

**SPECIAL POINTS
OF INTEREST:**

Article by Marc Caldwell, Gabrielle Saunders, Nancy Lawson, Kim Thompson, Deborah Brown, Jeanette Richardson, Diana Pope, Naomi Gates, Jaya Saiz
—Signal Intensity and Noise Evaluation (S.I.N.E) in a Critical Care Unit—Pages 1 & 3

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NCRAR Newsletter

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Message from the Director: Stephen Fausti Ph.D.



In August, NCRAR hosted a site visit meeting of our National Advisory Board (NAB). The NAB provides external review of the Center's programmatic development, direction, management and oversight, evaluates our productivity, and presents recommendations for the future direction of the NCRAR. This meeting gave us the opportunity to reflect on our journey and achievements to date that have resulted in the creation of the only national Center of Excellence devoted to multi-disciplinary research, education, and outreach for the prevention, diagnosis and rehabilitation of auditory disorders. The NAB commended the NCRAR's (exceptionally functional) infrastructure that provides a comprehensive array of support services and resources. This has enabled the Center to achieve unparalleled success in its rehabilitation research and development, education/mentoring/training, and community and professional education endeavors. Specifically, our state-of-the-art auditory rehabilitation research and development facility, core, shared equipment, dedicated grant and research program administration personnel, as well as engineering, statistical, and computer support are all located within the Center. Centralizing these resources allows the center to optimize administrative efficiencies, and promotes innovation and collaboration. Becoming a national resource, the NCRAR has also become a national hub for collaboration and dissemination dedicated to the

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Signal Intensity and Noise Evaluation (S.I.N.E) in a Critical Care Unit

By Marc Caldwell, Gabrielle Saunders, Nancy Lawson, Kim Thompson, Deborah Brown, Jeanette Richardson, Diana Pope, Naomi Gates, Jaya Saiz

NCRAR Investigator, Dr. Gabrielle Saunders and audiologist, Marc Caldwell, recently joined with nurses from the intensive care unit (ICU) to survey noise and equipment alarm intensities in the ICU. The project stemmed from nurses' concerns that the ICU is an acoustically hostile environment with considerable noise created by equipment and by staff. The staff was specifically concerned that noise levels in the ICU may not be optimal for promoting recovery in many of the ICU's extremely ill patients.

The NCRAR provided two sound level meters and instructed ICU nurses on use of the devices for recording different types of sound. Because most patients in the ICU are gravely ill, they are constantly monitored by multiple devices with altering alarms of varying intensity and frequency. In the first step of the study, the sound levels produced by these alarms were recorded. The nurses measured the peak intensities produced by each alarm from a position where the head of a patient would be in a

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Meet Wendy Helt, NCRAR Grants Administrator and Audiologist

I was born and raised in Medford, OR and graduated from Medford Senior High School in 1985—Go Black Tornadoes! I have a younger brother who lives in Salem, OR with his wife and one-year-old son. My mom and dad are retired, and still live in Medford.

My dad is the person who really got me interested in the field of Speech Pathology and Audiology, as he himself is a retired Speech-Language Pathologist. I wasn't really sure what I wanted to pursue as a career, and my dad always seemed to enjoy his work, so I decided to follow in his footsteps. I obtained my Bachelor of Science degree in Speech-Language Pathology and Audiology from Western Washington University in Bellingham, WA, and continued there with my studies until I completed my Master of Art degree in Audiology.

While attending college, I met my husband, Pat, and we have now been married for over nineteen years! Once I completed my master's degree coursework in 1992, I completed a summer internship at the Portland VAMC Audiology Clinic. This was the beginning of my "VA career." I continued in the clinic and was offered an Audiology Clinical Fellowship Year (CFY) position. After my CFY, I was hired by Dr. Fausti to work in his Auditory Research Laboratory (ARL). I was involved with various research projects involving hearing aids, tinnitus evaluation, and ototoxicity early identification. It was during this time that I also took an interest in grantsmanship, and began assisting Dr. Fausti with developing various sections of grant applications.

The turning point for the ARL was in 1997, when the VA Rehabilitation Research and Development (RR&D) Service announced a unique funding opportunity to support a limited number of VA RR&D Centers of



Excellence. Our research team was, of course, very excited about this, and under Dr. Fausti's direction, we came together, drafted a plan, assigned tasks, and worked diligently over many extended hour days (and a few short nights too) to prepare an application for what has now become the National Center for Rehabilitative Auditory Research (NCRAR). It has been truly amazing to see the NCRAR grow from a staff of approximately eight to over forty people in just over ten years! Even more impressive is the quality of people at the Center, each having unique areas of interests and expertise.

I currently serve a dual role for the NCRAR, as a Research Audiologist on the OtoID project, and the Grants Administrator for the Center. The OtoID project is focused on the development of a portable device that can be used for early detection of ototoxicity. My work on the project involves beta testing the OtoID device and providing feedback to the research team regarding functionality and needed refinements. My role as the Grants Administrator for the NCRAR includes providing support to the research investigators by identifying potential funding opportunities, assisting with the preparation and review of

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Signal Intensity and Noise Evaluation (S.I.N.E) in a Critical Care Unit (Continued from Page 1)

typical ICU room. They also measured these same alarms from an adjacent room in order to gauge how much sound reaches nearby patients and staff when an alarm occurs.

In the second step of the study, noise levels were surveyed in various rooms throughout the ICU for periods of 24 hours. Noise levels were measured in rooms with the doors open to the hallway, and with the doors closed. It was thought that some rooms might be noisier than others, and that noise levels would be higher at some times of the day than at others. Sound samples were recorded for 15 minute intervals and efforts were made to record continuously for 24 hours to capture the most realistic "acoustic picture" of an average day in the ICU.

Our analyses show that increasing the volume of alarms does increase the level of the alarm inside that room but that it does not appreciably increase the level of sound reaching an adjacent room. Compare the levels 'Inside room with alarm' to 'Adjacent Room door closed and adjacent room door open' in Figure 1. Nurses presumably increase the alarm level in order to alert medical staff in an adjacent room of a medical emergency inside a different room. The implication of our data is that increasing the volume of the alarm only minimally increases sound levels reaching adjacent rooms, at least in the ICU at the Portland VAMC. The increased volume will, however, increase disturbance to the patient in the room with the alarm.

Results of the 24 hour surveys indicate that some rooms in the ICU are subject to higher noise levels than others, and that peaks in sound occur frequently throughout the day and night. Figure 2 shows the average levels and the peak levels for rooms surveyed with the door to the room closed (blue bars) and open (green bars). As expected, closing the door to the patient's room decreases the average noise levels.

The results of the study will guide future research directions on noise control in the Portland VA and ultimately may help to shape future ICU policy regarding noise control.

This study has been submitted for a poster presentation at the "4th Annual Nursing Research & EBP Conference" to be held in Seattle in January of 2009.



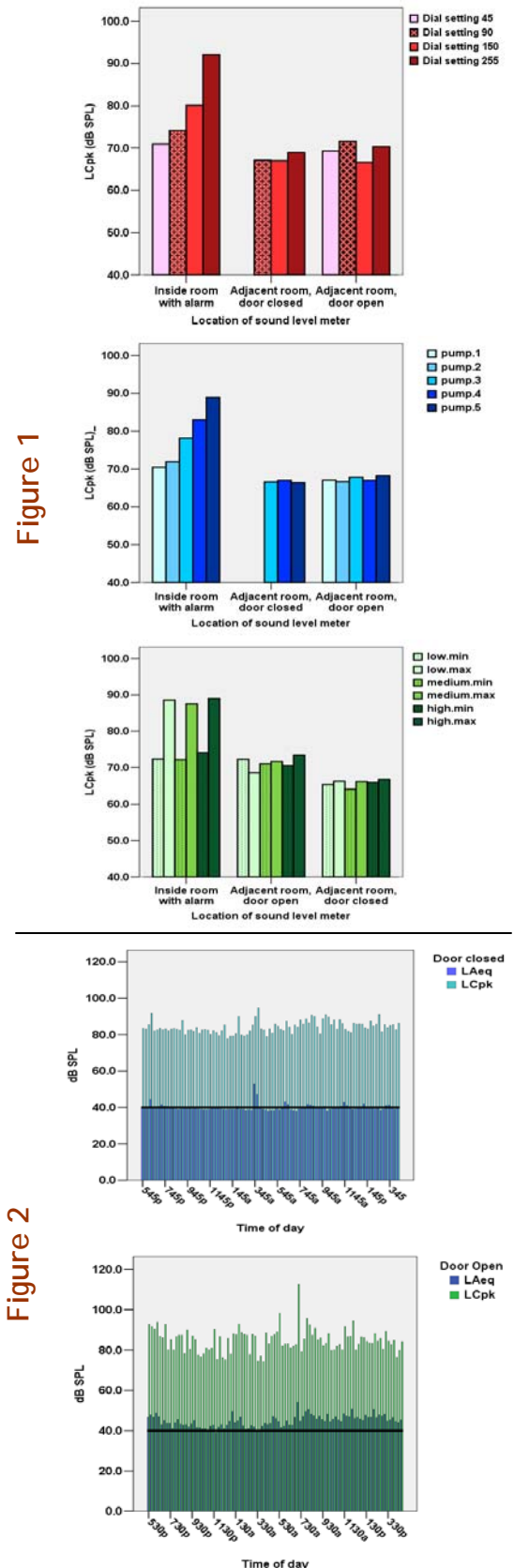
Marc Caldwell, Au.D. is a Research Audiologist at the NCRAR



Gabrielle Saunders, Ph.D. is an Investigator and Deputy Director at the NCRAR

Nancy Lawson, Kim Thompson, Deborah Brown, Jeanette Richardson, Naomi Gates, & Jaya Saiz are nurses in the ICU who chose to conduct this research study in order to improve the environment for their patients.

Diana Pope Ph.D. is Acting Director of Nursing Research at the Portland VAMC



Upcoming NCRAR Events



March 6 2009: James W. Hall, Ph.D. Clinical Professor and Associate Chair in the Department of Communicative Disorders University of Florida, *Title: Auditory Processing Disorders (APD) in Adults: Identification, Diagnosis & Management*

Save the Date

The 4th biennial NCRAR Conference titled: "The Ear-Brain System: Approaches to the Study and Treatment of Hearing Loss" will take place in Portland, OR on October 8-10 2009

Invited speakers:

Robert Shannon Ph.D.,
Nina Kraus Ph.D.,
Robert Zatorre Ph.D.,
Steve Colburn Ph.D.,
William Noble Ph.D.,
Ervin Hafter Ph.D.,
Sridhar Kalluri Ph.D.,
Arthur Boothroyd Ph.D., and
Robert Sweetow Ph.D.

November 19 2008: NCRAR Seminar by Robert Folmer Ph.D. *NCRAR, Title: Tinnitus treatment and Research: controversies and Conundrums*

Most NCRAR seminars are broadcast live via v-tel to other VA facilities. Contact deborah.halffman@va.gov for information.

December 5 2008: NCRAR Seminar by Michelle Molis Ph.D. *NCRAR. Title: Music, Hearing Loss, and Hearing Aids*

Seminars are from 12 to 1 pm in PVAMC Building 101 Room 109, unless otherwise noted.

NCRAR Announcements

Welcome to:

- Curtis Billings, Ph.D., our new Investigator
- Garnett McMillan, our new Biostatistician
- Melissa Teahen, our new Research Audiologist
- Elizabeth Eskridge and Jeffrey Shannon, our new Au.D. Externs, who will be here for one year

Good luck to:

- Ken James who will be retiring the end of November
- Marc Caldwell will be leaving NCRAR to work as a Clinical Audiologist in the Puget Sound HealthCare system.

Congratulations to:

- Tara Zaugg on her marriage
- Patty Saub who is celebrating 10-years with the Veterans' Administration



DVD sets available

The NCRAR has sets of DVDs available from the 2005 and 2007 conferences that can be borrowed for viewing.

2005 conference: The Aging Auditory System: Considerations for Rehabilitation

2007 conference: Hearing Therapies for the Future

If interested please contact Gaby Saunders at Gabrielle.saunders@va.gov

NCRAR Presentations & Publications – July – October, 2008

Publications:

Fausti, S.A., Wilmington, D.J., Gallun, F.J., Myers, P.J., Henry, J.A. (2008) *Auditory Dysfunction Associated with Traumatic Brain Injury*. J Rehab Res Dev., (accepted for publication).

Gallun, F. J. and Souza, P. (2008) *Exploring the role of the modulation spectrum in phoneme recognition*. Ear & Hearing, 29(5), 800-813.

Gallun, F.J., Durlach, N.I., Colburn, H.S., Shinn-Cunningham, B., Best, V., Mason, C.R. and Kidd, G., Jr. (2008) *The extent to which a position-based explanation accounts for binaural release from informational masking*. J. Acoust. Soc. Am., 124, 439-449.

Henry, J.A., Zaugg, T.L., Myers P., Schechter, M.A. (2008) *Using Therapeutic Sound with Progressive Audiologic Tinnitus Management*. Trends in Amplification 12(3),185-206.

Henry, J.A., Zaugg T.L., Myers P., Schechter, M.A. (2008) *The role of audiologic evaluation in Progressive Audiologic Tinnitus Management*. Trends in Amplification 12(3),169-184.

Kidd, G., Jr., Richards, V., Mason, C.R., Gallun, F.J., and Huang, R. (2008) *Informational masking increases the costs of monitoring multiple channels*. JASA-EL, 124(4).

Langguth, B., Ridder, D., Dornhoffer J.L., Eichhammer, P., Folmer, R.L., et al. (2008) *Controversy: Does repetitive transcranial magnetic stimulation/ transcranial direct current stimulation show efficacy in treating tinnitus patients?* Brain Stimulation (in press).

Meikle, M.B., Stewart, B.J., Griest, S.E., Henry, J.A., Tinnitus outcomes assessment. *Trends in Amplification*. 12(3), 2008.

Saunders, G.H., Griest, S., *A Multimedia Hearing Loss Prevention Program for older adults: Theoretical Basis and Development*. Journal of the Academy of Rehabilitative Audiology. (in press)

Saunders, G.H., *Combined hearing loss and vision loss: current research and future rehabilitation*. Invited short story for Deaf-Blind American Magazine (in press).

Submitted publications:

Flores, M., Saunders, G.H., Pickett, B.P. *Aging and the Auditory System*. In *ML Knoefel and JE Knoefel (Eds.), The Clinical Neurology of Aging*. Oxford University Press: Oxford (in press).

Folmer, R.L., Griest, S.E., Martin, W.H. *Obsessive-Compulsiveness in a Population of Tinnitus Patients*. International Tinnitus Journal

Folmer, R.L. (2008) *Prevalence of Hearing Loss*. Archives of Internal Medicine.

Konrad-Martin, D., James, K.E., Gordon, J.S., Reavis, K.M., Phillips, D.S., Bratt, G.W., Fausti, S.A. (2008) *Evaluation of Audiometric Threshold Shift Criteria for Ototoxicity Monitoring*. Journal of the American Academy of Audiology.

Konrad-Martin, D. (2008). *Advances in Hearing Conservation Practices: An Interview with Mark Stephenson*. ASHA Special Interest Division 6, Hearing and Hearing Disorders: Research and Diagnostics (Submitted)

Konrad-Martin, D & Saunders G.H. Chapter 16: Aging, Hearing Loss and Auditory Rehabilitation. In RH Hull (Ed.), *Introduction to Aural Rehabilitation*. Plural Publishing: San Diego (in press).

Lauer, A.M., Dooling, R.J., and Leek, M.R. *Psychophysical Evidence of Damaged Active*

Lewis, M.S., Gordon, J., Lilly, D. & Crandell, C. *A pilot investigation of speech perception in noise for adults in the FM+EM listening condition*. American Journal of Audiology (in review).

Presentations:

Best, V., Gallun, F.J., Mason, C.R., Kidd, G., Jr., and Shinn-Cunningham, B.G. (2008) *Hearing loss and divided*

listening International Hearing Aid Research Conference (IHCON), Lake Tahoe, CA.

Bor, S., Souza, P., Wright, R., and Leek, M. *Vowel identification, hearing loss configuration, and hearing aid processing*. Presented at the International Hearing Aid Conference, Lake Tahoe, NV, August 2008.

Ellingson, R., Dille, M., Leek, M., Fausti, S. *On the synthesis of multiple frequency tone burst stimuli for efficient high frequency auditory brainstem response*. Proceedings of the 30th Annual International Conference of the IEEE EMBS, Vancouver, Canada, Aug 21-24, 2008.

Gallun, F.J. *The effect of hearing aid compression on the modulation characteristics of speech*, Boystown National Research Hospital, Omaha, NE

Gallun, F.J., *The advantage of knowing where to listen*, Invited Talk, Reed College Psychology Dept. Seminar Series, Sept. 18, 2008

Gallun, F.J. (2008) *Rapid processing of brief non-speech auditory stimuli*. Proceedings of the 14th Meeting of CSAIL. Hood River, OR

Henry J.A., Zaugg T.L. *Progressive Audiologic Tinnitus Management (PATM)*. Grand Rounds, Audiology Service, OTOHNS, National Naval Medical Center, Bethesda, MD, August 28, 2008. (invited full-day workshop).

Henry J.A., Zaugg T.L., Myers P. J., Schechter M.A. *Progressive Audiologic Tinnitus Management*. Academy of Rehabilitative Audiology Annual Institute, Portland, OR, September 11, 2008. (poster)

Henry JA, Zaugg TL, Myers PJ, Schechter MA. "Sound-based Methods of Tinnitus Management." Academy of Rehabilitative Audiology Annual Institute, Portland, OR, September 11, 2008. (poster).

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Meet Wendy Helt, NCRAR Grants

Administrator and Audiologist (Continued from Page 2)

administrative sections of proposals, in addition to assisting with the submission process. At times it can be challenging and hectic to balance competing demands, responsibilities and priorities, however both roles are rewarding in different ways.

Outside of work I enjoy spending time with my family and friends. My kids keep me very busy with school and extracurricular activities. Krista, my 12-year-old daughter is in 7th grade, and swims for the Tornadoes

Swim Team. It has been fun to watch her develop into a well-rounded, competitive swimmer, and a tall (imagine that) and beautiful young lady. Colin, my eight-year-old son is in third grade, and plays baseball, flag football, and also swims for the Tornadoes. He can be a real entertainer, enjoys building things with Lego's, and always seems to be thinking. Personally, I enjoy reading, water-skiing, running and listening to country music!

While the kids are participating in sports, I try to find time to put on my iPod and go for a run. Colin frequently reminds me not to have the volume too loud—hmmm, I wonder how he got to be so smart! Running is a good outlet for me to clear my mind. One of my biggest personal accomplishments this past year was running two half marathons!

Director's Message (Continued from Page 1)

development of new solutions to an increasingly ubiquitous health concern.

One way that the NCRAR has become a national resource is through our commitment to the dissemination of evidence-based research results. Outreach to the research community, patients, and multi-disciplinary collaborators has strengthened this role. The NCRAR has a monthly *Clinical Research Seminar* series featuring an array of highly-acclaimed, international leaders in the field that come to the NCRAR for collaborative talks and lectures which are televised on the VA's V-Tel network to VA medical centers throughout the country. Through this series, rehabilitation researchers and engineers, clinicians, and educators can access the latest research and development findings and information. In addition, the NCRAR has developed national educational programs in areas such as tinnitus evaluation techniques and ototoxicity early identification and monitoring to promote the widespread implementation of best practices in hearing healthcare. The NCRAR has also been successful in embarking on research collaborations with groups outside the auditory research community to expand awareness of hearing health issues. Examples include:

- Collaborating with the Nursing Service and Nursing Research Program to explore noise-related hearing damage on hospital wards.
- Collaborating with the Institute of Engineering to develop an auditory testing program.

Our NAB acknowledged the success of the NCRAR's community and professional outreach, and encourages keeping education as a significant component of the NCRAR's activities.

As we celebrate our accomplishments, it is important to have a clear plan for the future of the NCRAR to ensure its continued success. Our NAB emphasized the importance of continued collaborations with the Department of Defense, especially in the areas of hearing loss prevention, hearing conservation, and traumatic brain injury. This is especially relevant for both the DoD and VA as a result of injuries of military personnel involved in Operation Enduring Freedom and Operation Iraqi Freedom. The NAB stated that "Advances in these areas will impact clinical treatment for active duty personnel and veterans, and will have relevance for clinical practice in general." As confirmed by our NAB, the NCRAR is poised to continue to expand and strengthen its rehabilitation research and development, and educational program impacts using its exceptional infrastructure and multi-disciplinary consortium. In addition, the deployment of additional communications technologies will increase the NCRAR's capacity to effectively educate and inform healthcare professionals, veterans, their families, the community abroad, as well as enhance meaningful interactions with researchers, clinicians, and patients.



NCRAR Presentations & Publications – July – October, 2008

(Continued from Page 5)

Jacobs, P.G., Wan, E., Konrad-Martin, D. L. (2008). *On Correlating Otoacoustic Emissions with Blood Glucose*, (815) Accepted for presentation at the Proceedings of the 30th Annual International Conference of the IEEE Engineering in Medicine and Biology Society, Vancouver, British Columbia, Canada, August 20-24, 2008.

Konrad-Martin, D.L., Austin, D.F., Griest, S.E., McDermott, D.J., Fausti, S.A. (2009) *Lesion sites in diabetes-associated auditory impairment*. Poster or podium presentation to be given at the Southern Triological Society Meeting.

Lewis, M.S. (2008, September). *Multiple sclerosis and problems hearing: Are the two issues related?* Presentation given to the Salem MS Support Group, Salem, OR.

Lewis, M.S., Hutter, M., & McGuiness, A. (2008, August). *Patient and spousal expectations of hearing-aid utilization*. Poster presented at the International Hearing Aid Research Conference (IHCON), Lake Tahoe, CA.

Molis, M., Diedesch, A., Leek, M., and Gallun, F. “*Modeling the contributions of harmonic amplitude and phase contrast to improvement in vowel recognition by hearing-impaired listeners*” Presented at the International Hearing Aid Conference, Lake Tahoe, NV, August 2008

Myers, P.J., Henry, J.A., Zaugg, T.L. “*Utilizing Patient Education Principles in the Development of the Progressive Audiologic Tinnitus Management Program.*” Teleconference/PowerPoint presentation for the VA Office of Health Education & Information monthly conference call, September 2, 2008.

Pope, D. and Gallun, F.J. “*How noisy are the Portland VA medical/surgical nursing units?*” PVAMC Nursing Grand Rounds, September 4, 2008.

Saunders, G.H. (2008) *Performance Perceptual Test (PPT) and the Acceptable Noise Level (ANL): What do they measure?* Paper presented at the International Hearing Aid Research Conference (IHCON), Lake Tahoe, CA, August 13th-17th

Saunders, G.H., Lewis, M.S., & Forsline, A. (2008) *Expectations, pre-fitting counseling and hearing aid outcome*. Poster presented at the International Hearing Aid Research Conference (IHCON), Lake Tahoe, CA, August 13th-17th.

Poster presented at ARA (2008): Gabrielle Saunders Ph.D.; Samantha Lewis Ph.D., Anna Forsline Ph.D. “*Expectations, pre-fitting counseling and hearing aid outcome.*”

Souza, P. and Gallun, F.J. (2008) “Effect of amplification on consonant modulation spectra.” International Hearing Aid Research Conference (IHCON), Lake Tahoe, CA.

Turbin, M. presented “*Patient Centered Audiology: Its More Than Just Individualized Care.*” Presented at the Academy of Rehabilitative Audiology Institute. Portland Oregon, September 10 – 12, 2008.

Turbin, M. Patient-Centered Audiology poster presented at the VIII Congress, International Federation of the Hard of Hearing Association. “*A Global Community of Communication.*” Vancouver, B.C.

Zaugg, T.L., Henry, J.A. “*Managing Your Tinnitus: What to Do and How to Do it.*” (Part 1) NCRAR Tinnitus Education Group, VA Medical Center, Portland, OR, July 1, 2008 (special workshop open to veterans and general public)

Zaugg, T.L., Henry, J.A. “*Managing Your Tinnitus: What to Do and How to Do it.*” (Part 2) NCRAR Tinnitus Education Group, VA Medical Center, Portland, OR, July 15, 2008 (special workshop open to veterans and general public).

NCRAR Research funded between 7/08 & 10/08)

Chisolm & Wilson, Pls, Saunders CO-I. VA RR&D grant: Supplementing Hearing Aids with Computerized Auditory Training. 7/1/2008 to 6/30/2010.

Henry JA (PI) VA RR&D Tinnitus Management for TBI: Pilot Study. 7/1/08 to 3/31/10.

Henry JA & Folmer R (Pls). VA RR&D. Large equipment funding 7/1/08.

Fausti & Wilmington (VA RR&D. A portable audiometric monitoring device (the Otold) 7/08 to 6/11.