



# Department of Otolaryngology

Website: <http://oto.wustl.edu>

## Research Electives

### Otolaryngology Research Electives

During the fourth year, opportunities exist for many varieties of advanced clinical or research experiences.

The type of research will depend upon the current phase of the research program in each laboratory. Students should contact the director of each laboratory to negotiate.

---

#### Tatyana Yakusheva, PhD

East McDonnell Science Building  
4566 Scott Avenue  
Phone: 314-362-1013

This lab studies the role of the vestibulocerebellum and its target nuclei for eye movement control and spatial orientation. We use a range of methodologies, including single and multiunit recordings, electrical brain stimulation, computational methods, pharmacology and behavioral studies. Our main lines of research are as follows: (1) signal transformations carried out by the the vestibulocerebellum during visual and vestibular stimulation; (2) neuronal computations performed by the anterior and posterior cerebellar vermis for spatial navigation in mice; and (3) the role of the cerebellum-brainstem loop in motor learning in the vestibulo-ocular reflex.

Students will be instructed in one or several techniques and are expected to contribute significantly to the development of specific lab projects.

---

#### Judith E.C. Lieu, MD, MSPH

8600 MCC, 8th Floor  
Phone: 314-747-8205

The focus of the Lieu Lab is clinical outcomes research in pediatric otolaryngology. The techniques and methodologies of clinical epidemiology and health services research are applied to investigate clinical problems in children. Projects currently underway include the evaluation of the quality of life of young children with hearing loss, the evaluation of hearing loss on the perception of fatigue in children, and the evaluation of fatigue experienced in children with hearing loss compared with those who have sleep apnea. Potential studies include evaluating changes in the quality of life of children who begin using hearing amplification devices. Other projects of the student's choosing that would utilize these research techniques may also be pursued.

---

#### Kevin K. Ohlemiller, PhD

2205 Central Institute for the Deaf  
Phone: 314-747-7179

The focus of this lab is on gene-environment interactions in cochlear injury. We study the interaction of genes and environment that increase cochlear injury due to noise and ototoxic exposure, with an emphasis on how these may yield apparent presbycusis. Because cochlear function and injury is the same in mice and humans and governed by the same genes, we use mostly mouse models. Methods employed include standard auditory brainstem response assessment and intracochlear recording, quantitative light microscopy, immunocytochemistry, and Western blots. We and our collaborators have identified specific genes and inbred strains of mice that mimic the three major forms of human presbycusis (sensory, neural and strial). Sensory presbycusis appears to be promoted by alleles and mutations that impair protective factors (e.g., antioxidant enzymes) or that impair ion homeostasis. These may enhance cochlear injury from noise and ototoxins. Neural presbycusis can be modeled in part by mutations that impair inner hair cell/afferent synaptic function. Although it is not yet clear what types of genes and mutations can lead to strial presbycusis, we have discovered multiple mouse strains that show age-related endocochlear potential reduction along with distinctive strial pathology that includes fewer marginal cells as well as fewer and larger strial capillaries.

We have also published quantitative trait loci that impact the qualitative character of cochlear noise injury. Important implications of our findings are (1) that there exists no single "mammalian" archetype of cochlear noise injury and (2) that noise injury to the organ of Corti in young adult animals depends in part on the status of the cochlear lateral wall. The latter relation appears to be genetically linked and appears not to apply to older adults.

We collaborate widely, both within the School of Medicine and nationally. Our research is eminently adaptable in difficulty and scale to students' schedules and other requirements. Students may expect to learn the full range of methods we employ, including physiology, immunocytochemistry, histopathology and cellular/molecular techniques.

---

#### Jay F. Piccirillo, MD

8430 MCC, 8th Floor  
Phone: 314-362-8641

The Clinical Outcomes Research Office performs clinical epidemiology and health services research. Clinical epidemiology is the study of diagnosis, prognosis and the evaluation of treatment. Health service research is the study of the delivery of health care. The scientific methodology of clinical epidemiology is based on the architecture of clinical research, biostatistics and data processing. Current projects include studying the impact of comorbidities on the treatment and outcomes of patients with cancer. We also conduct research into the neurobiology, treatment and outcomes of patients with tinnitus. One method that we employ is the use of smartphone technology to

---

capture ecological momentary assessments of tinnitus. Additional projects include exploiting neuroplasticity as part of olfactory training for patients with anosmia. With the use of clinical epidemiology methodology, we can also study a variety of other diseases.

---