

NIDCD Research Training in the Hearing and Communication Sciences

Elyssa Monzack, Ph.D.
NIDCD Training Director

ASPET

April 2, 2016



National Institute on
Deafness and Other
Communication Disorders



What is NIDCD?

**Part of the National Institutes of Health (NIH),
NIDCD is the:**

**National Institute on Deafness and
Other Communication Disorders**



Porter Neuroscience Research Center



NIH Clinical Center

The NIDCD training program snapshot

- **Post-baccalaureate trainees**
 - Recently graduated from college and want to gain more research experience before graduate or medical school
- **Graduate students**
 - Partnerships with Oxford, Cambridge, Brown, Johns Hopkins
- **Medical students**
 - Performing a year of research in between their 3rd and 4th year of medical school
- **Post-doctoral trainees**
 - Completed graduate or medical school, continuing research training



https://www.training.nih.gov/life_at_nih

Why study hearing?

- Hearing loss is the **most common sensory impairment** in humans
- 15% of Americans between the ages of 20 and 69 (26 million people) have high-frequency hearing loss due to exposure to noise at work or during leisure activities
- The rate of **disabling hearing loss increases with age:**
 - 50% of adults aged 75 and over
- Considering the average life span in the United States reached **78.8 years** in 2012, **hearing loss will affect most of us**
- There is no cure for hearing loss



Why study hearing?

Developmental Neuroscience

Molecular Genetics

Systems Biology

Pharmacology

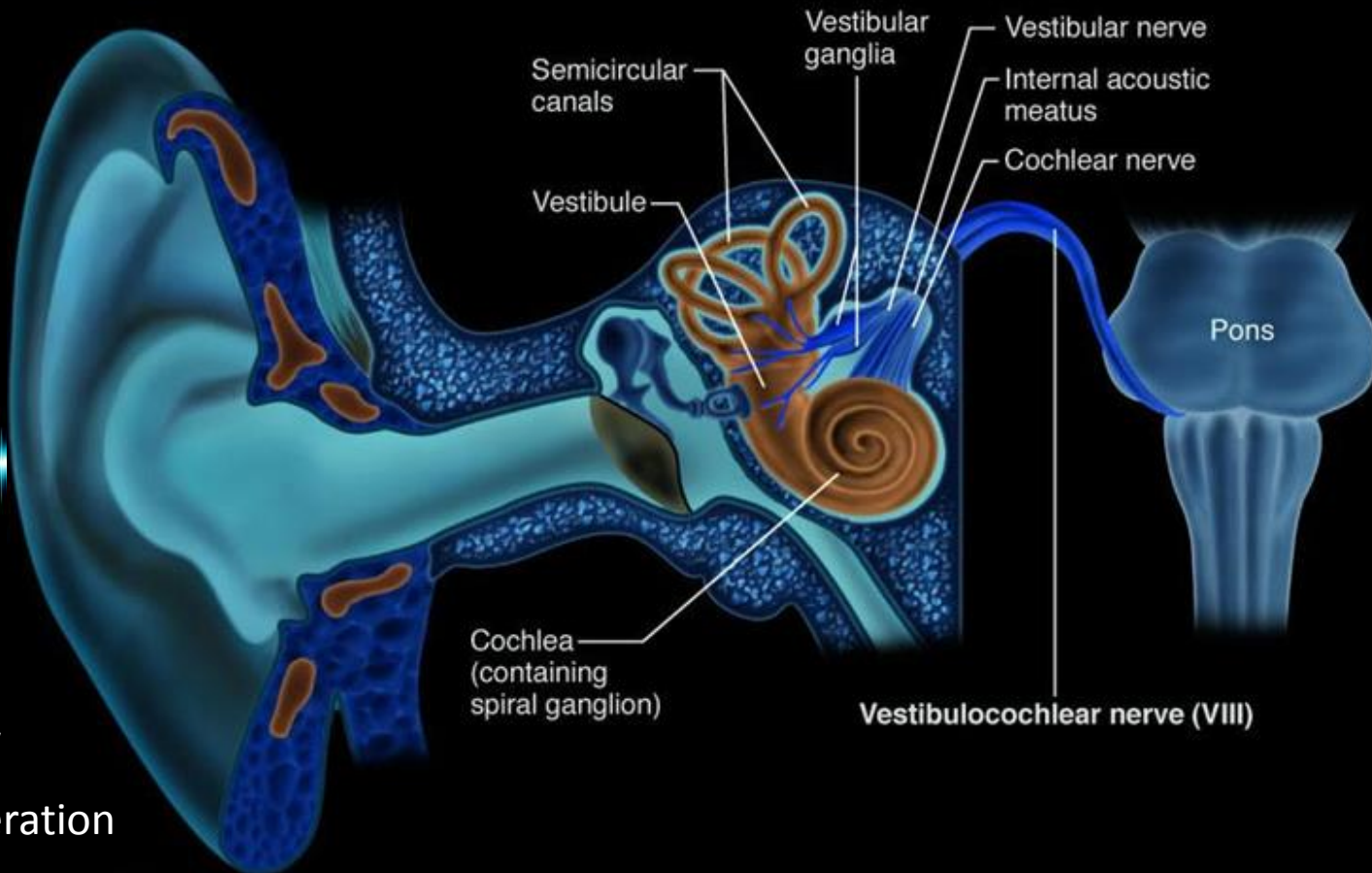
Physics

Auditory Mechanics

Sensory Cell Biology

Sensory Cell Regeneration

Neuronal Synaptic Circuitry



Why study hearing?

Developmental Neuroscience

Molecular Genetics

Systems Biology

Pharmacology

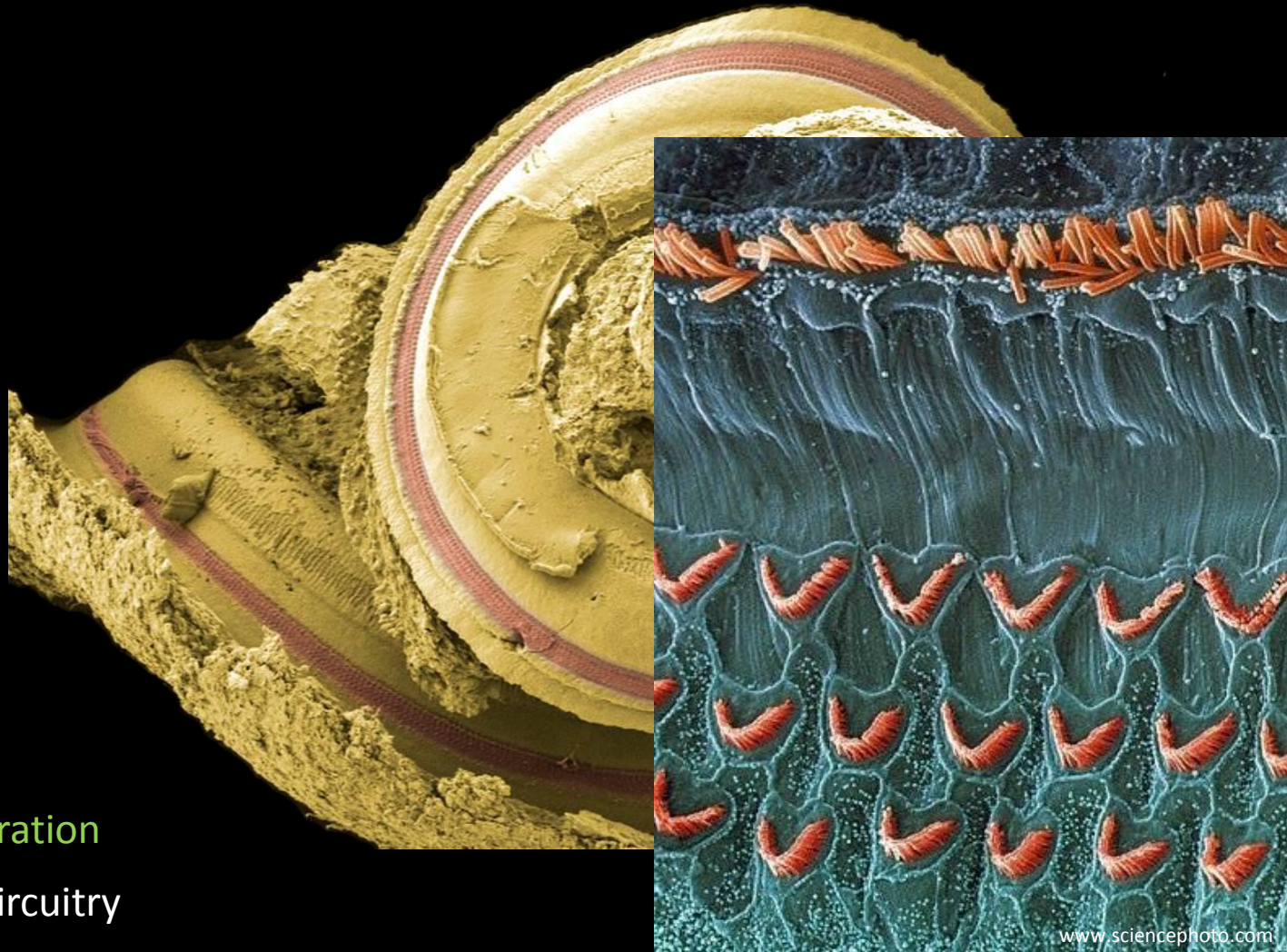
Physics

Auditory Mechanics

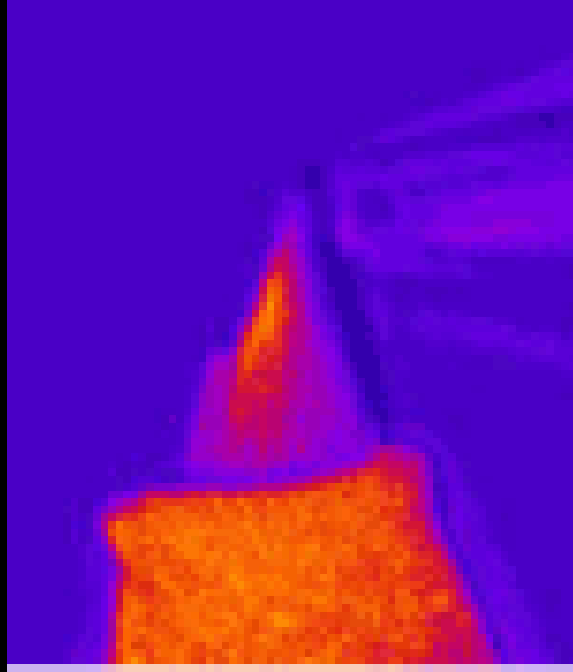
Sensory Cell Biology

Sensory Cell Regeneration

Neuronal Synaptic Circuitry



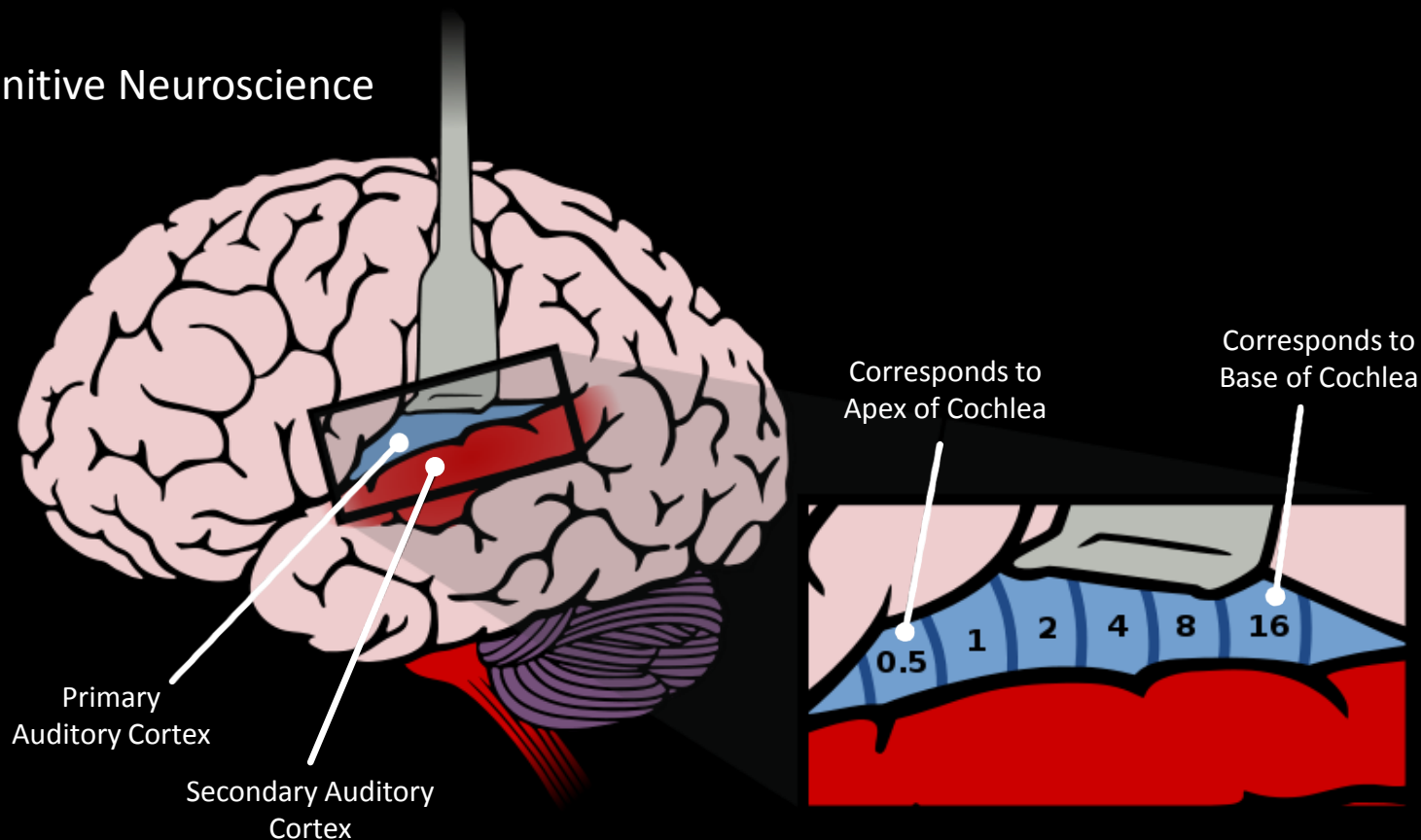
Hair cells are extraordinary mechanosensors



The system is sensitive enough to detect bundle deflections the width of a hydrogen atom ¹

Why study hearing?

Cognitive Neuroscience



Also under our umbrella...

Balance



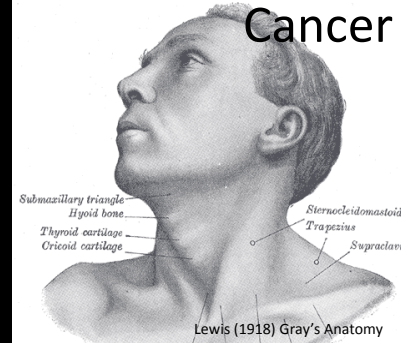
https://commons.wikimedia.org/wiki/File:Thonet_chair_balance.jpg

Taste



<http://mashable.com/2014/04/08/pucker-up/#vrbfTgVOb5qo>

Head/Neck
Cancer



Lewis (1918) Gray's Anatomy

Speech and Language



<http://childrenscampus.com/cms/wp-content/uploads/communication-matters.jpg>

Smell

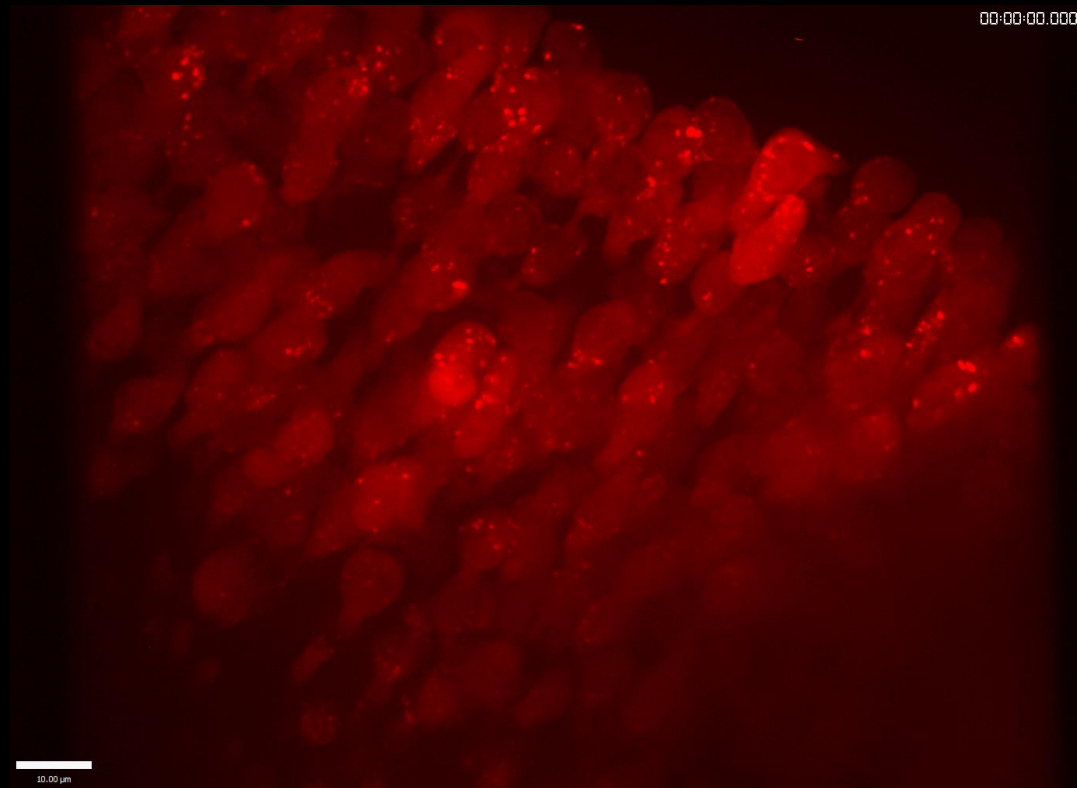


<https://connordefehr.wordpress.com/tag/culture/>

Opportunities at NIDCD- Section on Sensory Cell Biology

Examines molecular signals that regulate survival, homeostasis, and death of sensory hair cells

- What are the signal transduction pathways activated when a hair cell dies?
- How can we develop a drug that will prevent hair cells from dying?
- Can we spur hair cell regeneration?
- How can we screen existing drugs to find one that will do any of this?

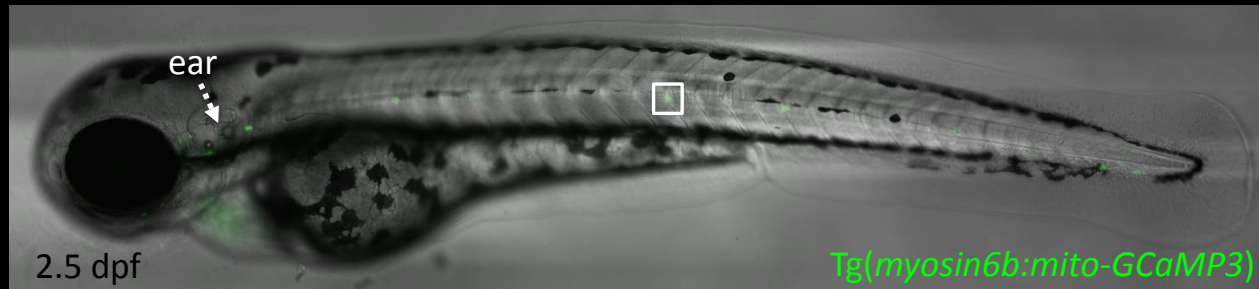


red=hair cells, 16 hrs total in neomycin, 30 min intervals

Opportunities at NIDCD- Section on Sensory Cell Development and Function

Investigates how discrete subcellular signals shape hair cell development and how these signals are required for proper physiological function

- Hair cells are very similar across species
- Cannot image hair cells live in mammals
- Can image hair cells in the whole living fish, both in the ear and along the body
- Use a zebrafish model system to study hair cells
- Zebrafish can be used to screen for drugs that damage or protect hair cells



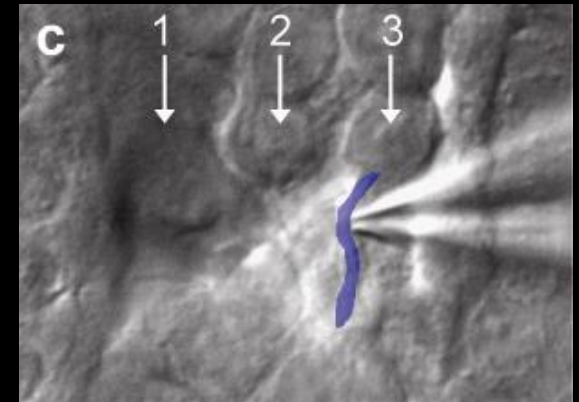
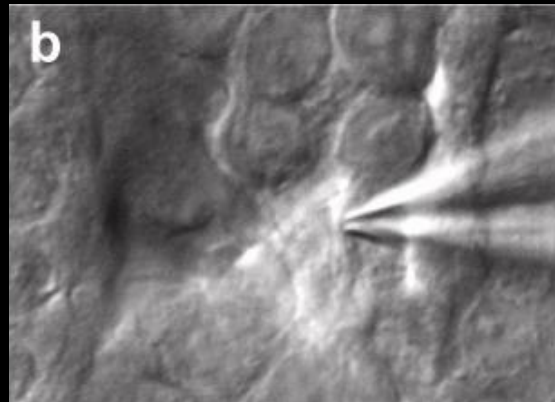
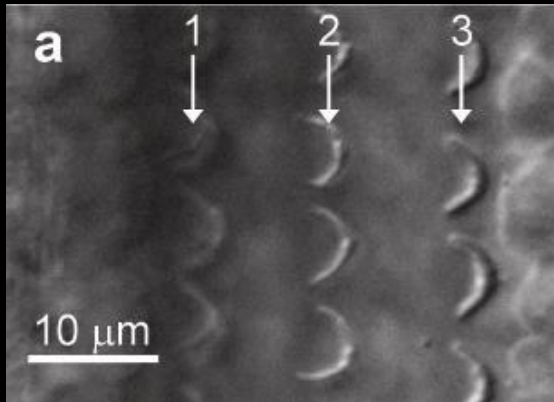
Lateral line hair cells express a fluorescent mitochondrial calcium indicator

Opportunities at NIDCD- Section on Neuronal Circuitry

Studies the communication between auditory neuronal pathways within the auditory system



- The “dynamic range problem” motivates the search for neural mechanisms underlying sound transduction
- To study the communication among neurons (or between neurons and hair cells), use a pipet to create a seal and examine the activity of the dendrites as they spiral out from outer hair cells
- Can apply different treatment conditions and examine changes in cellular response



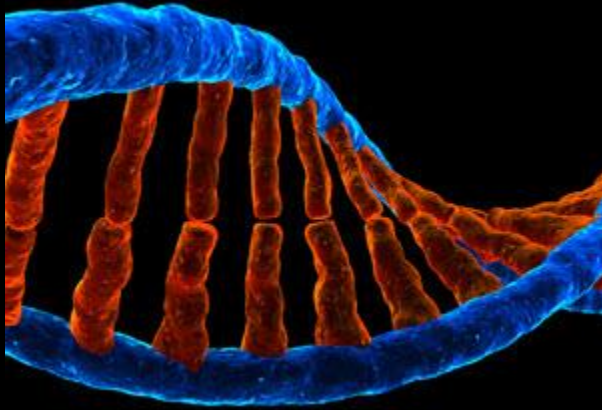
Otolaryngology Surgeon-Scientists

- OSSP brings in otolaryngology surgeons for junior faculty positions
- Labs perform clinically translational research
- Provides pipeline for drug development and first-in-human studies
- Trainees perform research in each laboratory



<https://www.nidcd.nih.gov/training/otolaryngology-surgeon-scientist>

Research Facilities at NIDCD



Genomics and Computational
Biology Research Facility



Mouse Auditory Testing
Research Facility



Advanced Imaging
Research Facility

http://www.ncbiotech.org/sites/default/files/pages/EG_NextGenerationSequencing.jpg

http://whyfiles.org/wp-content/uploads/2013/12/mouse_wi_headphones.png

[http://www.rothamsted.ac.uk/sites/default/files/groups/bioimaging_dev/full/DSC_7812_JEOL-JSM-6700F-Field-Emission-Gun-\(FEGSEM\)_smlFile.jpg](http://www.rothamsted.ac.uk/sites/default/files/groups/bioimaging_dev/full/DSC_7812_JEOL-JSM-6700F-Field-Emission-Gun-(FEGSEM)_smlFile.jpg)

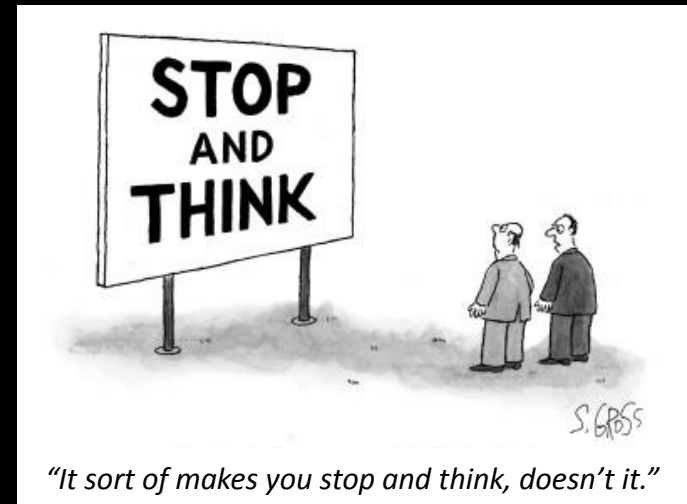
Seminars at NIDCD

In addition to performing research, also a rich environment for intellectual exchange:

NIDCD Division of Intramural Research Seminars

NIDCD Trainee Talks

- Administered by the **NIDCD Fellows Committee**, which is open to all NIDCD trainees
- Meets monthly to discuss any issues relevant to trainees (seminar series, taxes, child care, training, etc.)



Hands-on courses at NIDCD



EARSsentials:
Concepts and Techniques of
Contemporary Hearing Research

July 18-22, 2016
Lectures*: 8:30 am - noon, daily
Laboratories: 1 - 6 pm, daily**
National Institutes of Health
Bethesda, Maryland

Topics
inner ear development and morphology,
auditory and vestibular function, genetics of hearing loss,
stereocilia structure, mechanotransduction,
zebrafish lateral line, hair cell regeneration,
cell death, and the spiral ganglion

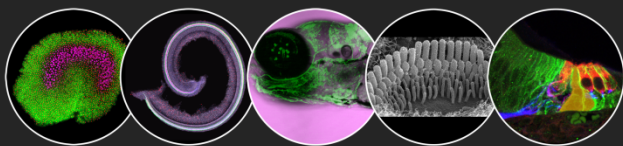
www.nidcd.nih.gov/research/EARSsentials

*Lectures take place in Building 49, room 1A51/1A59
**Space in laboratories is limited
Reservations are required for all lecture and lab sessions
Contact Elyssa Monzack: monzackel@nidcd.nih.gov, 301-827-4184



- NIDCD's crash course in hearing research
- 1 week long, offered every summer
- Lectures in the morning, hands-on laboratory sessions in the afternoon
- Next course will be July 18th-22nd, 2016
- Lectures will be videocast!
- If interested, contact:
elyssa.monzack@nih.gov

Robert Wenthold Postdoctoral Research Fellowship



Department of Health and Human Services
National Institutes of Health
National Institute on Deafness and Other Communication Disorders

Robert Wenthold Postdoctoral Research Fellowship

The Robert Wenthold Fellowship supports NIDCD intramural research training of the most highly promising postdoctoral research fellows seeking to become independent investigators and leaders within the mission areas of NIDCD. A Wenthold Fellow is encouraged to design a research training and career development plan that takes advantage of the multi-disciplinary training, dedicated core facilities, and the breadth and depth of communication sciences expertise within the NIDCD intramural research program (<http://www.nidcd.nih.gov/research/>). NIDCD intramural research includes basic and clinical studies of normal and disordered processes of hearing, balance, taste, voice, speech and language.

The Fellowship is designed to maximize the probability of success for a long-term independent research career in the multi-disciplinary field of communication sciences. Acquisition of new scientific approaches and methodologies is encouraged, with the opportunity for multi-disciplinary training and structured co-mentoring. The Fellowship includes an initial two-year commitment of salary, benefits, travel and annual supplies, with the potential for performance-based salary increases and extension of the appointment beyond two years.

Eligible individuals will have an MD and/or PhD, or an equivalent doctoral degree, and 0-2 years of prior postdoctoral research experience at the time of initial appointment. Prior postdoctoral experience may be in an NIH intramural or extramural laboratory.

To apply, please provide a curriculum vitae with bibliography, three publication reprints, and a one-page summary of research training and accomplishments, research interests, career goals, and a proposal for multi-disciplinary mentorship and training. Please submit your application to Dr. Elyssa Monzack, Office of the Scientific Director, NIDCD, 35A Convent Drive, Bldg. 35A, Room GF102, Bethesda, MD 20892 (elyssa.monzack@nih.gov). Also arrange for three letters of reference to be sent directly to Dr. Monzack. Applications are due by May 1, 2016.

DHHS and NIH are Equal Opportunity Employers and encourage applications from women and minorities.



National Institute on
Deafness and Other
Communication Disorders



- NIDCD's postdoctoral fellowship
- Must have less than 2 years of postdoctoral research experience
- Looking for candidates who are interested in performing multi-disciplinary science
- Applications due May 1 and October 1
- If interested, contact:
elyssa.monzack@nih.gov

www.nidcd.nih.gov

NIH Training Resources

The Office of Itramural Training and Education (OITE)

Mission is to improve the training experience for all trainees at NIH

Many training-related resources:

- scientific writing courses
- language skills programs for foreign fellows
- help with delivering talks, creating posters
- leadership and management training
- teaching programs
- lectures series on the job search
- expertise on a variety of career paths
- career counseling

www.training.nih.gov

Office of Intramural
TRAINING & EDUCATION
build your career, shape the future

NATIONAL INSTITUTES OF HEALTH | U.S. DEPARTMENT OF HEALTH AND HUMAN SERVICES

home training programs events career services about OITE for NIH staff

OTHER OITE CAREER STUFF
[more information](#)

Career Stuff Banner

PROSPECTIVE NIH TRAINEES CURRENT NIH TRAINEES TRAINEES OUTSIDE NIH INVESTIGATORS & STAFF

WHAT'S NEW

APPLICATIONS ARE NOW BEING ACCEPTED FOR THE NIH-DUKE TRAINING PROGRAM IN CLINICAL RESEARCH
There's still time to apply: the deadline is May 15! [Read more and apply.](#)

NOMINATIONS ARE NOW BEING ACCEPTED FOR THE 2015 POSTBAC DISTINGUISHED MENTOR AWARDS
The awards will be presented at Postbac Poster Day, April 30, 2015. [Read more and submit a nomination.](#)

APPLICATIONS FOR NIH INTRAMURAL AIDS RESEARCH FELLOWSHIPS ARE NOW BEING ACCEPTED
The deadline is March 25, 2015. [Read more and register for the March 5th information session.](#)

CALIFORNIA SCIENCE AND TECHNOLOGY POLICY FELLOWSHIPS APPLICATIONS ARE NOW AVAILABLE!
The deadline is February 28, 2015. [Read more.](#)

AWARDS CONFERRED AT THE 2015 GPP GRADUATE STUDENT RESEARCH SYMPOSIUM
Congratulations to the winners of the 2015 NIH Graduate Student Research Awards and the GPP Outstanding Mentor Awards! [Read more.](#)

[ALL NEWS](#)

CALENDAR OF EVENTS

BALTIMORE: WRITING AND PUBLISHING A SCIENTIFIC PAPER WRITING COURSE - MARCH 2015
Mar 12, 2015 2:00 pm - 5:00 pm
[More Information](#)
Event registration is limited to Graduate Students, Postbacs, Postdocs/Fellows and Staff. Please [Log in](#) to register.

POSTBAC CAREER EXPLORATION SERIES: CAREERS IN INDUSTRY
Mar 12, 2015 2:00 pm - 4:00 pm
[More Information](#) [Register](#)

MOM-DAD-DOCS: NIH PARENTING COACH
Mar 16, 2015 12:00 pm - 1:00 pm
[More Information](#) [Register](#)

FELCOM EVENT: CAREERS IN CLINICAL TRIALS MANAGEMENT
Mar 17, 2015 3:00 pm - 5:00 pm
[More Information](#) [Register](#)

FREDERICK: TIME MANAGEMENT STRATEGIES
Mar 17, 2015 9:00 am - 10:00 am
[More Information](#) [Register](#)

[MORE UPCOMING EVENTS](#)

MY OITE

[Life at the NIH](#) [Slideshow](#)

[Planning Your Move](#)
[Getting Ready to Leave?](#)

Blogs
[OITE Careers Blog](#)

Prior Events
[Find prior event info, materials, and video.](#)

For Former Trainees
Create an entry for yourself in the Alumni Database; search the Alumni Database; tell us about your successes.

Search the Alumni Database
Find former NIH trainees at the school you are hoping to attend or the company where you hope to work; reestablish old connections.

Life beyond the lab



- NIH fitness centers (gym, Crossfit, yoga, etc.)
- Sports teams (NIDCD has softball and relay teams)
- Clubs (akido, badminton, bicycle commuters, chamber singers, etc.)
- NIH market (breads, cookies, oils, pickles, dips, etc.)



https://nihrecord.nih.gov/newsletters/2015/10_09_2015/story3.htm

www.fedesp.com/nih

Thank you!



National Institute on
Deafness and Other
Communication Disorders

