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ANNUAL CONFERENCE
FEBRUARY 9-11, 2023
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Spectrum is available without charge to NHCA members in all categories. Anyone interested in publishing in Spectrum should contact Ashley Montoya at the NHCA office.

NHCA provides leadership, expertise, and education on hearing loss prevention strategies and services to the broader professional community and empowers and supports members through networking and advocacy.



The National Hearing Conservation Association


**P.O. Box 3406
 Englewood, CO 80155**

(303) 224-9022 • (303) 200-7099 Fax

nhcaoffice@hearingconservation.org

www.hearingconservation.org

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Welcome to the 2023 NHCA Annual Conference in Jacksonville, Florida!

We are excited to return to our in-person format and thankful to have been able to stay connected virtually with you over the past two years. The Program Task Force, under the direction of Madison Saunders and Laura Kauth, has been working hard to make this conference a success. The conference unites advances in daily practice, research, technology, and networking.

Thank you for joining us virtually leading up to conference for our “ignite” sessions to meet our annual sponsors and “spark” excitement for learning at the 2023 NHCA Annual Conference. Moreover, we have an extended conference experience this year to keep the conversations and “spark” ignited in the weeks following conference.

Together we continue to learn more and advance the NHCA mission. Have a great conference!

Gayla Poling, Ph.D.
NHCA President



Well, hello there, fellow hearing conservationists ... and welcome to Jacksonville, Florida! Yep, you read that right; we are back, baby! After two years of pivoting to virtual, we have returned in-person for the 47th annual NHCA conference (cue confetti). My name is Dr. Madison (Madi) Saunders; and I am this year's Program Chair. After serving on the program committee for both virtual conference years, no one is happier than I am to greet you here. It's going to be a great event on both the educational and social fronts. So bust out that business casual (yes, pants too, this isn't Zoom) and dust off those business cards. It's been a long time and we're here for a good time.

Thursday is a strong start with an impressive array of pre-conference workshops. For those registered, you can expect the ever informative "Basics", perfect for students, professionals new to hearing conservation, or those who simply want a thorough refresh on the latest gold standard practices. Additionally, we have engaging workshop tracks on the themes of ototoxicity, hearing conservation in the military, hearing protector fit-testing, and music.

The Thursday evening meet and greet happy hour is the perfect place for attendees to reunite and connect with one another. We will be bringing back Kahoot!, a fan favorite from our virtual days, so brush up on your trivia knowledge for your chance at prizes and bragging rights.

Friday officially kicks the conference off with some amazing programming. While the entire agenda of sessions is not to be missed, we are especially excited to hear from our keynote speaker, Dr. David Zapala, of Mayo Clinic, on the effects of noise on the vestibular system. After a stimulating day of learning, you'll obviously want to kick back at the Friday night fiesta at Top Golf, featuring a fajita bar and 'best' dressed golf costume contest, in addition to a bit of friendly competition. But don't stay out too late because you're not going to want to miss anything on Day Two.

I hope many of you have enjoyed the opportunity to engage with our Sponsors preconference at our two Ignite Sessions. During the conference, you will have plenty of opportunity to interact with the Sponsors: Thursday's reception; daily in the Sponsor Showcase area of the convention center; and Saturday at our Sponsor breakfast. Pull up a chair and learn about the latest and greatest products from the experts themselves...over eggs, bacon, and coffee.

Saturday we wrap up the conference with a designated block of time for poster presentations and three unique breakout tracks in addition to our exciting podium sessions. The projected total CEU count for this year's conference is 1.55 CEUs with the workshops; or .95 CEUs without the workshops, giving you the opportunity to score all your annual CEUs in one place.

Your NHCA Program Task Force Committee and Executive Council teams have worked to make this conference the best possible return to in-person for you, with engaging and informative sessions and exciting and enriching social events. Thank you all for being here to make it happen. Welcome back!



Madison Saunders, Au.D.
Program Chair

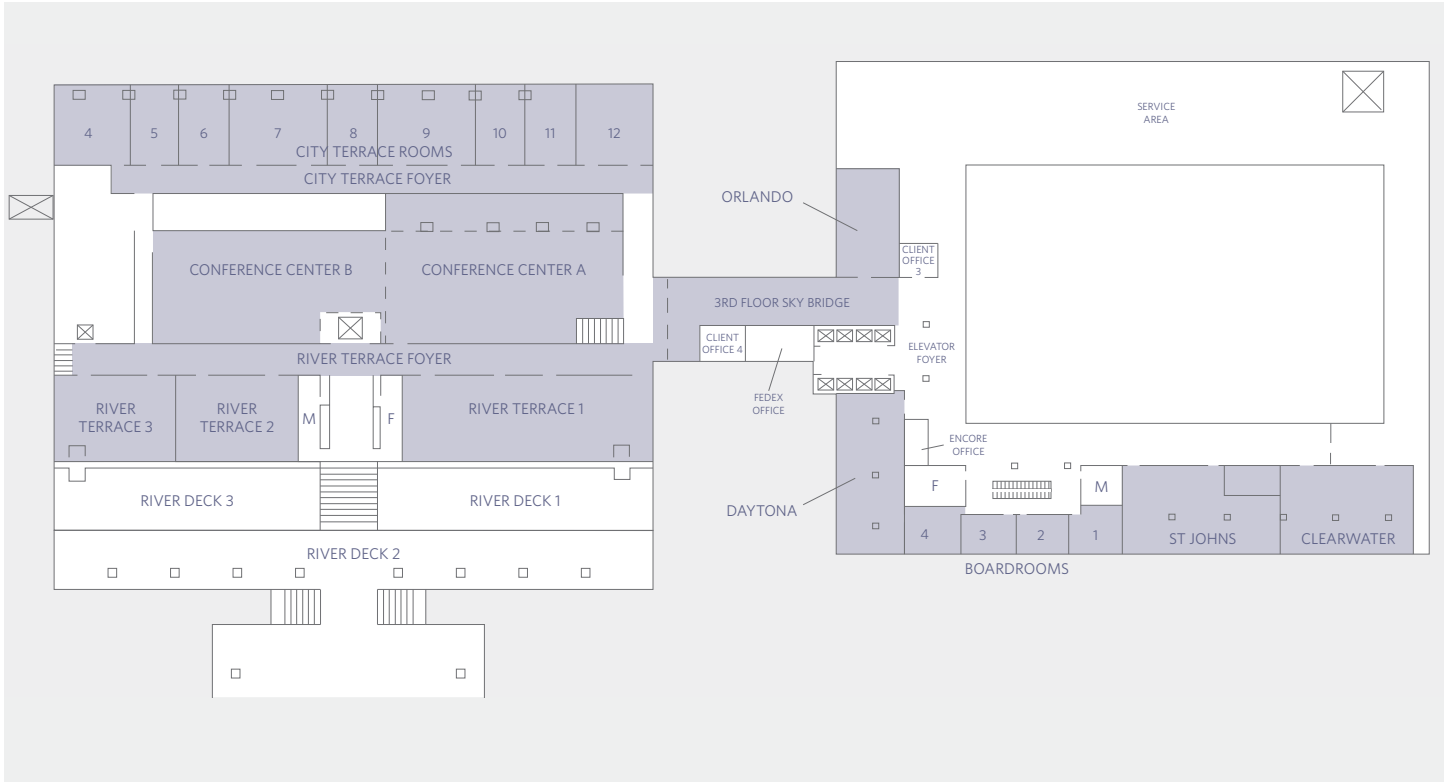
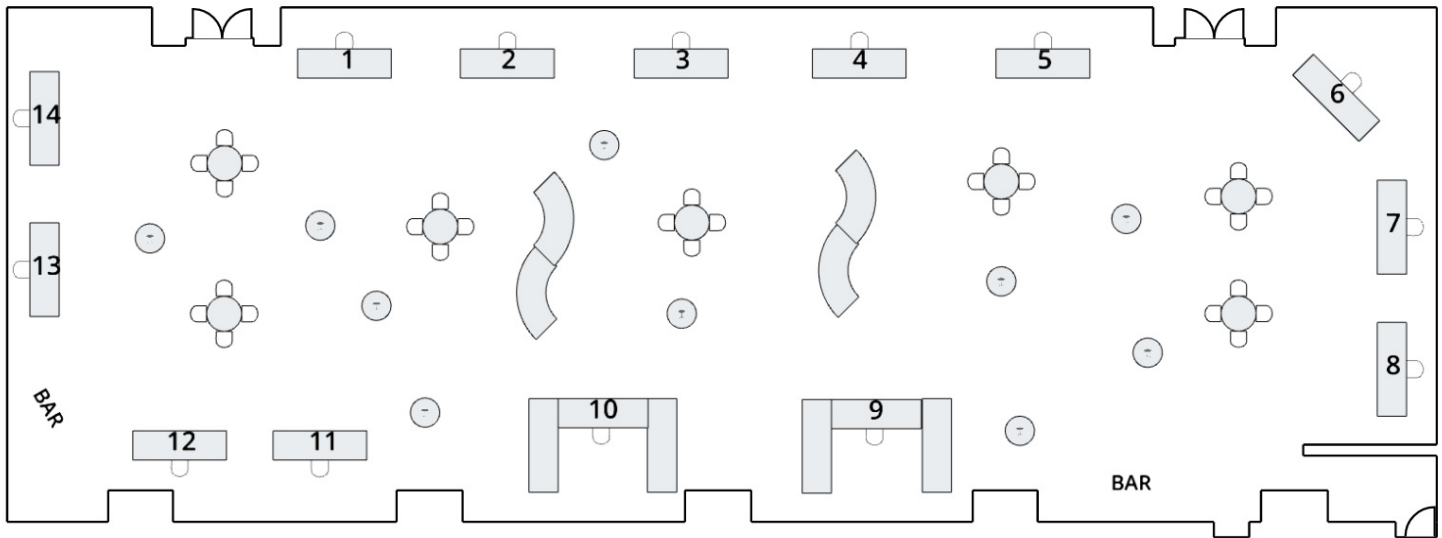


EXHIBIT HALL FLOORPLAN



- | | | | |
|----------|----------------------------------|-----------|-----------------------------|
| 1 | HearX Group | 8 | WAHTS |
| 2 | Starkey | 9 | 3M |
| 3 | Examinetics | 10 | SHOEBOX Ltd. |
| 4 | Virtual Hearing Solutions | 11 | Benson |
| 5 | NIOSH | 12 | Tremetrics |
| 6 | Minuendo | 13 | ASHA |
| 7 | CAOHC | 14 | Westone Laboratories |

Thursday • February 9 • 2023

7:00am – 8:00am	Breakfast	River Terrace 1
7:00am – 6:30pm	Registration	3 rd Floor Sky Bridge
	Workshops	
8:00am – 11:00am	Hearing Protector Fit testing: Standards, Systems, and Studies...Oh My! <i>Speakers: Laurie Wells, William Murphy</i>	City Terrace 9
8:00am – 11:00am	Ototoxicity Management from Occupational and Environmental Exposures to International Harmonization <i>Speakers: Gregory Zarus, Thais Morata, Gayla Poling, Adrian Fuente</i>	City Terrace 4
8:00am – 11:00am	What You Don't Hear Can Kill You - The Conundrum of Balancing Hearing Protection and Auditory Situation Awareness: Guidance for the Hearing Conservationist <i>Speakers: John Keady, John Casali, Kichol Lee</i>	City Terrace 7
8:00am – 4:00pm	The Basics <i>Speakers: Richard Danielson, Don Finan, Deanene V. Berry, Cassie Ford, Rachel Bouserhal, Caleb Kronen</i>	City Terrace 5
11:00am – 1:00pm	Lunch on Your Own	
	Workshops	
1:00pm – 4:00pm	Hands-On Experience and Demos of Hearing Protector Fit-Testing Systems <i>Speaker: William Murphy</i>	City Terrace 7
1:00pm – 4:00pm	Hearing Loss Prevention in the Uniformed Services <i>Speaker: Quintin Hecht</i>	City Terrace 4
1:00pm – 4:00pm	Investigational Inner Ear Medicines: Are Hearing Loss Prevention and Restoration Possible? <i>Speakers: Colleen Le Prell, Carlos Esquivel</i>	City Terrace 9
1:00pm – 4:00pm	Practical Hearing Conservation for Musicians <i>Speakers: Cory Portnuff, Frank Wartinger</i>	City Terrace 6
5:00pm – 5:30pm	Student/New Member Meet and Greet	River Terrace 1
5:30pm – 7:30pm	Exhibitor Reception	River Terrace 1

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Our mission: Advancing best practice in occupational hearing conservation worldwide, through credentialing, standards, education, & advocacy.

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Friday • February 10 • 2023

7:00am – 8:00am	Breakfast	Conference Center B
7:00am – 5:30pm	Registration	3 rd Floor Sky Bridge
7:00am – 5:30pm	Exhibit Hall	River Terrace 1
8:00am – 8:15am	General Session: Opening Remarks	Conference Center A
8:15am – 8:45am	KEYNOTE ADDRESS: Noise and Vertigo <i>Speaker: David Zapala</i>	Conference Center A
8:45am – 9:05am	The Myth of Normal Hearing <i>Speaker: Douglas Brungart</i>	Conference Center A
9:05am – 9:25am	Healthy Hearing Project: Cognitive Results <i>Speaker: Jan Moore</i>	Conference Center A
9:25am – 9:45am	Audibility Needs in the Workplace <i>Speakers: Colleen Le Prell, Eric Fallon</i>	Conference Center A
9:45am – 10:15am	Break	River Terrace 1
10:15am – 10:35am	Association of Noise from Various Sources with Risk of Hearing Trouble and Tinnitus in US Youth Aged 16 to 19 years: The 2017-2020 National Health and Nutrition Examination Survey (NHANES) <i>Speakers: Howard Hoffman, Christa L. Themann</i>	Conference Center A
10:35am – 10:55am	Auditory Difficulties in Normal-Hearing Young Adults with High Lifetime Noise Exposure <i>Speakers: Srividya Grama Bhagavan, Ishan Bhatt</i>	Conference Center A
10:55am – 11:15am	DOD/VA Hearing Technician (HT) Training and Certification Course: Overview and Pilot Program Results <i>Speaker: Kathy Gates</i>	Conference Center A
11:15am – 11:35am	Creating the NHCA Narrative - A Panel Discussion <i>Speakers: Gayla Poling, Theresa Schulz</i>	Conference Center A
11:35am – 12:15pm	General Session: Business Meeting	Conference Center A
12:20pm – 1:50pm	LUNCHEON SPEAKER: Experiential Design, Evolutionary Influence, and Spaces for Human Connection: Learning to Leverage our Access to Great Design to Make Change <i>Speaker: Scott Pfeiffer</i>	Conference Center B

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Friday • February 10 • 2023

1:50pm – 2:10pm	Differential Influence of Chronic Tinnitus and Impulse Noise Exposure on Hearing Thresholds and Distortion Product Otoacoustic Emissions in Young Adults <i>Speaker: Ishan Bhatt</i>	Conference Center A
2:10pm – 2:30pm	A Genome-Wide Association Study of Tinnitus Identifies Genetic Links to Neuropsychiatric Traits <i>Speaker: Ishan Bhatt</i>	Conference Center A
2:30pm – 2:50pm	Reference Equivalent Threshold Sound Pressure Levels: What are Those for? <i>Speaker: Odile Clavier</i>	Conference Center A
2:50pm – 3:10pm	Things You Should Know About Boothless Hearing Testing <i>Speaker: Deanna Meinke</i>	Conference Center A
3:10pm – 3:40pm	Break	River Terrace 1
3:40pm – 4:00pm	Allocating Hearing Loss Due to Occupational Noise Exposure <i>Speaker: Sridhar Krishnamurti</i>	Conference Center A
4:00pm – 4:20pm	Spectator Noise Exposures During a Season of Minor League Hockey <i>Speaker: Sean Hoverson</i>	Conference Center A
4:20pm – 4:40pm	Audibility, Speech Communication and Fit Testing of Hearing Protectors in the Context of the Newest Edition of the Canadian Hearing Loss Prevention Program Standard Z1007 <i>Speakers: Christian Giguère, Bev Borst</i>	Conference Center A
4:40pm – 5:00pm	Safe-in-Sound Awards <i>Speaker: Thais Morata</i>	Conference Center A
6:00pm – 9:30pm	Friday Night Event - TopGolf <i>Buses pick-up at 6:00pm</i>	Meet In Lobby for Buses

**All Times Eastern Time (ET)*



Hello NHCA Conference attendees! We are so looking forward to seeing everyone again. Just a reminder that the Friday Night Event at Top Golf includes a golfing costume contest, with a \$25 gift card for the winners (to be decided by our illustrious Presidential Trio).

Can you out-do some of our past fancy dressers?

Saturday • February 11 • 2023

7:30am – 8:30am	Breakfast	Conference Center B
7:30am – 4:30pm	Registration	3 rd Floor Sky Bridge
7:30am – 2:00pm	Exhibit Hall	River Terrace 1
8:30am – 9:30am	Poster Sessions	3 rd Floor Sky Bridge
Breakout Sessions – 9:30am - 9:50am		
9:30am – 9:50am	Auditory Function in Forestry Workers <i>Speaker: Sridhar Krishnamurti</i>	City Terrace 7
9:30am – 9:50am	Consider LAT Before MIRE or REAT: An Efficient Alternative for In-Field Verification of Earplug Quality of Fit <i>Speaker: John Keady</i>	City Terrace 12
9:30am – 9:50am	A Multi-Function In-Ear Device to Monitor the Impacts of Noise Exposure <i>Speakers: Deanna Meinke, Odile Clavier, Chris Brooks</i>	City Terrace 9
Breakout Sessions – 9:55am - 10:15am		
9:55am – 10:15am	Noise Exposure and Acute Changes to Monitored Heart Rate Among Electronic Waste Recycling Workers <i>Speaker: Xin Zhang</i>	City Terrace 12
9:55am – 10:15am	Developing a Fast and Easy System for Hearing- and Earplug Fit-Testing: An Update on What we Have Learned <i>Speakers: Jennifer Tufts, Jesse Norris</i>	City Terrace 9
9:55am – 10:15am	Towards a Hearing Protection Device with Hearing Aid Features <i>Speaker: Solenn Ollivier</i>	City Terrace 7
10:15am – 10:45am	Break	River Terrace 1
Breakout Sessions – 10:45am - 11:10am		
10:45am – 11:05am	The International Ototoxicity Management Group (IOMG) and Opportunities to Improve Management of Occupational Ototoxicity with Collaborative Research <i>Speaker: Krystin Carlson</i>	City Terrace 12
10:45am – 11:05am	PAR vs Derated NRR for Hearing Protection Devices <i>Speakers: William Murphy, Theresa Schulz</i>	City Terrace 7
10:45am – 11:05am	Evaluating Safety of Enhanced Hearing Protection for Workers with Hearing Loss <i>Speaker: Jackie DiFrancesco</i>	City Terrace 9
Breakout Sessions – 11:10am - 11:30am		
11:10am – 11:30am	Ototoxic Profiles of Hazardous Substances <i>Speaker: Gregory Zarus</i>	City Terrace 7
11:10am – 11:30am	Hearing Protector Fit Testing on Workers from Two Types of Enterprises in China <i>Speaker: Shibiao Su</i>	City Terrace 9
11:10am – 11:30am	Deep Learning-Based Own Voice Pickup for Enabling Speech Communication in Hearing Protection Devices <i>Speaker: Jan Rennies</i>	City Terrace 12

*All Times Eastern Time (ET)

Saturday • February 11 • 2023

11:45am – 1:30pm	Luncheon and Awards	Conference Center B
1:40pm – 2:00pm	GASAWAY LECTURE: No Need to Travel: Formative Design and Evaluation of the Dangerous Decibels® Online Training for Educators <i>Speaker: Deanna Meinke</i>	Conference Center A
2:00pm – 2:20pm	Evaluating Noise Exposure History with a Calibrated Noise Reference <i>Speaker: Jaclyn Schurman</i>	Conference Center A
2:20pm – 2:40pm	Do You Know Your Hearing Protection Devices? Pilot Project Results <i>Speaker: Kari Buchanan</i>	Conference Center A
2:40pm – 3:00pm	Should the Hearing Conservation Test Protocol for U.S. Service Members be Expanded? <i>Speaker: Taylor Paige</i>	Conference Center A
3:00pm – 3:30pm	Break	3 rd Floor Sky Bridge
3:30pm – 3:50pm	Audiology's Role in Facilitating In-Ear Monitors <i>Speakers: Alex Meibos, Heather Malyuk</i>	Conference Center A
3:50pm – 4:10pm	Practical Considerations for Choosing High Fidelity Hearing Protection Devices <i>Speakers: Colleen Le Prell, Cory Portnuff</i>	Conference Center A
4:10pm – 4:15pm	General Session: Closing Remarks	Conference Center A

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A Comparison of Impulse Peak Insertion Loss for a Hearing Protection Device Using Acoustic Test Fixtures with Standard and High-Level Microphones. *William J. Murphy*

A Comparison of the Auditory Situational Awareness of a User With Wireless Earbuds vs Open Ear *Ayden Blackwood*

Approaches to Measuring Noise Reduction of Firearm Suppressors *Stephen Tasko*

Creation of a Hearing Conservation Program for Musicians, Educators, and Students *Margaret Halinski*

Ethylbenzene Ototoxicity: A Systematic Review of Auditory Outcomes in Animal Studies *Helen Wu*

Examining Spatial Variability in Occupational, Environmental, and Total Noise Across Michigan *Abas Shkembi*

Middle Ear Surgery and Hearing Loss: An Audiologist's Personal Journey and Changed Perspective on How Even a Mild, Unilateral Hearing Loss Can Impact Daily Life and Communication Abilities *Lynnette Bardolf*

Noise in Schools and its Impact on Teachers' Work. *Alessandra Samelli*

Non-Auditory Effects of Noise: Electrophysiological Stress Indices – Pilot Study *Alessandra Samelli*

Preventing Occupational Hearing Loss: A 50-Year Timeline of NIOSH Research and Intervention *Christa Themann*

Profiling the Ototoxicity of Exposure to Volatile Organic Compounds *Onyinye Chukka*

Profiling the Ototoxicity of Metal Exposures. *Gregory Zarus*

Self-managed Hearing Health eTool: An integration of FDA, OSHA and NIOSH directives *Elora Gupta*

Self-Reported Hearing Disorders and Modifiable Risk Factors: Worker Hearing Protection Device Behavior and Risk for Reporting Hearing Difficulty *Conner Jansen*

Speech-in-Noise and Alarm Detection with Active and Passive Hearing Protection in Workplace Noise . . . *Aaron Cochran*

The Evaluation of Hearing Protection Effectiveness on Workers in Chinese Textile Industry *Shibiao Su*

The Importance of Hearing Conservation in College Orientation. *Madison McNeill*

Remember to Vote for the Outstanding Lecture and Outstanding Poster of the Year Using the Paper Ballot

You will receive two ballots at registration to cast your votes for the OLA and OPA for the 2023 Conference. Please make sure to print clearly and turn in your ballot at registration when it is complete.

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Council for Accreditation in
Occupational Hearing Conservation

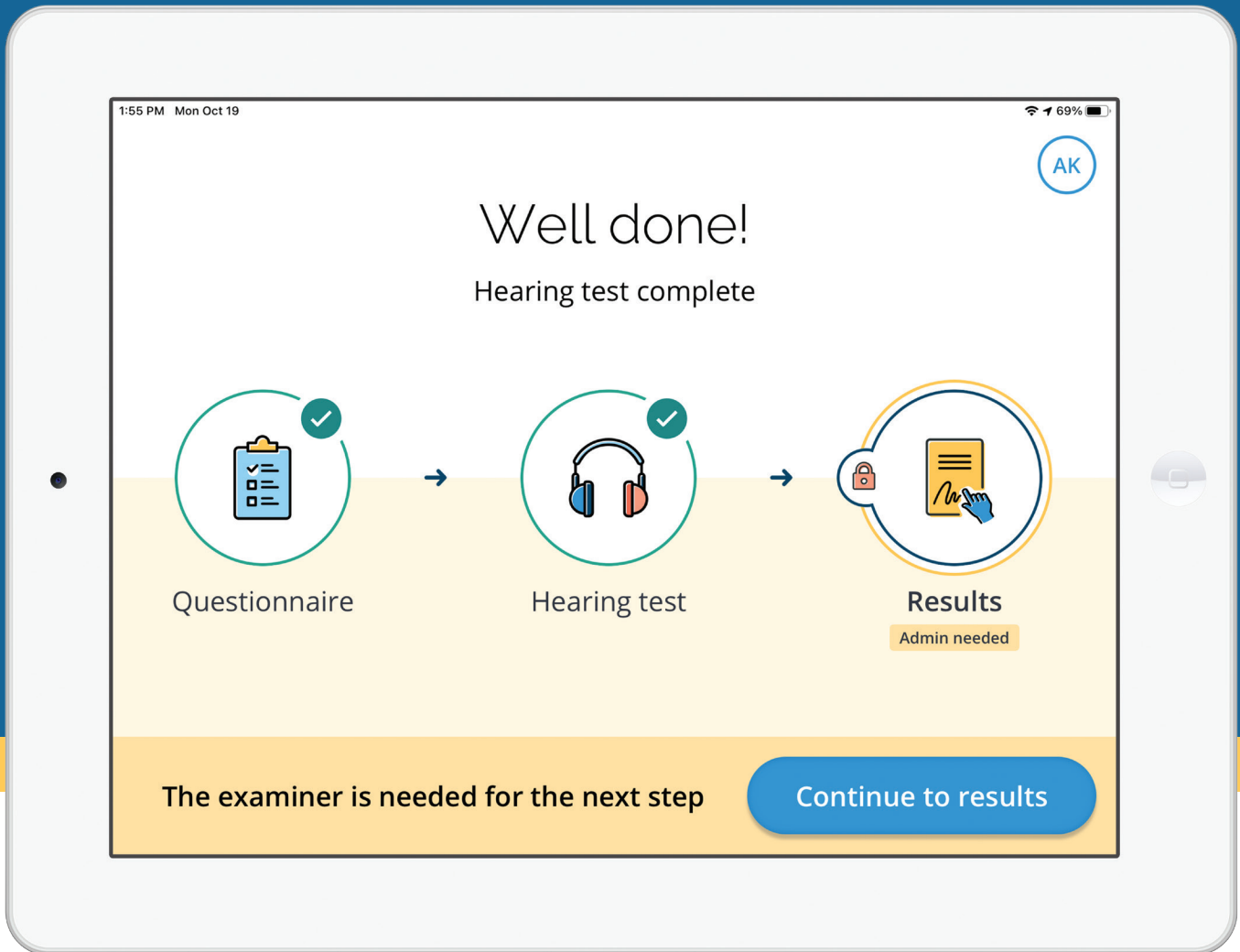
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enables clear communication in noise.





**Does your company have a successful hearing loss prevention program?
Have you or your organization, created an innovative approach
to noise control or hearing loss prevention?**

The National Institute for Occupational Safety and Health (NIOSH), the National Hearing Conservation Association (NHCA) and the Council for Accreditation in Occupational Hearing Conservation (CAOHC) present the Safe-in-Sound for Excellence in Hearing Loss Prevention Award™ to

- recognize organizations that document measurable field-based achievements and
- disseminate leading edge information from successful efforts to minimize the risk of work-related hearing loss.

Deadline for submission of Letters of Recommendation from third parties: **June 8th, 2023.**

Self-Nomination Due Date: **July 15, 2023.**

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Frank Wartinger, Au.D.

The Media Award was established to recognize the efforts of writers and/or producers of news features that serve to heighten public awareness of the hazards of noise. The award is also available to the National Hearing Conservation

Association members who take the time and effort to bring hearing conservation related issues to public lights

The NHCA is pleased to announce the 2023 Media Award is awarded to Frank Wartinger for creating the podcast "Talking Ears". NHCA would like to highlight Frank's contributions to spread knowledge on the importance of hearing health and hearing conservation particularly for professionals in the music industry.



Frank and his collaborators interviewed various all-stars in the field of hearing conservation for musicians including NHCA's own Michael Santucci, Juan Vasquez, and Heather Malyuk. With 14 episodes in total this emerging podcast covers various topics including, in-ear monitors, tinnitus, sound pressure level and diverse options for education. Some of these episodes have already reached over 100 downloads. You can listen to Talking Ears on all podcast streaming services. Frank's and his collaborators' efforts to increase knowledge in this important field are a great example of what the NHCA Media Award aims to celebrate.

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VHS HEARING SOLUTIONS

Better Hearing Starts Today

Gregory Flamme, Ph.D.

by: Mark R. Stephenson, Ph.D.



NHCA's Outstanding Hearing Conservationist Award recognizes outstanding contributions to or achievements within the field of hearing conservation. Since it was established 30 years ago, 22 individuals have received this honor. This year, the NHCA Executive Council is pleased to announce that Dr. Greg Flamme will receive this honor.

Currently, Dr. Flamme is the Chief Operating Officer (COO) of Stephenson and Stephenson, Research and Consulting, LLC (SASRAC), and has served in this position since 2017. SASRAC's primary efforts involve R&D related to bioacoustics and hearing science, with an emphasis on impulsive noise characterization and effects, development of damage risk criteria, and improving hearing loss prevention for both military and civilian populations. As the COO, Dr. Flamme oversees broad research and consulting activities, has responsibility for negotiating numerous scientific research agreements with academic, professional, and governmental entities, directs the daily activities of the SASRAC research and technical support staff, and oversees the development of publications and professional presentations by SASRAC scientists and engineers. Finally, Dr. Flamme has a key role in developing plans and programs for future SASRAC hearing loss prevention activities. However, Dr. Flamme did not start his hearing conservation career as the COO of SASRAC.

Dr. Flamme started down the path towards becoming a leader in our profession in 1991 when he completed a BA in Communication from Doane University. He earned an M.A. in Audiology in 1996 from the University of Memphis, and continued his studies there until he completed a Ph.D. in 2000. He gained his first research experience while at the University of Memphis, by serving as a Research Assistant.

Dr. Flamme then received a Post-Doctoral Fellowship (2000-2001) at the University of Iowa's Departments of Speech Pathology/Audiology, Epidemiology, and Biostatistics.

Since completing his academic degrees, Dr. Flamme has contributed to our profession in just about every way imaginable. As an educator, he taught and conducted research at the University of Iowa from 2001-2004 as an Assistant Professor in the department of Speech Pathology and Audiology. In 2005 Dr. Flamme joined the full-time faculty at Western Michigan University's Department of Speech, Language and Hearing Sciences. Concurrently, he continued as adjunct faculty at the University of Iowa from 2005 to 2010 in the Department of Occupational and Environmental Health. In 2009 he was promoted from Associate Professor to Assistant Professor and remained in that position until he joined SASRAC in 2017. It is a testament to his dedication to supporting the next generation of hearing health professionals that Dr. Flamme continues to maintain active adjunct faculty status at the University of Northern Colorado's Department of Audiology and Speech-Language Pathology.

Dr. Flamme's contributions to our profession are also exemplified through his prolific record of publications. To date, Dr. Flamme has authored/co-authored 54 peer-reviewed publications, including two book chapters. He has also authored/co-authored nearly two dozen successful grant applications for studies benefiting many aspects of hearing loss prevention. The impact of this body of work simply cannot be overstated. The chapter he co-authored with Dr. Bill Murphy "Brief High-Level Sounds" in the 6th edition, 2021, of the Noise Manual, establishes definitive and authoritative state-of-the-art guidance on all aspects of the hearing damage risk associated with impulsive noise, including how to correctly measure and protect oneself from brief high-level sounds. Likewise, his numerous publications regarding population hearing loss databases have been widely recognized as providing the scientific bases for updated national hearing damage risk criteria. The 2020 publication, "Population-based age adjustment tables for use in occupational hearing conservation programs", for which he was the first author, received the 2021 Alice Hamilton Award. This award is presented annually by CDC/NIOSH to recognize the preceding year's most influential scientific publication in the occupational safety and health fields of epidemiology and medical surveillance.

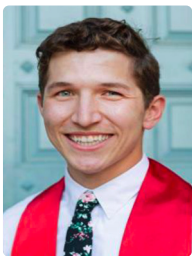
It is clear to see that Dr. Flamme's work has influenced and benefited hearing conservation efforts that cut across academia, professional organizations, the military, civilian governmental agencies, and the general public. For his leadership and dedication to our profession, and his numerous efforts to advance the science of hearing conservation/hearing loss prevention, NHCA is pleased to present Dr. Flamme with the Outstanding Hearing Conservationist Award.

First, the Scholarship Foundation Board would like to send out a huge thank you to all the reviewers for both the SCA and SRA awards. We really appreciate those who contribute their time and energy every year, helping us choose worthy candidates for these awards.

Second, thank you to those who have donated items for the Scholarship Foundation Silent Auction. We appreciate everyone's contributions. The monies raised for this will help us to provide needed scholarships, and meet travel expenses, for deserving students!

As you may have heard, we will longer have the 50/50 Split. During the pandemic and virtual conferences, the different state laws governing how these types of donation giveaways are carried out have caused us to have to step back and seek legal advice on this. Each State has different rules governing fundraising, which we realized would become too complicated for us to keep up with (depending on the state we are having the conference in); so Civica (our management company) has reached out for legal advice on this for us, and the legal advice was not favorable for us to continue this tradition. It breaks our hearts, but we also know that everyone understands why we don't want to get ourselves into legal trouble with our 50/50 split! Instead, we begin the "Buy a Hair Cell" donation campaign to help raise scholarship money. More information will follow at our Conference! We hope you faithful donators to the Scholarship Foundation will continue to raise much needed money for deserving Scholarship recipients, while still having fun doing it!

The NHCA Scholarship Foundation would like to say Congratulations to all of the 2023 Student Conference Award winners! They are as follows:



Connor Jansen

Connor is a doctoral student at The University of Texas at Dallas, in the dual Au.D./Ph.D. program there. His undergraduate degree was in Communication Sciences and Disorders also completed at UT Dallas. His research interests include hearing protection device habits and beliefs, musician's HPDs, and sub-clinical hearing loss. Please congratulate Connor when you see him at the Conference!



Xin Zhang

Xin Zhang is a first year PhD student at the University of Michigan, Dept of Environmental Health Sciences. He also holds a master's degree in Industrial Hygiene, and is certified as an Occupational Hearing Conservationist. Her areas of interest include occupational noise exposure and related physical and psychological health outcomes. Her doctoral research pursuits will focus on applying machine learning algorithms and time series analysis to explore the effect of noise exposure on hearing and cardiovascular systems collected by wearable sensors. Please congratulate Xin when you see her at the Conference!



Solenn Ollivier

Solenn Ollivier has both an engineering degree from France, and a Master of Science degree in Biomedical Engineering from Columbia University. Currently, Solenn is pursuing a PhD focusing on the development of a protective hearing aid for workers in noisy environments via a collaborative research project with the University of Ottawa, University of Laval and IRSST, the Quebec Occupational Health and Safety Research Institute. The research focuses specifically on combining hearing aid, hearing protection and continuous monitoring of an individual's noise exposure into a single intra-aural device. Please congratulate Solenn when you see her at the Conference!



Sean Hoverson

Sean Hoverson is currently a 4th year Doctor of Audiology (Au.D) student attending the University of Northern Colorado, and completing a 1 year audiology externship with the VA at Puget Sound Health Care System. Both his clinical and research interests include the prevention of noise-induced hearing loss, tinnitus, and adult aural rehabilitation. Sean is a certified CAOHC Occupational Hearing Conservationist. Sean's doctoral scholarly project is entitled "Spectator Noise Exposure During a Season of Minor League Hockey." Please congratulate Sean when you see him at the Conference.

The NHCA Scholarship Foundation will also have a big announcement at the 2023 Conference! So, stay tuned!

From all of us on the NHCA Scholarship Foundation Board, we want to say a big thank you for the needed donations! If you would like to donate, or become a Board member, please reach out to a member of the NHCA Scholarship Foundation Board, or reach out to the folks at Civica (our management company) who will direct you to us! Again, thank you!

Hearing Protector Fit Testing: Standards, Systems, and Studies Oh MY!!!

Presenters: Laurie Wells, William Murphy

Hearing protector fit testing can help employers improve employee protection and prevent noise-induced hearing loss. Many evidenced-based benefits have led professional organizations, regulatory agencies, standards bodies, and employers to recognize hearing protector fit testing as a best practice. With today's technology, employers can easily implement hearing protector fit testing for their workers. Attendees will learn about different fit-testing methods used by commercially available fit-testing systems, benefits of conducting fit testing, and considerations for implementing a fit-testing program. Information related to the ANSI/ASA S12.71-2018 performance criteria for hearing protector fit-test systems and the regulatory information will be shared.

Ototoxicity Management from Occupational and Environmental Exposures to International Harmonization

Presenters: Thais Morata, Adrian Fuente, Gayla Poling, Gregory Zarus

Ototoxicity management includes the diagnosis, monitoring, rehabilitation/therapeutic treatment of individuals who experience ototoxicity (hearing or balance deficits from exposures to ototoxicants). Currently, there are no widely used standardized guidelines/practices for ototoxicity management worldwide, despite the well-known detrimental effects that ototoxicity has on quality of life. This workshop will cover current ototoxicity evidence, contextually relevant public health initiatives for environmental and occupational implications (from OSHA, NIOSH, ATSDR, ACGIH and abroad), as well as expert consensus resources from the International Ototoxicity Management Group (IOMG). The IOMG is a multidisciplinary global consortium created to address healthcare gaps in the management of ototoxicity caused by medical, occupational, or environmental exposures. Few healthcare delivery models integrate ototoxicity management into the systems of care that utilize ototoxic therapies for essential and/or life-preserving treatment. In addition, there are no standard methods for the auditory surveillance of individuals exposed to hazardous chemicals at work, or through environmental contamination. This workshop will connect attendees with current consensus on gaps in ototoxicity management and strategies to address them, which are needed to achieve a global standard of ototoxicity management. A multicultural and interdisciplinary approach is needed to support its application in specific medical, environmental, and occupational contexts worldwide.

What You Don't Hear Can Kill You - The Conundrum of Balancing Hearing Protection And Auditory Situation Awareness: Guidance for the Hearing Conservationist

Presenters: John Casali, John Keady, Kichol Lee

Hearing is critical for maintaining vigilance to events in our realm and realization of our surroundings, providing a state of "auditory situation awareness" (ASA). Protection against NIHL via hearing protection devices (HPDs) or Tactical Communications & Protective Systems (TCAPS), together with concomitant preservation of ASA, is critical in dynamic military and civilian situations. Thus, devices should be as auditorily "transparent" as possible to the wearer, with minimal impact of attenuation, occlusion, compression and frequency response on hearing. This workshop reviews HPDs/TCAPS which provide either passive or battery-electronic level-dependent attenuation and pass-through of sound. Evidence from 15 experiments at Virginia Tech, as well as others, will demonstrate deleterious effects of certain HPDs/TCAPS on detection, recognition/identification, localization and communications abilities, as compared to performance with the open/natural ear. Live demonstration of TCAPS effects on ASA will occur in a "game" competition amongst the audience, with prizes to motivate participation. The importance of training HPD users for ASA skills acquisition, prior to being deployed with the products, will be covered, and a new computer-controlled system for training/testing ASA effects will be demonstrated. Guidance will be provided for selecting HPDs given ASA requirements. Actual accidents that stemmed from loss of ASA will be illustrated.

Hearing Conservation: The Basics

Presenters: Richard Danielson, Deanene Berry, Rachel Bouserhal, Donald Finan, Cassie Ford, Caleb Kronen

The Basics Workshop is designed to offer attendees a comprehensive perspective on the substance and conduct of occupational hearing conservation programs. This annual workshop, held on the conference's first day, is a "short course" that will clarify and illustrate key hearing conservation requirements, practices, and resources that are used in hearing conservation programs (and will be cited in subsequent platform presentations in this conference). The format is designed for a broad audience – from first-time conference attendees (like students or new employees) to experienced hearing conservationists seeking clarification about hot-topic issues from disciplines outside their own specialty. The Basics Workshop is designed to offer attendees a comprehensive perspective on the substance and conduct of occupational hearing conservation programs. This annual workshop, held on the conference's first day, is a "short course" that will clarify and illustrate key hearing conservation requirements, practices, and resources that are used in hearing conservation programs (and will be cited in subsequent platform presentations in this conference). The format will be designed for a broad audience – from first-time conference attendees (like students or new employees) to experienced hearing conservationists seeking clarification about hot-topic issues from disciplines outside their own specialty.

Hands-On Experience and Demonstrations of Hearing Protector Fit-Testing Systems

Presenter: William Murphy

Hearing protector fit testing can help employers improve employee protection and prevent noise-induced hearing loss. Many evidenced-based benefits have led professional organizations, regulatory agencies, standards bodies, and employers to recognize hearing protector fit testing as a best practice. With today's technology, employers can easily implement hearing protector fit testing for their workers. This afternoon workshop will provide attendees an opportunity to learn about the specific hearing protector fit-testing systems available for use and integration with hearing loss prevention programs. Participating vendors will provide a brief overview of their systems. Workshop participants will have the opportunity to try different fit-testing systems and interact with exhibitors.

Hearing Loss Prevention in the Uniformed Services

Presenter: Quintin Hecht

Co-Authors: Amy Blank, Theresa Schulz

Audiologists and other hearing conservationists are largely unaware of the opportunities to pursue a career in the Uniformed Services: Army, Air Force, Navy, and the Public Health Service (PHS). The Coast Guard, Marine Corps, Space Force and the National Oceanic

Atmospheric Administration do not have billets dedicated to audiologists. Audiologists serve in their traditional roles, seeing patients in clinical and hearing conservation settings, addressing hearing protection and communication needs, diagnosing hearing problems and providing non-surgical treatments. However, non-traditional roles are available as well. Within the Army, Air Force, Navy and PHS, different research laboratories have the responsibility to develop new technologies that protect hearing, improve situational awareness and facilitate communication in challenging acoustic environments. Research conducted by these laboratories affects not only the uniformed personnel in the military, but also translates the research from the laboratory environment to the practice for millions of workers worldwide. This workshop will provide an overview of the aforementioned services and will host a panel discussion where attendees can learn about unique features of the various services.

Investigational Inner Ear Medicines: Are Hearing Loss Prevention and Restoration Possible?

Presenters: Colleen Le Prell, Carlos Esquivel

Despite hearing protection device (HPD) requirements within occupational hearing loss prevention programs, the prevalence of noise-induced hearing loss (NIHL) remains stubbornly high. The continued problem of NIHL, combined with advances in understanding of cell death in the inner ear, has stimulated the development of medicines that may one day prevent acquired hearing loss such as NIHL, as well as hearing loss associated with ototoxic prescription medicines. In addition, efforts to develop gene and small molecule therapies that can re-activate developmental sequences in the inner ear and restore auditory function are robust. The combination of prevention and restoration therapies could positively impact individual patients and ameliorate this important public health issue. There are no current medications approved by the U.S. Food and Drug Administration at this time, but development of therapeutics for diverse hearing and balance indications is a highly active research space. This workshop will provide a basic introduction to the science of auditory medicines, explaining why they provide benefits in animals; summarize the clinical testing process and the pathway for investigational medicines; briefly review ongoing and completed clinical trials; and share specific messaging for patients regarding possible treatment options for acute NIHL as well over-the-counter supplements.

Practical Hearing Conservation for Musicians

Presenters: Cory Portnuff, Frank Wartinger

From measuring sound levels on stage to recommending hearing protection, hearing conservationists often interact with both amateur and professional musicians. This workshop is designed to help the hearing conservationist increase their knowledge of music audiology and to improve their clinical encounters with musicians. This workshop will discuss the evaluation of musicians and their sound exposure, practical techniques for measuring levels of music, as well as technology and interventions for preventing music-induced hearing disorders. Practical aspects of selecting and fitting hearing protection for music will be reviewed, with discussions about specialty hearing protection devices as well as in-ear monitors. Are you an audiologist who sees musicians as patients in the clinic? Are you a hearing conservationist who wants to better connect with musician patients? Are you ready to help understand the special hearing needs of musicians? Then this workshop is for you!

Effect of Noise Exposure on Vestibular Function: Critical Review

KEYNOTE PRESENTATION

Presenter: David Zapala

This talk will review some of the anatomical, physiological and test data evidence for noise-induced damage to the vestibular system, with a critical review on the potential for functional relevance in humans. Animal studies have shown dose dependent changes in peripheral and central vestibular system in response to noise exposure. While animal studies propose a model for organizing observations in humans, significant challenges limit generalizing animal data to human perception and performance. Some challenges are similar to the problems correlating hearing loss magnitude to day-to-day communication abilities. Other challenges likely reflect the variability in sensitivity and specificity of vestibular tests applied to humans. These factors will be reviewed along with future investigative needs.

The Myth of Normal Hearing

Presenter: Douglas Brungart

Individuals who have hearing thresholds better than 25 dB HL are generally considered to have "normal" hearing, and most hearing conservation audiologists would consider their program to be a success if it is able to keep all of its noise-exposed workers within these normal limits. However, recent measurements collected on more than 10,000 noise-exposed Service Members suggests that there are substantial systematic variations in functional hearing performance for listeners within the normal range, and that, in some cases, the degradation in hearing performance that occurs between -10 dB HL and +20 dB HL can be as large as the degradation that occurs between listeners with thresholds of +20 dB HL and those who meet the classic definition of mild to moderate hearing loss.

Here we discuss the systematic decreases in functional performance and increases in hearing complaints that occur for individuals across the range of normal hearing, and the implications that these changes may have for hearing conservation programs that are trying to protect individuals from the long-term negative consequences of occupational noise exposure. *[The views expressed in this presentation are those of the authors and do not reflect the official policy of the Department or the US Government.]*

Healthy Hearing Project: Cognitive Results

Presenter: Jan Moore

The goal of our project is to investigate the relationship between hearing loss in farmers and ranchers and cognitive status. This presentation addresses the cognitive tasks completed by our participants. Cognitive tasks include the Montreal Cognitive Assessment (MoCA) screening tool to identify mild cognitive impairment in persons over 50. All of our participants have passed the MoCA screener. The cognitive tasks included Symbol matching, STROOP, and a "Simon" Task. These tasks are evaluated by accuracy and reaction time. The symbol matching task has been completed with high accuracy in all participants. In the STROOP task the participant identifies the color of ink of words presented to them. Trials were either neutral (e.g. Chair in black ink), congruent (e.g., Red in red ink), or incongruent (e.g., Red in green ink). We expected and observed faster reaction times and higher accuracy on neutral and congruent trials. Similar results were found on the Simon task with congruent trials being faster and more accurate. We found that participants were faster and more accurate on a touch screen than with a computer and mouse. At this time, we are not seeing a clear relationship between hearing loss and cognitive task performance.

Audibility Needs in the Workplace

Presenters: Colleen Le Prell, Eric Fallon

Co-Authors: Aaron Cochran, Conner Jansen

Electronic hearing technologies have been studied for possible advantages in listening conditions that are highly relevant to military personnel. Applications to industrial occupational settings are less investigated. A contract research program was designed to broadly provide insight into worker audibility needs, worker behaviors related to audibility needs, the perceptions of workplace supervisors and hearing conservation program managers related to audibility needs, and possible improvements in audibility with electronic hearing protection use. This presentation will introduce questions about worker audibility needs and behaviors related to audibility and the methodological approach taken in the UTD studies. A high-level summary of perceived audibility needs and common worker-reported behaviors in difficult listening conditions, including removing or less securely fitting HPDs to improve audibility of machinery sounds or to improve audibility of co-worker communication, will be provided. The data reflect worker audibility needs to be an important unmet need. Support for this study was provided by 3M.

Association of Noise from Various Sources with Risk of Hearing Trouble and Tinnitus in US Youth Aged 16 to 19 years: The 2017-2020 National Health and Nutrition Examination Survey (NHANES)

Presenters: Howard Hoffman, Christa Themann

Co-Author: Chuan-Ming Li

The US National Health and Nutrition Examination Survey collected audiometric thresholds and self-reported data on hearing difficulty, bothersome tinnitus, and noise exposure history among youth aged 16-19 years in the pre-pandemic 2017-2020 survey cycle. A total noise exposure index was constructed from self-reported information on noise exposure and hearing protector use. Odds ratios were calculated to estimate risk using multivariable logistic regression to control for age, race/ethnicity, and income (poverty index). As expected, both hearing trouble and tinnitus increased with increasing levels, durations, and sources of exposure. The derived noise exposure index was categorized into five levels of increasing exposure. The prevalence of adverse hearing outcomes increased systematically with increases in the noise exposure index. Adjusted logistic regression models stratified by sex found significant associations between hearing trouble and the noise exposure index for both males and females. Males had increased levels of noise exposure and there was a significant association between the noise exposure index and frustration communicating with family and friends. Combined exposure to very loud work noise, non-work noise, and firearms increased risk of hearing trouble and other adverse hearing health outcomes. Interventions to reduce exposure from all noise sources among youth are needed.

Auditory Difficulties in Normal-Hearing Young Adults with High Lifetime Noise Exposure

Presenters: Srividya Grama Bhagavan, Ishan Bhatt

High noise levels that are typically encountered in occupational and recreational settings could induce cochlear synaptic dysfunction without causing a permanent elevation in hearing thresholds. Noise-induced synaptic dysfunction could cause suprathreshold speech perception difficulties in challenging listening conditions. The synaptic dysfunction could trigger abnormal hyperactivities in the auditory pathway associated with tinnitus and hyperacusis. This study evaluated the relationship between tinnitus, hyperacusis, suprathreshold speech perception difficulties, and lifetime noise exposure (LNE) in young adults with clinically normal audiograms. The study group comprised 150 normal-hearing young adults – 75 with chronic tinnitus and 75 without tinnitus. We used a structured LNE interview to categorize participants into low and high groups. Hearing thresholds (1-16 kHz) and questionnaire responses were evaluated. Suprathreshold perception was assessed with words-

in-noise, QuickSIN, and dichotic digit tests. Individuals with high LNE reported speech perception difficulties and a higher incidence of chronic tinnitus and hyperacusis. Tinnitus and self-reported speech perception showed significant association. LNE and dichotic digit test scores showed a significant association. Our results suggest that individuals with high LNE might exhibit a higher risk for suprathreshold speech perception difficulties, tinnitus, and hyperacusis, despite exhibiting normal audiograms.

DOD/VA Hearing Technician (HT) Training and Certification Course: Overview and Pilot Program Results

Presenter: Kathy Gates

Under a Joint Incentive Fund (JIF) project, the DOD and VA developed and implemented a standardized, distributed learning course for DOD and VA hearing technicians (HTs), resulting in improved Veteran and Service member access to hearing health care services. The course ensures that all HTs are trained and certified to the nationally recognized standard of the Council for Accreditation in Occupational Hearing Conservation (CAOHC), and that HT training meets best practices in hearing health care for Service members and Veterans. The training consists of three phases. Phase 1 is didactic (lecture) training, delivered virtually and synchronously through Adobe Connect or Microsoft Teams. Phase 2 is an in-person practicum instruction and assessment delivered by approved practicum instructors (PI). Phase 3 is an online CAOHC Occupational Hearing Conservationist (OHC) certification exam. Through distributed learning and the ability to focus training on specific population needs, benefits of this approach include reduced travel and course registration costs, increased competence of DOD and VA HTs, and increased patient satisfaction and access to DOD and VA audiology services. The purpose of this presentation is to provide an overview of the HT training and certification course and to offer useful ways to create such a course.

Creating the NHCA Narrative - A Panel Discussion

Presenters: Theresa Schulz, Gayla Poling

A narrative is an evolving collection of related stories that represent the central idea of our organization. A narrative is more than a vision or mission statement. It has characters who deal with a conflict by taking action. The character(s) (that's you!) motivates others to have greater impact. Narratives should connect with the intended audience on an emotional level in order to get them to change their behavior. This panel discussion will allow NHCAers to collectively develop our narrative to highlight our organization's passion and diverse expertise.

Experiential Design, Evolutionary Influence, and Spaces for Human Connection: Learning to Leverage our Access to Great Design to Make Change

LUNCHEON SPEAKER

Presenter: Scott Pfeiffer

Communicating about acoustics to non-acousticians can be challenging, but in this area none of us are alone. Many professions have us operating with specialized knowledge important to the lives of others, with little expectation that they will ever understand the importance of our work to them. Deciding how to communicate about our work in a way that can influence decisions of lay people in our midst, whatever our profession, is important to enabling progress toward a better future. Is it any wonder that the spaces in which we communicate might play a role in that?

Differential Influence of Chronic Tinnitus And Impulse Noise Exposure on Hearing Thresholds and Distortion Product Otoacoustic Emissions in Young Adults

Presenter: Ishan Bhatt

Hearing thresholds (HTs) and distortion product otoacoustic emissions (DPOAEs) are widely used for investigating cochlear physiology in clinics. HTs are the "gold standards" for measuring hearing sensitivity. DPOAEs are used as an objective tool to evaluate cochlear physiology. A direct comparison between these two measures could not be performed as they are measured on different scales (HTs in dBHL; DPOAEs in dB SPL) and are inversely correlated. We used a linear regression model to quantify (using standardized residuals) the magnitude of deviation in DPOAE strength relative to HTs to obtain a comparison metric. The present study collected HTs (1-16 kHz), and DPOAEs (L1/L2 = 65/55, and 55/40 dB SPL, F2 from 1-16 kHz) from 133 participants, 56 with continuous chronic tinnitus (>1 year), and 77 with no tinnitus. We found that individuals with chronic tinnitus show significantly elevated HTs, yet DPOAE strength remained comparable to those without tinnitus. In contrast, individuals reporting impulse noise exposure revealed elevated HTs, poorer DPOAE strength, and a steeper reduction in DPOAE strength than predicted from HTs. When interpreted under the current evidence, our findings indicate disproportional neural (or synaptic) dysfunction underlying chronic tinnitus, and disproportional mechanical dysfunction to the auditory system underlying impulse noise exposure.

A Genome-Wide Association Study of Tinnitus Identifies Genetic Links to Neuropsychiatric Traits

Presenter: Ishan Bhatt

Tinnitus, a phantom perception of sound in the absence of any external sound source, is an etiologically heterogeneous trait linked to occupational and recreational noise exposure. Recent studies highlighted a polygenic architecture of genetic susceptibility to tinnitus. Tinnitus is frequently accompanied by neuropsychiatric comorbidities (such as anxiety and depression). However, shared genetic underpinnings between tinnitus and psychiatric conditions remain elusive. We performed a genome-wide association study of tinnitus and tinnitus-related distress using the UK Biobank database (N=132,438), followed by tissue and trait-specific enrichment analyses. We identified a locus in the vicinity of GPM6A achieving genome-wide significance ($p < 5E-8$). Nineteen independent loci reach suggestive association ($p < E-6$). The enrichment analysis identified a shared genetic component between tinnitus and neuropsychiatric traits (such as bipolar disorder, cognitive ability, fast beta electroencephalogram, and sensation seeking). Tissue-specific enrichment analysis showed that the GWAS signals were collectively enriched in the hippocampus and cortex. This study provides novel insights into the genetic processes underlying tinnitus and demonstrated a shared genetic component underlying tinnitus and neuropsychiatric conditions.

Reference Equivalent Threshold Sound Pressure Levels: What are Those For?

Presenter: Odile Clavier

Co-Authors: Douglas Brungart, William Hal Martin, James Norris

A new audiometric transducer, such as the Wireless Automated Hearing Test System requires the development of reference equivalent threshold sound pressure levels (RETSPLs) that allow for the translation of measured threshold from dB SPL to dB HL. RETSPLs are intended to ensure consistent thresholds regardless of the equipment, and two standards currently specify how they should be obtained. We will present on the development of the WAHTS RETSPLs through two human studies conducted in accordance with ISO 389-9 standard. We will then present the results of two separate, independent validation studies that revealed potential flaws in the existing ISO standard or in its interpretation. As the RETSPLs are fundamental to the audiogram, and especially important when switching from one transducer to another, we will describe how the population used as the normative sample can significantly impact the comparison of thresholds across audiometric measurement systems. The results can affect longitudinal monitoring of hearing thresholds as hearing conservation programs adopt new technologies, including boothless audiometers.

Things you Should Know About Boothless Hearing Testing

Presenter: Deanna Meinke

Co-Author: William Hal Martin

The accuracy of hearing screening or threshold testing is vulnerable to the ambient noise levels in the test environment. Background noise will psychoacoustically mask the test signal, resulting in hearing thresholds that may be artefactually elevated. Technical standards specify the maximum permissible ambient noise levels (MPANLs) for the hearing testing environment. MPANLs are dependent on transducer parameters (supra-aural, circumaural, type of ear cushions or earphone enclosures, insert earphones), whether air or bone conduction is being evaluated, threshold testing vs. screening at a suprathreshold levels) and sound level measurement instrumentation. The ambient noise spectrum and temporal variability at the test site must be determined and continually accounted for during the testing procedure. This presentation will explain the concept of MPANLs and how they apply to boothless hearing screenings and evaluations. It will explain how characteristics of supra-aural, circumaural and insert earphones influence MPANLs and their impact on testing in boothless settings. The importance of and options for continuous ambient noise level monitoring and recommendations for boothless hearing testing protocols are presented.

Objectivization of the Occlusion Effect Induced by Various Types of Earplugs, Insertion Depths and Background Noise Levels in Laboratory Conditions

Presenter: Hugo Saint-Gaudens

Co-Authors: Olivier Doutres, Hugues Nélisse, Franck Sgard

Blocking the ear canal's entrance with an earplug can lead to users experiencing discomforts, one being the occlusion effect (OE), typically described as a distorted perception of one's own voice. This discomfort sometimes causes users to misuse or remove their earplugs which significantly lowers their efficiency. Reducing the OE generated by earplugs is therefore critical to make them more comfortable. However, assessing the OE is cumbersome and time-consuming as participants' feedback is required. Moreover, the influence of factors on the OE, namely the type or earplug, the insertion depth, and the background noise level, remains to be understood. Hence, this ongoing research aims at objectivizing the OE induced by earplugs during speech. To do so, the OE is assessed in laboratory conditions with 30 normal hearing participants using a questionnaire and by using surrogate earplugs for in-ear microphonic measurements. Various sound pressure level-based indicators are proposed and correlated to the (dis)comfort during the objectivization step. Multiple combinations of earplugs, insertion depths and background noise levels are tested to obtain a ranking of the conditions generating more or less OE. The objectivization of the OE will be a useful tool for manufacturers developing new earplugs without requiring participants' feedback.

Allocating Hearing Loss Due to Occupational Noise Exposure

Presenter: Sridhar Krishnamurti

Allocating hearing loss due to occupational noise exposure is a challenge faced by audiologists who evaluate individuals at risk for Noise Induced Hearing Loss (NIHL). The current study used retrospective data from 100 veterans with histories of hazardous noise exposures who were tested for audiological exams for VA disability determination purposes. Only de-identified data from 2022 veterans were included for study purposes and audiograms reflecting non-occupational hearing loss were excluded from analysis. The current study aimed to compare three types of methods to account for permanent threshold shifts attributable to occupational NIHL: 1) subtract the age effects from Pure tone average obtained at frequencies 2kHz, 3 kHz, 4 kHz (per Dobie hybrid data, BMJ, 2015); 2) use current VA Disability Compensation criteria for audiometry, word recognition, and military occupation specialty; and 3) determine percentiles for hearing based on age corrections applied to individual audiometric thresholds at frequencies 1kHz, 2 kHz, 3, kHz, 4 kHz by use of OSHA age corrections for males and females (Table F; OSHA 29 CFR 1910.95). All three methods provided outcomes that can be used to empirically validate NIHL among veterans. Results from these three method applications will be discussed in detail.

Spectator Noise Exposures During a Season of Minor League Hockey

Presenter: Sean Hoverson

Co-Authors: Deanna Meinke, Jennifer Weber

There is evidence that attending or working at a single sporting event, including professional hockey, may contribute to the risk of noise-induced hearing loss. The risk of over-exposure to sound can be expressed in terms of various damage risk criteria (DRC) and noise dosimetry measurement protocols including the Occupational Safety and Health Administration (OSHA, 1983) action level and permissible exposure level, the National Institute for Occupational Safety and Health (NIOSH, 1983) recommended exposure level and the World Health Organization (WHO) global noise exposure guidelines (Berglund et al., 1999). In this study, personal noise dosimetry was collected on a single spectator attending a full season of home games (n=34) played by a minor league hockey team. Additionally, six playoff home games were also attended. The regular season game, playoff season game, and seasonal cumulative risk of NIHL will be contrasted using each of the DRCs. Factors that may influence the noise exposure risk will also be explored. This study will inform public-health and professional sporting organizational efforts to prevent NIHL amongst minor league hockey season-ticket holders.

Audibility, Speech Communication and Fit Testing of Hearing Protectors in the Context of the Newest Edition of the Canadian Hearing Loss Prevention Program Standard Z1007

Presenters: Christian Giguère, Bev Borst

This presentation will highlight the new edition of the Canadian Standard Association (CSA) Z1007:22 standard on hearing loss prevention program (HLPP) management. This standard is intended to be used by HLPP administrators and defines roles, responsibilities and processes in order to protect workers from occupational hearing loss. An overview of the 8-elements of the HLPP will be provided. The presentation will also focus on the importance of audibility and communication during the selection of hearing protection devices (HPDs) and how to improve your HLPP efforts through effective implementation of HPD fit testing.

2023 Safe-in-Sound Excellence in Hearing Loss Prevention Awards™

Presenter: Thais Morata

Co-Author: Scott Schneider

Twenty-eight Safe-in-Sound Awards have been presented in the past 15 years, recognizing 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. In this presentation we will review what we learned in the process and discuss approaches to encourage quality nominations in the future.

Auditory Function in Forestry Workers

Presenter: Sridhar Krishnamurti

Agriculture, Forestry, and Fishing have been found to be industry sectors with high prevalence of NIHL along with manufacturing industry operations (Tak et al., 2009). The additional occupational exposure to vibration poses an additional auditory risk for workers along with high noise exposures. A typical logging crew used in forestry tree-cutting operations consists of feller-buncher, skidder, and loader operators. Feller operators typically use feller machines to bring down trees while skidder operators use forestry tractors to drag trees. Loader operators work on cutting trees into logs and then load logs into trucks. The logs are processed in a lumber fiber factory by factory workers. Our study looked at auditory function in each of these four types of forestry workers (feller, skidder, loader, factory worker). Pure tone hearing thresholds in forestry workers were significantly poorer than controls (non-forestry) participants. A two-way Analysis of Variance (ANOVA) on OAE data indicated that forestry workers consistently showed significantly lower SNRs, when compared to control (non-forestry) participants at all frequencies. Our study results support a synergistic interaction between noise and vibration in forestry workers putting them at greater risk for occupational hearing loss and support previous studies on noise interactions with vibration induced white-finger disease.

Consider LAT Before MIRE or REAT: An Efficient Alternative for In-Field Verification of Earplug Quality of Fit

Presenter: John Keady

Co-Authors: John Casali, Kichol Lee

Research by the US Navy¹, Army² and Air Force³ demonstrated earplug fitting improvements via attenuation measurement with commercially-available fit-testing systems. Applying REAT or MIRE measurements, these popular systems identify the need for earplug fit training or replacement earplugs for an individual. However, they require significant time/instrumentation in the field; thus, prior studies called for efficiency and ability to test multiple users. A new acoustical technique was developed to precede in-field REAT or MIRE, not requiring REAT's threshold tests or MIRE's in/under-earplug microphones. The Leak-and-Attenuation Test (LAT) comprises an instrumented headphone over the test earplug, and via analysis of resonance dependent upon the earplug's seal, leaks are identified in seconds. Using a simulated ear canal, a test signal having frequency components between 4400Hz to 5200Hz showed a peak frequency shift from 4835Hz to 4500Hz in the presence of a 2mm diameter leak, with magnitude drop of about 28dB at 5000Hz, as well as distinctive slope differences, compared to a sealed earplug. Given such objective data, the hearing conservationist can quickly decide whether to re-fit or assign an alternative earplug. Also, if the earplug demonstrates a seal using LAT, more detailed REAT data can subsequently be obtained using the LAT headphone.

A Multi-Function In-Ear Device to Monitor the Impacts of Noise Exposure

Presenters: Chris Brooks, Odile Clavier, Deanna Meinke

Real-time noise exposure monitoring has the potential to assess risk before damage occurs. We present on the development of an in-ear device that (1) provides hearing protection; (2) measures the noise in the ear canal to estimate exposure dose; and (3) monitors distortion product otoacoustic emissions (DPOAE) over time. To validate the device's ability to measure DPOAEs, we compared the measurements made with either the prototype or a commercially available system on the same group of subjects. Analysis of the data shows good agreement up to F2=4kHz but effects of distortion that render results unusable at F2>5kHz. We also evaluated the personal attenuation rating obtained by subjects wearing the device to establish its usefulness as hearing protection. Results show that one type of tip provides consistent results with 10-40 dB of attenuation across the frequency range. Finally, we present preliminary data on the recording of impulse noise when the device is inserted in an acoustic test fixture. We conclude with planned next steps to improve the prototype as we prepare for human studies that seek to establish the potential link between impulsive noise exposure and cochlear damage.

Noise Exposure and Acute Changes to Monitored Heart Rate among Electronic Waste Recycling Workers

Presenter: Xin Zhang

Adult electronic waste (e-waste) recycling workers were recruited in 2016 and 2017 for a cross-sectional study which, in brief, aimed to assess workers' health under various occupational exposures in Thailand and Chile. Specifically, we explored noise exposure measured under NIOSH standard and its acute effect on heart rate. Three matrices were used to describe the heart rate increase as compared to resting status, heart rate elevation compared to the previous minutes, and the magnitude of the calculated elevation. We implemented linear, binomial, and negative binomial regressions, respectively, with random effects, to model the relationships between noise and heart rate. We performed time series analysis and added 1 to 3 minutes lag to explore the temporal relationship between the two major variables. Preliminary results indicated that every 10dBA increase in noise was associated with a 6.1 (95% CI: 5.3, 7.0) beats per minute increase in heart rate for e-waste recycling workers, a 7% (4%, 9%) higher odds of an elevated heart rate from the previous minute, and a 5% (2%, 8%) higher risk of overall elevated heart rate. No significant lag was found with by-minute level analysis. Our findings suggest increased noise exposure may be associated with instantaneous elevated heart rate.

Developing a Fast and Easy System for Hearing- and Earplug Fit-Testing: An Update on What we Have Learned

Presenters: Jennifer Tufts, Jesse Norris

Co-Authors: Odile Clavier, Anna Frazier, David Hinckley

Our team is developing a new field attenuation estimation system (FAES) for earplugs through a Small Business Innovation and Research award funded by the National Institutes of Occupational Safety and Health. This new system will enable hearing conservation programs to quickly and easily test both hearing thresholds and earplug attenuation for employees who use any brand or style of earplug. A novel automated threshold search algorithm increases the speed of the fit test. In this presentation, we will discuss the results of human subject data collection comparing the system's performance to that of the well-established Fitchcheck Solo FAES in a sound-field configuration. Attenuation was measured under both systems for good and poor fits of foam and flange earplugs on normal-hearing individuals. We will consider measurement uncertainty and bias estimations, along with possible implementation approaches.

Towards a Hearing Protection Device with Hearing Aid Features

Presenter: Solenn Ollivier

Co-Authors: Fabien Bonnet, Rachel Bouserhal, Christian Giguère, Hugues Nélisse, Jérémie Voix,

Communication in noise is a common struggle, especially for people with hearing-impairment (HI). In the United States, 12% of the working population suffers from hearing loss and 25% is exposed to hazardous noise requiring the use of hearing protection devices (HPD). HPDs often worsen a HI user's ability to perceive and localize sounds. Such users are more likely to suffer from difficulties in communication and performing tasks efficiently and safely. Moreover, they may wear hearing aids at work, with or without HPDs, even though consequences of this practice have not reached a consensus. There is a need to develop an HPD able to amplify sounds of interest preserving speech perception yet reducing noise exposure when necessary. This work explores communication, noise exposure, and safety. For communication, the effects of the parameters of wide dynamic range compression on speech intelligibility in noise will be explored. After objective evaluation and optimization, the designed algorithms will be validated on participants with or without HI. The implementation of real-time in-ear noise dosimetry will be combined with adaptive amplification/compression to prevent overexposure to excessive noise. Finally, for safety, attenuation/compression algorithms will be adjusted such that loud alarms can be heard without being harmful.

The International Ototoxicity Management Group (IOMG) and Opportunities to Improve Management of Occupational Ototoxicity with Collaborative Research

Presenter: Krystin Carlson

A challenging area in hearing health today is ototoxicity; however, the International Ototoxicity Management Group (IOMG) is working to change this. IOMG is addressing deficiencies in ototoxicity management by creating guidance intended to give those exposed to ototoxicants greater control over their long-term auditory health. Opportunities exist (1) to better inform people of ototoxic risks, (2) to detect auditory and balance problems at earlier timepoints, and (3) to improve treatment following exposures to ototoxicants. This presentation will highlight collaboration opportunities for health professionals with a focus on IOMG projects related to occupational ototoxicity research. Currently, no audiological testing guidelines exist for the identification of hearing impairments associated with ototoxic chemicals. The Environmental and Occupational Exposures Working Group of IOMG is reviewing ototoxicity research on solvents. Separate reviews on human and animal data are underway. Results indicate that novel audiological tests are needed because pure tone audiometry alone cannot capture the full extent of damage in the hearing system related to ototoxic solvents. These reviews will facilitate the development of consensus guidelines for workers exposed to potentially ototoxic chemicals and determine key research gaps. Disclaimer: The views here belong to the authors and do not necessarily represent NIOSH, CDC, or NCRAR.

PAR vs Derated NRR for Hearing Protection Devices

Presenters: William Murphy, Theresa Schulz

National and international regulatory and consensus standards setting bodies have previously proposed derating hearing protector ratings to provide a better match between ratings determined in a laboratory and the real-world measurements of attenuation for workers. The authors examined four real-world studies where personal attenuation ratings (PARs) were measured at least twice, before and after an intervention in earplug fitting techniques. The training dramatically improves the PARs for the workers. Derating schemes fail to accurately predict PARs, both before and after training. Because hearing protector fit-testing systems are now readily available for use in the workplace, the derating schemes should be replaced with personal attenuation ratings.

Evaluating Safety of Enhanced Hearing Protection for Workers with Hearing Loss

Presenter: Jackie DiFrancesco

Co-Author: Jennifer Tufts

Workers with hearing loss (WWHL) experience challenges due to the combined effects of background noise, hearing protection, and an impaired auditory system. Wearing a personal amplification device in conjunction with hearing protection may help alleviate some of these difficulties. However, hearing professionals report concern about the safety of amplification use in noise and an insufficient evidence base to make recommendations for WWHL. This study evaluated the potential safety of wearing amplification with hearing protection in a noisy environment. Output levels from a hearing aid and a personal sound amplification product (PSAP), worn with a passive or active earmuff, were measured on an acoustical test fixture under several conditions of noise level, hearing profile, and use of the devices' noise reduction feature. The outputs were converted to diffuse-field-equivalent exposure levels and classified as underprotected (>85 dBA), overprotected (<70 dBA), or optimal (70-85 dBA). Results suggest that it may be possible to wear amplification in a noisy environment without increasing one's risk of hazardous noise exposure. However, verification and counseling on an individual basis will be necessary to ensure worker safety.

Ototoxic Profiles of Hazardous Substances

Presenter: Gregory Zarus

Co-Authors: Krystin Carlson, John Eichwald, Thais Morata, Patricia Ruiz

The Agency for Toxic Substances and Disease Registry (ATSDR) develops Toxicological Profiles on substances frequently found in the environment, including:

- 44 on volatile organic substances
- 38 on metals and inorganic substances
- 17 on pesticides
- Several on forever chemicals, chemical weapons, and radionuclides

Each peer-reviewed profile reflects an extensive evaluation, summary, and interpretation of a substance's available toxicological and epidemiological information. All major organ systems and health endpoints are researched. Specific ototoxicity-related effects include hearing loss, tonal alteration, cochlear impact, vestibular effects, and neurological effects. While the profiles are comprehensive, the term ototoxicity is seldom used, and the measured effects are often linked with effects in other systems, e.g., neurologic, hepatic, muscular-skeletal, and developmental. Thus, we developed a guide to finding ototoxicity in the profiles to examine hearing-related effects.

Here we will provide charts summarizing:

- the ototoxic effects associated with toxic substances,
- exposure routes,
- links to the portions of the toxicological profiles that address ototoxicity,
- the relative frequency of each of these substances in the environment

In presenting the evidence, clinicians can better identify ototoxic effects associated with patient exposure histories, and researchers can better identify substances that lack sufficient ototoxicity studies.

Hearing Protector Fit Testing on Workers from Two Types of Enterprises in China

Presenter: Shibiao Su

This study explored the effect of hearing protection device (HPD) worn by workers from two types of enterprises in China. 446 workers from two plastic manufacturing enterprises (single-owned enterprises), an automobile manufacturing enterprise and a petrochemical plant(state-owned enterprises) were chosen. The 3MTM E-A-R fit™ binaural validation system was used to measure the Personal Attenuation Rating(PAR) of HPD. The workers whose baseline PAR didn't meet the pass criteria received intervention. A questionnaire was conducted to collect workers' general information and information about HPD use. The baseline PARs of 221 workers from state-owned enterprises were higher than that of 225 workers from single-owned enterprises($p < 0.05$). The proportion of workers from state-owned enterprises who knew how to wear HPDs correctly and worn HPDs correctly in daily work were 98.6% and 91.8%, while respectively 69.3% and 50.2% in single-owned enterprises($p < 0.05$). Training on HPD fitting skills improved the PARs significantly in both enterprises($p < 0.05$). 6.6% of intervened workers needed replacement HPDs. The attention on hearing protection of both employer and workers, as well as the self-efficacy of workers were significant in obtaining high PARs. Incorrect wearing and improper selection of HPDs were major causes of the failure of baseline PAR. Training and appropriate selection of HPDs were helpful to improve the PARs.

Deep Learning-Based Own Voice Pickup for Enabling Speech Communication in Hearing Protection Devices

Presenter: Jan RENNIES

Co-Authors: Simon Doclo, Mattes Ohlenbusch, Christian Rollwage

For hearing protection devices (HPDs) to enable communication, a possibility is to integrate microphones outside of or inside the occluded ear. A system to obtain the own voice can then be used to prepare the signals for radio-based communication. In this application, outer and in-ear microphones exhibit distinct speech and noise characteristics. While speech recorded at an outer microphone is subject to heavy environmental noise, speech recorded at an in-ear microphone benefits from the HPD attenuation with respect to external noise. In turn, speech recorded inside the occluded ear is subject to band-limitation effects from transmission through bone and cartilage and additional body-produced noise. The advantage of a better speech-to-noise ratio at the in-ear microphone is thus counteracted by inferior speech quality. This contribution will present signal processing strategies that may help to overcome this limitation and hence facilitate speech communication in noisy environments in future HPDs. Recently, deep learning-based techniques have been shown to be advantageous for speech enhancement. In this session, we will describe the application of neural networks to the own voice pickup task. We will discuss data augmentation based on key signal characteristics and its influence on the enhancement performance. We investigate and compare several neural network designs.

No Need to Travel: Formative Design and Evaluation of the Dangerous Decibels® Online Training for Educators

GASAWAY LECTURE

Presenter: Deanna Meinke

Co-Authors: Odile Clavier, William Hal Martin, Judy Sobel, Matt Ueckermann, Alexys Wilbur

For the past 22 years, the Dangerous Decibels® has disseminated educator training through 2-day workshops for adults interested in delivering the 50-minute Dangerous Decibels® Program to K-12 students. The recent COVID-19 pandemic has served to reinforce the demand for accessible web-based training in order to meet the global demand for the Dangerous Decibels® workshop. The newly developed Dangerous Decibels® Online Educator Training targets 4-5th grade teachers and high school students. High school students are specifically targeted since successful hearing health promotion is difficult in adolescents and can be enhanced by the act of teaching others. The social-cognitive theory of health communication also supports the use of peers as influencers of health behavior change. Thus, the online educator training will train high school students to deliver the classroom program to 4-5th graders as older peers. An overview of the on-line training content will be provided in the context of a formative evaluation by high-school students. Plans for the summative research study will also be communicated.

Evaluating Noise Exposure History with a Calibrated Noise Reference

Presenter: Jaclyn Schurman

Co-Author: Douglas Brungart

One important component of any large-scale evaluation of hearing loss in the military is the ability to efficiently and accurately estimate the noise exposure experienced by each participant enrolled in the study. Most recent experiments that have evaluated the effect of noise exposure on hearing function have relied on written noise questionnaires to document the participant's history of noise exposure. However, the validity and reliability of these subjective surveys is largely unknown. In this study, we compared two methods for evaluating the history of continuous noise exposure for more than 600 service members. The first was a written question that asked how often they were exposed to noise that was loud enough to require a raised voice to communicate three feet away. The second was a question that played a sample of 85 dB noise and asked how often they were exposed to noise at or above that level. The results could have important implications for hearing conservation. For example, participants reported a higher frequency of exposure for the noise sample question, suggesting that noise levels have to be higher than 85 dB before individuals feel a raised voice is required for communication.

Do You Know Your Hearing Protection Devices? Pilot Project Results

Presenter: Kari Buchanan

Due to the loud noise environment in military operations, passive hearing protection devices (HPDs), play a critical role in preventing hearing loss in service members. Passive HPDs do not have electronics; traditionally, they have been viewed as providing noise attenuation only. However, some passive HPDs do allow critical sounds to be heard. Critical sounds are sounds that are integral to effective task performance, such as responding to an alarm or identifying the need to tune a musical instrument. The Hearing Center of Excellence developed training to increase awareness of passive HPDs, help identify when they can be most useful, and encourage the Department of Defense (DOD) to adopt lower attenuation HPDs. The training module includes instruction on hearing critical tasks and HPD selection, for an audience of active-duty and civilian industrial hygienists, safety professionals, and hearing conservation managers in the Army, Navy, Marine Corps, and Air Force. A quality improvement project was then conducted to evaluate the effectiveness of the online training module. Participants took surveys at three time-points: baseline (before the training module), post-training (immediately after the module), and at a 3-month follow-up. Pilot project results demonstrated that training is both needed and desired to learn about passive HPDs.

Should the Hearing Conservation Test Protocol for U.S. Service Members be Expanded?

Presenter: Taylor Paige

The primary purpose of this study was to determine if the inclusion of extended high frequency audiometry and/or speech in noise testing can enhance a traditional hearing conservation test protocol in US Service members. Service members with either primarily impulse (N=10) or continuous (N=13) occupational noise exposure and service members with no occupational noise exposure (N=11) were assessed for differences in group, ear, and/or frequencies assessed when measuring acoustic reflex thresholds (ART), conventional frequency audiometry, distortion product otoacoustic emissions, extended high frequency (EHF) audiometry, and speech in noise. Although there was no significant group effect for the ART test, the impulse noise group was significantly less likely ($p < .001$) to have a measurable ART than the control and continuous noise groups. As expected, hearing thresholds at 14000 Hz ($p < .001$) and 16000 Hz ($p < .001$) were significantly poorer than lower frequencies assessed across all groups. The continuous noise group was significantly less likely ($p < .001$) to have a response at 16000 Hz, as compared to the control and impulse noise groups. There were no significant findings for speech in noise testing. Implications of these findings as related to hearing conservation test protocols will be discussed.

Audiology's Role in Facilitating In-Ear Monitors

Presenters: Alex Meibos, Heather Malyuk

Audiologists have a professional responsibility to assist music industry workers in achieving optimal hearing health outcomes, including in the facilitation of custom in-ear monitor (IEM) systems. There is concern whether audiologists are implementing effective strategies to prevent hearing related injury in the facilitation of IEMs. The purpose of this talk is to present summary results from a cross-sectional survey exploring IEM facilitation practices and perceptions of audiologists providing services to music-industry workers and individuals seeking audiology services or consult in their acquisition of custom made IEMs, and to present results from a small experimental study exploring attenuation and output characteristics of entry-level custom IEMs using advanced clinical audiometric procedures including: real-ear at attenuation (REAT) measures, probe microphone insertion loss measures, and hearing instrument test-box verification measures.

Practical Considerations for Choosing High-Fidelity Hearing Protection Devices

Presenters: Cory Portnuff, Colleen Le Prell

Hearing conservationists are often called upon to recommend high-fidelity hearing protection devices (HiFi HPDs) for musicians, music consumers, and others. Recently, more literature has emerged to show how the newest generation of HPDs works for music, and early reports have discussed factors that influence the sound quality through these devices. Using recent literature, this presentation discusses how to choose HiFi HPDs and how to verify their fit in a clinical or occupational setting, evaluating both available research data and manufacturer claims. Suggestions will be provided for how to evaluate future devices both subjectively and objectively.

A Comparison of Impulse Peak Insertion Loss for a Hearing Protection Device Using Acoustic Test Fixtures with Standard and High-Level Microphones

Presenter: William Murphy

Co-Authors: Kristy Deiters, Donald Finan, Gregory Flamme, James Lankford, Deanna Meinke, Michael Stewart, Stephen Tasko

The American National Standard, ANSI S12.42-2010, specifies the impulse peak insertion loss (IPIL) for a hearing protection device (HPD) using an acoustic test fixture (ATF) over a range of impulse levels nominally at 132, 150 and 168 dB peak sound pressure level (dB pSPL). The GRAS 45CB ATFs have ear simulators fitted with GRAS 40BP microphones (6.35 mm diameter) that have amplitude limits of about 169 dB SPL (172 dB pSPL). The open ear transfer function measured at the 168-dB level can cause the peak amplitude to exceed the design specification of the microphone. Accordingly, the standard directs the user to measure the 150-dB transfer function between the field microphone and unoccluded ear (HFF, TM) and apply it to the field microphone measurement at 168 dB. A GRAS 45CB-S2 ATF, which is equipped with high-level GRAS 40BH microphones (193 dB / 196 dB pSPL) is currently available. We have measured the HFF, TM with GRAS 45CB ATF and with the GRAS 45CB-S2 ATF. Impulse peak insertion loss measured with both ATFs will be reported and compared.

A Comparison of the Auditory Situational Awareness of a User with Wireless Earbuds VS Open Ear

Presenter: Ayden Blackwood

Co-Author: Matthew Moschella

Bluetooth earbuds with malleable rubber ear tips are increasing in popularity among consumers worldwide eliminating the hassle of utilizing wired earbuds; however, this innovation calls into question a user's auditory situational awareness (ASA). The first purpose is to determine whether three commonly utilized Bluetooth earbuds: Apple AirPods, Samsung Galaxy Buds Pro, and Sony WF-1000XM3 provide sufficient spatial awareness. The second purpose of this study is to evaluate the transparency features of the earbuds.. Twenty-four Subjects took eight audio localization tests where they were tasked with identifying the direction of a noise while wearing different earbuds for each test. Two of the eight tests were done under open ear conditions as a control. The order of tests was counterbalanced to ensure accurate test results. Results were recorded as either absolute or ballpark meaning the subject accurately identified the direction of the sound or was close. The data displayed a statistically significant difference in averages between the earbud and open ear samples. The user's auditory situational awareness was hindered when wearing earbuds. The differences between types of earbuds were only marginal but some did perform better than others.

Approaches to Measuring Noise Reduction of Firearm Suppressors

Presenter: Stephen Tasko

Co-Authors: Kristy Deiters, Donald Finan, Gregory Flamme, James Lankford, Deanna Meinke, William Murphy, Michael Stewart

High-level impulse noise exposure from small caliber firearms presents a significant risk of noise induced hearing loss (NIHL) for an unprotected ear. The use of hearing protection by hunters, recreational shooters, firing range instructors and bystanders is the most common method to reduce the level of firearm noise. For a variety of reasons, not all individuals exposed to firearm noise consistently use correctly fit hearing protection. Firearm suppressors provide an engineering noise control that can mitigate a significant portion of the NIHL risk. There is not yet consensus about how to best measure the noise reduction of a firearm suppressor. This presentation will provide a comparison of different methods for assessing firearm suppressor noise reduction. Noise reduction as a function of the measurement analysis time window for A-weighted, C-weighted, and unweighted sound pressure levels will be assessed and contrasted with the ANSI S12-42 standard for measuring impulse peak insertion loss for hearing protection devices.

Creation of a Hearing Conservation Program for Musicians, Educators, and Students

Presenter: Margaret Halinski

Musicians and music educators are notorious for being unaware of the damage that can be caused to their auditory systems by high intensities of music, as observed during my 36-year career as a professional musician/educator. I have been investigating music induced hearing loss for 28 years, long before deciding to become an audiologist. Blending my two careers, and I have created a hearing conservation program for musicians, educators, and students. The program entails an introduction to the anatomy and physiology of our auditory pathway and changes that ensue after music/ noise exposure, review of research that describes the potential ramifications of high intensities of noise or music, and strategies for preventing hearing loss in the future. I have introduced this program to Iowa Music Educators Association, DODEA schools at West Point, NY, St. Peter's Health Partners, and Indiana State University. At the time of this conference, the program will also have been presented at Wisconsin State Music Conference, Midwest Band and Orchestra Clinic, and Indiana Music Education Conference. Through this poster presentation, I hope that attendees of the conference will be able to apply aspects of this program to their clinical practice.

Ethylbenzene Ototoxicity: A Systematic Review of Auditory Outcomes in Animal Studies

Presenter: Helen Wu

Millions of workers in the United States are exposed to solvents and many of these solvents are potentially ototoxic. To better understand solvent ototoxicity, a series of systematic reviews on animals exposed to solvents is being conducted by the International Ototoxicity Management Group's (IOMG's) Environmental and Occupational Exposures Group. IOMG plans to issue international health standards to facilitate improved protections and hearing health management for occupational ototoxic exposures. Ethylbenzene, found in various products including gasoline and paints, is a solvent with potent ototoxic effects. Nine toxicology studies were reviewed to synthesize findings on the ototoxic properties of ethylbenzene. Eight studies reported damage in the auditory system following ethylbenzene exposure. All of these eight studies found outer hair cell loss and two out of these eight studies found inner hair cell loss. Two studies examined noise exposures in combination with ethylbenzene; one of these two studies determined auditory impacts to be synergistic. One study reported potentiation of ototoxic effects due to xylene and ethylbenzene exposures in combination. More research is needed on hearing outcomes following ethylbenzene exposure, in animals as well as humans, to improve worker auditory health.

Examining Spatial Variability in Occupational, Environmental, and Total Noise Across Michigan

Presenter: Abas Shkemi

While some estimates of hazardous noise prevalence exist across the US, these estimates are limited by examining only community OR occupational noise, and creating nationwide estimates. This preliminary study extends previous work by examining state-, county- and neighborhood-level estimation of hazardous noise prevalence for occupational, community, and total (occupational + community) noise. Using (1) occupational 8-hr TWAs from our nationwide noise job exposure matrix (nosieJEM), (2) 24-hr LA_{eqs} from the Department of Transportation (DOT) National Transportation Noise Map (NTNM), and (3) occupational employment count by major SOC code from the US Census American Community Survey (ACS), we developed county- and neighborhood-level estimation of hazardous noise prevalence for occupational (>85 dBA), community (>70 dBA), and total noise (>70 dBA) for Michigan using Monte Carlo simulation methods. Overall, 44% of Michiganders are exposed to total noise levels hazardous to hearing health. Neighborhood-level hazardous total noise prevalence ranges from <10% up to 80%. At work, 15% (neighborhood range from 0% to 30%) of Michiganders are exposed to hazardous noise, dropping down to 5% (neighborhood range from 0% to 10%) after adjustment for HPD use. These findings highlight spatial variability in hearing loss risk and the need to examine spatial variability for targeted interventions.

Middle Ear Surgery and Hearing Loss: An Audiologist's Personal Journey and Changed Perspective on How Even a Mild, Unilateral Hearing Loss Can Impact Daily Life and Communication Abilities

Presenter: Lynnette Bardolf

Audiologists are generally well-educated, credentialed providers, who test and treat patients with hearing issues, along with using their knowledge to train others on the impacts of hearing loss related to various factors. However, do most Audiologists really have a clear and personal understanding of hearing loss, how hearing loss impacts daily life? As Audiologists, we do have textbook knowledge of how hearing loss can impact a person, but most of us don't have a deep personal experience or understanding of hearing loss ... until one day, the Audiologist suddenly becomes the ENT/Audiology patient, dealing with unexpected middle ear surgery, the recovery process, and the daily impact of a resultant hearing loss. Does the formal education and training Audiologists receive adequately prepare us for what to expect leading up to and following ear surgery, and for the impacts of associated hearing loss? This presentation walks the listeners through an Audiologist's personal journey and angst of middle ear surgery, the recovery process, and associated hearing loss; along with the Audiologist's eye-opening, ever-changed perspective on the daily impact that even a mild, unilateral hearing loss can have. These resulting experiences have changed the way the Audiologist now educates her patients and others.

Noise in Schools and its Impact on Teachers' Work

Presenter: Alessandra Samelli

Co-Authors: Camila Andrade, Benjamin Fluckiger, Martin Röösl

Introduction: Noise is an environmental problem, especially in urban areas, affecting a large number of people. Objective: To measure noise in seven schools in the western region of São Paulo, Brazil, evaluating its impact on teachers working in these locations. Methods: Noise meters were installed outside the buildings of seven schools. Measurements took place for one week in each of them (Noise Sentry RT type II sound level meter data logger; Convergencer Instruments, Canada). In addition, questionnaires were applied to 85 teachers (Noise Sensitivity Questionnaire - NoiSeQ ratings for 3-point scale, and ICBEN annoyance ratings for 11-point scale). Results: NoiSeQ showed moderator annoyance for work activities (mean 2.11 ± 0.29). ICBEN showed score values higher than 6 for talking/shouting in five schools; street parties in three and traffic in two. The average L_{day} in the seven schools was 63 dBA (59.44 – 66.22 dBA), reaching maximum average values of 96.66 dBA (88.86 – 101.62 dBA). Conclusion: The noise levels present in schools are above the limits recommended by the literature. The two scales used showed that the noise present in these schools during classes has had negative impacts on the health of teachers.

Non-Auditory Effects of Noise: Electrophysiological Stress Indices – Pilot Study

Presenter: Alessandra Samelli

Co-Authors: Carla Matas, Beatriz Perini

The physiological effects of noise are induced by the activation of the autonomic nervous system, which can be objectively measured through skin conductance or heart rate variability. Objective: To investigate the non-auditory effects of noise through electrophysiological stress indices. Methods: Pilot study with adults with normal hearing. The measures included amplitude of skin conductance (SC) (μS); high frequency heart rate variability (HF-HRV) power (ms^2); and respiratory rate (RR) cycles per minute (cpm). These measurements were performed in silence, in the presence of white noise at 65 and 75 dBA, during relaxation. Results: In the analysis of the phasic response of SC, amplitude peaks of 0.82 μS (65 dBA) and 0.67 μS (75 dBA) were observed, which occurred at 2.32 and 2.11 seconds, respectively, after the start of the stimuli. Relative to the baseline, HF-HRV power decreased (from 2066 – silence – to 1975 – 65 dBA – and to 1685 ms^2 – 75 dBA; $p=0.510$) and RR increased (from 17.96 – silence – to 19.54 – 65 dBA and to 19.68 cpm – 75 dBA; $p=0.282$), but without statistical significance. Conclusion: Our preliminary findings suggest that moderate noise levels caused changes in CS, HF-HRV and RR measurements.

Preventing Occupational Hearing Loss: A 50-Year Timeline of NIOSH Research and Intervention

Presenters: Christa Themann, Elizabeth Masterson

For more than 50 years, the National Institute for Occupational Safety and Health (NIOSH) has been actively working to reduce the effects of noise and ototoxic chemicals on worker hearing. From publishing the original 1972 noise criteria document to reaching our audiences through blogs and social media, from developing the hearing protector Noise Reduction Rating to promoting updated methods that address its limitations, from the 1968-1972 Occupational Noise and Hearing Survey to the current Occupational Hearing Loss Surveillance Program, NIOSH has pioneered research, established surveillance streams, designed interventions, and published recommendations that have made an impact in reducing occupational hearing loss. Over the past 50 years, substantial progress has been made in raising awareness of noise as a hazard, reducing the risk of occupational hearing loss, improving the use of hearing protection, and advancing measurement and control technologies. Nevertheless, noise remains a prevalent workplace hazard and occupational hearing loss is still one of the most common work-related illnesses. This poster will summarize 50 years of NIOSH work on occupational hearing loss and provide a brief preview of plans for the future.

Profiling the Ototoxicity of Exposure to Volatile Organic Compounds

Presenter: Layna Jeong, Gregory Zarus

Co-Authors: Krystin Carlson, Patricia Ruiz

Volatile Organic Compounds (VOCs) can produce ototoxicity. The Agency for Toxic Substances and Disease Registry (ATSDR) has developed toxicological profiles summarizing published material on hazardous chemicals. These reports focus on determining potential health effects based on organ systems and health endpoints from exposure. While less researched, ototoxicity is often reported along with other health endpoints. Ototoxicity describes hearing loss, vestibular effects, cochlear impact, and tonal alterations seen in humans and animals from exposure to toxic substances. Eleven VOCs are within the top 25 of ATSDR's highest priority substances due to their toxicity and environmental frequency. This presentation will chart the ototoxic effects corresponding with occupational and environmental exposure to priority VOCs. It will serve as a visual aid to organize the relative VOCs effects for each substance based on pathway of exposure and include related developmental or neurological effects. Examples of the differing effects, include:

- trichloroethene and mid-frequency range impact
- p-xylene and cochlear cell death
- ethylbenzene and irreversible hearing loss

By grouping and comparing information, scientists can quickly identify similarities between certain exposures and the specific data gaps associated with ototoxicity research. This is expected to increase user access by audiologists and increase opportunities to fill research gaps.

Profiling the Ototoxicity of Metal Exposures

Presenters: Onyinye Chukka, Gregory Zarus

Co-Authors: Krystin Carlson, Patricia Ruiz

Exposure to certain metals is associated with ototoxic effects. The Agency for Toxic Substances and Disease Registry (ATSDR) develops and updates peer-reviewed toxicological profiles that summarize published materials associated with hazardous substances. These profiles are focused on determining potential health effects in all major organ systems for which data are available. ATSDR profiles do include ototoxicity evidence, though the clinical research is typically less thorough compared to other health endpoints and often the evidence is included in along with related neurological effects. Ototoxicity includes hearing losses, vestibular effects, cochlear impacts, and tonal alterations in humans or animals following exposures to toxic substances. Many metals are on ATSDR's list of highest priority substances due to their toxicity and frequency in the environment. This presentation will describe the evidence, as contained in ATSDR priority metal profiles, for ototoxic effects. It will visually organize the potential ototoxic effects associated with occupational and environmental metal exposures. Primary routes of exposure associated with specific outcomes will be included, and any developmental or neurological effects measured in animals and/or humans will be indicated. Through this novel meta-analysis of ototoxicity findings, scientists can quickly identify similarities between certain toxicants and easily identify data gaps in ototoxicity research.

Self-Managed Hearing Health eTool: An Integration of FDA, OSHA, and NIOSH Directives

Presenter: Elora Gupta

There is a concerning increase in hearing loss particularly among young adults. Nonwork noise hazards are well-recognized for contributing significantly to hearing health decline. The FDA's landmark Over-The-Counter (OTC) Hearing Aid Rule (draft Rule published in 2021) is anticipated to usher in the future of hearing healthcare with emphasis on self-managed care. The Rule, when finalized, can potentially supplement OSHA Occupational Noise and NIOSH Total Worker Well-being principles by promoting personalized hearing care that is self-developed, self-controlled and extends beyond the workplace. The proposed eTool is based on information derived from US government and UN sources and consists of interactive self-education and self-assessment modules to (i) learn about the latest on hearing essentials (ii) self-analyze personal hearing risks/hazards, auditory and non-auditory health impacts, lifestyle needs and preferences (ii) self-identify signs and symptoms, decide when to self-treat or seek hearing professional consult (iii) self-monitor hearing and health effects, build safe listening practices and habits, advocate for personal hearing needs. The eTool is designed for self-care with ease and flexibility of use, ensures privacy and confidentiality, and encourages habits and decision-making for improving Quality of Life as well as further workplace safety and health.

Self-Reported Hearing Disorders and Modifiable Risk Factors: Worker Hearing Protection Device Behavior and Risk for Reporting Hearing Difficulty

Presenter: Conner Jansen

Co-Authors: Aaron Cochran, Eric Fallon,
Colleen Le Prell

Despite required use of HPDs in the workplace, many workers develop noise induced hearing loss (NIHL). Data on worker HPD-related behaviors at home and in the workplace were collected via survey techniques. In addition, data on self-reported hearing difficulties and professionally diagnosed hearing loss were collected.

Workers who reported they remove their HPDs to resolve audibility concerns had a higher rate of reporting of hearing difficulties, tinnitus, speech in noise difficulties, and behaviors suggestive of hearing loss, such as complaints by others that they set TV sound levels too high. Workers who reported both recreational firearm use and removing their HPDs due to audibility concerns had the highest rate of self-reported hearing disorders. The findings suggest audibility-related HPD removal behaviors in the workplace and noise exposure outside the workplace impact worker hearing. Counseling workers on healthy hearing habits in the workplace and at home is recommended. Support for this study was provided by 3M.

Speech-in-Noise and Alarm Detection with Active and Passive Hearing Protection in Workplace Noise

Presenter: Aaron Cochran

Co-Authors: Eric Fallon, Conner Jansen,
Colleen Le Prell

Noise induced hearing loss is a concern in the workplace. Outside of changing the workplace environment, hearing protection devices (HPDs) are the most common way of combating this. The purpose of this research was to measure the understanding of speech-in-noise and thresholds for detection of an alarm signal in simulated factory noise in both passive and electronic HPD conditions. Both an electronic earplug and an electronic earmuff condition were tested; each device was tested in maximum gain and off configurations. The electronic listening conditions were compared against both the passive (OFF) condition and an open-ear (unoccluded) baseline. Speech understanding was evaluated using the clinical Words-in-Noise test and NU-6 words lists presented in both quiet and with the simulated workplace noise. Alarm detection was evaluated using an alternating high-low alarm in similar conditions. Clinically significant increases in performance were observed when HPDs were set at maximum gain, relative to the off position. Performance in the electronic listening conditions was generally comparable to performance in the open ear condition in most tested conditions. Support for this study was provided by 3M.

The Evaluation of Hearing Protection Effectiveness on Workers in Chinese Textile Industry

Presenter: Shibiao Su

Noise is the major occupational hazard in textile industry, the use of hearing protection devices (HPDs) is common. HPD fit testing and questionnaire survey were conducted on workers in a textile factory in Jan 2021 as the baseline survey, with follow-up visit in Jun 2022 (N=192). The personal attenuation rating (PAR) indicated the noise protection of two earplugs obtained by users who were exposed to difference noise levels. We found that the PAR obtained by 1100 foam earplug wearers was higher than the 1270 premolded earplug wearers. Users exposed to noise at levels ranged 85-89 dBA were lower than that obtained by users who are exposed to 90-94 dBA or 95-99 dBA, adjusting sex, age, service year, education level and years of use of earplugs. Compared with baseline PARs, statistical difference was observed in the follow-up PARs. One-on-one intervention improved the PARs significantly in both visits. The follow-up fit testing revealed the statistical decrease in removing earplugs during working caused by talking and inspecting machines, and increase in receiving training and replacing earplugs.

The Importance of Hearing Conservation in College Orientation

Presenters: Madison McNeill, Anne Sommer

The purpose of this study is to examine the student perspective on their noise exposure and if hearing conservation education should be a part of freshman orientation curriculum. Purdue University hosts Boiler Gold Rush before the start of every Fall semester to help freshmen feel more comfortable with the transition to college. This large group orientation has many events that can expose students to hazardous noise levels with unknown effects on their hearing. This study uses an online survey to collect data from Purdue University undergraduate students about their experience with Boiler Gold Rush and noise.



Lynnette Bardolf

Dr. Lynnette Bardolf (Ph.D.) graduated with her B.S. and M.S. degrees in Audiology and Speech Pathology from the Florida State University, and with her Ph.D. in Audiology from the University of Florida. Dr. Bardolf spent almost 25 years serving in the Army as a military Audiologist, where she ran several

Audiology clinics, was heavily involved in hearing conservation, did Audiology research, and routinely taught CAOHC Courses. Since retiring in 2015 from the military, Dr. Bardolf headed up a tinnitus research project at the US Army Aeromedical Research Laboratory, was an Adjunct Professor with the University of Florida, contracted to with the VA to do Compensation and Pension evaluations, and volunteered at her local Military Treatment Facility as an Audiologist. Dr. Bardolf currently continues to teach CAOHC Courses, treats patients suffering with tinnitus, volunteers as an instructor for the School of Aviation Medicine, serves as a reviewer for a well-known journal, and provides consultation services on various Audiology-related issues when needed.



Deanene V. Berry, AuD Northeast Occupational Audiology Associates LLC

Dr. Deanene V. Berry is the owner of Northeast Occupational Audiology Associates LLC with offices in Hackensack, NJ and Westport, CT. A native of North Philadelphia, she attended Community College of Philadelphia and

completed the American Sign Language Interpreting program. She then attended Temple University where she earned a Bachelor of Arts degree in Communication Disorders. She received her Doctor of Audiology degree from Bloomsburg University of Pennsylvania in 2009. Dr. Berry is an audiologist with experience in multiple areas of audiology including tinnitus management, hearing aid dispensing, vestibular evaluations, and comprehensive audiologic testing. She considers working with Active Military members and Veterans to be highlights of her career. She has also worked as an occupational audiologist which included traveling around the United States calibrating audiometers, conducting sound level surveys, making workplace determinations for recordable hearing losses, and reviewing problem audiometric results. Dr. Berry has served as a CAOHC instructor since 2012 and enjoys presenting monthly training sessions for those desiring to become Occupational Hearing Conservationists (OHC). She also continues to work with companies that request workplace determinations and data reviews on short and long-term projects.



Ishan Bhatt University of Iowa

Ishan Bhatt is an Associate Professor in the Communication Sciences and Disorders Department at the University of Iowa. His main interest is to identify the confluence of genetic and non-genetic risk factors influencing complex hearing disorders. His research

program aims to create audiogenomic tools that can be used by healthcare providers to identify susceptible individuals well before they acquire permanent hearing health problems and to design individualized prevention and intervention strategies.



Bev Borst, COHN(C) 3M Canada Company

Bev Borst is a senior technical specialist with 3M Hearing Solutions, 3M Canada Company, Personal Safety Division. By profession, Bev is a registered nurse and certified occupational health nurse. She has been with 3M Canada for 26 years, prior to which she worked as

a registered nurse for 14 years in Ontario healthcare facilities. Her expertise spans hearing conservation, hearing protection devices, fit testing of hearing protectors and respiratory protection. As well as being 3M Canada's leading authority on hearing loss prevention, she also has global responsibility to support the 3M earmuff portfolio. Bev has conducted multiple seminars on hearing conservation across Canada and the US. Currently, Bev serves as a technical member of CSA Z94.2 Hearing Protection Devices Standard, Z1007 Hearing Loss Prevention Program Management Standard and CSA Vice-Chair for the Occupational Hearing Conservation Technical Committee.



Rachel Bouserhal, Ph.D. École de technologie supérieure

Rachel is an Associate Professor in the Department of Electrical Engineering at École de technologie supérieure (ÉTS) in Montréal, Canada. She completed her BS and MS in Electrical Engineering at Michigan State University, where she was heavily involved

with Audio Enthusiasts and Engineers, a student group that builds and designs audio-related projects. Following her passion for audio and signal processing, she moved to Montréal in 2012 where she completed her PhD at ÉTS in 2016. Her PhD focused mainly on speech signal processing and communication enhancement for advanced hearing protection devices. Currently, she holds a chair in Research in Hearing, Health, and Assistive Devices (RHAD). She is the inventor on a grant on in-ear speech enhancement which has received several accolades including: ÉTS's "Most Promising Invention Award" and the Mitacs NRC-IRAP "Award for commercialization" in 2018, as well as the Québec Science "Invention of the Year Award" in 2019. Her research interests are signal processing, speech, hearing, machine learning, health monitoring, nonlinear control, and engineering education.



Chris Brooks, Ph.D.
Creare LLC



Douglas Brungart, Ph.D.
Walter Reed NMMC

Douglas S. Brungart, PhD, is the Chief Scientist of the National Military Audiology and Speech Pathology Center at Walter Reed and the Senior Hearing Scientist within the U.S. Defense Department. Dr. Brungart holds a BS in Computer Engineering from Wright

State University (Dayton, Ohio), and an MS and PhD in Electrical Engineering and Computer Science from the Massachusetts Institute of Technology (Cambridge, MA). For 19 years, he worked as a research scientist and technical advisor for the Air Force Research Laboratory in Dayton, Ohio, where the laboratory work focused on spatial hearing, multitalker speech perception, and auditory displays. Since 2009, he has been the senior scientist of the research section at the Audiology and Speech Pathology Center at Walter Reed. During this time, he and his team have focused on the application of advanced technology to improve the prevention, diagnosis, and treatment of hearing loss and other hearing and speech disorders. Dr. Brungart has authored and co-authored more than 90 peer-reviewed journal articles on auditory perception, and he has been issued ten US patents for hearing-related research.



Kari Buchanan, MPH, MA
zCoreBusiness Solutions
in support of 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.



Krystin Carlson, Ph.D.
NIOSH

Dr. Krystin Carlson is a Toxicologist/Risk Assessor at NIOSH with expertise in ototoxicity. Dr. Carlson's past research focused on bridging toxicology and epidemiology to improve public health. She has investigated hearing health in humans exposed to environmental and occupational ototoxicants. In the laboratory, she has modeled complex exposures to toxicant mixtures in animals. Past projects included investigations on essential metal interactions with toxicant metals, exposures to chemicals with simultaneous exposures to noise, and interactions between multiple toxicants. Dr. Carlson completed her PhD in Toxicology at the University of Michigan. She has taught both graduate and undergraduate students at the University of Michigan and Oakland University. Adding to her contributions to the scientific community, Dr. Carlson has been an active member of the Society of Toxicology (SOT) since 2011 where she has served as a leader for graduate students as well as a representative for the Mixtures Specialty Section. As part of the SOT Graduate Student Leadership Committee, she served as both the Secretary and the Professional Development Chair. Dr. Carlson also won the SOT Mixtures Specialty Section Best Abstract Award for her mouse model on investigations of ototoxicity due to lead, cadmium, and noise.



**John Casali,
Ph.D., CPE, CIE**
Virginia Tech

Dr. Casali is the Grado Professor of Industrial & Systems Engineering at Virginia Tech (VT), and a Board-Certified Professional Ergonomist (CPE). He founded the Auditory Systems Laboratory at VT in 1983. He also is founder and CTO of HEAR, LLC, a product design and litigation support firm. He is a Fellow of the Institute of Industrial Engineers and the Human Factors & Ergonomics Society, the latter of which presented him with the Lauer Safety Award in 2017 for advancements in worker and consumer safety. He received the NIOSH-NHCA Safe-in-Sound Award for Innovation in Hearing Conservation in 2016, and the NHCA's Outstanding Hearing Conservationist Award in 2009. His externally-sponsored contract research and foundation funding at VT has totaled over \$15 million, across over 120 contracts and grants. As a consultant, he has served over 80 companies and government agencies, and has twice received VT's highest external service award for Outreach Excellence, in 2020 and 2006, recognizing his pro bono work in community and other settings. He has 7 patents and over 200 publications, and he has advised 25 Ph.D. and 31 Master's students to graduation. He enjoys working with companies, the military, and government agencies on acoustics and hearing conservation research.



Odile Clavier, Ph.D.
Creare LLC

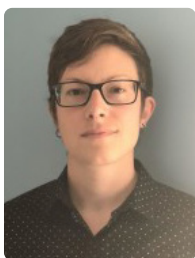
Dr. Odile Clavier received her master's and Ph.D. from Stanford University in the department of Aeronautics and Astronautics. Since joining Creare, she has been the Principal Investigator for several biomedical applications. She has led the development of innovative hearing assessment systems, such as the Wireless Automated Hearing Test System for high quality boothless audiometry as well as the TabSINT software which was designed to enable distributed studies of hearing across multiple or remote sites. Dr Clavier has also led the development of the Tympan Open Source Audio Processing platform and continues to innovate in the field of hearing research. As a Principal Engineer at Creare, she leads a business area focused on innovative technologies that can lower the cost of healthcare while increasing access to a variety of populations. Her team works on several devices at different stages of readiness, from cutting edge high risk research to market-ready transition.



Richard Danielson, Ph.D.

For over 45 years, Dick Danielson PhD has directed a wide variety of programs aimed at reducing the risk of hearing loss related to military, occupational and aerospace noise exposures. As a military audiologist, Colonel (retired) Danielson guided audiology and hearing conservation programs for US Army medical centers and installations in the U.S.

and Europe, as well as leading a unique Audiology Task Force that deployed for Operation Desert Storm. He then served for 18 years as NASA's Risk Custodian for the Risk of Hearing Loss Due to Spaceflight and as the clinical audiologist for space explorers and those who support them at Johnson Space Center. In 2014, the National Hearing Conservation Association recognized him with its "Outstanding Hearing Conservationist Award" for outstanding contributions and achievements in the field of hearing loss prevention.



**Jackie DiFrancesco,
Au.D., CCC-A**
University of Connecticut

Dr. Jackie DiFrancesco is a research audiologist with experience in clinical, industrial, and research settings. Her research interests include optimizing hearing protection for workers with hearing loss, and bridging the gap between preventative and rehabilitative hearing care.



**Carlos Esquivel,
M.D., F.A.C.S.**
Defense Health Agency

Carlos Esquivel, M.D., F.A.C.S., is Chief Medical Officer for the DOD Hearing Center of Excellence. He has over 25 years of experience as a clinical Neurotologist and researcher within the Military Health System.

His research interests include both clinical and basic science understanding of noise induced hearing loss.



Eric Fallon, Au.D.
3M Company

Eric Fallon, AuD, 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.



Don Finan, Ph.D.
University of Northern
Colorado, Dept. of Audiology
and Speech Sciences

Donald Finan, Ph.D., is a Professor of Audiology and Speech-Language Sciences at the University of Northern Colorado. He received a BS in speech-language pathology

and audiology from Eastern Illinois University and a MS in speech-language pathology from the same institution. He received a PhD in speech physiology and neuroscience from Indiana University –Bloomington. His research interests include measurement of noise and associated auditory exposure, music-induced hearing disorders, technology use in clinical and research settings, and developing innovative tools and pedagogies for speech and hearing science instruction. He has served as one of the founders and the inaugural Coordinator for the American Speech-Language-Hearing Association's Special Interest Group (SIG) 19, Speech Science. He was the NHCA Gasaway Lecturer for 2021.



**Cassie Ford,
M.A., CCC-A, CPS/A**
Examinetics Inc

Cassie Ford is an occupational audiologist who received her B.S. in Speech Language Pathology at Texas Christian University and her M.A. in Audiology at the University of Iowa.

Cassie has been a practicing audiologist for 30 years and has worked exclusively in hearing conservation for the last twenty years. Cassie is a CAOHC certified course director and professional supervisor. As the manager of audiology services at Examinetics, Cassie leads a team of occupational audiologists who guide a diverse group of clients through their hearing conservation programs and regulatory compliance. Cassie has been a primary subject matter expert in the development of Examinetics' proprietary audiometric database management and online reporting tools, as well as a new portable testing and training system. She was also part of the team that developed the Examinetics processes for making determinations of work relatedness for clients. Additionally, Cassie has specific expertise in railroad industry compliance, where she has had the opportunity to work closely with various health and safety teams including occupational medicine physicians, occupational audiologists, industrial hygienists, and other safety professionals.



Adrian Fuente, Ph.D.
University of Montreal

Dr Fuente completed his PhD at the University of Hong Kong where he investigated the effects of solvents on the auditory system with a special emphasis on the central auditory nervous system. In 2008 he obtained a Postdoctoral Fellowship from the University

of Queensland in Australia. At this University he was a postdoctoral fellow until 2012 where he investigated age-related changes in the central auditory nervous system and hearing aid benefit in older adults. In 2012, he became an NHMRC Senior Research Officer at the University of Queensland. He has published widely and lectures extensively in several countries. Dr Fuente moved to Montreal in September 2013 to join the School of Speech Pathology and Audiology at the Université de Montréal.



Kathy Gates, Au.D.
DOD Hearing Center
of Excellence

Dr. Kathy Gates joined the Department of Defense (DOD) Hearing Center of Excellence (HCE) in October 2012 and is currently working under the Prevention Section. One of her primary roles is to actively promote and initiate

the Comprehensive Hearing Health Program to Audiology and Hearing Conservation/Program Clinics across the DOD and VA. Colonel (Retired) Gates served twenty-six years in the U.S. Army Medical Service Corps as an Army Audiologist. Dr. Gates currently serves as Coordinator for Specialty Interest Group (SIG 8), Public Health Audiology, American Speech Language and Hearing Association (ASHA). She holds certification as a CAOHC Course Director and Professional Supervisor.



Christian Giguère, Ph.D.
University of Ottawa

Christian Giguère is Professor in Audiology and Speech-Language Pathology at the Faculty of Health Sciences at the University of Ottawa. He teaches courses in acoustics, speech science, instrumentation in audiology, and hearing aids. His research interests include speech

communication, warning sound perception, hearing protection, and hearing loss prevention. He has authored over 150 journal articles, conference proceedings and book chapters. Professor Giguère is active in standards organisations and is a member of several national (CSA, ANSI) and international (ISO) technical workgroups on topics related to occupational hearing loss, hearing protection and audiology. He was president of the Canadian Acoustical Association (2007-2013), co-chair of the International Commission on the International Commission on the Biological Effects of Noise (2008-2014), and chair of the Technical Committee on Occupational hearing loss with the Canadian Standards Organisation (2016-2022). He is currently Associate Editor with The International Journal of Audiology and Member of the NHCA's Task Force on Auditory Situational Awareness. He is a Distinguished International Member of the Institute of Noise Control Engineering (INCE-USA).



**Srividya Grama Bhagavan,
M.A.S.L.P.**
University of Iowa

Srividya Grama Bhagavan joined the Ph.D. program at Iowa in fall 2021. She completed her Bachelor's in Speech Language Pathology and Audiology (B.A.S.L.P.) in 2016 from Bangalore University, India, and Master's

degree in Audiology and Speech-Language Pathology (M.A.S.L.P) in 2019 from Manipal Academy of Higher Education, Mangalore, India. Prior to joining the Ph.D. program, she worked as an Audiologist and Speech Language Pathologist in renowned hospitals and private clinics in India, where she authored three international publications.



Quintin Hecht, Au.D.
DoD Hearing Center
of Excellence

Quintin Hecht, AuD, is a research audiologist and project manager for the Department of Defense (DoD) Hearing Center of Excellence (HCE) at Joint Base San Antonio-Lackland, Texas. Dr. Hecht joined the DoD HCE in

2016 and also serves as an Army Reserve Audiologist for the Army Public Health Center. Dr. Hecht is licensed and board-certified, and received his AuD from Illinois State University. He is also certified as a Professional Supervisor of the Audiometric Monitoring Program and as a Course Director by the Council for Accreditation in Occupational Hearing Conservation (CAOHC). Dr. Hecht's research interests include boothless audiometry technology, acute auditory injury, and education delivery methods.



Howard Hoffman, MA
NIDCD

Howard J. Hoffman is Director, Epidemiology and Statistics Program, Division of Scientific Programs, National Institute on Deafness and Other Communication Disorders (NIDCD), National Institutes of Health (NIH). He has led the NIDCD epidemiology program since 1992.

This research program is focused on determining the prevalence, incidence, risk factors, and preventive interventions for conditions or disorders in all the mission areas of the Institute. He is NIDCD Project Officer for the Hearing, Balance, and Chemosensory Components of the National Health and Nutrition Examination Survey (NHANES) and for many other epidemiologic studies supported by NIDCD in the US and abroad.



Sean Hoverson, B.A.
University of Northern
Colorado

Sean Hoverson is a 4th year doctor of audiology (Au.D.) student at the University of Northern Colorado. Currently, he is completing a final year externship at the Veteran's Administration Puget Sound Health Care

System in Seattle, WA. His clinical and research interests include hearing loss prevention due to noise exposure, tinnitus, and adult aural rehabilitation. Mr. Hoverson is a CAOHC certified Occupational Hearing Conservationist. He grew up in Grand Forks, North Dakota and enjoys hiking and exploring the Pacific Northwest in his free time.



**John Keady,
Ph.D., J.D., Esq.**
HEAR LLC

Dr. Keady is CEO at HEAR LLC, CTO and Assistant General Counsel at Staton Techiya LLC, is a Registered Patent Attorney and teaches University Physics at George Mason University as an adjunct. He has Ph.D.s in

Physics and Computational Sciences, an M.B.A. in Entrepreneurial Management, a B.S. in Aerospace and Ocean Engineering, and has taught physics and computer science at the university level. He is listed as an inventor on over 130 patent and patent applications ranging from acoustics, DNA analysis, and plasma propulsion and has over 20 publications, presentations, and technical reports. He enjoys inventing, whether it be new acoustic based software and hardware systems, new art forms (magnetically controlled painting), or energy systems (thermal windmill, electrolysis energy storage system).



Sridhar Krishnamurti, Ph.D.
Auburn University

Dr. Sridhar Krishnamurti is Professor and Program Director of Audiology at Auburn University. He is an Executive Council member for the National Hearing Conservation Association.



Caleb Kronen, Au.D.
Marion Downs Center

Caleb Kronen, Au.D. is an audiologist and the Director of Hearing Conservation at the Marion Downs Center, who serves as the certified professional supervisor of over 300 industrial companies in Colorado. Prior to working as a hearing conservation

audiologist, Dr. Kronen worked for six years in the Hearing Research Laboratory at the University of Colorado, conducting research on music-induced hearing loss, signal processing of music in hearing aids, and psychoacoustics. As a past member of the executive council of the National Hearing Conservation Association, he has worked to provide educational material for safety professionals, audiologists, workers, and technicians in the field of occupational hearing conservation. He also serves hundreds of local and touring musicians as a hearing conservation consultant in Denver.



Colleen Le Prell, Ph.D.
University of Texas at Dallas

Colleen Le Prell, Ph.D., is the Emilie and Phil Schepps Professor of Hearing Science, Chair of the Department of Speech, Language, and Hearing, and Program Head for the Ph.D. Program in Speech, Language, and Hearing Sciences at the University of Texas at Dallas.

She has received research funding from government, industry, and philanthropic sources. Clinical, translational, and applied research in her laboratory advances understanding and prevention of noise-induced hearing loss.



Nichol Lee, Ph.D.
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.



Heather Malyuk, Au.D.
Soundcheck Audiology

Doctor Heather Malyuk, Au.D. is an audiologist and musician from northeast Ohio. Dr. Malyuk holds a degree in Music History & Literature from the University of Akron and earned her clinical doctorate in Audiology from Kent State University. She owns and directs Soundcheck

Audiology, a concierge practice focused on best practices care for the music industry. Throughout her career, she has served and continues to serve as co-author, advisor, and mentor for research on music industry professionals. In addition to her work in private practice, she is a part-time investigator at the University of Akron studying the effects of pharmaceutical intervention for Noise-Induced Hearing Loss, and she serves as Head of Audiology for Tuned, a virtual audiology clinic.



**Madison McNeill,
B.S., COHC**
Purdue University

Madison McNeill, BS, COHC, is a Year II Doctorate of Audiology student at Purdue University. She earned her bachelor's degree in Biology from Maryville University of St. Louis in 2021. Ms. McNeill holds a certification from

the Council for Accreditation in Occupational Hearing Conservation (CAOHC) as a Certified Occupational Hearing Conservationist. Other than hearing conservation, her clinical interests include hearing aids and cochlear implants. Ms. McNeill currently serves as President for the Student Academy of Audiology chapter at Purdue University. She enjoys educating other students about the profession of Audiology and helping them find opportunities to be more involved within the field.



Alex Meibos, Au.D., Ph.D.
The University of Akron /
Northeast Ohio Au.D.
Consortium

Alex is an Assistant Professor of Audiology at The University of Akron and Northeast Ohio AuD Consortium (NOAC). His research has been focused in the areas of audiologic

counseling, audiological practices across the lifespan, hearing loss prevention, and investigating factors that influence effective partnerships between hearing health professionals and individuals adversely impacted by hearing loss or other ear related disorders.



**Deanna Meinke,
Ph.D., CCC-A**
University of Northern
Colorado, Dept. of Audiology
and Speech Sciences

Deanna Meinke received her undergraduate degree in communication disorders from Colorado State University and a master's

degree in Audiology from Northern Illinois University. She holds a Ph.D. from the University of Colorado in Audiology and is currently a Winchester Distinguished Professor in the Audiology and Speech-Language Sciences program at the University of Northern Colorado. She is a recipient of the "Outstanding Hearing Conservationist" award from the National Hearing Conservation Association and the American Academy of Audiology recently recognized her with the "Jerger Career Award for Research in Audiology". Her research is focused on the early detection and prevention of noise-induced hearing loss including the auditory risk of impulse noise, educational gaming to promote hearing health, and the use of wireless automated hearing test systems. She has served as past president of the National Hearing Conservation Association and is Co-Director of the Dangerous Decibels® program. Her favorite sound is the call of the sandhill crane at dawn echoing through a mountain valley.



Jan Moore, Ph.D.
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 was a Fulbright Scholar

to Canada in 1993. She completed graduate work in public health at the University of Nebraska Medical Center in 2016. She is full Professor at the University of Nebraska Kearney and serves as interim chair. Currently she is investigating the relationship between hearing loss and cognitive change in aging farmers and ranchers.



Thais Morata, M.S., Ph.D.
National Institute for
Occupational Safety and Health

Thais Morata is a Research Audiologist at the National Institute for Occupational Safety and Health of the Centers for Disease Control and Prevention in the US, and the Director of the Safe-in-Sound Excellence in Hearing

Loss Prevention Award™. Thais is a Founding Associate Editor for the International Journal of Audiology and for Cochrane Work Review Group. She has published and lectures extensively in the United States and abroad. She is recognized as a mentor and collaborator with researchers across the globe, and recipient of several awards. Her pioneering research on noise and health has contributed to international occupational safety and health policies. She is currently devoting time to improving the communication of science to the public through new media and promoting the adoption of evidence-based health practices.



William Murphy, Ph.D.
Stephenson and Stephenson,
Research and Consulting, LLC.

William J. Murphy, Ph.D., is a senior scientist with Stephenson and Stephenson Research and Consulting (SASRAC). He received a B.S. in physics and an M.S. in solid-state physics from Iowa State University. He completed a

Ph.D. in physics with an emphasis in hearing science from Purdue University. He joined NIOSH in 1992 and was commissioned as a Lieutenant in the United States Public Health Service (USPHS) in 1993. He completed an M.Eng. in acoustics at The Pennsylvania State University in 2012. In 2022, he retired as a Captain in the USPHS and joined SASRAC. His research is focused on measurement and evaluation of impulse noise, testing, rating, and fit-testing of hearing protection devices, and development of audiometric test methods to evaluate the hearing for an occupational setting. 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 and vice-chair for the ASA Committee on Standards.



Jesse Norris, Ph.D.
Edare, Inc.

James (Jesse) A. Norris, Ph.D., has a background in biomedical engineering and applied research. Within auditory science, he has studied relationships between custom earplugs, attenuation, and comfort; developed algorithms and hardware to support otoacoustic emissions research; and designed and built new hearing test equipment that may be paired with mobile devices to increase the reach of hearing health care. He currently works at Edare and has been focused on transitioning hearing related technologies from research into products. He has helped Edare develop a production-ready quality system, register with the FDA, and oversees product development, manufacturing, and support.



Solenn Ollivier, Ph.D.
École de technologie
supérieure

Solenn holds an engineering degree from École Nationale Supérieure d'Arts et Métiers (ENSAM, France) and a Master of Science in Biomedical Engineering from Columbia University (NY, USA). Deeply passionate about sciences and their ability to help others she has always been looking to work on projects bringing science and health together and was involved in different innovation challenges. After an internship at École de technologie supérieure (ÉTS) in Montréal with Prof. J. Voix and Dr. H. Nélisse, she decided to pursue a PhD on the development of a protective hearing aid for workers in noisy environment, a collaborative research project between ÉTS, U.Ottawa, U. Laval and IRSST, the Quebec occupational health and safety research institute. Her research focuses on combining hearing aid, hearing protection and continuous monitoring of an individual's noise exposure into a single intra-aural device. The resulting prototype would aim at enhancing research on hearing impairment in noisy workplace environment and could lead to a commercialized device on the emerging high-growth market of over-the-counter hearing aids.



Taylor Paige, Au.D.
University of South Alabama

Maj Taylor Paige is an active duty U.S. Air Force audiologist, currently pursuing a Ph.D. in Communication Sciences and Disorders at the University of South Alabama. She graduated from Nova Southeastern University with her AuD in 2017 and her B.S. in Communication Sciences and Disorders from James Madison University in 2013. Maj Paige's research interest has been focused on noise induced hearing loss and extended high frequency audiometry.



Scott Pfeiffer, FASA
Threshold Acoustics LLC

Scott is a Partner at Threshold Acoustics. For decades, Scott has participated in virtually every aspect of the acoustical consulting profession, from modeling and measurements to leading the design of complex rooms, audio and video installations, and electronic enhancement systems. Scott has been honored as a Fellow in the Acoustical Society of America for his accomplishments in the design of worship and performing arts spaces as well as his leadership in pursuing great Unanswered Questions, a topic he explored at length in the ASA's Knudson Distinguished Lecture. He is currently the President-Elect for the National Council of Acoustical Consultants.



Gayla Poling, Ph.D.
Mayo Clinic

Dr. Gayla L. Poling is the President of the National Hearing Conservation Association. She studied Audiology and Hearing Sciences at The Ohio State University. She is the Director of Diagnostic Audiology Research at Mayo Clinic, Rochester, MN. Her primary area of interest is auditory diagnostics with her research focus on early detection and prevention of hearing loss across the life course.



Cory Portnuff, Au.D., Ph.D.
UCHealth Hearing and Balance Clinic

Dr. Cory Portnuff is a clinical audiologist at the University of Colorado Hospital and an Assistant Clinical Professor at the University of Colorado School of Medicine. In the clinic, he works with patients of all ages, with a focus on audiologic rehabilitation, treatment for tinnitus and services for musicians. Dr. Portnuff is board certified in audiology with a specialty certification in pediatric audiology. His research focuses on hearing loss prevention, including noise-induced hearing loss in children and hearing protection for musicians. Dr. Portnuff teaches in the AuD program at the University of Colorado Boulder and has taught courses at a variety of other universities. In his free time, he enjoys hiking, camping, and long walks on Colorado beaches.



Jan Rennies, Dr.rer.nat.
Fraunhofer Institute for Digital Media Technology IDMT



Hugo Saint-Gaudens, B.Ing.
École de technologie supérieure

Hugo Saint-Gaudens is a PhD candidate in the Department of Mechanical Engineering at ÉTS. His research focuses on assessing and objectivizing the occlusion effect induced by earplugs in laboratory conditions.



Theresa Schulz, Ph.D.
National Hearing Conservation Association

Dr Theresa Schulz is Prevention and Surveillance Section Lead at the DoD Hearing Center of Excellence. Her background includes VA, NIOSH, US Army, US Air Force and DoD and well as industry experience in hearing loss prevention. She received her Bachelor's and Master's degrees from the University of Texas at Austin and her PhD from The Ohio State University. Theresa is Past-President of the National Hearing Conservation Association. Dr Schulz is a certified Project Management Professional. She is a sought-after speaker and is passionate about sound and hearing health.



Jaclyn Schurman, Au.D., Ph.D.
Walter Reed National Military Medical Center

Jaclyn Schurman Au.D., Ph.D. has been a Research Audiologist at the National Military Audiology and Speech Pathology Center at Walter Reed National Military Medical Center since 2015. She received her B.A., Au.D., and Ph.D. from the University of Maryland, College Park. She has had several years of experience working with military audiologists conducting auditory research in the field and in a clinic.



Anne Sommer, Au.D. Purdue University

Anne Sommer, Au.D., CCC-A, CPS/A, CH-TM is a Clinical Assistant Professor at Purdue University. Since 2009, she is responsible for clinical education of Year I and Year II Au.D. graduate students. Dr. Sommer currently manages the university Hearing Conservation Program (HCP) for approximately 300 campus employees. Other clinical interests include tinnitus management, misophonia and professional advocacy efforts at the state and national level. Dr. Sommer served as the Audiology Vice President for the Indiana Speech-Language-Hearing Association (ISHA) for 7 years and received ISHA Honors of the Association in 2022. In addition, Dr. Sommer also hold certification from the Council for Accreditation in Occupational Hearing Conservation (CAOHC) as a Course Director and Professional Supervisor of the Audiometric Monitoring Program (CPS/A). She is passionate about hearing conservation efforts and presents regularly on the topics of hearing loss prevention, noise-induced hearing loss as well as tinnitus.



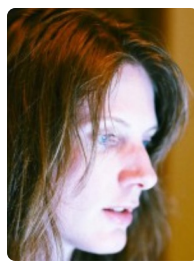
Shibiao Su, M.D. Guangdong Province Hospital for Occupational Disease Prevention and Treatment

Su Shibiao is a chief physician who has worked in Guangdong Province Hospital for Occupational Disease Prevention and Treatment for nearly 20 years. Su Shibiao has mainly conducted research on the fit testing of hearing protection devices and the risk assessment of noise-induced hearing loss.



Christa L. Themann, MA, CCC-A CDC/NIOSH

Christi Themann is a Research Audiologist at the National Institute for Occupational Safety and Health in Cincinnati, Ohio. Her research experience includes animal studies on the effects of impulse noise on hearing, methods for assessing hearing protector attenuation, and developing effective hearing loss prevention strategies. Prior to COVID shut-downs, Christi managed audiometric testing for several large epidemiologic studies, including the National Health and Nutrition Examination Survey. She remains involved with hearing-related content for the National Health Interview Survey and the Healthy People program. Christi is also interested in integrating hearing health into overall wellness programs (e.g., through a Total Worker Health® approach) and in translating research findings into appropriate educational materials using traditional and new media.



Jennifer Tufts, Ph.D. University of Connecticut

Jennifer Tufts, Ph.D. is a professor of audiology in the Department of Speech, Language, and Hearing Sciences at the University of Connecticut. Previously, she completed postdoctoral clinical and research training at Walter Reed Army Medical Center in Washington DC. She is a past-president of the National Hearing Conservation Association (NHCA) and a winner of NHCA's Outstanding Lecture Award (2014) and Outstanding Poster Award (2010). She is currently serving on the NHCA Scholarship Foundation board of directors. Her research areas include hearing loss prevention and auditory fitness in diverse populations.



Frank Wartinger, Au.D. Earmark Hearing Conservation

Frank Wartinger, AuD, is a hearing conservationist and audiologist who founded Earmark Hearing Conservation, a Music Audiology clinic in Philadelphia. He is an active CAOHC course director, and served as the Director of Communications of the National Hearing Conservation Association in 2017-19. Outside of audiology (but still inside sound), he is a busy composer, producer, mixing engineer, podcaster, and multi-instrumentalist.



Laurie Wells, Au.D. 3M Personal Safety Division

Laurie Wells, Au.D. is a Doctor of Audiology and Lead Regulatory Affairs Specialist for 3M Personal Safety Division. Laurie works with hearing protection and hearing conservation program regulatory issues, such as developing evidenced based standards, around the globe. Laurie has been a long-time co-presenter for the highly regarded 3M Hearing Loss Prevention Seminars and enjoys presenting and teaching about hearing and preventing noise-induced hearing loss. Before coming to 3M, she worked for Associates In Acoustics, Inc., a consulting firm providing professional audiology review, hearing conservation services and guidance to employers and employees. Highlights of her many professional activities include representing the American Academy of Audiology on the Council for Accreditation in Occupational Hearing Conservation (CAOHC). She is a Past-Chair of CAOHC and a Past-President of the National Hearing Conservation Association.



David Zapala, Ph.D.
Mayo Clinic Florida

Dr. Zapala received his Bachelor of Arts degree in Communication Disorders from California State University in Fullerton and his Master of Science degree in Audiology from Utah State University. He earned a Ph.D. in Hearing Science from the University of Memphis. He

directed audiology services for Methodist Healthcare in Memphis and developed the Methodist / University of Tennessee Hearing and Balance Center. He joined the Mayo Clinic in 2001. He served as the Chair of Audiology at Mayo Clinic in Florida from 2010 – 2020. He is currently a consultant in Audiology and the Department of Otorhinolaryngology/ Head and Neck Surgery and an Associate Professor at the Mayo Clinic College of Medicine & Science. His areas of interest include clinical information management, auditory and vestibular diagnostics, and public health access to hearing healthcare.



Gregory Zarus, A.B.D., M.S.
ATSDR

Greg Zarus is the director of the Agency for Toxic Substances and Disease Registry's (ATSDR's) Office of Innovation and Analytics. Greg's office addresses ATSDR's main namesake programs: Toxic Substance Profiles and Disease Registries and develops innovative

tools to conduct Geospatial Research and Simulation Science.



Xin Zhang, M.P.H., COHC
University of Michigan Dept
Env Health Sci

Xin Zhang is a first year PhD student under Dr. Neitzel's mentorship at the University of Michigan. She holds a master's degree in Industrial Hygiene and is a certified occupational hearing conservationist. Her

areas of interest are occupational exposure (with a focus on noise), and related physical/psychological health outcomes. She is also interested in adopting novel exposure assessment methods in environmental epidemiological studies.

NAME	CONFLICT
Andrade, Camila	No conflict of interest
Bhagavan, Srividya	No conflict of interest
Bhatt, Ishan Sunilkumar	No conflict of interest
Blackwood, Ayden	Employed at Virginia Tech
Blank, Amy	Employed, US Army; NHCA LAT
Borst, Bev	Employed at 3M; ownership interest
Bouserhal, Rachel	NHCA President Elect
Brooks, Chris	Employed at Creare LLC
Brungart, Douglas	No conflict of interest
Buchanan, Kari	No conflict of interest
Carlson, Krystin	No conflict of interest
Casali, John	Business partner in HEAR, LLC
Chukka, Onyinye	No conflict of interest
Clark, Khaya	No conflict of interest
Clavier, Odile	Employed, Board member, Owner at Creare LLC
Cochran, Aaron	Independent Contractor; Grant Through 3M Company
Danielson, Richard	CAOHC CD for Occupational Marketing Inc.
Davies, Hugh	ACGIH TLV (Chemical Substances) Committee Member
DiFrancesco, Jackie	Employed at Honeywell
Esquivel, Carlos	No conflict of interest
Fallon, Eric	Employed at 3M; ownership interest
Finan, Don	No conflict of interest
Fuente, Adrian	No conflict of interest
Gates, Kathy	Past PTF, NHCA Director of Marketing & Public Relations
Giguère, Christian	No conflict of interest
Gupta, Elora	Volunteer advisor, Audition Technology
Halinski, Margaret	No conflict of interest
Hecht, Quintin	No conflict of interest
Hoffman, Howard	Employed at NIH/ NIDCD
Hoverson, Sean	No conflict of interest
Jansen, Conner	Independent Contractor; Grant Through 3M Company
Jeong, Hyeyeon	No conflict of interest
Keady, John	Business partner in HEAR, LLC
Konrad-Martin, Dawn	Co-inventor on two US Patents on methods and technology for ototoxicity monitoring
Krishnamurti, Sridhar	Consultant for LHI (Matrix providers); member of NHCA Program TF
Le Prell, Colleen	Independent Contractor; grant through 3M Company; Board member on NORA Hearing Loss Prevention Cross-Sector Council

NAME	CONFLICT
Lee, Kichol	Business partner in HEAR, LLC
Martin, William	No conflict of interest
Masterson, Elizabeth	Employed at CDC/NIOSH; Director of Communication, NHCA EC
McNeill, Madison	No conflict of interest
Meibos, Alex	Grant through AAA Foundation
Meinke, Deanna	Grant through Creare/UNC
Montoya, Ashley	Employed at Civica; NHCA ED
Moore, Jan	No conflict of interest
Morata, Thais	No conflict of interest
Moschella, Matthew	Paid researcher
Murphy, William	CDC/ NIOSH; HPD Well-Fit License & funded grant for Creare Fit Test system; NHCA Conference Co-Chair
Neitzel, Richard	No conflict of interest
Norris, Jesse	Employed at Edare
Ollivier, Solenn	No conflict of interest
Paige, Taylor	Employed, USAF
Poling, Gayla	Employed at Mayo Clinic; NHCA President
Portnuff, Cory	Member Delegate, NHCA EC
Rennies-Hochmuth, Jan	Employed at Fraunhofer Institute IDMT
Ruiz, Patricia	No conflict of interest
Saint-Gaudens, Hugo	No conflict of interest
Samelli, Alessandra	No conflict of interest
Schulz, Theresa	Employed at DOD HCE; Past President, NHCA
Schurman, Jaclyn	No conflict of interest
Shkempi, Abas	No conflict of interest
Smith, Lauren	No conflict of interest
Sommer, Anne	Employed at Purdue University; NHCA PTF; ASHA Committee of Ambassadors In Audiology Rep 2021-2023
Su, Shibiao	No conflict of interest
Tasko, Stephen	Consulting arrangement with American Suppressor Assoc (ASA); presentation relies on data collected prior
Themann, Christa	Employed at CDC/NIOSH
Tufts, Jennifer	Creare LLC, grant (Independent contractor)
Wartinger, Frank	No conflict of interest
Wells, Laurie	Employed at 3M; ownership interest; Co-Coordinator of NORA Hearing Loss Prevention Cross-Sector
Wu, Helen	No conflict of interest
Zapala, David	No conflict of interest
Zarus, Gregory	No conflict of interest
Zhang, Xin	No conflict of interest



**The National Hearing Conservation Association's 47th Annual Conference,
February 9 - 11, 2023, is approved for 1.55 CEUs from the organizations listed below.
This information is also available online at nhca.civicaconferences.com.**

Instructions for receiving CEUs:

1) Each day, you must sign-in at the beginning of the day and sign-out at the end of the day, by completing the sign-in/sign-out sheet at the NHCA registration desk located in the 3rd Floor Sky Bridge.

2) You must complete the presentation assessments online using the code provided to you at the end of each presentation. Be sure to document the codes so you can submit them in the assessment, as it's required.

You will access the LMS to complete the presentation assessments in order to receive your certificate(s) of attendance. The presentations/sessions will be grouped by day because we are approved to offer partial CEU credit by day. Best practice would be to complete the assessment at the end of each day. Benefit: The LMS system will also automatically save your CEU credits to your profile in the NHCA database and you can pull a transcript whenever you need to. And, you can manually add CEUs you earn from other events/entities to your NHCA profile, so you have all of them in one place for easy access when you need to report them.

To visit the NHCA LMS and complete the conference presentation assessments:

- a) Visit nhc.mclms.net
- b) Click on the login button in the upper right-hand corner.
After you login, you will be returned to the same webpage in the LMS. (Note: You need to login because only conference attendees have access to the conference information on the Learning Management System.) You will login using your NHCA Username and Password typically your email and a password. If you are having trouble logging in, click on "Retrieve Username" or "Reset Password." If you are still having trouble, visit us at the Registration Desk or NHCA Booth or contact the NHCA office at nhcaoffice@hearingconservation.org.

c) There will be three packages listed in the LMS - one for each day of the conference. Click on the day you are completing assessments for. Complete assessments for the sessions you attended then take the "Final Survey For Certificate" to receive your CEUs and your certificate via email. The "Final Survey" will ask you for your AAA and/or ASHA Member ID number. You must provide your Member ID number to receive credit as this will need to be provided to AAA and/or ASHA with the final participant report. If your Member ID is not provided you are not guaranteed to receive credit.

d) Once you complete the assessments and take the "Final Survey" you will receive an email that says "Congratulations, You've earned a Certificate." The email will include your certificate of attendance for that day noting the CEUs you earned.

Day 1 = .60 CEUs

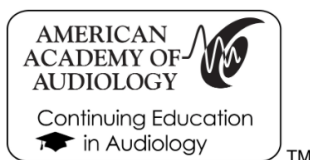
Day 2 = .55 CEUs

Day 3 = .40 CEUs

TOTAL CEUs for conference is 1.55

e) If you are attending the entire conference, you will need to complete the assessments for each day to get the three certificates that total 1.55 Total CEUs for the entire conference.

3) Following the conference you will receive an email with a link to an online survey to evaluate the conference overall and submit ideas for future content. As part of the CEU approval process we are required by AAA and ASHA to conduct a needs assessment survey for planning and development purposes.



American Academy of Audiology

National Hearing Conservation Association is approved by the American Academy of Audiology to offer Academy CEUs for this activity. The program is worth a maximum of 1.55 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.



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.

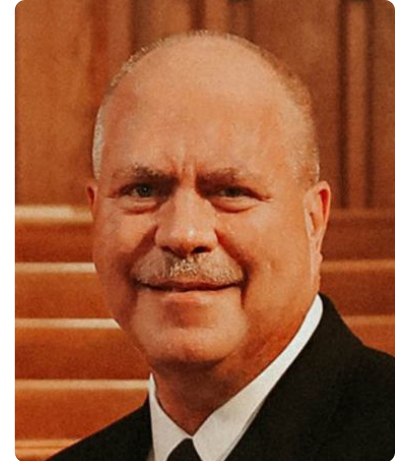
This course is offered for 1.55 ASHA CEUs (Intermediate level, Professional area).

Sneak Peek: NHCA 2024 Annual Conference

The Executive Council is pleased to announce that William (Bill) Murphy, Ph.D. graciously accepted the role of Conference Program Chairperson for NHCA's 2024 Annual Conference.

To no one's surprise, it is NHCA's good fortune that the 2024 Conference is already taking shape to acknowledge and celebrate hearing conservation successes. Individually and collectively, NHCA members have advanced the mission of hearing loss prevention. The NHCA membership's research transforms occupational hearing loss prevention programs so that persons can be assured that they won't have to suffer hearing loss.

Bill has made his professional home with NHCA. He has attended NHCA since 1995 and has shared his research findings and professional expertise in both national and international settings. He has aspired to be a productive member of NHCA. He has served as the guest editor of the NHCA conference proceedings, been involved with developing new standards for hearing protection devices, served on the task force for recreational firearm noise exposure and the task force to develop updated age-adjustment tables for occupational hearing conservation programs. Bill has authored more than one hundred peer-reviewed papers and government publications and given more than 300 conference presentations. He has received several awards from NHCA, the National Institute for Occupational Safety and Health (NIOSH), and the Acoustical Society of America (ASA). Bill served as the team leader for the NIOSH Hearing Loss Prevention Team (2004-2015) and as the coordinator for the NIOSH Hearing Loss Prevention Research Program (2015-2022). He was elected as a Fellow of the ASA and has led the development of standards for noise and bioacoustics. In the 2015 NHCA Annual Conference, Bill received NHCA's prestigious "Outstanding Hearing Conservationist" Award. On that occasion NHCA recognized the scope of his career that has resulted in such a wide-range of positive applications specific to hearing loss prevention.



When asked to comment:

"I value my experience at the NHCA Annual Conference because it provides the opportunity to connect with my colleagues and to meet new people. The best opportunities to learn new things and explore cutting edge ideas occur during the Annual Conference through formal and informal discourse. The camaraderie and friendships you will experience among this assembly of hearing conservationists is truly the trademark of NHCA's signature event.

I look forward to the challenges and responsibilities that come with Chairing the 2024 Program for NHCA's 48th Annual Conference. It is a personal privilege to serve the NHCA in this manner because NHCA has been such a significant part of my experience as a hearing scientist and hearing conservation professional. Final selection of those who will be serving with me on this Program Committee is near completion.

We will be crafting and presenting a finished product worthy of your investment of time and expense - a program focused on a common cause, designed to inspire and offer take-away insights - within a setting that will continue the benefits of renewing friendships and the discovery of new friends."

William J. Murphy,
2024 Conference Program Chair

Save the Date for the
48th NHCA Annual Conference!

