

## **Final Report**

### **2-4 Evaluation of the Pharmacology Department PhD Program**

The 2-4 evaluation was performed at the request of the Graduate School of all PhD programs with an emphasis on years 2-4 of students' PhD training. Both the graduate student and faculty participated in the assessment of years 2-4. During the assessment it became clear that training in year 1 was equally as important to evaluate for the Pharmacology training program. This report first describes the process to evaluate the program followed by the changes that the Pharmacology Department will make.

#### **The 2-4 Evaluation Process**

The GSA representative met with all graduate students and spoke to the DGS (Prof. Elias Lolis) about recommendations the students made for the 2-4 project, some of which went beyond years 2-4, and sent an email to the DGS with recommendations.

The Vice Chairman of the Department (Prof. William Sessa) and the DGS met with the graduate students to discuss the recommendations the graduate students made. A follow-up email was sent to the graduate students. The primary Pharmacology faculty met to discuss all recommendations and vote on changes to the training program.

#### **Current Program Structure**

The Pharmacology and Pathology Departments combined to form the Pharmacology and Molecular Medicine Track under the Biological and Biomedical Sciences (BBS) program. Entering students are advised by the DGS for each department in a coordinated manner during the first year. These students take classes and rotate in three different labs, usually among faculty from Track. The PI of each of the three labs must provide a grade and written evaluation of the student's lab performance to the registrar and student. At the end of the second semester, each student chooses a PhD adviser and the Graduate Degree Program (either the Experimental Pathology or Pharmacology). The students are free to choose a PhD adviser and/or degree program outside the track as long as it remains under the umbrella of the BBS.

Students in the Pharmacology Degree Program begin thesis research in their mentor's lab in the summer between years 1 and 2. In the fall and sometimes in spring of the second year they continue to take courses to fulfill the six course Pharmacology requirement, including Pharmacology I and II. Grades of at least High Passes (HP) are required in the Pharmacology I and II courses. Among these six courses, students must obtain grades of Honors (H) in two of their courses, a requirement of the Graduate School.

In November the students meet with the faculty member serving as the Qualifying Exam Coordinator to receive instructions about the process. By mid-January they must submit a topic, which must be in a field of study different from their thesis lab's area of research. The specific aims of the topic will be approved by Feb 1, and a completed 10-page proposal will be submitted

to the Coordinator by the last day in February. The exams are scheduled in mid-March. The students orally defend their proposal, and are questioned about the rationale of the study, the anticipated results, and alternatives if the anticipated results do not match their anticipated results among four Pharmacology faculty. The Qualifying Exam Coordinator is one of the four faculty attending all qualifying exams. Questions from topics in the Pharmacology I and II courses can also be part of this exam. In addition to courses and the Qualifying Exam, some students choose to be a teaching assistant (TA, required for a PhD) in the second year. Other students may TA one course in the second year and one in the third or TA two courses in their third year.

The students are expected to immerse themselves in the PhD project after meeting all course/grade, TA requirements and passing the Qualifying Exam. At the end of the third year, a Thesis Prospectus is submitted, approved by the DGS, and a thesis committee is assigned that meets with the student every 6 or 12 months, depending on the student's needs. Two new Pharmacology requirements have been implemented within the last three years before obtaining a PhD. Each student needs to be a first-author on two manuscripts in journals deemed to be of significant impact by the Pharmacology faculty. The second requirement is that a thesis pre-defense is presented to only the Pharmacology faculty approximately six months prior to the anticipated thesis defense date.

The pre-defense was instituted to avoid a problem that became associated with the actual thesis defense. It became difficult for a thesis committee to fail a student after the thesis defense examination when members of the student's family, some of whom travelled a great distance to celebrate a successful thesis defense, were in attendance in the thesis defense. It also avoided any strain that might develop between the member(s) of thesis committee and the student's mentor regarding the quality of the research and when the thesis study should be considered complete. Currently, a quorum of the faculty decides if there are any additional experiments that need to be pursued beyond that described by the student to finish the thesis study and makes the decision on whether the student can begin writing the thesis. The two first-author manuscript "requirement" serves a similar purpose, except that peer review is used as the instrument to decide whether the work of the student is worthy of publication. The Pharmacology faculty recognizes that some thesis-related work takes a longer time and may not yield anticipated results. Examples include making a gene knockout (KO) mouse that has no apparent phenotype, making it difficult to assign a function to the protein, or expressing and purifying a multi-protein complex that will not crystallize for X-ray structural analysis. As long as the student has made significant progress in parallel experiments, the faculty can exempt a student from two first-author requirement.

Although the faculty and senior students believe changes have been made to improve the quality of the learning/PhD process for graduate students, the 2-4 Project process identified other areas for improvement.

### **Recommendation by the Pharmacology Faculty**

1. Switching the semesters of the two required Pharmacology courses (PHAR 504a, Pharmacology I and PHAR 504b, Pharmacology II) will be switched. This would allow all first year students to take both Pharmacology courses in their first year.

2. Student will be given the option of taking the qualifying exam in late September of the fall semester of their second year. For students who take this option, the time to their thesis defense is likely to decrease.
3. In certain circumstances, the number of rotations may be limited to two if the student has had significant research experience prior to becoming a Yale graduate student. This will require approval by the DGS.
4. Only two rotation talks are required for rotations performed during the academic year.

**Miscellaneous Recommendations Regarding Areas of Concern** (based on feedback from students and faculty)

1. The DGS of Pharmacology and Experimental Pathology (the Pharmacology and Molecular Medicine Track) will meet individually with the first year students *prior* to the first day of classes to recommend courses based on scientific interests and transcripts. At this meeting, expectations of the students will be clearly communicated.
2. The DGS of Pharmacology will meet with all the pharmacology graduate students in a town-hall format at least once a year to gather information on what can be done to improve the PhD experience in the Pharmacology Department.
3. The DGS of Pharmacology will send out an email at the end of each academic year to meet with any student who has not received an adequate or timely feedback on his/her progress (from the DGS, PI, thesis committee, course director, or anyone else) or discuss any issue of importance to the student (in confidence, if desired). In this email, the DGS will emphasize and remind students that they can request an appointment with the DGS whenever the need arises.
4. A committee composed of faculty and students has been assembled to update the Pharmacology web site and produce a brochure to more adequately reflect the new requirements for the students as they progress to their PhD.
5. Members of the Pharmacology faculty are interested in the success of all the students and are willing to spend to time with students whenever there is a need. However, it is the responsibility of students to inform the DGS or a specific faculty member of any academic or other problem that they would like resolved.

*Opportunities for Students*

1. Workshops on writing and presentations on science-related topics will be forwarded to the graduate students.
2. As noted above, all first year students will present their work in two of three lab rotations. All students advanced to candidacy are required to present a yearly, 30-minute public Research in Progress seminar. This student seminar series starts in September and ends in

May. The most senior graduate students are scheduled first and the students just admitted to candidacy are scheduled last. Posters by students are also encouraged for the departmental retreat. In addition, through the generosity of Dr. William Prusoff travel awards are available for any Pharmacology student that presents a poster in a biomedical conference.

3. A new departmental committee on seminars will be formed composed of faculty and students. The students will have a substantial role in inviting seminar speakers.