Final Report

NOISE-INDUCED HEARING LOSS
In Children At Work & Play

Covington, Kentucky
October 19 & 20, 2006

Conference Grant –Report

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Prevention of Noise-Induced Hearing Loss in Children and Adolescents

Principal Investigator:
William Hal Martin, Ph.D.
Department of Otolaryngology, Oregon Hearing Research Center - NRC-04
Oregon Health & Science University, 3181 SW Sam Jackson Park Road
Portland, OR 97239
martinw@ohsu.edu

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Noise-Induced Hearing Loss: in children at work and at play
October 19 & 20, 2006
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Co-Principal Investigator:
Deanna Meinke, Ph.D.
University of Northern Colorado

Project Directors:
William Hal Martin & Deanna Meinke

Project Coordinator
Linda C. Howarth

Sponsors:
National Institute of Occupational Safety and Health
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Marion Downs Hearing Center

Contributors:
3M
AEARO/Peltor
American Academy of Audiology
Acoustical Society of America
American Speech-Language-Hearing Association
Deafness Research Foundation
Etymotic Research, Inc.
International Journal of Audiology
Oregon Health & Science University – Tinnitus Clinic

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Abbreviations

NIHL – Noise-Induced Hearing Loss

NIDCD - National Institute on Deafness and Communication Disorders

NIOSH - National Institute of Occupational Safety & Health

Abstract

The October 19-20, 2006 conference titled Noise-Induced Hearing Loss in Children at Work and at Play brought together a diverse international group of basic and applied science researchers with expertise related to the prevention of noise-induced hearing loss (NIHL) in children and adolescents. The purpose of the meeting was to explore and discuss the most recent theoretical and experimental work in the relevant fields in an effort to expand the practical applications of the knowledge shared. The conference targeted the issue of NIHL in children and the millions of youth who begin their employment experiences as early as age 10-12 years, often in hazardous sound environments such as construction, agriculture, entertainment, and landscaping/grounds work while also participating in recreational and school activities that increase their risk and incidence of noise-induced hearing loss. Presentations were diverse and encompassed the areas of auditory development, auditory physiology, auditory and extra-auditory effects of hazardous noise, noise exposure sources and assessment, health communication strategies as well as intervention efforts including hearing protection, educational outreach efforts, and worker training targeting youth. The National Institute of Occupational Safety & Health's (NIOSH's) mission to provide national and world leadership to prevent work-related illnesses and injuries coupled with the National Institute on Deafness and Communication Disorders (NIDCD) mission to acquire new knowledge to help prevent, detect, diagnose and treat disease and disability related to hearing were both supported by this conference. The event included basic and applied science research, the exchange of ideas for effective intervention, and health communication strategies unique to children and young adults. The long term goal was to consider the implications, applications, and key scientific information critical to public health policy decision making, public information dissemination, and future research guidance for the prevention of noise-induced hearing loss in youth.

Public health policy relevance: NIH estimates that one-third of hearing losses are due to NIHL, most of which occur in the workplace. Many children are noise-exposed at a young age and teens are often employed in hazardous noise environments without proper training or awareness of the risk. An unknown but significant number of children are likely to have NIHL due to non-occupational exposures. This conference contributed to the achievement of Healthy People 2010 Goals: Section 28-17: Reduce noise-induced hearing loss in children and adolescents aged 17 years and under" and Section 28-16: Increase the use of appropriate ear protection devices, equipment, and practices.

Introduction

The conference titled *Noise-Induced Hearing Loss in Children: at work and at play* was held at the Embassy Suites in Covington, Kentucky on October 19 and 20, 2006. This conference was a unique opportunity to exchange knowledge and experience among a diverse group of basic and applied science researchers, health and safety professionals, educators and health communication specialists with expertise related to the prevention of NIHL in children and adolescents. Until this conference there was no forum that offered an integrated venue to explore the following issues and topics:

1. Basic Science: Identify priorities and methods for animal studies addressing the developmental nature and potential for NIHL. What is the developmental nature of NIHL in the young? Are there critical periods of increased risk or susceptibilities? What are the research priorities and methods for animal studies that would further address the developmental nature of NIHL in the young?
2. Applied Science: Update relevant epidemiology and identify priorities and methods for human studies addressing NIHL in children and adolescents, in terms of exposure assessment, damage-risk criteria, hearing protection and training. What are the auditory risks to children and adolescents related to hazardous noise exposure? What are the priorities and methods for human studies that address the risk for NIHL in youth? What auditory damage risk criterion is most applicable when considering prevention of NIHL in children & adolescents throughout their lifespan? How utilized and effective are hearing protectors for youth? What health communication strategies are appropriate for the prevention of NIHL? What educational and intervention strategies are available and most effective for this special population?
3. Research to Practice (Translational Medicine) and Public Health Policy Issues: Identify best practices for monitoring noise exposures and auditory function in youth. What are the relationships between hearing loss prevention practices and behaviors learned as children to healthy behaviors exhibited as employees? How can public health promotion and occupational health protection collaborate and work synergistically to promote a healthy hearing productive workforce in the future?

Organizing Committee

The conference planning committee was composed of the following:

William Hal Martin, Ph.D., Professor of Otolaryngology-Head & Neck Surgery, Professor of Public Health & Prevention Medicine, Oregon Hearing Research Center, Oregon Health & Science University

Deanna K. Meinke, Ph.D., Assistant Professor, Audiology and Speech-Language Sciences
University of Northern Colorado

Patricia Blessing, Communications Director, Acting Chief, Health Communication and Public Liaison
National Institute on Deafness and Other Communication Disorders

Robert L. Folmer, Ph.D., Associate Professor of Otolaryngology-Head & Neck Surgery, Oregon Health & Science University Tinnitus Clinic

Pamela S. Graydon, Electronics Engineer, Division of Applied Research and Technology
Hearing Loss Prevention Team, National Institute for Occupational Safety & Health (NIOSH)
Centers for Disease Control and Prevention (CDC)

Susan E. Griest, M.P.H., Staff Scientist, Oregon Hearing Research Center, Oregon Health & Science University

Howard J. Hoffman M.A., Program Director for Epidemiology and Biostatistics, Translational Research Branch, Division of Scientific Programs, National Institute on Deafness and Other Communication Disorders (NIDCD)

Linda C. Howarth, Research Associate, Oregon Hearing Research Center, Oregon Health & Science University

Carol M. Stephenson, Ph.D., Chief, Training and Evaluation Branch, Education and Information Division
National Institute for Occupational Safety & Health (NIOSH), Centers for Disease Control and Prevention (CDC)

The inter-agency collaboration in the planning committee significantly enhanced our ability to establish a diverse program with wide-based support from a variety of professional organizations. We are sincerely indebted to their hard work, creative energies, and commitment to this conference.

Overview

Attendance totaled 115 and represented five countries: USA, Canada, Sweden, New Zealand, and Argentina. The meeting brought together an interdisciplinary group of researcher scientists, audiologists, government agency and institute representatives, industrial hygienists, college and high school students, educational audiologists, PhD candidates, and hearing loss prevention advocates. See the attendee list is available in Appendix 1.

Thirty-three podium presentations were given and 18 posters or interactive tables displayed during the two-day conference. There were eight presentations with students as primary or co-author. Approximately 15 graduate students attended the conference. Appendix 2 is the conference program as a supplement for the National Hearing Conservation Association newsletter. It includes a list of all the presenters, their biographies, and the topics they discussed.

On Thursday, October 19 continental breakfast refreshments were offered and the registration desk opened at 7:00. Attendees each received a canvas bag containing a three-ringed binder for the program and hand-outs, and donated gifts such as ear plugs and ear muffs materials. At 8:00 AM the conference convened and 15 minutes talks began. There were 25-minute breaks halfway through the morning and the afternoon and an hour and half lunch break, with a buffet lunch served outside the meeting room, all these breaks allowed time for attendees to network. They also used this time to visit the posters and interactive displays that were assembled around the perimeter of the main meeting room. Talks continued all afternoon until 4:50PM when the meeting was adjourned for the day. Buses picked attendees up outside the hotel at 6:00 to transport them to a special off-site dinner. On Friday, October 20 the general schedule was a repeat of the day before without the special dinner to end the event.

One of the exciting additions to the meeting was a poster and discussion presented by a group of high school students formerly from Montague Middle School in Montague, Michigan. This team of seven students presented their four-panel poster display, titled, "Can You Hearing Me Now?" They also presented their combined report on the problem of hearing loss in teens, a public policy solution they advocate, and their action plan to reach their public policy goals. Their project was part of the federal "Project Citizen" program in which students study public policy issues and seek to make a difference through volunteerism and advocacy. Their presentation was well-received. They were asked several thoughtful questions by the moderator and then were asked to pose questions to the audience. These questions and the answers given by audience members created a wonderful dynamic exchange of ideas. The exchange was highly enlightening, energizing, and surprising for all.

Though not a specific target for the initial meeting, the response from our foreign colleagues was welcomed and broadened the exchanges.

Continuing education units were offered for the American Academy of Audiology and the American-Speech-Language Hearing Association.

There were three invited speakers:
Edwin W Rubel, Ph.D., Virginia Merrill Bloedel Hearing Research Center, University of Washington, Seattle.

Sharon Kujawa, Ph.D., Harvard Medical School, Massachusetts Eye and Ear Infirmary, Boston.

Mario R. Serra, Ph.D. and Esther C. Blassoni, Ph.D., Centro de Investigación y Transferencia en Acústica, National Technical University, Córdoba, Argentina.

Speaker evaluation feedback is presented in Appendix 3.

Presentations/Affiliations/Topics *(see Appendix 2 for abstracts)*

Elliott Berger, M.S., INCE Board Certified, E·A·R/Aearo Technologies
The Essential Auditory Experience

Edwin W Rubel, Ph.D. (Invited Speaker), University of Washington
Cellular Studies of Critical Periods of Inner Ear and Central Auditory System Vulnerability

Floyd Thurston, M.D., Indiana University.
Is External Noise a Risk to Hearing Development in the Fetus?

Deanna K. Meinke, Ph.D., University of Northern Colorado
Noise Exposure Among Children and Young Adults: What Do We Know, and What Do We Need to Find Out?

Samuel Bittel B.S., Nova Southeastern University (Student)
Investigation of Toy Noise Exposure in Children

Melisa K. Witherspoon, Medical University of Ohio.
Noise Exposure Assessment of Three Adolescents Living on Farms in Northwest Ohio

John Eichwald, M.A., FAAA, National Center on Birth Defects and Developmental Disabilities, CDC
How NIHL in Children May Align With CDC Health Protection Goals

Sharon Kujawa, Ph.D. (Invited Speaker), Massachusetts Eye and Ear Infirmary
Noise Exposure to Young Ears: When Things Go From Bad to Worse.

Cory D. F. Portnuff, B.S., University of Colorado at Boulder (Student)
Output Levels of Portable Digital Music Players.

Brian J. Fligor, Sc.D., CCC-A, Children's Hospital Boston. and Terri Ives, Sc.D., Pennsylvania Ear Institute.
Does Earphone Type Affect Risk for Recreational Noise-Induced Hearing Loss?

Roland Eavey, M.D., Massachusetts Eye and Ear Infirmary.
MTV Awareness Survey and Media.

Judith Sobel, Ph.D., Portland State University
Persuading Adolescents to Protect Their Hearing: What Can We Learn From Hearing Communication Research?

Stephen E. Widén, Ph.D., University West, Sweden
Noise and Music: A Matter of Risk Perception?

Soly Erlandsson, Ph.D., University West, Sweden
Attitudes Toward Noise and Risk Behavior in Children and Young Adults.

William Hal Martin, Ph.D. Oregon Hearing Research Center, Oregon Health & Science University
Dangerous Decibels®: Partnerships for NIHL Prevention in Children.

Elliott Berger, M.S. INCE Board Certified, E·A·R/Aearo Technologies
Children and Hearing Protection: What is Available and is it Used?

Ted Madison, M.S., 3M Company
Hearing Protection Considerations for Children & Adolescents.

Lee Hager, Sonomax Hearing Healthcare, Inc.,
Working Youth, Noise Exposure and Hearing Loss.

William Clark, Ph.D., Washington University School of Medicine.
Historical Trends in Hearing of Young People.

Howard J. Hoffman, NIDCD/NIH and National Health and Nutrition Examination Survey.
Declining Trends in Noise-Induced Hearing Loss (NIHL) in Children Based on the U.S. Health Examination Survey.

William Hal Martin, Ph.D., Oregon Hearing Research Center, Oregon Health & Science University
Hearing Health Research in a Public Setting.

Deanna K. Meinke, Ph.D., University of Northern Colorado.
Comparison of Audiometric Screening Criteria for Early Identification of Noise-Induced Hearing Loss in Adolescents.

Cheryl DeConde Johnson, Ed.D., Audiologist, Colorado
Noise-Induced Hearing Loss: Legal Implications for Schools.

Sargunam Sivaraj, Team Leader, Wellington Hospital, New Zealand (Student)
Are We Doing Enough to Prevent Noise/Music Induced Hearing Loss in Children in New Zealand?

Mario R. Serra, Ph.D. and Esther C. Blassoni, Ph.D. (Invited Speakers), Centro de Investigación y Transferencia en Acústica. National Technical University, Córdoba, Argentina.
Hearing Impairment among Adolescents.

Kris Chesky, Ph.D., Texas Center of Music & Medicine.
Hearing Conservation in College Music Programs.

Gael Hannan, The Hearing Foundation of Canada.
Sound Sense: Save Your Hearing for the Music!

Greg Flamme, Ph.D., Western Michigan University
Effectiveness of School-Based Hearing Loss Prevention Programs in a Rural Area.

Patricia Blessing, NIDCD, Health Communication and Public Liaison
Review and Future Recommendations of NIDCD's Public Education Efforts to Prevent NIHL in Children

Susan E. Griest, M.P.H., Oregon Hearing Research Center, Oregon Health and Science University
Program Evaluation: Results of Noise-Induced Hearing Loss and Tinnitus Prevention Interventions.

Joseph Cerquone, CAE, American Speech-Language-Hearing Association
Using the Media as an Education Tool.

William Hal. Martin, Ph.D., Oregon Hearing Research Center, Oregon Health and Science University
Effectiveness of Web-Based Edu-Tainment for Hearing Loss Prevention in Children.

Robert Folmer, Ph.D., Oregon Hearing Research Center, Oregon Health and Science University
Resources to Facilitate Classroom Instruction of Hearing Loss Prevention.

Poster Presentations *(see Appendix 2 for abstracts)*

Margareta Bohlin, M.Sc., University West, Sweden (Student)
Adolescent Risk Taking - Leisure Time Noise and Risk Behaviour

David K. Brown, Ph.D.
Walkometer AKA The Big Purple Head

Susan E. Griest, M.P.H.,
Racial and Ethnic Differences in Outcomes of Four Hearing Loss Prevention Interventions in Elementary Students.

Doryce B. Iverson, Au.D., Central Michigan University (Student)
A Hearing Conservation Website for Parents.

Annaliisa Koski and Judith Sobel, Ph.D., Portland State University
Beliefs about Hearing Loss and Hearing Protection in a Small Public High School in Oregon.

Patricia Niquette, M.A., Etymotic Research
Development of a High-Fidelity Earplug for Children

Sargunam Sivaraj, Wellington Hospital, New Zealand (Student)
1. *Personal Stereo and Hearing Loss.*
2. *Prevention of Hearing Loss: Why is it Not a Health Priority when it is Feasible, Beneficial, and Justifiable?*
3. *Guidelines on Prevention of Preventable Hearing Loss.*
4. *Noise...Noise...Noise...Everywhere: What Do We Do About It?*

Carol Stephenson, Ph.D. – National Institute for Occupational Safety and Health
Curriculum for High Schools: Hearing Loss Prevention Module.

Wendy Steuerwald, M.S., Ohio Children's Medical Center, Cincinnati
Hear Today, Hear Tomorrow.

Julee Sylvester, Sight and Hearing Association
Noisy Toys: Annoying or Harmful?

David Vermeulen & 9th Grade Students, Montaque High School, Montaque, Michigan
Can You Hear Me Now? Personal Music Players and Hearing Loss

William Hal Martin Ph.D. Oregon Hearing Research Center, Oregon Health & Science University
Dangerous Decibels® Interactives and Educational Materials Available for YOU!

Mona Thomas, M.S.W., American Speech and Hearing Association
Using the Media as an Education Tool.

Gael Hannan, The Hearing Foundation of Canada
Sound Sense: Save Your Hearing for the Music!

Genevieve Y. Martin, Boston University (Student) and William Hal Martin, Oregon Health & Science University
Jolene: How Loud is Your Music?

Highlights/Significant Findings

Specific Aim 1: To provide a friendly cross-disciplinary forum to exchange scientific knowledge, critiques and practical experience. The most important result of this conference was the gathering itself. It was the first time individuals and groups from around the world, for the most part working in isolation, could come together to share ideas, research results, and experiences. It was a chance to find out what others were doing in the field of noise-induced hearing loss prevention. It was a tremendous opportunity to develop partnerships to enhance future research and intervention programs targeting noise-exposed youth in a variety of settings. In fact, several researchers were already brainstorming future studies during the networking times. Researchers from Argentina, Canada, New Zealand, Sweden and the U.S. contributed to the podium presentations. The conference was specifically designed to encourage participant interactions on several levels; formal podium presentations, interactive demonstration tables and posters, networking luncheons, panel discussions and an evening social event. The conference also provided a venue for representatives from an assortment of public and private entities to meet and discuss potential future efforts as they related to public health, education and environmental guideline(s) development. Representatives from the following agencies either presented at the conference or attended the event;

- National Institute of Occupational Safety and Health (NIOSH)
- National Institute of Deafness and Other Communication Disorders (NIDCD)
- Environmental Protection Agency (EPA)
- Centers for Disease Control and Prevention: Division of School & Adolescent Health
- Noise Pollution Clearinghouse
- The Hearing Foundation of Canada
- American Speech-Language-Hearing Association
- National Institutes of Health
- Stamford Connecticut Board of Education

Perhaps one of the most practical and interactive components of the program was a lively panel discussion between the conference attendees and a group of high school and undergraduate college students related to their perceptions, experiences and concerns about noise-induced hearing loss.

Specific Aim 2: To engage new researchers and students. The conference was successful in engaging new researchers and graduate students in related disciplines. Certainly, the future of any research agenda is dependent upon the growth of new investigators. In addition the conference was innovative in terms of involving younger scientists and civic activists from the high school and undergraduate levels. The following students were first authors on these presentations;

- Investigation of toy noise exposure in children. Samuel Bittel, Au.D. (Student) Nova Southeastern University.
- Output levels of portable digital music players. Cory Portnuff, Ph.D. (Student) University of Colorado.
- Are we doing enough to prevent noise/music induced hearing loss in children in New Zealan? Sargunam Sivaraj, Ph.D. (Student), Wellington Hospital, New Zealand. In addition to the podium presentation, this participant also provided three poster presentations.
- Risk talking and leisure time noise among adolescents, Margareta Bohlin, M.Sc. (Student) University West, Sweden
- A hearing conservation website for parents. Doryce Iverson, Au.D. (Student) Central Michigan University.
- Beliefs about hearing loss and hearing protection in a small public high school in Oregon. Annaliisa Koski, Riverdale High School, Portland, Oregon.
- Can you hear me now? Personal music players and hearing loss. David Vermeulen and seven students formerly from NBC Middle School, Montague, Michigan.
- Jolene: How loud is your music? Genevieve Martin, (Student) Boston University, Boston, Massachusetts.

In addition, students were co-authors on four other presentations. Lastly, the conference had approximately 20 graduate students as attendees at the conference, including some actively engaged in thesis or dissertation work related to the prevention of noise-induced hearing loss in youth.

Specific Aim 3: To produce a series of scientific presentations: The presentations from the conference are available on the NHCA website for public viewing at www.hearingconservation.org/conf_childrenconf.html. In addition, two journal supplements will be forthcoming in late 2007/early 2008 from the American Journal of Audiology and Seminars in Hearing. These publications will publish a series of peer-reviewed papers from the conference. Initial estimates are for approximately 24 papers.

Specific Aim 4: To disseminate, basic, applied and translational research related to the prevention of NIHL in youth: The conference program was well balanced in terms of research types and areas. Two invited basic science presentations were especially thought provoking in terms of early noise exposure influences on auditory development (Edwin Rubel, Ph.D) and enhancement of age-related hearing loss (Sharon Kujawa, Ph.D.) in animal models. The program committee focused on balancing the program with at least two or more presentations from all facets of hearing loss prevention. These presentations included the characterization of hazardous noise exposures, music-induced hearing loss, health communication influences and strategies, hearing protection devices, audiometric monitoring, epidemiology trends, regulatory issues, geographical/cultural/racial influences and intervention program strategies and outcomes. Cutting-edge research was reported at the conference that had not been previously disseminated.

Specific Aim 5: To identify research gaps and research needs. Almost all presentations highlighted some challenges, issues, and gaps in the research related to the prevention of noise-induced hearing loss in youth. Perhaps, most evident was the lack of longitudinal research studies and research designed to address youth specific damage-risk assessments and sustained intervention program outcomes. Also discussed was the lack of policies, guidelines, and regulations related to both work and school environments that are often hazardous to youth in terms of noise levels.

Specific Aim 6: To provide a public scientific outreach opportunity. The conference itself provided a variety of opportunities for linking public scientific outreach. The grant PI's and colleagues were actively conducting training workshops or exhibits for multiple professional disciplines (audiologists, speech-language pathologists,

school nurses, children's museum professionals and educators) in several states; California, Colorado, Florida, Massachusetts, Minnesota, Oregon, Pennsylvania, South Carolina, Washington D.C. and Washington during the planning phase of this meeting. The conference interactive demonstration tables also provided a forum for attendees to become familiar with outreach resources such as the NIOSH OSH curriculum, "Dangerous Decibels®", "Listen to Your Buds", "Wise Ears" and "Sound Sense" programs. A new educator training kit was also unveiled to provide the hands-on tools and resources needed for successful classroom/outreach presentation to children and adolescents. The conference PI's currently have future workshops scheduled in Ohio, Nevada, Colorado, Maine, Pennsylvania, Florida, and Auckland, New Zealand in 2007. Lastly, the conference planning committee initiated a series of press releases and lay papers that the media could access on the NHCA website. This resulted in numerous media articles discussing the risk of noise-induced hearing loss for youth (including the front page of the Rocky Mountain News in Denver, CO).

Conference organizers planned to have a free public outreach workshop for local educators. The workshop lead by Dangerous Decibels staff is titled Have Fun Fighting Dangerous Decibels: Prevention of Noise-Induced Hearing Loss and Tinnitus. The workshop was canceled due to a lack of local response to advertising. Workshop organizers worked for many months attempting to gather interest through multiple emails, faxes, mailing, and phone calls to the local and state school districts offices and homeschooling organizations, local schools – public and private - in Kentucky and Ohio, and to state and national organizations such as School Nurse Associations, Educational Audiologist Associations, and the Ohio and Kentucky Federation of Teachers. Future workshops of this kind may do much better in attracting participants if they target National meetings for groups such as the ones mentioned above.

Translation of Findings

Application to the Workplace and Public Health: a summary of key conclusions from multiple presenters

1. Education is the key to the prevention of noise-induced hearing loss. Educational programs are best designed to take into account health communication strategies and adapted for cultural/ethnicity/racial and socioeconomic influences. Outcome measures of program effectiveness should address changes in knowledge, attitudes and ultimately impact behavior.


2. Widespread dissemination of intervention programs targeting youth is lacking. There is a critical need for sustained awareness programs for employers, schools, youth groups, public health agencies, healthcare providers and recreational venues with youth participation.


3. Partnerships are critical for effective intervention programs for NIHL. Innovative programs/initiatives can be developed through public and private collaborations. Technology and unique research venues can contribute to the scientific knowledge base.

4. There is evidence of noise-induced hearing loss in youth and the risk of hazardous noise exposures from work, school and recreational activities. The number of working youth is increasing. Estimates of 1.6 FTE youth workers may yield in the range of 500 cases of hearing impairment in the youth workforce annually (Hager, 2006). This does not include any estimates from "underground" employment arrangements. The seasonal nature of youth employment may further complicate the determination of actual numbers of noise-exposed youth in the workplace.

5. The actual risk of NIHL in youth has not been adequately ascertained due to the lack of comprehensive longitudinal studies incorporating, noise exposure assessment including level and duration of exposures, audiometric monitoring, hearing protection usage and detailed activity analysis for children of all ages. Current damage-risk criteria based on adult workplace work habits may not be appropriate for children.

6. Employers can expect to have young workers entering the workforce with existing NIHL.

7. It does not appear that there is an "increase" in the prevalence of NIHL in children since 1966 – 2004 based on NHANES data analysis. However, the existence of NIHL in youth necessitates hearing loss prevention and monitoring programs.

8. There is evidence of hazardous noise exposure and increased risk of NIHL for children involved in farm/agricultural activities. Specific school-based intervention programs are being implemented/investigated targeting farm youth and families.

Noise Exposure Limits

Noise Level dB A	76	79	82	85	88	91	94	97	100	103	106	109	112	115	118
minutes 1															
2															
4															
8															
15															
30															
Noise Level dB A	76	79	82	85	88	91	94	97	100	103	106	109	112	115	118
hours 1															
2															
4															
8															
16															
Color Codes	No Hearing Protection Needed				Use Earplugs or Earmuffs						DANGER! Reduce Listening Time				

Example: Bench Grinder = 94 dB A, maximum unprotected exposure = 30 minutes; maximum exposure with earplugs or earmuffs = 4 hours.

Rural Noise Levels

dB A	Source	dB A	Source
150 +	Rifle or shotgun	93	Grain auger
115	Chain saw while cutting	92	Tractor, no cab
103	Pig feeding	86	4-wheeler or snowmobile
100	Weed-whacker	76	Tractor interior, quiet cab
99	Bench grinder	76	Car interior noise, no music
95	Compressed air	65	Conversational speech

Category	Explanation
No Hearing Protection Needed	It is safe to listen to these sound levels for this amount of time.
Use Earplugs or Earmuffs	To safely listen, earplugs or earmuffs should be used. Otherwise, your hearing may be damaged.
DANGER! Reduce Listening Time	Earplugs and earmuffs may not protect you against these sounds for this amount of time. You should reduce the listening time.

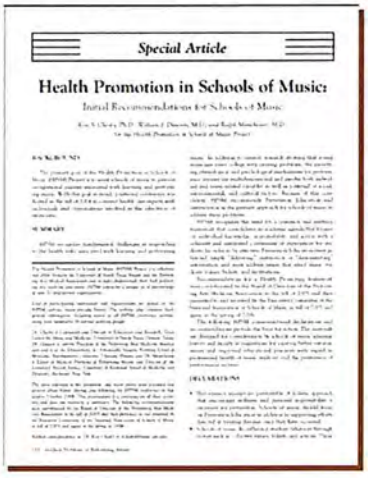
9. There appears to be evidence from animal studies that there are critical periods for auditory development with varying susceptibility to injury. There also appears to be evidence for long-term auditory effects from hazardous noise exposures at young ages. These studies have implications for pregnant workers, neonates, infants and young children as well as the use of hearing protection at young ages. These issues need further investigation specific to hazardous noise exposures.

10. Schools present a unique environment whereby children, teachers and employees may be at risk of NIHL. Current regulatory policy does not adequately protect these workers/students.

11. Traditional hearing screening programs are not adequate for the early identification or monitoring of NIHL in youth.

12. Regulatory policies appear inadequate for protecting children from hazardous noise exposure from toys, school/work activities and music.

13. Unique approaches for mandating hearing loss prevention may be pursued by incorporating it into the accreditation of teacher/music training programs at the university level.



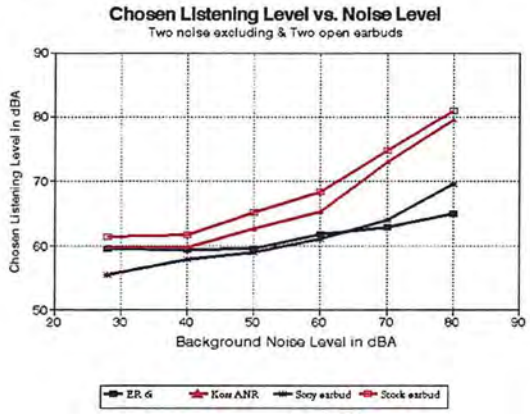
Special Article

Health Promotion in Schools of Music:

Initial Recommendations for Schools of Music

14. Federal agencies are responding to the call for increased awareness and prevention activities related to the prevention of NIHL in children and/or the promotion of healthy hearing. These include NIOSH, NIDCD, EPA and CDC.

15. Listeners are potentially at risk of NIHL from personal digital music players.



% of Volume Control	Maximum listening time per day			
	Earbud	Isolator	Supra-Aural	iPod, stock earphones
10-50%	No limit	No limit	No limit	No limit
60%	No limit	14 hours	No limit	18 hours
70%	6 hours	3.4 hours	20 hours	4.6 hours
80%	1.5 hours	50 minutes	4.9 hours	1.2 hours
90%	22 minutes	12 minutes	1.2 hours	18 minutes
100%	5 minutes	3 minutes	18 minutes	5 minutes

Table 2. Average time to 50% noise dose (8-hour TWA) using NIOSH damage-risk criteria. "Earbud" includes stock earphones and iPod In-ear earphones. "Isolator" includes Etymotic ER6i earphones and Shure E4c earphones. "Supra-Aural" includes Koss headphones that rest on top of the ear.

16. International collaborations are beneficial for investigating and understanding the factors impacting the development and prevention of NIHL.

17. Hearing protectors for children primarily depend upon adapting/choosing adult products for children. There are a limited number of devices designed specifically for child ears/heads. There may not be adequate market demand to drive manufacturer development of products at this time.

18. The attenuation and effectiveness of various devices for children has not been investigated. There are unique issues related to the fit and use of hearing protection by children including, ear canal/head size, manual dexterity, swallowing risk, comfort and retention.

19. The public media and the internet may be leveraged for conveying public health messages, survey research and educational resources.

20. Youth should be engaged in the discussions, investigations and development of resources/programs for the prevention of NIHL.

21. Engaging approaches can be utilized to enhance awareness and feedback to youth regarding the risk of NIHL from digital music devices such as the "Walkometer" and "Jolene".

Outcomes/Relevance/Impact -

1. Identification of future research needs and direction for public and private research agendas.

2. Inclusion of hearing loss prevention on broader publicly driven youth health agendas. The CDC, EPA, NIOSH and NIH are presently exploring their direction and opportunities for promoting healthy hearing in youth as a direct result of the conference.

3. Interdisciplinary collaboration on future research and public/employer hearing loss prevention programs targeting youth.

4. Greater public and employer awareness of the need for hearing loss prevention programs targeting young workers.

5. Broader dissemination of existing devices, materials, methods and resources available for hearing loss prevention outreach efforts.

6. Enhanced hearing loss prevention program design and outcome potential through a greater awareness of health communication influences and multi-cultural/ethnicity considerations.

7. Awareness of the need to integrate health promotion and hearing loss prevention in the work and school settings for children and adolescents.

8. Recognition of the need for a greater consensus related to the consistency and content of public and educational outreach messages.

9. High school, undergraduate and graduate students were actively engaged in terms of initiating scientific/civic inquiry and presenting their findings.

Networking Opportunities

On Thursday evening a special off-site dinner was held at the beautiful Dress Pavilion overlooking the Ohio River. A local band accompanied dinner and later taught the group to square dance. There was plenty of time to talk, network, and relax together.




In addition to the Thursday evening event, there was time set aside during the conference for long lunches and visits to the poster and interactive display tables. These times were important for development of partnerships, for sharing information in an informal way, and for networking.




Publications

Thirteen papers will be published in an early 2008 edition of Seminars in Hearing. At least that many manuscripts were submitted to American Journal of Audiology for a special supplement to be published in June 2007.

The conference website is included on the NHCA site and features the program, biographies and abstracts. Many of the presentations from the conference are available for viewing on the web site (Lay Papers - Press Room) http://www.hearingconservation.org/conf_childrenconf.html.

Inclusion of Gender and Minority

Attendees were made up of slightly more women then men 60/50

Inclusion of Children

A group of seven high school students attended the conference and presented the results of their study. They presented the material both as a panel discussion and as an interactive table/poster. Their attendance we welcomed and in fact added significantly to the dynamics and interactive nature of the conference.

Principal Investigator/Program Director (Last, First, Middle): Martin, William Hal

Inclusion Enrollment Report

This report format should NOT be used for data collection from study participants.

Study Title: Prevention of Noise-Induced Hearing Loss in Children and Adolescents

Total Enrollment: 115 **Protocol Number:**

Grant Number: R13 – OH00856-01

PART A. TOTAL ENROLLMENT REPORT: Number of Subjects Enrolled to Date (Cumulative) by Ethnicity and Race

Ethnic Category	Sex/Gender			
	Females	Males	Unknown or Not Reported	Total
Hispanic or Latino				0 **
Not Hispanic or Latino				
Unknown (individuals not reporting ethnicity)	62	50	0	112
Ethnic Category: Total of All Subjects*				*
Racial Categories				
American Indian/Alaska Native				
Asian				
Native Hawaiian or Other Pacific Islander				
Black or African American				
White				
More Than One Race				
Unknown or Not Reported	62	50	0	112
Racial Categories: Total of All Subjects*	62	50	0	112 *

PART B. HISPANIC ENROLLMENT REPORT: Number of Hispanics or Latinos Enrolled to Date (Cumulative)

Racial Categories	Females	Males	Unknown or Not Reported	Total
American Indian or Alaska Native				
Asian				
Native Hawaiian or Other Pacific Islander				
Black or African American				
White				
More Than One Race				
Unknown or Not Reported				
Racial Categories: Total of Hispanics or Latinos**	0	0	0	0 **

* These totals must agree.
** These totals must agree.

NIHL in Children Conference

Grant Number: 1 R13 – OH00856-01

Revenue - Actual as of 11/20/06		
Registration 13ppl x $100	$	1,300.00
Registration 68ppl x $195	$	13,260.00
On-Site regis. 3ppl x $195	$	585.00
ASHA CEUs 34ppl x $3	$	102.00
On line Transaction fee	$	213.00
Thurs night event	$	75.00
Marion Downs	$	5,000.00
NIDCD	$	5,000.00
NHCA	$	5,000.00
NIOSH Grant Balance	$	30,000.00
TOTAL INCOME	**$**	**60,535.00**

Expenses - Actual as of 02/10/2007 FINAL			Not on NIH grant
Hotel Attrition	$	5,935.00	
Meeting Space	$	1,955.20	
Hotel A/V, Internet, Easels	$	693.77	
AVW TELAV Audio/Visual Support	$	9,549.60	
American Institute of Physics: Media Support	$	2,720.00	
COMM-EUREKALERT Press Release	$	125.00	
Spkr reimb transport, hotel, f&b, mileage OHSU	$	8,690.84	
Printing	$	168.70	
Copy /Printing Kinkos	$	2,204.19	
Supplies	$	389.32	
Supplies - OHSU Reimburse	$	1,634.95	
Signage	$	477.80	
Shipping	$	209.36	
Shipping FedEx	$	1,331.71	
Postage	$	3.00	
ASHA Continuing Ed Fee	$	225.00	
Staff Time - ED @ $55/hr	$	522.50	
Staff Time - AA @ $35/hr	$	3,706.82	
Staff Travel	$	913.69	
MemberClicks (online fees)	$	27.91	
E-Corporate Gifts (spkrs)	$	944.25	
PS Trophies & Awards	$	181.14	
Deanna Meinke reimburse - printing	$	863.22	
Deanna Meinke reimburse - printing	$	337.98	
Conference calls	$	329.76	
Conference Proceedings	$	-	
Typesetting	$	-	
Hotel Food & Beverage Only	$	8,510.79	x
Drees Pavilion Room Charge	$	600.00	x
Bus Transportation	$	555.00	x
F&B at Drees Pavilion	$	5,868.50	x
Birthday Cake	$	110.00	x
Rabbit Hash String Band	$	750.00	x
TOTAL EXPENSES	**$**	**60,535.00**	

Appendices

Appendix 1 – List of Attendees

Appendix 2 – Spectrum Supplement – Program

Appendix 3 – Speaker Evaluations

Appendix 1

List of Attendees

NOISE-INDUCED HEARING LOSS
In Children At Work & Play

October 19-20, 2006
Cincinnati, OH

ATTENDEE LIST

DAVID AHLSTROM
NBC Middle School Student
Montague, MI

TERRY ALSUM, M.A., CCC-A
Calvin College
1700 S. Norwalk SE
Grand Rapids, MI 49508
Phone: 616.452.8878
tda3@calvin.edu

ROBERT ALTKORN
Intertek RAM
2107 Swift Dr., Ste. 200
Oak Brook, IL 60523
Phone: 630.623.8141
bob.altkorn@ram.com

ANN ANDERSON, Au.D.
Mayo Clinic
200 First St. SW
Rochester, MN 55905
Phone: 507.538.2615
anderson.ann2@mayo.edu

KIMBERLY ANTHONY, M.A.
Ohio Department of Health
246 N High St., PO Box 118
Columbus, OH 43216-0118
kimberly.anthony@odh.ohio.gov

ABIGAIL ASHLEY
University of Louisville
830 Packard Ave.
Louisville, KY 40217
Phone: 502.644.3744
abigail_ashley@hotmail.com
Guest: Tom Powers

KATIE AUSTIN
University of Louisville
1844 Trevilian Way
Louisville, KY 40205
Phone: 859.619.6520
katie.austin@louisville.edu

CHARLOTTE BALL
NIDCD
1 Communication Ave.
Bethesda, MD 20892-3456
Phone: 800.241.1044
Fax: 301.770.8977
cball@shs.net

ELLIOTT BERGER, M.S., INCE Bd Cert
E-A-R/Aearo Technologies
7911 Zionsville Rd.
Indianapolis, IN 46268-1657
Phone: 317.692.3031
Fax: 317.692.3116
eberger@compuserve.com

ESTER BIASSONI, Ph.D.
CINTRA-Universidad Tech Nacional
M Lopez y Cruz Roja Argentina
Cordoba, Argentina 5016
Phone: 54 351 4686389
cbiassoni@scdt.frc.utn.edu.ar

SAMUEL BITTEL, B.S., B.A.
Nova Southeastern University
8032 Lakepoint Ct.
Plantation, FL 33322
Phone: 954.236.6935
sbittel@nova.edu

>OVER>

PATRICIA BLESSING
NIH/NIDCD/PHCPL
Bldg. 31,Rm 3C-35, 31 Center Dr.
Bethesda, MD 20892-2320
Phone: 301.496.7243
Fax: 301.402.0018
blessinp@mail.nih.gov

LES BLOMBERG
Noise Pollution Clearinghouse
Box 1137
Montpelier, VT 05608
Phone: 802.229.1659
Fax: 802.223.3266
npc@nonoise.org

RICHARD BOWRING
The Hearing Foundation of Canada
80 Richmond St., West, Ste. 1401
Toronto, Ontario, Canada M5H 24A
Phone: 416.364.4060
Fax: 416.364.9638
rbowring@hearingfoundation.ca

LAURA BRADY, M.A., CCC-A
Cleveland Hearing & Speech Center
7964 Burton Lane
Hudson, OH 44236
Phone: 330.405.5466
Fax: 216.382.4520
lbrady@chsc.org

DAVID BROWN, Ph.D.
Cincinnati Children's Hospital Medical Center
Dept. of Otolaryngology; MLC 2018
3333 Burnet Ave
Cincinnati, OH 45229
Phone: 513.636.2577
Fax: 513.636.8133
david.brown@cchmc.org

SCOTT BRUECK, CIH
CDC/NIOSH
4676 Columbia Pkwy, MS R-11
Cincinnati, OH 45226
Phone: 513.841.4140
Fax: 513.458.7147
sbrueck@cdc.gov

DAVID BRUEGGEMAN, MS, CCC-A
Southcentral Foundation
Alaska Native Medical Center
4315 Diplomacy Dr.
Anchorage, AK 99508
Phone: 907.729.1421
Fax: 907.729.1474
dbruegge@anmc.org

ANTHONY CACACE, Ph.D.
Albany Medical College
47 New Scotland Ave.
Albany, NY 12208
Phone: 518.262.0800
Fax: 518.262.0802
cacacea@mail.amc.edu

JOSEPH CERQUONE, CAE
American Speech-Language-Hearing Association
10801 Rockville Pike
Rockville, MD 20852
Phone: 301.897.5700 x4104
Fax: 301.897.7348
jcerquone@asha.org

KRIS CHESKY, Ph.D.
University of North Texas
College of Music
Denton, TX 76203
Phone: 940.565.4126
Fax: 940.565.2002
kchesky@music.unt.edu

LINDSAY CILETTI
Western Michigan University
3326 W. Main St., Apt. 302
Kalamazoo, MI 49006
Phone: 269.779.0790
lynnzpt@yahoo.com

JACKIE CLARK, Ph.D.
University of Texas at Dallas Callier Center
1966 Inwood Road
Dallas, TX 75235
Phone: 214.905.3031
Fax: 214.905.3146
jclark@utdallas.edu

WILLIAM CLARK, Ph.D.
Washington University School of Medicine
660 S. Euclid Ave.
Campus Box 8042
St. Louis, MO 63110
clarkw@wustl.edu
Guest: Christine Clark

MARY JO COOLEY HIDECKER
Michigan State University
1286 Otto Rd.
Charlotte, MI 48813
Phone: 517.541.0819
hidecke1@msu.edu

BENSON DAVIS
University of Cincinnati
14 Highridge Dr.
Loveland, OH 45140
Phone: 513.600.6474
davibo@email.uc.edu

RICK DAVIS, Ph.D.
NIOSH
4676 Columbia Pkwy, MS C-27
Cincinnati, OH 45226
Phone: 513.533.8142
rrd1@cdc.gov

SHAWNA DELL
University of Florida
Gainesville, FL
sdell@phhp.ufl.edu

AMY DONAHUE, Ph.D.
National Institutes of Health
6120 Executive Blvd., Ste. 400-C
Rockville, MD 20892-7180
Phone: 301.402.3458
Fax: 301.402.6251
smithtre@mail.nih.gov

ROSANNE DOUVILLE, CCC/A, SLO
Miami Valley SERRC
4801 Springhill St.
Riverside, OH 45431
Phone: 937.236.9965
Fax: 937.233.0161
douviller@mvserrc.esu.k12.oh.us

EDIE EADS, M.A., CCC-A, FAAA
Cincinnati Children's Hospital
3153 Fender Road
Melbourne, KY 41059
Phone: 859.635.1180
edie.eads@cchmc.org

ROLAND EAVEY, M.D.
Massachusetts Eye and Ear
243 Charles Street
Boston, MA 02114

JANET EHLERS, R.N.
NIOSH
4676 Columbia Pkwy, MS R-17
Cincinnati, OH 45226
Phone: 513.841.4205
jehlers@cdc.gov

JOHN EICHWALD, M.A., FAAA
Centers for Disease Control and Prevention
1600 Clifton Rd., NE, MS E-88
Atlanta, GA 30333
Phone: 404.498.3961
Fax: 404.498.3060
jeichwald@cdc.gov

SOLY ERLANDSSON, Ph.D
University West
Dept. of Individual and Society
Trollhattan, Sweden 461 86
Phone: 46520 22 37 59
Fax: 46520 22 39 99
soly.erlandsson@hv.se

JEFF FISCHER, CCC-A
Kentucky School for the Deaf
303 S. Second St., PO Box 27
Danville, KY 40423
Phone: 859.239.7017
jfischer72@gmail.com

GREG FLAMME, Ph.D.
Western Michigan University
1903 W. Michigan Ave.
Kalamazoo, MI 49008
Phone: 269.387.8067
Fax: 269.387.8044
greg.flamme@wmich.edu

BRIAN FLIGOR, ScD, CCC-A
Children's Hospital Boston
LO-367, 300 Longwood Ave.
Boston, MA 02115
Phone: 617.355.8980
Fax: 617.730.0320
brian.fligor@childrens.harvard.edu

ROBERT FOLMER, Ph.D.
Oregon Health & Science University
3181 SW Sam Jackson Park Rd., MC NRC04
Portland, OR 97239
Phone: 503.494.2939
Fax: 503.494.5656
folmerr@ohsu.edu

BARRY FREEMAN. Ph.D., FAAA
Nova Southeastern University
Audiology Department
3200 S. University Drive
Ft. Lauderdale, FL 33328
Phone: 954.262.7717
freemanb@nova.edu

>OVER>

NANCY GALLIHUGH
Constance Brown Hearing Centers
1634 Gull Road
Kalamazoo, MI 49048
Phone: 269.343.2601
Fax: 269.372.3021
nancyg@cbrown.org

SARA GILL
University of Northern Colorado
722 Harp Ct.
Greeley, CO 80634
Phone: 970.381.6978
gill1442@blue.unco.edu

PAM GRAYDON
NIOSH
4676 Columbia Pkwy, MS C-27
Cincinnati, OH 45226
Phone: 513.533.8582
Fax: 513.533.8139
psg2@cdc.gov

SUSAN GRIEST, M.P.H.
Oregon Health & Science University
3181 SW Sam Jackson Park Rd., MC NRC04
Portland, OR 97201
Phone: 503.494.2929
Fax: 503.494.5656
griests@ohsu.edu

LEE HAGER
Sonomax Hearing Healthcare
248 Church St.
Portland, MI 48875
Phone: 517.647.5882
Fax: 517.647.5883
lhager@sonomax.com

GAEL HANNAN
The Hearing Foundation of Canada
80 Richmond St., West, Ste. 1401
Toronto, Ontario, Canada M5H 2A4
Phone: 416.364.4060
Fax: 416.364.9638
ghannan@hearingfoundation.ca

GREG HARRIS
NBC Middle School Student
Montague, MI

ANGELA HIGGINS
Calvin College
3445 Burton St SE
Grand Rapids, MI 49546
amh25@calvin.edu

HOWARD HOFFMAN, M.A.
NIDCD, NIH
Suite 400, EPS Bldg, 6120 Executive Blvd
Bethesda, MD 20892-7180
Phone: 301.402.0390
hoffmanh@nidcd.nih.gov

ALICE HOLMES, Ph.D.
University of Florida
Box 10074
Gainesville, FL 32610
Phone: 352.273.0640
Fax: 352.273.6545
aholmes@phhp.ufl.edu

GLENN HOOD
Big Ear, Inc.
6660 Delmonico Dr., Ste. D161
Colorado Springs, CO 80919
Phone: 719.531.6868
Fax: 719.635.3665
glennhood@msn.com

GINA HOUNAM, M.A., CCC-A
Hearing Speech & Deaf Center of Greater Cincinnati
2825 Burnet Ave.
Cincinnati, OH 45219
Phone: 513.221.0527
Fax: 513.587.8392
ghounam@hearingspeechdeaf.com

LINDC. HOWARTH, B.A.
Oregon Health & Science University
MC NRC-04
3181 SW Sam Jackson Park Rd
Portland, OR 97239
Phone: 503.494.0670
Fax: 503.494.5656
howarthl@ohsu.edu

PETE HUNT, M.P.H.
Centers for Disease Control and Prevention
Division of School and Adolescent Health
4770 Buford Hwy., NE
Atlanta, GA 30341
Phone: 770.488.6208
Fax: 770.488.5771
phunt@cdc.gov

DORYCE IVERSON, Au.D.
CMU
Grosse Ile, MI 48138
Phone: 734.231.1255
di@iversonindustries.com

TERRI IVES, Sc.D., Au.D.
PCO School of Audiology
8360 Old York Road
Elkins Park, PA 19027-1598
Phone: 215.780.1478
Fax: 215.780.1259
tives@pco.edu

CATRICE JEFFERSON
U.S. Environmental Protection Agency
Office of Air and Radiation, OPAR
1200 Pennsylvania Ave NW
Mail Code-6103A
Washington, DC 20460
Phone: 202.564.1668
Fax: 202.564.1557
jefferson.catrice@epamail.epa.gov

CHERYL DeCONDE JOHNSON , Ed.D.
University of Colorado
5432 W. 27th St.
Greeley, CO 80634
Phone: 970.590.5500
cheryl@colorado.edu

TED JOHNSON, Au.D., CCC-A
PCO School of Audiology - Elkins Park, PA
6 Wilson Way
Delanco, NJ 08075
Phone: 609.658.0481
audmcl@yahoo.com

BRANDON KIEFT
NBC Middle School Student
Montague, MI

BRETT KEMKER, Ph.D.
University of Southern Mississippi
Speech & Hearing Sciences
118 College Dr., #5092
Hattiesburg, MS 39406-0001
Phone: 601.266.5216
Fax: 601.266.5224
brett.kemker@usm.edu

HEATHER KIRKLAND
Sinclair Community College
3680 Gorman Ave.
Englewood, OH 45322
Phone: 937.545.5955
hrkirkland@gmail.com

LAURA KRETSCHMER, Ed.D.
University of Cincinnati
3202 Eden Ave.
French East Bldg.
Cincinnati, OH 45267-0379
Phone: 513.558.8514
Fax: 513.558.8500
laura.kretschmer@uc.edu

SHARON KUJAWA, Ph.D.
Massachusetts Eye and Ear Infirmary
Harvard University
243 Charles St.
Boston, MA 02114
sharon_kujawa@meei.harvard.edu

FRANCE LACOMBE
O.O.A.Q.
235, bvl. Rene-Levesque, 601
Montreal, Quebec, Canada H2X 1N8
Phone: 514.282.9123
Fax: 514.282.9541
flacombe@ooaq.qc.ca

JAMES LANKFORD, Ph.D.
Northern Illinois University
325 Joanne Lane
DeKalb, IL 60115
Phone: 815.758.5111
jelank@niu.edu

CHANTAL LAROCHE
University of Ottawa
451 Smyth Road, #3062
Ottawa, Ontario, Canada K1H 8M5
Phone: 613.562.5800
Fax: 613.562.5428
claroche@uottawa.ca

MARGARET LARSEN
Western Michigan University
3223 Woodhams
Portage, MI 49002
Phone: 269.978.4687
margaret.larsen@charter.net

ELAINE LAW-RAMOS
Stamford CT Board of Education
888 Washington Blvd
Stamford, CT 06901
Phone: 203.977.5399
elaine@intermixx.com

>OVER>

LIDIA LEE, Ph.D.
Eastern Michigan University
128 Porter Bldg.
Ypsilanti, MI 48167
Phone: 734.487.3300
Fax: 734.487.2473
lidia.lee@emich.edu

MIKE MACIONE
Jackson County ISD
1175 West Parnall Rd.
Jackson, MI 48103
michael.macione@jcisd.org

TED MADISON, M.A., CCC-A
3M Company
3M Center, Building 0235-02-E-91
St. Paul, MN 55144-1000
Phone: 651.575.5575
Fax: 651.736.7388
tkmadison@mmm.com

ERICA MANDRICK
Western Michigan University
1302 Jenner Dr.
Allegan, MI 49010
Phone: 269.686.6888
elquist4@yahoo.com

BARBARA MARLENGA, Ph.D.
National Farm Medicine Center
1000 North Oak Ave.
Marshfield, WI 54449
Phone: 715.389.3021
marlenga.barbara@mcrf.mfldclin.edu

GENEVIEVE MARTIN
Oregon Health & Science University
3181 SW Sam Jackson Park Rd., MC NRC04
Portland, OR 97239
Phone: 503.913.8705
gymartin@bu.edu

WILLIAM HAL MARTIN, Ph.D.
Oregon Health & Science University
3181 SW Sam Jackson Park Rd., MC NRC04
Portland, OR 97239
Phone: 503.494.2927
Fax: 503.494.5656
martinw@ohsu.edu

PAM MASON, CCC-A
American Speech-Language-Hearing Association
10801 Rockville Pike
Rockville, MD 20812
Phone: 301.897.0135
pmason@asha.org

SUSAN MEGERSON, MA, CCC-A
University of Kansas Medical Center
14212 W. 72nd St.
Shawnee, KS 66216
Phone: 913.962.1759
scmegerson@mindspring.com

DEANNA MEINKE, Ph.D.
University of Northern Colorado
Gunter Hall 150, CB 140
Greeley, CO 80639
Phone: 970.351.1600
Fax: 970.351.2974
deanna.meinke@unco.edu

WILLIAM MURPHY, Ph.D.
NIOSH
4676 Columbia Pkwy, MS C-27
Cincinnati, OH 475226
Phone: 513.533.8125
wjm4@cdc.gov

PATTY NIQUETTE, M.A.
Etymotic Research, Inc.
61 Martin Lane
Elk Grove Village, IL 60007
Phone: 847.228.0006
p_niquette@etymotic.com

OLATEJU OLAJOKE
Calvin College
Timmer 147, 3201 Burton St., SE
Grand Rapids, MI 49456
Phone: 651.278.3652
oao2@calvin.edu

CATHERINE PALMER, Ph.D.
University of Pittsburgh
Eye & Ear Institute
203 Lothrop St.
Pittsburgh, PA 15213
Phone: 412.647.6089
Fax: 412.647.2455
palmercv@upmc.edu

CORY PORTNUFF, B.S.
University of Colorado
409 UCB, SLHS Dept.
Boulder, CO 80309-0409
Phone: 303.579.5297
cory.portnuff@colorado.edu

ALEXYS RACE
NBC Middle School Student
Montague, MI

TARA REED
NBC Middle School Student
Montague, MI

EFREM REEVES, Ph.D.
NIOSH
Pittsburgh Research Laboratory
626 Cochrans Mill Rd.
Pittsburgh, PA 15236
Phone: 412.386.6158
efr2@cdc.gov

EDWIN RUBEL, Ph.D.
University of Washington
Virginia Merrill Bloedel Hearing Research Center
Box 357923
Seattle, WA 98195
Phone: 206.543.8360
Fax: 206.221.5685
rubel@u.washington.edu

CHEYNE RUSHING
NBC Middle School Student
Montague, MI

THERESA SCHULZ, Ph.D.
NIOSH
Pittsburgh Research Laboratory
626 Cochrans Mill Rd.
Pittsburgh, PA 15236
Phone: 412.386.6679
tschulz@cdc.gov

MARIO SERRA, Ph.D.
CINTRA-Universidad Tecnologica Nacional
M Lopez y Cruz Roja Argentina
Cordoba, Argentina 5016
Phone: 54 351 4686389
mserra@scdt.frc.utn.edu.ar

SARGUNAM SIVARAJ
Wellington Hospital
Wellington, New Zealand
Phone: 0064 4 9186656
Fax: 6449186656
sathuann@paradise.net.nz

JODI SKROVAN, M.A., CCC-A
NCO SERRC
1495 W. Longview Ave., #200
Mansfield, OH 44906
Phone: 419.747.4808
Fax: 419.747.3806
skrovan.jodi@ncoserrc.k12.oh.us

JULIAN SMITH
NBC Middle School Student
Montague, MI

KRISTEN SMITH, M.A., F-AAA
ENT Associates of Cincinnati, Inc.
9403 Kenwood Rd., Ste. C-204
Cincinnati, OH 45242
Phone: 513.936.4824
Fax: 513.936.0600
kricket3@gmail.com

JUDITH SOBEL, Ph.D., MPH
Portland State University
School of Community Health
PO Box 751
Portland, OR 97207
Phone: 503.725.5112
Fax: 503.725.5100
sobelj@pdx.edu

CAROL STEPHENSON, Ph.D.
NIOSH/CDC
4676 Columbia Pkwy.
Cincinnati, OH 45226
Phone: 513.533.8581
Fax: 513.533.8560
cem3@cdc.gov

MARK STEPHENSON, Ph.D.
NIOSH/CDC
4676 Columbia Pkwy, MS C-27
Cincinnati, OH 45226
Phone: 513.533.8144
Fax: 513.533.8139
mstephenson@cdc.gov

WENDY STEUERWALD, M.S., CCC-A
Cincinnati Children's Hospital Medical Center
3333 Burnet Ave
Cincinnati, OH 45229
Phone: 513.636.3035.
Fax: 513.636.7316
wendy.steuerwald@cchmc.org

DANIEL STOOL
Intertek RAM
2107 Swift Dr., Ste. 200
Oak Brook, IL 60523
Phone: 630.605.3619
daniel.stool@ram.com

RICHARD SWEITZER, Ed.D.
200 Vestavia Circle
Birmingham, AL 35216-1328
Phone: 205.822.9066
rssweitzer@charter.net

>OVER>

JULEE SYLVESTER
Sight & Hearing Association
674 Transfer Rd.
St. Paul, MN 55114
Phone: 651.308.6225
jlps@sightandhearing.org

CHRISTA THEMANN, M.A.
NIOSH
4676 Columbia Pkwy, MS C-27
Cincinnati, OH 45226
Phone: 513.533.8485
clt6@cdc.gov

MONA THOMAS, M.S.W.
American Speech-Language-Hearing Association
10801 Rockville Pike
Rockville, MD 20852
Phone: 301.897.0156
Fax: 301.897.7348
mthomas@asha.org

FLOYD THURSTON, M.D.
Occupational Medicine
3310 Mulberry Ct.
Bloomington, IN 47401
Phone: 812.331.0722
fet@thurstons.us

N. WENDELL TODD, M.D.,MPH
Emory
1052 Castle Falls Dr.
Atlanta, GA 30329
ntodd@emory.edu

RANDY TUBBS, Ph.D.
NIOSH
4676 Columbia Pkwy, MS R-11
Cincinnati, OH 45226
Phone: 513.841.4569
Fax: 513.458.7147
rtubbs@cdc.gov

KAREN TURNER
Protec Hearing Inc.
Unit E-77 Redwood
Winnipeg, Manitoba, Canada R2W 5J5
Phone: 204.582.3932
Fax: 204.586.0472
protec@escape.ca

DAVID VERMEULEN
NBC Middle School
4700 Stanton Blvd.
Montague, MI 49437
Phone: 231.894.5617
Fax: 231.8/94.5728
dvermeul@montague.k12.mi.us
Guest: Gina Kieft

LAURIE WELLS, M.S., FAAA
Associates in Acoustics, Inc.
2283 Danielle Ct.
Loveland, CO 80537
Phone: 970.593.6339
Fax: 970.593.6345
lwellshear@cs.com

STEPHEN WIDEN, Ph.D.
University West
Trollhattan
Vasta Gotaland, Sweden S46186
Phone: 46 521 22 37 15
stephen.widen@hv.se

MELISA WITHERSPOON, MSOH
Delta Environmental, Inc.
121Burlingwood Dr.
Perrysburg, OH 43551
Phone: 419.872.1397
melisa@deltaenvironment.com

Appendix 2

Spectrum Supplement – Conference Program

Noise-Induced Hearing Loss
In Children At Work & Play

www.hearingconservation.org/conf_children.html

Spectrum Supplement
October 19-20, 2006

Embassy Suites Hotel Cincinnati – Rivercenter, Covington, KY

Funding for this conference is provided by: NIOSH 1 R13 OH008567-01,
National Hearing Conservation Association,
National Institute on Deafness and Other Communication Disorders
and the Marion Downs Hearing Center

Hearing can last a lifetime!

NIDCD National Institute on Deafness and Other Communication Disorders
NHCA
NIOSH The National Institute for Occupational Safety and Health
Marion Downs
University of Northern Colorado
Oregon Health & Science University

Noise-Induced Hearing Loss
In Children At Work & Play

CONFERENCE PROGRAM

October 19-20, 2006

Embassy Suites Cincinnati - RiverCenter, Covington, KY

FUNDED BY:

- Centers for Disease Control & Prevention: National Institute of Occupational Safety and Health (NIOSH) R13 OH008567-01
- National Institute on Deafness and Other Communication Disorders (NIDCD)
- Marion Downs Hearing Center (MDHC)
- National Hearing Conservation Association (NHCA)
- Oregon Health & Science University (OHSU)
- University of Northern Colorado (UNC)

CONTRIBUTORS:

Acoustical Society of America (ASA)

American Academy of Audiology (AAA)

American Speech-Language Hearing Association (ASHA)

Deafness Research Foundation (DRF)

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NIDCD
National Institute on Deafness
and Other Communication Disorders

Marion Downs
HEARING CENTER

NHCA

OREGON
HEALTH
& SCIENCE
UNIVERSITY
OHSU

UNIVERSITY of
NORTHERN COLORADO

Contributors

Acoustical Society of America

AMERICAN
ACADEMY OF
AUDIOLOGY

American
Speech-Language-
Hearing
Association

Deafness
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Foundation

Publication Support

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International Journal of Audiology
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Hearing Protector Manufacturers

3M
EAR / Peltor
Etymotic Research, Inc.

Organizing Committee

Patricia Blessing
Communications Director
Acting Chief, Office of Health Communication and Public Liaison
National Institute on Deafness and Other Communication Disorders
National Institutes of Health
31 Center Drive, MSC 2320
Bethesda, MD USA 20892-2320
Voice: (301) 496-7243
Email: blessingp@ms.nidcd.nih.gov

Robert Folmer, Ph.D.
Associate Professor of Otolaryngology
Oregon Health & Science University Tinnitus Clinic
3181 S.W. Sam Jackson Park Road, NRCO4
Portland, OR 97201-3098
Voice: (503) 494-2939
Fax: (503) 494-5656
Email: folmerr@ohsu.edu

Pamela S. Graydon
Electronics Engineer
Division of Applied Research and Technology
Hearing Loss Prevention Team
National Institute for Occupational Safety & Health (NIOSH)
Centers for Disease Control and Prevention (CDC)
4676 Columbia Parkway, C-27
Cincinnati, OH 45226
voice: (513) 533-8582
fax: (513) 533-8319
Email: pgraydon@cdc.gov

Susan Griest, M.P.H.
Staff Scientist
Oregon Hearing Research Center
Oregon Health & Science University
3181 SW Sam Jackson Park Road, NRCO4
Portland, OR 97201-3098
voice: (503) 494-2929
Fax: (503) 494-5656
Email: griests@ohsu.edu

Howard J. Hoffman M.A.
Program Director for Epidemiology and Biostatistics
Translational Research Branch
Division of Scientific Programs
National Institute on Deafness and Other Communication Disorders (NIDCD)
National Institutes of Health (NIH)
Executive Plaza South Building, Suite 400A
6120 Executive Boulevard, MSC 7180
Bethesda, MD 20892-7180
Tel: (301) 402 - 1843 [secretary]
(301) 435 - 1349 [direct]
Fax: (301) 402 - 0390
Email: hoffmanh@nidcd.nih.gov

Linda Howarth
Research Associate
Oregon Hearing Research Center
Oregon Health & Science University
3181 SW Sam Jackson Park Road, NRCO4
Portland, OR 97239
Voice: (503) 494-0670
Fax: (503) 494-5656
Email: howarthl@ohsu.edu

William Hal Martin, Ph.D.
Multi-Program Director
Oregon Hearing Research Center
Oregon Health & Science University
3181 SW Sam Jackson Park Road, NRCO4
Portland, OR 97239
voice: (503) 494-7954
fax: (503) 494-5656
Email: martinw@ohsu.edu

Deanna Meinke, Ph.D.
Assistant Professor
Audiology and Speech-Language Sciences
University of Northern Colorado
Campus Box 140
Greeley, CO 80634
voice: (970) 351-1600
fax: (970) 351-2974
Email: Deanna.Meinke@unco.edu

Carol M. Stephenson, Ph.D.
Chief- Training and Evaluation Branch
Education and Information Division
National Institute for Occupational Safety & Health (NIOSH)
Centers for Disease Control and Prevention (CDC)
4676 Columbia Parkway, C-10
Cincinnati, OH 45226
voice: (513) 533-8581
fax: (513) 533-8560
Email: cstephenson@cdc.gov

Program Features

PROGRAM GOALS:

- To disseminate basic, applied and translational research related to the prevention of NIHL in children and adolescents with an emphasis on adolescent workers.
- To provide a friendly, cross-disciplinary forum to exchange scientific knowledge, critiques and practical experience while providing a forum to explore cross-disciplinary and cross-agency mutually beneficial collaborations. Discussions may fuel the motivation and creativity of researchers working on hearing loss prevention and inspire others not currently involved in the area.
- To engage new researchers and graduate students in the exploration of differing points of view and ideas not readily available in textbooks and to provide opportunities to interact with individuals working in the laboratory and the field.
- To identify research gaps and research needs to further the advancement of hearing loss prevention programs targeting children and adolescents, both prior to entering the workforce and upon entry into the workforce. Additionally, this will contribute toward the future development of consensus statements and public message content guidelines used across agencies and venues for hearing loss prevention programs. Problem identification may be supplemented with problem resolution suggestions through structured working group activities as part of the conference.
- To produce a series of scientific presentations that will be published and available to others not in attendance at the conference.

CONTINUING EDUCATION:

American Speech-Language-Hearing Association

APPROVED CONTINUING EDUCATION PROVIDER
AMERICAN SPEECH-LANGUAGE-HEARING ASSOCIATION

1.2 CEUs
Provider Code: AAOF
Activity Number: 0206
The National Hearing Conservation Association (NHCA) 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. This program is offered for 1.2 CEUs (various levels; professional area). ASHA CE Provider approval does not imply endorsement of course content, specific products, or clinical procedures.

American Academy of Audiology

AMERICAN ACADEMY OF AUDIOLOGY
Continuing Education in Audiology

The National Hearing Conservation Association (NHCA) is approved by the American Academy of Audiology (AAA) to offer Academy CEUs for this activity. The program is worth a maximum of 1.1 CEUs. Academy approval of this continuing education activity does not imply endorsement of course content, specified products, or clinical procedures.

Welcome Letter

Noise-Induced Hearing Loss
In Children At Work & Play

www.hearingconservation.org/conf_childrenconf.html

C/O National Hearing Conservation Association
7995 E. Prentice Avenue, Suite 100, Greenwood Village, CO 80111
(P) 303-224-9022 (F) 303-770-1614 nhca@gwami.com

October 19, 2006

Dear Colleagues,

Welcome to the first ever scientific conference focused on the prevention of noise-induced hearing loss (NIHL) in children and adolescents. This is a unique opportunity for you explore and discuss the most recent theoretical and experimental work in the relevant fields. We encourage you to re-connect with old friends and meet new colleagues. Share your own knowledge and experiences with others and build working partnerships. With both national and international participants, we will gain a global perspective of the issues. In the long-term we strive for a greater understanding of the implications, applications and key scientific information critical to public health policy decision making, public information dissemination and future research guidance for the prevention of noise-induced hearing loss in youth.

We would like to extend a special greeting to our international colleagues joining us. They are traveling from four different countries (Argentina, Canada, Sweden and New Zealand) and contributing ten presentations to the meeting.

The very target of our efforts… young students… will be attending this meeting to share their own research, efforts and insights into NIHL within their ranks. Nine young students will present their works on NIHL prevention performed during their middle school, high school and early college experiences. We have much to learn from them.

With our sincere appreciation, the conference planning and implementation have benefited from partnerships with other organizations. We wish to recognize the significant collaborations of both the individuals and the organizations who have contributed to the event;

- National Institute of Occupational Safety and Health (NIOSH)
  (NIOSH grant #1 R13 OH008567-01)
- National Hearing Conservation Association (NHCA)
- Marion Downs Hearing Center (MDHC)
- National Institute on Deafness and Other Communication Disorders (NIDCD)
- Oregon Health and Science University (OHSU)
- University of Northern Colorado (UNC)
- Acoustical Society of America (ASA)
- American Academy of Audiology (AAA)
- American Speech-Language Hearing Association (ASHA)
- Deafness Research Foundation (DRF)

On a personal note we would like to thank the organizing committee members for their dedication and diligence in developing the program and logistical details of the conference. The efforts of Patricia Blessing, Robert Folmer, Susan Griest, Howard Hoffman, Linda Howarth and Carol Stephenson, are all very much appreciated. We'd also like to acknowledge Pam Graydon who has been an exceptional resource for local arrangements. We are certainly indebted to NHCA staff; Karen Wojdyla and Sheryl McLandsborough for their experience, patience and professional guidance. The superlative conference program is a result of many individuals who contributed their time and expertise by submitting preliminary conference grant abstracts and responding to the call for papers.

The culmination of our efforts is the intellectual interchange, informal discussions, and personal interactions that can only occur at the conference itself. In that regard, we hope that you have a rewarding and enjoyable time at the conference. Please let us know if there is anything we can do to enhance your learning experience and opportunities for interaction with colleagues. We'll look forward to greeting each of you personally.

William Hal Martin, Ph.D.
Conference Co-Chair
Professor of Otolaryngology/Head & Neck Surgery
Professor of Public Health and Preventive Medicine
Oregon Hearing Research Center NRC04
Oregon Health & Science University
3181 SW Sam Jackson Park Rd
Portland, OR 97239
Voice: 503 494 7954
Fax: 503-494-5656
Email: martinw@ohsu.edu

Deanna K. Meinke, Ph.D.
Conference Co-Chair
Assistant Professor
Audiology & Speech-Language Sciences
University of Northern Colorado
1500 Gunter Hall
Campus Box 140
Greeley, CO 80639
Voice: 970-351-1600
Fax: 970-351-2974
Email:Deanna.Meinke@unco.edu

Noise-Induced Hearing Loss
In Children At Work & Play

Invited Guest Speakers

Sharon Kujawa, Ph.D.

Dr. Kujawa is an Associate Professor of Otology and Laryngology at Harvard Medical School and Director of the Department of Audiology at the Massachusetts Eye and Ear Infirmary. She is on the faculty of the Harvard-MIT Program in Speech and Hearing Biosciences and Technology and is a Principal Investigator in the Eaton-Peabody Laboratory of the Massachusetts Eye and Ear Infirmary. Her current research efforts are directed toward understanding the mechanisms by which normal cochlear function is compromised by aging and noise trauma.

Edwin W Rubel, Ph.D.

Dr. Rubel is the Virginia Merrill Bloedel Professor of Hearing Sciences at the University of Washington. He has studied development of hearing, of the inner ear, and of the brain pathways involved in hearing in laboratory animals since 1972. Among Dr. Rubel's research contributions are a long series of studies on the role of experience on development of the lower brain pathways that process auditory information. These studies have examined the critical role the neural activity plays during development of the auditory system.

Mario R. Serra, Ph.D, and Ester C. Biassoni, Ph.D.

Dr. Serra, is the Head of Centro de Investigación y Transferencia en Acústica. National Technical University, Córdoba, Argentina. He is a Researcher of the National Scientific and Technical Research Council (CONICET), Argentina. He is a professor at the Grad and Postgrad Level and is Secretary of Acoustics and Electroacoustics Commission of the Argentine Institute for Standards (IRAM).

Ester C. Biassoni, Ph.D., is a Dr. Psychology specialized on Psychoacoustics, Environmental Psychology and Hearing Conservation. Researcher of the National Scientific and Technical Research Council (CONICET), Argentina. Head of Research Department, Centro de Investigación y Transferencia en Acústica, National Technical University–Córdoba, Argentina. Professor at Grade and Postgrade Level.

Appreciation Extended To:

Karen Wojdyla, Executive Director

Sheryl McLandsborough, Staff

National Hearing Conservation Association
7995 E. Prentice Avenue Suite 100
Greenwood, Village, CO 80111-2710
303.224.9022 (v)
303.770.1614 (f)
Email: nhca@gwami.com
www.hearingconservation.org

Linda Howarth
OHSU Administrative Support

James Lankford, Ph.D.
Conference Photographer

Elliott Berger, M.S.

Lee Hager
Timekeepers

Scott Baird
Marion Downs Hearing Center
Publications and Communications Manager

Program Presenters & Abstracts

Thursday, October 19

8:00 AM Deanna Meinke, Ph.D. and William Hal Martin, Ph.D. Welcome

Moderator 1 – Carol Stephenson

8:10 AM Elliott Berger, M.S., INCE Board Certified - The Essential Auditory Experience.

8:25 AM Edwin W Rubel, Ph.D. - Cellular Studies of Critical Periods of Inner Ear and Central Auditory System Vulnerability.

9:10 AM Floyd Thurston, M.D. - Is External Noise a Risk to Hearing Development in the Fetus?

9:30 AM Rick Neitzel, M.S., CIH, Deanna K. Meinke, Ph.D. - Noise Exposure Among Children and Young Adults: What Do We Know, and What Do We Need to Find Out?

9:50 AM Samuel Bittel B.S., B.A., Brett Kemker, Ph.D., Barry A. Freeman, Ph.D. Investigation of Toy Noise Exposure in Children

10:05 AM Break

8:10 AM

The Essential Auditory Experience.

Elliott Berger, M.S., INCE Board Certified

Elliott H. Berger, M.S., is the Senior Scientist for Auditory Research at E·A·R / Aearo Company, where for 30 years he has studied noise and hearing conservation, with an emphasis on hearing protection. He chairs the ANSI working group on hearing protectors, has been lead editor for two highly-regarded texts in noise and hearing conservation, served on a National Academy of Science committee evaluating hearing loss in the military, and has presented his research in numerous text book chapters and over 60 published articles

Abstract: The premise of this talk is that sound is vital to the human condition – whether it is our own sounds, those of loved ones, the sounds of communication, the sounds of play, or the sounds of the nature – we are immersed in and touched by our auditory environment (aurally, physically, metaphorically); although often peripheral to our focus and attention, sound is vital to the quality of our emotional experience. Be it a child for whom listening and the development of language and communication is essential and for whom the sound of a parent's voice can provide comfort and security, or a teenager for whom sound can mean excitement, thrills, and social networks, or adults for whom sound and communication may be the keys to career or the joy of connection with loved ones and with the environment, it is important for us to perceive, understand, and appreciate the soundscape in which we are immersed. The intent of this talk is to direct our awareness to the auditory realm and increase our awareness and understanding of that sensory modality.

8:25 AM

Cellular Studies of Critical Periods of Inner Ear and Central Auditory System Vulnerability.
Edwin W Rubel, Ph.D. (Invited Speaker)

Edwin W Rubel, Ph.D. is the Virginia Merrill Bloedel Professor of Hearing Sciences at the University of Washington. He also holds appointments as Professor of Otolaryngology-Head and Neck Surgery, Professor of Physiology and Biophysics, adjunct Professor of Psychology, and director of Research for the Department of Otolaryngology-Head and Neck Surgery at the University of Washington. Dr. Rubel has studied development of hearing, of the inner ear, and of the brain pathways involved in hearing in laboratory animals since 1972. He founded the Virginia Merrill Bloedel Hearing Research Center at the University of Washington in 1989. He has published over 230 scientific papers, edited 5 books and won many honors including the 2005 Award of Merit from the Association for Research in Otolaryngology. Among Dr. Rubel's research contributions are a long series of studies on the role of experience on development of the lower brain pathways that process auditory information. These studies have examined the critical role the neural activity plays during development of the auditory system.

Abstract: The presentation will review two types of studies: 1) Studies showing a critical period during development of the inner ear in laboratory animals during which the hair cells are particularly vulnerable to ototoxic insults from excessive noise or ototoxic drugs; and 2) Studies examining periods of differential vulnerability of neurons in the central nervous system to sensorineural and conductive hearing loss, and recent experiments attempting to understand the molecular mechanisms underlying such critical periods.

9:10 AM

Is External Noise a Risk to Hearing Development in the Fetus?
Floyd Thurston, M.D.

Floyd Thurston, M.D. is a recently retired specialist in Occupational Medicine and former Adjunct Assistant Professor in the School of Public and Environmental Affairs at Indiana University whose interest in the possible risk to fetal hearing from external noise was stimulated by questions raised by several workers in noisy environments.

Abstract: Although loud noise is a known risk factor for hearing loss in both adults and children, some researchers have suggested that excessive noise in a pregnant woman's environment can adversely affect the developing fetal ear, and may account for some cases of hearing loss in young children. Some studies have found that each year between one and three per 1000 newborns have some degree of hearing loss. Should noise be considered a risk factor in some of those cases? While some experimental animal studies have shown that loud noise external to the pregnant mother's abdomen has detrimental effects on the developing fetal ear resulting in measurable hearing loss in the newborn animal, other studies have not. The few retrospective studies which compared hearing in children born of mothers who, while pregnant, were exposed to noisy work environments, to hearing in those born of unexposed mothers have reported contradictory findings. Numerous intrauterine measurements of trans-abdominally transmitted external sound have been made in both pregnant ewes and humans. Those measurements have shown that the intrauterine environment is a relatively "noisy" one even before transmitted sound from an extra-corporeal source is added, and that lower frequencies appear to be attenuated less by abdominal tissue and transmitted more freely than are higher frequencies. However, even some of these findings are controversial. This presentation will be a critical summary of the pertinent literature and an update of a previous review of the topic published by the presenter 15 years ago.

9:30 AM

Noise Exposure Among Children and Young Adults: What Do We Know, and What Do We Need to Find Out?
Rick Neitzel, M.S., CIH, and Deanna K. Meinke, Ph.D.

Rick Neitzel, M.S., CIH is a Research Scientist in the University of Washington (UW) Department of Environmental and Occupational Health Sciences, serves as Director of Communications for the National Hearing Conservation Association, and sits on the American Industrial Hygiene Association Noise Committee. He is a Certified Industrial Hygienist, and is also pursuing a PhD in Environmental and Occupational Hygiene at UW. His research interests include assessment of noise exposure, noise controls, and hearing loss, as well as evaluation of vibration exposure and health effects.

Dr. Meinke is an Assistant Professor of Audiology and Speech-Language Sciences at the University of Northern Colorado. She presently chairs the National Hearing Conservation Association Task Force on Children and Noise and coordinated the present conference.

Abstract: There have been a number of studies on children and young adults, which have attempted to estimate hazardous sound (noise) exposure levels. Very few of these have involved direct long-term measurements of noise exposure; most have instead relied upon noise exposure levels associated with specific activities. This presentation will review the available data on child and adolescent noise exposures, including studies involving direct measurement of exposure and research dependent upon exposure estimates based on noise levels derived from other studies. The presently available and needed data will be summarized and presented within a developmental framework.

9:50 AM

Investigation of Toy Noise Exposure in Children
Samuel Bittel B.S., B.A., Brett Kemker, Ph.D., Barry A. Freeman, Ph.D.

Mr. Bittel is currently a doctoral audiology student and research assistant at Nova Southeastern University. Mr. Bittel received his Bachelor of Science degree in psychology from Fort Hays State University in 2001. Mr. Bittel also received a Bachelor of Arts degree in Sociology from Fort Hays State University in 2002.

Brett E. Kemker, Ph.D. is currently an Associate Professor of Audiology at Nova Southeastern University. He received his Ph.D. in 1999 from the University of Florida. Areas of expertise: Teaching: Clinical Audiology, Aural Rehabilitation, Counseling, Research areas: Auditory attention/distraction, Audiologic rehabilitation.

Barry A. Freeman, Ph.D., Chair/Professor in the Audiology Department - Nova Southeastern University. Ph.D. in Auditory Science - Michigan State University. 1996-1997 president of the American Academy of Audiology; served on Academy's Board of Directors six years; continues to serve on various academy committees. Founding member of the Florida Academy of Audiology; serves as Legislative Liaison for the Academy.

Abstract: This study evaluated the sound pressure levels of common children's toys and family reported data on toy usage during a typical week. These sound pressure level and toy use findings were compared to the ASTM International toy noise standard to determine if children may be at risk for acquiring hearing loss and, also, to assess the efficacy of this standard. This study's results give important information about toy sound intensity, toy usage and resultant noise exposure, compliance with the ASTM International standard by toy manufacturers, and the appropriateness of the current standard. This study's results give important information about toy sound intensity, toy usage and resultant noise exposure, compliance with the ASTM International Standard by toy manufacturers, and the appropriateness of the current standard.

10:05 AM Break

Moderator 2 – Laurie Wells

10:30 AM	Sheryl A. Milz, Ph.D., CIH, John R. Wilkins, III, BCE, Dr. PH, Melisa K. Witherspoon, April L. Ames, MSOH - Noise Exposure Assessment of Three Adolescents Living on Farms in Northwest Ohio.
10:50 AM	John Eichwald, M.A., FAAA - How NIHL in Children May Align With CDC Health Protection Goals
11:05 AM	Sharon Kujawa, Ph.D. - Noise Exposure to Young Ears: When Things Go From Bad to Worse.
11:50 AM	Poster & Interactive Table Introductions (by Greg Flamme)
Noon	Lunch

10:30 AM

Noise Exposure Assessment of Three Adolescents Living on Farms in Northwest Ohio.
Sheryl A. Milz, Ph.D., CIH, John R. Wilkins, III, BCE, Dr. PH, Melisa K. Witherspoon, April L. Ames, MSOH

Dr. Milz, is a certified industrial hygienist and epidemiologist, having been employed in each capacity before joining the faculty at the Medical University of Ohio. Her research interests are in the field of occupational and environmental exposure assessments, particularly for farm families.

John R. Wilkins, III, BCE, DrPH is an environmental epidemiologist and environmental engineer who has been conducting research in the area of agricultural safety and health for more than 15 years, including studies of agriculture-related noise induced hearing loss.

Melisa K. Witherspoon is graduate of the MSOH program at the Medical University of Ohio. She also works full time as an environmental and occupational health consultant at Delta Environmental, Inc. in Perrysburg, Ohio and part time as a research technician at the Medical University of Ohio. Ms. Witherspoon will provide the podium presentation in Dr. Milz's absence.

April L. Ames, MSOH is employed as an environmental and occupational health consultant at Delta Environmental, Inc. in Perrysburg, Ohio. She is a graduate of the Medical University of Ohio in the MSOH program and continues to work at the university on research projects.

Abstract: A NIOSH-funded pilot project is underway to evaluate both occupational and non-occupational noise exposures of persons living and working on farms in Northwest Ohio. Noise exposure monitoring is being conducted for one week during each farming season: planting, growing, and harvesting. To date, two families have completed the monitoring process, including three adolescents. Teen 1 was a high school student who assisted on the farm part time, including driving tractors and other heavy machinery. Teens 2 and 3 were home-schooled and performed some chores daily, but did not operate any machinery. The results from the study are as follows. Teen 1 wore the dosimeter a total of 130.85 hours, including 91.55 hours at school (Leq range 70.8 – 77.7 dBA). This teen performed 8.25 hours of farming (Leq range 72.8 – 80.7 dBA). Teen 2 wore the dosimeter 60.33 hours and performed 4.87 hours of farm work (Leq range 70.6 – 88.8 dBA). Teen 2 also performed nonfarm activities (Leq range 70.6 – 84.4 dBA) and wore the dosimeter one day during home schooling for 4.97 hours (Leq of 70 dBA). Teen 3 wore the dosimeter 47.68 hours and performed 4.87 hours of farm work (Leq range 66.9 – 85.0 dBA). Teen 3 also performed nonfarm activities (Leq range 74.3 – 88.4 dBA) and wore the dosimeter for 13.33 hours during home schooling (Leq range 70.6 – 82.3 dBA). No standards exist for noise exposure during agricultural operations. However, one exposure for Teen 1 would have exceed the ACGIH TLV.

10:50 AM

How NIHL in Children May Align With CDC Health Protection Goals
John Eichwald, M.A., FAAA

Mr. Eichwald is the Team Lead for the Early Hearing Detection and Intervention Program within the National Center on Birth Defects and Developmental Disabilities at the CDC in Atlanta, Georgia. John has nearly thirty years experience as a pediatric clinical audiologist in public health, education, and the private sector. He has published in several peer reviewed journals and made numerous presentations primarily concerned with the early identification of hearing loss in infants and children.

Abstract: Over the last two years, the Centers for Disease Control and Prevention (CDC) has reorganized to address 21st century health and safety challenges. The agency is implementing new technologies, new strategies, and new goals to increase its positive impact on the health and quality of life for the people it serves. To do this, CDC has defined specific Health Protection Goals. Healthy People 2010 was a key resource used to help shape these CDC goals. Agency resources, staff, and activities are being aligned to address these Health Protection Goals to improve its public health impact and reduce health disparities. This presentation will provide an overview of CDC's new Health Protection Goals and how the issue of noise induced hearing loss in children may align with them. These specific Health Protection Goals are designed to help prioritize and focus CDC's work and investments and measure Agency progress. CDC is currently developing strategies for achieving the Health Protection Goals and will be seeking wider input on the goals, thus providing another opportunity to get input from partners, stakeholders, advisory committees, and the public to provide feedback. Over time, these Health Protection Goals will allow CDC to objectively measure and clearly demonstrate the impact of its health protection activities, and can help inform the public, the administration, Congress, partners and stakeholders about the state of the public's health. Work on CDC's Health Protection Goals will help achieve the 2010 objectives and future Healthy People objectives.

11:05 AM

Noise Exposure to Young Ears: When Things Go From Bad to Worse.
Sharon Kujawa, Ph.D. (Invited Speaker)

Dr. Kujawa is an Associate Professor of Otology and Laryngology, Harvard Medical School and is Director of the Department of Audiology at the Massachusetts Eye and Ear Infirmary, Boston. She is on the faculty of the Harvard-MIT Program in Speech and Hearing Biosciences and Technology and is a Principal Investigator in the Eaton-Peabody Laboratory of the Massachusetts Eye and Ear Infirmary. Her current research efforts are directed toward understanding the mechanisms by which normal cochlear function is compromised by aging and noise trauma. She studies how susceptibility to such compromise is shaped by genetic background, how it is altered by exposure history or by efferent activation, and how the compromise can be minimized or prevented using pharmacologic therapies.

Abstract: Numerous studies describe an early period of heightened sensitivity to insult from noise or ototoxic drugs. Comparatively little information is available, however, regarding the long-term effects of such exposure to young, vulnerable ears. We have undertaken studies of noise - age interactions in the mouse; an animal with a short life span, with intra-strain genetic homogeneity to minimize variability and with inter-strain differences in vulnerability that can be exploited to probe mechanisms. We have confirmed that young ears of CBA/CaJ mice are substantially more vulnerable to noise than those of adults; threshold shifts are larger at short post-exposure times, they extend across a broader range of frequencies, and show less recovery from acute insult by 2 weeks post exposure. We have also uncovered evidence that noise exposure to these young ears can exacerbate hearing loss and inner ear damage that commonly develop as ears age. Specifically, young-exposed mice held for long post-exposure times showed substantial deterioration of cochlear neural responses without further change in pre-neural responses, and corresponding histological evidence of primary neural degeneration throughout the cochlea. Such findings question currently-held beliefs about the time-limited effects of noise exposure and have obvious public health significance given the high prevalence of noise exposure in, and the aging of our society.

11:50 AM Poster & Interactive Table Introductions – Moderator: Greg Flamme, Ph.D.

Noon: Lunch

Thursday, October 19

Moderator 3 – Susan Griest

1:30 PM	Cory D. F. Portnuff, B.S., Brian J. Fligor, Sc.D., CCC-A - Output Levels of Portable Digital Music Players.
1:50 PM	Brian J. Fligor, Sc.D., CCC-A, Terri Ives, Sc.D. - Does Earphone Type Affect Risk for Recreational Noise-Induced Hearing Loss?
2:10 PM	Roland Eavey, M.D. - MTV Awareness Survey and Media.
2:25 PM	Judith Sobel, Ph.D., Mary Meikle, Ph.D., Gloria Reich, William H. Martin, Ph.D. - Persuading Adolescents to Protect Their Hearing: What Can We Learn From Hearing Communication Research?
2:40 PM	Stephen E. Widén, Ph.D., Soly Erlandsson, Ph.D. - Noise and Music, A Matter of Risk Perception?
3:00 PM	Break

1:30 PM

Output Levels of Portable Digital Music Players.

Cory D. F. Portnuff, B.S., Brian J. Fligor, Sc.D., CCC-A

Cory Portnuff is a graduate student in Audiology at the University of Colorado at Boulder, working on his Au.D./Ph.D. His research interests focus on noise-induced hearing loss across the lifespan, with a particular emphasis in children. Cory's past research also includes epidemiologic research on auditory neuropathy/dyssynchrony.

Brian J.Fligor, Sc.D., CCC-A is Director of the Diagnostic Audiology at Children's Hospital Boston. His research interests focus on acquired hearing loss, particularly in children. His work on the potential for hearing loss from irresponsible use of personal stereo system headphones has been highlighted in the considerable media coverage of the topic.

Abstract: With the advent of digital music technology, the popularity of digital music players is rising; according to market survey reports, the most popular brand, the Apple iPod, has sold more than 40 million units since it was introduced in 2001. The newer technology with large storage capacity allows use for extended periods of time. While it has been assumed that portable music players are capable of producing high output levels, studies evaluating hearing loss risk from using current digital music technology have yet to be published. This study looks at the output levels of five digital music players from three manufacturers and includes both stock earphones and commercially available earphones. Using a Knowles Electronic Manikin for Acoustic Research (KEMAR), recordings were taken of five popular song clips, pink noise, and a pure tone through each of the players. Volume controls were set in gradations of 10%, for the full range of output, for all devices with the stock earphones, and at maximum levels for the commercially available earphones. The output levels of the players and differences between earphones, as well as reliability measures are reported. Preliminary results indicate that output levels of portable digital music players are similar to output levels of compact disc players, as has been previously described in the literature. Guidelines for minimizing risk of noise-induced hearing loss from using these systems are presented.

1:50 PM

Does Earphone Type Affect Risk for Recreational Noise-Induced Hearing Loss?

Brian J. Fligor, Sc.D., CCC-A, Terri Ives, Sc.D.

Dr. Fligor is the Director of the Diagnostic Audiology at Children's Hospital Boston. His research interests focus on acquired hearing loss, particularly in children. His work on the potential for hearing loss from irresponsible use of personal stereo system headphones has been highlighted in the considerable media coverage of the topic.

Terri Ives, Sc.D., Au.D. is Assistant Professor at PCO School of Audiology and Balance Center Director at Pennsylvania Ear Institute. Former positions include Manager of Clinical Research at Sound ID, Palo Alto, CA, and Chief of Audiology and Balance Center Director at the Hearing Institute for Children and Adults, San Jose, CA.

Abstract: Many leisure activities expose individuals to sound levels that place them at risk for noise-induced hearing loss (NIHL). One potential risk is listening to music via portable stereo system (PSS) headphones, as suggested by Fligor and Cox (2004) and Williams (2005). To probe whether listening behaviors under frequently encountered noise conditions place a person at risk for NIHL from PSS use, we measured chosen listening levels (CLL) of 100 human subjects using a psychophysical method-of-adjustments procedure under a variety of listening conditions and earphone types. The type of earphone varied according to the amount of passive sound attenuation provided by the earphone. The resulting data can be fitted with a two-segment spline, where the baseline CLL varies between subjects in quiet, and above a threshold ambient noise level, CLL increases linearly with increasing ambient noise. The effect of the level of the ambient noise on CLL is in turn decreased as passive sound attenuation provided by the earphone is increased. These results highlight the risk to a percentage of the population who use PSS, particularly under certain noise conditions, and have implications for directing hearing conservation efforts.

2:10 PM

MTV Awareness Survey and Media.

Roland Eavey, M.D.

Dr Eavey is Director of the Pediatric Otolaryngology Service at the Massachusetts Eye and Ear Infirmary and he is Professor, Otology and Laryngology, Harvard Medical School. He is boarded both in Otolaryngology and Pediatrics. His clinical care focus is pediatric otology and research interests are concerned with the pediatric ear.

Abstract: Background: We hypothesized that many individuals were not concerned about hearing issues and a relationship to loud music. Methods: An awareness survey was conducted in cooperation with MTV and published in Pediatrics in April 2005. The survey was web based, yielding 10,000 responses in 3 days, from the MTV.com site. Results: The survey demonstrated that hearing loss was not felt to be an important issue for respondents (8%) compared to other health issues (nearly 50%) despite the fact that the majority of individuals reported hearing loss/tinnitus after exposure to loud music. Most individuals did indicate willingness to prevent hearing loss if educated. Subsequent to publication in 2005, hundreds of sustained global media hits occurred including such venues as Rolling Stone Magazine, National Public Radio, and the Harvard University Home Page. Conclusions: Respondents had not generally been aware of possible hearing loss from loud music. However, the topic has resonated with the media which has been helpful regarding increasing awareness for audiences. A future MTV survey is planned to determine if awareness and behavior modification has been achieved.

2:25 PM

Persuading Adolescents to Protect Their Hearing: What Can We Learn From Hearing Communication Research?
Judith Sobel, Ph.D., Mary Meikle, Ph.D., Gloria Reich, William H. Martin, Ph.D.

Dr. Sobel is an Associate Professor in the School of Community Health at Portland State University. She teaches in the field of media and health, and conducts research on noise-induced hearing loss prevention with the Oregon Hearing Research Center. She received her PhD at the University of Minnesota in Mass Communication Theory.

Mary B. Meikle, Ph.D., Professor of Otolaryngology at OHSU, has conducted research into hearing loss and related disorders since 1969. Her special interest is evaluation, treatment and prevention of noise-induced tinnitus (ringing or other noises in ears or head) because it affects millions of Americans, many very severely.

Gloria Reich: no biosketch received

William H. Martin, Ph.D. is a professor of Otolaryngology/Head & Neck Surgery and professor of Public Health & Preventive Medicine at the Oregon Health & Science University in Portland, Oregon. He is also director of the OHSU Tinnitus Clinic and Research Programs, Intraoperative Neurophysiologic Monitoring Services and of the Dangerous Decibels® project. His research interests are in the neurobiology of tinnitus, auditory neurophysiology and noise-induced hearing loss and tinnitus prevention.

Abstract: As with many other public health problems there are substantial barriers to the acceptance of the hearing conservation message, particularly among adolescents. It is critical that the knowledge and experience gained over 30 years of health communication research be applied to adolescent hearing loss prevention programs. A number of theoretical models have been tested in a variety of settings that shed light on how to effectively communicate health risk information to school age children. The Transtheoretical model demonstrates that everyone moves through stages before they decide to change behavior. The Theory of Reasoned Action demonstrates that children's' attitudes, perceived control of the environment, and subjective norms are critical to behavior change. Social Cognitive Theory predicts that interactions that take place within the social environment, and the degree of self-efficacy, will affect adolescent health behaviors. Messages must reflect these variables if they are to succeed in changing behavior. School based health communication interventions driven by behavioral theory have shown that specific strategies work best in the classroom. These include tailoring the program, using peer-leaders and role modeling, involving parents and the community, affording enough time, and creating an interactive, positive, skills-based environment. We can increase the effectiveness of hearing loss prevention programs in the schools if we draw from the extensive literature on health communication and health behavior interventions.

2:40 PM

Noise and Music, A Matter of Risk Perception?
Stephen E. Widén, Ph.D., Soly Erlandsson, Ph.D.

Dr. Widén received his doctoral degree in Psychology at the University of Göteborg 2006. Title of the PhD-dissertation: "Noise and Music – a matter of risk perception".

Soly Erlandsson, Ph.D. is a senior researcher and lecturer in psychology. PhD thesis on tinnitus, psychological and psychophysiological aspects (1990). Tutor for Margareta Bohlin and Stephen Widen in their PhD studies in psychology. Interdisciplinary research on clinical management (therapy) for patients with tinnitus. Works with professor Alice Holmes, Univ. of Florida on cross-cultural studies on young adults attitudes and risks for NIHL.

Abstract: This presentation is a summary of four empirical studies, where adolescents' risk-taking behaviour regarding exposure to loud music has been investigated. Several studies have highlighted the negative auditory effects of exposure to loud music at concerts and discotheques, environments in which young people today spend considerable periods of time. The appreciation of loud music clearly involves health-risks. However, adolescents' behaviours regarding noise exposure have seldom been investigated from a risk-perspective. Our finding that adolescents' attitudes to noise and behaviours regarding the use of hearing protection differed between levels of socio-economic status is of considerable interest, since this finding might imply future inequalities in ear health. We have found that in Sweden the use of hearing protection at concerts was substantially higher than in the USA, a result that

can be explained by cultural and attitudinal differences between the countries. Young people's experiences, attitudes and beliefs concerning risk-taking in musical settings have also been investigated in a qualitative study. In a theoretical model which is based on the four studies, we suggest that variables, such as gender, culture and socio-economic status may have an impact on the individual's self-image, risk consideration, social norms and ideals. These variables, together with attitudes and experience of risk-behaviour, are considered as important factors in the understanding of health-risk behaviour regarding noise exposure.

3:00 PM Break

Thursday, October 19

Moderator 4 – Bob Folmer

3:30 PM	Soly Erlandsson, Ph.D., Alice Holmes, Ph.D., Stephen E. Widén, Ph.D., Margareth Bohlin, M.Sc. - Attitudes Towards Noise and Risk Behavior in Children and Young Adults.
3:50 PM	William Hal Martin, Ph.D., Susan E. Griest, M.P.H., Judith Sobel, Ph.D., Linda Howarth, Baker Yong-Bing Shi, M.D., Ph.D. - Dangerous Decibels®: Partnerships for NIHL Prevention in Children.
4:15 PM	Elliott Berger, M.S. - Children and Hearing Protection: What is Available and is it Used?
4:35 PM	Ted Madison, M.S. - Hearing Protection Considerations for Children & Adolescents.
4:50 PM	Wrap-Up

3:30 PM

Attitudes Towards Noise and Risk Behavior in Children and Young Adults.

Soly Erlandsson, Ph.D., Alice Holmes, Ph.D., Stephen E. Widén, Ph.D., Margareth Bohlin, M.Sc.

Dr. Erlandsson received her Ph.D. at the University of Göteborg 1990. Licensed psychologist 1991 in Sweden. A post doc position at Department of Psychology, University of Göteborg 1992-1998. Senior lecturer at University West 1999. Board member of the Foundation of Audiological Research (FAR) since and the Stinger foundation.

Alice Holmes Ph.D. received her Ph.D. at Pennsylvania State University. Past President - Academy of Rehabilitative Audiology; Secretary & Treasurer - International Colloquium of Rhabilitative Audiology. Honors: 2003 Professional Achievement Award, Idaho State University, GN Resound 1999 Caring for the Profession Award, Florida Association Speech-Language Pathologists & Audiologists 1999 Clinician of the Year.

Stephen E. Widén, Ph.D. received his doctoral degree in Psychology at the University of Göteborg 2006. Title of the PhD-dissertation: "Noise and Music – a matter of risk perception".

Margareth Bohlin, M.Sc. was born in 1970. B.Sc. in Psychology at University West in 2002 and M.Sc. in Psychology at University West in 2003. Employed at University West since 2002. Admitted in the Graduate program in Psychology at Gothenburg University in 2004. Teaching psychology in areas of personality, gender, social and emotional development.

Abstract: Several studies have reported an increasing trend of NIHL among children and adolescents (Niskar et al, 2001, Blair et al, 1996). Exposure to loud music, especially among young people, is an important source of concern. Concert- and discotheque-goers are routinely exposed to sound levels above 100 dBA (Clark, 1991), which may cause temporary or permanent damage to

the human ear and symptoms such as tinnitus (Kroener-Herwig et al, 2000). A comparative study revealed differences in attitudes between young adults in Sweden and in USA (Widén, Holmes & Erlandsson, in press). The young adults in the US sample had in general more positive attitudes towards noise or loud sounds than the Swedish sample. They seem not to protect their hearing to the same extent that young people in Sweden do when attending concerts and discotheques. In a previous study we found that the experience of hearing disturbances (e.g. tinnitus) and concern about developing hearing loss correlate with concert-goers' use of hearing protection (Olsen-Widén & Erlandsson, 2004). Therefore, we would like to draw the attention to the association between risk behaviour regarding exposure to loud music and risk behaviour in a more traditional sense, e.g. smoking, drug abuse etc. In order to prevent young people from developing NIHL more research on the effects of attitudes, norms and behaviour and in what way these aspects can explain hearing damage is needed.

3:50 PM

Dangerous Decibels®: Partnerships for NIHL Prevention in Children.

William Hal Martin, Ph.D., Susan E. Griest, M.P.H., Judith Sobel, Ph.D., Linda Howarth, Baker Yong-Bing Shi, M.D., Ph.D.

Billy Martin is a professor of Otolaryngology/Head & Neck Surgery and professor of Public Health & Preventive Medicine at the Oregon Health & Science University in Portland, Oregon. He is also director of the OHSU Tinnitus Clinic and Research Programs, Intraoperative Neurophysiological Monitoring Services and of the Dangerous Decibels® project. His research interests are in the neurobiology of tinnitus, auditory neurophysiology and noise-induced hearing loss and tinnitus prevention.

Susan E. Griest, M.P.H., is a Staff Scientist for the Oregon Hearing Research Center, Oregon Health and Science University in Portland, Oregon. Ms. Griest is a researcher in the area of tinnitus and noise-induced hearing loss. She is a member of the NHCA Task Force: Children and Noise and has served on the NHCA Executive Council for the past 3 years.

Judith Sobel, Ph.D. is an Associate Professor in the School of Community Health at Portland State University. She teaches in the field of media and health, and conducts research on noise-induced hearing loss prevention with the Oregon Hearing Research Center. She received her PhD at the University of Minnesota in Mass Communication Theory.

Linda Howarth is research associate in the Oregon Hearing Research Center at Oregon Health & Science University. She is the program coordinator for the Dangerous Decibels project, a hearing loss prevention program geared to school-age children.

Baker Yong-Bing Shi, M.D., Ph.D. received his medical and doctoral degrees in China, was a Post-Doc Research Fellow at Temple University from 1992-94 and returned to become a Research Associate/Neurophysiologist there in 1997. He joined the faculty at the OHSU Department of Otolaryngology in 1998 and is an Assistant Professor. He is a Fellow of the American Academy of Otolaryngology-Head and Neck Surgery. He specializes in tinnitus, voice disorders, intraoperative neurophysiological monitoring and otoacoustic emissions, and is the Medical Director of the OHSU Tinnitus Clinic.

Abstract: The Dangerous Decibels® program is a model for innovative, effective, multi-disciplinary partnerships in addressing hearing health issues using museum exhibitions, public events, classroom educational programs, web-based activities and instruction, educator training programs, televideo-conferencing, the media and ongoing research to reduce the incidence of noise induced hearing loss in the public, especially among young people. Partnerships between hearing scientists, museum exhibit designers and fabricators, public health experts, health communications scientists, evaluators, multicultural advisors, public and private schools, and multiple funding sources are required to achieve the program goals. Information is disseminated at different levels of complexity to approximately 800,000 individuals/year through the combined outreach efforts. This presentation will present an overview of the program activities and resources, discuss the role of local partnerships to accomplishing NIHL prevention, and present new Dangerous Decibels initiatives within the Native American tribes in the Pacific Northwest.

4:15 PM

Children and Hearing Protection: What is Available and is it Used?
Elliott Berger, M.S., INCE Board Certified

Elliott H. Berger is the Senior Scientist for Auditory Research at E·A·R / Aearo Company, where for 30 years he has studied noise and hearing conservation, with an emphasis on hearing protection. He chairs the ANSI working group on hearing protectors, has been lead editor for two highly-regarded texts in noise and hearing conservation, served on a National Academy of Science committee evaluating hearing loss in the military, and has presented his research in numerous text book chapters and over 60 published articles

Abstract: For many noise exposures, the only feasible auditory defense is a hearing protection device (HPD); for many other exposures such devices are desirable or are the most convenient protective strategy. Their use and application in adult populations is well understood and documented, but in children and teenagers, such is not the case. This paper will summarize available data on HPD utilization and effectiveness in younger age groups and suggest if and how utilization could or should be improved. Considerations for measuring hearing protector effectiveness in children will be explored. HPDs that are available for groups from neonatal infants in the hospitals, to youngsters accompanying their parents during noise-hazardous activities such as target shooting, hunting, or loud public events, to teenagers involved in part-time noisy occupations, will be described. Safe listening is a habit that should be instilled at an early age and this paper will provide tools to help make that a reality.

4:35 PM

Hearing Protection Considerations for Children & Adolescents.
Ted Madison, M.S., CCC-A

Mr. Madison is an audiologist with 3M Company, where he participates in the development of hearing protection products and hearing loss prevention education programs. He is a CAOHC Course Director and a frequent visitor to St Paul area schools where he teaches kids about hearing health using the Dangerous Decibels curriculum. Ted is a Past-President of NHCA and recipient of the 2002 NHCA Outstanding Lecture Award.

Abstract: Teaching school age children to know when and how to use hearing protection can be a challenge. It's made more difficult by the fact that nearly all hearing protectors on the market today are designed to fit adults and that the claims made by hearing protector manufacturers regarding fit and performance of their products are all based on testing conducted with adults. To help children select and wear hearing protectors effectively, parents, audiologists and teachers must consider the differences between children and adults with respect to fit, comfort, ease of use, and compatibility of hearing protectors. The author will describe his experiences in teaching children to wear hearing protectors and discuss the practical considerations of hearing protector fitting in a classroom or clinical setting.

4:50 PM Wrap-Up

Friday, October 20

Moderator 5 – Ted Madison

8:10 AM	Lee Hager - Working Youth, Noise Exposure and Hearing Loss.
8:25 AM	William Clark, Ph.D., Carl Bohl, D.Sc. - Historical Trends in Hearing of Young People.
8:55 AM	Howard J. Hoffman, Chia-Wen Ko, Ph.D., Christa L. Themann, M.A., CCC-A, John R. Franks, Ph.D. - Declining Trends in Noise-Induced Hearing Loss (NIHL) in Children Based on the U.S. Health Examination Survey.
9:10 AM	William Hal Martin, Ph.D., Baker Y-B. Shi, M.D., Ph.D., Susan E. Griest, M.P.H. - Hearing Health Research in a Public Setting.
9:25 AM	Deanna K. Meinke, Ph.D., Noel Dice, Au.D. - Comparison of Audiometric Screening Criteria for Early Identification of Noise-Induced Hearing Loss in Adolescents.
9:40 AM	Cheryl DeConde Johnson, Ed.D. - Noise-Induced Hearing Loss: Legal Implications for Schools.
10:00 AM	Break

8:10 AM

Working Youth, Noise Exposure and Hearing Loss.
Lee Hager

Lee Hager brings nearly 20 years of experience to his position as Hearing Loss Prevention Consultant for Sonomax Hearing Healthcare, Inc., including consultation regarding the quality and integrity of hearing conservation programs. He has served as President of the National Hearing Conservation Association (NHCA); chair of the Noise Committee of the American Industrial Hygiene Association (AIHA); NIOSH National Occupational Research Agenda (NORA) Noise Team member; and with ANSI Working Group S12/WG11 on hearing protector evaluation and labeling issues. He presents and publishes regularly on noise and hearing topics, having received the AIHA Noise Committee Outstanding Lecture Award in 2003 and NHCA's Threadgill Award in 2004. Most of all, he cares about your ears.

Abstract: Excessive workplace noise exposure is a risk factor for hearing loss in workers of all ages, including adolescents and youth. Determination of the number of workers exposed to noise has been problematic, with estimates ranging from 9 million to 30 million US workers. Comparison is made between sector-based estimates of noise-exposed adult workers and the adolescent and youth counterparts to estimate the number of young workers at risk of hearing loss due to workplace noise. Data from the NIOSH National Occupational Exposure Survey (NOES) is compared to recent young worker employment statistics to estimate the number of young workers potentially exposed to hazardous noise on the job. Cases of OSHA recordable hearing loss (reflecting both hearing change and hearing impairment attributed to workplace noise exposure under 29CFR1904.10) from 2004 are compared by industry to young worker exposure estimates to project the effect of workplace noise on young workers.

8:25 AM

Historical Trends in Hearing of Young People.
William Clark, Ph.D., Carl Bohl, D.Sc.

Dr. Clark is Professor and Director of the Program in Audiology and Communication Sciences at Washington University School of Medicine. He has a long-standing interest in noise-induced hearing loss and has published more than 50 peer-reviewed laboratory and field studies.

Carl Bohl, Sc.D., is an industrial hygienist and served for many years as the director of the hearing conservation program for Monsanto. Dr. Bohl teaches in the Program in Audiology and Communication Sciences at Washington University and has published a number of articles on NIHL with Dr. Clark

Abstract: Recent interest in the types and amounts of excessive noise exposures experienced by children and youth has led to the suggestion that young people of the current generation have worse hearing, and more noise-induced hearing loss than their predecessors. To address these related questions, we reviewed the data from National Health Surveys conducted in 1935-1936, 1963-1965, and 1988-1994. We also conducted a retrospective analysis of audiograms collected as part of a NIOSH study of changes in hearing of industrial workers. From an original sample of more than 140,000 audiograms obtained from the hearing conservation programs of 24 industrial companies and provided to NIOSH, we selected the audiograms collected between 1970 and 1985 of workers who were age 20, and who had been employed in their present job for less than six months. This procedure yielded 14,716 audiograms, most obtained prior to employment. The data were sorted by year, and the results were plotted by audiometric test frequency (0.5 kHz, 1 kHz, 2 kHz, 3 kHz, and 6 kHz) for the right, left, average, and better ears. Linear regression of the data by year indicated the slopes of the functions did not differ significantly from zero. That is, there was no trend toward worse hearing in the 20-year-olds over the 15-year period of the study. Combined with the findings of the National Health Surveys, it can be concluded that today's youth do not have worse hearing than their predecessors.

8:55 AM

Declining Trends in Noise-Induced Hearing Loss (NIHL) in Children Based on the U.S. Health Examination Survey.
Howard J. Hoffman M.A., Chia-Wen Ko, Ph.D., Christa L. Themann, M.A., CCC-A,
John R. Franks, Ph.D.

Howard Hoffman is Director, Epidemiology and Biostatistics Program, NIDCD/NIH is the Project Officer for the National Health and Nutrition Examination Survey (NHANES) and other research studies in communication disorders. He has an advanced degree in mathematical statistics and has published over 185 scientific papers, plus several chapters, and two books.

Chia-Wen Ko, Ph.D., is a Research Biostatistician in the Epidemiology and Biostatistics Program, NIDCD/NIH. She has published 18 peer-reviewed papers. Her research has focused on clinical trials, survival studies, and the epidemiology of hearing loss, including long-term sequelae of early-onset, recurrent otitis media, age-related hearing loss, and familial deafness.

Christa LThemann, M.A., CCC-A, Research Audiologist, National Institute for Occupational Safety and Health (NIOSH), Cincinnati, Ohio. Her research includes epidemiologic studies (NHANES, AGES-Reykjavik, FELS Longitudinal Study, and NIOSH Farm Family Health and Hazard Survey) and she has also studied hearing protector attenuation and hearing conservation strategies for hearing-impaired workers.

John R. Franks, Ph.D., National Institute for Occupational Safety and Health, has worked on hearing loss prevention and standards development for more than 20 years. He has published/presented 70 papers and holds two patents. In 1981, he conducted one of the first studies of tinnitus among persons with normal hearing.

Abstract: We have analyzed trends in NIHL using data collected in two nationally-representative surveys: the National Health Examination Survey (NHES) Cycles 2 & 3, 1963–1970, and the National Health and Nutrition Examination Survey (NHANES III), 1988–1994. Questions about potential risk factors were asked in household interviews independently of pure-tone audiometry

conducted in mobile exam centers (thresholds determined 0.5–8 kilohertz [kHz], each ear). We used high-frequency "notches" in both ears as the proxy indicator for NIHL. A notch was considered present if any threshold at 3, 4, or 6 kHz exceeded the average threshold at 0.5 and 1 kHz by 15 decibels (dB) or more and the threshold for 8 kHz was at least 5 dB better than the maximum threshold at 3, 4, or 6 kHz. In NHES, age-specific prevalences, 6.3%, 7.8%, 15.4%, 18.2%, and 24.9%, were much higher than 20 years later in NHANES III when these prevalences were 0.8%, 1.7%, 4.8%, 2.3%, and 8.0% for children 6–8, 9–11, 12–14, 15–17, and 18–19 years. NIHL was more common in male adolescents (NHES: odds ratio = 1.70, 95% confidence interval: 1.51–1.91; NHANES III: 1.77, 0.94–3.34). In NHES, logistic regression models adjusted for sex and age showed an increased NIHL risk with teen smoking (1.19, 1.01–1.41) and residence in rural areas or the South or West. NHANES, 2005–2008, will be used to update knowledge of risk factors, allowing educational programs to target specific high risk groups to improve prevention efforts.

9:10 AM

Hearing Health Research in a Public Setting.

William Hal Martin, Ph.D., Baker Y-B. Shi, M.D., Ph.D., Susan E. Griest, M.P.H.

Billy Martin is a professor of Otolaryngology/Head & Neck Surgery and professor of Public Health & Preventive Medicine at the Oregon Health & Science University in Portland, Oregon. He is also director of the OHSU Tinnitus Clinic and Research Programs, Intraoperative Neurophysiological Monitoring Services and of the Dangerous Decibels® project. His research interests are in the neurobiology of tinnitus, auditory neurophysiology and noise-induced hearing loss and tinnitus prevention.

Baker Y-B. Shi, M.D., Ph.D., received his medical and doctoral degrees in China, was a Post-Doc Research Fellow at Temple University from 1992-94 and returned to become a Research Associate/Neurophysiologist there in 1997. He joined the faculty at the OHSU Department of Otolaryngology in 1998 and is an Assistant Professor. He is a Fellow of the American Academy of Otolaryngology-Head and Neck Surgery. He specializes in tinnitus, voice disorders, intraoperative neurophysiological monitoring and otoacoustic emissions, and is the Medical Director of the OHSU Tinnitus Clinic.

Susan E. Griest, M.P.H., is a Staff Scientist for the Oregon Hearing Research Center, Oregon Health and Science University in Portland, Oregon. Ms. Griest is a researcher in the area of tinnitus and noise-induced hearing loss. She is a member of the NHCA Task Force: Children and Noise and has served on the NHCA Executive Council for the past 3 years.

Abstract: Informal educational settings, such as museums, stimulate public interest in science and technology. Changes in museum formats and priorities have led visitors from just looking to "experiencing" exhibits through hands-on, interactive educational activities. The Dangerous Decibels museum exhibition at the Oregon Museum of Science and Industry (OMSI) includes one exhibit that acquires demographic, reported behavioral and physiological data from visitors that can be used to study hearing health. A stylized sound insulated booth hosts a computer game based data acquisition system. Visitors are invited to allow their answers and responses to be included in a research project of the Oregon Hearing Research Center. Information regarding age, gender, race/ethnicity, military service, reported noise exposures during the past year are obtained. In addition, monaural hearing levels at 4,000 Hz are tested between 20 and 65 dB HL using a game format. Results are tagged if there are high levels of ambient noise in the booth or more than 5 false positive responses during the hearing screening. Over 36,000 subjects between the ages of 6 and 85 years of age have participated. Results can be analyzed by age, gender, hearing threshold and by reported noise exposures. A validation study determined the accuracy of the test results to be very high. Results are continuously updated and available online to scientists and the public for their own evaluations at www.dangerousdecibels.org in the Information Center, under Exhibit Research. This work represents the first application of public health research on hearing issues in an informal educational setting.

9:25 AM

Comparison of Audiometric Screening Criteria for Early Identification of Noise-Induced Hearing Loss in Adolescents.
Deanna K. Meinke, Ph.D., Noel Dice, Au.D.

Deanna Meinke is an Assistant Professor of Audiology and Speech-Language Sciences at the University of Northern Colorado. She is a project consultant for the Marion Down Hearing Center and a regional audiology coordinator for the Colorado Department of Health. Her research interests include distortion product otoacoustic emissions and the prevention of noise-induced hearing loss. She is past-president of the Colorado Academy of Audiology and presently chairs the National Hearing Conservation Association Task Force on Children and Noise.

Noel Dice, Au.D., is a recent doctor of audiology graduate from the University of Northern Colorado. She is presently employed as a clinical audiologist at Western Otolaryngology in Wheatridge, Colorado where she provides clinical audiology services to clients of all ages.

Abstract: In order to gain insight into the utility of school-based hearing screening programs to provide early identification of noise-induced hearing loss (NIHL) in children; the school-based hearing screening protocols for each state in the U.S., and protocols advocated for by various organizations were obtained and evaluated. Hearing screening protocols were compared on the basis of the potential to detect early noise-induced hearing threshold shift (NITS) in adolescents using the Niskar et al. (2001) noise-notch criteria. Audiometric pure-tone thresholds were obtained on 9th and 12th grade students using an industrial model of audiometric testing. The results indicate that the majority of existing school-based hearing screening protocols are not adequate for the early identification of NITS. There is a need for the creation, implementation and standardization of a school hearing screening/testing protocol with appropriate criteria for the early identification of NIHL in adolescents.

9:40 AM

Noise-Induced Hearing Loss: Legal Implications for Schools.
Cheryl DeConde Johnson, Ed.D.

Cheryl Johnson recently retired from the Colorado Department of Education where she was the audiology consultant for 16 years. She is currently part-time faculty in three audiology doctoral programs and maintains an active consulting practice. Cheryl has also worked as an educational audiologist, hearing specialist, and deaf education program supervisor.

Abstract: Noise-induced hearing loss in children has not received the level of attention that it deserves. Whether due to inadequate hearing screening programs, lack of awareness of the implications of minimal and mild hearing losses, or state regulations that do not recognize high frequency hearing loss as having an impact on learning, these children often go unidentified in our schools. Many of these children are actually eligible for and receive special education services as a result of their inability to have full communication access in their school programs. This presentation will address ADA, 504 and IDEA 2005 requirements for schools relative to hearing loss and hearing loss prevention. In addition, the implications of OSHA noise standards for public and private school settings including exposure by employees and students will be discussed. Case law will be reviewed to illustrate compliance issues and requirements for monitoring of high noise areas, use of ear protection, testing for hearing sensitivity of those exposed, and hearing loss education.

10:00 AM Break

Friday, October 20

Moderator 6 – Pam Graydon

10:30 AM	Sargunam Sivaraj, Aneeta Samuel - Are We Doing Enough to Prevent Noise/Music Induced Hearing Loss in Children in New Zealand?
10:50 AM	Mario R. Serra, Ph.D., Ester C. Biassoni, Ph.D. - Hearing Impairment Among Adolescents.
11:35 AM	Lunch

10:30 AM

Are We Doing Enough to Prevent Noise/Music Induced Hearing Loss in Children in New Zealand?

Sargunam Sivaraj, M.Sc., Aneeta Samuel

Mr. Sivaraj is presently enrolled as PhD candidate, the project title is Music and its effects on hearing with Massey University. For the past 4 Years, I have been working as the team leader for the audiological services of the CCDHB at the Wellington hospital. . Before that I was serving as the head of audiological services with the government of United Arab Emirates. Conducted various research related to Neonatal Hearing screening and Noise Induced Hearing loss. Research work was presented at various international meetings. Considering that the prevention of hearing loss is integral part of the scope of audiology practice, have been actively involved and taken lead roles with the various national level preventive measures in New Zealand and United Arab Emirates (UAE). Was always involved in public and professional education on prevention of hearing loss.

Aneeta Samuel has 12 years of clinical experience in the field of audiology. has taken several steps towards prevention of hearing loss. Involved in various research related to Neonatal Hearing screening and Noise Induced Hearing loss. Research work was presented at various international meetings. Considering that the prevention of hearing loss is integral part of the scope of audiology practice, have been actively involved in preventive measures in New Zealand and United Arab Emirates (UAE).

Abstract: NIHL in children is on the increase because of listening to personal music systems, playing musical instruments, television that is too loud, car stereos that are loud, using loud toys, firearms and being a bystander in a noisy environment. There are number of studies to support that the incidence of noise induced hearing loss in children is on the increase. The purpose of this study was finding out the number of preventable noise induced hearing loss in children. There were 72 children identified with high frequency hearing loss in the age group of 4 to 19 yrs in the past 2 years. Out of this 25 children have been referred after they have failed school hearing screening at 4 kHz. An attempt to group them based on the causative factors associated with hearing loss revealed that at least 32% of hearing loss can be attributed to the direct result of music exposure, 18% related to noise exposure, 10% personal stereo, 1% to loud car stereo 14% ototoxicity and 25% cause could not be identified. Some of the proposed measures to prevent hearing losses are 1) Educational programs aimed at prevention of hearing loss starting from elementary grades 2) Implementation of Hearing conservation programs in all the schools especially children who all are part of the music band, industrial/art classes and various recreational activities 3) Improvement in School hearing screening program to include higher grade children not stopping at school entry screening. Screening should include Otoacoustic Emission testing and basic audiometry should include 6 and 8 KHz as well and 4) Prevention of preventable hearing loss in children should become a national priority.

10:50 AM

Hearing Impairment Among Adolescents.

Mario R. Serra, Ph.D. and Ester C. Biassoni, Ph.D. (Invited Speakers)

Dr. Serra is a Dr. Eng. specialized on Acoustic. He is currently Head of Centro de Investigación y Transferencia en Acústica. National Technical University, Córdoba, Argentina. He is a Researcher of the National Scientific and Technical Research Council Researcher of the National Scientific and Technical Research Council (CONICET), Argentina. Professor at Grade and Postgrade Level. Secretary of Acoustics and Electroacoustics Comission of the Argentine Institute for Standards (IRAM).

Ester C. Biassoni, Ph.D., is a Dr. Psychology specialized on Psychoacoustics, Environmental Psychology and Hearing Conservation. Researcher of the National Scientific and Technical Research Council (CONICET), Argentina. · Head of Research Department, Centro de Investigación y Transferencia en Acústica, National Technical University –Córdoba, Argentina. Professor at Grade and Postgrade Level

Abstract: Multidisciplinary project whose aim is to find the causes of hearing impairment among young people and to contribute to its prevention. First stage: an study with adolescents of middle socio-economic level over a period of four years, in which exposure to high sound levels during their leisure activities was cause of hearing disorders among adolescents with tender ears, at the age of only 17/18. Nevertheless, the same sound levels did not damage the ears of other adolescents of the same study. Second stage: a programme addressed to adolescents —14/15 years of age— of low socio-economic level who are prospective applicants for jobs in factories. These adolescents attend the schools from which they are annually selected for work, and are re-tested at the age of 17/18. The aspects considered are: - Hearing diagnosis by applying conventional and extended high frequency audiometry and otoacoustic emissions. A vehicle has been acoustically prepared and equipped as a movable audiometric booth. -Determination of psychosocial variables and recreational habits. - Measurements of sound immission during recreational activities. - Application of standardized metrological procedures. When hearing disorders are detected: a) counselling, assistance and adequate medical treatment are provided; b) prevailing genetic mutations are studied and the genotype-phenotype correlations are established. Our purpose is: a) to define the etiology of the problem; b) to give personal advice and assistance; c) to plan and launch educational campaigns; d) to contribute with scientific guidelines in the setting up of standards and bylaws in relation with the hearing health.

11:35 AM Lunch

Friday, October 20

Moderator 7 – Howard Hoffman

1:30 PM	Kris Chesky, Ph.D. - Hearing Conservation in College Music Programs.
1:50 PM	Gael Hannan, Heather Ferguson - Sound Sense: Save Your Hearing for the Music!
2:10 PM	Lidia Lee, Ph.D., CCC-A - Hearing Conservation Program in the Schools: A Collaborative Approach
2:30 PM	Greg Flamme, Ph.D., Shelby Myers-Verhage - Effectiveness of School-Based Hearing Loss Prevention Programs in a Rural Area.
2:50 PM	Patricia Blessing - Review and Future Recommendations of NIDCD's Public Education Efforts to Prevent NIHL in Children
3:05 PM	Break

1:30 PM

Hearing Conservation in College Music Programs.

Kris Chesky, Ph.D.

Dr. Chesky holds degrees from Berklee College of Music (B.M.) and the University of North Texas (M.M.E., Ph.D.). Dr. Chesky is Director of Education and Research for the Texas Center of Music & Medicine. He currently serves on the Board of Directors for the Performing Arts Medical Association, the Scientific Review Board for the Medical Problems of Performing Artists Journal, and the Music Induced Hearing Loss task force of the NHCA. In addition to teaching within the UNT College of Music and being an active professional trumpet player, Dr. Chesky's conducts research related to the medical problems of musicians. Dr. Chesky is currently serving as the Executive Director of the Health Promotion in Schools of Music project.

Abstract: Approximately 100,000 music students are enrolled in college music programs in the US. The Health Promotion in Schools of Music Project (www.unt.edu/hpsm) recommends that all schools of music accredited by the National Association of Schools of Music inform college music students about noise induced hearing loss. Educating music students has the potential to impact generations of future musicians and music teachers. As a working model for this recommendation, the College of Music at the University of North Texas (UNT) recently established an educational approach that uses the music ensemble class as the setting for informing students about NIHL. This program was recently profiled in the March 2006 issue of Hearing Review. www.HearingReview.com The NHCA Music Induced Hearing Loss task force participated in the development of an educational resource designed to assist UNT music faculty to deliver hearing loss prevention information in the context of ensemble classes. This first-of-a-kind initiative offers insights into the social/cultural challenges associated with labeling music school ensemble classes as "at risk" instructional settings.

1:50 PM

Sound Sense: Save Your Hearing for the Music!
Gael Hannan, Heather Ferguson

Gael Hannan is a renowned hearing loss prevention advocate with The Hearing Foundation of Canada, a not-for-profit organizations committed to eliminating the devastating effects of hearing loss on the quality of life of Canadians by promoting prevention, early diagnosis, leading edge medical research and successful intervention.

Heather Ferguson is the current President of The Hearing Foundation of Canada.

Abstract: Research shows that the better children hear, the better they learn. Even mild hearing loss can affect academic, social and future career achievements. Studies also confirm the success of hearing conservation programs aimed at young people, yet hearing injury prevention is not taught in school. In 2005, The Hearing Foundation of Canada introduced Sound Sense: Save Your Hearing for the Music!, an exciting program that teaches students why and how they can protect their sense of hearing from noise damage. The music-themed, interactive program complements the Grades 4 to 7 core health curriculums and is easy to deliver in a 30-60 minute class period. Students explore the role of sound and hearing in their lives; they learn how hearing works, the effects of noise, what it might be like to have a hearing loss and finally, strategies to help protect their hearing. The attractively packaged presentation kit includes a curriculum booklet, an entertaining, partially-animated 10-minute video, and take-home materials for students and parents. Sound Sense, currently rolling out in several provinces, is delivered in the schools by both in-school teachers, and by hearing health professionals and other volunteer facilitators who understand the importance of hearing loss conservation. This program overview will cover the need for, goals, delivery methods, feedback on the first year of rollout, and future plans for Sound Sense in Canada..

2:10 PM

Hearing Conservation Program in the Schools: A Collaborative Approach.
Lidia Lee, Ph.D., CCC-A

Dr. Lee is an Associate Professor in the Department of Special Education at Eastern Michigan University. She holds a Ph.D. in Audiology from Indiana University, Bloomington. She has utilized an academic service learning model in teaching hearing loss prevention to children in the local community. Other research interests include psychoacoustics, and the perception of sound quality in communication systems.

Abstract: This session will present a step-by-step approach to integrating a hearing conservation program in a graduate curriculum. This hearing conservation program targets students who are in lower elementary levels, and is presented by graduate students in speech-language pathology. The graduate curriculum evolves from an academic-service learning model that integrates community service, academic learning, as well as civic learning among students in higher education. A hearing conservation program is established as a collaborative effort of the elementary school and the higher-education institutions based on civic engagement. The presenter will discuss the program details, program effectiveness and retention outcomes. Furthermore, the effectiveness of an academic-service learning model will also be presented

2:30 PM

Effectiveness of School-Based Hearing Loss Prevention Programs in a Rural Area.
Greg Flamme, Ph.D., Shelby Myers-Verhage

Dr. Flamme is an Assistant Professor in the Department of Speech Pathology and Audiology at Western Michigan University in Kalamazoo, MI. His research interests focus on the epidemiology, prevention, and the evaluation of rehabilitative techniques for people with mild hearing impairment.

Shelby Myers-Verhage is an instructor in the Department of English at Kirkwood Community College. She taught middle school English for 8 years, and then returned to school to earn an M.A.T. at the University of Iowa. Shelby's professional interests focus on curriculum development for public school systems.

Abstract: This presentation will describe the results of an evaluation of four hearing loss prevention programs, two for grade 4 and two for grade 7. Within each grade level, one basic and one comprehensive program were developed. The basic program included hearing evaluations, a brief individual consultation, and easy access to a supply of hearing protectors (grade 7 only). The comprehensive program added classroom presentations, take-home activities/ materials, and booster interventions. Participants in basic and comprehensive programs (N = 309) were compared with responses with a reference group of approximately 600 students from other school districts in which no program was administered. Outcomes, measured 9 to 12 months after the start of the intervention, included changes in hearing status, self-reported exposure frequency, knowledge, health beliefs, and intentions regarding hearing loss prevention. No significant differences in hearing sensitivity were observed across the basic and comprehensive treatment groups. At both grade levels, both treatment groups showed better outcomes (re: health beliefs and intentions) than the reference group. The comprehensive treatment showed better belief and intention outcomes than the basic treatment group in grade 7 only. We concluded that basic hearing loss prevention programs provide superior outcomes to no systematic hearing loss prevention education, and that benefits from comprehensive hearing loss prevention education were observable within the 7th grade group 9 to 12 months following the start of the intervention. Research supported by NIOSH (R21 OH07707).

2:50 PM

Review and Future Recommendations of NIDCD's Public Education Efforts to Prevent NIHL in Children
Patricia Blessing

Ms Blessing is is director of NIDCD's Office of Health Communication and Public Liaison, where she plans and directs media relations, community relations, public education, and dissemination of scientific information. She received her B.S. in nutrition research in 1981 from the University of Maryland and completed master's coursework in science communication.

Abstract: The effects of loud noise on hearing have been a primary area of focus for the National Institute on Deafness and Other Communication Disorders (NIDCD) since its beginning in 1988. In 1990, the NIDCD took part in an NIH consensus conference on noise and hearing loss which, in part, recommended the need for education programs beginning with school-age children to prevent hearing loss caused by noise. Shortly thereafter, NIDCD developed an educational guide and video for teachers in grades 3 through 6 to teach children about the importance of protecting their hearing. In 1998, a NIHL conference was held, sponsored by the NIDCD, the National Institute of Environmental Health Sciences (NIEHS), NIOSH, and the private sector. As a result of the conference, the WISE EARS! program was born and for almost seven years, a coalition of nearly 90 partner organizations disseminated information materials to the public and health professionals. An evaluation of the WISE EARS! efforts and recommendations for the best communication strategies for the future will be presented.

3:05 PM Break

Friday, October 20

Moderator 8 – Brian Fligor

3:30 PM	Susan E. Griest, M.P.H., William Hal Martin, Ph.D., Judy Sobel, Ph.D., Linda Howarth - Program Evaluation: Results of Noise-Induced Hearing Loss and Tinnitus Prevention Interventions.
3:50 PM	Mona Thomas, M.S.W., Joseph Cerquone, CAE, Pamela Mason, M.Ed., CCC-A, Brenda Lonsbury-Martin, Ph.D. - Using the Media as an Education Tool.
4:10 PM	William Hal Martin, Ph.D., Susan E. Griest, M.P.H., Casey Spain, Linda Howarth - Effectiveness of Web-Based Edu-Tainment for Hearing Loss Prevention in Children.
4:30 PM	Robert Folmer, Ph.D., Susan E. Griest, M.P.H., William Hal Martin, Ph.D. - Resources to Facilitate Classroom Instruction of Hearing Loss Prevention.
4:50 PM	Adjournment

3:30 PM

Program Evaluation: Results of Noise-Induced Hearing Loss and Tinnitus Prevention Interventions.

Susan E. Griest, M.P.H., William Hal Martin, Ph.D., Judy Sobel, Ph.D., Linda Howarth

Ms Griest is a Staff Scientist for the Oregon Hearing Research Center, Oregon Health and Science University.

Dr. Martin is a professor of Otolaryngology/Head & Neck Surgery and professor of Public Health & Preventive Medicine at the Oregon Health & Science University.

Dr. Sobel is an Associate Professor in the School of Community Health at Portland State University.

Ms. Howarth is program coordinator for the Dangerous Decibels program at Oregon Health & Science University.

Abstract: Four intervention strategies applying current health communication and behavior theory, to increase knowledge, change attitude and behavioral intention consistent with hearing loss prevention were compared to a non-intervention, control group in fifty-four, Oregon, 4th grade classrooms. Students received pre- and post-intervention and follow-up questionnaires. Intervention 1: Classroom Presentation by Older-Peer Educators (High school students). Intervention 2: Classroom Presentation by Health Professional Educators (School nurses). Intervention 3: On-site Museum Experience (12-component exhibition of NIHL and tinnitus prevention at the Oregon Museum of Science and Industry). Intervention 4: Web-based Museum Experience (Web-based version of the above museum exhibit). Non-Intervention: 4th grade control groups matched for age, gender, socio-economic and geographic factors. A 2-factor ANOVA with post-hoc comparisons using classroom as the unit of comparison was performed. All four-intervention groups showed significant improvements from pre to post intervention. No significant differences were identified between older peers and school nurses in regard to increases in knowledge, changes in attitudes and behavioral intentions. Classroom presentations did better than the web-based museum interventions in regard to changes in behavioral intention. The control group showed no improvement from the time of pre to follow-up questionnaire strongly suggesting that the increases obtained by the intervention groups were due to the educational intervention. A significant drop in gains made by the intervention groups at post-intervention was revealed at follow-up evaluation although significant improvements compared to the pre-intervention still remained. Implementation of a booster intervention separated in time from the initial program, is recommended for improving long-term retention.

3:50 PM

Using the Media as an Education Tool.

Mona Thomas, M.S.W., Joseph Cerquone, CAE, Pamela Mason, M.Ed., CCC-A, Brenda Lonsbury-Martin, Ph.D.

Joseph Cerquone is Director of Public Relations for the American Speech-Language-Hearing Association, Rockville, MD.

Mona Thomas is director of media relations for the American Speech-Language-Hearing Association (ASHA).

Abstract: This presentation will illustrate how working with print and broadcast media can provide another method of educating the public about the issue of noise and hearing loss. Gaining visibility in the media for your hearing conservation programs and services or science and research projects can be an easy and cost-effective way to bring these important issues into the awareness of a greater number of people as well as communicate messages about prevention. This session will examine the nuts and bolts of working with the media, whether you have dollars to spend or you have no budget at all, using a variety of public relations strategies and tools.

4:10 PM

Effectiveness of Web-Based Edu-Tainment for Hearing Loss Prevention in Children.

William Hal Martin, Ph.D., Susan E. Griest, M.P.H., Casey Spain, Linda Howarth

Dr. Martin is a professor of Otolaryngology/Head & Neck Surgery and professor of Public Health & Preventive Medicine at the Oregon Health & Science University.

Ms Griest is a Staff Scientist for the Oregon Hearing Research Center, Oregon Health and Science University.

Mr. Spain is a software developer working with the Oregon Museum of Science and Industry.

Ms. Howarth is program coordinator for the Dangerous Decibels program at Oregon Health & Science University.

Abstract: The internet is the fastest growing and most widely accessed source of information in the world. Under the 1996 Telecommunications Act, $60 million/year will be allocated to assist schools and libraries in promoting Internet education for children and youth (Murase, Emily et al., 1999). The Dangerous Decibels® education and hearing scientists have worked with museum exhibit developers to create an entertaining, educational web-based Virtual Exhibit, consisting of 8 modules encompassing three educational goals: 1. What are sources of dangerous sounds?, 2. What are the consequences of exposure to dangerous sounds?, 3. How do I protect myself from dangerous sounds? The effectiveness of the Virtual Exhibit was improving knowledge, attitudes and intended behaviors regarding noise-induced hearing loss and tinnitus prevention was evaluated in 301 4th grade students. Students completed questionnaires immediately before and after visiting the Virtual Exhibit for 20 minutes. They took a follow-up questionnaire 3 months later to evaluate retention of information. Students who explored the Virtual Exhibit showed significant improvements in knowledge, attitudes and intended behaviors immediately after and at 3 months after the intervention compared to the control group. Other work indicates that the Virtual Exhibit enhanced the long-term impact of classroom programs when used as a booster intervention. Internet edutainment can be a cost-effective means of conveying hearing health information to young people, especially when used as part of a comprehensive NIHL prevention program.

4:30 PM

Resources to Facilitate Classroom Instruction of Hearing Loss Prevention.
Robert Folmer, Ph.D., Susan E. Griest, M.P.H., William Hal Martin, Ph.D.

Robert Folmer is Clinical Neurophysiologist and Associate Professor of Otolaryngology at Oregon Health & Science University.

Ms Griest is a Staff Scientist for the Oregon Hearing Research Center, Oregon Health and Science University.

Dr. Martin is a professor of Otolaryngology/Head & Neck Surgery and professor of Public Health & Preventive Medicine at the Oregon Health & Science University.

Abstract: Elliott Berger and Julia Royster made the following statement about occupational hearing conservation programs: "In large part, what is needed is not the development of new solutions, but rather the broad dissemination of existing techniques." This statement also applies to educating children about the consequences of excessive noise exposure. Numerous programs, curricula and materials exist that can be used to teach hearing loss prevention in classrooms. However, there is a lack of dissemination of this important information to our children. This presentation will review resources available now that can facilitate instruction of hearing loss prevention practices in schools.

4:50 PM Adjournment

Posters and Interactive Table Displays

Moderator 9 – Greg Flamme

1. Poster	Margareta Bohlin, M.Sc., Soly Erlandsson, Ph.D. - Adolescent Risk Taking - Leisure Time Noise and Risk Behaviour
2. Table	David K. Brown, Ph.D. - Walkometer AKA The Big Purple Head
3. Poster	Susan E. Griest, M.P.H., William H. Martin, Ph.D. - Racial and Ethnic Differences in Outcomes of Four Hearing Loss Prevention Interventions in Elementary Students.
4. Poster	Doryce B. Iverson, Au.D., Kris English, Ph.D., Anne Marie Tharpe Ph.D., Cheryl DeConde Johnson, Ed.D. - A Hearing Conservation Website for Parents.
5. Poster	Annaliisa Koski, Judith Sobel, Ph.D., Jacqueline Villnave M.P.H. - Beliefs About Hearing Loss and Hearing Protection in a Small Public High School in Oregon.
6. Poster	Patricia Niquette, M.A., Gail Gudmundson, Au.D., Andrew Haapapuro - Development of a High-Fidelity Earplug for Children
7. Poster	Sargunam Sivaraj and Aneeta Samuel - Personal Stereo and Hearing Loss.
8. Poster	Sargunam Sivaraj and Aneeta Samuel - Prevention of Hearing Loss: Why is it Not a Health Priority when it is Feasible, Beneficial, and Justifiable?
9. Poster	Sargunam Sivaraj and Aneeta Samuel - Guidelines on Prevention of Preventable Hearing Loss.
10. Poster	Sargunam Sivaraj and Aneeta Samuel - Noise...Noise...Noise...Everywhere: What Do We Do About It?
11. Table	Carol Stephenson, Ph.D. - NIOSH OSH Curriculum for High Schools: Hearing Loss Prevention Module.
12. Poster	Wendy Steuerwald, M.S. - Hear Today, Hear Tomorrow.
13. Poster/Table	Julee Sylvester - Noisy Toys: Annoying or Harmful?
14. Poster	David Vermeulen & Students - Can You Hear Me Now? Personal Music Players and Hearing Loss
15. Table	William H. Martin Ph.D., Susan Griest, M.P.H., Linda Howarth - Dangerous Decibels® Interactives and Educational Materials Available for YOU!
16. Table	Mona Thomas, M.S.W., Joseph Cerquone, CAE, Pamela Mason, M.Ed., CCC-A, Brenda Lonsbury-Martin, Ph.D. - Using the Media as an Education Tool.
17. Table	Gael Hannan, Heather Ferguson - Sound Sense: Save Your Hearing for the Music!
18. Poster	Genevieve Y. Martin, William Hal Martin, Ph.D., William Lambert, Ph.D - Jolene: How Loud is Your Music?

1. Poster

Risk Taking and Leisure Time Noise Among Adolescents.

Margareta Bohlin, M.Sc., Soly Erlandsson, Ph.D.

Dr. Erlandsson is Board member of the Foundation of Audiological Research (FAR) and the Stinger Foundation – University West, Sweden

Ms Bohlin is in the graduate program at Gothenburg University - Sweden.

Abstract: Risk taking and leisure time noise among adolescents: Adolescents in Western society often expose themselves to high levels of sound at gym, rock concerts, discotheques etc (Olsen Widén & Erlandsson, 2004). These behaviours are as threatening to young peoples' health as traditional risk behaviours. Theories of risk taking behaviours among adolescents do not include exposure to noise as risky situations. The aims of the present study were to examine risk taking behaviours and judgments among Swedish adolescents by the use of the "Adolescent Risk-taking Questionnaire" (ARQ by Gullone, Moore, Moss and Boyd, 2000) and to analyse the relationship between self-exposure to noise and risk taking behaviours. The study included 310 adolescents age 15-20 (167 men/143 women) in three upper secondary schools in Sweden. The response rate was 84.2%. The results reveal a correlation between adolescents' behaviour in different risk situations and behaviour in noisy environments. There was also a correlation found between traditional judgments about risk and judgment regarding noise exposure. Female students judge risk situations generally as more dangerous than male students do, although they behave in the same way as men. Since a relationship exists between adolescents' risk taking in noisy environments and other types of risk taking, research dealing with hearing prevention among young people need to acknowledge and make use of theories on risk taking. Likewise, theories on risk taking should acknowledge noise as a risk factor. Results also reveal the importance of analyzing gender differences in studies regarding risk behaviour.

2. Table

Walkometer AKA The Big Purple Head.

David K. Brown, Ph.D.

David Brown Ph.D. is the Director of Audiological Research at Cincinnati Children's Hospital Medical Center and Assistant Professor in the Departments of Otolaryngology and Communication Sciences and Disorders at the University of Cincinnati.

Abstract: A WALKOMETER is a device which visually shows how loud an individual listens to their personal stereo system. This device can be used in many different settings including schools, and health fairs to quickly and easily demonstrate whether a person's own system is in the "safe" or "danger" zone. In order to use the WALKOMETER, a person walks up to it and simply places their headphones on the device's ears and turns it on to the level at which they normally listen. The device's sound level meter then measures the level of the sound coming from the headphone and displays it in terms of a series of green (safe), yellow (caution) or red (danger) lights (listening zones). It is very "kid friendly" and attracts a significant amount of attention. Children are drawn to the device because of its uniqueness, after which you can discus the potential harm of listening at too loud a level or for too long a time

3. Poster

Racial and Ethnic Differences in Outcomes of Four Hearing Loss Prevention Interventions in Elementary Students.

Susan E. Griest, M.P.H., William H. Martin, Ph.D.

Ms Griest is a Staff Scientist for the Oregon Hearing Research Center, Oregon Health and Science University.

Dr. Martin is a professor of Otolaryngology/Head & Neck Surgery and professor of Public Health & Preventive Medicine at the Oregon Health & Science University.

Abstract: Four hearing loss prevention interventions were presented to 54 fourth grade classes in Oregon. Interventions included: 1. a classroom program presented by trained school nurses, 2. a classroom program presented by teams of two high school students, 3. a class visit to the Dangerous Decibels museum exhibition, or 4. a visit to the web-based Dangerous Decibels® Virtual Exhibition. Interventions were based upon current health communication and behavior theory. Students completed questionnaires before, immediately after and three months after the intervention presented to them. The questionnaires evaluated knowledge, attitudes and intended behaviors regarding noise exposure and hearing loss prevention. A stratified randomization procedure was implemented to increase numbers of targeted minority groups (Hispanic and African Americans) within each intervention group. A two-factor analysis of variance with post-hoc comparison was performed using classrooms as the unit analysis. Results indicate significant differences in regard to increases in knowledge, changes in attitudes and behavioral intentions between classrooms with primarily Hispanic and African-American students compared to classrooms with primarily Caucasian students. These differences were present across all four-intervention strategies. Implications of these findings will be presented and the importance of developing culturally competent hearing loss prevention interventions will be discussed.

4. Poster

A Hearing Conservation Website for Parents.

Doryce B. Iverson, Au.D., Kris English, Ph.D., Anne Marie Tharpe Ph.D., Cheryl DeConde Johnson, Ed.D.

Doryce B. Iverson, Au.D. received her doctoral degree from Central Michigan University in August 2006.

Kris English, Ph.D is an Associate Professor at the University of Pittsburgh.

Anne Marie Tharpe, Ph.D is an Associate Professor at Vanderbilt University/Bill Wilkerson Center

Cheryl DeConde Johnson recently retired from the Colorado Department of Education where she was the audiology consultant for 16 years.

Abstract: Research has shown that noise induced hearing loss in children is increasing. It has been suggested that public awareness of the issue can help reverse this trend. Because parents are a child's first teacher and role model, it is important that parents play a role in educating their children on the dangers of excessive noise. To accomplish this, parents must both understand the dangers and learn how to protect their children's hearing properly. Parents need to have easy access to this information and other available resources. While many excellent hearing conservation programs have been developed for teachers for use in the classroom, programs designed to educate parents on these same topics appear to be limited. Therefore, a hearing conservation website has been developed for parents. Easily accessible through the internet, it is intended to be a comprehensive resource that parents can use as a guide when educating their children on the dangers of excessive noise and the use of hearing protection devices. The website contains: an overview of the anatomy and function of the ear; a discussion of noise and its sources in our daily environment; an explanation of how noise can damage hearing; and information on hearing protection devices and their proper use. Parents are provided with numerous links to resources where they can find more information, and activities to assist in teaching this information to their children.

5. Poster

Beliefs About Hearing Loss and Hearing Protection in a Small Public High School in Oregon.

Annaliisa Koski, Judith Sobel, Ph.D., Jacqueline Villnave M.P.H.

Annaliisa Koski is e a freshman at Colby College in Maine.

Judith Sobel, Ph.D. is an Associate Professor in the School of Community Health at Portland State University.

Jacqueline Villnave, M.P.H received her Master of Public Health degree in spring 2006 from the Oregon Master of Public Health program.

Abstract: There is growing concern that this is the noisiest generation in history. It has been noted that "as many as 5.2 million children in the United States have some hearing damage from amplified music and other sources." In an effort to understand what teenagers are thinking and how they are acting in the face of this potential crisis, students from a small public high school in Portland Oregon were surveyed about exposures to loud sounds, use of hearing protection, knowledge about hearing science, attitudes about using hearing protection, communication with parents and friends, and behavioral intentions. Of the 171 students who answered the survey, 104 were male and 67 were female. Results showed that more than 80% of the students used headphones. A majority of students were exposed to sounds loud enough to hurt their ears or cause ringing. However, about half of the population had never worn hearing protection. Most had seen their parents wear ear protection but had not spoken to their parents about protecting their hearing. Students had reasonable knowledge of hearing science and ways to protect their hearing, and about half suggested that they would use protection if they were around power tools. Yet 80% of these high school students said that they would not use hearing protection if they went to a loud concert. This information can help researchers to understand the attitudes of high school students for future interventions in this population.

6. Poster

Development of a High-Fidelity Earplug for Children.

Patricia Niquette, M.A., Gail Gudmundson, Au.D., Andrew Haapapuro

Patricia Niquette M.A. is an audiologist at Etymotic Research.

Gail Gudmundsen, Au.D., is director of sales and marketing at Etymotic Research.

Andrew Haapapuro is in the engineering department at Etymotic Research.

Abstract: Increasing media coverage and broadened public awareness of noise-induced hearing loss from loud music have highlighted the importance of hearing protection for young persons. The purpose of this poster presentation is to describe the development process for a 20dB high-fidelity flat attenuation earplug for small ear canals. ER-20 High Fidelity earplugs (covered by patents #4,852,683 #5,113,967 and #5,887,070) were developed in the late 1980s as a low-cost, one-size-fits-most alternative to custom Musicians Earplugs. While the need for non-custom flat attenuation earplugs for smaller ears was identified many years ago, they have not been available until recently. Factors influencing the frequency response and attenuation characteristics of these earplugs include: average ear canal volume and length; the length of the sound path; and the diameter of the bore in the eartip. Several earplugs were constructed with different combinations of overall length and diameter, and the resulting effect on the frequency response was evaluated. The dimensions of the eartip, stem and endcap affect the response and the total length of the earplug. The high frequency response is particularly variable depending on the total length of the earplug. Graphical representation of this process from prototype to final product will be presented.

7. Poster

Personal Stereo and Hearing Loss.

Sargunam Sivaraj, M.Sc. and Aneeta Samuel

Sagunam Sivaraj is Team Leader of Audiological Services at Wellington Hospital in New Zealand

Aneeta Samual is clinician in audiology at Wellington Hospital in New Zealand.

Abstract: This is a public educational material developed to educate the public on prevention of possible noise induced hearing loss from wearing the personal stereo system for prolonged periods at a loud volume setting. The information is also available in A4 size to be used as a handout. Our ears are not designed to cope with loud noise exposure. The iPods ear buds, the essential accessory that have become almost of a status symbol as the device itself. According to one of the recent market survey, there are several millions of people now own MP3 players. It is also interesting to note that 25.6 million iPod players were sold in the first half of 2005. It is possible that any rise in popularity of personal music player might lead to more cases of hearing loss/tinnitus in the future. These new devices merely add to the daily din of environmental noise and increase the risk of incidence of premature hearing loss. We are seeing the kind of hearing loss in younger people typically found in aging adults. Our ear ages faster with noise exposure. Many are likely to loose their hearing in their thirties instead of their sixties

8. Poster

Prevention of Hearing Loss: Why is it Not a Health Priority when it is Feasible, Beneficial, and Justifiable?

Sargunam Sivaraj and Aneeta Samuel

Abstract: This poster outlines various issues related to hearing loss in general and outlines proposed measures to be undertaken at national level to prevent hearing loss. Today hearing loss is one of the leading and fast growing serious disabilities in our modern society. Hearing experts believe that it is a serious but a quiet epidemic and because of noise and/ or music exposure the average level of human ear sensitivity is being altered. Noise/music is one of the leading causes of hearing loss. It is on the increase and more and more young people are becoming hard of hearing. Hence prevention of preventable hearing loss should become a health priority. Otherwise a considerable portion of health funding will be spent on hearing loss rehabilitation. The allocated funding will never become sufficient to fulfill everyone's hearing needs.

9. Poster

Guidelines on Prevention of Preventable Hearing Loss.

Sargunam Sivaraj and Aneeta Samuel

Abstract: This is a public educational material developed for educating the public on prevention of preventable hearing loss. This can be displayed on the waiting areas in the hospital, school and colleges. This consists of almost all the information related to prevention of music and/or noise induced hearing loss. The information is also available in A4 size to be used as a handout.

10. Poster

Noise...Noise...Noise...Everywhere: What Do We Do About It?

Sargunam Sivaraj and Aneeta Samuel

Abstract: This is a public educational material developed for educating the public on prevention of Noise/music Induced hearing loss. The information is also available in A4 size to be used as a handout. Noise exposure is the major cause of premature hearing loss. Although prevention of all types hearing impairment is not entirely possible, a majority of them can be prevented and/or the harmful effects on individual's life can be reduced if identified early. Work-related hearing loss continues to be a critical workplace safety and health issue. The big industries have noise reduction methods in place, but the small scale /home based industries don't. And there are several unidentified occupation that are not considered as the high risk category, and they don't get their hearing tested

and the noise levels are not monitored. The National Institute for Occupational Safety and Health (NIOSH) named hearing loss as one of the 21 priority areas for research in the next century. Noise-induced hearing loss is 100 percent preventable but once acquired, hearing loss is permanent and irreversible.

11. Table

NIOSH OSH Curriculum for High Schools: Hearing Loss Prevention Module.
Carol Stephenson, Ph.D.

Carol Stephenson, Ph.D. is a Social Psychologist and Branch Chief for the Centers for Disease Control and Prevention/ National Institute for Occupational Safety and Health (NIOSH).

Abstract: During this session, NIOSH will display their new OSH Core Curriculum designed for High School Students. The curriculum covers basic information about risk of injury in the workplace for young workers, how to recognize hazards, how hazards are characterized and controlled, what to do in an emergency, how to communicate effectively with co-workers and employers about workplace safety, and rules appropriate to young workers. Noise issues are interwoven throughout the curriculum as examples and a noise module utilizing materials from the Dangerous Decibels program is offered to teachers as supplemental materials. The curriculum was tested in 10 states, and 100% of teachers utilized the optional noise module and rated it favorably.

12. Poster

Hear Today, Hear Tomorrow.
Wendy Steuerwald, M.S.

Ms. Steuerwald is the Clinical Manager of Audiology at Cincinnati Children's Hospital Medical Center in Cincinnati, Ohio.

Abstract: Hear Today, Hear Tomorrow is a pediatric hearing conservation program designed to teach fourth and fifth graders healthy hearing habits to last a life time. Prior to the presentation, students complete a hearing conservation pretest and are asked to bring a noise/ music producing item to school. During the program, each student receives a poster teaching the parts of the ear and how sound travels through the ear to the brain. The different types of hearing loss and their causes are discussed. The familiar sounds audiogram is introduced to illustrate where average conversational speech and a variety of environmental sounds occur. Next, the class is exposed to what hearing loss sounds like by listening to sounds filtered to simulate normal, a mild and a moderate hearing loss. At this point, the students are given a chart listing different noise sources, their decibel level, and the amount of time the noise source can be listened to before causing hearing loss. The warning signs of noise induced hearing loss and prevention methods are discussed. Then the students take turns measuring the output of their noise/music source with a sound level meter. We compare our sound level meter readings to the noise level chart they were previously given and determine how long the student can safely use the item. Band instruments, iPods, and hand held games are popular items assessed. Students take a post test and are given handouts for reinforcement.

13. Poster/Table

Noisy Toys: Annoying or Harmful?
Julee Sylvester

Julee Sylvester is director of public relations and marketing for the Sight & Hearing Association, in St. Paul, Minn

Abstract: At the Sight & Hearing Association, our work focuses on preventing hearing loss due to noise; we have found that children are being exposed to potentially harmful decibel levels in toys. For the past eight years, the Sight & Hearing Association has tested a variety of toys — taken right off toy store shelves — for potentially dangerous noise levels. The resulting annual Noisy Toys List has become an important vehicle to disseminate the message of the dangers of loud toys to the general public, and a sought-after item with media across the country, most recently appearing in the May 2006 issue of Parents magazine. Up until March 2004, no regulations regarding the acoustics of toys existed. The American Society of Testing and Materials (ASTM) in 2004 set a voluntary recommendation of levels of toys not to exceed 90 dB 10 cm from the surface of the toy. Recent studies by the Sight & Hearing Association still find toys exceeding 100 dB. This poster will display the results of our annual studies, some pertinent articles and related media coverage, and will feature a demonstration of a few of the loudest toys in recent years.

14. Poster

Can You Hear Me Now? Personal Music Players and Hearing Loss
David Vermeulen & Students; David Ahlstrom, Greg Harris, Brandon Kieft, Alexys Race, Tara Reed, Cheyn Rushing and Julian Smith)

The presenters are currently 9th grade students at Montague Public High School in Montague, Michigan. As 8th graders, they formed a Project Citizen Team, earning highest honors in state competition for their portfolio, titled, "Can You Hear Me Now?" Their Civics teacher is Mr. David Vermeulen.

Abstract: This team of seven middle school students will present their 4-panel poster display, titled, "Can You Hear Me Now?" They will read their report on the problem with hearing loss in teens, some alternative solutions, a public policy solution they advocate, and their action plan to reach their public policy goals. This presentation is part of the federal "Project Citizen" program, in which students study public policy issues and seek to make a difference through volunteerism and advocacy.

15. Table

Dangerous Decibels® Interactives and Educational Materials Available for YOU!
William H. Martin Ph.D., Susan Griest, M.P.H., Linda Howarth

Dr. Martin is a professor of Otolaryngology/Head & Neck Surgery and professor of Public Health & Preventive Medicine at the Oregon Health & Science University (OHSU).

Ms Griest is a Staff Scientist for the Oregon Hearing Research Center, Oregon Health and Science University.

Ms Howarth is coordinator for the Dangerous Decibels Program at OHSU.

Abstract: Hearing loss prevention has historically been the domain of military and occupational fields. Recently, it has become apparent that non-occupational activities include a host of noise exposures that can be potentially hazardous to adults and children. Dangerous Decibels® is a public health partnership with the goal of reducing the incidence of noise-induced hearing loss and related tinnitus through creative education, museum exhibitry and outreach. The Dangerous Decibels® project recently developed several educational resources as part of an NIH funded (NCRR and NIDCD) research project investigating the

development and effectiveness of innovative hearing health interventions. The goal was to change knowledge, attitudes and behaviors regarding noise exposures, in the public. Special focus was given to developing interventions that were effective in elementary, middle and high school students. Many of these resources are now available for use in research and/or education regarding noise induced hearing loss prevention the Dangerous Decibels® website. These include a database and research tool with 38,000+ subjects, a virtual museum exhibit with eight fun, interactive activities and simulations, and a Teacher's Resource Guide filled with activities, instructions and hearing health information. An instructional DVD with images, simulations and activities that parallel the Teacher's Resource Guide is also available through contact information on the website. These resources can be applied in industrial, military or public educational hearing loss prevention efforts. www.dangerousdecibels.org

16. Table

Using the Media as an Education Tool.

Mona Thomas, M.S.W., Joseph Cerquone, CAE, Pamela Mason, M.Ed., CCC-A, Brenda Lonsbury-Martin, Ph.D.

Mona Thomas is director of media relations for the American Speech-Language-Hearing Association (ASHA).

Joseph Cerquone is Director of Public Relations for the ASHA.

Pamela Mason is ASHA Director of Audiology Professional Practices

Brenda Lonsbury-Martin is Director (Chief Staff Officer) of Science and Research at the ASHA.

Abstract: This presentation will illustrate how working with print and broadcast media can provide another method of educating the public about the issue of noise and hearing loss. Gaining visibility in the media for your hearing conservation programs and services or science and research projects can be an easy and cost-effective way to bring these important issues into the awareness of a greater number of people as well as communicate messages about prevention. This session will examine the nuts and bolts of working with the media, whether you have dollars to spend or you have no budget at all, using a variety of public relations strategies and tools.

17. Table

Sound Sense: Save Your Hearing for the Music!

Gael Hannan, Heather Ferguson

Gael Hannan is a renowned hearing loss advocate with The Hearing Foundation of Canada.

Heather Ferguson is the current President of The Hearing Foundation of Canada.

Abstract: Research shows that the better children hear, the better they learn. Even mild hearing loss can affect academic, social and future career achievements. Studies also confirm the success of hearing conservation programs aimed at young people, yet hearing injury prevention is not taught in school. In 2005, The Hearing Foundation of Canada introduced Sound Sense: Save Your Hearing for the Music!, an exciting program that teaches students why and how they can protect their sense of hearing from noise damage. The music-themed, interactive program complements the Grades 4 to 7 core health curriculums and is easy to deliver in a 30-60 minute class period. Students explore the role of sound and hearing in their lives; they learn how hearing works, the effects of noise, what it might be like to have a hearing loss and finally, strategies to help protect their hearing. The attractively packaged presentation kit includes a curriculum booklet, an entertaining, partially-animated 10-minute video, and take-home materials for students and parents. Sound Sense, currently rolling out in several provinces, is delivered in the schools by both in-school teachers, and by hearing health professionals and other volunteer facilitators who understand the importance of hearing loss conservation. This program overview will cover the need for, goals, delivery methods, feedback on the first year of rollout, and future plans for Sound Sense in Canada.

18. Poster

Jolene: How Loud is Your Music?

Genevieve Y. Martin, William Hal Martin, Ph.D., William Lambert, Ph.D

Genna Martin is a sophomore photojournalism major at Boston University. She created Jolene as part of a summer internship in the Oregon Health and Science University Center for Research in Occupational and Environmental Toxicology.

Dr. Martin is a professor of Otolaryngology/Head & Neck Surgery and professor of Public Health & Preventive Medicine at the Oregon Health & Science University.

Dr. Lambert is a scientist and associate professor in the Oregon Health and Sciences University Center for Research in Occupational and Environmental Toxicology.

Abstract: The popularity of personal stereo systems has exceeded any possible expectations. It is projected that sales of Ipod devices alone may approach 24 million in 2006. Studies of personal stereo systems indicate that they can readily produce sound levels in excess of 105 dBA SPL. Utilization practices have not been well documented, but anecdotal reports indicate that young people use the devices up to several hours each day. Public awareness of personal stereo system outputs and recommended exposure levels is an important, first step in the public health campaign for noise induced hearing loss prevention. David Brown developed "The Big Purple Head" or Walkometer as a device to measure sound levels of personal stereo systems. The system presented in this session, Jolene, is a new version of such a device that was designed to be produced with relatively easy to acquire and inexpensive materials (used mannequin, Radio Shack sound level meter, Velcro, a glue gun) that can be assembled by middle or high school students to create their own versions of a sound measuring system. It has been used for public outreach and education in the Portland, Oregon area.

Appendix 3

Speaker Evaluations

Appendix 3

Speaker Evaluations

Attendees were asked to rate the speakers using a rating scale of 1 (lowest) to 10 (highest).

Elliott Berger, M.S., INCE Board Certified *The Essential Auditory Experience*

Relevance and Content	Mean = 8.8	Range: 6-10
Presentation	Mean = 9.1	Range: 7-10

Edwin W. Rubel, Ph.D. *Cellular Studies of Critical Periods of Inner Ear and Central Auditory System Vulnerability*

Relevance and Content	Mean =7.9	Range: 3-10
Presentation	Mean = 7.7	Range: 3-10

Floyd Thurston, M.D. *Is External Noise a Risk to Hearing Development in the Fetus?*

Relevance and Content	Mean = 7.8	Range: 3-10
Presentation	Mean = 5.6	Range: 2-10

Rick Neitzel, M.S., CIH and Deanna Meinke, Ph.D.
Noise Exposure Among Children and Young Adults: What Do We Know and What Do We Need to Find Out?

Relevance and Content	Mean = 8.5	Range: 5-10
Presentation	Mean = 8.0	Range: 5-10

Samuel Bittel, B.S., B.A.; Brett Kemker, Ph.D. and Barry A. Freeman, Ph.D.
Investigation of Toy Noise Exposure in Children

Relevance and Content	Mean = 8.4	Range: 5-10
Presentation	Mean = 7.8	Range: 3-10

Sheryl A. Milz, Ph.D., CIH; John R. Wilkins, III, BCE, Dr. PH; Melissa K. Witherspoon and April L. Ames, MSOH *Noise Exposure Assessment of Three Adolescents Living on Farms in Northwest Ohio*

Relevance and Content	Mean = 6.7	Range: 2-10
Presentation	Mean = 6.6	Range: 2-10

John Eichwald, M.A., FAAA *How noise induced hearing loss in children may align with CDC health protection goals*

Relevance and Content	Mean = 7.8	Range: 3-10
Presentation	Mean = 7.8	Range: 6-9

Sharon Kujawa, Ph.D. *Noise Exposure to Young Ears: When Things go from Bad to Worse*

Relevance and Content	Mean = 8.6	Range: 4-10
Presentation	Mean = 8.2	Range: 4-10

Cory D.F. Portnuff, B.S. and Brian J. Fligor, Sc.D., CCC-A
Output Levels of Portable Digital Music Players

Relevance and Content	Mean = 9.5	Range: 6-10
Presentation	Mean = 8.5	Range: 6-10

Brian J. Fligor, Sc.D., CCC-A and Terri Ives, Sc.D. *Does Earphone Type Affect Risk for Recreational Noise-Induced Hearing Loss?*

Relevance and Content	Mean = 9.0	Range: 7-10
Presentation	Mean = 8.7	Range: 6-10

Roland Eavey, M.D. *MTV Awareness Survey and Media*

Relevance and Content	Mean = 8.8	Range: 5-10
Presentation	Mean = 9.4	Range: 8-10

Judith Sobel, Ph.D., Mary Meikle, Ph.D., Gloria Reich and William Hal Martin, Ph.D.
Persuading Adolescents to Protect Their Hearing: What can we learn from hearing communication Research?

Relevance and Content	Mean = 8.5	Range: 5-10
Presentation	Mean = 8.2	Range: 5-10

Stephen E. Widen, Ph.D., Soly Erlandsson, Ph.D. *Noise and Music, a Matter of Risk Perception?*

Relevance and Content	Mean = 8.5	Range: 5-10
Presentation	Mean = 7.7	Range: 5-10

Soly Erlandsson, Ph.D., Alice Holmes, Ph.D., Stephen E. Widen, Ph.D. and Margareth Bohlin, M.Sc.
Attitudes to Noise and Risk Behavior in Children and Young Adults

Relevance and Content	Mean = 7.3	Range: 4-10
Presentation	Mean = 7.2	Range: 4-10

William H. Martin, Ph.D., Susan Griest, M.PH., Judith Sobel, Ph.D., Linda C. Howarth & Baker Y-B Shi, M.D., Ph.D.
Dangerous Decibels®: Partnerships for NIHL Prevention in Children

Relevance and Content	Mean = 9.6	Range: 8-10
Presentation	Mean = 9.6	Range: 8-10

Elliott Berger, M.S., INCE Board Certified *Children and Hearing Protection: What is Available and is it Used?*

Relevance and Content	Mean = 8.6	Range: 5-10
Presentation	Mean = 9.2	Range: 7-10

Ted Madison, M.S., CCC-A *Hearing Protection Considerations for Children & Adolescents*

Relevance and Content	Mean = 8.7	Range: 5-10
Presentation	Mean = 8.9	Range: 5-10

Lee Hager *Working Youth, Noise Exposure and Hearing Loss*

Relevance and Content	Mean = 9.0	Range: 5-10
Presentation	Mean = 8.2	Range: 5-10

William Clark, Ph.D. and Carl Bohl, D. Sc. *Historical Trends in Hearing of Young People*

Relevance and Content	Mean = 8.9	Range: 5-10
Presentation	Mean = 8.0	Range: 3-10

Howard J. Hoffman, Chia-Wen Ko, Ph.D., Christa L. Themann, M.A., CCC-A and John R. Franks, Ph.D.
Declining Trends in Noise-Induced Hearing Loss (NIHL) in Children Based on U.S. Health Examination Survey

Relevance and Content	Mean = 8.5	Range: 5-10
Presentation	Mean = 7.6	Range: 3-10

William Hal Martin, Ph.D., Baker Y-B Shi, M.D., Ph.D. and Susan E. Griest, M.P.H.
Hearing Health Research in a Public Setting

Relevance and Content	Mean = 9.2	Range: 7-10
Presentation	Mean = 9.2	Range: 7-10

Deanna K. Meinke, Ph.D. and Noel Dice, Au.D.
Comparison of Audiometric Screening Criteria for Early Identification of Noise-Induced Hearing Loss in Adolescents

Relevance and Content	Mean = 9.3	Range: 7-10
Presentation	Mean = 9.0	Range: 6-10

Cheryl DeConde Johnson, Ed.D. *Noise-Induced Hearing Loss: Legal Implications for Schools*

Relevance and Content	Mean = 9.4	Range: 7-10
Presentation	Mean = 8.9	Range: 7-10

Sargunam Sivaraj, Ph.D. Candidate and Aneeta Samuel *Are we Doing Enough to Prevent Noise/Music Induced Hearing Loss in Children in New Zealand?*

Relevance and Content	Mean = 7.4	Range: 5-10
Presentation	Mean = 7.1	Range: 3-10

Mario R. Serra, Ph.D. and Ester C. Biassoni, Ph.D. Hearing Impairment Among Adolescents

Relevance and Content	Mean = 8.8	Range: 5-10
Presentation	Mean = 7.9	Range: 3-10

Kris Chesky, Ph.D. Hearing Conservation in College Music Programs

Relevance and Content	Mean = 9.2	Range: 7-10
Presentation	Mean = 9.1	Range: 7-10

Gael Hannan and Heather Ferguson *Sound Sense: Save Your Hearing for the Music!*

Relevance and Content	Mean = 9.1	Range: 6-10
Presentation	Mean = 9.2	Range: 6-10

Lidia Lee, Ph.D., CCC-A *Hearing Conservation Program in Schools: A Collaborative Approach*

CANCELLED: REPLACED BY YOUTH / AUDIENCE DISCUSSION PANEL

Greg Flamme, Ph.D. and Shelby Myers-Verhage

Effectiveness of School Based Hearing Loss Prevention Programs in a Rural Area

Relevance and Content	Mean = 8.9	Range: 5-10
Presentation	Mean = 9.0	Range: 7-10

Patricia Blessing NIDCD's Public Education Efforts to Prevent NIHL in Children

Relevance and Content	Mean = 8.3	Range: 3-10
Presentation	Mean = 8.4	Range: 6-10

Susan E. Griest, M.P.H., William Hal Martin, Ph.D., Judy Sobel, Ph.D. and Linda Howarth

Program Evaluation: Results for Noise Induced Hearing Loss and Tinnitus Prevention Interventions

Relevance and Content	Mean = 8.9	Range: 5-10
Presentation	Mean = 8.8	Range: 5-10

Mona Thomas, M.S.W., Joseph Cerquone, CAE, Pamela Mason, M.Ed., CCC-A and Brenda Lonsbury-Martin, Ph.D.

Using the Media as an Education Tool

Relevance and Content	Mean = 7.8	Range: 2-10
Presentation	Mean = 7.3	Range: 2-9

William Hal Martin, Ph.D., Susan E. Griest, M.P.H., Casey Spain and Linda Howarth

Effectiveness of Web-Based Edu-tainment for Hearing Loss Prevention in Children

Relevance and Content	Mean = 9.2	Range: 8-10
Presentation	Mean = 9.2	Range: 8-10

Robert Folmer, Ph.D., Susan E. Griest, M.P.H. and William Hal Martin, Ph.D.

Resources to Facilitate Classroom Instruction of Hearing Loss Prevention

Relevance and Content	Mean = 9.3	Range: 7-10
Presentation	Mean = 9.3	Range: 7-10