



the **REGISTRY**

Newsletter of the NIDCD National Temporal Bone, Hearing and Balance Pathology Resource Registry

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The REGISTRY is published semiannually by the NIDCD National Temporal Bone, Hearing and Balance Pathology Resource Registry. The Registry was established in 1992 by the National Institute on Deafness and Other Communication Disorders (NIDCD) of the National Institutes of Health to continue and expand upon the former National Temporal Bone Banks (NTBB) Program. The Registry promotes research on hearing and balance disorders and serves as a resource for the public and the scientific community about research on the pathology of the human auditory and vestibular systems.

Editorial

Protecting the Science – and Art – of Otopathology

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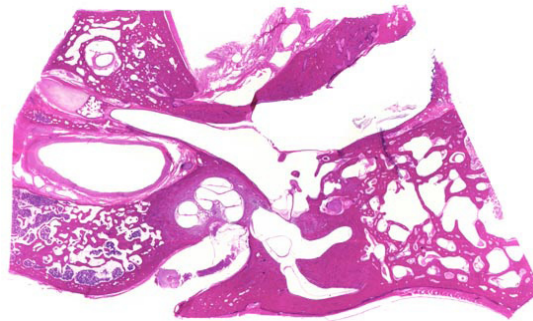


Figure 1. A section of a normal human temporal bone near the mid-modiolar plane.

For the past century, the time-consuming, laborious and expensive histological preparation of human temporal bones (HTBs) (Figure 1) has led to the discovery of the pathology of Ménière’s disease, otosclerosis, cholesteatoma and many other human ear diseases. Once a thriving enterprise worldwide, laboratories that prepare HTBs for histological study have closed at an alarming rate so that only three remain to provide the specialized skill and know-how for future discoveries. In addition, the number of otopathologists who analyze and interpret HTB samples is declining. How did we get to this point?

To answer this question, we first need to go back 100 years. Century-old techniques to fix, decalcify, embed and section a HTB for comprehensive histological study are slow, highly specialized and learned only through observing others in a “hands-on mentor” system. Because of closure of most HTB laboratories, there are only a few individuals left in the world who can skillfully and properly perform the precise techniques needed for accurate otopathologic HTB analysis.

On a financial level, many HTB laboratories have suffered the vicissitudes of “soft” money and have closed. For a HTB lab to function well and remain open, it needs stable funding for its personnel, equipment and space. To illustrate how quickly things can change: In the mid 1980s, there were 32 active histopathology labs worldwide to prepare HTBs, including 25 in the United States. Today there are three (see Figure 2). Of those, two will likely close within the next two years if stable sources of funding are not found.

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Active Human Temporal bone Labs

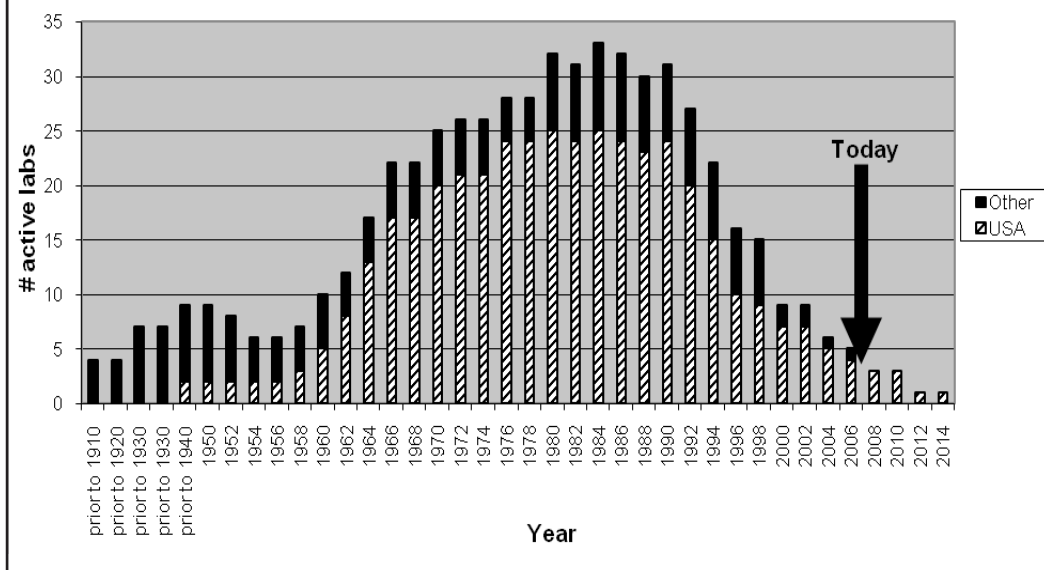


Figure 2. Human temporal bone histopathology laboratories started in Europe a century ago. Active labs reached a peak in the mid 1980s and have closed at an alarming rate.

These critical issues were discussed during a workshop held on September 12, 2003 (http://www.nidcd.nih.gov/funding/programs/hb/temp_bone_wrkshp.htm) that was organized by Dr. Julie Gulya from the National Institute for Deafness and other Communication Disorders (NIDCD). I chaired the meeting. Several recommendations were presented, including the following:

- “The most pressing need for human temporal bone laboratory survival is support for the costs of initial temporal bone acquisition, processing and assessment of specimen utility.”
- “Funding supporting the core functions of such laboratories is critical to their survival and to their ability to train future generations of otopathologists.”
- “The training of aspiring otopathologists should be supported by funds that allow sufficient time to acquire the multidisciplinary skills required.”

The NIDCD responded to these recommendations by issuing a request for application (RFA) for an NIDCD Cooperative Agreement (U24). Three

applications were funded: two utilized whole temporal bone histopathology and one utilized specialized histological studies of the cochlea. While this mechanism helped to maintain a couple of productive laboratories, it is uncertain whether the U24 RFA will be re-issued. Hence, the existing HTB laboratories continue to operate under a cloud of uncertainty.

The following points explain why we must continue to support laboratories that process and study HTBs:

- The histopathological study of human tissues is and always has been the underpinning to understanding human disease and its treatment.
- Adequate HTB processing requires laborious, time-consuming techniques that cannot be performed in laboratories that do not specialize in these techniques.
- HTB processing from autopsy to final sectioning and mounting requires months of careful preparation and long-term commitment by otopathologists and their technical staff.
- Preparing and sectioning an HTB is a precise and highly specialized craft, with at least 100 different factors that

must be considered if consistent, usable sections are to be obtained. For example, technicians must attend to variations in the celloidin character, the quality of the microtome knife edge and angles of the sliding microtome knife. Technicians who understand these factors and have mastered these skills must teach others because these skills cannot be learned from written materials. Thus, once these skills are lost, it is unlikely that they can be re-acquired.

- Skills required to analyze and interpret the histopathology within archived HTBs now reside in a handful of individuals in the world. To learn these skills, years of training are required. With the loss of HTB labs over the last few decades, there are few, if any, aspiring otopathologists to maintain the discipline in the decades to come. Without stable sources of funding, there seems to be no future for an academic career in HTB pathology.
- Secrets contained in the ears of individuals with newly understood diseases could be hidden from the world unless their temporal bones are adequately studied. For example, though we now recognize over 50 causes of genetic deafness, the histopathology of only three is known. Understanding the histopathology of these disorders is likely to stimulate new and unpredictable lines of investigation into the fundamental nature of how hearing and balance organs function.
- New interventions to treat diseases of the temporal bone are being devised regularly. Without an understanding of the histopathological consequences of these interventions, advances will depend on speculation. The consequences of interventions such as drug delivery to the inner ear, semicircular canal obstruction and electromechanical stimulation of the cochlea are currently unknown. Future interventions such as the introduction of regenerating stem cells into the cochlea and vestibular labyrinth will require detailed study of the HTB to advance the field.
- In many cases, animal models that advance knowledge of the ear do not demonstrate characteristic otopathology observed in humans. Hence, human specimens are needed to verify the validity of animal models. There are also many otologic disorders for which no animal models exist.
- Very few HTBs have been procured from individuals with well-documented normal levels of hearing and balance function. Normal specimens are essential to serve as controls, especially in studies utilizing molecular techniques. For example, to investigate whether changes in the expression of certain genes are associated with presbycusis, one needs tissue from well-defined normal controls.

To address these important issues, we need to urgently develop stable, long-term funding for the few remaining temporal bone histopathology laboratories. While funding by the NIDCD of the National Temporal Bone Registry (<http://www.tbregistry.org/>), the Temporal Bone Consortium (<http://temporalboneconsortium.org/>) and the U24 Cooperative Agreement has been a step in the right direction, more is needed.

I suggest that a funding mechanism such as a renewable contract be issued to several key regional HTB laboratories. Costs to maintain the remaining laboratories are modest and should be part of a long-term commitment by the NIDCD, the American Academy of Otolaryngology-Head and Neck Surgery, the American Otological Society and the American Neurotology Society. This long-term commitment is required to protect the science and art of otology and to ensure that a career in the study of HTB pathology is to be attractive to the next generation of otopathologists.

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NEWS & ANNOUNCEMENTS



Noise-induced hearing loss (NIHL) is 100 percent preventable. Yet approximately 26 million Americans between the ages of 20 and 69 have high-frequency hearing loss from overexposure to loud noises at work or during leisure activities. More than 30 million Americans are exposed to dangerous levels of noise on a regular basis (1). Children also are frequently exposed to noise levels that could permanently damage their hearing. Noise levels generated by activities as common as doing yard work, playing a band instrument, and attending sports events can result in NIHL. Research suggests that NIHL experienced at an early age may accelerate age-related hearing loss later in life (2).

In October 2008, the National Institute on Deafness and Other Communication Disorders (NIDCD), part of the National Institutes of Health (NIH), launched It's a Noisy Planet. Protect Their Hearing. The Noisy Planet campaign is designed to increase awareness among parents of children ages 8 to 12 ("tweens") about the causes and prevention of NIHL. With this information, parents and other caring adults can encourage children to adopt healthy habits that will help them protect their hearing for life.

NIDCD is focusing its campaign on the parents of tweens because children at this age are becoming more independent and developing their own attitudes and habits related to their health. They also are beginning to develop their own listening, leisure, and work habits—or soon will do so. Consequently, the tween years present an open window of opportunity to educate children about their hearing and how to protect it.

Parents still have a great deal of influence over their tween's behavior, and the Noisy Planet campaign provides them with resources that they can use to educate their children about the causes and prevention of NIHL. The campaign Web site at noisyplanet.nidcd.nih.gov provides parents with facts about NIHL, tips on how to encourage their tween to adopt healthy hearing habits, and other steps they can take to protect their tween's hearing. The site also offers information specifically for tweens, such as interactive games about noise and hearing.

1. National Institute on Deafness and Other Communication Disorders (n.d.). National Institute on Deafness and Other Communication Disorders health disparities strategic plan fiscal years 2004–2008. Available online at www.nidcd.nih.gov/about/plans/strategic/health_disp.asp.

2. Kujawa, S.G. and Liberman, M.C. (2006). Acceleration of age-related hearing loss by early noise exposure: Evidence of a misspent youth. *Journal of Neuroscience*, 26(7), 2115–2123. Available online at www.jneurosci.org/cgi/content/abstract/26/7/2115.

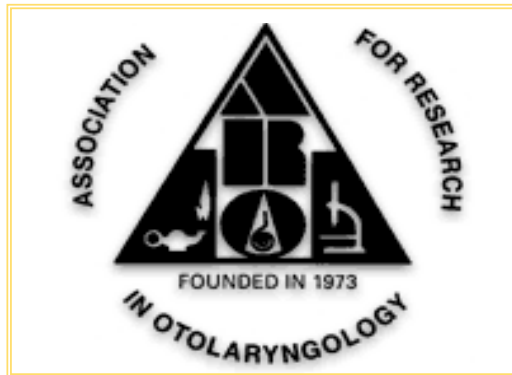


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NIDCD supports and conducts research and research training on the normal and disordered processes of hearing, balance, smell, taste, voice, speech, and language and provides health information, based on scientific discovery, to the public. For more information about NIDCD programs, see the Web site at www.nidcd.nih.gov.

MEETINGS

THE REGISTRY IS PLANNING TO
EXHIBIT AT:



*34th Mid Winter Meeting
The Baltimore Marriott Waterfront
Baltimore, Maryland, USA
February 19- 23, 2011*

OTOPATHOLOGY MINI-TRAVEL FELLOWSHIP PROGRAM

The NIDCD National Temporal Bone Registry is pleased to announce the availability of mini-travel fellowships. The fellowships provide travel funds for research technicians and young investigators to visit a temporal bone laboratory for a brief educational visit, lasting approximately one week. *The emphasis is on the training of research assistants, technicians and junior faculty.* The fellowships are available to:

- 1) U.S. hospital departments who aspire to start a new temporal bone laboratory
- 2) Inactive U.S. temporal bone laboratories that wish to reactivate their collections or
- 3) Active U.S. temporal bone laboratories that wish to learn new research techniques

Up to two fellowship awards will be made each year (\$1,000 per fellowship). The funds may be used to defray travel and lodging expenses. Applications will be decided on merit. Interested applicants should submit the following:

- 1) A 1-2 page outline of the educational or training aspect of the proposed fellowship
 - 2) Applicant's curriculum vitae
 - 3) Letter of support from temporal bone laboratory director or department chairman
 - 4) Letter from the host temporal bone laboratory, indicating willingness to receive the traveling fellow
- Applications should be sent to:

Saumil N. Merchant, M.D.
NIDCD National Temporal Bone Registry
Massachusetts Eye and Ear Infirmary
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<p><i>That Others May Hear</i> is a short brochure that briefly describes the functions of the Registry, and answers commonly asked questions regarding the temporal bone donation process. (Dimensions: 9" x 4")</p>	<p><i>The Gift of Hearing and Balance: Learning about Temporal Bone Donation</i> is a 16-page, full-color booklet which describes in more detail the benefits of temporal bone research. It also answers commonly asked questions regarding the temporal bone donation process. (Dimensions: 7" x 10")</p>
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If you are willing to display either or both of these brochures, please complete the form below and return it to the Registry by mail or fax. The brochures will be sent to you **free of charge**. Please circle the amount requested for each brochure or write in amount not listed.

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