University of Washington

The Graduate School

Review of the Degree Programs
in the
Department of Pathology

School of Medicine

2001

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VII. GRADUATE STUDENTS

I. CONTEXT AND HECB INFORMATION

A. Name of Unit authorized to offer degrees:
Department of Pathology

B. School:
School of Medicine

C. Exact title of degree offered:
Ph.D. in Cellular and Molecular Pathology

D. Year of last review:
1988/89

E. Description of field and history at UW:

Pathology is both a basic medical science and a clinical discipline. The Department of Pathology at the University of Washington has had a strong basic research component for the last 40 years, starting with the chairmanship of Dr. Earl Benditt, one of the major figures in establishing the direction of experimental studies of disease pathogenesis. The basic goal of the Graduate Program is to educate students in the molecular mechanisms of disease using the most up-to-date techniques of cell and molecular biology. Although the techniques used in pathology research are common to other disciplines of basic biomedical research, both the research goals and the combination of techniques used in the research make pathology a distinct discipline. The Department of Pathology at the University of Washington is at the top of Pathology Departments nationwide as a recipient of NIH grants as well as awards received from other agencies. Total direct funding for research in the Department of Pathology was approximately $14 million in 1999/2000 and included five training and eight Center/Program Project grants (interdisciplinary, directed by Pathology faculty) as well as more than 40 R01-type NIH grants.

About a decade ago, the new imperative in experimental pathology was the introduction of molecular approaches to a discipline that relied heavily on morphological methods. This has been successfully accomplished and the Department of Pathology at the University of Washington has been at the forefront of these advances. The research contributions of the Department have included major achievements in studies of atherosclerosis and vascular biology, aging, Alzheimer's disease and cancer pathogenesis. We are once again at a turning point in experimental pathology that reflects new directions in biomedical research in general, that is, the switch from an essentially reductionist approach to the understanding of the integrated biology and pathobiology of whole tissues and organs. This change plays to the strengths of pathology as a science concerned with the molecular and cellular basis of disease processes that affect tissues and organs. We plan to give new emphasis to the formal instruction of graduate students in mechanisms of disease, and will offer an additional course that deals with basic disease processes. Because graduate students in the program will have more course requirements during their first year, the Department of Pathology will set aside funds to support the students during that year, before they select a thesis advisor.

F. Continuing need for PhD program:

The Pathology Ph.D. program satisfies the following needs:

Needs of students: Graduate students in the Pathology Ph.D. program benefit from the opportunity to learn the theory and practice of biomedical research in an environment/department that spans clinical and basic divisions, that has the funding to fully support the research, and that has a long tradition of training researchers for careers in academia and biotechnology/industry. The pathology department has a relatively low ratio of graduate students to postdoctoral fellows and faculty, so that the students have many opportunities to interact with more advanced researchers and there is little competition between graduate students for resources.

Needs of faculty: Graduate students provide part of the full diversity (age, race, background, etc) that most researchers enjoy about working in an academic setting. Most faculty desire to participate in the training of the next generation of scientists. The ability to mentor a graduate student is usually mentioned as one of aspects of academic research that retains faculty at a university (cf loss to industry).

Needs of society: Experimental pathology is the discipline that most explicitly uses modern research techniques to address important problems in human disease. It is desirable that scientists be trained to appreciate and pursue this approach.

G. Assessment of student learning:

The most important component of the pathology Ph.D. program is the research that is performed under the direction of the graduate student's thesis advisor, and by far the most important assessment of the student's progress is made by the thesis advisor. Advisors are requested to complete a once-yearly written assessment of the student's progress. The second most important level of assessment is by the thesis committee. Department policy is that the committee meet with the student once each year. Additional assessment comes in the form of grades in courses (first 2 years) and performance in public presentation of research (lab meetings, graduate student retreats, department retreats)

H Grid of data on numbers of students completing program:

	2000	1999	1998
Number of undergrad majors graduating from unit in each of the last three years	0	0	0
Number of master's degrees granted in each of the last three years	0	0	0
Number of doctoral degrees granted in each of the last three years	6	3	6

I. Plans to improve the quality and effectiveness of the program:

The Pathology Graduate Program review of 1988/89 identified three areas that required substantial improvement: 1) increased instruction in experimental pathology as a discipline, 2) increased graduate student numbers and cohesiveness, 3) increased teaching experience. These areas remain at the

forefront of our attention. We will describe the progress that we have made in these areas and present our plans for remedying remaining weaknesses.

1. Need for greater in depth instruction in experimental pathology as a specific discipline:
One of the major criticisms in the review of 1989 was that we did not provide enough course work or other work that related specifically to the discipline of "experimental pathology". At the time of that review, the program did not require any courses that were uniquely identified with experimental pathology. The review suggested that we could accomplish this by "developing a one- or two-quarter general pathology course that focuses upon graduate students". We began adding and revising courses during the next few years. By 1995/6 we had established the current 3-quarter series that is required for all first year students.:

PATH 507 Introduction to Pathology Research. Lectures on experimental pathology research as conducted by members of the Pathology Department. In a small group/seminar setting, Pathology Graduate Faculty describe their own research in the context of investigation of disease mechanisms. One session per faculty. The students write a hypothesis-testing grant proposal based on the research presented by one of the faculty. Two sessions per week.
Qtr offered: Autumn
Credits: 2 credits cr/ncr
Prerequisite: None for Path Grad Students

PATH 500 Introduction to General Pathology. This a course originally designed for first year medical students (medical students register for it as HUBIO 520). To address issues/interests appropriate for grad students, graduate students attend special weekly review session with the instructors.
Qtr offered: Winter
Credits: 3 graded credits.
Prerequisite: None for Path Grad Students

PATH 510 Introduction to Histology and Pathology Methods. This hands-on/eyes-on course is designed to introduce graduate students to the fundamentals of image analysis, histology, histopathology, postmortem evaluation, surgical pathology, cytogenetics, and other ways in which tissue changes are evaluated to provide insight into disease etiology, progression, and manifestation in humans and in animal models.
Qtr offered: Spring
Credits: 3 graded credits
Prerequisite: PATH 500

Future plans for augmenting instruction in experimental pathology:

1) We plan to add at least one additional course that will provide further exposure to the practice of experimental pathology. The department is currently in an excellent position to offer such a course because, after a period of several years during which many senior faculty were retiring and no replacement faculty were on board, we now have several energetic new faculty (Jeff Virgin, Brian Rubin, Tony Parks, Tom Lawton) with experience in both hospital pathology and research who have expressed an interest in participating in this course.

Molecular Basis of Disease
Proposed Schedule

Courses would be in 5-week blocks. Schedule would repeat every 2 years
Classes would meet twice weekly, once for lecture and once for literature review.

Year 1
Winter 1: Cell injury, cell death (Fausto, S. Schwartz, Murry)
Winter 2: Inflammation, tissue repair (Smith, Alpers, Harlan, Liles, Argenyi, Narayanan, Murry)

Spring 1: Atherosclerosis, ischemia and infarction (S. Schwartz, Raines, Clowes, Bornfeldt, Reidy, Bowen-Pope, Murry)
Spring 2: Infectious disease, immune diseases/transplantation (Smith, Cookson, Alpers, Mullins, McDougall/Galloway, Kiviat, Sale)

Year 2
Winter 1: Neoplasia (Loeb, Monnat, Swisshelm, Virgin, Rubin, Fausto, Parks, Lawton)
Winter 2: Genetics, developmental diseases (Beyers, U. Schwartz, Monnat, Swisshelm, Kapur, Siebert)

Spring 1: Neurodegeneration (Martin, Vincent, Oshima, Jin, Swisshelm)
Spring 2: Aging (Martin, Norwood, Wolf, Rostad)

Other considerations:
Environmental pathology
Molecular diagnostics
Neoplasia could be an entire quarter
Neurodegeneration and aging could be lumped together

2) We will require courses in general/biomedical statistics and bioinformatics. The following courses fits our needs very well:

BIOST 511 Medical Biometry I (4)
Presentation of the principles and methods of data description and elementary parametric and nonparametric statistical analysis. Examples are drawn from the biomedical literature, and real data sets are analyzed by the students after a brief introduction to the use of standard statistical computer packages. Statistical techniques covered include description of samples, comparison of two sample means and proportions, simple linear regression and correlation. Offered: AS.

MEDED 536 Bioinformatics and Gene Sequence Analysis (3) Rose
Nature and relevance of molecular sequence information, computer-based protein, and DNA sequence analysis, molecular sequence and genomic databases, and methods for database accession and interrogation. Prerequisite: background in molecular biology and permission of instructor. Offered: jointly with PABIO 536; W.
Instructor Course Description: Stuart Yarfitz

2) Group size and cohesion.

The second major concern identified in the review of 1988/89 was that "the graduate program is sorely in need of a critical mass of graduate students", and that there needed to be much more "cohesiveness" in the program, especially at the University campus. At the time of that review, the program included about 20 students, and more than half of these students were working in the laboratories of faculty members whose primary appointments (and laboratories) were at the Fred Hutchinson Cancer Research Center (FHCRC). There was little or no communication between graduate students at the two campuses.

The program now includes 33 graduate students and all but 2 of them are working with pathology faculty in the UW Health Sciences Building. This is an appropriate number of students given the current size of the pathology graduate faculty.

In order to create a sense of program identity, to enhance interactions between students, and to improve communication skills, we instituted (beginning 1994) the following:

Entering students/first year.

New graduate students first meet their future peers at the admission recruitment dinner. We rent a room at the local Ivar's restaurant and invite all current graduate students to attend (most do) along with the top applicants to the grad program. In addition to providing a means for potential new students to meet and talk to existing students, it serves as a venue for general student bonding/socializing.

Once a student has been accepted into the program, we ask that they attend the grad student retreat that is held just before Autumn quarter begins (see below). The grad student retreat allows the new students to hear about the research projects of students in the senior classes and provides another opportunity for them to meet and socialize with their new peers.

During their first quarter, the new students are required to take PATH507. This class meets twice per week in a conference room and is designed to introduce the new students to the pathology graduate faculty, ie to the pool of potential thesis advisors. Each faculty describes their research program, in terms of its general background and goals and in terms of actual ongoing projects and personnel.

The students remain as a group through the remaining 2 quarters of required Pathology courses (PATH500 and PATH510). These are small classes (rarely more than 8 students) and the new students get to know one another very well. Since the Spring quarter course (PATH 510) is taught largely by practicing pathologists in the department, the students get introduced to faculty and staff in the department who are not engaged in basic research *per se*, but who provide great future resources/advice/collaboration for studies of human tissue/disease.

Pathology graduate students are required to complete three 1–quarter research projects (PATH 551, Laboratory Rotations) during the first year. These rotations serve three goals: They ensure that each student will have a substantial familiarity with at least three areas of research in the department. They allow a trial period prior to choice of a final lab for thesis research. They ensure that each student has personal contacts in at least 3 labs that will facilitate later social interactions and scientific discussion/help.

Student interactions in subsequent years/recurring

Twice per year (end of winter and end of summer quarters) all Pathology graduate students are required to attend the "graduate student retreat" at the UW Waterfront Activities Center or similar venue. These retreats are organized like conferences, with presentations and catered lunch (pizza). At the winter retreat, the more senior students present their research. At the summer retreat the more junior students present. Students are chosen to chair the two sessions into which each program is divided. Faculty are not specifically excluded but are not actively invited, with the exception of the program director (Dan Bowen-Pope) who always attends, and who opens the retreat with a discussion of current graduate program concerns and issues. The rationale for discouraging faculty participation in these retreats is that early experience showed that when faculty are present they tend to dominate the question/answer periods after the talks and this reduces the value of the event as an experience for the students in both presenting and in participating. The presence of faculty also dilutes the inter-student bonding/socializing.

Once per year the department has a 2 day retreat to which faculty, grad students and postdocs are invited. The goal of the department retreat is to promote interaction between all ranks/members of the department. Grad students are encouraged to bring posters of their research projects and to be available to discuss the work during the poster-viewing /social sessions. To encourage the grad students to participate in this, a cash prize is offered for the best grad student poster.

Grad students are also asked to attend the twice monthly Pathology Presents seminars. This is set up as a 1 credit course (PATH520). Since all Pathology faculty, postdocs and students are encouraged to attend these seminars, this is an additional, recurring, venue for department/program interaction.

3) Teaching experience for Pathology graduate students: The Department of Pathology does not teach courses that involve graduate teaching assistants (TAs) nor does the Pathology department have any TA funding slots. Nevertheless, students have ample opportunity to organize and present didactic talks through lab meetings, retreats, Proseminars, etc. Students wishing to gain formal classroom teaching experience to prepare for academic positions that entail substantial teaching have been able to do this as TAs in departments that teach undergraduate courses, including Genetics, Biochemistry, Microbiology and Biology. Graduate students also have many opportunities to participate in teaching through community outreach programs such as the Science Education Partnership (SP) Program.

Needs of the program:

We have been facing increasing limitations in our ability to make financial commitments to our top applicant candidates. In the past, we have been able to identify training grants that appear appropriate for most applicants, and the directors of these training grants have been willing to start the students on the training grant during their first year. As training grants have come under increasing pressure to ensure a focus on their specific research area, they have been less willing to begin supporting students before the student has definitely started on an appropriate thesis project in an appropriate lab. To deal with this problem, we will initiate a plan to make at least 4 entering positions available based on merit alone, ie independent of training grant funding. We expect to continue to get one recruitment slot (stipend and tuition for 1 year) from the Graduate School. In addition, we plan to commit department funds to fully cover (tuition plus stipend) three entering graduate students each year. This new department commitment will represent a major improvement in our ability to accept new graduate students based on merit rather than on training grant slot availability.

II. SELF-EVALUATION

A. Strengths of the unit:

The Pathology Department at the University of Washington is recognized as one of the best in the country because of its strengths in research and service. The diagnostic services of the Department of Pathology process approximately 30,000 surgical specimens annually as well as 18,000 cytology samples. Approximately one-third of the surgical pathology volume represents material sent for consultation to our faculty from outside sources (private physicians, academic medical centers, etc.) Gastrointestinal pathology, renal pathology, cytology, cytogenetics and more recently dermatopathology, are areas of major strength because of diagnostic expertise and faculty involvement in translational and/or basic research. Research in the Department of Pathology ranges from very basic studies of molecular and cell mechanisms of disease to applied research in specific diseases. An excellent example of the crossover between basic research and clinical diagnostic activities in the Department of Pathology is the Connective Tissue Laboratory directed by Dr. Peter Byers. This laboratory is unique for its expertise in diagnosis of collagen and bone disease, including Marfan Syndrome, osteogenic imperfecta and other hereditary syndromes. Material received for diagnosis has served as a starting point for in depth research on the molecular pathogenesis of these diseases, as well as for state-of-the-art research work on mechanisms of gene splicing. Research in cardiovascular biology, with emphasis on atherosclerosis re-stenosis and blood vessel injury, is another area of great strength. Research in cardiovascular pathobiology in the Department of Pathology has been recently enriched by the work of Dr. Charles Murry on vascular stem cells and the detailed analysis of gene expression patterns in blood vessels using microarray technology done by the group under the direction of Dr. Stephen Schwartz. In the area of cancer and carcinogenesis, Dr. Larry Loeb has made theoretical and practical notable contributions. He proposed the concept of mutator phenotypes in cancer development, an area that is actively pursued by cancer researchers throughout the world. Other research areas of great achievement among the faculty of the Department of Pathology include aging and Werner syndrome (Drs. G. Martin, P. Rabinovitch, R. Monnat), liver regeneration and hepatocarcinogenesis (N. Fausto) and colon carcinogenesis and ulcerative colitis (M. Bronner, P. Rabinovitch).

B. Criteria for evaluating success:

The criteria for measuring excellence in clinical work include peer recognition and national and international reputation. This is indicated by invitations to the faculty to present lecturers and courses at professional societies and academic institutions. Perhaps more important than this type of recognition is the confidence received from outside physicians, both regionally and nationally, in the quality of the work performed by the unit. A clear measure of this confidence is the large number of specimens submitted to the Department of Pathology for primary diagnosis and consultation. In addition, the quality and efficiency of our work is constantly being evaluated by clinicians and surgeons at the University of Washington, who depend on services provided by the Department of Pathology. The University of Washington Medical Center is one of the top hospitals in the country and the demands of the Pathology Department require the delivery of high level, accurate and efficient services. In addition to strictly diagnostic work, pathologists participate at or direct specialty conferences, both to review interesting cases and to plan therapeutic strategies for individual patients, as is the case for the biweekly breast cancer multi-specialty conferences.

Achievement in research is measured in a similar way as for other biomedical disciplines. The major criteria are independence, research productivity, grant support and national and international

recognition. The Department values sustained, high quality research above numbers of papers published. Brown University, The University of Toronto, Johns Hopkins and University of Pennsylvania and University of North Caroline, Chapel Hill, among others, have excellent graduate programs in pathology. Our program compares very favorably with those offered by these institutions.

C. Weaknesses:

During the last few years, the Graduate Program may have strayed somewhat from the primary emphasis on disease mechanisms by not sufficiently stressing knowledge on major diseases, which form the basis for pathogenesis research. We plan to provide a stronger focus on disease mechanisms by offering an additional course on the molecular basis of disease, directed by Dr. C. Murry. The course will be presented in five-week blocks and the cycles would be repeated every two years. The purpose of the course is to give the student an understanding of the general aspects of important diseases and to propose research problems.

Another aspect of the program that requires attention is to assure good participation of the faculty (in particular, adjunct faculty) on course offerings. The Department is considering establishing a teaching requirement for adjunct appointments.

D. Changes in the field:

Pathology research has drastically changed during the past decade from primary reliance on morphology to the application of modern techniques of cell and molecular biology. The newly acquired knowledge on the genetic basis of disease, particularly (but not confined to) in cancer research has introduced an entirely new dimension in pathology research. In addition, while a decade ago research using human tissues was seen by the scientific community at large as being unreliable and even "unscientific," a great deal of modern research relies on the analysis of human material. Molecular techniques, immunocytochemistry, cytogenetics and flow cytometry are now standard elements in the practice of diagnostic pathology. Cytogenetics has experienced major growth in our unit. Its services and research include the areas of prenatal diagnosis, solid tumors and hematologic malignancies. The application of cytogenetics to patient care at the University of Washington was greatly expanded with the establishment of the Seattle Cancer Care Alliance, a consortium between the Fred Hutchinson Cancer Research Center, the University of Washington and the Children's Hospital Medical Center. In the experimental arena, the use of genetically modified mice, including transgenics and knockouts coupled with techniques for gene induction and cell or tissue-specific expression, have become obligatory tools in modern pathology research.

Application of modern technologies, particularly those on genetic approaches, will continue to accelerate in the coming years. There is much talk about the use of "chips" for molecular diagnosis as well as other types of devices based on gene scanning. At the University of Washington, Pathology and Laboratory Medicine, which are combined into single departments in the vast majority of medical schools, constitute separate departments. Nevertheless, the two departments work together to not only apply but also to lead in the development of new diagnostic techniques. We are greatly helped in these developments by the superb environment at the University of Washington.

E. Role of the unit:

We do not perceive differences between the unit and the University as to our role or goals. We feel that a graduate program in the molecular and cellular basis of disease is an essential component of a first class Medical School.

III. RESEARCH AND PRODUCTIVITY

A. Balance between individual faculty interests and department goals and expectations:

In general, there is a good match between faculty interests and department goals. In clinical anatomic pathology, faculty expertise needs to exactly match the service requirements in various subspecialized areas of Pathology. The research directions of the faculty are in complete concordance with the goals of the department.

B. What impediments to faculty exist:

Impediments to scholarly activity derive from excessive service obligations. However, at this time, the staffing of the department is adequate and service obligations are evenly distributed to allow for available time for teaching and research activities.

C. Mentoring of junior faculty:

The goals and expectations of the department are clearly presented to faculty at the time of hiring. The Chair of the department monitors the progress of the academic careers of junior faculty and has at least one formal meeting per year with assistant professors. During these meetings, accomplishments, difficulties, plans and goals are discussed. Planning and goals for the future year are mutually agreed by faculty and the Chair. Senior faculty on their own or at the request of the Chair also advise and mentor junior faculty.

D. Heterogeneity and subfields:

Because of the very broad nature of the activities of the Department of Pathology. its faculty has diverse expertise ranging from basic science research to specialized anatomic pathology diagnosis. Departmental facilities are concentrated into groups of facilities that are geographically disperse. The research laboratories encompass about 50,000 square feet of space. The units located at the K-wing, the fifth floor of the Health Science Building and laboratories located at the Research and Training Building at Harborview Medical Center are state-of -the-art facilities.

Despite the diversity of its activities, a major goal of the Department of Pathology is to function as a unified entity, blending research, service and teaching. Although this is a challenging task, the Department of Pathology has by and large been successful in establishing firm linkages between all of its activities.

E. For each state funded faculty member in your department, please list: number of courses taught per year, number of credits taught, and total student credit hours:

Dr. Alvord:	Path 563, 2 credits, 0 students registered
	Path 564, 4 credits, 0 students registered
	Path 571, 2 credits, 0 students registered
	Path 572, 2 credits, 0 students registered

Dr. Bowen-Pope:	Rotation talks, 1 credit, 5 students registered Retreat, 1 credit, 30 students registered Path 510, 3 credits, 5 students registered Path 551, 2-10 credits, 5 students registered Path 600, 10 credits, 3 students registered Path 800, 10 credits, 1 student registered
Dr. Disteche:	Path 530, 4 credits, 2 students registered Path 800, 10 credits, 1 student registered
Dr. Fausto:	Path 499, 2-5 credits, 2 students registered Path 551, 2-10 credits, 2 students registered Path 600, 10 credits, 1 student registered Path 800, 10 credits, 2 students registered
Dr. Loeb:	Path 499, 2-5 credits, 3 students registered Path 551, 2-10 credits, 1 student registered Path 600, 10 credits, 3 students registered Path 800, 10 credits, 1 student registered
Dr. Martin:	Path 450, 3 credits, 20 students Path 499, 2-5 credits, 5 students Path 551, 2-10 credits, 1 student Path 600, 10 credits, 1 student
Dr. Monnat:	Path 499, 2-5 credits, 2 students registered Path 555, 3 credits, 8 students registered
Dr. Murry:	Path 499, 2-5 credits, 2 students registered Path 600, 10 credits, 1 student registered
Dr. Norwood:	HuBio 520, 4 credits, 120 students registered
Dr. Page:	Path 444, 2-3 credits, 44 students registered
Dr. Schwartz:	Path 520, 1 credit, 5 students registered Path 551, 2-10 credits, 1 student registered Path 552, 2-5 credits, 2 students registered Path 600, 10 credits, 2 students registered
Dr. Swisshelm:	Path 444, 2-3 credits, 44 students registered Path 507, 2 credits, 5 students registered Path 551, 2-10 credits, 3 students registered Path 800, 10 credits, 2 students registered
Dr. Wolf:	Path 450, 3 credits, 20 students registered

F. Allocation of teaching responsibilities:

Appointment of course directors are done by the Chair in consultation with the faculty. Course directors allocate teaching responsibilities to faculty according to their areas of expertise. The course directors consult with the Chair about situations which may involve conflicting demands for faculty teaching time.

G. Faculty rewards for enhancing learning:

Teaching quality is a major criterion in determining suitability of faculty for promotion. The extent and quality of teaching are taken into account in determining merit salary increases for individual faculty.

H. Please see answer to Item II, #D.

I. Staff Productivity:

The Department of Pathology staff works to provide a supportive environment, which facilitates the academic activities of the faculty. The staff is under the general supervision of Ms. Barbara Peterson, Director of Administration for the Department of Pathology. The department maintains a central business office with personnel specialized in purchasing, grant applications and management, budget projections and accounting, and teaching support. Ms. Peterson meets with individual staff, including business office personnel, secretaries and research technicians to discuss problems and career advancement options. She also meets with staff groups to discuss changes in management practices and problem solving. The technical staff in Anatomic Pathology is under the general supervision of Ms. Kim Simmons, who oversees staff activities and advises the staff as to career advancement.

IV. RELATIONSHIPS WITH OTHER UNITS

The clinical service activities of the department are by their very nature fully interactive. They required a constant interaction between pathologists, clinicians and surgeons. The research conducted in the Department of pathology has major interdepartmental components. All of the training grants and program projects based in the Department of Pathology include faculty of other departments. For instance, the Experimental Pathology/Toxicology Training Program is essentially a joint enterprise with the Department of Environmental Health Sciences at the School of Public Health. Research in cardiovascular biology done in the Department of Pathology is part of a network that includes faculty in the Departments of Medicine and Surgery. The Hepatitis C Collaborative Research Center includes faculty from the Departments of Microbiology and Laboratory Medicine. These interactions have been crucial to the success of these activities and is a great help in recruiting faculty and students. There are no impediments to developing these interdisciplinary activities. On the contrary, interdisciplinary research is encouraged and greatly welcomed throughout the School of Medicine.

V. DIVERSITY

A. Inclusion of underrepresented groups in the graduate student group:

Current students:
Rachel Hernandez, Hispanic, Class of 1995-
Rose James, Native American, class of 1995-
Carmen Booth, Hispanic, class of 1999-
Donovan Joseph, African American (class of 2000. Transferred Autumn 2001 to MS in Health Science Administration)

C. Outreach to minority students:

The program director (Dan Bowen-Pope) attends the outreach programs on campus. Our current graduate student Rose James (Native American) and often Rachel Hernandez (Hispanic) have been active in the student-run Mosaic and Minority Think Tank organizations.
Recruitment of faculty from underrepresented groups, particularly blacks, has been difficult because of the very small pool of pathologists (of any racial origin) available nationwide. The only effective solution for this problem is to train more Ph.D. and M.D. pathologists from underrepresented groups.

D. Affect of diversity:

Our graduate student body is multi-racial and multi-national. We believe that this is intellectually stimulating for all.

VI. DEGREE PROGRAMS

A. Doctoral program

1. Objectives of the Pathology PhD program :

The objective of the Pathology Ph.D. program is the training/development of practicing biomedical scientists: individuals who can use the scientific method to ask and answer testable questions about significant biomedical problems. To a large extent, this is accomplished by role modeling and research apprenticeship in a functioning research lab. We consider that a graduate student in the pathology Ph.D. program should be:

1) Able to frame a significant hypothesis, based on the findings of others, and to devise an approach to test this hypothesis.

2) Able to critically evaluate experiments, statements, and publications, and identify their strengths and weaknesses.

3) Thoroughly familiar with the literature in the area in which the thesis research was performed and familiar to some extent with the broad sweep of current biomedical research and hypothesis.

4) Able to communicate the background, approach and results of the thesis research, both in oral presentation and in publications (though we do not specifically require a specific number of publications as a prerequisite for obtaining the Ph.D.)

5) Proficient in use of a range of experimental techniques that is broad enough to address a significant scientific question (the thesis).

6) Familiar with the major mechanisms of disease and the general status of research into the etiologies of these diseases. We do not expect Pathology Ph.D. students to be skilled anatomic pathologists, able to diagnose disease based on histologic or laboratory findings. Students who wish to obtain those skills are encouraged to obtain an MD and subsequent residency training in pathology.

2. Standards for self evaluation:

Since the goal of our program is to train students for the practice of biomedical research, we consider that the program is successful if our graduates continue to advance toward becoming fully functioning scientists. The next step for most graduates is a postdoctoral position. Our graduates have no problem finding postdoctoral fellowships in excellent labs. After a postdoctoral fellowship, the next career step is a permanent position (assistant professor, staff scientist, etc). As documented in the attachments, our graduates are virtually always successful in finding satisfactory permanent jobs.

3. Mentoring and career preparation:

During the first year in the Pathology Ph.D. program (until establishing a home lab/thesis advisor) the program director (Dan Bowen-Pope) serves as the student's advisor. After choosing a thesis advisor,

that faculty becomes the student's mentor. Because all graduate students are required to present their research once per year at the graduate student retreats, the program director maintains relatively direct surveillance of the student's progress.

As noted elsewhere in this Self Study (eg in the section above), the Pathology PhD program is devoted to the training of practicing biomedical scientists: individuals who can use the scientific method to ask and answer testable questions about significant biomedical problems. To a large extent, this is accomplished by research apprenticeship in a functioning research lab, supplemented by additional classroom courses. This makes the home lab environment extremely important. The thesis advisor, as chief of the home lab, becomes the most important and most visible example of the practice of academic science. Everyone in the home lab becomes a potential role model, instructor and/or mentor. Almost all Pathology research laboratories include more postdoctoral fellows than graduate students so the graduate students have excellent opportunity to observe and learn from scientists at the next levels of professional development.

The Pathology Ph.D. program actively encourages its graduate students to consider careers outside of academia. Many of our postdocs and graduate students find careers at biotech companies and many faculty are engaged in collaborative projects that involve biotech companies. All first year students take a half day visit to ZymoGenetics (as part of PATH 510) where staff scientists who had graduated from the Pathology Ph.D. program discuss their personal experiences of the difference between pursuing a career as a scientist at a university vs at a biotech company. In addition, representatives of biotech companies are routinely invited to make presentations at the grad student retreats.

4. Keeping track of careers post degree:

The Graduate Program Coordinator, Kathy Hobson, keeps track of past graduates. Every other year we update our information on where our past graduates are. We often use this information for our 5 training grants which require us to also update this information.

VII GRADUATE STUDENTS

A. Recruitment and retention.

1. Recruitment programs: We advertise in Peterson's and our web site is easily found by a keyword search.

2. Retention rates:

Our retention rate is 88% for our doctoral program. We attempt to prevent unnecessary attrition by counseling and encouragement. The Graduate Program Director (Dan Bowen-Pope) attempts to maintain close enough interactions with all graduate students in the program to ensure that students get advice about problems that arise. In many cases, this advice consists largely of encouragement and sympathy. In some cases, it involves changes in advisory committees to deal with difficult interpersonal situations or changes in research goals to deal with intractable research goals. In other cases, the advice is to exit the program with a masters degree. We do not attempt to retain students for whom the program is clearly not appropriate. Students who decide to leave the program to pursue other goals are never made to feel guilty about this, and se support them as well as we can in making this transition.

We ensure that the students have stipend and tuition support throughout their tenure in the Ph.D. program. We use department funds for this when funding from the home laboratory and/or from a training grant is not available. This ensures that loss of funding is never cause for a student to leave the program.

B. Inclusion in governance.

1. Inclusion in governance: Much of the "governance" that most concerns a graduate student after his/her first year in the program is the governance of the home lab. Most laboratories have group dynamics that encourage suggestions from all members (technician, grad students, postdocs, etc). Graduate students in Pathology do not play any official role in governance of the department. The pathology department, as far as it concerns graduate education (c.f. clinical service work) has a very democratic feel/operating mode. Graduate students find it easy to make their opinions known, either directly or via the program Director (Dan Bowen-Pope)

2. Grievance process: Pathology graduate students can go through the formal (extradepartmental) grievance procedures, but this is rare in practice. In almost all instances, satisfactory resolution can be accomplished with the mediation of the Program Director (Dan Bowen-Pope) or Program Coordinator (Kathy Hobson) or other department staff (e.g. Barb Peterson, Dept Administrator).

C. Information about student service appointees

1. Appointment process: Applications for admission are first reviewed by the Program Director (bp), who selects the best 20-30 application to be reviewed by the Admissions Committee, consisting of 6 members of the Pathology graduate faculty with substantial experience training graduate students. The committee reviews the applications and meets to select the subset (often 5-10) who will be invited for a paid visit to the department to be interviewed and to become familiar with the program and the campus/city. Offers are made to the best (and most appropriate for our program) candidates. We do not formally guarantee funding of for entering students, but we are almost always able to provide initial funding, and often can arrange for training grant support that is usually good for 5 years.

2. Average duration of appointment: The average duration is 5.25 years

3. Mix of funding among the various appointments: We have 13 research assistants, 16 fellows and 5 self-pay.

4. What criteria do you use for promotions and salary increases: We follow the School of Medicine guidelines

5. In what ways are graduate student service appointees supervised: See VI A3 for basic information about supervision and mentoring in the home lab. In addition, the following "outside" supervision is maintained:

   Any time a Pathology graduate student's GPA for the quarter falls below a 3.0, the Program Director receives a "low scholarship report" and contacts the student to determine why this happened and what will be done to rectify the problem.

   Every year in the spring, the Pathology Graduate Program Coordinator (Kathy Hobson) mails out evaluation forms to the thesis supervisor of each graduate student. These are reviewed by the Program Director to look for evidence of problems.

   The program requires that the thesis committee of each student meet once per year. These reviews represent the most important form of supervision/surveillance because it is the thesis committee that ultimately rules on the students success/failure in the general and final exams.

   Twice per year (end of winter and end of summer quarters) all Pathology graduate students are required to participate in the "graduate student retreat" These retreats are organized like conferences. Every student presents once per year and the presentation is evaluated by the other students and by the pathology Program Director.

6. What training do graduate student service appointees receive to prepare them fo their specific role:

   As noted elsewhere in this Self Study, the Pathology PhD program is devoted to the training of practicing biomedical scientists: individuals who can use the scientific method to ask and answer testable questions about significant biomedical problems. The Pathology Ph.D. program actively encourages its graduate students to consider careers outside of academia. Many of our postdocs and graduate students find careers at biotech companies and many faculty are engaged in collaborative projects that involve biotech companies. All first year students take a half day visit to ZymoGenetics (as part of PATH 510) where staff scientists who had graduated from the Pathology Ph.D. program discuss their personal experiences of the difference between pursuing a career as a scientist at a university vs at a biotech company. In addition, representatives of biotech companies are routinely invited to make presentations at the grad student retreats.