines the latest ease-of-use technology with powerful analysis for automatic OSHA compliance.

Easy Compliance is Only Surpassed
by Ease of Use!

It's what you'd expect from the latest
generation of "Seamless Sound Solutions."

Benson Medical Instruments Co.
Minneapolis, MN • (612) 827-2222
sales@bensonmedical.com

Make Your *Next* visit to www.bensonmedical.com



seamless sound solutions

tool with 29,000 subjects, a virtual museum exhibit with eight fun, interactive activities and simulations, and a Teacher's Resource Guide filled with activities, instructions and hearing health information. These resources can be applied in industrial, military or public educational hearing loss prevention efforts.

Evidence for Loud Music Dependency Disorder

Dr. Mary Florentine, Matthews Distinguished Professor, Northeastern University, Boston, MA

Dr. Linda Welsh, Psychotherapist, Brown University, Providence, RI

Why do some individuals continue listening to loud music despite knowledge of potential hearing loss? Is it possible that they may have a dependency-like disorder underlying excessive listening to loud music as suggested by Florentine et al. (*Ear and Hearing* 19, 420-428, 1998)? This talk (1) presents the conceptual framework for the existence of a new dependency disorder, (2) reviews data suggesting the presence of such a disorder, and (3) presents a case study of an individual whose music-listening behaviors meet clinical criteria for a behavioral dependency disorder as defined by an adapted version of the American Psychiatric Association's Criterion for Substance Dependence (1994). This case study appears to confirm the existence of a true dependency on loud music. If Loud Music Dependency Disorder is confirmed to exist in a significant number of individuals, programs for the prevention of noise-induced hearing loss may need to be modified.

Effect of Training Modality on Earplug Attenuation

Antony R. Joseph, Au.D., Ph.D., U.S. Navy, FPO AP

Mark R. Stephenson, Ph.D., NIOSH Taft Laboratories, Cincinnati, OH

Jerry L. Punch, Ph.D., Michigan State University, East Lansing, MI

William J. Murphy, Ph.D., CDC/NIOSH, Cincinnati, OH

The effect of group versus individual hearing loss prevention (HLP) training on the attenuation performance of hearing protection devices (HPDs) was investigated. A subject-fit methodology, which gives naïve listeners access only to the instructions printed on the HPD product label, was used to determine real-ear attenuation at threshold (REAT) at third-octave noise bands between 125-8000 Hz. REAT measurements were augmented by use of the HLP Attitude-Belief survey, a self-assessment tool developed by the National Institute for Occupational Safety and Health. Participants were randomly assigned to one of four experimental groups, consisting of 25 listeners each. A short multimedia program was presented to listeners, with half randomly assigned to individual training and the other half assigned to group training. Results showed training to have a significant effect, for two types of HPDs (formable and premolded) on real-ear attenuation and attitude, but, importantly, there was no difference between group and individual training.

SATURDAY, FEBRUARY 18

Considerations for Active Noise Control in Ducts Using Splitting Vanes for Multiple Duct Channels

Jeremy M. Slagley, U.S. Air Force, Morgantown, WV

Active noise control (ANC) is particularly useful in hard-walled ducts in low frequency regions for canceling plane waves. The frequency region of plane waves that can be controlled increases as the cross-sectional dimensions of the ducts decrease. One method to reduce the inner dimensions of a large duct is to insert axial splitting vanes down the length of the duct to separate the inner space into smaller channels. A commercially-available ANC system was used to reduce random noise in a large 18 inch round duct having four different diameter (6, 8, 12, and 16 inch) round ducts inserted as axial splitting vanes. Insertion loss (IL) at frequencies above the large duct plane wave region (≥ 315 Hz) increased by an average of 3-4 dB with 12 and 16 inch inserts as the large duct inner dimensions decreased. This research may make ANC more applicable particularly for HVAC systems inside buildings, or exhaust stacks contributing to environmental noise.

Do Earphones for Music Reproduction Provide Hearing Protection?

John G. Casali, Ph.D., CPE, Auditory Systems Laboratory, Dept. of Industrial & Systems Engineering, Virginia Tech, Blacksburg, VA

Jeffrey A. Lancaster, Ph.D., Auditory Systems Laboratory, Dept. of Industrial & Systems Engineering,

Virginia Tech, Blacksburg, VA

Scott Grinker, Shure, Inc. Niles, Illinois

Earphones that are designed for listening to music consist of in-ear devices (such as "ear buds," "ear pods," and other inserts), on-the-ear devices (lightweight headsets), and devices that encircle the ear (muff-style headsets). Both passive and active noise reduction (ANR) strategies are used. Depending upon the noise environment, the wearer of a music headphone may be in need of hearing protection, such as is the case with a disc jockey in a dance club. This research examined 8 commonly-available music earphones from 4 manufacturers to determine attenuation afforded. The devices were tested using standardized REAT (real-ear attenuation at threshold, per ANSI S3.19-1974) and MIRE (microphone in real-ear, per ANSI S12.42-1995) procedures. Ten subjects underwent both REAT and MIRE attenuation tests and also provided comfort preference rankings. The results indicated that certain music earphones *do* provide significant protection, while others offer little or no protection. Noise Reduction Ratings (NRRs) computed from the spectral data ranged from 25 to -7. For the sample, passive, insert-type devices generally provided higher attenuation than the ANR devices. There were also substantial attenuation as well as comfort differences between flanged and foam eartips. The research also offers a comparison of data emanating from REAT and MIRE protocols for a common set of products.

Attitudes Towards Noise and the Use of Hearing Protection in Young Adults in Sweden and the USA

Alice E. Holmes, Ph.D., University of Florida, Gainesville, FL

Stephen E. Widén, Göteborg University, University of Trollhättan/Uddevalla, Sweden

Soly I. Erlandsson, Göteborg University, University of Trollhättan/Uddevalla, Sweden

Differences between Swedish (N=179) and American (N=203) young adults (17 to 21 years) regarding attitudes toward noise, hearing protection use and reported tinnitus and hearing loss were investigated. Multivariate logistic regression analysis was used to examine if attitudes, gender and nationality can explain hearing protection use. Results indicate that attitudes can predict hearing protection use to some extent. Large differences were found between Sweden and USA regarding attitudes towards noisy environments and actual hearing protection use. The Swedish sample had significantly greater use of hearing protection than the USA young adults. Likewise the USA subjects were indicated more positive attitudes towards noise than the Swedish subjects. Reported prevalence of hearing loss and tinnitus in the subjects will also be presented.

Recordable Hearing Loss in the US: 2004

Lee D. Hager, Hearing Loss Prevention Consultant, Sonomax Hearing Healthcare, Inc., Portland, MI

While OSHA's revised criteria for recordable hearing loss as reflected in the revision of 29CFR1910 came into effect in 2003, a unique location for recording hearing loss was not placed on OSHA's recordkeeping form (Form 300) until January 2004. Because of this change, national incidence and prevalence analysis of occupational hearing loss is available for the first time for 2004. Analysis of Bureau of Labor Statistics data indicates about 28,400 recorded hearing losses in 2004, constituting about 11% of the total illnesses recorded, with manufacturing and transportation accounting for the majority of the hearing losses recorded.

Estimated Noise-Induced Permanent Threshold Shift from Audiometric Shape

Robert A. Dobie, M.D., Dept. of Otolaryngology, UC-Davis Medical Center, Sacramento, CA

To explore the relationship between audiometric shape and speech-frequency noise-induced permanent threshold shift (N5123), 270 audiograms were created (using ISO-1999), representing a variety of ages, exposure levels, and percentiles. Bulge depth (BD) was defined as the difference between pure tone average (PTA) for 2, 3, and 4 kHz and PTA for 1 and 6 kHz. N5123 was well-predicted by quadratic functions of BD. Estimates of N5123 based on BD can be helpful in medical-legal diagnosis and allocation of hearing loss.

Best Practices, International Standards and Legislations Regarding Chemical Exposure in the Workplace and the Risk of Hearing Loss

Thais Morata, Ph.D., NIOSH, Cincinnati, OH

The adverse auditory effects of chemical toxicants have been investigated more systematically during the past two decades, both in animal and human field and clinical studies. Although noise is considered the predominant source of work-related hearing loss, recent evidence has demonstrated that chemical toxicants can also cause hearing loss and enhance sensitivity to noise. The new evidence has prompted the proposal of new guidelines and standards on hearing loss prevention. In the U.S., the National Institute for Occupational Safety and Health and the American College of Occupational and Environmental Medicine have discussed specific research needs regarding the ototoxicity of chemicals used at work. The American Conference of Governmental Industrial Hygienists and the U.S. Army have proposed preliminary practical steps

that employers and occupational health professionals can take to improve hearing loss prevention. Australia and New Zealand have developed standard AS/NZS 1269:2005, requiring hearing tests for workers exposed to ototoxic agents. In the legislative arena, the European Parliament published a new noise directive (2003/10/EC), to be adopted by all participants' countries by 2006. This Directive requires employers to give attention to any effects on workers' health and safety resulting from interactions between noise and work-related ototoxic substances, when performing risk assessment of workplaces. Legislation regarding compensation has also changed in Australia (Workcover Guides for the Evaluation of Hearing Impaired, June 2002) and Brazil (Decree 3048, May 6, 1999). This presentation will examine the recent guidelines and legislative developments and discuss alternative strategies for preventing auditory effects of exposure to ototoxic chemicals.

Comfort and Personal NRR in a Longitudinal Study of Highly Experienced Earplug Users

Rickie R. Davis, Hearing Loss Prevention Team, NIOSH, Cincinnati, OH
William J. Murphy, Ph.D., Hearing Loss Prevention Team, NIOSH, Cincinnati, OH
David Byrne, Hearing Loss Prevention Team, NIOSH, Cincinnati, OH
John R. Franks, Ph.D., Hearing Loss Prevention Team, NIOSH, Cincinnati, OH

The Hearing Loss Prevention Team of NIOSH was invited to be the technical advisor in a study of an advanced hearing protector at a facility of a major auto manufacturer.

The study consisted of four visits over the course of one year. Subjects were assigned to one of three groups: Group A received the new hearing protector, Group B was counseled in the proper wear of their current hearing protector, and Group C was not counseled. At the first visit all

3M

Foam Ear Plug Dispenser

Hearing Protection at Your Finger Tips

New!



www.3M.com/occsafety

groups filled out a hearing health questionnaire, a comfort survey (based on Parks and Casali), an attitudes and beliefs survey (based on Stephenson) and appropriate consent forms. They also received a pure-tone audiogram and a Fit Test. Except for the audiogram and hearing health questionnaire, the same information was collected during the subsequent visits at one month and 6 months. The previous information plus audiograms were collected at 12 months.

This talk will present the results and discussion associated with changes in comfort and personal NRR over the one year study.

DART 05-143
EPHB 305-05d

A High-Tech Hearing Protector to Maximize Attenuation and Speech Understanding

King Chung, Ph.D., Purdue University, West Lafayette, IN
Kyle N. Acker, M.A., Purdue University, West Lafayette, IN

People working in noisy environments often have difficulties in understanding speech while wearing hearing protectors. This presentation discusses the concept of adapting advanced signal processing algorithms from high-performance hearing aids to hearing protectors so that the speech understanding ability is maximized and the noise level is minimized for users of hearing protectors. The important features of the algorithms to allow environment-dependent and listener-dependent signal processing will also be discussed along with the results of our evaluation of several hearing aids for this application.

Insert Passive Noise Reduction Earphones

Bob Oliveira, Ph.D., Hearing Components, Oakdale, MN
Mike Venem, M.S., Hearing Components, Oakdale, MN

It is sensible to put passive noise reduction phones in-the-ear rather than over-the-ear. An overview of the why, what, and how of insert Passive Noise Reduction and its advantages will put into perspective the utility of this approach as practiced by the communication systems for US Army helicopters, headsets for general aviation, and hearing in noise earbuds.

Consistent & Dependable Daily Biological Checks Using Bio-Acoustic Simulators

- Eliminates Errors Inherent In Human Test Subjects
- Works with Manual, Automatic & Microprocessor-based Audiometers
- Works with Standard Earphones -- With or Without Audio Cups
- Easy Operation & Comprehension of Results
- AC or Battery Powered
- Extremely Lightweight & Portable
- Can Be Used Table-Top or Wall-Mounted
- Two Models Additionally Monitor Hearing Test Booth and Room Background Noise
 - OSHA-Required Levels & Type 2 Accuracy
 - ANSI-Required Levels & Type 1 Accuracy



For more information:

- Call us at **1-800-245-0779**
- Email us at **sales@Quest-Technologies.com**
- Visit us at **www.Quest-Technologies.com**



ISO 9001:2000 Registered Company
ISO 17025 Accredited Calibration Laboratory
Employee-Owned Company

POSTER ABSTRACTS

1. An Assessment of Noise Exposures during Post Hurricane Katrina Relief Efforts

Chandran Achutan, Ph.D., NIOSH, Cincinnati, OH

NIOSH investigators assessed worker exposures to noise during the post-Hurricane Katrina relief effort. Six of the fourteen workers monitored exceeded the NIOSH REL, and one exceeded the OSHA AL. Workers who exceeded the NIOSH REL included a worker passing out tickets to trucks bringing in debris, a forklift driver supplying construction material to roofers at a naval air station, a veterinarian, a veterinary assistant, and two veterinarian technicians providing care to canines at a temporary outdoor animal shelter. One of the veterinarian technicians also exceeded the OSHA AL. NIOSH investigators recommended use of hearing protection devices to protect workers exposed to high noise levels.

2. Compilation of Representative Sound Level Data for over 1700 Noise Sources

Elliott H. Berger, M.S., E-A-R/Aearo Company, Indianapolis, IN
Rick Neitzel, M.S., University of Washington, Dept. of Occupational & Health Sciences, Seattle, WA

This poster describes a new free web-based compilation of sound level measurements for over 1700 noises, including occupational, recreational, and military sources. The data were compiled from sources in the literature and the authors' own measurements. A reference is provided for each tabulated value. The data are primarily A-weighted sound pressure levels (SPLs) for representative sound sources at typical distances. For impulsive sounds, such as gunfire, the values are generally peak sound pressure levels and are so designated. To determine probable personal exposures the user would have to factor in the total exposure time and unique aspects of their own acoustic environment. The poster will highlight selected data and compare levels commonly reported in the popular media to those found in the scientific literature. The spreadsheet represents a useful resource for screening and ranking common noise exposures. The most current version of the spreadsheet is available at http://www.e-a-r.com/hearingconservation/faq_main.cfm

3. Relation of Noise-Induced Temporary Threshold Shift to Permanent Threshold Shifts

Robert A. Bertrand, M.D., Bertrand-Johnson Acoustics, Inc., Montreal, Quebec, Canada

Noise-Induced Temporary Threshold Shift (NITTS) is the first manifestation of injury to hearing following exposure to noise. While its mechanisms are still the object of investigations, its clinical manifestations can be observed by proceeding to audiometric tests. In 1958, Ward et al demonstrated that NITTS is dependent on noise intensity. Formulas were developed in relation to the acquisition and the recuperation of NITTS. Ward also postulated that, for the first ten years, there is a relation to NITTS and Noise-Induced Permanent Threshold Shift (NIPTS). Evolution

of HTLs and NITTSs were performed on 220 employees in 5 different plants. Based on the results of the noise analyses of this study, NITTS and NIPTS evolution of the involved workers was done taking into account several variables, such as: dosimetry, spectral noise analysis, tasks, HPDs used, NITTS evolution of HTLs on day of tests and evolution of PTS over several years. Results of this study are presented.

4. Developing a Low-Cost Miniature Personal Noise Dosimeter

Harold A. Cheyne, II, Ph.D., Sensimetrics Corp., Somerville, MA

This research aims to develop a miniaturized, low cost, user-friendly personal sound level dosimeter that meets the ANSI S1.25-1991 standard. The intended user is anyone whose work-related or recreation-related noise exposure may cause hearing loss. The prototype uses a microcontroller, LCD display, an inexpensive microphone capsule, and a reduced feature set as compared to commercial dosimeters. Preliminary tests suggest its approximations to standard dosimeter function blocks can simplify signal processing without sacrificing ANSI operating tolerances.

5. Evaluation of Active Hearing Protectors by Physical versus Psychoacoustic Means

Dr. Hugo Fastl, AG Technische Akustik, Lehrstuhl fuer Mensch-Maschine-Kommunikation
Technische Universitaet Muenchen, Germany

Active hearing protection was first largely used in the headsets of pilots. In essence, the surrounding noise is measured by a microphone, inverted in phase and played back by the headphone. Ideally, the (inverted) playback noise and the external noise cancel each other perfectly. This concept has been so successful that active noise cancelling is widely used these days. The effectiveness of the noise reduction is limited to lower frequencies, say below 2 kHz and usually measured in decibels reaching typical values of 10...20 dB. In the poster, the psychoacoustic meaning of these figures is addressed. It will be shown, how much the perceived loudness is reduced by a typical "anti noise" device. Using the Dynamic Loudness Model (DLM), predictions are given for persons with normal hearing as well as persons who already acquired hearing deficits.

6. The Effect of Noise Exposure on the Spectral Periodicity of Otoacoustic Emissions

Jennifer L. Hill, B.S., Ball State University, Muncie, IN
Lauren A. Shaffer, Ph.D., Ball State University, Muncie, IN

High resolution measures of distortion product otoacoustic emissions (DPOAEs) reveal a quasi-periodic pattern of amplitude variation with frequency called fine structure. Approximately 20 normal hearing subjects experiencing significant history of noise exposure were recruited. Spacing and depth of fine structure peaks were measured. These results are compared to the same measurements from a normal hearing, non-exposed control group. We test the hypothesis that noise exposure broadens the spacing of fine structure peaks.

7. Public Occupational Hearing Loss Surveillance in Rio Grande do Sul Brazilian State

Raul N. Ibañez – M.D.,

Otolaryngologist (presenter), Centro Estadual de Vigilância em Saúde (State Health Surveillance Center), Porto Alegre - Rio Grande do Sul – Brasil

Elisa Lucchese – Audiologist

Gabriel R. Cordoni – M.D., Occupational Medicine

Christian F. Bezerra – Systems Analyst

Public occupational hearing loss surveillance in Rio Grande do Sul State is a challenge to State Health Department (Secretaria de Estado da Saúde). Federal Legislation refers to employer obligations, but almost one half of working people belongs to informal economy, that means, have no employer. This presentation describes public regional centers of surveillance, intervention and assistance in occupational hearing loss prevention as well as a web based system developed to centralize audiometric information from public services.

8. The Sound Attenuation Fit Estimator (SAFE₅₀₀)

Antony R. Joseph, Au.D., Ph.D., U.S. Navy, FPO, AP

A review of a simplified method of insert ear protector fit-testing, dubbed the Sound Attenuation Fit Estimator (SAFE₅₀₀), which uses a single test frequency (500 Hz) in a real-ear attenuation at threshold (REAT) headphone technique, will be presented. Statistical data from two independent samples of naïve earplug wearers, including Kappa analyses, will be discussed. Because the SAFE₅₀₀ procedure correlates highly with the subject-fit Noise Reduction Rating (NRRSF), it should be regarded reliable for earplug attenuation estimation.

9. How Airborne Ultrasound Damages Hearing

Martin Lenhardt, Au.D., Ph.D. Biomedical Engineering,
Virginia Commonwealth University, Richmond VA

The ACGIH increased the TLVs for airborne ultrasound and these levels were adopted by OSHA. The European community and Canada have retained the more stringent levels that stemmed from reports of “ultrasonic sickness” in the 1960s. The US less restricted values are now supported by the mechanism of airborne ultrasonic entry in the body. The pathway is through the eyes via brain fluid conduction into the cochlea and the recommended hearing protection is goggles.

10. Noise Exposure Levels, Hearing Loss, and Hearing Conservation in a University Music Program

Dana Libman, Sheetal Vyas, Jennifer Lister, University of South Florida doctoral project co-chair
Robert Zelski, University of South Florida doctoral project co-chair

In a university percussion department, sound levels were recorded during lessons, rehearsals, and performances. Hearing evaluations were performed before and after music exposures. OSHA’s eight hour time weighted average (TWA_(8 hr)) of 85 dBA was not exceeded, however the extreme noise limitation of 115 dBA was surpassed in all conditions. Two percussionists had hearing loss. OSHA guidelines

were used to develop a hearing conservation program for both students and faculty in the music department.

11. Use of Hearing-Loss Simulation in Military Hearing Conservation Programs

Lynne Marshall, Ph.D., Naval Submarine Medical Research Laboratory, Groton, CT
Patrick M. Zurek, Ph.D., Sensimetrics Corporation
Joseph G. Desloge, Ph.D., Sensimetrics Corporation
Judi A. Lapsley Miller, Ph.D., Naval Submarine Medical Research Laboratory

Hearing-loss simulation demonstrates future hearing impairment to people with normal hearing and can motivate them to wear hearing protection. This poster describes an extensively flexible simulator that binaurally simulates hearing loss, rapid growth of loudness, tinnitus, and hearing protection along with military applications. A demonstration is provided. This improves on earlier simulations, which have mainly used recordings, or have used real-time signal processing with linear filtering only, which does not capture loudness recruitment. (Work supported by ONR and NIDCD.)

12. Noise Exposures from Road Paving Equipment on Construction Sites: Bystander and Operator Positions

Lovejoy Muchenje, Auditory Systems Laboratory, Virginia Polytechnic Institute and State University, Blacksburg, VA
Jeff A. Lancaster, Ph.D., Auditory Systems Laboratory, Virginia Polytechnic Institute and State University, Blacksburg, VA
John G. Casali, Ph.D., CPE, Auditory Systems Laboratory, Virginia Polytechnic Institute and State University, Blacksburg, VA

Road construction workers are exposed to intense noise during their operations. In a research study investigating the impediments to speech and signal detection for these workers, it has been found that they are exposed to noise levels as high as 106 dBA (i.e., milling machines), and it has been observed that few, if any, of these workers wear hearing protection. Pre- and post-shift audiograms indicate threshold shifts, further spotlighting the need to protect these workers.

13. The Dynamic Ear Canal and Compliant Earpieces

Bob Oliveira, Ph.D., Hearing Components, Oakdale, MN
Vasant Kolpe, Ph.D. and Bill Parish, M.S.

Common problems caused by the ear canal and compliant solutions will be discussed to improve the physical fitting of earpieces. Ear canal changes will be viewed from four time windows: a) jaw motion—seconds and minutes, b) water retention—hours c) cerumen production—days, and d) the aged canal—years. Laser scans defining changes in the canal with normal jaw action from the bony region to the active outer cartilaginous region will also be discussed.

14. Bone Conduction Sensitivity to Sound Field Stimulation

Sabine Reinfeldt, Department of Signals and Systems, Chalmers University of Technology, Goteborg, Sweden
Stefan Stenfelt, Tobias Good, and Bo Hakansson, Department of Signals and Systems, Chalmers University of Technology, Goteborg, Sweden

Bone conduction (BC) sensitivity for sound field stimulation gives an estimate of the maximal attenuation achievable by ordinary hearing protection devices. Above this limit, BC transmission is dominant. The BC sensitivity was estimated using three methods: Real Ear Attenuation at Threshold, Microphone in Real Ear, and by measuring the vibrations of the skull bone with an accelerometer. For frequencies below 700 Hz the BC sensitivity estimate was 40-60 dB and at higher frequencies it was 45-55 dB.

15. Dual Wearing of Noise Dosimeters in Agricultural Workers

*Rachel Sanders McArthur, University of Northern Colorado, Greeley, CO
Deanna Meinke, Ph.D., University of Northern Colorado, Greeley, CO
James Lankford, Ph.D., Professor Emeritus, DeKalb, IL*

The exposure to excessive sound levels from farm equipment places agricultural workers at an increased risk for noise-induced hearing loss. Farm workers typically present with an asymmetrical high-frequency noise-induced hearing loss in combination with presbycusis. The present study investigated the hypothesis that there is a differential noise exposure between the right and left ears of farmers as a consequence of farm equipment design and operator head position. Simultaneous noise dosimetry samples were obtained from each shoulder of the farm worker while operating combines or tractors.

16. Wake up Call for Audiologists Regarding Infrasonics and Very Low Frequency Noise: A Case Report

*Curtis R. Smith, Ph.D., Industrial Hearing Conservation Services, Auburn, IL
Kelli McDowell, Au.D. student, Auburn University, Auburn, IL*

This presentation is about a middle-aged white female who claims that since a multibillion dollar oil conglomerate built a natural gas compressor station approximately .5 miles away from her home, she has suffered from multiple permanent psychological and physiological problems. She claims these problems are caused by the low frequency and infrasonic sounds emitted by the compressor station. This presentation will highlight the key elements audiologists must know to handle cases such as this one.

17. Risk Patterns and Shooting Habits of Recreational Firearms

*Andrea Wagner, AuD student, Central Michigan University, Mt. Pleasant, MI
Michael Stewart, Ph.D., CCC-A, Central Michigan University, Mt. Pleasant, MI
Mark Lehman, Ph. D., CCC-SLP, Central Michigan University, Mt. Pleasant, MI*

While efforts to reduce the occurrence of occupational noise exposure are well recognized, recreational noise exposure has been given little attention. It is known that the recreational use of firearms is one of the leading causes of noise induced hearing loss (NIHL), however little is known about the shooting habits and associated risk patterns that may significantly increase the risk of NIHL secondary to firearm noise exposure. This study was conducted to acquire information regarding the risk patterns and shooting habits of recreational firearm users. Subject age, occupation, exposure to occupational noise, use of hearing

protective devices (HPDs), type of firearm used, number of unprotected shots fired per year, and self perception of hearing sensitivity and tinnitus were included as survey items. The results of this study suggest that many individuals who engage in the recreational use of firearms are at a high risk for NIHL secondary to firearm noise exposure during target practice and hunting activities and that more education regarding the risk firearm noise exposure is needed.

18. Headset Noise Experienced by Medical Transcriptionists

*Randy L. Tubbs, Ph.D., National Institute for Occupational Safety and Health, Cincinnati, OH
Chucri A. Kardous, P.E., National Institute for Occupational Safety and Health Cincinnati, OH*

NIOSH received requests from union officials to conduct health hazard evaluations at hospitals in California involving medical transcriptionists who use a telephone dictation system and who were concerned about excessive noise from the telephone headset. NIOSH and OSHA investigators visited the hospitals and measured the noise levels through the transcriptionists' headsets with an acoustic mannequin and the ambient noise levels in their offices. Employees were interviewed by a NIOSH investigator to document their concerns about the dictation system and any symptoms they felt were the result of their work. A similar dictation system was evaluated by NIOSH using the KEMAR acoustic mannequin and actual medical dictations chosen by the transcriptionists and identified as problematic. The NIOSH investigators determined that a potential for excessive noise exposure exists with the dictation equipment if the volume control is left in the maximum position. If the volume control is placed at the middle position or lower, the noise exposures through the headsets are at a safe level for an 8-hour work shift. Recommendations were offered to the employees and management at the hospitals to maintain the noise levels from the headsets at a safe level and to improve the clarity of medical dictations.

CONFERENCE PRESENTERS

Kyle N. Acker, M.A.

Kyle Acker graduated from Purdue University with a Bachelor's of Science degree in Health Sciences with a specialization in Industrial Hygiene. He is currently pursuing a Doctorate of Audiology (Au.D.) degree from the Department of Speech Language and Hearing Sciences at Purdue University. During his undergraduate work he completed a research project on the "Characterization of Diesel Particulate Emissions from School Buses." Kyle is currently working with Dr. King Chung on improving speech intelligibility and listening comfort for users of hearing protection devices and cochlear implants. Following his education he plans to enter private practice in audiology and pursue some industrial noise control consulting.

Elliott Berger, M.S.



Elliott H. Berger, M.S., is the Senior Scientist for Auditory Research at E•A•R. For 30 years he has studied hearing protection, hearing conservation, and related topics, and has presented his research in numerous lectures and publications. He chairs the ANSI working group on hearing protector attenuation, served on a National Academy of Science committee evaluating hearing loss in the military, is Past-President of the National Hearing Conservation Association, a Fellow of both the Acoustical Society of America and the American Industrial Hygiene Association, a Board Member of the Council for Accreditation in Occupational Hearing Conservation, and a recipient of the National Hearing Conservation Association's Outstanding Hearing Conservationist Award. Among his favorite sounds is the occasional and rapidly disappearing pristine silence to be heard in the deserts of the southwest.

Robert A. Bertrand, m.d., f.r.c.s.(c)



Robert Bertrand is an otologist, Emeritus Member of the Medical Health Center of the Université de Montréal. He has been actively involved in hearing conservation programs for the last 25 years as a professor. He is the director of the hearing conservation program for the Quebec Mining Association as well as several major industries. He is currently involved in the development of a TTS approach as an adjunct to be added to HCP to prevent permanent thresholds shift.

David Byrne, MS, CCC-A



David Byrne received a B.A. in physics from the University of Pittsburgh and an M.S. in audiology from Penn State University, with additional graduate study in acoustics. He served on active duty in the U.S. Army, and also worked in the Bio-Acoustics Division at the U.S. Army Environmental Hygiene Agency. David later held the position of Senior Consultant with Associates in Acoustics, Inc. He has been a Research Audiologist with NIOSH for the past seven years, first at NIOSH's Pittsburgh Research Laboratory, and now at the Robert A. Taft Laboratories in Cincinnati.

John G. Casali, Ph.D., CPE



Dr. John Casali is the John Grado Professor of Industrial and Systems Engineering at Virginia Tech. After receiving his Ph.D. in Human Factors Engineering at Virginia Tech, he developed the Auditory Systems Laboratory, an acoustics research facility that specializes in hearing protection, auditory displays, and communications devices. He is a Fellow of the *Human Factors and*

Ergonomics Society and the *Institute of Industrial Engineers*, and is President-Elect of NHCA. He has received NHCA's Media award. His research at Virginia Tech has been sponsored by various government agencies and corporations to a total of over \$5.5 million. He serves on several standards committees for ANSI and the National Fire Protection Association dealing with personal protection equipment. Dr. Casali holds three patents and has authored over 150 publications. He enjoys consulting with companies and community groups on warning signal issues, hearing protection, community noise, and patent litigation, at least between periods of fishing and pretending to be a mechanic to his British sports cars.

Harold A. Cheyne, II, Ph.D.



Harold A. Cheyne II, PhD, Research Scientist, received his B.S. in Electrical Engineering at Tufts University, and his Ph.D. in Speech and Hearing Biosciences and Technology from MIT. His dissertation focused on developing an acoustic model of the human vocal system to relate external skin acceleration to conventional clinical measures of vocal function. He continued this work by collaborating with Sensimetrics to develop an ambulatory monitoring device for voice that uses an accelerometer as input. Currently at Sensimetrics, his research explores developing a low-cost miniature sound level dosimeter, and investigating acoustic cues responsible for our perception of talker-to-listener distance.

King Chung, Ph.D.



Dr. King Chung is currently an Assistant Professor of Audiology at Purdue University. Her current research interests are hearing aids, the application of hearing aid technologies to create smart hearing protectors, and the application of hearing aid technologies to enhance cochlear implant performance.

Dick Danielson, Ph.D.



Dr. Dick Danielson is the Manager for Audiology and Hearing Conservation at NASA's Johnson Space Center, Houston TX. Working for the National Space and Biomedical Research Institute and Baylor College of Medicine, he leads a NASA program aimed at preventing noise-induced hearing loss (during space and ground-based missions) among astronauts, pilots, and others at Johnson Space Center. He retired from the U.S. Army after a career serving as an audiology clinician, consultant and researcher. He is the Immediate Past Chair of the Council for Accreditation in Occupational Hearing Conservation and recently served on a committee (called by the Institute of Medicine/National Academies of Science) to review hearing loss and tinnitus associated with military service from World War II to the present.

Rickie R. Davis, Ph.D.

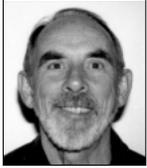


Rickie Davis, Ph.D., (Commander, US Public Health Service) is Co-Team Leader of the Hearing Loss Prevention Team at NIOSH. He is adjunct at the University of Cincinnati in biological sciences and is involved in graduate training. Joining NIOSH in 1985, his research has explored the effects of impact noise, solvents, genetics, and aging on the hearing of experimental animals. He received his Ph.D. in medical psychology from the Oregon Health Sciences University in Portland, Oregon.

Robert A. Dobie, M.D.

After medical school and ENT residency, a research fellowship, and faculty positions at the University of Washington and Texas, Bob Dobie became Director of the Division of Extramural Research at NIDCD. He is the author of *Medical-Legal Evaluation of Hearing Loss* (2nd Edition). He has served as a member of the

Council for Accreditation in Occupational Hearing Conservation, as chairman of the noise subcommittee of the AAO-HNS, and as president of the Association for Research in Otolaryngology.

Charley Fankhauser

Charley Fankhauser is an audiologist in private practice in Northern California. He limits his practice to audiology and consultation services related to prevention of occupation-related hearing loss. His other interests include education programs for children on preventing hearing loss caused by noise. He has three

sons, two grandchildren, one wife (for forty-three years) and a beagle. He recently moved from Oakland to Napa and has taken a vow to never again drink bad wine. He finds that training a beagle is equivalent in difficulty to convincing employers that they can eliminate work-related hearing loss.

Mary Florentine, Ph.D.

Mary Florentine, PhD, is Matthews Distinguished Professor of Audiology at Northeastern University in Boston. She has over 100 articles on various topics, including models of auditory processing in normal hearing and hearing loss, understanding speech in noise, cross-cultural attitudes toward noise, and hearing-loss prevention. She has received continuous funding from NIH to support her research for over 20 years. She is a Fellow of the Acoustical Society of America and the American Academy of Audiology.

of the Acoustical Society of America and the American Academy of Audiology.

John R. Franks, Ph.D.

Dr. John Franks of the National Institute for Occupational Safety and Health has been involved in the development of standards and regulations related to occupational hearing loss prevention for more than 30 years. He has served on committees of the American Speech-Language Hearing Association, the

American Society for Testing and Materials, the American National Standards Institute and the National Hearing Conservation Association. He has published or presented more than 70 articles and presentations and holds two patents. His interest in impulsive noise dates back to 1969 when he forgot to insert his earplugs before firing an M-1 rifle in Army basic training.

Jeffrey M. Goldberg

Jeffrey M. Goldberg, President, Custom Protect Ear Inc., began in 1969 when he conceived, created and built the first Cash and Carry retail chain Canada and continued to build this company for the following 15 years. Concentrating on plumbing, heating, hardware, tools and electrical products, this chain

evolved to six major plumbing centers with sales to both consumers and contractors. In 1985, Jeffrey then created the Goldberg & Pegg Plumbing Corporation in order to capitalize on the market demand for lower priced plumbing fixtures. This corporation created supply relationships in Central America and Asia and sold its branded products to contractors and distributors throughout Canada. In 1988, Jeffrey joined the Goldberg & Pegg Plumbing Corporation with Western Pottery, based in Los Angeles, California, to create a North American wide manufacturer & distributor of plumbing fixtures.

Western Pottery had offices situated in Vancouver, Los Angeles and Bangkok, Thailand. Under Jeffrey's sales direction, the merged company almost trebled its sales by 1994. In 1996, Western Pottery was taken public and Jeffrey became Vice President, Sales and Marketing and was responsible for all product, promotional and sales aspects of the corporation, to include a sales force of 50 agents directly under Jeffrey's authority. In 2002, Jeffrey purchase Custom Protect Ear Inc., and became involved in all aspects of the business as President. Custom Protect Ear is North America's foremost manufacturer of custom molded hearing protection. Community service is also important to Jeffrey and he has been a board member of Vancouver Talmud Torah, a Jewish Parochial school, Fund Raising chairman for Schara Tzedek Synagogue, member of the working cabinet for the central fund raising campaign of the Jewish Federation of Greater Vancouver and Board Member of both the Jewish Federation of Greater Vancouver and Jewish Community Centre of Greater Vancouver.

Susan Griest, M.P.H.

Susan Griest, M.P.H. is a Staff Scientist for the Oregon Hearing Research Center at Oregon Health and Science University. She also is a collaborator with the Veterans Affairs Medical Center, National Center for Rehabilitative Auditory Research in Portland, Oregon. She received her Masters in Public Health from the

University of Washington (1989). For the past 22 years, Ms. Griest has been a researcher and educator in the area of tinnitus and noise-induced hearing loss. She has been a Co-Investigator for the Dangerous Decibels% project over the past four years. Since 1996, Ms. Griest has been a member of the National Hearing Conservation Association (NHCA) Task Force: Hearing Conservation Education for Children & Adolescents. For the past two years she has served as the associate member delegate for the NHCA Executive Council.

Scott C. Grinker, B.S.E

Scott Grinker is a Project Engineer working in the electro-acoustical engineering department at Shure, Inc. Shure is the manufacturer of audio electronics, wireless and wired microphones, and consumer audio accessories. He is currently working with the Personal Audio Division at Shure, developing in-ear earphones, telecomm headsets, and other high-end portable consumer accessories. He holds a B.S. in Acoustical Engineering from Purdue University and is completing his Master of Engineering in Acoustics from Penn State University. He also holds an M.B.A. from Ball State University.

Lee D. Hager

Lee Hager brings nearly 20 years of experience to his position as Hearing Loss Prevention Consultant for Sonomax Hearing Healthcare, including consultation regarding the quality and integrity of hearing conservation programs. He has served as President of NHCA; chair of the Noise Committee of AIHA; NIOSH National Occupational Research Agenda team member; and with ANSI S12/WG11 on hearing protector evaluation and labeling issues. He presents and publishes regularly on noise and hearing, having received the AIHA Noise Committee Outstanding Lecture Award in 2003 and NHCA's Threadgill Award in 2004.

Alice E. Holmes, Ph.D.

Dr. Alice E. Holmes is a Professor of Audiology and Graduate Coordinator in the Department of Communicative Disorders at the University of Florida. She received her doctorate in Communication Disorders from the Pennsylvania State University. She is the director of the AuD distance-learning program at

UF. Dr. Holmes has also been the audiology director of the Cochlear Implant Team at the University of Florida since 1985. She is a past president of the Academy of Rehabilitative Audiology and currently Secretary and an Invited Fellow of the International Colloquium of Rehabilitative Audiology. Her honors include the 2003 Professional Achievement Award, Idaho State University, GN Resound 1999 Caring of the Profession Award, and Florida Association of Speech-Language Pathologists and Audiologists 1999 Clinician of the Year. She is Board Certified with a Specialization in Cochlear Implants. She has been involved in a series of studies on the prevalence and effects of hearing loss in adolescents and young adults.

James J. Jerome, MA, CCC-A



James (Jim) Jerome has been president/occupational audiologist of Hearing Safety- Midwest, Inc, in Indianapolis, Indiana, since July 2002. Prior to that he worked as an occupational audiologist for an industrial hygiene and safety group for four years and as a U. S. Army audiologist for twenty-one years. He holds an undergraduate degree from the University of Wisconsin- Milwaukee and a masters degree from Western Illinois University. He has been a certified course director with CAOHC since 1985, and a member of NHCA since 1999.

Antony R. Joseph, Au.D., Ph.D.



Dr. Antony R. Joseph, Lieutenant Commander, is the Director of Community Health for the US Naval Hospital Okinawa Japan. Tony is board certified by ABA, Fellow of AAA, certified member of ASHA, and a certified Course Director of the CAOHC. Tony received his BS (1985) Marquette University, MA (1989) University of Massachusetts at Amherst, AuD (2001) Central Michigan University, and PhD (2004) from Michigan State University specializing in Experimental Audiology and Epidemiology.

Jeffrey A. Lancaster, Ph.D.



Dr. Jeffrey Lancaster is Research Assistant Professor of Industrial and Systems Engineering at Virginia Tech, and Laboratory Manager of the Auditory Systems Laboratory, an acoustics research facility. He holds the M.S. and Ph.D. in Human Factors Engineering/Ergonomics, is a member of the *Human Factors and Ergonomics Society* and NHCA. He has conducted numerous experimental investigations into hearing protection devices and augmented devices for both basic and applied research. He has substantial experience with real-ear-attenuation-at-threshold (REAT), microphone-in-real-ear (MIRE), and acoustic test fixture (ATF) testing protocols for hearing protection. He also conducts research into flight safety, particularly as it relates to communications issues and pilot workload.

Martin Lenhardt, Au.D., Ph.D.



Marty Lenhardt hold a B.S. in Biology and a M.A. in Audiology from Seton Hall University in N.J., an Au.D. From Kirksville College of Osteopathic Medicine, a Ph.D. in Psychoacoustics/Speech Science from Florida State University and a postdoctoral fellowship in Otolaryngology and Biomedical Engineering at the John Hopkins University. Marty is presently Professor of Biomedical Engineering, Otolaryngology and Emergency Medicine at Medical College of Virginia, of Virginia Commonwealth University in Richmond. Marty is a principal in two bio tech companies at the university's Research Park. He co-authored, with the late Dan Johnson, the OSHA ultrasonic hearing standards.

Merlyn Lubiens



Merlyn Lubiens is President of Center for Hearing Health (CHH), a provider of audiology services in the administration of industrial hearing conservation, based in northern California. For the past 25 years Merlyn has actively applied his administrative and leadership skills to the world of occupational hearing conservation. This has included various committee responsibilities with the National Hearing Conservation Association (NHCA), a term as President of NHCA, and Merlyn was the 2002 recipient of NHCA's Michael Beall Threadgill Award.

Lynne Marshall, Ph.D.

Dr. Lynne Marshall is a Senior Research Audiologist at the Naval Submarine Medical Research Laboratory in Groton, Connecticut. She also is a Jayhawker from the University of Kansas, where she obtained master's degrees in Speech Pathology and in Audiology, and a Ph.D. in Speech and Hearing Science. Following a clinical fellowship year in audiology at the Upstate Medical Center in Syracuse, New York, she spent several years in Omaha, Nebraska, where she was Clinical Coordinator of Audiology at the University of Nebraska Medical Center, a faculty member at the University of Nebraska, and also did postdoctoral work at Boys Town National Research Hospital. At the Naval Submarine Medical Research Laboratory she first did auditory sonar research, and now is working on the potential role of otoacoustic emissions in Hearing Conservation Programs, a hearing-loss simulator for Hearing Conservation applications, and a model to estimate the Life-Cycle costs of hearing loss for designers of weapons systems and platforms (e.g., ships).

William Hal Martin, Ph.D.



Dr. Billy Martin is the director and one of the co-founders of the Dangerous Decibels® noise-induced hearing loss and tinnitus prevention program and recipient of the OHSU Distinguished Science Educator Award for extensive work in hearing health education and science outreach. He serves as the Research Scientist in Residence to the Oregon Museum of Science and Industry. Dr. Martin's training included speech and hearing science, linguistics, electrical engineering, medicine, neuroscience and computational physics. His research interests include health communications theory applied to NIHL prevention, the neurobiology of tinnitus, and the development of intraoperative neurophysiological monitoring techniques.

Rachel I. McArthur, Au.D. Candidate



Rachel I. McArthur is a third year Au.D. student from the University of Northern Colorado in Greeley, Colorado. She graduated with a double major of Audiology and Speech Language Pathology and a minor in musical performance from UNC in 2003.

Susan Megerson, M.A., CCC-A



Susan Megerson received her B.A. from Emory University and M.A. in Audiology from the University of Kansas. She is an ASHA-certified audiologist, CAOHC-certified course director, and long-time provider of hearing conservation services to industry. She is a past Chair of the Council for Accreditation in Occupational Hearing Conservation and has been an active member of the American Industrial Hygiene Association's noise committee. Susan joined NHCA in 1986 and has served on committees, the executive council, and as the association's President. She is the 1998 recipient of NHCA's Threadgill Award for Outstanding Service. She is currently a consultant and instructor at the University of Kansas.

Kevin Michael, Ph.D.



Dr. Kevin Michael is President of Michael & Associates, evaluating hearing protectors in a laboratory environment for many years. Kevin developed FitCheck, an HPD evaluation system designed for use on workers assisted by a company hygienist. He and his partner, Alton Burks, also formed the start-up company doseBusters USA. The doseBusters methodology is based on the concept of continuous monitoring of protected noise exposure. Kevin has a B.S. and M.S. in Electrical Engineering, and a Ph.D. in Communication Disorders from Penn State.

Thais Morata, Ph.D.



Thais Morata is an audiologist who has been working in the area of hearing loss prevention since 1982. A native of Brazil, she earned degrees in speech pathology and audiology and communication disorders from the Pontifical Catholic University of São Paulo (B.S.; M.S.) and the University of Cincinnati (Ph.D.). She works at the National Institute for Occupational Safety and Health, in Cincinnati, OH, USA. Her main area of interest is the prevention of auditory effects of combined exposure to noise and chemicals in the workplace. She collaborates with several international occupational health institutes in this area and is a guest lecturer at the University Tuiuti do Paraná, in Brazil.

Lovejoy S. Muchenje



Lovejoy S Muchenje is a graduate research assistant in the Auditory Systems Lab at Virginia Polytechnic and State University. His duties in the Lab include assisting in collection and interpretation of data in various auditory research projects and running HPD tests. Mr. Muchenje is currently working on his Masters degree in Industrial and Systems Engineering doing the Human Factors option. His current thesis topic is based on noise conservation in construction Industry. Prior to that he was at The Ohio State University where he attained his Bachelors degree in Mechanical Engineering.

CDR William J. Murphy, Ph.D.



Commander William Murphy is co-leader of the NIOSH Hearing Loss Prevention Team in the Division of Applied Research and Technology in Cincinnati OH. His primary interests are fundamental acoustics, hearing loss, hearing protection devices (HPDs) and noise control engineering. Recently, he has researched the impulse response of both nonlinear and linear hearing protectors and has developed software to measure the attenuation of HPDs and pioneered the analysis of laboratory and field attenuation measurements of HPDs.

Rick Neitzel, M.S.



Rick Neitzel holds an MS in Environmental Health from the University of Washington, a BS in Safety from the University of Southern California, and is a Certified Industrial Hygienist. He is a Research Scientist in the UW Department of Environmental and Occupational Health Sciences, serves as Director of Communications for the National Hearing Conservation Association, and sits on the Noise Committee of the American Industrial Hygiene Association. His research interests include assessment of noise exposure and hearing loss in construction, evaluation of vibration exposure and health effects, and development of noise controls and effective hearing conservation programs.

Robert J. Oliveira, Ph.D.



Bob Oliveira, Ph.D., is the founder/president of Hearing Components; Oakdale, MN, as well as a biochemist and inventor. Hearing Components conducts research on the ear canal to design and manufacture unique products that make personal hearing devices, e.g., hearing aids, cell phones, earphones, stethoscopes, etc., work better. The objective is to improve and/or protect hearing. Hearing Components licenses its patents and also sells associated consumable products. These inventions and products improve the reliability and performance of personal hearing devices. Ad•hear™ Cerumen Guards, Comply™ Canal Tips, Comply Soft Wraps, Comply Snap Tips and SXE™ Noise Reducing Earphones are trademarked products of Hearing Components. The National Institutes of Health have awarded Dr. Oliveira seven Small Business Innovative Research grants (~\$3 Million) for research to define the activity and geometry of ear canals and related product development to improve the physical fitting of hearing aids, earplugs, and instant fit starter-hearing devices. as well as improve hearing protection. Research, using magnetic resonance imaging, sequential ear impressions and laser scans, quantify ear canal size changes with changing mouth position, the main cause for physical fit problems with custom made hearing devices. Work is underway with the company's already strong position in hearing-in-noise. Dr. Oliveira has over 15 patents, has published over 30 articles or chapters on topics related to the human ear canal, and has given numerous invited presentations throughout the world. He has been an elected member of the Board of Directors of the Hearing Industries Association and an elected Board Director member for the American Auditory Society. His background includes a doctorate in biochemistry from Iowa State University and post-doctoral work in bio/immunochemistry and aging at the Oak Ridge National Laboratories. He worked at 3M for 18 years where he developed products in biochemical diagnostics and disposable surgical products and led their Cochlear Implant business for five years. In 1990 he spun Hearing Components out of 3M as a stand-alone independent business.

Aaron Patnode



Aaron Patnode is the Media Specialist in the Department of Public Affairs and Marketing at Children's Hospital Boston. Spending the majority of his time combing the hospital in search of newsworthy research and clinical stories, he is also responsible for maintaining the press reputation of one of the world leaders in pediatric care. Having cultivated relationships with reporters and producers on the national and local levels, he has placed expert interviews with outlets including NBC Nightly News, CBS Evening News, ABC World News Tonight, Good Morning America, the CBS Early Show, the TODAY Show, the *New York Times*, *Wall Street Journal*, and *USA Today*. Keenly aware of exactly what producers and reporters are looking for in an interview, Patnode also has significant experience media training spokespeople who have little or no experience working with members of the press. Prior to working for Children's Hospital Boston, Aaron spent four years as an account executive with a public relations firm in Waltham, Mass., where he was responsible for securing coverage for several small to mid-sized entrepreneurial high tech companies. Aaron received a B.A. in Communications from Boston College where he was the recipient of the Brian D. Hall Award for student leadership in extra curricular activities.

Christine Perneti, MA, CCC-A

Christine Perneti is an Occupational Audiologist and manager of the Hearing Conservation Department at St. Luke's Hospital in Cedar Rapids, Iowa. She received her M.A. in Audiology from Central Michigan University and has been practicing audiology for over 20 years. She is currently involved in coordinating and providing mobile hearing testing and training services, CAOHC training and custom hearing protection, and will begin pursuing her AuD in 2006.

Major Rob Pluta



Major Rob Pluta has been an Air Force audiologist for 12 years. He's currently assigned to Brooks City-Base, TX, as the Chief of the Hearing Conservation Data Registry. His prior military assignments include Offutt AFB, NE, Mac Dill AFB, FL, and Lackland AFB, TX. Prior to obtaining his Master's degree from the

University of Georgia, Rob spent four years as a clarinetist while assigned to the Band of the Air Force Reserve.

Jerry L. Punch, Ph.D.



Dr. Jerry Punch, an audiologist, is a professor in the Department of Audiology and Speech Sciences at Michigan State University, where he directs the Hearing Aid Research Laboratory. His research interests include hearing aids, hearing aid fitting procedures, hearing conservation, hearing handicap, and the development of hearing performance standards. He is a Fellow of the American Speech-Language-Hearing Association (ASHA) and is the recipient of three research and service awards.

Sabine Reinfeldt, M.Sc.



Sabine Reinfeldt received her M.Sc. in Physics Engineering with emphasis on Biomedical Engineering from Chalmers University of Technology, Gothenburg, Sweden, in 2003, and is currently a Ph.D. student in the Hearing Research Group at the department of Signals and Systems at Chalmers University of Technology. Her Ph.D. project, Hearing and communication in extreme environments, takes advantage of bone conduction hearing and skull bone vibrations from one's own voice to communicate in noisy environments.

Timothy L. Rink, Ph.D.



Tim Rink holds an undergraduate degree from Capital University and masters and doctoral degrees in audiology from The Ohio State University. He is the founder and chief executive of HTI, Inc., a corporation that has provided on-site medical surveillance, reporting and record keeping services to clients throughout North America since 1976. In addition to serving as the PSO Delegate on the NHCA Executive Council, Tim has served on various Ad Hoc Committees.

Michael Santucci, M.S., F-AAA



Michael Santucci is an Audiologist and founder of Sensaphonics Hearing Conservation. Sensaphonics designs, develops and manufactures custom in-ear monitors and musicians earplugs for the Dave Matthews Band, Eminem and hundreds of other top touring performers as well as local club bands. He serves as a consultant to NASA, the Indy Racing League, and the Chicago Board of Trade and designs specialized, custom ear pieces to

meet their specialized applications. Michael has a BS in Speech and Hearing Science from University of Iowa and a MS in Audiology from Illinois State University. Michael was the first recipient of the prestigious Larry Mauldin Award for Excellence in the Hearing Healthcare Field for his work in raising awareness of the damaging effects of loud music on hearing.

Jeremy Slagley



Jeremy Slagley is pursuing his PhD in Occupational Safety and Health at West Virginia University under a generous Air Force scholarship. His research area has been active noise control applications with a specific focus on longwall coal mining. Jeremy and his wife Buffy have been blessed with 5 wonderful children (#6 is due in July). They make their home in Morgantown, WV, until this summer when the US Air Force will send them somewhere else.

Curtis R. Smith, Ph.D.



Dr. Curtis R. Smith is the author of "Smith's Audiometric Database Analysis System", an elaborate computer system used to analyze employee audiograms for hundreds of plants' Hearing Conservation Programs. He is a Professor Emeritus of Communication Disorders at Auburn University in Auburn, Alabama. Dr. Smith is owner of Industrial Audiology in Auburn and can be reached at 334.887.6302 or fax to 334.821.2612.

Sigfrid D. Soli, Ph.D.



Dr. Sigfrid Soli is Vice President, Technology Transfer, and Head, Department of Human Communication Sciences and Devices, House Ear Institute. His laboratory develops and evaluates hearing diagnostics, assessment procedures, and devices for individuals for hearing impairment. He has advised the NIDCD on hearing aid research the National Research Council on functional hearing assessment. He is currently a consultant to the FDA's Ear Nose and Throat Device Panel and a Fellow of the Acoustical Society of America.

Mark R. Stephenson, Ph.D.



Mark Stephenson is a Senior Research Audiologist at the Centers for Disease Control and Prevention's National Institute for Occupational Safety and Health (NIOSH). In this capacity, he is responsible for coordinating the NIOSH hearing loss prevention research programs. He joined NIOSH in 1993 after having completed a 20-year career in the USAF. Mark spent most of his Air Force career at the Aerospace Medical Research Laboratory where he investigated the effects of hazardous noise and hearing protector performance. At the time of his retirement from the USAF, he was serving as an Associate Chief of the USAF Biomedical Sciences Corps, through which he functioned as the director of the USAF audiology programs. In 1986, Mark received a Ph.D. in audiology from Ohio State University.

Richard L. Stepkin



Richard Stepkin has dedicated his entire professional career to Occupational Audiology, three years as a military audiologist and the last 30 years as founder and president of Enviromed Corp in Lindenwold, NJ, a company serving industry in all aspects of hearing conservation, mobile audiometry, and educational training throughout the U.S. Contact him at rstepkin@protectyourhearing.com.

Michael Stewart, Ph.D.

Dr. Michael Stewart received his MA degree in audiology from Western Michigan University and his Ph.D. degree in audiology from Michigan State University. He has been a supervising audiologist in hearing conservation since 1979 and currently operates a private practice in East Lansing, Michigan which provides clinical, educational and industrial audiology services. He is also a professor in the Department of Communication Disorders at Central Michigan University where he teaches doctoral-level classes and conducts research in various aspects of recreational and industrial hearing conservation.

Carolyn Tolley

Carolyn Tolley is a certified and licensed Industrial Audiologist whose 22 years experience in the field of Occupational Hearing Conservation has brought her much recognition. She is President and owner of ASI Health Services since 1982. She is located at the corporate office in Dallas, Texas and has a northeast office in Pittsburgh, PA. Prior to becoming an Industrial Audiologist, Carolyn worked as a clinical audiologist for three years and prior to that a teacher of the deaf for three years. She was President of the National Hearing Conservation Association in 1989 and served on the Board of Directors from 1983 through 1990 and as the PSO Delegate in 2002. She is a past Chairman of the Board of Directors of the Texas Safety Association and has served as a Director and Officer from 1984 to current. The Texas Safety Association awarded Carolyn certificates for devoted service as Exhibits Chairman, Vice Chairman for Community Safety for five years, Secretary Treasurer and Chairman of the Board. She is also past President of Women in Executive Leadership. In 1994 she was awarded "Woman of the Year" by the Women in Executive Leadership of Dallas, Texas. In 1998, she was featured in a book entitled Cases of Women Who Have Won. She also took part in the originating task force committee that created the Texas Academy of Audiology.

Randy L. Tubbs, Ph.D.

Dr. Randy Tubbs is a psychoacoustician with NIOSH, having served in this position for the last 20 years of his 28 year career as an officer in the U.S. Public Health Service, reaching the rank of Captain. He is responsible for addressing all of the occupational noise and vibration exposure requests in support of NIOSH's Health Hazard Evaluation program. He received his A.B. in Experimental Psychology from the University of Michigan - Flint, and the M.A. and Ph.D. degrees in Experimental Psychology from Miami University, Oxford, Ohio. Dr. Tubbs is active in research on the effects of noise on hearing, on hearing conservation programs, and on occupational vibration exposures.

Andrea S. Wagner, Doctor of Audiology Student

Andrea is a student in Central Michigan University's Doctor of Audiology program. She will complete the program and receive her Au.D. degree in May of 2006. She is currently completing her 4th year externship at a private practice in Ohio. She received a Bachelor of Science degree from the University of Nebraska.

Andrea is a candidate member of the Academy of Dispensing Audiologists and the American Academy of Audiology. She is also a member of the National Association of Future Doctors of Audiology where she served as Chapter President.

**Laurie Wells, MS, FAAA**

Laurie Wells is a board certified audiologist and the Manager of Audiology for Associates in Acoustics, Inc. She has served NHCA in the past on the Nominations, Steering, Publications, and Editorial committees and in

electing offices as Secretary and Vice-President, President-Elect and currently as NHCA President. As a hearing loss prevention consultant, Laurie provides professional audiology review and audiometric database management, advises on hearing conservation issues including hearing protection, workers' compensation, employee education, recordkeeping, noise measurement, and hearing loss management in the work place. Laurie is a CAOHC course director and has directed multiple courses in the U.S. and Europe.

Linda Welsh, Ph.D.

Linda M. Welsh, PhD, is a psychotherapist at Brown University. Her primary research area is in behavioral addictions. Her dissertation explored Internet Addiction and her postdoctoral research focused on music-listening behaviors. Whereas the bulk of her clinical work has been with college students, she has also worked with a wide range of clients as a smoking cessation counselor and a crisis clinician.

Gail M. Whitelaw, Ph.D.

Gail M. Whitelaw, Ph.D. is the Clinic Director at The Ohio State University in Columbus, OH. She is responsible for overseeing the administration of the Speech-Language-Hearing Clinic at Ohio State. Her areas of clinic interest are in pediatric and educational audiology, including hearing screening and conservation programs aimed at children, tinnitus, and auditory processing disorders in children and adults. She also provides clinical supervision to students enrolled in the AuD program and teaches courses in the area of pediatric audiology in Ohio State's AuD program. In addition, Dr. Whitelaw is on a Maternal and Child Health (MCH) with the focus on facilitating leadership among professionals working on interdisciplinary teams with children with neurodevelopment disabilities and their families. Dr. Whitelaw currently serves as President of the American Academy of Audiology. She has been a member of the The Academy's board of directors (2000-2003). Dr. Whitelaw has served the Academy as chair of the governmental relations committee, as a committee member on a number of convention committees, and as the Program Chair for Convention 2004 in Salt Lake City, UT. She is a past-president of the Ohio Academy of Audiology and served on the Ohio Speech and Hearing Governmental Affairs Coalition (GAC) for more than a decade.

Brad K. Witt

Brad is Audiology Manager at Howard Leight Industries in San Diego, part of the Bacou-Dalloz Hearing Safety Group. He has consulted to Hearing Conservation Programs for 25 years, providing OSHA-standard services to 200 worksites. He served as President of NHCA, and prior to joining Howard Leight Industries, was Industrial Audiologist for six years at Saudi Aramco. In his present position, he manages the Howard Leight Acoustical Laboratory, and provides training to professional and end-user groups in all aspects of hearing conservation.

Dr. David D. Yager

After undergraduate years at Wesleyan University, Dr. Yager studied human anatomy, physiology, and pathology at the University of Michigan Medical School. Pursuing an interest in animal communication, he moved to Cornell University where his doctoral and postdoctoral research included studies of underwater frog communication, insect hearing and bat evasion, and fish that use electric signals for navigation and courtship. Currently on the faculty of the University of Maryland, his research focuses on the evolution of hearing.



HERE TODAY. HEAR TOMORROW.

What people hear at work doesn't stay at work.

Noise-induced hearing loss is cumulative. And irreversible. Howard Leight helps ensure that everyone receives the full benefit of hearing protection with in-ear choices that are comfortable, convenient and specially suited to their needs. Let Howard Leight show you a whole new way to look at hearing protection that puts the focus where it should be: on people. Learn more at www.hearingportal.com/people

