respectively. The threshold of both group showed a statistically significant difference ($p < 0.05$). In the beta-carotene experiment, both control and studied group showed 21.66 ¡¾ 3.23 dB on their hearing. After the noise exposure, the control group showed 85.00 ¡¾ 3.41 dB HL and experimental group showed 61.00 ¡¾ 2.34 dB HL. After one month their hearing thresholds were 80.00 ¡¾ 3.4 dB HL and 62.00 ¡¾ 1.2 dB HL, respectively. The threshold of both group showed a statistically significant difference ($p < 0.05$).
Conclusion : From these experiments we can see that retinoic acid and beta-carotene helped to prevent the hearing loss partially, when introduced to the mice before the noise exposure. The preventive effect of these two substances differs by about 15 dB.

598 History of Hearing and Hearing Loss Research at NIOSH

Rickie Davis[1]
[1]*NIOSH*

The Occupational Safety and Health Act of 1970 created two new agencies, the National Institute for Occupational Safety and Health (NIOSH) in the Centers for Disease Control and Prevention (CDC) and the Occupational Safety and Health Administration (OSHA) in the Department of Labor. NIOSH's mission is to protect the American worker from occupational illness, injury and death through research and education.
Since its inception, NIOSH has been actively involved in hearing research. NIOSH wrote the first criteria document for Noise Induced Hearing Loss which became the bases for the Occupational Noise Exposure Standard (1971) and the Hearing Conservation Amendment (1983).
In 2006, the Institute of Medicine of the National Academies of Science was contracted to do a peer review of the NIOSH Hearing Loss Prevention Program. This required the program to organize past and present research efforts into a coherent body of knowledge. We found that our research clustered around four themes: 1) Contribute to the development, implementation and evaluation of effective hearing loss prevention programs; 2) Reduce hearing loss through interventions targeting personal protective equipment; 3) Develop engineering controls to reduce noise exposures; 4) Improve understanding of occupational hearing loss through surveillance and investigation of risk factors.
This presentation will highlight some of the hearing research efforts and partners over the 30+ years of its history.

599 Diverse Synaptic Terminals on Rat Stapedius Motoneurons

Thane E Benson[1], M Christian Brown[1,2], Daniel J Lee[1,2]
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The middle ear muscle (MEM) reflex is a major efferent system to the auditory periphery and, in humans, is mediated primarily by contraction of the stapedius muscle. This reflex protects the ear from acoustic injury and reduces the masking effects of background noise. Although the afferent and efferent pathways of the MEM reflex are well characterized, the central pathways are poorly understood. To elucidate the central reflex circuitry and other inputs, we characterized the synaptic profile of stapedius motoneurons (SMNs). Horseradish peroxidase labeled perifacial neurons ventromedial to the facial motor nucleus were selected for EM analysis (3 SMNs from 2 rats). Several types of terminals were found to synapse on SMNs. One type has oval-to-round vesicles filling the terminal, occasional dense core vesicles, and a markedly asymmetric synapse. This terminal type is small, 0.5-1 µm. Some of them may be serotoninergic (Thompson and Thompson, 1998, Brain Res. 787:175-178). Another terminal type has round vesicles clustered near the asymmetric synapse. This type is larger, e.g., abutting the SMN along 10 µm of proximal dendrite and 1.75 µm at its widest. It makes intermittent contacts with the SMN separated by small (less than 1 µm) discontinuities including minute glial processes. This type of terminal may be from globular bushy cells of the cochlear nucleus (Smith, P. H. et al., 1991, J. Comp. Neurol. 304:387-407). Surprisingly few synapses from these large terminals may explain the high threshold of the stapedius reflex driven by an otherwise low-threshold source. Other terminals include small ones with pleomorphic vesicles and symmetric active zones, a terminal with large, round vesicles and a subsynaptic (?) cistern rather than a flocculent post-synaptic density, and a terminal with round vesicles of bi-modal sizes. A diversity of terminal types suggests a relatively large amount of synaptic integration in SMNs.
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600 Gene Expression in the Cochlear Nucleus: Microarray Analysis of Multipolar and Spherical Bushy Cells Isolated by Laser Capture Microscopy

David Friedland[1], Rebecca Eernisse[1], Nicole Lenihan[2], John Doucet[2]
[1]*Medical College of Wisconsin,* [2]*Johns Hopkins University*

The cochlear nucleus is the only central nervous system region receiving direct input from the auditory nerve. Primary auditory signals are processed within the cochlear nucleus and relayed to higher auditory centers for interpretation of sound location, pitch and intensity. Distinct processing tasks are addressed by specific types of neurons such as spherical and globular bushy cells, multipolar cells, octopus cells and several classes of neurons in the dorsal cochlear nucleus. While electrophysiological and morphological studies have helped to define some of the features sub-serving the unique response properties of these cells, the genetic determinants of these phenotypes have not been delineated. We performed microarray analysis on RNA extracted from spherical bushy and multipolar cells within the rat ventral cochlear nucleus. Multipolar cell bodies were retrogradely labeled with BDA conjugated Alexa-488 by stereotactic injection of tracer into the inferior colliculus. Spherical bushy cells were labeled by Nissl stain and selected from the rostral most portion of the AVCN based

ABSTRACTS OF THE THIRTIETH ANNUAL
MIDWINTER RESEARCH MEETING

ASSOCIATION FOR RESEARCH IN OTOLARYNGOLOGY

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CONFERENCE OBJECTIVES

After attending the Scientific Meeting participants should be better able to:

1. Understand current concepts of the function of normal and diseased ears and other head and neck structures.
2. Understand current controversies in research methods and findings that bear on this understanding.
3. Understand what are considered to be the key research questions and promising areas of research in otolaryngology.

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For Example:
Young, Eric, 2007, Circuits and Signal Representations in the Auditory System, Assoc. Res. Otolaryngol. Abs.: **687.**

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President's Message

Welcome to the mile high city of Denver, Colorado for the 30th Annual MidWinter Meeting of the Association for Research in Otolaryngology. This is the first time we've been landlocked for the February meeting; we've moved from the west coast to the east coast of Florida, from the Mississippi delta to Chesapeake Bay. Hopefully, Denver won't be as cold as Baltimore was last year. Denver is a pleasant city with easy access to winter sports activities (hopefully, snowboarding and ski-lodge related injuries will be minimal). The Hyatt Hotel is an excellent facility: it is less that one year old with terrific meeting space and great views of the city and mountains. Be sure to visit the many shops and restaurants in the LODO district (LOwer DOwntown) and Larimer Square, as well as the new, Daniel Libeskind designed wing of the Denver Art Museum, all within walking distance of the hotel.

Thanks to the good response from our members, we have scheduled many interesting and innovative symposia, including: Neurobiology of Vocal Communication: Beyond Acoustic Features, Specification of the Auditory and Vestibular Hindbrain, Wnt Signaling Pathways and Inner Ear Development, Spatial and Binaural Hearing: Perception and Physiology, Beyond Cochlear Implants: Functional Stimulation and Recording in the Auditory Nervous System, and Ion Transport in the Stria Vascularis: Modeling and Experiment. The short course presented Saturday evening will be Translational Research in Otolaryngology. The presidential symposium on Sunday morning is titled: Ear and Brain: Hearing beyond the Cochlea.

The ARO continues to search for a new meeting venue that will maintain the excellent scientific and social experience of meetings past. Under the constraints of the present economy, the ARO Council and Management Team are working hard to find affordable venues in attractive locations. You may not be aware of the behind-the-scene efforts needed to arrange the MidWinter meeting and run the organization, but thanks are certainly due to the ARO council and to the Talley Management Group for their excellent work in organizing the Denver meeting. In particular, we applaud the hard work of John Middlebrooks (serving double duty as Council member and Program Organizing Committee Chair) and Lisa Astorga (Meeting Coordinator).

This year we have been able to continue to offer travel awards to research trainees, thanks to generous donations from the AAO, DRF, and AAA/AAAF. These funds allow for an important function of the MidWinter meeting: introducing young people to the network of scientists and researchers of the ARO. Young researchers are vital to the health of the organization, as "new blood" invigorates both the scientific and social interactions made possible by the meeting. I vividly remember (well, maybe not vividly) my first scientific meeting and the impact it had on my career (of which the

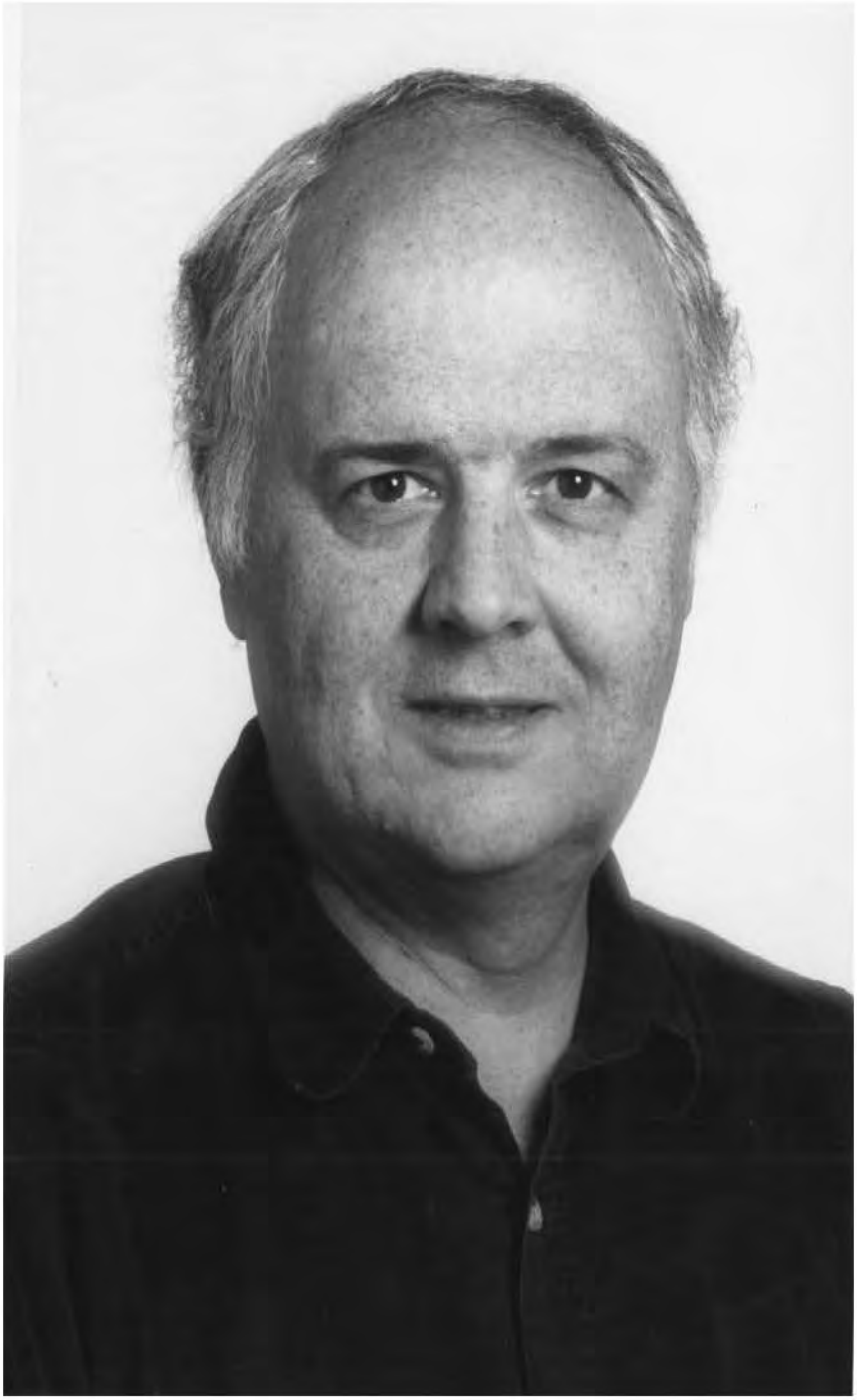
tequila-fueled barn-burners were no small part). We welcome all new attendees and look forward to their ongoing participation in the ARO.

Speaking of “young” researchers, Eric Young has been selected to receive the Award of Merit this year. The title of Eric's Presidential Lecture will be Circuits and Signal Representations in the Auditory System. Many former students and colleagues will participate in this tribute to Eric and his great influence on auditory neuroscience.

Ruth Anne Eatock has assumed editorship of the JARO, while simultaneously moving to a new institution (she is now at the Eaton-Peabody laboratory and the Department of Otology and Laryngology, Harvard Medical School). Anyone who has ever relocated their research lab knows the extra effort required to establish yourself in a new institution. The fact that Ruth Anne has also taken on the JARO editorship deserves our admiration for her commitment to public service.

I expect we will have another fun and productive MidWinter meeting. Attendance and membership in the ARO has remained strong over recent years, despite the difficulties associated with venue changes. The number of registrants and submitted abstracts has been stable over the last 5 years. As the MidWinter Meeting moves to new locations in the future, members remain strongly committed to the meeting and to the organization. It's clear that the ARO is much more than an organization - it’s a true community of science. I feel fortunate and look forward to “brainstorming” with colleagues, meeting new people, and relaxing with old friends in Denver.

Bob Shannon



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2007 Award of Merit Recipient