National Hearing Conservation Association • www.hearingconservation.org

PRESIDENT'S WELCOME

Thank you for joining us here in beautiful Grapevine Texas for our 43rd annual NHCA Conference. The theme is "Deep in the hEARt of Texas" and so here we are in Texas where everything is bigger! The 2019 Conference Program Committee has worked hard this year led by Program Chair, Edward Lobarinas and his Program Chair-Elect, Tanisha Hammill. As always, it takes a team and other members of the committee who spent many hours on the planning included Elliott Berger, Rachel Bouserhal, Susan Cooper, Kathy Gates, Heather Malyuk, and the Presidential Trio. A very special thanks to the staff of our new management company, Civica. The staff heavily involved in conference planning, and here in attendance, are Kim Gill, Emma Gremel, and Jessica Goth. They have done a tremendous job of assuming a very difficult undertaking midway. Of course, we always appreciate the support of Cory Portnuff, our AV Technician. Please take the time to thank these individuals when you bump into them here at the conference.

I am excited about the location having spent a little time in this community and I hope you will take an opportunity to visit historic Grapevine while here and to also take advantage of the many amenities the Gaylord Texan has to offer. Along with some fun, we have a nice educational line-up that starts with some great workshops, lectures, and posters designed to make this a memorable conference. We want to give a big thanks to our sponsors and our exhibitors as these conferences would not be possible without them. Please join us Thursday evening for the Exhibitor's Reception and ensure you get around to talk to and spend some time with our exhibitors throughout the conference and thank them for their support.

We always start our conferences with our Keynote and this year the Keynote will be "Hear, Better. Do More". Dan Gauger is a Senior Research Engineer with Bose Corporation and I can't wait to hear what he has to share. No conference is complete without our Friday Luncheon speaker and I have never been disappointed. This year Gershon Dublon will present "Listening Machines & the Future of Extended Intelligence." He has an impressive background and I know I am extremely curious about his presentation...maybe it will explain why Alexa listens to me and not my husband? Our Friday Night is something I always look forward to because informal networking has always been what NHCA is about for me! The Friday Night event this year is going to be a fun teambuilding and networking experience provided in the Gaylord so no need to spend time traveling to another location. It is going to be a really fun and hilarious time enjoyed by all. Of course, dinner will be provided as well as a cash bar. If you are a newcomer or student there will be a reception just prior to the event, so stayed tuned for announcements on that. We are doing things a little differently this year and will have our main poster session on Saturday morning during breakfast instead of our roundtables. We want to ensure you have time to visit with the poster presenters and of course, cast your votes for the poster award. We have a special treat this year so hope you definitely join us for the Awards Luncheon on Saturday as well as the Gasaway Lecture. Our featured speaker for this lecture is Brian Felsen who I'm sure will infuse the room with the passion he brings to hearing loss prevention throughout the year.

A big Texas "Howdy" to all! I hope all y'all are rested because we're fixin' to have quite a ride over the next few days. Enjoy your visit! I look forward to seeing all of you.

Vickie Tuten *NHCA President*

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NHCA LEADERSHIP

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Expanding OSHA Age Correction Tables: **Nancy Wojcik**
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Nominations: **Amy Blank**
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Webinars: **Jeffrey Goldberg**
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Liasons

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Legislative Issues: **Evan Nass**
Military Audiology Association (MAA): **Amy Blank**
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Occupational Safety and Health Administration (OSHA): **William J. Murphy**
Public Inquiry Response: **Laura Kauth**
Safe in Sound: **Thais Morata**
Social Media: **John Byram**

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GAYLORD TEXAN
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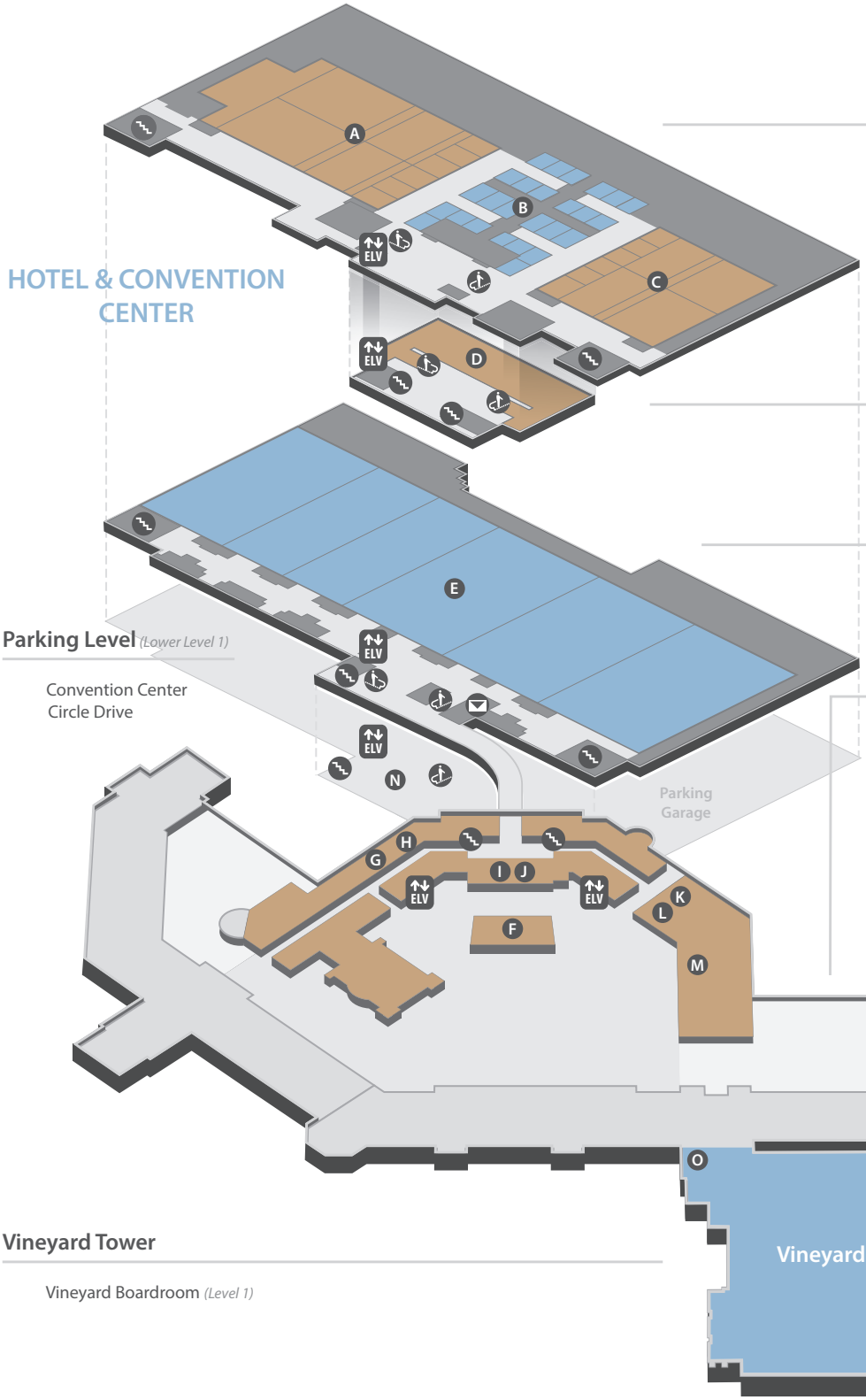


Level 3 *(Ballroom Level)*

- Texas Ballroom
- City Hall Breakout Rooms
- Grapevine Ballroom

Level 2 *(Mezzanine Level)*

- Sales & Conference Management

Level 1 *(Exhibit Level)*

- Longhorn Exhibit Halls

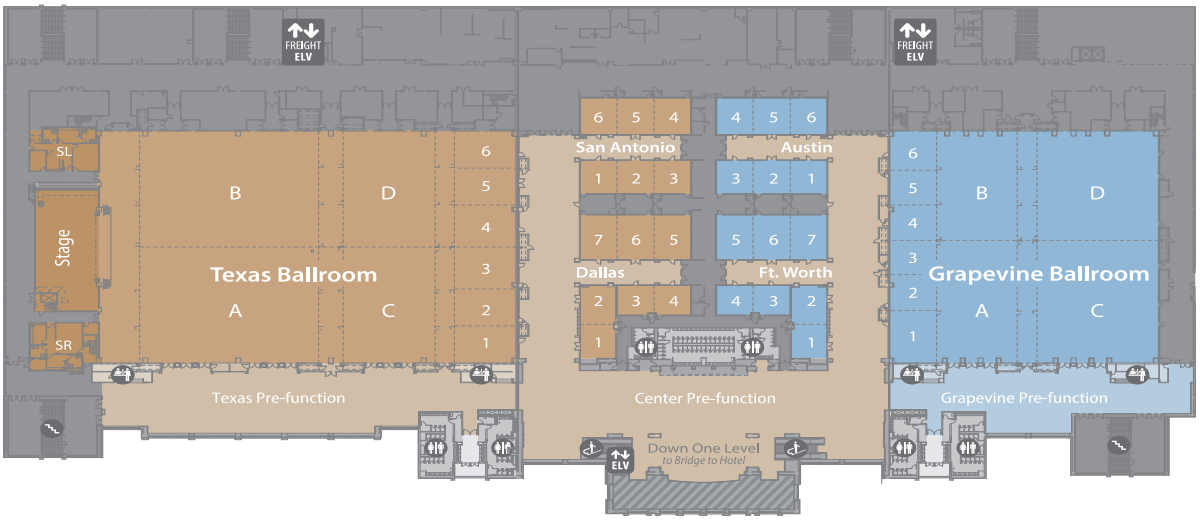
Lone Star Atrium *(Hotel)*

- Mission Plaza *(Lower Level)*
- Del Rio Meeting Rooms *(Level 1)*
- Mustang Meeting Rooms *(Level 3)*
- Bluebonnet & Primrose Boardrooms *(Level 4)*
- Palomino Meeting Rooms *(Level 3)*
- Pecos Meeting Rooms *(Level 1)*
- Appaloosa Meeting Rooms *(Level 3)*
- Yellow Rose Ballroom *(Level 1)*

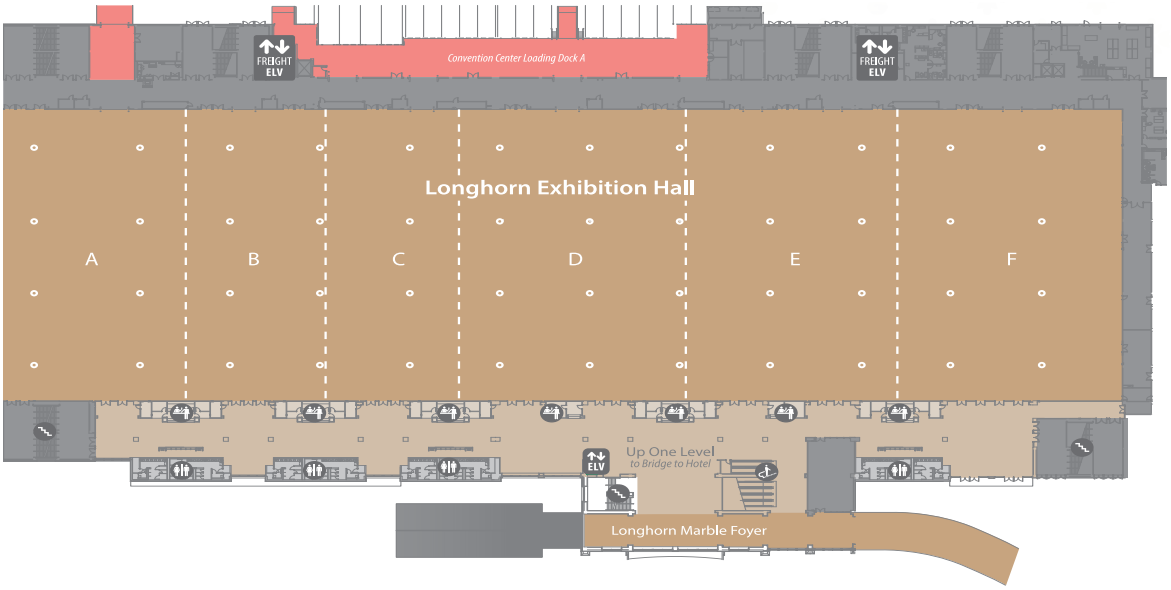
Vineyard Tower

- Vineyard Boardroom *(Level 1)*

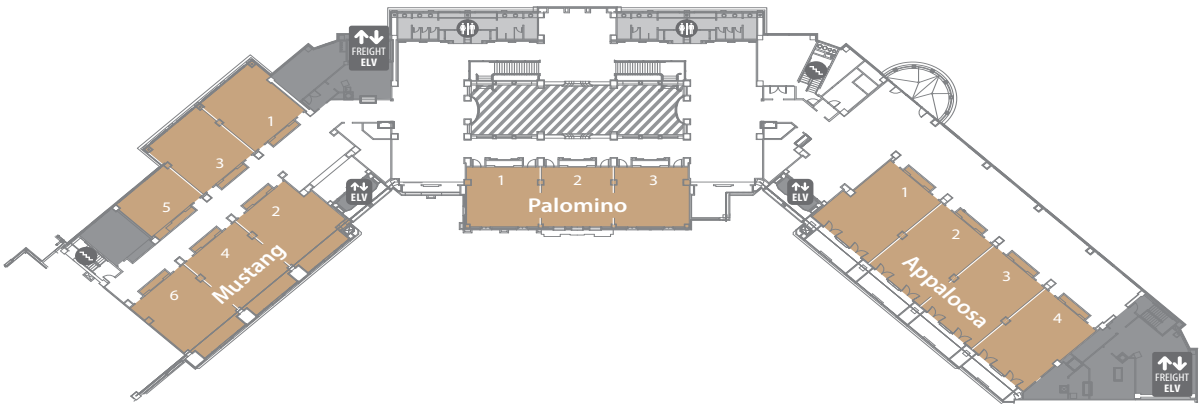
Convention Center • Level 3



Convention Center • Level 1



Hotel • Lone Star Tower • Level 3



2019 SCHEDULE OF EVENTS

Wednesday • February 6 • 2019

7:30 AM – 4:30 PM	Course Director Certification & Re-certification Workshop through CAOHC	

Thursday • February 7 • 2019

7:30 AM - 5:00 PM	Registration Desk Open	Grapevine A
7:45 - 8:45 AM	Breakfast	Grapevine A
	Full Day Workshop	
8:30 AM - 4:00PM	**The Basics Workshop** *Speakers: James Jerome, Mary McDaniel, Theresa Schulz, Theresa Small, Timothy Swisher, Laurie Wells*	Dallas 5-7
	Morning Workshops	
8:30 - 11:30 AM	**Boothless Audiometry** *Speakers: Laura Prigge, Andrew Fallon, Odile Clavier, Kathy Gates, Samuel Gordon, Dirk Koekemoer, Renee Lefrancois, Jameel Muzaffar, Rishi Mandavia*	Appaloosa 2
8:30 - 11:30 AM	**The Art of Presentation** *Speaker: Elliott Berger*	Appaloosa 3
8:30 - 11:30 AM	**Selecting Hearing Protection Devices Using New & Updated Standards** *Speakers: Kari Buchanan, Major Malisha Martukovich, Robert Williams*	Appaloosa 4
8:30 - 11:30 AM	**Overview of the proposed Audiologist and Speech Pathologists Occupational Licensure Compact** *Speaker: Dan Logsdon*	Fort Worth 1-2
11:30 AM - 1:00 PM	Lunch On Your Own	
	Afternoon Workshops	
1:00 - 4:00 PM	**Fit Testing** *Speaker: William J. Murphy*	Appaloosa 2
1:00 - 4:00 PM	**Exploring The Audio of Hearing & Hearing Conservation** *Speaker: Benjamin Kanters*	Appaloosa 3
1:00 - 4:00 PM	**Advanced Hearing Protection** *Speakers: Eric Fallon, Doug H. Moses*	Appaloosa 4
4:00 - 5:30 PM	Exhibit Set-up and Registration	Longhorn D
5:30 - 8:30 PM	Exhibitor Reception	Longhorn D

2019 SCHEDULE OF EVENTS

Friday • February 8 • 2019

7:00 AM - 5:00 PM	Registration Desk Open	Grapevine A
7:00 AM - 6:00 PM	Exhibit Hall Open	Longhorn D
7:00 - 8:00 AM	Breakfast / Exhibits Open / Silent Auction	Longhorn D
8:00 - 8:15 AM	**Opening Remarks**	Grapevine A
8:15 - 8:45 AM	**Keynote: Hear, Better. Do More.** *Speaker: Dan Gauger Author: Andy Sabin*	Grapevine A
8:45 - 9:05 AM	**The OSHA Age Corrections Are Not Correct: Evidence From NHANES & Longitudinal Analyses of Exposed Workers** *Speakers: Kristy K. Deiters, Greg Flamme*	Grapevine A
9:05 - 9:25 AM	**Adult Use of Personal Hearing Protection Devices at Loud Athletic or Entertainment Events** *Speakers: John Eichwald*	Grapevine A
9:25 - 9:45 AM	**Otoprotective Pharmacologic Agents: The Way Forward** *Speaker: Kathleen Campbell*	Grapevine A
9:45 - 10:15 AM	Break with Exhibitors	Longhorn D
10:15 - 10:35 AM	**Influence of Incidental Motor Activity On Middle Ear Muscle Contractions** *Speaker: Stephen Tasko*	Grapevine A
10:35 - 10:55 AM	**The Future Is Now: Eight Ways Otoacoustic Emissions Can Be Used To Advance Hearing Conservation Programs** *Speaker: Lynne Marshall*	Grapevine A
10:55 - 11:15 AM	**A National Occupational Research Agenda for Hearing Loss Prevention** *Speaker: William J. Murphy*	Grapevine A
11:15 - 11:35 AM	**Kurtosis Level Incorporating Additional Information Into Noise Exposure Analysis** *Speaker: Edward Zechmann*	Grapevine A
11:35 AM - 12:05 PM	NHCA Annual Business Meeting	Grapevine A
12:05 - 1:30 PM	**Luncheon Speaker - Listening Machines and the Future of Extended Intelligence** *Speaker: Gershon Dublon*	Longhorn D

Schedule Continued on Next Page

2019 SCHEDULE OF EVENTS

Friday • February 8 • 2019

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1:50 - 2:10 PM	**A Portable Auditory Localization Training System For Military Applications: Training Stimuli Development & Protocol Optimization** *Speakers: Kara Cave, John G. Casali, Kichol Lee, Brandon S. Thompson*	Grapevine A
2:10 - 2:30 PM	**Noise Injury in the Military: Where is it Really Coming From?** *Speakers: Quintin Hecht, Christopher Smalt*	Grapevine A
2:30 - 3:00 PM	Break with Exhibitors	Longhorn D
3:00 - 3:20 PM	**Acoustic Trauma: Minimum Exposures To Continuous Noise** *Speakers: Robert Dobie, Elliott Berger*	Grapevine A
3:20 - 3:40 PM	**Facilitating Corporate Adoption of Hearing Conservation Improvements & Best Practice** *Speaker: David Greenberg*	Grapevine A
3:40 - 4:00 PM	**Use of Technology in Hearing Protection Educational Interventions Among Youth: Lessons Learned From Recent Studies** *Speaker: Khalid Khan*	Grapevine A
4:00 - 4:20 PM	**Sometimes 85 is Just a Number, But Sometimes it's More. And, Sometimes it's Less** *Speaker: John Franks*	Grapevine A
4:20 - 4:40 PM	**Comparison of Gas-Powered vs. Battery-Powered Equipment for Landscape Maintenance; Hedge Trimming Operations** *Speakers: Bryan Beamer, Jackie DiFrancesco*	Grapevine A
4:40 - 5:15 PM	**2018 Safe-in-Sound Excellence in Hearing Loss Prevention Awards** *Presenter: David Byrne*	Grapevine A
5:15 - 6:00 PM	Student and New Member Meet and Greet	Mission Plaza
6:00 - 9:00 PM	Reception	
6:00 - 9:00 PM	Friday Night Event	Grapevine A

2019 SCHEDULE OF EVENTS

Saturday • February 9 • 2019

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7:00 AM - 2:00 PM	Registration Desk Open	Longhorn D Foyer
7:00 - 9:00 AM	Breakfast	Longhorn D
7:30 - 9:00 AM	Poster Session	Longhorn D

Breakout Session #1: Appaloosa 2	Breakout Session #2: Appaloosa 3	Breakout Session #3: Appaloosa 4
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Assessing Hearing, Aging, and Cognitive Decline in Agricultural Workers *Speaker: Jan Moore*	**Learning to Localize with Advanced Hearing Protectors and TCAPS, Importance and Practicality of Learning Curves** *Speakers: Kichol Lee, John G. Casali*	**Laboratory and Field Studies of MEMC in Response to Impulse Noise** *Speakers: Kristy K. Deiters, Greg Flamme, Stephen Tasko*
9:25 AM – 9:45 AM		
Noise Exposure of Sugar Cane Factory Workers in Guatemala *Speaker: Ashley Stumpf*	**Effects of Hearing Loss and Language Proficiency On Speech Intelligibility of Radio Messages Over Tactical Communication Devices** *Speakers: Christian Giguere, Chantal Laroche*	**Fundamental Mechanisms of the Objective Occlusion Effect Revisited Using A Finite Element Model of the Outer Ear** *Speaker: Kevin Carillo*
9:50 AM – 10:10 AM		
Noise and Hearing Loss Among Farmers: Results From A Point Source Intervention Study *Speaker: Chandran Achutan*	**Hearing Protective Devices and Firearms Suppressors: Audiologists' Knowledge and Self-Efficacy** *Speaker: Alexander Morris*	
10:10 AM – 10:40 AM - Break with Exhibitors- Longhorn D		

Schedule Continued on Next Page

2019 SCHEDULE OF EVENTS

Saturday • February 9 • 2019

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11:30 - 11:50 AM	**Hearing Loss Among World Trade Center Firefighters and Emergency Medical Services Workers: A 10-Year Longitudinal Analysis** *Speaker: Greg Flamme*	Longhorn D
12:00 - 1:45PM	**Hosted Luncheon and Awards**	Longhorn D
1:50 - 2:20 PM	**Gasaway Lecture** *Speaker: Brian Felsen*	High Plains
2:20 - 2:40 PM	**Comparisons of DRC for Impulsive Noise: Evidence from Firearm Noise** *Speakers: Greg Flamme, Deanna Meinke*	High Plains
2:40 - 3:00 PM	**Removing the Din from Dining: Raising Noise Pollution Awareness, Community by Community** *Speakers: Sherilyn Adler, Gregory Scott*	High Plains
3:00 - 3:30 PM	Break	High Plains
3:30 - 3:50 PM	**Automated Audiometry and Telemedicine: Breaking Down Barriers to Diagnostic Audiometry** *Speaker: Anna McCraney*	High Plains
3:50 - 4:10 PM	**How Can New Technology Help Stop Headphone Users Suffering From Avoidable Hearing Loss?** *Speaker: Stephen Wheatley*	High Plains
4:10 - 4:30 PM	**Closing Remarks**	High Plains
4:30 - 5:30 PM	Program Task Force Committee Meeting	Appaloosa 2
5:30 - 9:00 PM	Executive Committee Meeting	Appaloosa 3

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www.cdc.gov/niosh/topics/noise
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ViAcoustics provides systems and software for a wide variety of application in hearing protector measurement, hearing sciences research and acoustic measurements. Located in Austin, Texas, ViAcoustics partners with ETS-Lindgren, National Instruments and GRAS Sound and Vibration to provide state of the art systems for testing and research applications. The ViAcoustics booth will have demonstrations of systems for REAT testing and impulsive noise testing of hearing protectors and audiometric research.

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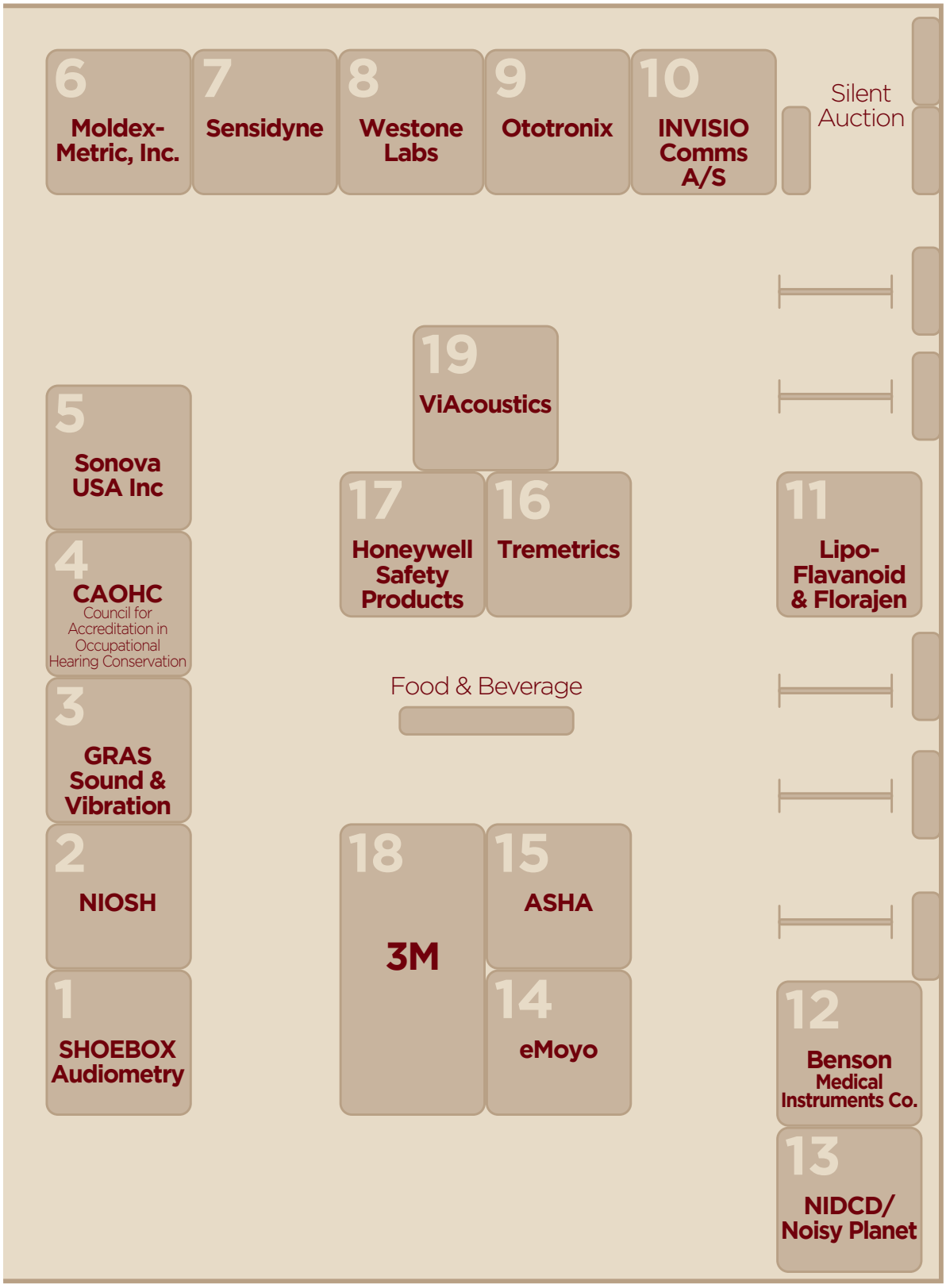


OUTSTANDING HEARING CONSERVATIONIST AWARD

Dr. Kathy Gates

For more than thirty years, Dr. Kathy Gates has been a champion for comprehensive hearing health practices that prevent noise-induced hearing loss and ensure optimal functional hearing among Department of Defense personnel. Under her visionary military leadership, the Army's hearing conservation program evolved from a program that focused primarily on hearing loss as an occupational exposure risk to one that also considered hearing loss as an operational liability to the Army. This evolution effectively broadened the scope of hearing services, resulting in improved hearing health and ultimately, a more combat-ready force.

Each of Dr. Gates' military assignments laid the foundation for this important contribution. Early in her career she served as the Army's representative at the Tri-Service Hearing Conservation Office, and in this role she collaborated and provided technical oversight on the development of the Defense Occupational and Environment Health Registry System - Hearing Conservation (DOEHRS-HC). To this day, nearly 25 years later, DOEHRS-HC is the Department of Defense system of record for all hearing conservation and hearing readiness data. As a staff officer for the Army Surgeon General, Dr. Gates established the importance of hearing loss prevention through advocacy for a workload accounting system that quantified and justified the workload of all Army audiologists associated with hearing loss prevention activities. Dr. Gates' efforts also resulted in the publishing of significant policies which improved monitoring audiometry practices and improved accessibility to appropriate hearing protection for service members.

In her role as the Integrated Service Chief for the merging of Walter Reed Army Medical Center and the National Naval Medical Center, Dr. Gates laid the groundwork for improvement of the Audiology and Speech Center (ASC) at the resulting Walter Reed National Military Medical Center. During this time of significant reorganization, Dr. Gates leveraged opportunities for progress and redirected the ASC research branch. While previously well-known for its world class clinical research, the ASC's research section now leads efforts within the Department of Defense to redefine auditory fitness for duty and functional hearing standards, and sets performance criteria for tactical communication and protection devices.

Since Dr. Gates' retirement from active military service, she continues to advocate for hearing loss prevention with the Department of Defense Hearing Center of Excellence. She is a frequent speaker at national conferences and routinely publishes work endorsing comprehensive hearing health promotion.

By accomplishment alone, Dr. Kathy Gates is deserving of the Outstanding Hearing Conservationist Award. But Kathy's contributions go beyond her tangible accomplishments. She is a leader of vision and strategy and has inspired and motivated several generations of military audiologists to look at problems creatively and to apply innovative solutions. We owe her a debt of gratitude for her contributions to the field of hearing conservation – and for inspiring us all to do better.

SAFE·IN·SOUND
EXCELLENCE IN HEARING LOSS PREVENTION AWARD

Safe-in-Sound Award™ for Innovation Winner

Kurt Yankaskas

Office of Naval Research

This year the Safe-in-Sound Award for Innovation is being awarded to Kurt Yankaskas of the Office of Naval Research (ONR) and his Noise-Induced Hearing Loss (NIHL) Research Program. Kurt's program funds a wide portfolio of research on noise control for ships, aircraft and equipment; NIHL surveillance and risk evaluation; medical treatment of NIHL; and improved hearing protection for Navy personnel. Approximately one in four sailors suffer from NIHL. Kurt's research portfolio has provided innovative solutions to difficult problems like ship noise control. Kurt's focus on the costs of both NIHL and tinnitus to the Navy have led to a unique program focus on preventing "auditory injury." Other innovations include the Warfighter's Hearing Health Instructional Primer (WHIPP) training app and Designer Noise, a program for computer-aided design of ships to include noise control features. The accomplishments of Kurt's program are broad and numerous. Come to hear his talk and learn about the great successes he and his program have accomplished.

Safe-in-Sound Award™ Presenter

David Byrne

National Institute for Occupational Safety and Health

David Byrne is a Research Audiologist with NIOSH in Cincinnati, Ohio. He is the Team Leader for the nine-member Hearing Loss Prevention Team. David's previous employment history includes: three years on active duty with the US Army; working at the Bio-Acoustics Division at the US Army Environmental Hygiene Agency; and five years working for Dennis Driscoll at Associates in Acoustics. He received his B.A. in Physics from the University of Pittsburgh, his M.S. in Audiology from the Pennsylvania State University, and his PhD in Communication Science and Disorders from the University of Pittsburgh.

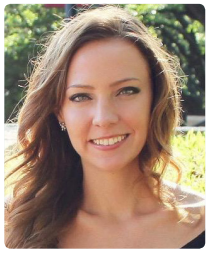
The National Hearing Conservation Association Scholarship Foundation is proud to announce the recipients of the 2019 Student Conference and Student Research Awards.

2019 STUDENT CONFERENCE AWARD WINNERS

Megan Bilodeau

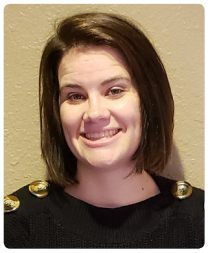
Megan Bilodeau is a third-year AuD student at Vanderbilt University. Prior to pursuing her AuD, Megan received a Bachelor's degree in Violin Performance with a minor in French from Belmont University in Nashville. Before starting her audiology studies at Vanderbilt, she worked as a professional musician, sharing the stage with country star Trisha Yearwood, bluegrass legend Ricky Skaggs, operatic soprano Denyce Graves, and others. During this time, she also volunteered at a local deaf and hard-of-hearing community outreach center in their after school program and community sign language classes. She is the current president of the Vanderbilt chapter of the Student Academy of Audiology. Recently, Megan created a brochure for parents about protecting children's hearing and creating safe listening habits. Megan will be completing her fourth year externship at Massachusetts Eye and Ear Infirmary.

Candace Johnson



Candace Johnson is a third year Doctor of Audiology student at the University of Texas at Austin. Growing up in North Dakota, she was very involved in music classes and absolutely loved being in the band. During her undergraduate time, Candace created a hearing conservation program for the Texas State Marching Band in completion of her honors thesis. The enjoyment she received from teaching others about hearing health and conducting her own research has inspired her to continue pursing hearing conservation research in her career. Says Candace, "I am honored to be a recipient of this year's NHCASF Student Conference Award."

Jennifer Meyer



Jennifer Meyer is currently a third-year student at Illinois State University, working towards her Doctor of Audiology degree. She is a strong advocate for preventive healthcare with a focus on disease prevention, rather than disease treatment. Because of this, occupational audiology and hearing conservation is a field of interest for her future endeavors. Currently, she is engaged with a *Cochlear Implant User and Noise Exposure Project*, which aims to identify unique hearing conservation needs of workers with minimal residual hearing. The study aims to establish relevant guidelines for management and counseling of this population. Jennifer's upcoming 4th year externship will take place at OSF Illinois Neurological Institute in Peoria, Illinois.

2019 STUDENT RESEARCH AWARD WINNER

Megan Annis

Megan is a fourth year audiology graduate student at the University of Wisconsin-Madison and will be receiving her AuD in May 2019. She graduated from Kent State University in 2014, with a Bachelors Degree in Hearing Sciences. Currently, she is completing her externship year at Ohio Head and Neck Surgeons in Canton, Ohio. Megan's previous placements include Moreland ENT/Professional Hearing Services in Waukesha, Wisconsin, and the William S. Middleton Memorial Veterans Hospital in Madison, Wisconsin. Her interests in audiology include hearing aids, hearing loss prevention, diagnostics, and vestibular testing. Outside of audiology, Megan enjoys spending time with her family and friends.

FINANCIAL DISCLOSURES

Chandran Achutan	No Financial Information to Disclose
Bryan Beamer	No Financial Information to Disclose
Elliott H. Berger	Consultant of 3M
Rachel Bouserhal	No Financial Information to Disclose
Kari Buchanan	No Financial Information to Disclose
Douglas N. Callen	No Financial Information to Disclose
Kathleen CM Campbell	Consultant for Eloxx
Kevin Carillo	No Financial Information to Disclose
Asa Castleberry	Techiya, LLC paid student travel grant for conference
Kara M. Cave	No Financial Information to Disclose
Jackie DiFrancesco	No Financial Information to Disclose
Robert Dobie	No Financial Information to Disclose
John Eichwald	No Financial Information to Disclose
Andrew Fallon	No Financial Information to Disclose
Eric Fallon	Employee of 3M
Gregory Flamme	No Financial Information to Disclose
John Franks	No Financial Information to Disclose
Dan Gauger	Employee of Bose
Robert M. Ghent Jr.	Owner/employee of Honeywell
Christian Giguere	No Financial Information to Disclose
Sarah Gittleman	No Financial Information to Disclose
David Greenberg	CEO of EAVE, company develops innovations in hearing conservation
Mahad Gudal	Received stipend for summer student intership from Project Imotep Program
Quintin Hecht	No Financial Information to Disclose
Logan Honea	No Financial Information to Disclose
Arielle Iola	No Financial Information to Disclose
James J. Jerome	No Financial Information to Disclose
Benj Kanters	No Financial Information to Disclose
Khalid Khan	No Financial Information to Disclose
Nicole Larionova	No Financial Information to Disclose
Kichol Lee	No Financial Information to Disclose
Renée Lefrançois	Owner/employee of Clearwater Clinical
Li Pei-Chun	No Financial Information to Disclose
Elizabeth A. Masterson	No Financial Information to Disclose
Anna McCraney	Employee of Ototronix
Mary M. McDaniel	No Financial Information to Disclose
Deanna Meinke	No Financial Information to Disclose
John A. Merkley	No Financial Information to Disclose
Jan Moore	No Financial Information to Disclose
Alexander W. Morris	Is on the Board of Directors at AAA
William J. Murphy	No Financial Information to Disclose
Ann Nakashima	No Financial Information to Disclose
Rick Neitzel	No Financial Information to Disclose
James A. Norris	Employee of Creare
Laura Prigge	Employee of GSI
Hugo Saint-Gaudens	No Financial Information to Disclose
Scott Schneider	No Financial Information to Disclose
Theresa Y. Schulz	Employee of Honeywell
Gregory Scott	No Financial Information to Disclose
Theresa H. Small	No Financial Information to Disclose
JR Stefanson	No Financial Information to Disclose
Ashley Stumpf	No Financial Information to Disclose
Timothy A. Swisher	No Financial Information to Disclose
Stephen M. Tasko	Grant recipient of Department of the Army, NIOSH
Jeremie Voix	No Financial Information to Disclose
Stephen Wheatley	No Financial Information to Disclose
Tess Zaccardi	No Financial Information to Disclose
Edward Zechmann	No Financial Information to Disclose

HEARING LOSS PREVENTION: THE BASICS

Hearing Loss Prevention: The Basics – Noise Measurement and Instrumentation

Presenter: James J. Jerome, MA
Workplace Integra - Indianapolis Office

This presentation provides an overview of the principles of noise measurement. Topics discussed include acoustical instrumentation, types of noise surveys, noise exposure criteria, how to conduct a noise survey, and overview of the principles of noise control.

Hearing Loss Prevention: The Basics – The Audiogram And How To Use It

Presenter: Timothy A. Swisher, MA, CCC-A
Hearing Safety

The audiogram is the tool used to record hearing test results. It is the primary vehicle used to evaluate the effectiveness of the Hearing Conservation Program. As such, it is necessarily implemented to monitor the hearing sensitivity of noise affected employees. This presentation will discuss the employment of the audiogram, and hearing testing, in Hearing Conservation Programs. The basis for valid audiograms, the different styles of audiograms, purposes for hearing testing, and examples of audiometric results will be shown and deliberated. Standard Threshold Shift (STS) determination will be presented and age correction calculation and influence examined. STS follow-up procedures, to include baseline revision, will be reviewed. The NHCA guidelines for baseline audiogram revision will be examined. In summary, the audiogram will be discussed as an invaluable asset for the Hearing Conservationist during employee education and training.

Hearing Loss Prevention: The Basics – Hearing Loss Recordability Issues

Presenter: Theresa H. Small, AuD, CPS/A
Associates In Audiology, Inc.

This workshop presentation will focus on the basic requirements of MSHA, OSHA and FRA recordkeeping regulations, as well as implications for professional review of audiograms and determination of work-relatedness. Although compliance with recordkeeping rules are 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.

Hearing Loss Prevention: The Basics – Effective Hearing Protection

Presenter: Theresa Y. Schulz, PhD
Honeywell Industrial Safety

As hearing conservationists we can measure, assess, document, and counsel. However, when it comes to effective intervention, our primary tool, sometimes our only tool is a hearing protector. We need to be knowledgeable about the selection of hearing protection devices and their use in hearing conservation programs. This presentation will focus on identifying types of hearing protectors, regulatory requirements, appropriate fitting procedures and techniques, and the NRR rating system.

Hearing Loss Prevention: The Basics – Education and Motivations

Presenter: Laurie Wells
3M Personal Safety Division

Federal regulations require annual training for noise-exposed workers. Specific hearing conservation topics are mandated leading to training sessions that are designed to meet the regulatory requirements. This session will expand the expectation for workers to retain knowledge by including both the art and science of training to influence workers' attitudes and beliefs about their hearing. Emphasis is placed on strategies to motivate employees regarding hearing health care, appreciating the value of hearing, and enhancing hearing conservation training efforts in the workplace.

Hearing Loss Prevention: The Basics – Regulations, HIPAA and GINA

Presenter: Mary M. McDaniel, AuD, CCC-A, CPS/A
Pacific Hearing Conservation, Inc

This portion of the workshop will provide attendees with an overview of the various federal regulations relating to hearing conservation and will contrast the differences between compliance and best practices. Also discussed will be an overview of the Health Insurance Portability and Accountability Act (HIPAA) as it relates to the hearing loss prevention service provider.

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Boothless Audiometry: What Do We Need and What Can We Do Now? A Hands-On Workshop Discussion

Presenter: Andrew Fallon, AuD, CCC-A
DoD Hearing Center of Excellence
Co-Presenters: Kathy Gates, Rishi Mandavia, Jameel Muzaffar, Odile Clavier, Laura Prigge, Samuel Gordon, Renée Lefrançois Dirk Koekemoer

A sound booth has long been the standard equipment needed to conduct audiological examinations, requiring substantial square footage and a trained on-site audiologist. But within the last 10 years, several companies have worked towards developing novel strategies to bring hearing assessment out of the booth, making services more accessible, while increasing efficiencies. Additional requirements within specialty populations and markets, including foreign and domestic militaries as well as U.S. Veterans, add specialized capabilities to the list of acceptable solutions. With developers rushing to meet these needs, it has become increasingly difficult to keep up with the ever-evolving technological landscape. Moreover, recognizing the growing investment in this field, it is essential to develop frameworks that can be used by decision makers to assess the potential value of innovations in the field, from an early stage of their development. This will help accelerate their uptake and adoption into hearing services. This workshop will be comprised of four parts: 1) an overview of military, Veteran and civilian requirements driving development; 2) the current summary of technologies available as matrixed to meet those requirements; 3) presentations from participating boothless audiometry developer representatives; and 4) hands-on demonstrations to allow participants the opportunity to become familiar with each device.

The Art of Presentation

Presenter: Elliott H Berger, MS, INCE Board Certified
Independent Consultant

In a world where YouTube videos, TED talks, and other engaging content is in the palm of our hand and a finger flick away, we as speakers need to raise our bar. Imagine: you have just invented the world's best foam earplug, or perhaps you have succeeded in identifying the relationship between an otoprotectant and a particular type of noise exposure that may lead to better hearing loss prevention for millions. And now, unless you can effectively communicate that information to others, it comes to naught. Indeed, a memo, an email, or written documentation is important, but public speaking brings with it a more powerful tool set. When as listeners we peer into a speaker's eyes, hear their tone of voice, sense vulnerability, intelligence, or most importantly passion, communication is transformed to a new level. Instead, we often sit numbed or confused, by cluttered bullet point slides, tedious indecipherable charts, or a lackluster presenter who is uncomfortable or ill prepared. Come join award winning presenter, Elliott Berger, as he discusses the "laws of public speaking," engages the audience with kinetic learning and polling software, and shares his insights from over 40 years of observation and presentation of lectures in venues around the world.

Selecting Hearing Protection Devices Using New and Updated Standards

Presenter: Kari Buchanan, MPH, MA
zCore Business Solutions / DoD Hearing Center of Excellence

Co-Presenters: Major Malisha Martukovich, USAF Robert Williams

Hearing is a critical sense for individuals in many jobs, work places, and other occupationally-related processes. However, noise can interfere with detecting, identifying, and localizing sounds as well as communication. Instituting noise controls is the primary method to reduce exposure and allow critical sounds

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to be heard, though administrative controls and personal protective equipment are often necessary. Hearing protection devices (HPDs) with newer technologies have been introduced with capabilities to localize sounds and improve speech intelligibility beyond what older HPDs could provide. Knowing what criteria to use to assess HPD capabilities and when to select newer HPDs is a new challenge for hearing conservation programs. Participants in this course will learn how to identify hearing critical tasks (HCT) in the work place, how HPDs differ in their ability to suppress different types of noise, what assessment methods are being used to determine localization, and how to select hearing protection based upon all the information. Participants will also learn how to instruct hearing protection users on selecting HPDs appropriate for the task.

Hearing Protector Fit-Testing

Presenter: William J. Murphy, PhD
CDC/NIOSH

Co-Authors Not Presenting: Christa L. Themann, David C. Byrne

For over 30 years, hearing conservation professionals have known that the Noise Reduction Rating is not necessarily representative of the protection afforded to the average user of hearing protection. This workshop will present an overview of the technologies available to the hearing conservation professional. During the first part of the session, attendees will learn about different methods to implement fit-testing, benefits of conducting fit testing the different methods used by various commercially available fit-testing systems. Information related to the recently approved ANSI/ASA standard for hearing protector fit-test systems will be shared. During the second part of the session, attendees will experience hands-on demonstrations of the various products.

Exploring the Audio of Hearing and Hearing Conservation

Presenter: Benj Kanters, MM, Assoc. Prof.
Columbia College Chicago

The HearTomorrow "Audio of Hearing Workshop" will explore hearing physiology, disorders and conservation in the context of audio systems theory. Attendees will gain not only a new perspective on the hearing mechanism, but also an understanding of audio systems. The ear IS and audio system and we use modern audio technology in the development of hearing assist and conservation products. The language and mindset of each informs the other. The workshop will cover the following topics pertinent to these areas: microphones & loudspeakers, analog and digital signals, conversion and circuits, and signal processing in the spectral and dynamic domains. Wherever possible, audio principles will be explained using the language and theories of hearing physiology, psychoacoustics and cognition.

Advanced Hearing Protection and Communications Workshop

Presenter: Eric Fallon, AuD
3M
Co-Presenter: Doug H. Moses

Hearing protection device selection criteria is generally relegated to TWA and the attenuation required to reduce the exposure to beneath the mandated level. The noise exposure is typically generalized to a continuous exposure as opposed to a dynamic exposure constructed of intermittent and fluctuating noise. Audibility and communication are often an afterthought and workers are left to navigate the auditory hurdles through the workday, sometimes choosing to risk hearing damage to in an attempt to hear and communicate. Modern electronic hearing protectors may offer several advantages to workers who have communication and situational awareness requirements not met by passive protectors. This workshop will combine classroom lecture with hands on experience of utilizing a variety of electronic protectors in dynamic acoustical environments.

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Keynote: Hear, Better. Do More.

Presenter: Dan Gauger
Bose Corporation

Co-Author Not Presenting: Andy Sabin

Hearing is our most fundamentally human sense. Humanity wouldn't have advanced to its present level without the way hearing and its companion, voice, enabled early people to communicate and collaborate. In fact, the words communicate and community share the same Latin root! But, while language began with the sound of the spoken word, over time technology has translated it to visual form: from books to e-books, from letters to email to SMS to WhatsApp. Today's world is dominated by screens and visual interfaces controlled with our fingers. At the same time, life has gotten faster and more complex, with vast amounts of information at our Cloud-connected thumb-tips – and these interfaces have become increasing sources of distraction from living life, being present in the world around you. Today, however, headphones and earphones are poised to change this for the better. This may seem odd because stereo headphones are best known as a way to isolate yourself and enjoy music, privately. But, earphone technologies I'll describe will allow you to connect better with those around you, give your ears new powers akin to your eyes and allow us to better balance and mix our engagement with the physical and the virtual world.

The Osha Age Corrections are Not Correct: Evidence from Nhanes and Longitudinal Analyses of Exposed Workers

Presenter: Gregory Flamme
SASRAC

Co-Presenter: Kristy K. Deiters

Co-Authors Not Presenting: Mark R. Stephenson, Christi L. Themann, WIliam J. Murphy, David C. Byrne, David G. Goldfarb, Rachel Zeig-Owens, Charles B. Hall, David J. Prezant

The NIOSH tables used to adjust occupational audiograms for the effects of age were developed using cross-sectional trends observed in a small dataset (380 men; 206 women). The data for those tables were collected over 50 years ago and do not account for: (1) reductions in hearing loss prevalence; (2) worker ages beyond 60; (3) race/ethnicity differences; and (4) the flawed logic of applying group cross-sectional trends to individual longitudinal changes. Nationally-representative cross-sectional trends from NHANES (ages 12 to 85+; N=9937) were examined across gender and race/ethnicity using quantile regression. The results were consistent with: (1) reduced prevalence of hearing loss in the population relative to the NIOSH dataset; (2) slower rates of age-related change in hearing sensitivity; and (3) substantial differences across race/ethnicity. The cross-sectional trends provided a close match to median longitudinal changes in a large group of noise-exposed workers (> 76,000 tests), which could mean that the effects solely due to age remain overestimated by these trends. This study indicates that application of the age adjustments in the OSHA Hearing Conservation Amendment reduces the effectiveness of the hearing conservation program and lead to under-identification of occupational hearing losses.

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Adult Use of Personal Hearing Protection Devices at Loud Athletic or Entertainment Events

Presenter: John Eichwald, M.A.
Centers for Disease Control and Prevention
Co-Authors Not Presenting: Franco Scinicariello, MD, Yulia Carroll, MD, PhD, Jana Telfer, MA

CDC's National Center on Environmental Health analyzed a representative sample of the U.S. adult population (aged >18 years) from a 2018 national marketing survey which included questions about hearing protection device (HPD) use during recreational exposure to loud sounds. The analysis revealed only 8 percent of respondents reported consistent use of an HPD at these types of events. Two thirds of the adults who were more likely to wear an HPD had at least some college education and half had higher income levels. Women and older adults were significantly less likely to use HPDs. These findings suggest the need for an increasing commitment to strengthen a public health focus on recreational noise exposure. This analysis illustrates the need for continued efforts to raise public awareness about the adverse health effects of excessive noise exposure at home and recreational settings, as well as the protective value of HPDs. Discussions between patients and healthcare providers regarding the consequences of excessive sound exposure and the potential health benefits from the use of HPD might provide opportunities to prevent or reduce harmful effects.

Otoprotective Pharmacologic Agents: The Way Forward

Presenter: Kathleen CM Campbell, CCC-A, PhD
Southern Illinois University School of Medicine

For over 2 decades we have been hearing about pharmacologic otoprotective agents moving towards clinical use for noise- and drug-induced hearing loss. So why do we not yet have any FDA approved agents available? At what stage of development are we now? This lecture will discuss some of the issues in the approval process including clinical trials populations, clinical trials for temporary threshold shift versus permanent threshold shift, prophylaxis versus rescue, the use of FDA approved versus new agents in clinical trials, intellectual property issues, approval processes, drug delivery methods, safety and efficacy determinations and how advancements in one area can facilitate developments in other areas. The purpose of this presentation is to update clinical audiologists on the bench to bedside process of otoprotective agent development and to help them understand how they may be able to assist in the process and how they can respond to inquiries from patients and physicians. Once at least one of these agents is approved, this session should also help clinical audiologists understand how the area could further develop and expand for additional populations and applications. Time will be allotted for questions.

Influence of Incidental Motor Activity on Middle Ear Muscle Contractions

Presenter: Stephen M. Tasko, PhD
SASRAC/Western Michigan University

Co-Presenters: Gregory A. Flamme, Kristy K. Deiters

Co-Authors Not Presenting: Madeline V. Smith, William J. Murphy, Heath G. Jones, William A. Ahroon

The majority of research on middle ear muscle contractions (MEMC) has focused on its role in mediating the acoustic reflex. However, there is growing evidence for non-acoustic elicitors of MEMC. Recent work has established that voluntary motor behaviors such as eye closure and saccadic eye movements can reliably elicit MEMC. Additionally, our research team recently presented preliminary evidence that incidental activity of head and neck muscles concomitant with acoustic elicitors could modulate acoustically elicited MEMC. These results highlight that factors other than the experimental elicitor may influence the likelihood of observing an MEMC. The aim of this study is to describe an approach for quantifying the influence of incidental motor activity on MEMC and controlling for such influences. Results will be discussed in the context of damage-risk criteria for impulsive noise that include MEMC as a protective mechanism.

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The Future is Now: Eight Ways Otoacoustic Emissions can be Used to Advance Hearing Conservation Programs

Presenter: Lynne Marshall, PhD
University of Connecticut

Co-Author Not Presenting: Judi A. Lapsley Miller, PhD

Otoacoustic emission (OAE) testing and forward-pressure level calibration are on the cusp of revolutionizing evaluation of auditory damage in hearing-conservation programs (HCPs). HCPs rely on pure-tone audiometry (PTA), which has not seen a significant technological advance for decades. Technology now exists to increase the validity and reliability of PTA and OAEs, and to add objective evaluation of outer-hair-cell status, all of which could be used to reduce the prevalence of noise-induced hearing loss. We have identified 8 ways where OAEs can advance HCPs (often in conjunction with audiometry), including: evaluating the overall success of HCPs and of specific interventions for groups within shorter time frames than audiometry, detecting preclinical noise-induced change in the inner ear, efficiently tracking recovery from temporary threshold shift, predicting permanent-threshold-shift susceptibility or risk by early identification of low-level OAEs in normal-hearing ears, predicting permanent threshold shift susceptibility or risk with medial-olivocochlear testing via an OAE protocol, estimating hearing status in those unable to respond, evaluating suspected functional hearing loss, and educating personnel about inner-ear damage. Furthermore, forward-pressure level calibration improves not only the reliability of OAE measurements but PTA measurements as well, especially at those frequencies most vulnerable to noise damage.

A National Occupational Research Agenda for Hearing Loss Prevention

Presenter: William J. Murphy, PhD
CDC/NIOSH

Co-Authors Not Presenting: Lauraine E Wells, Elizabeth A. Masterson, Amanda S. Azman

The National Institute for Occupational Safety and Health Hearing Loss Prevention Cross Sector Council was formed from stakeholder partners representing academia, trade/professional organizations, industry, unions, and government agencies. The Council was charged, in part, with developing the National Occupational Research Agenda for Hearing Loss Prevention, to identify research, information, and actions most urgently needed to prevent occupational hearing loss. The Agenda provides a vehicle for stakeholders to describe the most relevant issues, gaps, and safety and health needs. It is also intended to guide or promote high priority research efforts on a national level, conducted by various entities; including government, higher education, and the private sector. The Agenda describes five high level objectives: • Provide input for policies and guidelines that will inform best practices for hearing loss prevention efforts; • Development of effective, evidence-based education designed to improve hearing conservation program outcomes for exposed workers and management; • Noise control development, commercialization and widespread implementation on jobsites in key industries; • Development of audiological tests for hearing loss prevention; and • Improving occupational hearing

Kurtosis Level Incorporating Additional Information into Noise Exposure Analysis

Presenter: Edward Zechmann, INCE Bd. Cert., PE, MS
NIOSH

The equal energy hypothesis has been shown to be inadequate for describing the risk of hearing impairment due to impulsive noise exposure. Sound pressure level can be interpreted as the amount of sound energy. Kurtosis level can be interpreted as the type of sound energy. By

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using a proposed signal processing methodology both the sound pressure level and kurtosis level can be calculated with the same optimized time-frequency resolution. This provides more information to describe the distribution of the sound pressure time waveform. Results from the analysis of datasets of continuous and impulsive noises will be presented.

The Department of Defense Comprehensive Hearing Health Program: A Precision Medicine Initiative Study

Presenter: John A. Merkley, AuD, CCC-A, CPS/A
U.S. Army Public Health Center

Co-Presenter: Julieta Scalo, PhD, PharmD

Co-Authors Not Presenting: Natasha Gorrell, MSPH, Tanisha Hammill, PhD

The Comprehensive Hearing Health Program of the Department of Defense Hearing Center of Excellence (HCE) aims to reduce hearing injury through Education, Protection, and Monitoring. Hazardous noise pervades military operations, and tinnitus and hearing loss are the top two service-connected disabilities. HCE developed educational materials covering topics like: causes of noise-induced hearing loss (NIHL), hazardous noise sources, and exposure reduction. Educational needs may differ among individuals because NIHL risks vary with exposure, individual behaviors, and genetics. Therefore, HCE aims to develop education, customizable to individual needs. The Precision Medicine Initiative study quantifies current educational impacts, and characterizes three precision preventive medicine elements: 1) knowledge, attitudes, beliefs, and behaviors (KABB), 2) noise exposures, and 3) genetic susceptibility. Hearing-related KABBs were surveyed before and after education, and at three months. Audiometric tests and saliva samples were collected for genetic analysis of NIHL biomarkers. Seven-day total-noise exposure was measured in a subcohort via diaries and wearable dosimeters. Analyses will identify knowledge gaps, classify groups by exposure, explore genetic biomarkers of NIHL, and discuss future development of a combined factors NIHL risk-profile matrix to inform the development of tailored health education materials and delivery strategy.

A Portable Auditory Localization Training System for Military Applications: Training Stimuli Development and Protocol Optimization

Presenter: Kara M Cave, PhD
U.S. Army

Co-Presenters: Dr. John G. Casali, Dr. Kichol Lee, and LTC Brandon S. Thompson

The objective of this research is to develop a portable, field-validated auditory localization training system for the U.S. military. Convergent experiments designed to generate a validated portable localization training system involve: 1) developing an empirically-optimized auditory localization training methodology, 2) developing a portable localization training system validated against a laboratory-grade system, 3) evaluating the efficacy of the localization training with TCAPS and HPDs, and 4) validating the portable training system against a field localization task using live weapon fire. The optimized auditory training methodology is built upon Virginia Tech's DRILCOM system. Two pilot studies determined the stimuli and number of replications within each training unit to be used in the optimized method. Results demonstrated that training with a tonally-dissonant signal that incorporated interaural timing and level differences (ITDs and ILDs) transferred to untrained, military-relevant signals, but only those which provided ITDs and ILDs. Results of the portable system validation experiment that incorporates the optimized methodology is reported. Practical applications of auditory localization training and test systems are discussed.

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Noise Injury in the Military: Where is it Really Coming From?

Presenter: Quintin Hecht, Au.D, CCC-A, CPS/A
HoChunk Inc in support of the Defense Health Agency Hearing Center of Excellence

Co-Presenter: Christopher Smalt, PhD

Co-Authors Not Presenting: Douglas Brungart, PhD; Tanisha Hammill, PhD; Benjamin Sheffield, PhD; Julieta Scalo, PhD, PharmD

This presentation will describe a military study with the intent to characterize noise and blast exposures experienced by specific subgroups in the military population and to identify with an unprecedented level of detail any resulting acute or short-term-acquired hearing changes. Many military operations cannot fully abate noise hazards without decreasing mission success, and the benefits of hearing-protection technologies are limited when exposures are unexpected or exceed a device's protective capabilities. These realities coupled with Veterans Affairs compensation for hearing loss and tinnitus signal the need to develop pharmaceutical interventions (both prophylaxis and rescue) for noise-induced hearing loss, yet the dose-response relationship with noise and the full spectrum of noise-induced auditory damage are still not fully understood. By employing state-of-the-art noise and blast measurement methods, boothless audiometry technology, comprehensive hearing assessment, and big-data analytics, this study will characterize the exact conditions in which our Service Members experience injurious noise, and develop a better understanding of the effects of injurious noise on hearing function. Study aims, design, and preliminary results will be discussed.

Acoustic Trauma: Minimum Exposures to Continuous Noise

Presenter: Robert Dobie, MD
University of Texas Health Science Center at San Antonio

Co-Presenter: Elliott Berger

Although "acoustic trauma" has been used loosely to refer to almost any adverse effect of sounds on hearing (whether temporary or permanent, acute onset or developing over years), it is now generally accepted that acoustic trauma means a permanent pure tone threshold shift from a single exposure, and can result from either impulsive noise (e.g., gunfire) or continuous noise. Ward (1991) reviewed the literature and described an inverse relationship between intensity and duration for continuous noise; individual cases of acoustic trauma occurred after tonal exposures lasting only seconds at 138 dB SPL, and after longer exposures at lower levels (8 minutes at 120 dB). In contrast to these cases, which could represent unusually susceptible people, much more intense exposures (e.g., 32 minutes at 130 dB) caused only temporary threshold shifts in groups of volunteer subjects. We updated this review based on literature published in the 28 years since Ward's paper, searching PubMed and our own files, and asking approximately 50 international colleagues for documented cases that had escaped our search. We found no evidence of acoustic trauma for tonal exposures less than 120 dB. At levels above 130 dB, exposures lasting only seconds can cause acoustic trauma.

Facilitating Corporate Adoption of Hearing Conservation Improvements and Best Practice

Presenter: David Greenberg, BSc, PhD
EAVE

1. Identify opportunities for introducing improvements 2. Classify internal stakeholders 3. Review methods of continual improvement Improvements can be based on many small changes rather than radical changes. Ideas can and should come from the workers themselves, they are less likely to be radically different, and therefore easier to implement. Ideas can and should come from the talents of the workforce, as opposed to top-down implementation or consultants which could be expensive and potential sources of conflict. All employees should continually be seeking ways to improve their own performance. It helps encourage workers to take ownership for their hearing health

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which requires an element of education and awareness. Applying the Plan, Do, Check, Act (PDCA) cycle as a quality management problem-solving approach and as a tool for stakeholder buy-in and organisational adoption of hearing conservation improvements. A particular challenge for organisations in implementing the PDCA cycle in hearing conservation is being able to demonstrate 'leading' performance indicators. Automated, cost effective, accurate and simple measuring and reporting on performance can be of large organisational value by demonstrating ROI and supporting continual improvement and stakeholder buy in.

Use of Technology in Hearing Protection Educational Interventions among Youth: Lessons Learned from Recent Studies

Presenter: Khalid Khan, PhD
Indiana University, Bloomington

Co-Presenters: Sylvanna Bielko, Marjorie McCullagh

Millions of farm and rural youth are exposed to hazardous noise as they work, live on, and visit farms. Children exposed to high noise are at risk for academic failure and behavioral problems, in addition to the risks of noise-induced hearing loss and other somatic effects of noise. However, most farm and rural youth are not served by hearing conservation programs. The role of technology in promoting health behavior among youth is of great interest since youth are highly receptive to multimedia audiovisual presentations, interactive websites, and smartphone apps. In this systematic review, we examined the use of technology and other features of programs designed to increase use of hearing protection among noise-exposed youth in production agriculture. The number of published reports of hearing conservation programs for youth was low (n=10). Assessment of program efficacy was not included in most reports, and multiple methodological limitations constrain their utility to public health. Some recent small intervention studies using low-cost technology-based educational approaches had evidence of efficacy as they demonstrated significant improvement in hearing protection knowledge and behavior in multiple settings across the United States. Integrating technology in future hearing conservation programs offers promise, in that this approach offers low-cost and youth-friendly characteristics.

Sometimes 85 is Just a Number, But Sometimes it's More. And, Sometimes it's Less.

Presenter: John Franks, PhD
LytleSound

The 1994 NIOSH publication Preventing Hearing Loss: A Practical Guide suggested that the maximum noise-exposure level should be 85 dBA Leq,8. Occupational Noise Exposure, Revised Criteria 1998, made that suggestion a formal NIOSH Recommended Exposure Limit. Since then, many other countries, most recently Canada, have adopted the NIOSH REL as a Permissible Exposure Limit. There are two common confusing misuses of the value of 85 dBA. The first is labeling it as safe. At a working-life exposure level of 85 dBA Leq,8 between 8 and 12 percent will develop material hearing impairment. A safe noise-exposure level with 0 percent developing material work-related noise-induced hearing loss, it would have been 75 dBA Leq,8. The second misuse is confusing an exposure level for a noise level. An exposure level is determined by averaging noise levels over a specified time, hence the Leq,8; equivalent level for 8 hours. A noise level is of little value since the time of exposure is not specified. This type of misuse is often found in the "safety" portion of earphones along with what would be fairly entertaining descriptions of how to determine the output level if the hearing of the consumer weren't at risk.

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Comparison of Gas-Powered vs. Battery-Powered Equipment for Landscape Maintenance; Hedge Trimming Operations

Presenter: Bryan Beamer, PhD, PE, CSP
National Institute for Occupational Safety and Health
Co-Presenter: Jackie DiFrancesco

Grounds maintenance professionals use a variety of noise-producing equipment and are at a high-risk for occupational hearing loss. The most common method of hearing loss prevention is the use of Personal Protective Equipment (PPE). Similar to other industrial situations, the preferable solution for protecting workers from the harmful effects of noise is to control noise at the source, which can eliminate the need for PPE and Hearing Loss Prevention Programs. One effective control strategy is to replace noisy equipment with quieter equipment. For instance, battery-powered tools are typically quieter than gas-powered tools, and have additional ergonomic, environmental, and health-related benefits. This presentation is based on a field comparison of worker noise dose and sound levels for two different hedge-trimming crews: 1) one using gas-powered equipment and 2) the other using battery-powered equipment. Dosimetry and sound level measurements show that the crew using battery-powered equipment had significantly lower noise exposures than the crew using gasoline-powered versions. Furthermore, the management of this grounds maintenance crew provided researchers with a great deal of information regarding efforts to prevent worker hearing loss. These efforts include evaluation of the feasibility of switching over to battery-powered equipment and a systematic approach to buying quieter equipment.

2018 Safe-in-Sound Excellence in Hearing Loss Prevention Awards

Presenter: Scott Schneider, CIH, FAIHA
Retired
Co-Presenter: Kristin Casto, L COL US Army

In this 11th round of Safe-in-Sound Awards the National Institute for Occupational Safety and Health (NIOSH) and the National Hearing Conservation Association (NHCA) will recognize organizations that document measurable achievements in hearing loss prevention. The submissions are evaluated against key performance indicators in a rigorous review process designed to capture and evaluate the successes. The attendees will get to hear about the innovative strategies and the success stories from the winners themselves firsthand; information which will be shared later to a broader community. Join us for the remarkable presentations! *#wewanttohear*

Assessing Hearing, Aging, and Cognitive Decline in Agricultural Workers

Presenter: Jan Moore, PhD
University of Nebraska Kearney

Progressive and permanent sensorineural hearing loss associated with noise exposure (NIHL) is a chronic health condition in agricultural workers. In addition to the impact of hearing loss on communication, hearing loss and exposure to noise have negative impacts on balance, cardiovascular health, mental health, and cognitive skills. Recent large-scale public health studies among elderly and middle-aged persons indicated hearing loss presents a significant and independent risk factor for the development of dementia. This project will examine the hearing status and cognitive skills of aging farmers and ranchers over the age of 50. Audiological assessment and a hearing health history will be obtained for each participant. Pure tone average and Speech Intelligibility Index will be computed. Due to the fact that agricultural workers often have concomitant hearing loss, the memory and cognitive processing tests used for this study will assess cognitive status through the

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visual and visual-motor domains. The following screening tests are proposed for the first phase of this study: The Montreal Cognitive Assessment (MOCA), Stroop Color and Word Test (STROOP) and the Digit Symbol Digit Symbol Substitution Test (DSS). The data obtained will provide new information regarding the impact of long-term hearing loss on cognition in older agricultural workers, and also provide a foundation of knowledge for longitudinal studies.

Learning to Localize with Advanced Hearing Protectors and TCAPS; Importance and Practicality of Learning Curves

Presenter: Kichol Lee
Virginia Tech

Co-Presenter: John G. Casali, PhD

Previous research showed that one can reach a similar level of open ear azimuthal localization performance given sufficient training with certain TCAPS. The objective of this research was to compare the rate of learning under different hearing conditions, including over-the-ear (OTE) and in-the-ear (ITE) devices, and the open ear. The localization training/test system was modified from the DRILCOM system. Three hearing conditions, open-ear, Etymotic ER125-GSE (ITE), and Peltor ComTac III (OTE), were presented in counterbalanced order. Each single session of 20 minutes consisted of paired combinations of training and testing trials, and comprised a "Learning Unit (LU)." Naive, normal-hearing subjects completed 12 LUs for each hearing condition. The results showed that subjects training with the ITE device learned at a statistically similar pace (slope) as with the open ear, and their absolute accuracy was within 7% of the open ear after full training, improving from 40% correct starting with the 1st LU to 78% correct after 12 LUs. However, learning rate was significantly worse than open ear with the OTE device, starting with 24% accuracy and ending at 37% accuracy after 12 LUs. Essentially, the OTE device never approached open ear performance, even after extensive training.

Laboratory and Field Studies of MEMC in Response to Impulse Noise

Presenter: Stephen M. Tasko, PhD
SASRAC/Western Michigan University

Co-Presenters: Gregory A. Flamme, Kristy K. Deiters

Co-Authors Not Presenting: Heath G. Jones, Madeline V. Smith, William J. Murphy, William A. Ahroon, Nathaniel T. Greene

Numerous damage-risk criteria (DRC) for impulsive noise have included a role for middle ear muscle contractions (MEMC). One DRC proposes that if an individual expects an impulse, an MEMC will occur in the listener in anticipation of the impulse. Few studies have systematically examined reflexive and/or anticipatory MEMC in response to impulsive noise. In recent years, our research group has been focused on filling this knowledge gap. This presentation will (1) present results from a series of laboratory studies of reflexive and anticipatory MEMC that indicate that MEMC should not be included in DRC and; (2) describe the details of a large, ongoing field study designed to assess MEMC during live-fire exercises with rifles. This latter study will examine if results obtained from laboratory studies generalize to an environment common to the warfighter.

Noise Exposure of Sugar Cane Factory Workers in Guatemala

Presenter: Ashley Stumpf, Doctor of Audiology Student
Univeristy of Northern Colorado

Co-Authors Not Presenting: Grant Erlandson, Jennifer Ruths, Lee Newman, Lyndsey Krisher, Claudia Asensio, Daniel Pelloni, Alex Cruz, Deanna Meinke

Hazardous noise exposure has been identified as a hearing health risk in sugar industry workers (Rao et al, 2015, Rocha et al, 2010). Suryaprakasa et al (2015) have reported sound pressure levels ranging between 85 to 96 dB[A] in the working population of a sugar mill in Andrhra Pradesh, India. Representative

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noise dosimetry studies were conducted on 51 workers performing 22 sugar cane mill jobs in a Guatemalan sugar mill. The majority of departments/jobs exceeded the ACGIH/NIOSH recommended exposure limit of 100% noise dose (85 dBA time-weighted average). Noise doses ranged from a low of 51.9% to an extreme of 25174%. Ninety percent of noise dosimetry samples were between 50% to 1200% dose. Sugar mill workers are at risk of noise-induced hearing loss and a hearing loss prevention program including engineering noise control is recommended for these workers.

Effects of Hearing Loss and Language Proficiency on Speech Intelligibility of Radio Messages Over Tactical Communication Devices

Presenter: Christian Giguere
Professor

Co-Presenter: Chantal Laroche

Co-Author Not Presenting: Véronique Vaillancourt

Hearing loss and language proficiency are key factors that can impact verbal communications in tactical operations. To investigate these factors, three groups of participants (control, non-fluent, hearing-impaired) were paired with a standard individual (fluent normal hearing) of the same gender in a task of word discrimination using the Modified Rhyme Test (MRT). This was carried out over the radio channel of two tactical communication devices with integrated hearing protection, while immersed in an 85-dBA simulated military noise. Performance on the MRT was similar with the control and hearing-impaired groups. Significantly lower scores were found, however, in many situations when the non-fluent group of participants acted as listeners or talkers, compared to the two other groups. MRT scores were also consistently lower with the device configured with an in-ear voice pick-up microphone compared to the other device using an external mouth microphone, particularly for females. In contrast, the talk-through setting had little effect on the results. Overall, the study indicated that language proficiency and the method of sensing the talker's voice are key issues to consider with tactical radio communications. These findings are critical in the context of multi-country deployments.

Fundamental Mechanisms of the Objective Occlusion Effect Revisited Using a Finite Element Model of the Outer Ear

Presenter: Kevin Carillo
École de Technologie Supérieure

Co-Authors Not Presenting: Olivier Doutres, Franck Sgard

Human outer ear occlusion is commonly associated with the so-called occlusion effect, significantly noticeable at low frequencies when wearing an intra-aural occlusion device. This effect is known as a source of discomfort notably responsible for the non-wearing of hearing aids and earplugs hearing protectors. The cause of the occlusion effect is the propagation of noise from human body internal sources by bone conduction to the cochlea, in particularly via the transmission path through the outer ear. The preponderance of this path depends on the ear canal entrance condition (occluded or not) and on the frequency, for reasons that, in the light of the scientific literature, seem unclear. The occlusion effect is sometimes explained by the fact that the noise radiated into the ear canal by its walls cannot escape from it when it is occluded contrary to the open case. Sometimes, this effect is rather explained by the role of the acoustic impedance of the ear canal seen by its walls which would control the pressure radiated by them. The present study returns in detail on the often acclaimed theories of the occlusion effect in order to revisit the understanding of the fundamental mechanisms of this phenomenon using a finite element model of the outer ear.

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Noise And Hearing Loss among Farmers: Results from a Point Source Intervention Study

Presenter: Chandran Achutan, PhD, CIH
University of Nebraska Medical Center

Co-Authors Not Presenting: Josie Ehlers, Sean Navarrette, Elizabeth Lyden, Lorena Baccaglini, Risto Rautiainen

The purpose of this study is to identify and describe noise exposures and hearing loss among farmers, to explore factors that influence farmers' high-frequency pure tone average hearing thresholds, and to evaluate changes in hearing over time due to a point-source intervention. The intervention consisted of a box containing hearing protection devices placed near loud noise sources on the farm. Maximum noise exposures were at 102 dB. Farmers have high-frequency hearing loss. Standard threshold shifts and high-frequency notches were identified, many affecting left ears. Farmers in the control group had poorer low-frequency hearing than farmers in the intervention group (p=0.01). Farmers experience high-frequency hearing loss. Left ears were less sensitive than right ears. Presbycusis is evident in the study population. However, sensorineural hearing loss appears to be common among this group of farmers especially in the left ear. Long-term follow-up is warranted.

Hearing Protective Devices and Firearms Suppressors: Audiologists' Knowledge and Self-Efficacy

Presenter: Alexander W. Morris, BA, AuD Student
University of Texas at Dallas

Co-Author Not Presenting: Carol Cokely, PhD

It is well documented that firearms produce sound pressure levels deleterious to hearing. Hearing protective devices (HPDs) are the first line of hearing loss prevention for patients who use firearms; however, they may not sufficiently protect hearing due to fit issues and level of protection. There is a growing interest by the public in the use of suppressors as hearing protection. Whereas recent research has demonstrated that suppressors reduce sound levels to the ear, their use as a HPD is controversial. Many misconceptions exist about their protective value among both patients and healthcare providers. Via online survey, this study examined audiologists' knowledge, education level, and self-efficacy regarding HPDs/suppressors. Data from 137 respondents across the United States was analyzed. The demographics of the respondents were similar to those seen for previously reported ASHA surveys of providers. This study aimed to examine the relationships among audiologists' personal firearms use, demographic factors, graduate and post-graduate education, knowledge, and self-efficacy. Study outcomes can be used to prompt further research into the state of graduate and continuing education for hearing loss prevention, the use of various HPDs and the the synergistic effects of traditional HPDs and suppressors.

Systematic Reviews of Health Outcomes Associated with Noise Exposure in Humans

Presenter: Rick Neitzel, PhD, CIH
University of Michigan School of Public Health

Co-Authors Not Presenting: Yulia Carroll, John Eichwald

Industrial hygienists have long recognized that excessive occupational noise exposure is a health risk for noise-induced hearing loss. However, in the past several decades, noise exposures both inside and outside the workplace have been potentially linked to additional health outcomes. With the objective of identifying safe levels of exposure, the Centers for Disease Control and Prevention (CDC) National Center for Environmental Health has conducted a formal review process to better understand the range of health risks potentially resulting from noise. To accomplish this objective, eleven systematic reviews have been conducted to identify what noise levels, and for how long, are associated with eleven specific health end points: 1) hearing loss; 2) ischemic heart disease; 3) hyperten-

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sion; 4) mental health/psychological disorders; 5) injuries; 6) sleep disturbance; 7) low birth weight/premature birth; 8) endocrine disruption; 9) cognitive impairment; 10) obesity/overweight, and; 11) cancer or tumorigenesis. Each review involved a systematic literature review and rating of the available evidence; reviews also included a meta-analysis of health risks when sufficient evidence was available. Using these reviews, CDC will be able to raise awareness and enhance prevention strategies.

Classification of Nonverbal Human Produced Audio Events: A Pilot Study

Presenter: Rachel Bouserhal, PhD
Centre for Interdisciplinary Research in Music Media and Technology
École de technologie superieure

Co-Authors Not Presenting: Philippe Chabot, Milton Sarria-Paja, Patrick Cardinal, Jeremie Voix

The accurate classification of nonverbal human produced audio events opens the door to numerous applications beyond health monitoring. Voluntary events, such as tongue clicking and teeth chattering, may lead to a novel way of silent interface command. Involuntary events, such as coughing and clearing the throat, may advance the current state-of-the-art in hearing health research. The challenge of such applications is the balance between the processing capabilities of a small intra-aural device and the accuracy of classification. In this pilot study, 10 nonverbal audio events are captured inside the ear canal blocked by an intra-aural device. The performance of three classifiers is investigated: Gaussian Mixture Model (GMM), Support Vector Machine and Multi-Layer Perceptron. Each classifier is trained using three different feature vector structures constructed using the mel-frequency cepstral (MFCC) coefficients and their derivatives. Fusion of the MFCCs with the auditory-inspired amplitude modulation features (AAMF) is also investigated. Classification is compared between binaural and monaural training sets as well as for noisy and clean conditions. The highest accuracy is achieved at 75.45% using the GMM classifier with the binaural MFCC+AAMF clean training set. Accuracy of 73.47% is achieved by training and testing the classifier with the binaural clean and noisy dataset.

Hearing Loss among World Trade Center Firefighters and Emergency Medical Services Workers: A 10-year Longitudinal Analysis

Presenter: Gregory Flamme,
SASRAC

Co-Authors Not Presenting: David Goldfarb, Rachel Zeig-Owens, Charles B. Hall, James E. Cone, David J. Prezant

Nearly all active-duty personnel in the Fire Department of the City of New York (FDNY) responded to the World Trade Center (WTC) attacks on 9/11/2001. These firefighters and emergency medical services (EMS) workers were likely exposed to noise and other ototoxic agents. Increased rates of self-reported hearing problems have been found among members of the WTC Health Registry, particularly if they were highly exposed to the WTC dust cloud. In this study of 8,646 FDNY personnel we evaluated changes in hearing over the decade after 9/11/2001 using audiometric records from regular occupational health exams. In the first analysis, thresholds before the attack were compared with the first available results after the event to identify systematic trends in 15 dB threshold shifts across exposure level. In the second analysis, we fit exponential time-to-event models to assess whether participants with greater exposures were at greater risk of 15 dB changes in threshold. FDNY personnel who arrived at the WTC site on the morning of 9/11/2001 had greater odds of a threshold shift pre-9/11 to post-9/11, and personnel who arrived earlier and spent more time at the WTC site during the recovery effort were at greater risk of hearing loss.

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Comparisons of DRC For Impulsive Noise: Evidence From Firearm Noise

Presenter: Deanna Meinke, PhD
University of Northern Colorado

Co-Presenter: Gregory A. Flamme

Co-Authors Not Presenting: William J. Murphy, James E. Lankford, Michael Stewart, Donald S. Finan, Stephen M. Tasko, Edward L. Zechmann

Damage-risk criteria (DRC) for noise are intended to describe the relationship between an acoustic signal and the risk of harm to the auditory system. Exposure limits for impulsive noises are expressed in maximum permissible exposures (MPE). There are a variety of DRC for impulsive noises, and the exposure limits imposed by each can vary widely. DRC models rely on different theoretical constructs (e.g., A-weighted equivalent energy, cochlear input signals, expected basilar membrane activity) and assumptions, but the outcomes of these models could be related. If strong, these relationships might permit the transformation of the outcomes of one model to another. In this study, recorded impulses from 49 firearms at each of 18 microphone locations were used to evaluate the predictability of the outcomes of one DRC based on the outcomes of a different DRC. The results suggested that the interrelationships permit reasonably accurate transformations of outcomes across DRC.

Removing the Din from Dining: Raising Noise Pollution Awareness, Community by Community

Presenter: Gregory Scott
SoundPrint

Co-Presenter: Sherilyn M. Adler

SoundPrint and Ear Peace: Save Your Hearing Foundation partnered to raise noise-pollution awareness in Miami Dade County by focusing on the collection, analysis and distribution of sound level data in local restaurants. This case study reviews the entire process (including both successful and unsuccessful methods utilized) during a year-long effort to educate the public about the dangers of noise pollution. The end result is a 'noise pollution awareness campaign playbook' that NHCA members and other community leaders can use to replicate studies and results in their own cities and communities.

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Automated Audiometry and Telemedicine: Breaking Down Barriers to Diagnostic Audiometry

Presenter: Anna McCraney, AuD
Ototronix
Co-Presenter: Beth Spearman

Hearing loss is one of the most prevalent chronic health conditions and yet there are various obstacles that affect the logistics of timely and appropriate hearing testing, not the least of which is the requirement of a sound booth for traditional audiometric testing. Sound booths represent a significant capital expense and relegate prime clinical real estate for a singular function. Another significant barrier to efficacious testing is the reality that patients and providers often don't occupy the same locale, making it necessary for one or both to commute in order to connect. The employment of boothless technology, particularly when paired with telemedicine increases access and cuts costs, benefiting patients and providers alike.

How Can New Technology Help to Stop Headphone Users Suffering from Avoidable Hearing Loss?

Presenter: Stephen Wheatley, CEO
HearAngel/LimitEar Ltd

There is growing concern amongst hearing health organisations around the world that increasing headphone use could be permanently damaging the hearing of headphone users. The World Health Organisation report '1.1 billion people at risk of hearing loss' claim that for most people hearing loss is due to large sound doses, the biggest source of which is from headphone use. Exposure to large sound doses (combination of how long, how loud and energy of what you listen to) can destroy your auditory hair cells giving you permanent hearing loss. 68% of headphone users, in a company survey, are aware of the risks, though few of act as the only information they get is from the simple volume level warning from their phone, which, if adhered to, makes their content inaudible in many listening situations. As a result most users ignore the warnings and listen too loud, for too long and damage our hearing. Is the solution is to allow us to listen as loud as we wish for as long as is safe? Could we start to change behaviour by providing easy to understand sound dose based information with optional protection a Fitbit for the ears perhaps?

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Earphone Eartip Comfort and Usability: Human Factors Assessment Over a Three-Week Period using Online Ratings and Rankings of Three Devices

Presenter: Asa Castleberry, Student
Techiya LLC

Co-Presenters: John P. Keady, John G. Casali

Earphones represent an exploding market segment, expected to reach $15.8B revenue by 2025, with in-ear devices accounting for $4B in 2015 alone. Innovations in electronic features have proliferated, but significant developments in eartip design have paled in comparison. A new pneumatic, bulb-shaped eartip (Techiya AirTip®) was compared to two common eartips, a Comply® foam tip and a polymer single-flange tip. All 3 eartips were applied on a Beyerdynamic iDX 160 iE earphone. Subjects, who were experienced earphone users but with no experience on any of the products under test, used one eartip the first day, a second eartip the next day, and then a third eartip the third day, then a 1-day break, and then the same pattern was repeated for 3 more days. Usage of the 3 eartips continued for 2 more weeks, with a counterbalanced order of eartips. Thus, each subject had 36 2-hour experiences with each eartip; after each usage, subjects provided online ratings on a Likert scale of -3 (least favorable) to +3 (most favorable). Data were graphed with 95% confidence limits. The AirTip® rated more favorably than the other 2 eartips on comfort, perceived pressure and satisfaction, while the flange tip ranked best on insertion difficulty. The foam eartip ranked least favorable on the 4 scales.

Current Hearing Conservation Practices for Workers with Hearing Loss

Presenter: Jackie DiFrancesco, BA, COHC
University of Connecticut

Co-Presenter: Jennifer Tufts

Workers with hearing loss pose a unique challenge for hearing conservationists. Limited guidance exists for addressing the need to preserve residual hearing while maintaining the ability to communicate, and little is known about the current practices of hearing conservationists in this regard. This survey aimed to capture current practices for protecting workers with hearing loss. The survey was emailed to hearing conservationists and posted to relevant message boards. The majority of respondents (total N=92) were female (52%), identified their primary field of work as audiology (66%), and hold the Professional Supervisor CAOHC certification (60%). The factors most commonly considered when making recommendations for hearing-impaired workers were level of noise exposure, communication needs, degree/type of hearing loss, work environment, safety, job duties and compatibility with other PPE. Commonly-reported challenges included issues with compliance, the need for both audibility and protection, and lack of access to specialized HPDs. Common solutions for workers with hearing aids included taking the aids out and using passive or electronic HPDs. Survey findings indicate that hearing conservationists still encounter significant challenges in protecting workers with hearing loss.

Noise versus Tones as Hearing Protector Fit Testing Stimuli

Presenter: Robert M Ghent Jr, AuD
Honeywell Safety Products USA, Inc.

Observations during earplug fit testing requiring the binaural comparison of monotic stimuli presented under headphones reveal some challenges for the listener: Pure tone stimuli are often perceived at different pitches or timbres in the two ears (diplacusis); tinnitus may affect loudness judgments or threshold detection at higher frequencies; signal quality (distortion, frequency response, intensity) can vary between the two earphones if earphone transducer quality is poorly controlled. One question explored by the present study is whether random noise can mitigate some of these issues. A second question addresses obtaining an attenuation value with a single stimulus to predict a multi-frequency Personal Attenuation Rating (PAR). The new ANSI standard, S12.71-2018, Performance Criteria for Systems that Estimate the Attenuation of Passive Hearing Protectors for Individual

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Users, states that if a single test frequency is used it should be in the range of 500 to 2000 Hz. Would attenuation using a broad-band noise be a better predictor of a multi-frequency PAR than a single frequency? The present study is a preliminary evaluation of noise versus tones with respect to the foregoing questions. Some observations and caveats are made along the way.

Relationship Between Gain in the Speech Frequencies and Self-Reported Difficulty Understanding Speech in Noise

Presenter: Sarah Gittleman
The University of Texas at Dallas

Co-Authors Not Presenting: Sarah Grinn, AuD, Colleen Le Prell, PhD

The human earcanal varies in width, length, and curvature and thus, the amplification pattern across frequencies also varies across individuals. However, amplification is generally greatest from 2000 to 4000 Hz. This is likely beneficial for the perception of speech sounds, in that speech sounds are amplified but lower-frequency background noise is not amplified, improving signal to noise ratios within the earcanal. Because individual ears have different characteristics and thus, different resonance patterns, different ears will receive different gain within the speech frequencies. This project therefore examines potential associations between the transfer function of the open ear (the total gain of the open ear, measured as the difference between sound levels measured inside the ear versus outside the ear), the peak resonance frequency (the frequency at which the greatest gain is observed), and self-reported difficulty understanding speech in noise. All subjects underwent earcanal resonance measurements and filled out a survey regarding their perceived difficulty understanding speech in noise. It has long been thought that noise-induced hearing loss is observed at 3000 - 6000 Hz because of the resonant amplification in this range. It is possible that speech in noise deficits preceding overt NIHL are similarly related to resonant amplification.

Verification of Noise Reduction in Hearing Protection for Infants and Toddlers

Presenter: Logan Honea, BA
University of Texas at Dallas

Co-Author Not Presenting: Colleen Le Prell, PhD

This project was designed to compare manufacturer-provided noise reduction ratings (NRRs) for infant and toddler hearing protection devices (ITHPDs) to laboratory-based measurements of attenuation made using both a calibrated adult head and torso model (i.e. KEMAR) and an infant sized mannequin. To accomplish these study goals, an infant-sized "Jolene" mannequin was created using modifications to the procedures in the Jolene Cookbook. Pseudo-noise reduction ratings (pNRRs) were calculated using microphone-in-real-ear (MIRE) measurements taken from KEMAR and the Jolene infant. A two-way ANOVA was completed to assess potential statistically significant main effects for mannequin (KEMAR, Baby Jolene) or hearing protective device (Baby Banz, Alpine Muffy Baby Earmuffs, Pro for Sho Baby Ear Muffs, Lucid Audio HearMuffs, EMS for Kids Baby Earmuffs, and Baby Bear Ear Muffs). The potential for interaction effects was also assessed. Study outcomes and guidance for parents will be presented.

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Relationship Between Peak Resonance, Tympanometric Measurements & Transfer Functions of the Open Ear

Presenter: Arielle Iola
The University of Texas at Dallas

Co-Authors Not Presenting: Sarah Grinn, AuD, Colleen Le Prell, PhD

Sound travels through every ear differently. The ear naturally provides amplification at certain frequencies and these frequencies are different for each person (peak resonances). These peak resonance differences contribute to the different transfer functions of the open ear across individuals (i.e., differences in the amount of gain results in differences at the eardrum despite the same sound being delivered outside of the ear). Measurements using probe microphones were completed to capture peak resonances and the transfer function of the open ear (TFOE). Additionally, specific characteristics of the external and middle ear, such as earcanal volume and pressure and tympanic membrane compliance were measured through tympanometry. Relationships between these physical characteristics and the peak resonance frequency and amplitude were assessed to determine if higher amplitude at peak resonance was reliably associated with an overall larger TFOE. Additional comparisons assessed relationships between tympanometric data, TFOE, and resonances, to determine whether tympanometric data might provide insight into the probability of larger TFOE or resonance measurements. This study provides further insight into the relationships between individual ear characteristics and in-ear gain.

The Comprehensive Hearing Health Program Precision Medicine Initiative: Survey Results by Demographic Characteristics

Presenter: Nicole Larionova, BS
DoD Hearing Center of Excellence

Co-Authors Not Presenting: Natasha Gorrell, MSPH, Julieta Scalo, PhD, Tanisha Hammill, PhD

The DoD HCE developed the Comprehensive Hearing Health Program to prevent one of the most pervasive Service-related injuries – noise-induced hearing loss (NIHL) – through targeted education, protection, and monitoring. The Precision Medicine Initiative intends to inform development of next-generation hearing health and prevention of NIHL educational strategies that are customizable to individual Service member (SM) needs. At four participating military installations, SMs at hearing conservation and audiology clinics are provided an educational session using HCE-developed materials. Knowledge, attitudes, beliefs, and behaviors (KABB) are surveyed immediately before and after intervention and again three months later. Participants undergo audiometric testing and provide saliva samples for genetic analysis of NIHL risk factors. Noise exposure over a seven-day period is measured in a subcohort via personal noise exposure diaries and wearable noise dosimeters. Enrollment to date is 183 subjects, with complete enrollment (N=266) anticipated by end of 2018. This poster evaluates baseline survey responses by key demographic factors. Of particular interest is how hearing health literacy and behaviors vary across Service branches, clinic type, and demographic groups. Associations between baseline KABB and self-reported hearing loss or tinnitus will also be explored, as well as self-reported hearing loss compared to audiometry results.

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A Script-Driven Distributed Auditory Experiment and Noise Measurement System

Presenter: Pei-Chun Li, Associate Professor
Mackay Medical College

Co-Authors Not Presenting: Liu Ching-Ju, Chen Pen-Li

Advances in smartphone technology provide new ways to capture sound levels and measure hearing, which could become a valuable tool for improving the public's noise pollution awareness and negating the negative effects of untreated hearing impairment through early identification. However, the device's variability on the accuracy of measurements and the output sound levels should be considered. In addition, the Reference Equivalent Threshold Sound Pressure Level for an earphone in a model is not covered by international standards and should be obtained by subjective experiments. Researchers find it difficult to develop new applications while very carefully managing hardware variations. We propose a description language for researchers to describe their procedure and upload their descriptions to our server to facilitate development. Users can install an interpreter app we developed that downloads user-specified applications' descriptions and translates them into executable code on the mobile device. The interpreter will also download calibration and other hardware-dependent information from the server to help users correct the settings. Two common applications were built to evaluate this system's applicability: a sound level meter and a pure-tone hearing screening test. Reference measurements were obtained using a Brüel & Kjær type 2250 sound level meter and a KEMAR manikin.

Prevalence of Hearing Loss among Noise-Exposed Workers within the Mining, and Oil and Gas Extraction Sectors, 2006-2015

Presenter: Elizabeth A. Masterson, PhD, CPH, COHC
NIOSH

Co-Author Not Presenting: Sean M. Lawson

The purpose of this study was to estimate the prevalence of hearing loss for noise-exposed U.S. workers within the Mining, and Oil and Gas Extraction (OGE) sectors. Methods: Audiograms for 1.8 million workers (8,803 in Mining; 655 in OGE) from 2006-2015 were examined. Prevalence and adjusted risk as compared to a reference industry (Couriers and Messengers) were estimated for all industries combined and the Mining and OGE sectors and sub-sectors. Results: The prevalences of hearing loss for Mining and OGE were 24% and 13%, respectively, compared with 16% for all industries combined. Mining and OGE sub-sectors with the highest prevalences were Construction Sand and Gravel Mining (37%), Uranium-Radium-Vanadium Ore Mining (32%), Bituminous Coal and Lignate Surface Mining (30%), and Natural Gas Liquid Extraction (28%). Workers within Support Activities for Coal Mining had double the risk for hearing loss than workers in the reference industry. Conclusions: The Mining and OGE sectors need attention to prevent worker hearing loss. Engineering and administrative controls can most effectively reduce worker exposures when hazardous noise sources cannot be eliminated or substituted. Noise and ototoxic chemical exposure information is also lacking and additional research is needed to further characterize exposures and improve hearing conservation measures.

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Influence of Impulse Noise on Noise Dosimetry Measurements on the International Space Station

Presenter: Ann Nakashima, M.A.Sc., P.Eng.
Defence Research and Development Canada

Co-Presenter: Richard W. Danielson

Co-Authors Not Presenting: Andrew J. Boone, Jose G. Limardo

During long-duration missions on the International Space Station (ISS), results of noise dosimetry data, including impulse noise, are closely monitored and applied against unique ISS acoustic requirements for crew health and performance. The current study investigated the impact, if any, of impulse noise on overall crew noise exposure, using these ISS noise exposure criteria. The data revealed very few high-level (>115 dB peak) impulses in the crew-worn dosimetry data obtained during sleep time and in static dosimetry data obtained at any time of day. The number of impulses (> 115 dB peak) that occurred during work time was strongly correlated with the LAeq 16h, suggesting that impulses were caused by crew activity rather than ambient sources. However, for high-level impulses, the peak levels at 1-minute intervals did not correlate with the corresponding LAeq (1 min) reading. Further analysis of the 1/3 octave band spectra of the impulses found that it was possible to associate some of them with non-acoustic causes (e.g., thumping or brushing against the microphone). The current analysis demonstrates that impulse noise data can provide additional insight in the investigation of exceedances or abnormalities in future ISS dosimetry data sets.

A Prototype Insert-Hearing Protector that Measures Sound Level in the Ear (Dosimetry) and DPOAEs

Presenter: James A Norris, PhD
Creare

Co-Authors Not Presenting: Amelia Servi, Odile Clavier

Military operations and training exercises and some industrial settings expose personnel to high noise levels that increase their risk of noise induced hearing loss. We present an insert hearing protector with integrated electronics to perform in-ear dosimetry and measure otoacoustic emissions. This earplug will support research into the relationship between complex noise exposure and cochlear function. Preliminary evaluation of performance with acoustic test fixtures will be presented.

Investigating the Effect of Excitation Type and Sound Attenuation on the Occlusion Effect Induced by Hearing Protection Devices

Presenter: Hugo Saint-Gaudens, Student
École de technologie supérieure

Co-Authors Not Presenting: Hugues Nélisse, Olivier Doutres, Franck Sgard

Workers exposed to loud environments often protect themselves from harmful noises using hearing protection devices (HPD). However, wearing an HPD may result in the occlusion effect, a sound amplification phenomenon in the occluded earcanal at the low frequencies. The occlusion effect is often perceived as an unpleasant sensation, sometimes provoking the removal of the HPD. To better understand this phenomenon and raise sound protection awareness, a measurement method is proposed, based on continuous speech and miniature microphones. Sound pressure levels are measured in the open and occluded ears of various participants subjected to three kind of excitations namely loudspeakers, bone oscillator or vocal effort. Sound attenuation and occlusion effect levels are derived for three protection config-

POSTER ABSTRACTS

urations (earplugs, earmuffs, dual protection). Statistical analyses of the measured data are performed to investigate the effect of various factors on the occlusion effect, such as: type of excitation, and attenuation levels. Results are presented and discussed, particularly in relation with the development of a single-number index to characterize the occlusion effect.

Noise Protection of the Communication Earplug (CEP) with a Custom Earplug Tip and the HGU-56/P Flight Helmet

Presenter: JR Stefanson, BS
United States Army Aeromedical Research Laboratory

Co-Presenter: William A. Ahroon, PhD

Hazardous noise environments, such as in Army aviation, often require the use of personal protective equipment (e.g., earplugs, helmets). While aviators need adequate hearing protection, they also need to be able to communicate. For this reason Army aviators are currently issued communications earplugs (CEP) with their flight helmet. The CEP provides the hearing protection of an expandable-foam earplug while passing a clear radio communication signal to the ear. The CEP may also be combined with a custom-molded earplug tip that is specifically made to fit a user's ears. While the use of custom hearing protection has become more prevalent in the armed forces, there is no Army Airworthiness Release (AWR) for using custom CEP earplug tips. Thus, aviators are not currently permitted to use them without a waiver. For this study, twenty volunteers were recruited to evaluate the protection of custom CEP ear tips. Real-ear attenuation at threshold (REAT) measurements were conducted according to the American National Standard Methods for Measuring the Real-Ear Attenuation of Hearing Protectors S.12.6-2016, Method A: trained-subject fit procedure. REAT measurements were made for all volunteers with the custom CEP ear tips and coupled with the HGU-56/P flight helmet. REAT measurements were also made with expandable foam CEP ear tips. Preliminary results suggest custom CEP ear tips offer comparable attenuation as foam CEP ear tips.

Earcanal Sizing: What Does Your Little Finger Tell You?

Presenter: Jeremie Voix
École de technologie supérieure

Co-Author Not Presenting: Guilhem Viallet

The human earcanal remains mostly an uncharted territory: earcanal shapes and dimensions are unique to each individual and despite recent advances in 3D scanning, the capture of the earcanal's exact geometry remains challenging. Nevertheless, the proper selection of an intra-aural hearing protector often requires that the earcanal size be estimated. Therefore, several tools -such as earcanal and concha gages- have been developed over the years to quickly and approximately assess one's earcanal dimensions and recommend the appropriately matching earplug size. In this anthropometric study, sparked by the lexical similarity in French between the noun for the little finger (auriculaire) and the adjective related to aural parts (auriculaire), we explore whether Nature did not provide a suitable earcanal sizing tool... at the tip of our fingers. The results from a recent pilot study will be presented together with possible field applications for hearing protectors and a selection of in-ear wearables.

POSTER ABSTRACTS

Sound Level Attenuation Using High Fidelity Hearing Protection Devices: Human Ears

Presenter: Tess Zaccardi, BHS
University of Texas at Dallas

Co-Authors Not Presenting: Sarah Grinn, AuD, Sarah Gittleman, BA, Arielle Iola, BA, Colleen Le Prell, PhD

In this study, we are assessing the flatness of attenuation for a variety of high-fidelity hearing protection devices (HPDs) from 250 Hz to 20 kHz using microphone in real ear (MIRE) and real ear attenuation at threshold (REAT) protocols. Preliminary data on frequency-specific attenuation measurements were presented at the NHCA conference in 2018. Since then, 11 different HPDs have been assessed in a single participant cohort using not only MIRE and REAT protocols, but also speech in noise (SPiN) testing. The words in noise (WIN) test was completed across participants with and without the various HPDs. We are also assessing subjective sound quality through surveys administered after participants listened to music with and without HPDs. Additional survey data regarding the participants' usage of the provided HPDs post-study participation will be provided.

Sound Level Attenuation Using High Fidelity Hearing Protection Devices: Mannequin Devices

Presenter: Tess Zaccardi, BHS
University of Texas at Dallas

Co-Presenter: Zein Rahman

Co-Author Not Presenting: Colleen Le Prell, PhD

In this study, we are assessing the flatness of attenuation for a variety of high-fidelity hearing protection devices (HPDs) from 250 Hz to 12 kHz using microphone in real ear (MIRE) protocols and two calibrated mannequins (KEMAR and HATS). All measurements were completed both with and without real-ear probe tubes in place, to assess the potential for compromised seals when a probe tube is used during testing. When probe tubes were in place, data were simultaneously collected using the probe tube microphone (either Verifit 2 or Etymotic ER-7C). Audiologists are likely to have access to Verifit or other real ear test devices.

PRESENTER BIOGRAPHIES

Chandran Achutan, PhD, CIH

University of Nebraska Medical Center

Dr. Chandran Achutan is an Associate Professor at the University of Nebraska Medical Center College of Public Health. After receiving his doctorate in Industrial Hygiene at the University of Iowa, he worked at the National Institute for Occupational Safety and Health prior to joining academia in 2008. He is a member of the Council for the Accreditation of Occupational Hearing Conservationists.

Bryan Beamer, PhD, PE, CSP

National Institute for Occupational Safety and Health

Bryan Beamer has over 20 years' work experience as an Industrial Engineer and Educator, including: work as an Industrial Engineer at Rittal Corporation; experience as a Research Engineer at the National Institute for Occupational Safety and Health; over ten years as an Associate Professor at the University of Wisconsin-Stout; and one year teaching in Finland as part of a Fulbright Fellowship. Dr. Beamer has done research on protecting postal workers from acts of bioterrorism, evaluating misting technologies for brick saws to protect workers from silica exposure and is currently doing research with the NIOSH Hearing Loss Prevention Team.

Elliott H Berger, MS, INCE

Independent Consultant

Elliott, recently retired from his role as Division Scientist for 3M's Personal Safety Division, is now an acoustical consultant. For over 40 years has studied hearing protection, hearing conservation, and related topics, and authored 17 textbook chapters and over 75 published articles. He chairs the ANSI working group on hearing protector attenuation, served on a National Academy of Science committee on hearing loss in the military, is a Fellow of the ASA, Past President of NHCA, Fellow of the AIHA and Past-Chair of its Noise Committee, a past Board Member of CAOHC, and a recipient of NHCA's Lifetime Achievement Award.

Rachel Bouserhal, PhD

Centre for Interdisciplinary Research in Music Media and Technology
École de technologie supérieure

Rachel is a passionate teacher, an inquisitive researcher, an adventurous cyclist and an ardent music lover. She completed her B.S and M.S in Electrical Engineering at MSU. She moved to Montreal in 2012 to follow her research interests. In June 2016, she completed her PhD at École de technologie supérieure (ÉTS). During her PhD she developed a low-complexity in-ear speech enhancement algorithm and modeled the vocal effort of talkers wearing HPDs. She is now a postdoctoral fellow at NSERC-EERS Industrial Research Chair in In-Ear Technologies. She works on understanding the audio-phonation loop and the role of signal processing and machine learning in the advancement of in-ear technologies.

PRESENTER BIOGRAPHIES

Kari Buchanan, MPH, MA

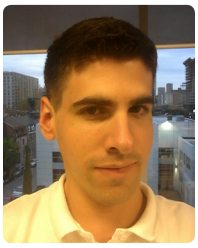
zCore Business Solutions/ DoD Hearing Center of Excellence

Kari Buchanan, M.P.H., M.A. is a retired U.S. Navy Industrial Hygiene Officer providing contract support through zCore Business Solutions to the DoD Hearing Center of Excellence. Ms. Buchanan is currently managing efforts on developing a hearing protective device evaluated products list and associated assessment methods for hearing protective devices. She received her M.P.H. in Environmental Health Sciences from Columbia University and her M.A. in National Security and Strategic Studies from the U.S. Naval War College. She has a broad background in military operations, occupational hazards in the military, DoD organization and risk assessment.

Kathleen CM Campbell, CCC-A, PhD

Southern Illinois University School of Medicine

Kathleen CM Campbell, PhD is Research Professor and Distinguished Scholar at SIU School of Medicine in Springfield IL. She was a clinical audiologist for over 25 years but now focuses on NIH/DoD fundresearch only in ototoxicity/otoprotective agents. She has received Honors of the Association from ASHA, Honors of the Association from ILAA, a Presidential Citation from AAA, was Inventor of the Year 2012 and Scholar of Distinction 2014,for the Southern Illinois University Sytem, the Natalie Stukas Award for Noise Induced Hearing Loss and Conservation and 2 Medical Innovators Awards. She also received 5 US and 33 foreign patents for her otoprotective agents. She also consults on clinical trials.



Kévin Carillo

École de Technologie Supérieure

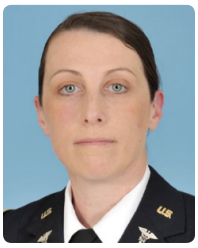
Currently PhD student in acoustic and vibration in the ICAR laboratory at the École de technologie supérieure (ETS), I am studying the application of vibro-acoustic meta-materials in the field of hearing protection. The main objective is to improve the acoustic comfort (sound attenuation and occlusion effect) of hearing protectors.

Asa Castleberry

Student Researcher - Techiya LLC

Asa Castleberry is a Senior at Blacksburg High School, and will enroll into an university after completing high school. Asa currently has a 4.2 GPA, and has participated in Track and Field all three years. Having lived in Blacksburg, Virginia all his life, Asa has devoted himself to the area. Asa has volunteered hundreds of hours in community service, including picking up litter around the town and helping the local animal shelter. Having focused on academia, athletics, and community service, Asa has recently started to concentrate on research in acoustics and hearing. In the middle of 2018, Asa headed a ear tip comfort study for Techiya, a private ear tip and headphones company.

PRESENTER BIOGRAPHIES



Kara M. Cave, PhD

U.S. Army

Major Kara Cave is a PhD candidate in the Industrial and Systems Engineering Department at Virginia Tech. Her research interests include human factors issues involved in tactical communication and protective systems use, auditory localization, blast related noise-induced hearing injury, and fitness-for-duty standards. Her previous assignments include: Walter Reed Army Medical Center; Army Research Laboratory; 10th Combat Support Hospital; William Beaumont Army Medical Center; Blanchfield Army Community Hospital; and Martin Army Community Hospital. She received a B.A. from Boston College in 1999 and a Ph.D. in Audiology from James Madison University in 2005.

Jackie DiFrancesco, BA, COHC

University of Connecticut

Jackie is in the Au.D./Ph.D. program at the University of Connecticut, studying under Dr. Jennifer Tufts in the Hearing Conservation Lab. This past summer she participated in a research fellowship at NIOSH with mentor LCDR Bryan Beamer, where they investigated noise exposure and engineering controls in grounds maintenance professionals. Jackie is interested in improving hearing conservation practices for workers with hearing loss.

Robert Dobie, MD

Dept. of Otolaryngology - University of Texas Health Science Center at San Antonio

Robert Dobie MD is clinical professor of otolaryngology at the University of Texas (San Antonio) and partner in Dobie Associates, providing consultation in hearing, balance, hearing conservation, and ear disorders (www.dobieassociates.net). After residency training at Stanford University, he completed fellowships in auditory physiology and otoneurosurgery. Previous positions included professor (University of Washington), department chair (University of Texas), and director of extramural research (NIDCD, NIH). Dr. Dobie's research interests include age-related and noise-induced hearing loss and tinnitus. He is the author of Medical-Legal Evaluation of Hearing Loss (3rd edition, 2015).

John Eichwald, MA

Centers for Disease Control and Prevention

John Eichwald is an audiologist within the Office of Science in the Centers for Disease Control and Prevention (CDC) National Center for Environmental Health, working on non-occupational noise induced hearing loss. John has over 40 years' experience in the field of Audiology. He has published extensively and made numerous presentations on the early identification of hearing loss in newborns and most recently the prevention of noise induced hearing loss. Prior to CDC, he spent nearly 20 years at the Utah Department of Health serving in both clinical practice and administrative positions.

PRESENTER BIOGRAPHIES

Andrew Fallon, AuD, CCC-A

DoD Hearing Center of Excellence

Dr. Andrew Fallon is a Clinical Audiologist for the Department of Defense Hearing Center of Excellence. Dr. Fallon serves as a subject matter expert, both leading and providing support for HCE research and clinical endeavors using his background knowledge in information technology. Projects currently underway include facilitating the use of online learning management systems, standardization of clinical coding, TeleAudiology standards, migration and merging of legacy and current day patient information data bases and the systematic evaluation and implementation of next-generation clinical testing software.

Eric Fallon, AuD

3M

Dr. Fallon currently works for 3M Corporation as a Hearing Specialist in Technical Service. Having spent 25 years in the military as an infantryman, artilleryman and audiologists, Eric has managed hearing conservation programs as large as 48,000 personnel. He has multiple deployments to both Iraq and Afghanistan and has seen firsthand the challenges of communicating in noisy environments. He routinely works with the military community in solving tactical communication issues and is broadening that interest to the industrial workplace. Eric holds a Doctorate Degree in Audiology.

Gregory Flamme, PhD

SASRAC

Gregory A. Flamme, Ph.D. is a Senior Scientist with Stephenson and Stephenson Research and Consulting (SASRAC). Prior to joining SASRAC, Dr. Flamme held faculty positions at Western Michigan University and The University of Iowa. He completed his Ph.D. in Audiology at The University of Memphis and conducted post-doctoral studies in Epidemiology and Biostatistics at The University of Iowa. His research interests include the assessment of hearing status and the identification and mitigation of risk factors for hearing impairment.

John Franks, PhD

LytleSound

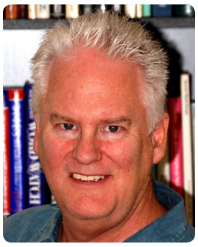
Dr. Franks is the former Chief of the Hearing Loss Prevention Section of the National Institute for Occupational Safety and Health (NIOSH). While at NIOSH he directed the nation's research into the improvement of hearing protectors and testing methods, directed the national assessment of hearing of Americans through the NHANES program. Dr. Franks was an Assistant Professor of Audiology at Arizona State University and an Associate Professor of Audiology at Northern Illinois University. He has over 70 publications, has received awards from NHCA and is a Fellow of the Acoustical Society of America.

PRESENTER BIOGRAPHIES

Dan Gauger

Bose Corporation

Dan Gauger is a Distinguished Engineer at Bose Corporation where he has worked for more than 38 years. He is one of the two engineers at Bose who laid the foundation for its aviation, military, consumer headphone and hearing assistance businesses and he continues to shape the future direction of the company's work in this area: one executive titled him “our spiritual leader for headphone sound control.” Dan also contributes significantly to the work of ANSI S12 WG11 on hearing protector testing. He's holds the SB/SMEE degrees from MIT and, of equal importance to him, a 3rd-dan rank in Aikido.



Robert M. Ghent Jr, AuD

Honeywell Safety Products USA, Inc.

Bob Ghent is Manager of the Acoustical Lab at Honeywell Safety Products in San Diego, CA. Bob's early career included a clinical practice providing hearing care to the entertainment industry. A musician and audio engineer, he is personally motivated to care for professional listeners. Bob has taught at the University of Utah and Brigham Young University, and was a Senior Researcher at the Center for Amplification and Hearing Research in Salt Lake City, Utah. After two decades in remediation, Bob is again focused on hearing loss prevention. Bob has a doctorate in audiology from A.T. Still University, and bachelor's and master's degrees from Brigham Young University.

Christian Giguère

University of Ottawa

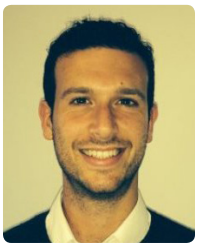
Christian Giguère is a Professor in Audiology and Speech-Language Pathology at the University of Ottawa. His research interests include speech communication and warning sound perception, hearing protection, and auditory fitness for duty. He has authored over 125 journal articles, conference proceedings and book chapters. Professor Giguère is active in the area of standardization (CSA, ANSI, ISO) with several technical workgroups related to occupational hearing loss, hearing protection and audiology. He is past president of the Canadian Acoustical Association (CAA) and former co-chair of the International Commission on the International Commission on the Biological Effects of Noise (ICBEN).

Sarah Gittleman

The University of Texas at Dallas

Sarah Gittleman is a second year Au.D. student at the University of Texas at Dallas. She holds a bachelor's degree in Linguistics from Washington University in St. Louis, where she earned a dual major in Psychological and Brain Sciences and a minor in Speech and Hearing Sciences. Sarah has been involved in research teams at both universities, covering topics from psycholinguistics to hearing conservation. She has presented research relating to speech perception at the ASA conference. She is currently a graduate research assistant in Dr. Le Prell's Hearing Conservation lab at UTD. Sarah grew up in Houston, TX, and in her spare time enjoys knitting and kickboxing.

PRESENTER BIOGRAPHIES



David Greeberg, BSc, PhD

EAVE

Prior to working in the NIHL field Dr David Greenberg worked as an NHS Clinical Audiologist in London, UK, and as a Research Audiologist in hearable medical device trials and oto-pharmaceutical clinical trials. Following the completion of a PhD in Auditory Neuroscience focussing on communication in noise Dr Greenberg taught at the UCL School of Audiology and UCL Medical School with his work published in leading peer reviewed journals on cochlear implants, tinnitus, neurophysiology and psychophysics. Dr Greenberg's personal mission is to discover and act on the most efficient and effective methods of preventing the loneliness and isolation that can result from Hearing Loss.

Quintin Hecht, AuD, CCC-A, CPS/A

HoChunk Inc in support of the Defense Health Agency Hearing Center of Excellence

Quintin Hecht, AuD, is a research audiologist and senior program manager for the DHA Hearing Center of Excellence at Lackland AFB, TX. Dr. Hecht's experience includes assignments as the USAF Hearing Conservation Program Manager at the School of Aerospace Medicine, a clinical audiologist at Wilford Hall Ambulatory Surgical Center and an Army Reserve audiologist. He is licensed and board certified, and received his AuD from Illinois State University. He is also a certified CAOHC Course Director and Professional Supervisor of the Audiometric Monitoring Program. Dr. Hecht's research interests include noise-induced hearing loss, tinnitus, ototoxicity and hearing protection device fit-testing.

Logan Honea, BA

The University of Texas at Dallas

Logan Honea is a third-year Doctor of Audiology student at UT Dallas. She previously received her Bachelor of Arts degree in Communication Sciences and Disorders from the College of Wooster in 2016. Completing her undergraduate thesis, “To All Who Come To This Happy Place: An Exploration of the Hearing Assistive Technology and Accommodations at U.S. Theme Parks,” inspired an interest in hearing assistive technology and safe listening levels. Her current interests include pediatric and educational audiology.

Arielle Iola

The University of Texas at Dallas

Arielle Iola is a second year Aud student at The University of Texas at Dallas. She holds a bachelor's degree in Hearing and Speech Sciences from the University of Maryland where she also earned a minor in Spanish Language. Arielle has been involved in research projects at both universities focusing on presbycusis and hearing conservation. She is currently a graduate research assistant in Dr. Le Prell's Hearing Conservation Lab. Arielle currently serves on the Student Academy of Audiology executive board and is passionate about advocating for the profession of audiology. Arielle grew up in Dallas, Texas and enjoys outdoor activities and knitting in her spare time.

PRESENTER BIOGRAPHIES

James J. Jerome, MA

Workplace Integra - Indianapolis Office

James (Jim) Jerome is a senior occupational audiologist for Workplace Integra, working out of the Indianapolis office since 2007. Prior to that, he worked as an occupational audiologist for an IH and safety group for four years, a US Army audiologist for 21 years, and a school audiologist for 5 years. Jim has been an active member of the NHCA since 1999. He served as Secretary on the NHCA Scholarship Foundation (NHCASF), Secretary/Treasurer on the NHCA Executive Council, Program Chair for the 2012 and 2015 Annual NHCA Conferences, President of NHCA, and currently President of the NHCASF. Under CAOHC, he has been a Course Director since 1985 and a Professional Supervisor since 2014.

Benj Kanters, MM

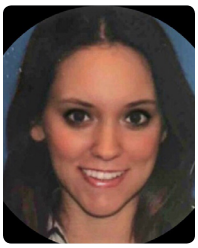
Columbia College Chicago

Benj has been a professor at Columbia College since 1993, after 20 years in the audio and music industries, including 14 years teaching audio at Northwestern University. Through the 70s, he was partner and sound engineer with the Chicago area concert club, Amazingrace. During the 80s, he was partner and head engineer of Studiomedia Recording Company. After studying hearing physiology at NU, he developed the course Studies in Hearing to teach physiology and conservation to audio students. In 2007, he founded The Hearing Conservation Workshop, presenting over 90 seminars on hearing physiology and conservation for students and professionals in the audio, music and hearing sciences.

Dr. Khalid Khan

Indiana University, Bloomington

Khalid Khan is an Assistant Professor of Environmental and Occupational Health at the Indiana University School of Public Health, Bloomington. His research interests are centered on the broad area of environmental epidemiology with specific emphasis on prevention of environmental exposures including loud noise, water contaminants pathogens associated poor hygiene behavior in vulnerable populations. Also, he examines how these exposures are related to neurocognitive functions in children and adolescents. Dr. Khan obtained his doctoral degree from Columbia University Mailman School of Public Health and has about 10 years of research experience in rural, agricultural and low-income communities.



Nicole Larionova, BS

DoD Hearing Center of Excellence

Nicole Larionova is a Research Assistant who has been working for the Department of Defense (DoD) Hearing Center of Excellence (HCE) since June 2017. After obtaining her Bachelor of Science degree in Biology at the University of Texas at San Antonio, she worked in Pharmacological research at the University of Texas Health Science Center at San Antonio, where she managed a research team and performed pre-clinical pharmacokinetic studies. Nicole utilizes her research experience to assist with on-going research projects at the HCE. In the near future, Nicole plans to continue her education to further her career in research administration and knowledge translation.

PRESENTER BIOGRAPHIES

Kichol Lee

Virginia Tech

Dr. Lee is a research assistant professor of Industrial and Systems Engineering at Virginia Tech. He received a Ph.D. in Human Factors Engineering at Virginia Tech in 2011. As a manager of Auditory Systems Lab at Virginia Tech, he conducts various projects related to product design and human audition. In recent years, he conducted several human auditory situation awareness projects. He also is chief scientist of HEAR, LLC, a design, testing, and litigation support company.

Li Pei-Chun, PhD

Mackay Medical College

Pei-Chun Li received the B.S. degree in Electrical Engineering from National Taiwan University, Taiwan, in 1992, and the Ph.D. degree in Biomedical Engineering from National Yang-Ming University, Taiwan, in 2006. From 2009 to 2012, he was a board member and a senior manager with the Aescu Technologies, where he was responsible for managing hearing aids software and hardware R&D, production engineering, and quality assurance. He is currently an Associate Professor with the Department of Audiology and Speech-Language Pathology, Mackay Medical College, Taiwan. His research interests focus on assistive listening technologies, electroacoustic measurements, and hearing conservation.

Lynne Marshall, PhD

University of Connecticut

Lynne Marshall was a Senior Scientist for the Naval Submarine Medical Research Laboratory for over 30 years before retiring in 2015. She specialized in hearing conservation with an emphasis on using otoacoustic emission (OAE) testing to help prevent hearing loss. In 2015 she was awarded the Department of the Navy's Top Scientists and Engineers Award. She has remained active in hearing research since retiring; joining the faculty of the University of Connecticut, serving on the Veterans Administration's Congressionally Directed Advisory Committee on Prosthetics and Special Disabilities Programs, attending professional meetings, and doing contract work for the Office of Naval Research.

Elizabeth A. Masterson, PhD, CPH, COHC

NIOSH

Elizabeth (Liz) Masterson is an Epidemiologist in the newly named Health Informatics Branch of the Division of Field Studies and Engineering at the National Institute for Occupational Safety and Health, Cincinnati, Ohio. She is the Project Officer for the NIOSH Occupational Hearing Loss Surveillance Project and serves as an Assistant Coordinator for the NIOSH Hearing Loss Prevention Cross-sector. She also serves on the NIOSH Hearing Loss Prevention Cross-sector Council. Liz has a PhD in Environmental Health/Epidemiology from the University of Cincinnati and is certified in Public Health and Occupational Hearing Conservation.

PRESENTER BIOGRAPHIES

Anna McCraney, AuD

Ototronix

Dr. Anna McCraney earned her Bachelor of Science degree in Speech and Hearing Science from the University of Wyoming and her Doctorate of Audiology (Au.D.) from Baylor College of Medicine. She is a board certified audiologist and a fellow of the American Academy of Audiology, the American Speech-Language-Hearing Association and the Texas Speech-Language-Hearing Association. Dr. McCraney has held clinical positions at major medical centers including the Houston VA Medical Center and Texas Children's Hospital. She currently practices as the Director of Audiology at Ototronix LLC, home of the MAXUM hearing implant. She also sits on the Board of Directors for The Sleeping Baby Hearing Foundation.

Mary M. McDaniel, AuD, CCC-A, CPS/A

Pacific Hearing Conservation, Inc

Mary is the owner of Pacific Hearing Conservation, Inc. a consulting firm in Seattle, WA, and has worked exclusively in occupational audiology since 1984. Dr. McDaniel is a Past President of the National Hearing Conservation Association and in 2003 received the NHCA's Michael Beall Threadgill Award for outstanding leadership and distinguished service. She served on the Council for Accreditation in Occupational Hearing Conservation (CAOHC), is a Past-Chair of the Council, a certified CAOHC Course Director and a Certified Professional Supervisor. She is a member of the American Speech-Language-Hearing Association and was the Chair of ASHA's Special Interest Division in Hearing Conservation

Deanna Meinke, PhD

University of Northern Colorado

Deanna Meinke, Ph.D., is a professor in the Department of Audiology and Speech-Language Sciences at the University of Northern Colorado and is the Co-Director of the Dangerous Decibels public health partnership for prevention of noise-induced hearing loss. Her research interests include the prevention and early detection of hearing loss in children and adults, evaluation of firearm noise hazards, and the effectiveness of hearing protection.

John A. Merkley, AuD, CCC-A, CPS/A

U.S. Army Public Health Center

LTC John 'Andy' Merkley is an Army Audiologist currently serving as the Army Hearing Division Chief at the Army Public Health Center in Aberdeen, Maryland. He holds a Master of Science in Communicative Disorders from Utah State University and a Doctor of Audiology from Central Michigan University. LTC Merkley's professional associations include American Speech-Language-Hearing Association (ASHA), the Military Audiology Association (MAA) and the National Hearing Conservation Association (NHCA). LTC Merkley represents the MAA on the Council for Accreditation in Occupational Hearing Conservation (CAOHC) and serves as the vice-chair of education on the CAOHC Executive Committee.

PRESENTER BIOGRAPHIES

Jan Moore, PhD

University of Nebraska Kearney

Jan Allison Moore received graduate degrees from the University of Illinois (Ph.D.) and Purdue University (M.S.) and her undergraduate degree from the University of Central Arkansas. She also completed a graduate certificate program in Public Health at the University of Nebraska Medical Center. She was a Fulbright scholar to Canada in 1993. She is a full Professor at the University of Nebraska Kearney. Her primary research interests include speech production children with hearing loss. Most recently, she has embarked on a new area of research focusing on prevention of noise-induced hearing loss in persons attending contemporary worship services.

Alexander W. Morris, BA

The University of Texas at Dallas

Alexander Morris is a fourth-year doctor of audiology (AuD) student at the University of Texas at Dallas currently completing his externship at the Advanced Hearing Center (Sugar Land, TX). He serves on the board of the Student Academy of Audiology as chair for the Public Outreach Committee. His clinical and research interests include hearing loss prevention, tinnitus, music perception, practice management, and hearing healthcare public policy.

William J Murphy, PhD

CDC/NIOSH

William J. Murphy is a Captain in the United States Public Health Service Commissioned Corps and is coordinator for the Hearing Loss Prevention cross sector for the National Institute for Occupational Safety and Health. He is an active member of the National Hearing Conservation Association and a Fellow of the Acoustical Society of America. He is currently the chair for the ASA's American National Standards Institute (ANSI) Accredited Standards Committee S3 for Bioacoustics. He has provided leadership to the ASA as chair of the Technical Committee on Noise and through work with the national and international standards on noise.

Ann Nakashima, MASc, PEng

Defence Research and Development Canada

Ann Nakashima, P.Eng., has been a Defence Scientist with Defence Research and Development Canada for 14 years. She specializes in military noise measurement and hearing conservation and is a licensed Professional Engineer in Ontario.

PRESENTER BIOGRAPHIES

Rick Neitzel, PhD, CIH

University of Michigan School of Public Health

Dr. Rick Neitzel is an Associate Professor and Associate Chair of the Department of Environmental Health Sciences. His research focuses on the characterization of exposures to noise, heavy metals and other ototoxins. He has published >80 papers on these topics. He is particularly interested in incorporating new exposure sensing technologies into research, and also has a strong interest in translating his research findings into occupational health practice. He has created a national job exposure matrix for occupational noise (http://noisejem.sph.umich.edu/). He is Vice Chair of the ACGIH Threshold Limit Values-Physical Agents Committee. He has been a Certified Industrial Hygienist since 2003.

James A Norris, PhD

Creare

Dr. Norris received his degree in Biomedical Engineering at the School of Biomedical Engineering and Sciences (Wake Forest University and Virginia Tech). His research focused on adapting techniques from dynamic systems theory to quantify stability of human neuromuscular control. After graduating, he joined Creare,Äîa small business focused on research and development. Within hearing, he has worked on understanding relationships between custom earplugs, attenuation, and comfort; developing algorithms and hardware to support otoacoustic emissions research, and designing and building new hearing test equipment that may be paired with mobile devices to increase the reach of hearing health care.

Hugo Saint-Gaudens

École de technologie supérieure

Hugo Saint-Gaudens obtained his bachelor's degree in mechanical engineering in 2017 and is now doing his master's degree in acoustics at the École de technologie supérieure (ÉTS) in collaboration with the Institut de Recherche Robert-Sauvé en Santé et Sécurité du Travail (IRSST). Member of the Groupe de Recherche en Acoustique de Montréal (GRAM) and under the supervision of Olivier Doutres (PhD), Hugues Nélisse (PhD) and Franck Sgard (PhD), his main topic of research is the occlusion effect induced by hearing protection devices and he is working on a new approach to measure it.

Scott Schneider, CIH, FAIHA

Retired Industrial Hygienist

Scott Schneider is a Certified Industrial Hygienist. He has worked on occupational safety and health issues in the Labor movement for the past 38 years. He worked for the Carpenters Union, the Workers' Institute for Safety and Health (WISH), the Center for Construction Research and Training (CPWR) and the Laborers' Health and Safety Fund of North America (LHSFNA), from which he recently retired. Over his career he has helped develop standards to protect workers from Asbestos and Silica, fought to protect workers from noise exposure and ergonomic injuries as well as in areas such as work zone safety, fall prevention and improving safety climate in construction.

PRESENTER BIOGRAPHIES

Theresa Y. Schulz, PhD

Honeywell Industrial Safety

Theresa Y. Schulz, PhD, LtCol, USAF (ret.) Dr Theresa Schulz is Global Training Manager for Honeywell Industrial Safety. With graduate degrees from the University of Texas and the Ohio State University, as well as almost 30 years of experience, Dr Schulz provides consultation in hearing loss prevention issues and hearing conservation programs. Theresa was recognized as the US Air Force Outstanding Audiologist of the Year in l989 and l997, and received the Elizabeth Guild Award for Contributions to Military Hearing Conservation in l996 and the military's Outstanding Volunteer Medal in 2004 for her extensive work to prevent noise-induced hearing loss both in the military and in the public.

Gregory Scott

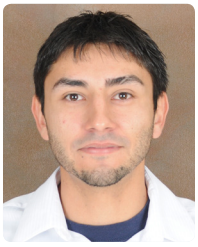
SoundPrint

Greg is the founder of SoundPrint, a company that aims to measure and collect sound level data to be used for research purposes with respect to raising awareness of noise pollution.

Theresa H. Small, AuD, CPS/A

Associates In Audiology, Inc.

Theresa H. Small, Au.D., CPS/A is an occupational audiologist consultant, CAOHC certified professional supervisor and course director and owner of Associates In Audiology, Inc., a professional consulting firm specializing in occupational audiology, and hearing loss prevention. Dr. Small has been practicing audiology since 1999, with a 100% focus on hearing loss prevention since 2007. She wrote an article for the CAOHC Update in June 2013, “Applying GINA in the Occupational Hearing Conservation Program”. Dr. Small has been a member of NHCA since 2007 and has attended every conference since then. She is currently on the NHCA executive council as the secretary/treasurer.



JR Stefanson, BS

United States Army Aeromedical Research Laboratory

Mr. Stefanson is a regional research administrator for the DoD Hearing Center of Excellence (HCE) and a research investigator for the United States Army Aeromedical Research Laboratory, Fort Rucker, Alabama. Over the past several years he has studied the performance of hearing protection devices (HPDs) in continuous and impulsive noise, the effect of the HPDs on auditory localization ability, HPD field attenuation estimation systems, and the performance of custom hearing protection and communication devices. Mr. Stefanson graduated magna cum laude from Troy University with a Bachelor of Science in Biology and is accredited by the Council for Accreditation in Occupational Hearing Conservation.

PRESENTER BIOGRAPHIES

Ashley Stumpf

Univeristy of Northern Colorado

Ashley Stumpf is a 4th year doctor of audiology (Au.D.) student at the University of Northern Colorado. Currently, she is completing a final year externship at a neuro-otology practice, Denver Ear Associates. Her academic interests include hearing loss prevention due to noise exposure as well as ototoxic pharmaceuticals, educational audiology, and hearing loss rehabilitation. Ashley is a certified Dangerous Decibels educator and a CAOHC certified Occupational Hearing Conservationist. Ashley also enjoys volunteer coaching of youth engaged in high school sports.

Timothy A. Swisher, MA, CCC-A

Hearing Safety

Tim is an occupational audiologist and president of Hearing Safety. He received his B.S. at Indiana University of Pennsylvania and his M.A. in Audiology at Western Illinois University. He began his audiological career as an Army audiologist, retiring as a major after 20 years service. He credits his time in the service as developing his primary interest in hearing conservation and expanding his skills as a hearing conservationist. In his current capacity he provides full time hearing conservation consultant services. Tim has been a long term member of NHCA and is an active CAOHC course director.

Stephen M. Tasko, PhD

SASRAC/Western Michigan University

Stephen Tasko, Ph.D. is an Associate Professor in the Department of Speech, Language and Hearing Sciences at Western Michigan University and Research Consultant with Stephenson and Stephenson Research and Consulting (SASRAC). Dr. Tasko earned his Ph.D. in Communication Disorders from the University of Wisconsin-Madison and completed post-doctoral work in the Audiology and Speech Center at Walter Reed Army Medical Center. Dr. Tasko has a wide range of research interests that include assessment of firearm noise, mechanisms of middle ear muscle function, and normal and disordered speech motor control.

Jérémie Voix

École de technologie supérieure

Prof. Voix leads the NSERC-EERS Industrial Research Chair in In-Ear Technologies (CRITIAS) for the development of leading-edge technology combining in-ear instrumented hardware platforms with audio signal processing and biosignal extraction algorithms to enable its Canadian industrial partner, EERS Global Technologies Inc., to commercialize in-ear wearables for hearing protection, hearing aid, two-way communication and brain-computer interfaces for industrial, military, consumer and medical markets. CRITIAS core research activities will include 3 areas of expertise: a) digital hearing protection, b) communication in noise and c) in-ear sensing.

PRESENTER BIOGRAPHIES

Stephen Wheatley

Co-Founder and Managing Director (CEO)
HearAngel/LimitEar Ltd

Is one of the Founders and Managing Director (CEO) of LimitEar Ltd a company established in 2010 to protect the hearing of people at work who use headphones in line with the occupational hearing protection regulations. Having supplied a number of major corporations including The BBC and Sennheiser the company is now using its intellectual property and know how to address the risks caused by recreational headphone use.

Tess Zaccardi, BHS

The University of Texas at Dallas

Tess is currently a third year doctor of audiology student at the University of Texas at Dallas. She has been interested in hearing conservation since joining Dr. Le Prell's hearing conservation lab at the University of Florida during her undergraduate degree. Since continuing on to the graduate level she has had the opportunity to lead her own projects in the hearing conservation lab at the Univ. of Texas at Dallas as well as participate in an industrial hearing conservation clinical rotation. She hopes to incorporate hearing conservation as a part of her audiological practice post-graduation.

Edward Zechmann, INCE Bd.Ct., PE, MS

NIOSH

CDR Edward Zechmann is a Mechanical Engineer with extensive experience in acoustics. He is currently working on a Ph.D. in Acoustics from Penn State. In 2004 he came to NIOSH developing software and hardware for characterizing hazardous noise and vibrations from power tools. He has continued to develop assessment methods and has supported field studies of jackhammers, development of an impulse noise lab and microphone calibration lab, and has worked with engineering students from the University of Cincinnati to assess noise controls. CDR Zechmann spent two years in-residence at Penn State studying noise induced hearing loss, noise control, and statistics.

NATIONAL HEARING CONSERVATION ASSOCIATION

The National Hearing Conservation Association's 43rd Annual Conference, February 7 - 9, 2019, is approved for CEU's from the organizations listed below. This information is also available online at nhca.conferences.com

Instructions for receiving CEUs:

1) You must complete the sign-in/sign out sheet at the registration desk.

2) For an hour or longer program, you must be present no later than 10 minutes after the starting time. For the twenty and thirty minute presentations, you must be present at the start of the presentation. You must remain until the scheduled ending time. There are session moderators who are monitoring attendance at each session.

3) You must complete the conference evaluation survey. You will receive an email after the conference with the link to the online survey.

4) At the end of each day, you must complete the presentation assessments online using the code provided at each presentation you attended. We will send you a link via Sched to the online assessments for each session. Be sure to document your presentation codes that you will receive at the end of each presentation so that you can submit them in the assessment, as it's required

4) For ASHA, you must complete a Program Participant Form. These are available at the registration table. It's most important to provide your name and ASHA number to ensure you receive CEU credit. Please provide your ASHA Member ID number on the sign-in/sign-out sheet.

6) For AAA, please make sure to provide your AAA Member ID number on the sign-in/sign-out sheet. This will be submitted to AAA with your name to disclose participation at the conference. If your AAA Member ID is not provided, you are not guaranteed to receive credit.

7) For AAOHN, you must be registered for this activity, present for the activity per the instruction in #2 above, as well as complete the assessments and evaluations per the above instructions #3 and #4. Please refer to page 19 for the conflict of interest disclosures and page 12 for the conference sponsors. There is no commercial for any of the CEU approved presentations.

AMERICAN ACADEMY OF AUDIOLOGY
Continuing Education in Audiology ™

AAA: NHCA is approved by the American Academy of Audiology to offer Academy CEUs for this activity. The program is worth a maximum of 1.35 CEUs. Academy approval of this continuing education activity is based on course content only and does not imply endorsement of course content, specific products, or clinical procedure, or adherence of the event to the Academy's Code of Ethics. Any views that are presented are those of the presenter/CE Provider and not necessarily of the American Academy of Audiology.

APPROVED PROVIDER ®
ASHA CONTINUING EDUCATION
AMERICAN SPEECH-LANGUAGE-HEARING ASSOCIATION

The National Hearing Conservation Association is approved by the Continuing Education Board of the American Speech-Language-Hearing Association (ASHA) to provide continuing education activities in speech-language pathology and audiology. **See course information for number of ASHA CEUs, instructional level and content area.** ASHA CE Provider approval does not imply endorsement of course content, specific products or clinical procedures.

This course is approved for **1.35 ASHA CEUs** (Intermediate level, Professional area).

AAOHN
American Association of Occupational Health Nurses, Inc.

AAOHN: This activity is pending approval by the American Association of Occupational Health Nurses (AAOHN), Inc. for 16 contact hours. AAOHN is an accredited approver of continuing nursing education by the American Nurses Credentialing Center's Commission on Accreditation. Full attendance at a program is required for contact hours to be awarded. Expiration of contact hours is 2 years from offering.

NHCA

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