University of Washington
INTERDEPARTMENTAL

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To: John T. Slattery, Associate Dean
Academic Programs
The Graduate School

From: Department of Pathology Review Committee
Henk Roelink, Department of Biological Structure, Chair
Nancy Maizels, Department of Immunology and Biochemistry
Steve Hauschka, Department of Biochemistry
Agnes Kane, Brown University
Steve Kunkel, University of Michigan

Re: Department of Pathology 10-year review

We are pleased to present this review of the Graduate Program of the Department of Pathology. We came to the conclusion and recommendations presented after study of the Departmental self-review, preliminary meetings with student and faculty, and meetings with Faculty and students during the site visit on March 11 and 12, 2002. The outside reviewers were particularly important in comparing the strengths and weaknesses of this program to Pathology/Disease Mechanism programs at other universities. The review committee reached consensus, summarized below.

Departmental Strengths

The Pathology Department is renowned for its scientific excellence and expertise. The focus groups on vascular biology, aging and cancer are home to some of the best researchers in the world. The Pathology faculty interacts well with colleagues in other departments. Some of the faculty are pioneers in experimental pathology, and the interactive character of these people is a benefit to the whole University. The overall quality of the faculty is reflected by high levels of outside funding.

The Department of Pathology at the University of Washington was one of the pioneers in defining the discipline of modern experimental pathology under the leadership of Dr. Earl Benditt. This department has continued to evolve and has developed a national and international reputation for research on the pathogenesis of vascular diseases, neurodegenerative diseases, and cancer. It has an outstanding faculty with extremely strong external research support and a rich, intellectual environment that bridges basic science and clinical medicine. Under the leadership of Dr. Nelson Fausto, young, research-oriented faculty have been recruited.

The untimely deaths of the Dean of the Medical School and three faculty members have had a sobering influence on this department. With the recent recruitment of new faculty, it appears that the department is recovering from these tragic events. It is anticipated that this external review will help to accelerate the recovery process and reinvigorate this graduate program.

Within the University, the Pathology Department plays an important role as a major bridge between clinical and basic science, allowing students easy access to human tissue. Unlike many other Departments, there is unique access to tissues and cells for experiments, which is a major asset in graduate training.

The Department has excellent laboratory space, both in the recently-built K wing and in the newly renovated space in HSC. However, the committee noted that no space was dedicated to a gathering room/lunchroom in the new design. The absence of such space was also noted by students to be a deficiency in what is otherwise a lovely renovation. The committee hopes that future renovations in HSC will take note of this need for a common gathering area. Space with this function is critical in fostering scientific interactions, and it also allows ready compliance with health and safety regulations that prohibit eating or drinking in many laboratory areas.

The strength of the faculty is also reflected in a core group which is dedicated and enthusiastic about graduate education. Dr. Nelson Fausto, the chair, and an internationally recognized expert in molecular basis of disease, is supportive of junior faculty, approachable, and a major asset to the Department. The willingness of Dr. Fausto to infuse the Graduate Program with funds totaling over $150,000 will be a major factor in addressing some of the concerns the committee has identified.

Experimental Pathology as a Discipline and the Need for Graduate Training in This Field

Traditionally, pathologists have been involved in establishing diagnoses and determining prognostic criteria for disease using morphologic and biochemical techniques. Modern experimental pathologists integrate classical morphologic techniques with new approaches using cellular and molecular biology to study the etiology and pathogenesis of disease. Under the editorship of Dr. Nelson Fausto, The American Journal of Pathology has evolved into the leading journal in this field with the appropriate subtitle, Cellular and Molecular Biology of Disease. This subtitle aptly describes this graduate program.

The recent development of powerful new tools for quantitative imaging and molecular analysis of human tissue has opened up an exciting new era of research in experimental pathology. Quantitative imaging techniques have been developed that allow multiparameter imaging of single cells in tissue sections (confocal scanning laser microscopy) or in monolayers (laser scanning cytometry). With laser capture microdissection, it is possible to identify precisely and to collect individual cells for subsequent molecular analyses. Laser capture microdissection is applicable to archival, paraffin-embedded, or frozen tissue specimens. New microarray technologies allow analysis of multiple genes simultaneously in these microdissected cell populations. Pathologists play a

central role in the collection, storage, and categorization of human and experimental tissue samples; and even more importantly, they have the diagnostic skills needed to use these specimens appropriately for quantitative and molecular analyses. At the same time, new transgenic models of human disease using conditional, tissue-specific gene targeting are increasingly important. Pathologists are essential for the quantitation and interpretation of subtle anatomic changes that occur in these transgenic animals and in correlating these changes with human disease. A new generation of experimental pathologists must be trained both in morphologic and biochemical diagnosis of human disease as well as in these powerful new technologies.

The Graduate Program in Experimental Pathology

The central strength of this program is its core of excellent faculty, well suited to mentor students towards a Ph.D. in experimental Pathology. The student body has grown considerably over the last ten years and now clearly has sufficient critical mass. The vast majority of the students work in labs located in the department, which facilitates good student interactions. Graduate training is further enhanced by a series of faculty-free seminars, and a highly successful series of seminars known as the Breakfast Club, and the Departmental Retreats

It appears that the Program serves an interesting and real need for students who want to obtain a second degree, or students who realize at later career stages that they want to obtain a Ph.D. This has resulted in a diverse and eclectic group of students in the Pathology graduate program. The Program allows for considerable flexibility, taking advantage of the large range of research interests and expertise within the Department.

The bridge function of the department between clinical and basic sciences provides a unique environment to study disease mechanisms due to the availability of human diseased tissue. The clinical relationship of the Program is supported by the requirement that students enroll in the same Pathology course as the medical students. However, even though a special small group is offered for graduate students, the medical school course might not be well-adapted to developing the skills in reasoning and critical thinking that we hope to nurture in our graduate students.

The retention of students is good, probably in part because the students are somewhat more mature than the average graduate student and therefore more certain about their career goals. The time to degree is reasonable, and not significantly different from other programs. Finally, the current Director of the Program, Dr. Bowen-Pope, has excellent interactions with the students. Importantly, the students could not have a better advocate in the Department.

Certain issues did emerge during this review, and these are noted below. It should be noted that some of these issues will be addressed by availability of funds to cover stipend and tuition for the first year students, as pledged by Dr. Fausto:

- A significant general observation is that there is a considerable disparity between the quality of students in the program and the quality of the

mentors. A highly qualified and well-funded faculty should be able to attract students who are better qualified on paper; and who have stronger career outcomes.

- Although the committee is aware that a significant fraction of the faculty has clinical duties, and that the teaching in the Medical, Dental and Pharmacology Schools is one the teaching requirements, it perceives a lack of recognition of the importance of opportunities in teaching for Graduate students. A higher Departmental incentive to Graduate teaching is necessary. Currently, there are few courses specifically for graduate students. This concern was noted by reviewers, and independently raised by the graduate students.
- The total student body in the graduate program does now achieve critical mass, particularly because so many students are in Departmental laboratories. However, it remains a concern that each incoming class is small, making it difficult to justify mounting new courses directed exclusively to pathology students. Attracting students from other Programs/Departments into the Pathology classes might help addressing this problem.
- Recruiting and outreach is not sufficiently aggressive to attract competitive students. The Department currently employs a rolling recruitment strategy, in which student folders are reviewed whenever they are received and there is a funded position available. Essentially all other graduate programs in the country recruit in early winter, require students to accept or decline admission by April 15, and have students matriculate in the fall. Using a different schedule greatly diminishes the chance of attracting the best students. The late schedule for recruiting put the Program at a serious disadvantage with respect to other Departmental and Interdepartmental Programs.
- The distribution of students among departmental laboratories is unbalanced. Some faculty members who are nominally participants in the program have no graduate students and have not had graduate students. The presence of large number of inactive affiliates does not enhance the Program. Evaluation of faculty as potential graduate trainers does not seem to include criteria relevant to the training environment that would be provided by a laboratory if a student were to choose to work there. Distinguishing the better training laboratories has been left to the student grapevine, and this strategy has been detrimental to progress of some students.
- The students experience insufficient ownership of the program. This could be improved, for example, by adding student-initiated seminars, and by encouraging participation of students in the Graduate Education Committee.
- Monitoring of student progress is a major deficiency. Committee meetings are irregular, and reports are minimal. There should be annual committee meetings followed by reports written by the advisor, discussed with the student, and placed in the student's file. General exams re typically taken

very late. They should be taken earlier, and a reasonable and uniform deadline for this examination should be publicized and applied to all students. Student progress should be an annual agenda item for faculty meetings, and there should also be faculty-wide discussion of any problems on a case-to-case basis. The committee looked at a random group of student files and was unable to find routine information in some. The student files should be more comprehensive and up to date.

- Tying graduate positions to specific training grants is detrimental to recruiting. Providing 5 years of TG support limits number of students in program, especially when faculty are sufficiently well-funded to support students from their grants. This may also contribute to slow movement of students through the program. The NIH is eager for training grants to be used while students are truly "training". Limiting training grant support to students in years 4 (or even 3) and below would allow the department to expand the number of students in the program with no additional cost to the university.

Curriculum

Additional courses and seminars

Several new courses were developed since the previous review, including an innovative lecture/demonstration/discussion course in Environmental Pathology (Path 555). The pathology faculty are heavily involved in teaching professional and allied health students, and this has limited the graduate course offerings in the past. However, additional faculty have been recently recruited and they should be able to contribute to graduate teaching. The model developed for Path 555 that incorporates a problem-solving approach would probably appeal to graduate students more than formal lectures. Similar courses could be developed in Cardiovascular Disease, Carcinogenesis, and Aging and Neurodegenerative Diseases. These could be offered on a two-year, rotating basis so that both first- and second-year students could participate. Particularly as we enter an era in which connections between basic and clinical sciences are increasingly clear, these courses could easily be designed to appeal to graduate students in other basic science departments. This would be an efficient use of expertise of UW faculty and produce critical mass in the classroom.

Teaching opportunities for graduate students

Teaching is a very important component of graduate education, even for students who do not pursue careers in academia. One opportunity for pathology graduate students at the University of Washington is teaching allied health students. This could be done under faculty supervision for one quarter. These students could be compensated financially for their teaching, either directly or by providing a general stipend increase via the pool available for graduate stipends, thus freeing up additional resources for graduate student support and enrichment activities.

Recruitment and Admissions

The absence of a critical mass of students was a major point raised during the previous review. This issue has been addressed well, and the core of around 30 students now does represent a critical mass. In addition, the number of students located in the FHCRC has decreased considerably, helping to centralize students within the department. However, the expansion of the number of students has been achieved by recruiting from a pool of students generally ignored by other Programs. The recruitment appears to be ad hoc, and the number of students pre-determined by open slots in the training grants. Tying graduate positions to specific training grants is detrimental to recruiting. Providing 5 years of TG support limits number of students in program, especially when faculty are sufficiently well-funded to support students from their grants.

Although the committee recognizes that the success of a graduate student is only partially determined by his GRE and GPA scores, the long-term survival of the training grants is supported by recruiting students with strong records on paper. Program support from the Department should go a long way addressing the most pressing issues here. The committee believes this support is critical. We suggest the following:

- Students should be recruited from a national pool of applicants. Timing should be in parallel with other programs, and rolling recruitment should be abolished. Life/work experience criteria can be used to identify highly motivated students.
- Students should be supported for 3 or 4 ten-week rotations, which coincide with academic quarters, before they commit to a lab. The rotations should be on a regular schedule, and not prolonged informally to allow students to "complete" projects. This greatly enhances student progress in the long term.
- Support on TGs should be limited to 3 years. This would allow more students to enjoy the support of the training grants.

Program Administration

Dr. Bowen-Pope is a great Program Director, but we feel he is overextended and under empowered. We recommend that a separate graduate education committee be established to monitor student progress and educational content, and to advise and support the Graduate Program Coordinator. There should be an associate director to function in case of Coordinator's absence. An administrator identified with graduate program should be appointed and supported at appropriate level. There appears to have been little change since the last review in issues of student quality and tracking, which needs improvement. The student files are not up to date, and they do not appear to contain critical pieces of information about the students, like feedback from the student committee meetings. Curriculum changes have been largely cosmetic, but not yet substantive.

Although the program has rules in place regarding examinations and progress reports, there is a perception within the student body that these rules are not applied evenly. The committee recommends that the rules for

examination be clearly formulated and clearly publicized, known and agreed upon by all students and committee members, applied uniformly and subject to change only in very unusual circumstances and upon approval of the graduate education committee

The PhD in Experimental Pathology

The definition of an intellectual center by the faculty — and a definition of a PhD in Experimental Pathology — becomes increasingly difficult within basic sciences, where the increasing reliance upon modern molecular and cell biological techniques blurs distinctions between disciplines. This is increasingly true for the Pathology Department, since most research in other basic science departments in one way or another investigates disease mechanisms, as highlighted by the large number of affiliate and associated faculty in the Pathology Department. A PhD in experimental Pathology is very valuable, but there is much research going on in laboratories outside the Department of Pathology that could greatly contribute to the education of such PhDs.

We think that the education of PhDs in disease mechanisms should be a SOM-wide endeavor, modeled in part on the curriculum developed in the Department of Pathology. Many of the problems identified during the review could be alleviated by recruiting students under a larger umbrella, which would also recruit students into other SOM Departments, like Immunology, Biochemistry and Biological Structure. This would eliminate many of the perceived weaknesses of the Pathology Program. The committee sees the following advantages to this strategy:

- Admitting students into an umbrella program will allow recruitment of higher quality students to the UW. At the present time, resources are not available to attract these students, and they therefore join umbrella programs at other excellent universities.
- Departmental identities and research focus can be maintained or even strengthened through specific teaching tracts and certifications.
- Redundancy in recruitment effort would be eliminated.
- Redundancy in staffing and administration of Graduate Programs would be reduced, and better-qualified, specialized staff could be employed.

We recommend that the PhD. Program in Pathology be maintained, but that in the meantime the possibilities of an SOM-wide recruitment of life sciences students is explored. We urge that the changes in graduate recruiting be implemented as soon as possible, as this will be to the benefit of students and faculty in the Department of Pathology, and the School of Medicine and University as a whole. In the longer term, we would hope to see other departments join in an umbrella program in the Life Sciences, either within the existing MCB Program or as part of specialized entity focused on using basic science to address problems specific to human biology and human health and disease. This future effort could benefit greatly from intellectual and technical expertise now resident in the Pathology Department.

Summary

Despite our recommendations for change, we think that the Pathology Department is an excellent environment for Graduate Student training. Many excellent, well-funded and highly motivated scientists make up this Department, and three Training Grants are maintained by Pathology Faculty. The unique position of this Department as a bridge between clinical and basic sciences provides a unique and valuable training environment, which benefits the entire School of Medicine. The program continues to attract outstanding MSTP students. The Program coordinator is a great student advocate and a great asset to the Program.

The major challenge for the Department of Pathology at this time is to re-examine their vision of graduate training in experimental pathology, especially given the new technological advances in this field. Integration of new data on the prevention, etiology, pathogenesis, and treatment of human disease with traditional morphologic, cellular, and epidemiologic approaches requires interdisciplinary collaboration. Increasingly, the frontiers of knowledge in human disease will be advanced by interdisciplinary research teams, including broadly trained pathologists. Pathologists who are trained in these new techniques and who have a basic knowledge of biostatistics and epidemiology; molecular genetics and toxicology; cell proliferation, apoptosis, and differentiation; and molecular carcinogenesis will be in a position to initiate novel mechanistic studies and to exploit transgenic models of human disease. With the promised infusion of financial resources and suggested administrative changes, the Department of Pathology at the University of Washington is in a strong position to become a national leader in the training of Graduate students in this emerging field.