

## **UW Resident Research in Otolaryngology-Head & Neck Surgery**

The UW O-HNS research committee consists of Dr. Nadine Connor, Research Director, Dr. Mark Pyle, Residency Program Director, Dr. Timothy McCulloch, Division Chairman, Dr. Charles Ford, Dr. Diane Bless, Dr. Jack Jiang, Dr. Gregory Hartig, Dr. Thomas Pasic, and Drs. Glen Leverson and Alejandra Munoz del Rio, biostatisticians.

### **A. Introduction**

All residents are expected to participate in research and scholarly activities. Dedicated research time is provided in the third year of residency (OTO-2). During the residency program, residents are expected to progress in their ability to evaluate current research and to conduct original research. To allow growth and development in scholarship, the University and the Department of Surgery maintain a very effective infrastructure for research and scholarly activity that is available to residents in Otolaryngology-Head and Neck Surgery. Facilities, equipment, research space, faculty mentoring, technical support, and library services are strong. Residents are encouraged to make use of all of the available resources.

The residency program in Otolaryngology-Head and Neck Surgery is conducted in an environment that promotes scholarship and the development of new knowledge. The University of Wisconsin-Madison is one of the foremost academic research centers in the nation and this spirit of inquiry carries over into all aspects of resident education. A fundamental goal of the residency is the development of research skills that not only allow residents to perform independent research in their future careers, but to develop lifelong habits of inquiry, effective utilization of resources (i.e., team building), and the ability to evaluate research findings in their reading.

The structured research experience is geared toward the understanding of principles of research design; data collection for basic science, clinical, or outcomes research; data analysis; and scientific reporting. Research ethics and compliance with animal care, human subjects, and biosafety research regulations are also directly communicated via Resident Research Seminars and one-on-one instruction with the Research Director. During the research rotation, guidance is provided to residents by a faculty mentor chosen by the resident and by the Research Director.

### **B. Goals**

#### **1. Overall goal of the resident research program**

Upon graduation from the program, the graduating resident will demonstrate proficiency in the research process such that he or she will recognize and continue to ask good questions. The resident will demonstrate research proficiency by: (1) successfully and effectively participating in research seminars and journal clubs, (2) demonstrating knowledge and competence in hypothesis

formulation, literature analysis, data collection and analysis methodology, oral presentations, and written presentation, and (3) by incorporating research results and ethics into clinical practice.

Residents are expected to participate in research activities and to evaluate research in the literature. Resident research education is facilitated via: (1) Direct teaching in Resident Research Seminars and journal clubs; and (2) Protected research time in the third year of residency, that is supervised by a faculty member chosen by the resident and the Research Director. During the residency, residents will progress in their ability to evaluate current research and to conduct original research. Members of the research committee advise residents regarding their research interests and projects throughout the residency.

All residents are expected to make at least one presentation at the State WSO-HNS meeting and one presentation at a major national meeting (the AAO-HNS, sectional or national meeting of the Triological Society, and other specialty societies of the COSM are considered major meetings). This requirement may be met in any residency year. Accordingly, the resident research experience will culminate with the successful completion of at least one research project, oral presentation at a state (or regional) and national meeting, and publication in a peer-reviewed journal.

## **2. Goals for each year of residency**

Each year of the residency has specific requirements with regard to participation in research education. These expectations are described below:

### ***a. OTO-1***

In preparation for dedicated research time, the OTO-1 resident will meet with faculty members, select a faculty mentor, meet with the Research Director and prepare a research proposal in the form of a brief abstract. Dedicated research time in the OTO-2 year is granted after a research proposal has been submitted to the Research Director and is then presented and approved by the resident at a meeting of the Division of Otolaryngology– Head and Neck Surgery Research Committee. OTO-1 residents are also expected to prepare human subjects or animal care protocol submissions, as needed, with direction from the Research Director. If the OTO-1 resident is interested in submitting a grant application for an AAO-HNSF resident research award, letters of intent are generally due in December of the OTO-1 academic year, with the full application due in mid-January, to allow for arrival of funding in time for their protected research time in the OTO-2 year. As such, residents who wish to pursue their own funding must have a well-developed research proposal in the OTO-1 year. In addition, OTO-1 residents will make effective use of Journal Club and Resident Research Seminars by attending scheduled conferences, making scholarly presentations of topics, and evaluating journal articles.

OTO-1 residents should also plan to take on-line web-based training for use of human subjects in research, HIPAA Research training, and use of animals in research training.

***b. OTO-2***

During the dedicated research rotation, residents will complete a research project under the direction of a faculty mentor and the Research Director. During the rotation, it is expected that the OTO-2 resident will collect and analyze data. As described earlier, successful participation in the research process should culminate in a research presentation at a local and major national meeting, and a publication in a peer-reviewed journal. However, the publication and presentation requirements may be fulfilled in the OTO-3 or OTO-4 years.

OTO-2 residents will have an approved human subjects or animal care protocol prior to collecting data; meet with a biostatistician prior to data acquisition to finalize the research design and will meet again, after data collection, for the purpose of data analysis; will meet with the Department of Surgery librarian to obtain a current literature search; and will meet weekly with the faculty mentor and/or the Research Director to report on progress. OTO-2 residents will demonstrate initiative in data collection and data analysis, develop a timeline for completion of research tasks, demonstrate sufficient weekly progress, as evaluated by the Research Director and faculty mentor, present research to faculty and residents at the Resident Research Seminar, and continue to make effective use of Journal Club and Resident Research Seminars.

***c. OTO-3, OTO-4***

If presentation and/or publication requirements have not been fulfilled in the OTO-2 year, residents must complete these requirements in the OTO-3 or OTO-4 years. Residents must show initiative in the effective utilization of Department of Surgery research resources for abstract, presentation (or poster) and manuscript preparation. These resources include biostatistics consultation, library consultation, and medical editing. Residents will independently verify any associated deadlines, such as dates of abstract submission for meetings. In addition, residents must continue to make effective use of Journal Club and Resident Research Seminars. Although residents must only complete one research project during their residency, many residents participate in several projects are encouraged to do so.

OTO-3 residents are expected to present their research at Resident Research Seminar. This presentation can be a final report on their OTO-2 research project (if not already presented to the group), or a proposal for a new project that might logically follow from their research project.

**C. Philosophy**

The philosophy employed in the research education program is that residents must be exposed to all stages of the research process in a manner that will be useful throughout their

careers. This philosophy was adapted from the recommendations of the Society of University Otolaryngologists Committee on Research and is organized in two levels:

### Level I Research Requirements

All residents completing the training program will:

- Understand basic principles of Evidenced Based Medicine.
- Develop a reluctance to accept anecdotal data.
- Learn a critical approach to evaluating results of other researchers.
- Maintain a daily awareness and questioning of procedures.
- Have sufficient exposure to the research process to cultivate research interest.
- Formulate and evaluate research designs, including:
  - formulating and testing hypotheses;
  - evaluating the underlying theory and its significance to the hypothesis;
  - determining the important and relevance of literature review;
  - executing pilot studies;
  - evaluating the adequacy of qualitative and quantitative methodology;
  - understanding the appropriate use of animal models; and
  - understanding the appropriate use of human subjects and informed consent.
- Understand and execute data collection and analysis techniques for research and clinical practice, including:
  - selection and operation of appropriate instruments for data collection purposes;
  - accurate and reliable measurement of selected variables in the research;
  - appropriate use of statistics;
  - limitations of categorical, qualitative and quantitative data collection;
  - sample size considerations;
  - Type I and Type II error in interpretation of statistical tests;
  - issues involved in multicenter studies;
  - implications of descriptive and experimental study designs;
  - analysis and interpretation of the results of single case design studies, retrospective and prospective studies, randomized clinical trials, outcomes studies, and anatomical/physiological investigations of the head and neck;
  - incorporation of research results into clinical practice.
- Incorporate research ethics into study design and clinical practice, including:
  - Institutional Review Boards;
  - patient rights and protection (HIPAA);

- animal experimentation and rights; and
- significance of studies.

### Level 2 Research Requirements

*Residents who may desire to spend a fellowship year of research training or are planning to pursue careers in research should be able to:*

- Develop research plans independently.
- Prepare a grant proposal for extra or intramural competition.
- Integrate basic scientific and clinical studies to bridge the gap between applied and basic sciences.

### **D. Journal Club and Research Seminar**

Journal Club is held once per month during the academic year. These sessions are typically scheduled on a Wednesday or Thursday evening and last for approximately 2.5 hours. All available faculty and many of the clinical personnel from Speech/Voice Pathology and Audiology attend these journal clubs. In addition, faculty from basic science departments and medical ethics are invited and often attend. The format and particular research discussed at the journal club is at the discretion of the faculty host, who serves as the moderator for that evening. The format may be topic-oriented, debate oriented, a review of current literature, or a discussion of landmark articles. After research articles are chosen, the chief resident assigns particular articles to individual residents for presentation to the group and subsequent discussion. Articles are presented in turn, as designated by the chief resident, with discussion following each article. Residents, faculty, students, and other staff may participate in the discussion. Discussion generally involves aspects of the study's research question, design, methods, results, manner of presentation, and interpretation. Emphasis is placed upon whether stated interpretations are justified based upon the data and methods employed, and whether generalization of results can be made to clinical practice.

The Research Director coordinates Resident Research Seminar. In Resident Research Seminars, residents participate in an interactive learning experience, or lecture concerning current research methodologies, ethics, statistical methods and research design. The Research Director presents these topics or invites a guest speaker with expertise in the particular research area. This seminar series also provides a forum for resident research presentations. The curriculum for resident research seminars cycles every two years. In this manner, residents are exposed to topic areas twice during their residency, with a different aspect of the topic presented each year.

Year 1 topics include: Statistical methods in medical research, Use of technology/computer resources in research, Human subjects in research, Outcomes Research, Scientific Writing, and resident research presentations. Resident research presentations may range from an informal

presentation of ideas or abstracts, work in progress, or a formal timed presentation in preparation for a national meeting.

Year 2 topics include: Research design, Clinical trials, Biostatistics of laboratory animal research, Research Design, Research Ethics, Information Retrieval for Evidence Based Medicine, and Resident research presentations.

## **E. Technical support for resident research**

The Research Director coordinates technical support for resident research and scholarly activities by introducing residents to particular research resources via Resident Research Seminars or one-on-one meetings. The Research Director works with residents to ensure that all resources are properly employed and provides support to residents at each stage of the resident research process. Early in the process, the Research Director instructs residents on research compliance and the expectations/goals of the resident research program. In addition, the Research Director is responsible for development and implementation of the research curriculum, assistance with research design, advising residents on animal care and/or human subjects protocols, assistance with study management, and assistance with data analysis and interpretation.

Technical support provided to residents for research and scholarly activity is comprised of: (1) Library Services, (2) Computer Support, (3) Statistical Consulting, (4) Experimental Surgery and Microsurgery Support, (5) Grant Management, (6) Publications Office and Medical Illustration.

### **1. Library Services**

Services are provided by the Department of Surgery librarian and include Medline searches for particular research topics, weekly update searches of the medical literature, and bibliographic training. In addition, the librarian is an expert in information retrieval from sources other than Medline and routinely employs other databases when performing a major search. The weekly searches are customized to the needs of each recipient and provide journal citations and abstracts. Medline literature search results are presented to residents in their preference of either paper or electronic format. Residents are required to work with the librarian when defining their resident research topic, with the goal of learning how to maximize the use of available resources and information retrieval strategies. The librarian also provides residents with instruction in how to optimize their independent Medline searches.

In addition to information retrieval via electronic database searches, the librarian also assists residents with interlibrary loan requests, use of library catalogs, indices, and reference books, use of evidenced based medicine resources, and with assistance in identifying library resources found elsewhere on campus.

There is now a new library service available to otolaryngology residents. Known as “Library Express,” this service allows residents to enter journal article requests on the library website. The article is then retrieved and scanned into digital form by the library and sent to residents via email, as a “.pdf” file. The resident may then open the document on his/her computer and print it out. This service has been instrumental in saving a great deal of time in retrieving articles from the library and has made scholarly activity much more accessible as a whole.

## **2. Computing**

Department of Surgery computer support staff provides support to Department faculty, staff, and residents. Computer problems are presented to the computer support staff via a “Help” phone line, e-mail, or pager, and computer support staff resolve problems quickly. Residents’ computing needs regularly include literature research, data collection and data analysis, creation of research or scholarly presentations, e-mail communication, and manuscript preparation. Residents have available computers in libraries, laboratories, clinics, and conference rooms to meet all of their computing needs for research and scholarly activity. A computerized conference room has simplified the process of resident teaching and has allowed a new level of excellence to emerge in resident presentations due to the availability of state-of-the-art technology for use in creating multi-media presentations (*See Facilities, below*). The outstanding Department of Surgery website and use of e-mail has allowed efficient information dissemination to residents.

## **3. Statistical Consulting**

The three Department of Surgery biostatisticians assist residents with protocol design and planning prior to implementation of a research project, and with data analysis and interpretation assistance once data are collected. Residents are required to involve a biostatistician in the development of their research design and justification of their sample size. The rationale for this requirement is to instruct residents on the research process and to encourage proper planning, use of available resources, randomization, and other design decisions that must be made prior to data collection. Residents in Otolaryngology-Head and Neck Surgery also attend seminars provided by the biostatisticians in the Resident Research Seminar series. The stimulating seminars are designed to optimize generalization of statistical ideas to everyday practice and research. For example, recent topics have included “The Placebo Effect,” and “Case Reporting and Single Subject Designs,” in which statistics, ethics, and evidence-based medicine have been discussed in a unified manner.

## **4. Experimental Surgery and Microsurgery Support**

The Department of Surgery Experimental Surgery animal operating room area is managed by three research specialists, who provide operating room schedule coordination, preoperative animal preparation assistance, circulating assistance during the surgery, postoperative animal care, and microsurgery training and microsurgery research support. Courses provided in the lab,

such as the microsurgery course, also give residents the opportunity to learn new surgical skills outside of the operating room. Depending upon the focus of the resident's research project, a great deal of resident research training may take place in these laboratories, which are located onsite, on the third floor of the hospital.

## **5. Grant Management**

In the Department of Surgery Research Office, two professional staff members are dedicated to support of pre-award grant management. Services include grant and contract submission coordination and administration of the review of intramural grant funding. An Accounting Office of four persons provides additional post-award support for residents performing research, including purchasing supplies, and monitoring accounts.

With regard to grant submissions, this office assists investigators in developing funding strategies and searching for funding opportunities, provides grant applications and instructions to investigators, assists with budget development and completion of grant form pages, and ensures that grant applications are complete and that all University approvals and signatures are obtained prior to submission. In addition, electronic grant submissions are performed via the Research Office. This office also acts a liaison between the Department and University offices following the negotiation process of clinical trial agreements and other contracts.

Intramural grants are available for research performed by faculty and scientists in the Department of Surgery, and these intramural grants are reviewed, approved, and managed via the Research Office. All intramural grant applications reviewed by faculty and scientists serving on the Department of Surgery Research Committee.

The Department of Surgery Research Office also coordinates two research seminar series that are presented regularly throughout the academic year. A monthly research luncheon educates department staff on the diverse research performed in the Department, and keeps researchers informed of current research-related topics. A bimonthly research seminar gives scientists and faculty the opportunity to share their research and spark collaborative efforts with other Department scientists.

## **6. Publications Office and Medical Illustration**

Three professionals staff the Publications Office and provide editorial support for academic and publication-related projects. Services include copywriting; digital photography and video; editing/proofreading for journal articles, book chapters, grant proposals, and galley proofs; editorial coordination; graphic design and support for research figures; production of slides, videos, and posters for research presentations; web development; and word processing.

Residents make use of the services of the Publications Office and Medical Illustration when they are developing presentations and posters for national meetings or developing their research manuscripts. We have won research poster awards at several national meetings in part due to the



Publications Office's contribution to the final product. Residents submit electronic versions of their poster or manuscript content to the Publications Office, which then produces and edits the final product with careful consideration of journal or meeting formatting requirements. The Publications Office has made the process of submitting a manuscript or producing a research poster much more accessible to residents in that these professionals are trained in computer graphics and layout, as well as medical editing. They also serve as an effective liaison with various medical journals and maintain computer files with final version of submitted manuscripts.

## **F. Support for Resident Research**

The Research Director is responsible for coordination of funding for resident projects. All resident research is funded via intramural or extramural grants obtained by Otolaryngology faculty, by a separately maintained resident research fund, or via grants obtained by individual residents. While residents are not required to obtain their own funding for their research project, residents are encouraged to apply for resident research awards, such as those offered by the AAO-HNSF (<http://www.entnet.org/>). The Research Director and the Department of Surgery Research Office works with residents in preparation of their applications. In the event that a resident requires laboratory facilities or equipment that are not available within the Department or the Division, the Research Director is the liaison with other departments within the University with the goal of obtaining suitable space or equipment for the resident.

## **G. Research Facilities**

Residents are encouraged to make use of all of the available research facilities and resources. Research resources include:

- (1) On site libraries, including a major medical library,
- (2) Departmental computer network and support,
- (3) Shared experimental surgery and microsurgery research support and laboratories,
- (4) Dedicated otolaryngology research laboratories,
- (5) Animal Care Facilities,
- (6) Bast Temporal Bone Collection.

### **1. Libraries**

Department of Surgery residents have 24-hour access to the Department of Surgery library seven days per week. The library is located in room G5/316 of the UW hospital. The library is secured with a keypad combination lock and holds an up-to-date textbook collection and

subscriptions to more than 40 journals. The library provides access to phones, internet-accessible computers, presentation software, audiovisual equipment, and a photocopier.

The Division of Otolaryngology has a dedicated reference library for resident use (Robert Stanley Library in E6/603) that allows computer use and study area. Residents have access to this library 24 hours per day, seven days per week.

The Otolaryngology reference library and Department of Surgery libraries supplement the Ebling Library, providing over 150,000 books, 4,000 active journal subscriptions, 5,000 software programs and audiovisuals, and 70,000 microform volumes.

## **2. Computer Facilities**

A description of the Department of Surgery computer network can be found at <http://www.surgery.wisc.edu/admin/computer.shtml>.

A fulltime webmaster maintains the Department of Surgery website, which contains informative pages for current and prospective otolaryngology residents, including information on resident research. The research pages on the Surgery website can be found at <http://www.surgery.wisc.edu/Oto/>. All residents have email accounts, which are used to assist with information dissemination regarding conferences and other announcements.

The Division of Otolaryngology maintains a Pentium-processor-equipped computer in the Robert Stanley Library (E6/603). A laser printer, CD burner, scanner and connection to the Internet also is provided in the same room. Available applications consist of Microsoft Office Professional programs, online utility software, and the complete library of Patient of the Month programs developed by the Academy of Otolaryngology–Head and Neck Surgery. These resources are also available on pentium computers in all of the research laboratories and in the Otolaryngology clinics.

All Otolaryngology laboratories have computers that are used by residents for data collection, data analysis, internet-based literature research, presentation preparation, and the writing of manuscripts. In addition, the Division of Otolaryngology maintains a laptop computer that is available for use when necessary, such as for offsite research or scholarly presentations. The Department of Surgery maintains a portable computer projector that can also be checked-out for this purpose.

The newly-constructed main conference room in the Department of Surgery seats 70 people and has an integrated pentium computer station and hard-wired projection system that allows multi-media Powerpoint presentations to be given with ease. Videos, DVDs, and other digital images can also be projected through the projection system, as well as traditional slide projection. Users can log directly into the Surgery network and retrieve files for presentation, or may retrieve files from other media, such as CDs. In addition, the conference room podium allows

projection of xrays and other radiographic images, as well as a microscope hook-up to allow projection of pathology slides. There is also dedicated computer access to digital images from the Department of Radiology computers, to reduce the need for locating and transporting films to the conference room. Room lighting can be adjusted automatically at the podium to optimize visibility of projected material. All resident conferences and presentations are given in this room.

### **3. Shared Departmental Laboratories**

Excellent facilities and staff are provided to residents for both clinical and basic scientific discovery. Residents have full access to shared Department of Surgery laboratories and staff for use in scholarly or research pursuits.

The Department of Surgery supports an AALAC-accredited Experimental Surgery Unit, which consists of two large animal operating rooms (4 tables) and a microsurgery training area. This area is managed by three research specialists, who provide operating room schedule coordination, preoperative animal preparation assistance, circulating assistance during the surgery, postoperative animal care, and microsurgery training and microsurgery research support.

Other shared departmental laboratories are located at the adjacent VA hospital. In the VA G-wing, there is a 436-square-foot common equipment area that houses several –80 C freezers, a cryostat, a spectrophotometer, computer-assisted image analysis equipment, and miscellaneous molecular biology apparatuses. The common area also houses several floor centrifuges (both high and low speed), scintillation counters, and a Packard Cobra gamma counter. A 350-square-foot cold room and a 357-square-foot dishwashing facility also are available for use in the G wing. Available for use in the department are a Beckman ultracentrifuge, a liquid scintillation counter, a gamma counter, a Packard Matrix 96 beta counter, a computer-assisted image analysis system, and an ELISA plate reader.

In addition, a confocal microscope is maintained at the VA Hospital and can be used by Otolaryngology residents for their research projects. Otolaryngology faculty members contributed to the multi-user grant that was funded by the VA to purchase this microscope. This microscope consists of a Biorad MRC1024ES confocal imaging system mounted on a Nikon Eclipse inverted microscope.

### **4. Otolaryngology Laboratories**

Construction was completed on new research facilities on the 7th floor of the UW Hospital (Clinical Science Center) in the fall of 2000. These new laboratories included a dedicated temporal bone laboratory, and laboratories to support the research of otolaryngology faculty.

The temporal bone laboratory is state-of-the-art with dedicated workstations and an additional instructor station. All stations have microscopes, drilling apparatus, sinks, water, and

video capability. Two networked computers are also found in this room. Residents use the temporal bone laboratory during the temporal bone course in their OTO-2 year of residency, and throughout the residency for anatomy workshops, and hands-on seminars.

Faculty laboratories on the 7<sup>th</sup> floor of the CSC consist of dedicated areas for excised larynx studies, a digitizing and computer-assisted image analysis laboratory, and a small animal microsurgery and physiology laboratory. The excised larynx lab is fully equipped with a custom made multichannel recording system for data acquisition and analysis of vibratory in an in vivo simulated condition. The microsurgery lab is equipped with dissecting microscope, immunohistology equipment, microscope, and is used to study laryngeal interstitial proteins, growth factors and laryngeal scarring. The digitizing lab consists of a computer and associated software for measuring highspeed digital imaging.

Otolaryngology also has research laboratories at the VA Hospital and Medical Science Center (MSC). The VA lab is approximately 300 square feet and is used primarily for histological and biochemical preparation and analysis of tissue, as well as intravital microscopy. The 800 square foot Medical Science Center laboratory is dedicated to studies of laryngeal physiology and includes a machine shop and 5 additional rooms. Specifically, sophisticated instrumentation is used to study excised larynges, and to perform laryngeal image processing, digital signal processing, biomechanical modeling, laryngeal immunohistology, and aerodynamic assessment. The well-constructed and well-defined research protocols developed in this laboratory are highly compatible with resident participation.

The otolaryngology research facilities provide residents an opportunity to accomplish a unique mixture of : 1) clinical and surgical trials, 2) histological studies, 3) laboratory experiments, and 4) computer modeling in the study of the larynx and its disorders.

## **5. Animal Care Facilities**

The University of Wisconsin Research Animal Resource Center (RARC) provides veterinary and laboratory services, as well as training, in the support of high quality animal care onsite at the UW Hospital. The RARC also provides oversight and assistance in assuring compliance to all laws, regulations, and rules governing the care and use of laboratory animals. The animal care areas, which have restricted access, can support both large and small animals and are located in a region of the hospital convenient to the Department of Surgery and the Division of Otolaryngology.

Residents have frequently employed animal models in their research and have relied upon the services provided by RARC veterinarians and technicians. Residents have also consulted directly with these veterinarians in developing their animal research projects. In this manner, the RARC veterinarians have contributed directly to resident research education.

## **6. Bast Temporal Bone Collection**

The Bast Temporal Bone Collection represents one of 26 temporal bone collections in collaborating institutions in the National Temporal Bone Registry of the National Institute on Deafness and Other Communication Disorders (NIDCD). The Bast specimens were collected, prepared, and cataloged by age by Theodore Bast over a 33-year period from 1926 to 1959. The temporal bone collection is housed on site in the temporal bone laboratory and is available to residents for study during their dedicated research time.