BASIC SCIENCE RESEARCH FELLOWS' HANDBOOK

Division of Pulmonary and Critical Care Medicine, University of Washington

First Edition
2004

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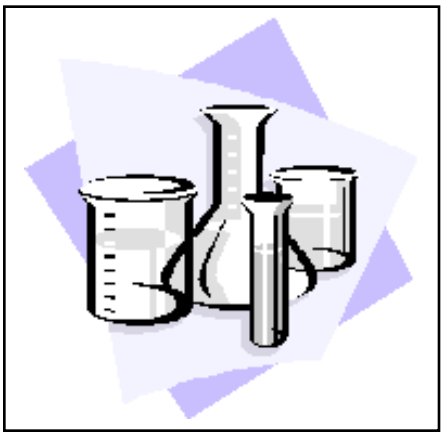

Acknowledgments
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Introduction

What encompasses basic science research? Basic science research spans from the cell to the whole animal, whether it's a mouse, rabbit, dog, or human and includes fields such as cell and molecular biology, immunology, and integrative physiology. Integrative physiology incorporates in situ cellular and molecular techniques with organ physiology to determine the functional significance of cellular mechanisms in the whole living animal.

Purpose of the Handbook:

1. To provide fellows considering basic science research with some general guidelines and suggestions about getting started.
2. To provide fellows with the expectations during their research fellowship.
3. To provide fellows with resources and information helpful for the research years.

Goals of the Basic Science Research Fellowship

Goal: To acquire the knowledge and skills necessary to conduct independent research and become a successful academic physician-scientist.

This is done by first embarking upon and completing a structured research project. The ultimate goal is to independently generate a hypothesis and then design and conduct experiments to test the hypothesis

As part of this process you will be expected to:

Master a variety of techniques and methodologies
Learn to troubleshoot experiments,design proper controls and interpret data
Gain skills in scientific writing and presentation in order to:

- Present findings at national meetings.
- Publish in peer-reviewed journals
- Obtain independent funding.

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Getting Started: Finding a Lab.

The first decision, and one of the most important decisions, is choosing a mentor and laboratory. Note that the actual project is secondary to the laboratory environment. In a basic science laboratory, you are in frequent and close contact with the laboratory principal investigator (PI) /mentor and other laboratory members. At the beginning of your research career, you should expect to have frequent interactions with your mentor -ranging from weekly laboratory meetings to almost daily review of data.

Because of this close relationship between mentor and fellow, matching of different personality styles should play a role in determining the success of a mentor-fellow relationship. Frequent and open communication is essential for a successful mentoring relationship.

The PI will provide guidance in terms of developing the research question, study design and technical expertise. Initially, you are not expected to be able to generate your own hypotheses independently; that will come with time. Fellows are generally not expected to have a specific research question or be ready to design the experiment at the start of their research training experience.

How to Find a Lab

Early in your first year of fellowship, you will choose an advisor. This person should be a division faculty member with whom you are comfortable and whose opinions you trust. The advisor's own research activity is irrelevant to the choice. The advisor will meet with you to discuss your general research interests and will direct you to other faculty members within the Division who are likely to be appropriate research mentors.

There are a variety of different sources of laboratories and mentors. During your first year, you will want to meet with as many potential mentors as possible. Don't be shy. The mini-sabbaticals are designed to allow you time to meet with these potential mentors while free from clinical responsibilities Schedule your meetings well in advance. This is your chance to learn what different faculty are working on. Meet with current research fellows as well. Be proactive. Remember, talking to potential mentors does not imply a commitment.

After the mini-sabbaticals, meet again with your advisor to discuss your impressions. This is also a good time to meet with the Program Director (Mark Tonelli) or the Research Director (Len Hudson).Think about multiple mentors: In addition to a primary mentor, having a secondary mentor can be invaluable. For example, having a junior mentor and a senior mentor or pulmonary mentor with a non–pulmonary mentor can be useful. It is still important to designate a primary mentor to ensure that you don't fall between the cracks.

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Mentors

Mentoring Options

1. Primary mentor is a trained researcher in the Division.
Your research mentor is a member of the Pulmonary Division who has an active basic science research program and is doing research in an area that interests you. The advantages are that you have an advocate within the Pulmonary Division and the national pulmonary community, and your research will generally be directly applicable to Pulmonary Medicine. Your mentor is your strongest advocate within the division and within the local and national pulmonary community. This is important in terms of finding a job and gaining a local and national reputation within professional societies. In addition, this person will help obtain the division resources necessary for the conduct of research.

2. Primary mentor is a trained researcher outside the Division.
There is tremendous basic science depth in the University in areas that are relevant to pulmonary biology. Some fellows have worked with these individuals along with a Division co-mentor. Advantages include availability of resources and expertise that the Division might not have and topic areas that Division faculty may not cover. Therefore, you might be able to bring back expertise in a new area for the Division. Disadvantages include the possibility of "falling between the cracks" as far as being supported within the Division or being advanced through national pulmonary and critical care society activities. It is important to have an advocate for you both in the Pulmonary Division and within the pulmonary research community. Many of these investigators may not be known to you. To identify potential mentors outside the Pulmonary Division, you will need to do some investigation. To start with, ask your advisor and Pulmonary faculty for ideas and suggestions.

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RCMB Mentors and Major Research Areas

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Current Research Interests

Investigations of acute lung injury associated with immune responses to adoptively transferred Th1 cells. The central hypothesis is that Th 1 cell activation initiates a multi-step sequence of signals that results in selective adherence of activated effector T cells in lung, amplication by selective recruitment of mononuclear cells, and accumulation of activated mononuclear cells and alveolar macrophages. We have used a murine model of lung injury initiated by the adoptive transfer of Th1 cells to mice that results in acute inflammatory response. Current investigations include the role of selectins and their ligands in Th1 cell adherence to pulmonary vasculature, and the role of CXCR3 chemokines in recruitment of inflammatory cells to lung. Preliminary studies are underway to explore the role of VEGF in this form of lung injury.

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Richard B. Goodman, M.D.

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Current Research Interests

Chemokines and Pathogenesis in ARDS.

The primary focus of this laboratory is the study of molecular mechanisms of lung inflammation. We are interested in defining the relative contribution made by neutrophils (PMN) to the pathological process of acute lung injury. Our goals are to identify the predominant signals produced by lung cells which recruit PMN from the bloodstream (known as chemoattractants or chemokines), to define the dominant cell surface receptor(s) responsible for PMN migration in pre-clinical disease models of acute lung injury.

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David K. Madtes, M.D.

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Current Research Interests

The focus of research is on the cellular and molecular mechanisms responsible for normal alveolar development and repair and for the fibroproliferative response that results in pulmonary fibrosis. Two primary projects: are 1) the identification of growth factors that regulate the cellular proliferation and extracellular matrix remodeling in the injured alveolus and in the developing lung; and 2) the identification of matrix metalloproteinases and tissue inhibitors of metalloproteinases responsible for extracellular remodeling in lung fibrosis.

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Current Research Interests

Investigation of the cellular and molecular mechanisms that regulate inflammatory responses in the lungs.

1) Studies supported by the Seattle ALI Specialized Center of Clinical Research (SCCOR) in Acute Lung Injury investigate host factors that control innate immunity in normal and critically ill humans.
2) Studies supported by the ALI SCCOR Program investigate the pathogenesis of lung epithelial injury in humans with ARDS, and in rabbit and murine models of pneumonia and peritoneal sepsis.
3) Studies supported by a collaborative Program Project Grant with investigators at Scripps Research Institute investigate the cellular and molecular mechanisms by which bacterial products activate inflammatory responses in the lungs.
4) Studies supported by the NIH investigate the molecular mechanisms that mediate leukocyte recruitment to the lungs, including specific cytokines and their receptors.
5) Studies supported by the VA Research Service investigate the mechanisms that regulate the stability of leukocyte chemotactic gradients in vivo.
6) Studies supported by the UW Regional Center of Excellence in Biodefense investigate the role of bacterial cell wall structures from unusual pathogens in triggering innate immune responses in humans.

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Current Research Interests

My main interest is to understand the mechanisms leading to alveolar epithelial damage in acute lung injury, and the interactions of those mechanisms with lung host defenses. We have focused primarily on the role of apoptosis in the development of epithelial damage, with a particular emphasis on the Fas/FasL system. Our current hypothesis is that the Fas/FasL system plays multiple roles in the pathogenesis of acute lung injury, depending on the target cell: it contributes to destruction of the epithelium by promoting apoptosis of alveolar epithelial cells, it contributes to the fibrotic response by promoting fibroblast proliferation and collagen deposition, and it contributes to the inflammatory response by promoting cytokine release from alveolar macrophages.

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Current Research Interests

Metalloproteinases in Lung Repair and Inflammation. Our work in matrix metalloproteinases (MMPs) focuses on three epithelial enzymes - matrilysin (MMP-7), stromelysin-2 (MMP-10), and epilysin (MMP-28) - and how these proteinases function in defense and repair. In our studies, we are primarily interested in the innate immune functions conferred by the epithelium of different organs (but with a hefty emphasis on lung), functions which encompasses defense against microorganisms, wound repair, and recruitment of inflammatory cells. Using knock-out mice and in vivo models, we have determined that these three MMPs serve distinct, non-overlapping functions in several distinct processes of innate immunity. Our goal is to
understand mechanism, that is, to identify the physiologic protein substrates of individual MMPs whose cleavage regulates specific processes, such as neutrophil recruitment, cell migration, etc..

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Current Research Interests

Adhesion molecules and matrix remodeling in lung injury and repair.

Our laboratory focuses on the interactions of integrins, a class of adhesion molecules, and extracellular matrix proteins, in normal and pathological conditions.
Studies are underway to investigate the role of integrins in the development of pulmonary fibrosis. Signaling pathways of integrins are being investigated, with particular interest in signaling events important in development and injury response.
We are also using state-of-the-art techniques in proteomics to analyze BAL fluid from patients with acute lung injury, to elucidate new pathways.
The second focus in the laboratory is to investigate the influence of extracellular environment on HIV infection. We have shown that multimeric fibronectin increases the ability of HIV to infect primary lymphocytes. This may be an important interaction in the lymph nodes, the primary anatomic site of infection. We propose that interactions of HIV with the extracellular matrix may facilitate infection of naïve cells. We are continuing our investigation into the role of matrix proteins in promoting viral infection, and investigating the effect of HIV infection of the adhesion and migration of leukocytes.

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Current Research Interests

The overall goal of the research program is to understand cellular and molecular mechanisms underlying pulmonary host defenses in bacterial pneumonia. The lab uses murine models of pneumonia and cell culture systems to explore the recognition pathways that activate innate and acquired immunity against diverse pulmonary pathogens, including Pseudomonas aeruginosa, Staphylococcus aureus, Legionella pneumophila, Francisella tularensis, and Yersinia pestis.

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Integrative Physiology Mentors and Major Research Areas

Moira L. Aitken, M.D.

Professor of Medicine, Pulmonary and Critical Care Medicine
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Current Research Interests

Overall objectives are to understand the mechanisms of airway inflammation and infection in cystic fibrosis (CF). The CF gene product (CFTR), leads to airway inflammation through a series of abnormalities, including hypertonicty of periciliary-fluid encouraging bacterial growth, altering airway adhesion molecules, and altering a variety of intracellular protein trafficking. She is also involved in Phase I and II clinical trials and in epidemiological studies of CF.

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Bill Altemeier, M.D.

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Current Research Interests

The research in my lab is focused on the immunomodulatory effects of mechanical ventilation. Specifically, I am interested in regulation of transcriptional pathways during mechanical ventilation and how this alters signaling from other clinically relevant stimuli such as bacterial products, hyperoxia, and ischemia-reperfusion to promote the development of lung injury. Our lab focuses on the use of mouse models to take advantage of large-scale screening methodologies such as expression arrays and proteomics and to apply genetically-modified mice in the evaluation of specific pathways of interest.

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Robb W. Glenny, M.D.

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Current Research Interests

Integrative pulmonary physiology incorporating in situ cellular and molecular techniques with organ physiology to determine the functional significance of cellular mechanisms in the whole living animal physiology. Currently focused on acute lung injury during lung transplantation and mechanical ventilation. Continued interests are descriptors, models, and mechanisms of pulmonary perfusion and ventilation heterogeneity with respect to both spatial and temporal and ventilation heterogeneity with respect to both spatial and temporal distributions. Clinical research interests are in exercise physiology and testing.

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Teal Hallstrand, M.D., M.P.H.

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Current Research Interests

The overall goal of my research is to understand the relationship between clinical manifestations of asthma and the underlying features of airway inflammation and remodeling. In particular, I am interested

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in the role of airway inflammation in exercise-induced bronchoconstriction, a common manifestation of asthma. Using minimally invasive procedures such as induced sputum and exhaled breath condensate, our laboratory is characterizing mediators of inflammation, indicators of oxidative stress and the expression of genes in the airways of persons with exercise-induced bronchoconstriction. It is our hope that this research will lead to targeted treatments for specific manifestation of asthma and new therapies for asthma.

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Erik R. Swenson, M.D.
Professor of Medicine and of Physiology and Biophysics, Pulmonary and Critical Care Medicine
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Current Research Interests

Importance of pH and CO2 in gas exchange, ventilatory control, hemodynamics, epithelial ion transport and inflammatory processes, with emphasis on the role of carbonic anhydrase and other membrane ion channels/transporters in these processes.
Influence of CO2, NO and hemaotocrit on VA/Q relationships, gas exchange, and pulmonary vascular hemodynamics and hypoxic pulmonary vasoconstriction.
Adaptations and maladaptation to hypoxia: renal, metabolic and pulmonary responses with emphases on acute mountain sickness and high altitude pulmonary edema.
Comparative aspects of gas exchange, acid-base regulation and renal function in fish and other non-mammalian vertebrates.

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Questions for Fellows to Ask Potential Mentors

1. What is your general research area?
   What projects are you working on?
   In what stage of completion are they?
   What projects might be good for me to work on?

2. Is there a project that I might work on and expect to be able to have an abstract ready for presentation at a national meeting in my first research year?

3. Do you have the time to mentor an additional fellow?

4. What are the resources that would be available for me?
   Where is the laboratory and bench space?
   a. Proximity of the laboratory to other active laboratories is important as this fosters collaborations and ensures a critical mass of researchers.
   b. Convenient access to core facilities and major equipment will also make your life much easier.
   c. Is there desk space for me?
   d. How big is the laboratory?
   How many fellows, technicians, students?
   e. What is the current funding level?

5. What has been the success of former fellows in terms of manuscripts, grants, jobs, etc?

6. What are your expectations in terms of grant submissions by me?

7. If I decide to do a 4th year to finish research and don't get a grant to fund it, what funding options might be available for me? (Also a question for the Program Director.)

8. When meeting prospective PIs outside the Division, particularly if the PI is not a clinician, make sure the PI understands and is comfortable with your clinical responsibilities during your research years.

It is also useful to speak with current and past fellows in the laboratory to get a perspective on the day-to-day work environment and their overall research experience. This will shed light on the management styles. Tracking down former fellows can be very enlightening, as they have a broader perspective. Remember that identifying the right mentor is an individual and personal decision that depends not only on the mentor's mentoring skills,but also on matching the personalities of the mentor and fellow.

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Expectations, Suggestions & Discouraged Activities

Expectations for the Basic Science Research Fellows
(Mandatory Requirements)

1. Identify a Primary Mentor, generally in the Division of Pulmonary and Critical Care Medicine, and meet with this individual to review progress and plans. Initially, meetings are expected to be frequent, at least on a weekly basis, sometimes more frequently than that. As the fellow becomes more independent, meetings can be less frequent.

2. Identify an Advisory Committee consisting of at least three faculty members, one of whom is either the Program Director or the Research Director (see p. 14).

3. Attend and be an active participant in laboratory meetings.

4. Obtain necessary training and approvals for the project.

5. Attend "Survival Skills for the Research Years" workshop.

6. Attend the RCMB Research Works-in-Progress sessions and present at this session at least three times per year.

7. Attend the Monday Pulmonary Research Conference and present at least once per year.

8. Attend the weekly Seattle Area Chest Conference and the Respiratory and Critical Care Conference at Harborview.

9. Meet with Advisory Committee 1-2 times per year to review progress and career goals.

10. Present at Respiratory and Critical Care conference in the 1st and 2nd research years.

11. Submit a grant application.

12. Act as a teaching assistant for the HuBio course during the 1st or 2nd research year

13. Attend the School of Medicine's mandatory lecture series on "The Ethical Conduct of Research."

14. Complete a research project within two years of research training. Submit an abstract and present the study at at least one national meeting, and write at least one manuscript to be submitted for publication in a peer-reviewed journal.

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Suggested Optional Activities

1. Identify and attend select seminars of interest in basic science departments (Dept of Pathology, Dept of Immunology)

2. Present research at Vanseaport Meeting

3. Attend and present research at focused scientific meetings (Gordon Conference, Keystone Conference)

4. Join appropriate ATS Assembly and attend Assembly business meeting at ATS meeting.
   Examples of potential Assemblies:
   - Allergy, Immunology & Inflammation (AII)
   - Microbiology, Tuberculosis & Pulmonary Infections (MTPI)
   - Pulmonary Circulation (PC)
   - Respiratory Cell & Molecular Biology (RCMB)
   - Respiratory Structure & Function (RSF)

Discouraged Activities

1. Writing review articles, chapters, case reports, except when the fellow is reviewing the same literature in preparation for her or his research.

2. Regular teaching or clinical activities (other than HuBio).

3. Delivering lectures or seminars in areas not related to your research project.

4. Developing a secondary research project in a completely different area from your primary interest.

Remember, the research fellowship provides you with the most protected time of your research career. Take advantage of that: stay focused; don't become distracted.

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Research Advisory Committee

The primary purpose of the Research Advisory Committee is to ensure that the fellow is progressing towards their career goals.

At the beginning of the research year, the fellow should choose an advisory committee. The advisory committee consists of 3-5 individuals including the research mentor, and additional faculty of the fellow's choice. Often times, one member of the committee may be outside the Division of Pulmonary Medicine, particularly if the research project involves collaboration with an outside laboratory. Either the Program Director (Mark Tonelli) or the Research Director (Len Hudson) should sit on each committee. Once the composition of the committee is determined, the fellow should forward their names to Jimmy Hoard (jthoard@u.washington.edu) along with a timeframe for the meeting. Jimmy will coordinate with committee members to arrive at a time and place for the meeting. The first meeting must be held by the fall of the first research year and meetings should be scheduled every 6-12 months thereafter.

In addition to advancing the career goals of the fellow, the advisory committee increases the pool of faculty who understand your research project and career goals. This is especially important when it comes time for career counseling and obtaining letters of recommendations for grant applications or jobs.

Expectations of the Research Advisory Committee

1. Help fellows determine their goals from the research fellowship and set an individualized timetable for accomplishing those goals.
2. Help identify interesting and feasible research questions and identify other resources and potential collaborators that may be useful to the fellow's projects.
3. Meet on a regular basis (1-2 times a year.)
4. Foster the fellow's productivity and provide some resources when necessary.
5. Help the fellow with choosing appropriate timing and sources for grant applications.
6. Suggest potential avenues for presentation of data (local or national meetings, etc)
7. Facilitate the fellow's career advancement and help the fellow find a job.
8. Provide a written summary of the meeting for the fellow and the Program Director.

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Approximate Schedule for Initial Research Years

Clinical Year

Elective and mini-sabbatical	Meet with potential research mentors. Identify primary mentor and laboratory by March/April. Inform Program Director and Mentor of decision. Identify a research project (often part of an ongoing project). Begin any applications/approvals required for the project.

First Research Year

July	Celebrate (briefly!) & start an experiment!
Aug./Sept.	Present research plan at RCMB WIP or Integrative Physiology Group
Sept.	Participate in Research Fellow's Orientation week. Choose members of Advisory Committee.
Oct.	Submit abstract to ATS Identify source of funding for travel to & registration for ATS.
Nov.	Meet with Advisory Committee.
May	Present at ATS.
June	Consider beginning to write a fellowship or research grant (p. 15) Meet with Monica Fawthrop to review grant process.

Second Research Year

July - Dec.	Meet with Advisory Committee. Present research at RCMB WIP or Integrative Physiology Group. Present research at Monday afternoon Research Conference. Write a grant for funding to begin July 1 (p. 15) Meet with Monica Fawthrop to review grant process. Consider abstract submission for additional scientific meetings.
Oct.	Submit abstract for ATS. Identify source of funding for travel to & registration for meetings.
Jan.-May	Meet with Advisory Committee.
April-June	Write up major research project.
May	Present at ATS.

Third Research Year

Fellows interested in going into academic medicine should plan to do a third research year. The goals of and funding for this third year should be worked out between the fellow and her or his research mentor, as the Division does not fund a third research year. The reality is that two years in the laboratory (actually 18 months when you take into account the additional clinical rotations) is not sufficient to allow one to become an independent investigator. Additional training is almost a necessity for being competitive in the academic job market.

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RCMB Research Works-in-Progress Sessions

The Division of Pulmonary and Critical Care Medicine has its own RCMB Research Works-in-Progress session. Research fellows are expected to attend this conference and to present at this conference at least three times a year. The basic information for the conference is as follows:

What Day: Second and fourth Thursdays of every month

What Time: 2:30 to 3:45 pm

Where: HMC R&T rm109-113

Why: To provide fellows and faculty doing basic science research a forum to present research proposals and preliminary results and receive feedback and to provide fellows with experience critiquing the work of others.

Format: Projects in ANY stage of development may be presented ranging from research ideas to preliminary results. Overheads rather than polished presentations are encouraged.

Fellows are strongly encouraged to present their research proposal early in the first research year. This is a great opportunity to get feedback about hypotheses experimental design. The RCMB WIP is designed to be a supportive environment where investigators can bring research projects for critical evaluation and discussion. Projects are welcome at every phase from "twinkle in the eye" through implementation and pre-presentation practice. No project can be presented too early or too often.

To make sure you walk away with the information that's important to you, carefully consider and distribute a list of questions on which you would like to focus. The questions will depend on the research questions and design and the stage of the project. These questions can range from: “Is this an interesting and feasible research question?” to “Where's the best place to send this manuscript?”

If you are ready to present or you are not on the email list, contact Deborah Snapp dsnapp@u.washington.edu

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Integrative Physiology Group

The Integrative Physiology Group meets weekly to review studies and published manuscripts. Research fellows are expected to attend this conference and to present at this conference at least three times a year. The basic information for the conference is as follows:

What Day: Every Monday

What Time: 2:00 to 3:00 pm

Where: UW HSB RR-134

Why: To provide fellows and faculty doing integrative physiology research a format to present research proposals and preliminary results and receive feedback and to provide fellows with experience critiquing the work of others.

Format: Projects in ANY stage of development may be presented ranging from research ideas to preliminary results. Overheads are encouraged.

Fellows are strongly encouraged to present their research proposal early in the first research year. Integrative Physiology Group meeting is designed to be a supportive environment where investigators can bring research projects for critical evaluation and discussion. Projects are welcome at every phase.

To make sure you walk away with the information that's important to you, carefully consider and distribute a list of questions on which you would like to focus. The questions will depend on the research questions and design and the stage of the project. These questions can range from: “Is this an interesting and feasible research question?” to “Where's the best place to send this manuscript?”

If you are ready to present or you are not on the email list, contact Bill Altemeier billa@u.washington.edu

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Pulmonary Research Seminar

The Division of Pulmonary and Critical Care Medicine organizes a weekly research seminar where faculty, research fellows, and invited guests present their work. Faculty and trainees from our Division as well as other Divisions and Departments in the University interested in lung research attend this seminar. Research fellows are expected to present their research work yearly at this conference. This allows the fellow to gain experience with formal presentations of their work and practice responding to questions in a more formal environment. The basic information for the conference is as follows:

What Day: Every Monday

What Time: 4:00 to 5:00 pm

Where: UW HSB RR-134

Why: To provide fellows and faculty doing basic science research a forum to present in a more formal, but still local environment and receive feedback as well as to keep the local research community informed of the current research activities in the Pulmonary & Critical Care Division. This is also a venue for presentations by visiting professors.

Format: Although a more formal environment, projects in any stage of development are appropriate for this conference. Slides are the usual presentation format.

Attendance by research fellows at this weekly conference is strongly encouraged in addition to presenting yearly. The schedule for this conference is organized by the training track leaders with administrative support from Donna Schier (dschier@u.washington.edu). The Pulmonary Division conference schedule is available at: http://depts.washington.edu/pulmcc/Calendar/calendar.htm.

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Writing a Grant During the 1st or 2nd Research Year

Most fellows will write at least one grant during their research training years. These grants may be to support their salary, to provide funding for research activities, or both. There are many different potential sources for research funding. Some of the common ones are listed below. Fellows should discuss potential grant sources and optimal timing of grant applications with their mentors. Remember most grants take approximately 9 months from the time of submission until the award period. It is not uncommon for grants to require resubmission before they are funded.

When you do decide to write a grant, be aware that in addition to the deadline for the grant, you need to leave time for:

1. Administrative review and approvals – Every grant is required to be reviewed by a minimum of four offices – this process takes 3 weeks prior to the grant deadline.
2. Internal review in the following sequence:
   - A. Your mentor(s)
   - B. Other faculty members in the RCMB or IP Research Training Track
   - C. Other members of your advisory committee
3. Obtaining letters of recommendation - Required for many fellowship applications.

   Ask potential writers in advance if they are comfortable writing a letter of recommendation.

   Provide an updated CV, draft of the grant (or at least the title and specific aims), any required forms, and addressed envelopes.

   Be prepared to write a draft of a recommendation for your letter writer. This is common practice - you need to get used to tooting your own horn!

To complete this sequence in a reasonable timeframe, you should plan to have a first draft of your grant done **2 months prior to the deadline**. Notify potential readers well in advance.

Once you decide to apply for a grant, or even contemplate applying for a grant, contact Monica Fawthrop (mfawthro@u.washington.edu) and let her know your tentative plans.

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Some Grant Options for Salary Support

1. American Lung Association Research Training Fellowship: National level award funds 4th and 5th year fellows. Local level supports fellows at any level. Deadline for national award is generally September.
2. American Heart Association: Also funded at a national and local level. Deadlines for national level are generally in July and February.
3. NIH/NRSA Individual Fellowship Awards: Stipends funded based on experience on NIH pay scale.

   Individual NRSA applications are due:
   4/5, 8/5, and 12/5, with earliest corresponding start dates of December, April, and July.

4. March of Dimes
5. NIH Career Development (K Awards)

   New applications for K Awards are due:
   2/1, 6/1, and 10/1, with earliest corresponding start dates of December, April, and July.

Writing a Grant During the 3rd Research Year

Fellows interested in a career as a physician-investigator in academic medicine will often write a grant during their third research year that will bridge them into a faculty position. This type of "career development" grant may come from the NIH (such as a K08 award), the VA, or a foundation. Fellows should be talking with their mentor(s) early in the third research year about such a grant.

UW Resources for Grant Information

Research Funding Service (http://healthlinks.washington.edu/rfs/services.html) offers a variety of services that are useful for research fellows. These include the "Grants for Lunch" series and individual consultations to determine funding opportunities that fit your specific criteria (http://healthlinks.washington.edu/rfs/forms/consult.html). You can also sign up for the Research Funding Service Bulletin to receive notice of upcoming grant deadlines.

From ATS Career Talk Website, June 2002, Editor: Angela Wang
http://www.thoracic.org/women/careertalk/career0602.asp

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Navigating the NIH Website

If you're a scientist performing human health-related research, you need to become familiar with the National Institutes of Health (NIH). NIH funding represents the major source of funding for both clinical and basic research scientists. For many, the first R01 is a milestone in their biomedical research career. In this guide, you will find an overview of NIH granting mechanisms, with particular emphasis on the K, or career development, awards.

NIH home page: http://www.nih.gov

Types of NIH Funding:

1. Fellowships (F series):

http://grants.nih.gov/training/nrsa.htm#fellowships/

This award provides up to three years of support (this includes support from institutional training grants) for full-time research training in areas that reflect the national need for biomedical and behavioral research and is offered by all the NIH institutes and centers. Before submitting a fellowship application, the applicant must identify a sponsoring institution and an individual who will serve as a sponsor (also called mentor or supervisor) and will supervise the training and research experience. Provides a stipend that varies according to years of postgraduate experience.
Useful links: NILBI supplemental guidelines:
http://www.nhlbi.nih.gov/funding/policies/t32/index.htm

2. Career awards (K series):

http://grants1.nih.gov/training/careerdevelopmentawards.htm

These awards provide protected time needed to develop an independent research career (typically 75% time). Candidate must be a US citizen or permanent resident. Career development activities are required and of high priority.

General information:
Career award wizard: Helps you select the right award
Awards Data: Want to know which institute awarded the highest percentage of applications?
Overview: Excellent summary of research training programs for postdoctoral individuals and newly independent researchers.
http://www.nhlbi.nih.gov/funding/training/redbook/newintro.htm

K08: (Mentored Clinical Scientist Development Award)
K23: (Mentored Patient-Oriented Research Career Development Award).

KO8 and K23 are similar awards that support the development of the independent research scientist. The K23 is designed to support individuals who are committed to patient-oriented research. For the purposes of this award, patient-oriented research is

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defined as research conducted with human subjects (or on material of human origin such as tissues, specimens, and cognitive phenomena) for which an investigator directly interacts with human subjects. This area of research includes: 1) mechanisms of human disease; 2) therapeutic interventions; 3) clinical trials, and; 4) the development of new technologies.

The project period for both awards is for 3-5 years depending upon the amount of prior research experience, additional experiences needed, and the policy of the NIH institute. Awards are not renewable. Salary and fringe benefits are independently determined by each NIH institute. Typically $75,000 + fringe. Amount of research support varies according to the institute, e.g., NHLBI provides up to $25,000. Funding cycle dates: February 1, June 1, and October 1.

Useful links:

National Heart, Lung, and Blood Institute (NHLBI)
Contact Information: Lorraine Silsbee, M.H.S.
Email: SilsbeeL@nhlbi.nih.gov
Website: http://www.nhlbi.nih.gov/funding/training/index.htm
NHLBI sample application: http://www.nhlbi.nih.gov/funding/training/redbook//k08.pdf
NHLBI application hints: http://www.nhlbi.nih.gov/funding/training/redbook/hints.htm

National Institute of Allergy and Infectious Diseases (NIAID)
Contact Information: Beth Schucker, M.A.
Email: SchuckeB@nhlbi.nih.gov.
Website: http://www.niaid.nih.gov/ncn/trainsub.htm

Other Institutes: http://grants1.nih.gov/training/careerdev/pdfopporte.html#mentoredk08

K02: (Independent Scientist Award) Salary-only award to provide protected time (75% effort) for newly independent (and funded) scientists. The candidate must clearly document that he/she has a relatively small amount of time dedicated to research and has a need for protected time that would allow the candidate to focus on research and research-related activities.

K22: (Individual Career Award) This career transition award provides support for individual postdoctoral fellows in transition to a faculty position. Many institutes include an NIH intramural component.

K01: (Mentored Research Scientist Development Award) Provides 3-5 years of support for career development in a new area of research.

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3. Research Grants:

http://grants.nih.gov/grants/funding/modular/modular.htm/

R01: These are individual, often investigator-initiated projects (i.e., no RFA or PA necessary)

R21: These exploratory/development grants are institute-specific. An RFA states if the R21 mechanism is used and will include instructions.

Grant Resources at the NIH:

1. From NIH homepage, go to "Grants & Funding Opportunities" or try "Research Training Opportunities". From "Grants and Funding opportunities" go to "Grants" page. (http://grants.nih.gov/grants/oer.htm). This page includes information on NIH grant and fellowship programs sponsored by the Office for Extramural Research (OER).

Welcome/Grant Writing Tips and Definitions - useful links:
What happens to your application after it is received at the NIH
Review of new investigator's RO1, tips for reviewers

Grant Topics - useful links:
Funding opportunities
Awards database
Forms and policies

Research Training - useful links:
Career Resources, including career and survival skills

NIH Guide
What special areas of interest are being targeted by the NIH? The NIH Guide for Grants and Contracts details NIH policies, procedures, and availability of funds.

Program Announcement (PA): Announces increased priority and/or emphasizes particular funding mechanisms for a specific area of science; applications accepted on standard receipt dates on an on-going basis. (A PAR is a PA for which special referral guidelines apply, described in the PAR.)
Request for Applications (RFA): Identifies a more narrowly defined area for which one or more NIH institutes have set aside funds for awarding grants; one receipt date, specified in RFA.
Request for Proposals (RFP): Solicits proposals for a contract; one receipt date, specified in RFP.

2. Each NIH institute has its own training site detailing training and career awards.
http://www.nhlbi.nih.gov/funding/index.htm

NCI training site also links to non-NIH training/funding opportunities:
http://www.nci.nih.gov/research_funding/organizations/

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Approvals & Training

Most research projects will require a variety of approvals for individuals. It is best to start this process as soon as possible, during the clinical year if possible, to avoid delays in starting the research project.

1. Bloodborne Pathogen Training

Administered through Environmental Health and Safety (EHS):
http://www.ehs.washington.edu/Index.htm

Initial and annual training is required for anyone working with human blood, blood by-products or human tissue (including human cell lines).

If you have not already completed the initial bloodborne pathogen course (which you should have done for the clinical year), then you will need to sign up for the initial course. Otherwise, you will need the annual refresher course. Both the initial and annual refresher courses are offered at the University and at Harborview.

For schedules and on-line registration:
http://www.ehs.washington.edu/training/corsdesc.htm 543-7201

2. Radiation Safety

http://www.ehs.washington.edu/training/radclass.htm

If your work will involve radioactive materials, you are required to complete an initial Radiation Safety Training course. This course is a series of four 2-hour lectures covering basic radiation physics, and radiation safety rules and regulations.

If you have not yet completed the training, you may work under the direct supervision of laboratory personnel/staff who are already certified for no more than 90 days (3 months). If you have had previous training, you may be able to just take the refresher course.

3. Human Subjects

You will need to complete a human subjects training class. Even if you aren't currently working with human tissues or human subjects, the training is valuable. You will only need to complete the training once.

Training can be completed either by attending a scheduled class (http://depts.washington.edu/hsd/INFO/train.htm) or completing a web-based training course offered through University of Miami (http://www.miami.edu/citireg/). In general, the class offered by the Human Subjects Division (HSD) is the preferable option (more enjoyable and more succinct).

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Approvals
Any project that uses human samples (blood, biopsies, tissue blocks, etc) will need human subjects approval. If your PI already has approval for the project, a modification will be required to add your name to the list of approved investigators (and you will need to complete the training above). If this is a new project, you will need to obtain human subjects approval. This will take (a lot) longer than you think.

Training information and forms can be found at: http://depts.washington.edu/hsd/ . It is worthwhile to discuss your research proposal with the staff at HSD to help you navigate the process.

4. Animal Use

To work with animals, you will need a general training class followed by facility-specific orientation. There are also animal-specific classes (mouse, rat, rabbit, etc), and additional training courses in different techniques (mouse husbandry, etc).
For information about classes and facility orientation, contact Jessica Brown (auts@u.washington.edu).

Approvals
If the protocol is already approved, a modification will be required to add your name to the list of approved investigators (and you will need to complete the training above). If this is a new project, you will need to obtain IACUC approval. This can take longer than you think. The veterinarians and support veterinary staff (Dept of Comparative Medicine) are very helpful when it comes to suggestions for proper animal care procedures. Again, it is worthwhile to directly contact them to help with your proposal.

General questions
Deborah Taylor: **debet@u.washington.edu**
Margaret de Hoyos: **mag411@u.washington.edu**

Comparative Medicine Directory:
http://depts.washington.edu/compmed/department/directory/contacts.html

Institutional Animal Care and Use Committee (IACUC)
http://depts.washington.edu/compmed/iacuc/index.html

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Useful UW Resources for the Basic Researcher

Bioinformatics
http://healthlinks.washington.edu/index.cfm?id=dcf7276a-4d84-435e-8096-00a505c5f140

Computer

General Questions (UW Help Line)

MCIS – Computer Support	543-7012
Mac help - helpdesk@u.washington.edu	616-6984

Software Questions

Apple Assistance Center (Mac Users)	800-996-1010
Microsoft Word for Windows (DOS Users)	462-9673

Environmental Health and Safety
http://www.ehs.washington.edu/Welcome/Index.htm

Harborview Research and Training Building General Information
http://depts.washington.edu/hmcrt/Information.htm

Human Subjects
http://depts.washington.edu/hsd/

Libraries

Health Sciences	543-3390
Odegaard	543-1947
K.K. Sherwood – HMC Library	341-4124

Research and Funding Service
http://healthlinks.washington.edu/rfs/services.html

TechTransfer
http://depts.washington.edu/techtran/

Email: techtran@u.washington.edu	543-0905

Miscellaneous

Benefits Office (Health/life insurance)	543-2800
Center for Educational Resources (Slides)	543-6114
Andy Blair – HMC Media Specialist	731-3470
Publication Services - Graphics (Posters)	543-5680

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Recommended Bibliography and Links

General:

1. ATS Career Talk http://www.thoracic.org/women/careertalk/default.asp
   Monthly column that covers a variety of topics relevant to fellows and junior faculty career development. Archival topics include "Time Management: A practical approach and philosophy" "Climbing the Academic Ladder and Why People Fall Off", "Mentors and Mentoring", "Preparing a Grant Application", "Navigating the NIH website"

2. Barker, K. 1998. *At the Bench: A Laboratory Navigator*. Cold Spring Harbor Laboratory Press, Plainview, New York.
   Great basic book that introduces the laboratory to newcomers. Very practical information.

3. Hailman, J.P. and K.B. Strier. 1997. *Planning, Proposing, and Presenting Science Effectively: A Guide for Graduate Students and Researchers in the Behavioral Sciences and Biology*. University Press, Cambridge.

4. *Making the Right Moves: A Practical Guide to Scientific Management for Postdocs and New Faculty.* HHMI 2004 http://www.hhmi.org/grants/office/scimgmt.html
   Excellent practical guide, includes chapters on negotiating a position, staffing your laboratory, technology transfer info, etc.

5. Zeiger, M. 1991. *Essentials of Writing Biomedical Research Papers*. McGraw-Hill Inc., New York.
   Starts with chapters on word choices and sentence structure, then moves to each section of a scientific paper (abstract, introduction, results, etc), with exercises for each chapter.

Mentors and Mentoring:

6. *Adviser, Teacher, Role Model, Friend*. National Academy Press, 1997 http://www.nap.edu/readingroom/books/mentor/#contents.
   This online guide summarizes features that are common to successful mentoring relationships. Its goal is to encourage mentoring habits that are in the best interests of both parties in the relationship.

7. Applegate WB, Williams ME. *Career development in academic medicine.* Am J Med 1990; 88:263-7.

8. Luft R, Low H. *Excellence and creativity in science.* Clin Res 1980; 28:329-33.

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9. Mentoring section from the NIH Fellows' Handbook.
   http://www.training.nih.gov/handbook/mentor.html
   Extremely useful overview.

10. Mentoring site for the Association of Women in Science
    http://www.awis.org/mentoring.html

Women in Medicine:

11. Bickel J. *Scenarios for success – enhancing women physicians' professional advancement.* West J Med 1995: 162:165-9.

12. DeAngelis CD, Johns ME. *Promotion of women in academic medicine*. JAMA 1995; 273:1056-7.

13. Tesch BJ et al. *Promotion of women physicians in academic medicine: glass ceiling or sticky floor?* JAMA 1995; 273:1022-5.