

Report on the School of Pharmacy 10-Year Program Review April, 2001

External Reviewers: William E. Evans (St. Jude Children's Research Hospital), Karen Rascati (University of Texas), and Dhiren Thakker (University of North Carolina)

Internal Reviewers: Patrick S. Stayton (Bioengineering), Christophe Verlinde (Biological Structure), Lucio Costa (Environmental Health)

Executive Summary

The 10-year review committee found the School of Pharmacy to be a thriving center for excellence in research and education that is ranked as a "Top-Five" program nationally. The School has world-class research strengths in drug disposition and biotransformations that are founded in a talented and distinguished faculty and excellent graduate students. The Pharmaceutical Outcomes Research and Policy Program (PORPP) is off to a strong start with excellent faculty and student achievement. There is strong cross-departmental collaboration and interdisciplinary breadth, and this breadth is notably tied together with a sharp strategic focus. The strategic plan for the School in the post-genome era is targeted toward evolving these strengths by incorporating pharmacogenetics and molecular mechanisms (e.g. molecular biology of membrane transporters). It is a time of rapid change in the Pharmacy field, and the Medicinal Chemistry and Pharmaceutics departments are well-positioned to use their strengths as a springboard to maintain and enhance the School's strong national stature. In this context, the reduction of activity of key senior faculty (due to retirement and move to administration) is both an opportunity and a risk. It is a critical opportunity to bring in new faculty expertise that ties the strengths in drug disposition and biotransformations to the new initiatives, but the leap of the field nationally puts the School at risk if they cannot compete strongly for new faculty in the face of major investments in pharmacogenomics and molecular mechanisms at peer institutions. It is thus imperative that the School be able to put together strong recruiting packages at the mid-to-senior faculty level for replacement hires in Medicinal Chemistry, and at the mid-to-junior faculty level in Pharmaceutics. While the current faculty and research programs are considered "top five", it is critical that this be viewed as a foundation for building even stronger programs in the future, which is critical if they are to remain "top five" and to make campus-wide contributions that fully capitalize on the potential of existing faculty and research programs. Taken together with opportunities for the School to lead larger UW initiatives in proteomics based on the mass spectrometry resource in Medicinal Chemistry, the major pieces of research excellence and new initiatives seem to be in place for continued evolution to maintain a vigorous and cutting-edge School of Pharmacy in the next century.

I. Review Process

The review committee was formed in November of 2000, with the charge to assess the quality of the graduate programs in the School of Pharmacy, and to provide constructive feedback on major education and research activities. The review scope included the departments of Medicinal Chemistry, Pharmaceutics, and there was a special focus on the PORP graduate program in the Pharmacy Department.

A detailed self-evaluation by the three departments in the School of Pharmacy was provided to the review committee, along with School's strategic plan for 2000-2005. The School was also responsive and helpful in providing supplementary information on recent time-to-graduation statistics, the pharmacogenetics strategic initiative, recent trends at peer departments, and the PORP program.

The internal review committee met with the dean of the SOP and the chairs of each department individually in March to review the department's self-evaluation, to identify opportunities and barriers, and to get additional feedback on the departments major research and education initiatives. The internal committee was joined by an exceptional team of external experts for the site review, who provided invaluable and extensive input over the two days of the review. The review team was also greatly assisted by Danielle LaVaque-Manty, who provided expert administrative assistance at all times.

II. Current Status of the School of Pharmacy

1. Overview

The School of Pharmacy (including all three departments) is widely recognized as a national leader and "Top Five" program. The School is built on a foundation of outstanding and innovative faculty, with several international leaders in their research areas and prominent senior faculty that play an active role in the field's leadership. Research programs are contemporary and the focus in biotransformations/drug-drug interactions and pharmacokinetics are particularly noteworthy as world-class areas of excellence. The PORPP faculty and students share a catching enthusiasm for their new program, which has quickly built a strong research and curricular foundation. Across the School there are excellent multi-disciplinary teams that bring both breadth and strong focus, reflecting an impressive faculty commitment to the School.

The dean and department chairs provide excellent and nurturing leadership. Their ability to work together on cross-departmental issues and initiatives is a principal strength of the School. There is a shared enthusiasm by the graduate students for the research opportunities and training quality provided by the School. The students are optimistic, with good reason, about their career opportunities and feel confident they have a strong preparation that will allow them to succeed.

There is a cohesive and cross-departmental vision to build off of these strengths and incorporate two of the primary new developments in the field: a move toward a more molecular/cellular understanding of pharmaceuticals and the development of pharmacogenomics (encompassing proteomics also). The review committee feels this is a compelling vision, and that the School is well-positioned to parlay its leadership areas in drug disposition and biotransformation research into cross-departmental initiatives which bring in and apply pharmacogenetics and molecular/cellular biology.

The School's leaders and faculty recognize this as a time of opportunity, but also as a particularly critical period because of the rapid developments in the field that is coupled in time to the retirement/transfer of key senior faculty. The review committee strongly concurs with this evaluation, and believes the School is well-positioned to continue its leadership role with

strategic faculty hires– but the successful transition will require strong university support. The committee's specific recommendations are found in a following section.

2. Department of Medicinal Chemistry

The Department of Medicinal Chemistry is a national leader, with the potential to rise even higher as its excellent younger faculty continue to develop. The department, led by the chair, has also moved with a convincing vision and action to begin to incorporate pharmacogenetics into their world-class area of excellence in drug-drug interactions. The department has brought in genotyping technology through the local company Rapigen, a great new connection and development. This type of evolution will further propel the department into the future, and the pharmacogenetics research initiative is correctly tied in an applied manner to the department's primary research strength. The dean noted that the initiative in pharmacogenetics is in line with a nation-wide move to incorporate genome/proteome advances into Pharmacy education and research – the review committee agrees that the SOP must succeed in this initiative to retain its leadership position in the field.

With its many strengths and future potential in hand, the department is facing a critical juncture as two key senior faculty move toward retirement. The review committee was impressed by the well thought-out plan of the chair, with the support of the faculty, to search for a faculty replacement in the core area of chemistry/biochemistry/analytical applied to biotransformations and drug-drug interactions. The new faculty member could perhaps also provide this core drug metabolism as a focus for some applied pharmacogenetics research that incorporates individual variability. It is essential that the department retain its core expertise by bringing in a strong person for this position as Trager and Nelson move toward retirement. Future staggered hires are likely to be targeted toward applied pharmacogenetics and proteomics.

The department has also identified an opportunity to apply their strong mass spec expertise to proteomics research, and is working outside the SOP to develop this opportunity with the School of Medicine. This is also an exciting opportunity that utilizes an exceptional departmental strength in people and instrumentation. It is closely related and very synergistic with the pharmacogenetics initiative. A later future faculty hire may be targeted to the mass spec-based proteomics area, with complementary application to the drug metabolism area (in concert with the applied pharmacogenetics). The review committee sees this as a good way for the department to make larger connections outside the SOP, which may also facilitate resource allocations and create a larger collaborative environment outside SOP that could greatly aid faculty recruiting.

The department has made a strategic addition of more molecular-oriented faculty in the past decade, and this group has brought fresh perspectives and research expertise into the department. The younger faculty have also brought new connections to programs such as Biomolecular Structure and Design. The department expects this group to bring together a biostructure initiative together in the future, with a likely focus on therapeutic design and development.

The graduate students were enthusiastic about their research opportunities and the quality of the faculty. They were confident in their training and in their career opportunities. There was some concern about the quantity of coursework, which was reported to take close to two years for completion. The senior faculty noted that this was a recognized problem that had been targeted for reduction, and given the expanding breadth of the department (which will only increase with the pharmacogenetics initiative) it may be an opportune time to redefine a minimal core which retains depth, while constructing tracts that allow for flexibility. New pharmacogenomics content is being incorporated into existing classes. This is a good strategy, but in the future Med. Chem. and Pharmaceutics may need a distinct course in this area for their graduate students – another rationale for a SOP hire of a specialist in this area that has been prioritized by both departments.

3. Department of Pharmaceutics

The Department of Pharmaceutics is a national leader, and its stature is growing with the recent achievements of senior faculty in the areas of inter-individual variability and transporter molecular biology. The department enjoys strong leadership from the chair and an excellent senior faculty who are very active and accomplished. The department has been challenged by the transfer of Professor Shen to the Pharmacy Chair, and the reduction of Professor Slattery's time with his central administration duties. There is a current search in progress for a mid-level replacement, and a new assistant professor has been recently hired in the transporter molecular biology area.

The department has two primary research initiatives: pharmacogenetics, with a focus on the inter-individual variability of drug disposition, and transporter-related molecular/cellular biology as applied to pharmaceutics. The senior faculty have moved with impressive success into the pharmacogenetics area and into the molecular biology of transporters. They are aligned closely and synergistically with Med. Chem. in the former area, and are attempting to create collaborations outside of SOP in membrane transporters. The review committee felt this was an excellent and contemporary research focus to connect biotransformation excellence to pharmacogenetics and molecular mechanisms of drug transport. They connect well to the translational research strength of the department in linking fundamental science to clinical phenotype. These are essential initiatives and endeavors for the department, as it is clear their peer departments have made major investments in the pharmacogenetics and molecular mechanisms of drug transport areas. For both their inter-linked education and research programs, success in recruiting a high-quality faculty is key.

The committee was asked to review progress toward reducing the time to graduation. Updated graduation data, provided to the committee outside the self-study, indicated that significant reductions had indeed been achieved, through greater faculty attention to student progression and through a new system of cumulative exams (replacing the prelim) that starts in parallel with coursework rather than in sequence. Students provided feedback that was positive about these changes and the group we talked to felt that time to graduation had been improved and was reasonable.

4. Department of Pharmacy

The PORP program was created in 1994 and currently consists of 8 faculty and approximately 13 graduate students. The program lost its founding director after only 2 years, and the committee was asked to assess PORPP at this relatively early stage in its development. The committee found PORPP to have many of the hallmarks of a thriving new educational enterprise. The faculty were working together collaboratively and enthusiastically under the strong leadership of the director; the faculty have been successful in establishing a strong grant foundation and the curve continues upward; the faculty and students are working collaboratively outside PORPP with researchers at the Fred Hutchinson CRC, Public and Environmental Health, and even with researchers in Pharmaceutics/Med. Chem.; the program is serving other students

from epidemiology and public health; and the young faculty are achieving at a prominent national level.

The PORPP students were enthusiastic and engaging. Their curriculum is nicely designed to define an interdisciplinary core in three areas, followed by specialization in one of the three that matches their primary thesis area. The students thought this design and the content were serving them well. Several of the students at the review had multiple publications and awards, and the first graduates were finishing in under five years. A strength of the program is the organized and nurtured progression of students to graduation. There was strong demand for graduating students in the private sector.

The review committee felt that there was a strong likelihood that the growing success of the young PORPP faculty, which is tied to their impressive connections to hot research areas that will continue to expand, would create a capacity and need for a larger student population. The current target size of ca. 13-15 students seemed somewhat small to the committee given the faculty size and activity. The review committee thus recommends that PORPP give careful attention to recruiting efforts and expansion plans. The addition of a new assistant director will help in the former area, but success requires a strong faculty involvement also.

A limitation for expansion is the load on the PORPP director, and more broadly the lack of senior faculty. The loss of the original program director left this senior faculty hole, and the committee recommends that priority be given to finding a mechanism for refilling this faculty line. The continued development of the younger faculty seems rapid enough, however, to support a careful expansion over the next few years.

In summary, the committee was very impressed by the rapid PORPP development and its upward direction. The director is doing an outstanding job in leading and promoting an enthusiastic faculty and student group. Special recognition is also due for the new Pharmacy Chair, who has clearly supported and promoted the development of PORPP very directly with his time, effort and wisdom.

III. Primary Risks

At the conclusion of the site review, the committee identified the following primary risks that face the School of Pharmacy:

- 1. Loss of senior Med. Chem (retirement) and Pharmaceutics faculty (administration).** The most critical challenge facing the Med. Chem. and Pharmaceutics departments is replacement of distinguished senior faculty members (two moving toward retirement, one moving to Pharmacy Chair, and one moved to important role in central UW administration). This challenge is made all the more critical by important evolutionary movements in the Pharmacy field that are driven by the post-genomic advances and continued rapid advances in molecular/cellular biology. The SOP is well-positioned scientifically and intellectually to make this move on the one hand, but is at risk if they cannot attract high quality new faculty replacements. Most, if not all, of the top Pharmacy programs nationally have made major investments in pharmacogenomics and

"molecular" pharmacy, and the SOP will thus be competing for faculty in the face of serious competition at peer institutions. In summary, the faculty openings represent an opportunity to strategically catalyze SOP evolution at a critical time of change in the field, but there is significant risk of slipping if a high-quality mix of senior and junior replacements cannot be attracted in a very competitive national environment.

2. Loss of senior leadership in PORPP (to dot.com). The PORP program is developing rapidly, but has an unfavorable balance of younger to older faculty. State funding constraints have made it difficult to replace the originating founder of PORPP, and the lack of more senior faculty contributions have been felt both in the teaching load and on the research side.

3. Inadequate resources for recruiting faculty replacements. Both of the risks noted above are connected to the critical need of finding and recruiting high-quality faculty. The current uncertainty in the type of faculty replacement lines in Med. Chem is a significant risk, i.e. will they be returned at senior or junior level, what is the scale of recruiting packages. Pharmaceutics has already found that an inadequate recruiting package was responsible for not being able to recruit a targeted replacement in their current search. There is strong national competition in the strategic areas prioritized by both departments, and they are at risk if they cannot compete on relatively equal financial footing.

IV. Recommendations

1. Return 2-Med. Chem. faculty positions at mid-to-senior level as quickly as possible, which will fill the senior research leadership need in the core area of drug-drug interaction chemistry, provide an opportunity to strategically strengthen the application of pharmacogenetics to the department's research and education programs, and could be used to help build up the necessary recruiting packages with staggered searches.
2. If the hiring at the mid-level faculty level remains difficult, a junior faculty could provide good long-term balance to the faculty distribution in that department and provide catalytic expertise in the pharmacogenetics area.
3. Fill the senior PORPP faculty line, and plan for careful expansion of the student population through more structured recruiting efforts.
4. Consider broader pharmacogenomics (and proteomics) initiative led by SOP that could connect to efforts in other programs in Bioengineering, Center for Nanotechnology, Vaccine Center, Microbiology etc. A UIF initiative could be one option for doing this, and would be complementary to efforts in School of Medicine to utilize the Med. Chem. mass spectrometry resource as a springboard for a proteomics center. Such an initiative could also create an attractive force for faculty recruiting by creating a broader and more vibrant collaborative environment.
5. The university should consider creative financing options for the exciting initiatives in pharmacogenomics and proteomics, such as prioritizing it in the endowment campaign at the university level. At the same time, it is fair to expect that the School take some risks with a stronger leadership role in creating a mechanism and structure for getting other units involved.
5. Enhance recruiting efforts by making informational trips to targeted biochemistry, chemistry, and biology departments on and off campus. Use graduate students in this effort by having them go back to their undergraduate institutions and presenting research highlights and opportunities in the pharmacy fields.
6. Continue to restructure and streamline coursework in Med. Chem. by identifying a core curriculum for year one, with track options that can be completed in under two years.
7. Continue to work at better integrating and focusing the biostructure program and students into the mainstream of Medicinal Chemistry Dept.



**St. Jude Children's
Research Hospital**

ALSAC • Danny Thomas, Founder

Pat Stayton, Ph.D.
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May 11, 2001

Dear Pat:

It was a pleasure to participate in the external review of the School of Pharmacy Graduate Program, conducted last month. The primary focus of my contributions to this review, were related to the Pharmaceutics graduate program and the components of Medicinal Chemistry that relate to drug metabolism and pharmacogenomics. As I had anticipated prior to my arrival, based upon the written documents provided and my prior knowledge of the teaching and research programs in the Departments of Pharmaceutics and Medicinal Chemistry, I found the faculty and graduate programs to be outstanding. Their focus on contemporary and important areas of investigation, especially pharmacogenomics, proteomics, drug metabolism and drug interactions, is laudable, and they are clearly leaders in these areas of investigation.

I was also most impressed by the nature and extent to which faculty in Pharmaceutics and Medicinal Chemistry are interacting in their teaching and research. Such cooperation and synergy is a reflection of the strong and visionary leadership provided by Sid Nelson as Dean, and the strong department chairs and senior faculty. It is clear that Dr. Rettie and his faculty are marshalling their expertise and technology in areas that are complementary to and synergistic with the pharmacogenetics research and teaching programs lead by faculty in the Department of Pharmaceutics. Likewise, it is impressive that Dr. Levy has built upon the solid programs in drug metabolism led by Dr. Thummel and others, to establish new initiatives related to drug transporters. Pharmacogenomics represents a common theme that links these newer programs with the faculty's longstanding interests in drug metabolism, drug interactions and anti-retroviral pharmacology, connecting these more established programs with emerging areas of investigation that are reshaping the pharmaceutical sciences, clinical therapeutics and the pharmacy profession. The University of Washington School of Pharmacy has some of the nation's leaders in the emerging science of pharmacogenomics, and they are poised to take a leadership role in shaping its impact on therapeutics and pharmaceutical

education. In this regard, if provided with the requisite resources, the School of Pharmacy could take a much larger and broader role in leading pharmacogenomic initiatives at U.W., integrating programs among multiple disciplines and schools across the campus. This will require, however, that the University invest additional resources in the School of Pharmacy and the talented faculty who can lead such initiatives to international prominence.

I also found the graduate students to be bright, energetic, and excited about the research they are engaged in and the education they are receiving at the UW School of Pharmacy. Moreover, they were clearly enthusiastic about their work and optimistic about their futures. It is obvious that they think highly of the U. W. faculty with whom they have worked, and the nature of their research and education.

In my view, the greatest risk to the School of Pharmacy's graduate programs in pharmaceuticals and medicinal chemistry, is the difficulty in recruiting talented faculty from outside the U. W. sphere. It appears that the reason this is currently a challenge, is related to the relatively modest recruiting packages and meager salaries of U. W. School of Pharmacy faculty. There are also some limitations imposed by the lack of additional laboratory space, but this seems a more tractable issue to address. However, if the University continues to rely on the "Mount Rainier factor" to attract and retain talented faculty, it is likely that their potential leadership contributions in the fields of pharmacogenomics and proteomics, will not be fully realized.

In summary, it was a great pleasure to gain this first-hand view of what is clearly a first-rate graduate program in the pharmaceutical sciences. I am in complete concurrence with the summary report that has been developed to reflect our committee's collective evaluation of this outstanding program, and I am pleased to write this letter to amplify my personal views on specific aspects of the School of Pharmacy.

It was also a great pleasure to work with you in this external review. Your organizational skills, insightful perspectives and strong leadership, made this a most effect and efficient process for all who participated.

Sincerely, Bill [via email]

William E. Evans, Pharm.D.
First Tennessee Bank Professor
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Chair, Department of Pharmaceutical Sciences,
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May 7, 2001

Dean Marsha Landolt
Dean and Vice Provost
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Dear Dean Landolt:

It was a pleasure to visit the School of Pharmacy at the University of Washington. My comments concern the Pharmaceutical Outcomes Research and Policy Program (PORPP), which is a graduate program in the Department of Pharmacy.

Overall, I was impressed with the accomplishments for such a young program. Each member of the faculty is productive, the graduate students are pleased with their education, and the research funding is thriving. In addition, faculty members and students have already won many research awards and recognitions.

The PORPP has already taken advantage of many collaborative opportunities available at UW. They collaborate not only within the School of Pharmacy (on pharmacogenomic issues) but also with other schools on campus, most notably the School of Medicine and the School of Public Health. They also collaborate with managed care organizations and the Washington Department of Health. They bring in renowned speakers for seminars, which not only enhances the student's education, but also provides the speakers with information about the relatively new graduate program.

The PORPP successfully competes with prestigious programs (Harvard, Oxford, York, USC) for graduate students. Some potential graduate students come from those who originally apply to the School of Public Health, but have a specific interest in pharmacy issues. More time and resources should be devoted to recruiting graduate students in order to perpetuate the high quality reputation of the program.

The faculty is relatively young, mostly assistant professors and a few associate professors. The founding program director left 2 years after the program was initiated; yet the new director has done an excellent job of growing the program. Still, recruitment of a faculty member at the senior level would strengthen the program.

The amount of time graduate students spend in didactic courses is higher than for students in the other two departments, but similar to health policy type programs. The graduation time so far seems reasonable, and the number of publications and awards from graduate student work indicates a high level of quality.

The PORPP is on-track, healthy and strong. The current director has been doing an excellent job growing the program. It is becoming nationally and internationally known as a high quality program. The only suggestions I have are 1) step up graduate student recruitment efforts and 2) hire a faculty member at the senior level.

In conclusion, I give my full support to a positive report from our Review Committee.

Sincerely,

Karen L. Rascati, Ph.D.
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