

the sensory epithelium of the gravity receptors. In an effort to study the processes that regulate mammalian otoconia crystal growth, we employed a murine gene targeting strategy. Absence of Oc90, the main protein of otoconia, in mice lead to grossly abnormal otoconia crystallization and delayed vestibular functional development and balance deficits. Further analysis revealed the role of Oc90 in crystal seeding and in integrating a protein complex that defines the details of crystal formation including size, shape, number and stability. Initial examination showed no other histological abnormality of the inner ear in these mutant mice.

531 BDNF in the Adult Auditory System

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During embryonal development BDNF plays a crucial role for survival of the vestibular ganglia (Bianchi et al., 1996; Fritzsche et al., 1997, 1999; Pirvola & Ylikoski 2003). The role of BDNF for the adult inner ear, in particular for the mature cochlea is less understood. Disruption of trkB signalling pathways have been shown to lead to significant hearing loss (Schimmang et al., 2003), suggesting an important function of BDNF in the mature adult auditory system. Sensory-driven neuronal activity shapes developing circuits in sensory systems using the same key molecules and gene cascades up- and downstream of BDNF /trkB during development, experience mediated plasticity or during memory. Questioning an activity-dependent use of BDNF transcripts in the mature auditory system, we analysed BDNF expression in the peripheral and central auditory system during noise, injury and age. Surprising results became evident, which will be discussed controversially in the context of a role of BDNF for altered plasticity performance in the auditory system.

Acknowledgements: This work was supported by the Deutsche Forschungsgemeinschaft Kni 316/3-2 and Fortüne 816-0-0.

532 L-NAC Does Not Protect B6 Mice from Age-Related Hearing Loss

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The C57BL/6J mouse (aka B6) is homozygous for the age-related hearing loss allele (ahl) which causes them to begin losing hearing at about 3 months of age.

N-acetyl-L-cysteine (aka L-NAC) has been shown to protect the ear from noise-induced hearing loss in chinchillas. This is hypothesized to be due to the ability of L-NAC to cross the blood brain barrier and serve as the precursor to glutathione—the body's natural reactive oxygen species scavenger.

Twelve four-week old female B6 mice were divided into two groups—one group received a daily water change

including dissolved L-NAC (1 mg/ml) and a control group receiving just a daily water change. Water consumption was monitored.

Auditory brainstem responses for 4, 8, 16 and 32 kHz tone bursts were measured monthly until the mice were 8 months of age. Upon completion of the final ABR, mice were sacrificed, cochleae taken and prepared for quantitative whole mount morphological analysis.

Hearing loss was measurable in both groups at 16 and 32 kHz. Neither ABR thresholds nor cytochrome c oxidase differed significantly between the two groups.

We conclude that L-NAC, at the concentration used here, does not protect against hearing loss in mice from the effects of the ahl allele.

Research supported by a grant from the University Hospitals of Cleveland to KA.

“The findings and conclusions in this presentation have not been formally disseminated by NIOSH and should not be construed to represent any agency determination or policy.”

533 Cochlear Current Injection Restores Hearing in the Furosemide-Treated Ear

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We have shown that a hallmark of the presbycusis ear is a decreased endocochlear potential (EP) in scala media (SM) caused by the degeneration of the lateral wall and stria vascularis. An animal model of presbycusis that replicates age-related EP loss uses furosemide to reversibly block the EP generator in the stria vascularis (Schmiedt et al, J Neurosci, 22:9643-9650, 2002). The furosemide can be delivered to the cochlea chronically with an osmotic pump via a cannula, or, as was done here, acutely by intraperitoneal injection. With the decreased EP, the neural audiogram in the gerbil obtained with the compound action potential (CAP) mimics the profile seen with human presbycusis: a flat 15-20 dB hearing loss at low frequencies coupled with a sloping hearing loss at higher frequencies. To ameliorate this type of stria hearing loss, we have developed a stimulating system allowing direct currents of at least 10 μ A to be injected continuously for up to 12 hours into the gerbil cochlea. One micropipette is used to measure the EP through the round window; a second micropipette placed in the first turn is used to inject the current into SM. Injecting anodal (positive) current directly into SM as referenced to body ground increases the EP and can restore neural thresholds to their pre-furosemide values. With this electrode configuration, the effective resistance describing the voltage / current relationship is typically between 2 and 5 kohms. Thus a 10 μ A current will increase the basal EP by 20 to 50 mV with corresponding improvements in neural thresholds of 10 to 20 dB at low frequencies and up to 40 dB at high frequencies. Our results also show that neural threshold shifts caused by hair cell injury during electrode placement

**ABSTRACTS OF THE TWENTY-NINTH ANNUAL
MIDWINTER RESEARCH MEETING**

ASSOCIATION FOR RESEARCH IN OTOLARYNGOLOGY



February 5-9, 2006

**Baltimore Marriott Waterfront
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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.

ISSN-0742-3152

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President's Message



Welcome to Baltimore and to the 29th Annual MidWinter Meeting of the Association for Research in Otolaryngology. Our path to Baltimore for this year's meeting has been complicated and merits some review. In March of 2005, the ARO and the Pyramid Management Group reached an agreement that released the ARO from returning to the Adam's Mark (now Hilton) Hotel in Daytona Beach, Florida. As we have described in previous email messages to the membership, the ARO is making payments to the Pyramid Group as a part of this agreement. Our 2005 meeting at the Fairmont Hotel in New Orleans was successful, and evaluations of the hotel and the conference facilities were very positive. We had hoped to return to the Fairmont in New Orleans for the 2006 MidWinter Meeting. The tragic events surrounding hurricane Katrina forced a change in these plans. Staff members from the ARO Headquarters were in contact with representatives of the Fairmont Hotel soon after the hurricane. We wanted to return to New Orleans for the 2006 MidWinter Meeting to show our support for the people of the city who have endured so much hardship. As events unfolded in September of 2005, it became clear that it would be impossible for us to have our 2006 meeting in New Orleans, and the Fairmont Hotel released us from our contract. We are fortunate that the Waterfront Marriott in Baltimore had availability and appropriate facilities for our meeting.

The program committee under the leadership of John Middlebrooks has done excellent work in putting together an exciting scientific program. Special thanks also go to Bob Shannon who, although he officially rotated off the committee last year, provided valuable insight and advice in the organization of the program. The meeting begins with the presidential symposium on Sunday morning entitled "Vestibular Mechanisms: Achieving Balance in the Ear". Speakers in this symposium will explore aspects of vestibular function from sensory transduction in the periphery to vestibular disorders in patients. Other symposia in the meeting cover molecular biology of ear development, efferent innervation of hair cell systems, protein-protein interactions, toll-like receptors, and activity-dependent plasticity in the auditory brainstem. The workshop addresses topics in adult-onset hearing loss.

Robert Fettiplace has been selected by the Award of Merit Committee and the ARO Council to receive this year's Award of Merit. The title of Robert's Presidential Lecture is "Ion Channel Properties and the Second Filter". We will have the opportunity to celebrate Robert's accomplishments and those of other award recipients at the reception that will follow his lecture.

Eric Young has done wonderful work in leading the *Journal of the Association for Research in Otolaryngology* on a path of excellence. Eric has decided to step down as the editor of *JARO*. Under the guidance of Art Popper and Jerry Popelka, the Publications Committee conducted a thorough search for a new editor and presented recommendations to the ARO Council. The interest expressed by a number of highly qualified scientists in the editorship of *JARO* provides strong evidence of the important

place that the journal holds in our scientific community. We are pleased that Ruth Anne Eatock has accepted the position of editor. Ruth Anne and Eric are working together on the transition process.

Travel awards provide support for research trainees to attend the MidWinter Meeting. We are grateful for the generosity of the NIDCD, Deafness Research Foundation, American Academy of Otolaryngology—Head & Neck Surgery Foundation, and American Academy of Audiology/American Academy of Audiology Foundation (AAAF). The support from these organizations enables the ARO to provide travel awards and to hold the Travel Award Luncheon and Program which honors the recipients of the travel awards and their mentors.

Exhibitors at our MidWinter Meeting keep us informed about products that may benefit our research. They also provide us with information about publications and grants. In some cases they sponsor special receptions and events. Their participation helps us to keep our meeting costs down. Please show your support by visiting their exhibits.

Members of the ARO Council deserve special thanks for their role in organizing this meeting: Bob Shannon (president elect), Bill Brownell (past president), Steve Rauch (secretary treasurer), Peter Santi (editor), David Lim (historian), Ashley Wackym, Doug Cotanche, and Karen Steel. On behalf of all of us, I want to extend very special thanks to Bill Brownell who did enormously important work for the ARO during the interactions with the Pyramid Management Group.

The ARO continues to benefit from the expert organizational activities of the Talley Management Group. Darla Dobson and Lisa Astorga provide outstanding guidance and support for the ARO. We are very fortunate to have them as a part of our team. Members of the Council are working with Lisa Astorga on identification of future meeting sites. We want to keep room prices and expenses down so that as many people as possible can participate in the meeting. At the same time, we want to select cities and hotels that will be pleasant for our meetings.

These next few years are going to be especially critical for the ARO. The finances of our organization are challenged by our exodus from Daytona Beach. The support of every ARO member is vital. During these times, it is especially important for each of us to think about how much the ARO means to us. Our strength lies in the character and the commitment of our members. These attributes will enable us to meet our current challenges and move the organization forward to new levels of excellence.

Lloyd Minor



Robert Fettiplace, PhD
2006 Award of Merit Recipient