Section A: General Self-evaluation

1. Brief description of the field and its history at the University of Washington

The Department of Laboratory Medicine is responsible for all clinical testing on patient blood and other samples for the University of Washington Medical Center, Harborview Medical Center, University of Washington Physician Network clinics, some Seattle Cancer Care Alliance testing and samples sent to us from other hospitals and clinics. Clinical testing includes Hematology (red blood cell counts, white blood cell counts, platelet counts, blood clotting assays and other testing, Clinical Chemistry (electrolyte assays, protein and enzyme assays, lipid assays and other testing), Clinical Microbiology (detecting identifying pathogenic bacteria, viruses, fungi etc and evaluating sensitivity or these organisms to antibiotics), Molecular Diagnostics (using genomic techniques to identify genetic, neoplastic and infectious diseases) and other disciplines. Laboratory Medicine performs more than 5,000,000 tests on blood, urine, cerebrospinal fluid, joint fluid and other types of clinical samples each year. The Department of Laboratory Medicine is lead by Dr. James Fine, Chair. Each of the clinical divisions have an M.D. or Ph.D. level faculty director who works with M.S. or B.S. level supervisors and lead medical technologists who manage the daily operation of the clinical laboratory. Many of the supervisors and lead technologists have come from our Master's program in Medical Technology. Testing on clinical samples is performed primarily by B.S. level medical technologists with an smaller number of Associate Degree level technicians. High volume and stat testing is done at each hospital, non-stat lower volume testing is done in specialized labs located in the hospitals and other laboratory sites that are part of our Department in Seattle.

The Department of Laboratory Medicine in the School of Medicine at the University of Washington was established on July 1, 1969 with the recruitment of Dr. Paul Strandjord from the University of Minnesota to be chairman. The department was charged with the task of integrating the disparate clinical laboratories at the University Hospital, (UH, now UW Medical Center) and Harborview Medical Center (HMC) that had been scattered amongst a number of departments, optimizing quality clinical service while eliminating duplication. The department was expected to incorporate the existing undergraduate medical technology program, teach medical students, develop training for residents in Clinical Pathology and support postdoctoral fellowships in the clinical laboratory subspecicalities. In addition, the department faculty were expected to develop strong research programs.

Today, the Department of Laboratory Medicine is comprised of eight divisions: Chemistry, Coagulation, Genetics, Hematology, Immunology, Informatics, Microbiology, and Virology. The training programs include the undergraduate Medical Technology Program, the master level program in Medical Technology, medical school education, residency training in Clinical Pathology and clinical postdoctoral fellowships in Clinical Chemistry, Hematology and Microbiology, all carrying national certification. The clinical laboratories of the department are as extensive and diverse as at any university in the nation, supporting the patient care at UWMC, HMC, the Seattle Cancer Care Alliance, Hall Health and the University of

Washington Physicians Network (UWPN) of primary care clinics. The clinical labs perform thousands of different assays using the vast array of technology available, from standard spectrophotometry and ELISA to 10 color flow cytometry and DNA sequencing. Clinical testing volume is very respectable, with 5.0 million results for patients at our two main teaching hospitals, UWMC and HMC in 2004. The department also provides clinical testing services for the region, maintaining a very active outreach program. The faculty in the department have achieved success both in basic and applied research. In addition, the department supports other researchers through its research testing service. With the help of dedicated faculty and staff, the department has developed into one of the strongest Departments of Laboratory Medicine in the country, and its national reputation is well established. The foundation is sound, and traditions of excellence are firmly in place. We look forward to the opportunity to continue to serve our school, University and region.

Mission

The primary purpose of the Department of Laboratory Medicine is to serve as a regional resource for clinical laboratory services required for patient care and for educational programs in Laboratory Medicine.

Patient Care: The patient care services provided will exemplify the highest achievable quality and will serve as a model of excellence for other clinical laboratories across the nation. The Department will be managed to minimize the cost of delivering these services without compromising quality, and they will be made available to patients throughout the region as well as patients in the two University of Washington teaching medical centers.

Education: The Department will be organized to facilitate effective development of educational programs for undergraduate, graduate, and post-doctoral students. These programs will include opportunities for undergraduate students to work for Bachelor of Science degrees in Medical Technology and for graduate students to obtain Master of Science degrees. Courses in Laboratory Medicine will be conducted for medical students, and training will also be provided for residents and fellows seeking specialty or subspecialty certification in Clinical Pathology, Clinical Chemistry, or Clinical Microbiology. The faculty and staff of the Department will also represent a resource for residents training in clinical departments who desire exposure to related areas in Laboratory Medicine and for clinical laboratory technologists, physicians and scientists desiring courses in continuing medical education.

Research: The Department will foster an environment conducive to the performance of high quality research and development, and consultation and referral services will also be provided for investigators throughout the University.

Department Credo

- The personal dignity of each patient served will be courteously maintained.

- Each student will be offered maximum opportunity to learn and to acquire professional competence.
- All members of the faculty and staff will be encouraged to achieve professional fulfillment.

The Department is committed to vigorous application of the affirmative action policies of the University of Washington.

Administrative structure of the department:

The Department of Laboratory Medicine is an academic department in the School of Medicine with missions in education and research. Faculty in the department are located in the University of Washington Medical Center, Harborview Medical Center, Children's Hospital and Medical Center, Providence Medical Center and the Seattle Veteran's Hospital and Medical center. In addition, the department is responsible for all clinical laboratory service at the University of Washington Medical Center and Harborview Medical Center.

The administrative structure used in the department is that of a matrix organization. The department is organized into functional (clinical or service laboratories) and departmental programs, which include the undergraduate program (junior and senior years) and the Master of Science program as indicated on the matrix chart **(see Appendix D)**. The directors of the undergraduate and graduate programs and their coordinators are listed with the departmental programs (**Section F**).

The Department of Laboratory Medicine provides educational training, research and patient services within the University of Washington Medicine (UW Medicine) and in collaboration with other research and medical institutions, including the Fred Hutchinson Cancer Research Center. The Department of Laboratory Medicine employs nearly 800 people on its budgets, who work at the University of Washington sites, at HMC or at a number of off campus, leased locations. The activities of the department are coordinated under the leadership of the department Chairman, James S. Fine, M.D. and the Administrator, Paul Henderson, M.S.

In coordinating the wide range of department educational, professional and research activities, many committees further plan, direct and monitor the activities of the department's divisions and various degree programs.

All clinical laboratories are directed by faculty members of the department and managed by supervisors and lead technologists, certified Medical Technologists, and are staffed by technologists trained in the field. In these labs, students work along side professionals to gain valuable experience in the technical and interpretive intricacies of laboratory testing. The recent addition of a management track option in

the Master of Science program will allow students to further specialization in laboratory management and administration.

2. Measures of success:

We believe that one of the major advantages of the University of Washington program is the very high quality faculty, talented individuals whose expertise is applied to bridging the basic sciences with patient care through clinical laboratory techniques. These faculty are among the most outstanding in the nation in the discipline. The range of students are taught in an environment of the real world in laboratory medicine. In addition, they have the opportunity to interact with other students and trainees matriculating at different levels, learning from each other. State of the art instruments are available for student use in both clinical and research laboratories. In addition, the Regional Health Sciences Library is an outstanding resource available to the students. The University of Washington program is offered at a nationally recognized medical school and health sciences center.

The faculty in the department have achieved success both in basic and applied research. In addition, the department supports other researchers through its research testing service. There are a number of internationally recognized investigators in the department conducting research in a variety of disciplines of Laboratory Medicine. The total federal funding for such research exceeded 30 million dollars in direct grants for 2004, although more than 2/3 of this is administered at FHCRC and CHRMC and not by the University of Washington because many of our faculty have their research laboratories at these institutions. The faculty published over 800 articles, abstracts, chapters and books in 2003-2004. They also made numerous presentations at local, national and international meetings. The department's total grant and contract funding has increased markedly during the ten year period since the last review of this program.

The department provides a research testing service that performs clinical laboratory testing for clinical trials for investigators at the University of Washington and nationally. This provides state-of-the-art testing for clinical trials and is an important source of research projects for graduate students. The genesis of many new research and development projects that graduate students can participate in are clinical trials looking for new ways to evaluate patients using laboratory methods.

There is not a published ranking of Master of Science programs in laboratory medicine in the United States therefore, an evaluation of one's own program must be assessed in other ways. Such indicators as the background and quality of faculty, the quality and motivation of students at all levels and the performance of graduates on the job all combine to help determine the quality of the program. It is of interest that the Air Force has selected this program for the training of its officers and that one of the highest ranking officers in the laboratory in the Air Force is a graduate of this program. Using these criteria we consider this department and program to be among the top three in the nation.

The clinical laboratories of the department are accredited every two years by the College of American Pathologists (CAP). Laboratory Medicine has never experienced a limitation, suspension, probation or voluntary relinquishing of a license, certification or accreditation.

The residency program has been reaccredited this past year by the Residency Review Committee of the American Association of Medical Colleges. The undergraduate Medical Technology Program was recently reaccredited by the National Accrediting Agency for Clinical Laboratory Science. Postdoctoral programs in Clinical Chemistry, Hematology and Microbiology have also been accredited by their respective subspecialty boards.

3. What are your unit's weaknesses?

Our department functions very well and has the usual limits of space and faculty availability. There has been no increase in teaching space for the department in at least two decades. An active effort is underway in the department of obtain new space in facilities outside the two main hospitals (see 4. Dept. Changes below).

There has been no increase in faculty FTE support from state sources since early in the formation of the department, with all expansion supported by medical center, department or research sources. Since much of the support for the training programs comes from clinical sources, this will remain a concern for us as funding in healthcare continues to be a major challenge. This will remain the major challenge nationally for the foreseeable future as our population continues to age and demand more from our limited resources. The clinical laboratory is at the forefront of technological innovation and application and therefore will continue to need resources. Innovations have resulted in faster, more rapid analysis with less reagent and smaller specimens, but at the same time the menu of testing grows and the utilization increases, resulting in higher total outlay for lab testing. The impact of future legislation to contain health care costs will remain unknown.

Due to limited availability of funds, at this point, there is no school funding for graduate students. We cannot be as competitive in attracting the best candidates for the program because of this lack of funding. The graduate program committee is in the process of seeking scholarships and other funding opportunities.

Many of our students work in the department as Clinical Technologists. They use the tuition exemption program of the university to help pay their tuition. The combination of the limit of 6 exempt credits/quarter and working full time, extends their time in the program. The lack of funding tends to lengthen the time to degree since many of the students need to work while they are in the program. Currently full time students require on average 5 quarters to complete their degrees versus 10 quarters for part time students.

4. Dept. changes

A major need in the department is for additional space to support research, teaching and clinical work. The department has been working to meet this challenge by moving some aspects of the department out of two hospitals where space is constrained, to off-site locations where new space is available. We have recently moved billing functions off site and are planning to move virology molecular diagnostics and hematopathology to new locations. We have plans in the future to move even more non-stat, lower volume testing to a near-by location. This will free up space for teaching in the hospitals. Students will still have access to research and training opportunities in these new locations as well as additional space in the existing facilities.

Recently the department has expanded the program curriculum for the masters program to include a specialization in Laboratory Management, broadening the appeal of the program to prospective students with a business or administrative interest. In addition, Molecular Diagnostics has been added as a tract to train students in the new technologies that are transforming many areas of the clinical lab, from genetics to microbiology and virology. Adding these new tracts has enhanced our status as one of the best programs in the nation.

Section B: Teaching

1. Teaching assignments

A faculty member is assigned responsibility for each course offered by the Department of Laboratory Medicine. Most courses include lectures by several faculty or guest lecturers, i.e., Grand Rounds and Research Conference consist of presentations by faculty, fellows, residents and graduate students on current topics in Laboratory Medicine. See **Appendix C** for a current list of courses, credits, quarters offered and faculty, offered by the Department of Laboratory Medicine.

All faculty in the Department of Laboratory Medicine are involved in the education of students in the Department, regardless of the level of education. The Department has approximately forty full time faculty members, each of whom specializes in a specific scientific discipline. Lectures and courses are assigned by area of expertise and need.

Faculty sponsor students in research projects at both the undergraduate and graduate levels. They serve as mentors to the students by teaching them techniques and skills needed to perform research, such as literature review, instrument operation and evaluation of results. They supervise their projects and help them present their results in the appropriate forum.

Undergraduates have the opportunity to select a research rotation in their senior year. Faculty propose projects and provide the guidance and resources needed for their completion. See **Appendix C** for a sample program from the senior Medical Technology Grand Rounds with topics and mentors.

2. Evaluation

Students are encouraged to complete course evaluation forms provided by the faculty. Some of the faculty use the forms prepared by the Educational Assessment Center. In addition, the department chair and program director meet with the undergraduates semi-annually to elicit their evaluations of courses, instruction, faculty, staff, laboratory instruments, supplies and reagents used for teaching, etc. The chair requests information from the students concerning situations/conditions/faculty, which are most conducive to learning and those, which represent a barrier to learning.

The graduate program coordinator is available to assist the students with administrative issues. The program director and graduate committee meet with each student to evaluate their progress and to provide advice and guidance when the student is facing difficulty with their training. The Chair also meets with the graduate students to obtain input on progress and their evaluation of the program.

The progress of each graduate student is reviewed by the Graduate Committee, on a quarterly basis. This review includes both academic performance and progress on the student's thesis project. The chairperson of the student's supervisory committee is contacted to obtain information about the thesis project.

The graduate program coordinator stays in contact with several of the graduates of our program. Several of the graduates are employed in the department so the performance of the graduate is readily apparent to the faculty. Faculty often meet graduates at scientific meetings and informally report on their professional careers.

After reviewing student evaluations at the end of the didactic year, exit interviews at the end of the clinical year, and employer evaluations, a new component was added to Lab M 427, "Selected Studies in Laboratory Medicine". This component of the class is offered to students during their first quarter in the Medical Technology Program. Presentations are made on professionalism, interactions, blood borne pathogen training, safety, communication, critical thinking skills and professional societies. The rational for this class was to expose new students to these topics as early as possible in their Medical Technology education.

Faculty and staff recognized the need for including Molecular Diagnostics (MDx) in the curriculum. Course and Program evaluations by students included comments about increasing MDx during their MTP education. Initially, a limited exposure to MDx, usually only in lectures, was included during the didactic year for all students. Currently a MDx laboratory exercise had been added to Lab M 421, Medical Microbiology. Students spend two laboratory sessions analyzing DNA by PCR amplification, restriction analysis, and agarose electrophoresis.

After reviewing student and employer evaluations and the comments from the first Chemistry, Haematology, and Microbiology curriculum review committees, the senior clinical year was extensively redesigned. Formerly, the core rotations and enrichment components were scheduled during the entire senior year. This required major efforts of the MTP faculty and staff to arrange the schedules for the entire year and created difficulties with scheduling for the clinical laboratories. Under the new schedule, the core rotations for the three scientific areas are set equally to six weeks, falling during the first two quarters of the year. Enrichment for all students is scheduled for nine weeks during spring quarter. This resulted in a streamlined clinical rotation schedule that ensured consistent training in the core rotations and a viable, longer enrichment rotation.

Feedback from graduate students has also resulted in changing the Biochemistry 440 series from a requirement to a recommended series.

Students felt that twelve credits were too many to devote to this topic. They would rather spend their time in more relevant study. The Graduate Committee agreed and the changes were made.

3. Undergraduate teaching

All graduate students in this program are required to teach in undergraduate medical technology courses working directly with the faculty responsible for the course. Their participation may include lectures, teaching in the laboratory portion of the course, grading laboratory exercise reports and writing examination questions. Many of the students elect to take the course MEDED 520, Teaching Methods in Medical Education, before enrolling in LAB M 601 for their teaching experience. Students usually spend one quarter in this teaching activity. There are no teaching assistantships available.

4. Professional Development

The faculty and staff of the Department of Laboratory Medicine have extensive resources for professional development both within the Department, at the university, and in the community. The Department hosts Grand Rounds presentation weekly during the academic year. Presentations are made by visiting faculty, department faculty, faculty from other university departments, fellows, residents, and graduate students. Presentations cover current developments in all the major scientific areas of Laboratory Medicine. Similar weekly seminars are held by other University Departments and are available to all faculty, staff and students. Each of the clinical laboratories at the UW and Harborview also has regular faculty and staff meetings where scientific topics are discussed. The faculty and staff of the Department of Laboratory Medicine are encouraged to attend local, regional, and national society meetings and may be provided with department funds to pay for transportation, lodging, etc. Faculty and staff of the department and the various affiliates have also developed regional associations in many scientific areas and meet on a regular basis to discuss cases or attend presentations by visiting or local faculty and staff. These include local meeting such as the hematology-oncology conference between UW and FHCRC via teleconferencing, a clinical microbiology group with a meeting entitled “Show and Tell”, a coagulation group entitled “Clotters Club”, and a regional AACC group of clinical chemists. Faculty at affiliates attend laboratory in-service sessions on a wide variety of topics and meetings of national and regional professional organizations.

Section C: Research and Productivity

The faculty of the department are involved in both applied and basic science. The research effort within our department, as reflected by peer reviewed grant support, is one of the best in the nation for departments of Laboratory Medicine and/or Pathology. At present, there are several internationally recognized investigators in the department conducting research in a variety of disciplines of Laboratory Medicine. The total federal funding for such research exceeded 30 million dollars in direct grants for 2004, although more than 2/3 of this is administered at FHCRC and CHRMC and not by the University of Washington because many of our faculty have their research laboratories at these institutions. In addition, there was more than 6 million dollars in industry supported research. The department also provides a research testing service for federally funded clinical trials for investigators at the University of Washington and nationally**.** The department's total grant and contract funding has increased markedly during the ten year period since the last review of this program. . The department faculty encourage and support research efforts by students and trainees at all levels. Department faculty and students present papers at meetings of the scientific organizations of their disciplines.

The department chair encourages faculty to prepare grant requests for external funding. The amount of research effort is monitored by the chair as research proposals are submitted for signatures. Department faculty remain in contact with others with similar research interests by attendance at appropriate scientific meetings and conferences as well as contact with current appropriate literature.

The department uses a management by objective system to set goals on an annual basis. These are objectives which can be completed or established within a year. Major long term goals of the department for the next five to ten years include the following:

1. To adapt to changes in the health care system without sacrificing the quality of educational and service commitments
2. To continue to improve all educational programs in order to prepare all students in clinical laboratory science for the latter part of this decade and beyond.
3. To attract students into the graduate program in order to meet the anticipated requirements of the state and region.
4. To attract students into the undergraduate medical technology program in order to meet the anticipated requirements of the state and region.
5. To attract students from ethnic minorities into educational programs of all levels in the department.
6. To continue to attract and increase external funding of research activities.

Mentoring of junior faculty

Junior faculty function under the mentorship of senior faculty, usually division or program directors. They are encouraged to pursue their academic interests and time is allotted based on academic track. The department has research, clinician-scientist and clinician educator tracts. Those faculty on the research tract are expected to devote 100% effort toward research and are expected to fully fund their salary and research laboratories before promotion to Associate Professorship. Clinician-Scientist devote approximately 20% to clinical and educational activities and 80% research, while Clinician-Educators reverse those percentages. Although these percentages appear rigid, there is accommodation for individual variation depending on contributions to the overall mission of the department. Much of the support of junior faculty comes from resources earned through the departments well-developed outreach clinical testing program.

Impact of research on your field

The clinical laboratories and the field of Laboratory Medicine evolve continuously as medical research advances. New technologies and methodologies move from the research laboratory to the clinical laboratory on a regular basis. The most recent example of this has been the rapid integration of molecular testing in many areas of the clinical laboratory. Molecular testing, from PCR to DNA sequencing has had a major impact in virology where every major virus today is detected and quantitated using molecular techniques. Molecular testing is the major technology employed in genetic diagnostics and is also being employed in hematology and microbiology. Flow cytometry is another example of more recent technology which is transforming the diagnostic testing for leukemia and lymphoma diagnosis in hematopathology. Proteomics holds even more potential for the clinical laboratories as more and more proteins are identified and characterized in the research laboratory and brought into clinical testing.

Influence of changes in field

Changes in the field go hand-in-hand with changes in clinical medicine. As treatments are refined, the clinical laboratory must adjust. For example, a procedure that took two days to perform ten years ago may be inadequate today if treatment decisions require information from the laboratory in hours or minutes. This is exactly what has happened in cardiac diagnosis, where angioplasty and stent placement have necessitated rapid decisions – hours matter. This has resulted in changes in the testing done. At the same time, advances in clinical testing have changed the diagnostic categorization resulting in more refined treatment and maintenance protocols.

Strategies for promoting communication

Formal communication is primarily accomplished through faculty meetings, department research conferences and grand rounds, etc., as previously discussed. Complementing

this is the informal communication amongst faculty and trainees. The main offices in the department are designed around an open philosophy, a large room with faculty in partitioned spaces around the periphery, with residents, fellows, graduate students and support staff in the open area. This open office concept was designed specifically to foster this informal communication and has been very successful.

Impediments to productivity

Adequate space seems to be the major impediment. The department has had to adapt by using facilities beyond the university campus. This decentralization has made communication and operations more difficult, but has been done out of necessity as the department has grown more rapidly that could be accommodated on campus.

Encourage productivity of all staff

The staff and faculty have worked in a department that gets very little in the way of funding support from the university or medical school. They are aware that funding is dependent on productivity of the clinical and research labs of the department and realize that their jobs depend on the continued health of the department. Despite the fact that there are no tenured faculty in the department, we are able to compete and retain our faculty because of the collegial supportive environment – an environment that can be supportive because of the successes of our faculty in both service and research.

Section D: Relationship with other units

Formal and informal relationships with other departments and schools.

- Several faculty members, with primary appointments in Laboratory Medicine, have joint and/or adjunct appointments in other departments. See **Appendix D** for a listing of faculty appointments.
- A few faculty members, with primary appointments in other departments have joint or adjunct appointments in Laboratory Medicine.
- Faculty members of the department are located at Children's Hospital and Regional Medical Center, Seattle Cancer Care Alliance, Fred Hutchinson Cancer Research Center, Providence Hospital, Seattle Veteran's Hospital and Medical Center as well as the University of Washington Medical Center (UWMC) and Harborview Medical Center (HMC).
- A joint committee of the Departments of Laboratory Medicine and Pathology reviews and considers all applications for the joint residency program. The overall management of the program is shared by the two departments.
- Department faculty serve on several School of Medicine, UWMC and HMC committees such as Clinical Chairs, Medical School Executive Committee, Minority Affairs Advisory Board, Medical Staff Administrative Committee, Medical Staff Resource Use, Transfusion Practices, Infection Control, etc.

Laboratory Medicine serves as a bridge in research efforts and in providing state of the art laboratory service between the basic sciences, clinical sciences and industry. There are many opportunities for collaborative research projects with other units on campus and with industry as well as opportunities with other universities. Examples include joint research projects with faculty in other departments in the School of Medicine including Medicine (Cardiology, Endocrinology, Hematology, Infectious Disease), Obstetrics and Gynecology, Surgery, Biochemistry, Microbiology, Urology, Bioengineering, Anesthesiology, Ophthalmology, Pathology, Pediatrics, Neurosurgery (Epilepsy Center), Pharmacology, Animal Medicine and the Primate Center. Some faculty have joint projects with industry. These include drug companies, instrument manufacturers and companies which produce various reagents for biological and medical use. We believe these interdisciplinary relationships are valuable.

The faculty are involved in outside consulting work in several areas. These include service on national (including NIH) and local councils and agencies concerned with various kinds of investigation related to HIV (human immunodeficiency virus) and AIDS (acquired immunodeficiency disease). Faculty consultant with industry on the development and applicability of laboratory testing.

The department faculty provide professional expertise at the local, state, regional and national levels through contributions to many professional and scientific

organizations. Contributions are in the form of membership, service as committee members and chairpersons, service on executive councils, advisory boards, long range planning committees, steering committees, editorial boards, examining boards of various certifying agencies, presentations of seminars and workshops, etc. Many of these activities are listed on curriculum vitae of the faculty in **Appendix G**. Faculty interaction with others who are experts in their areas fosters interchange of ideas concerning education at all levels and in generation of research ideas and collaboration.

The department clinical laboratories also provide referral testing services and consultation for other clinical laboratories, both hospital based and commercial, physician offices and clinics throughout the region and investigators involved in clinical studies. Laboratory requests from the outside are usually for complicated, non-routine laboratory analyses such as genetic diagnosis, viral quantitation, bone marrow regeneration status, etc. Our department serves the community outside the University of Washington and at the same time benefits from the referral work. The larger patient base enables the department to offer a greater variety of laboratory tests and to provide additional educational opportunities for students at all levels.

Department faculty make many presentations in Continuing Education at the Pacific Northwest Section of the American Association for Clinical Chemistry, the Seattle and Washington State *S*ocieties for Clinical Laboratory Science, and other local organizations. Courses in which our faculty participate through scientific organizations are evaluated by questionnaires provided to those attending the sessions.

Section E: Diversity

1. Student Diversity

The Department of Laboratory Medicine continually strives to better recruit and retain students from underrepresented groups. This is one of the long term MBO objectives of the department.
A comparison between the first five years of this study period (1995-2000) and the last five years (2000-2005) reveal a slight decrease in the graduate student population from underrepresented groups as a percentage of the total enrollment. However, total enrollment as a whole has also decreased. Female and international student enrollment climbed higher as a percentage of total enrolment to 78% for female students, and 31% for international students. Ethnic minority representation remained about the same. Since the number of students in the program is low, it is difficult to interpret trends.

A plan to further increase the representation of underrepresented groups in now in place and includes increased program promotion including the publication and distribution of new program brochures to prospective students, and an updated website

http://depts.washington.edu/labweb/Education/Master/index.htm

with important information regarding the program made easily accessible for prospective students. Further exposure through the addition of a link to our graduate program on the School of Medicine website beginning January 2004, is also expected to contribute to a rise in applications. The department also participates in the GO-MAP graduate programs open house held annually.

Program changes include better mentorship opportunities for students to receive individualized support from faculty and the expansion of the program to include a specialization in laboratory management. This latter program specialization prepares students to become effective laboratory administrators and to occupy other laboratory leadership positions, which traditionally have not been held by underrepresented groups.

Five-Year Average Comparison Chart

All values are 5 year means and were calculated from the Graduate Student Statistical Summary.	Fall 1995-Summer 2000	Fall 2000-Summer 2005	Increase or decrease as a percent of total average (mean) enrollment
Enrollment History Total	9.0	6.4	29% decrease
Full-time	2.2	2.2	
% of Total	24	34	10% increase
Part-time	6.8	4.2	
% of Total	76	66	10% decrease
Male	3.2	1.4	
% of Total	36	22	14 % decrease
Female	5.8	5.0	
% of Total	64	78	14% increase
Ethnic Minority	2.2	1.2	
% of Total	24	19	5% decrease
International	1	2	
% of Total	11	31	20% increase
WA resident	7.4	4	
% of Total	82	62	20% decrease

2. Faculty diversity:

The department has actively sought highly qualified individuals from underrepresented groups. The number of female faculty members has increased dramatically over the past ten years as reflected in our faculty roster. It has been harder to find members of underrepresented minorities due to the few individuals available. However, there have been gains making our faculty more ethnically diverse over the past decade.

3. Recuitment and retention:

Recruitment of a diverse undergraduate student population has been accomplished. Such recruitment becomes much more difficult as we go to the resident, fellow and faculty level. Since the majority of our faculty are physicians with either an MD or MD/PhD degrees, there is already a selection process at work. Medical schools have shifted to 50% or more female students – a sharp contrast to the situation 30 years ago where the average was less than 10% female. Underrepresented minorities still make up a very small percentage of the

matriculating medical student population. As a result, our faculty reflects these trends. For faculty positions, we are dependent on the existing pool, one which has more female but few minority candidates.

4. Effects of diversity on curriculum:

Our curriculum is primarily dictated by advances in science and their applications to the clinical laboratory. It is therefore culturally and gender neutral and not really affected by the increased diversity in students or faculty. There is increased sensitivity to the needs of students with English as a second language, since many of our students are immigrants. We have tried as best we can to recognize the potential of each individual and eliminate any forms of discrimination from the classroom or work area.

Graduate students from foreign countries are encouraged to take ESL classes if needed. The director keeps in close contact with them to make sure that they are progressing in their studies and provides help and guidance when needed.

Section F: Educational Programs

Overview

The Department of Laboratory Medicine provides educational programs for undergraduate, graduate, and post-doctoral students. These programs include opportunities for undergraduate students to work for Bachelor of Science degrees in Medical Technology, graduate students to obtain Master of Science degrees, courses in Laboratory Medicine for medical students, and training for residents and fellows seeking specialty or subspecialty certification.

Baccalaureate Medical Technology Program

Program Curriculum-major scientific disciplines

Traditionally, medical technology has included four major scientific disciplines, clinical chemistry, clinical hematology, clinical microbiology, and immunohematology (blood banking). However, with advancement in scientific knowledge, newer and more sophisticated procedures are constantly being developed within all of these areas so that they have greatly expanded from their traditional content. Molecular biology plays an increasingly important role in clinical pathology and has been incorporated into the curriculum. For example, families with individuals who have inherited a genetic disease such as cystic fibrosis can be identified at the DNA level and greatly assisting in genetic counseling. Chromosomal abnormalities found in many cancers such as breast cancer or leukemia can be detected at the molecular level. Many bacteria, fungi and viruses can be identified using molecular techniques, frequently more rapidly than with traditional culturing methods.

The Medical Technology Program (MTP) at the University of Washington (UW) is a 2 + 2 program that culminates in the Bachelor of Science in Medical Technology degree. The first two years are offered either at the UW or at other accredited universities, colleges, or community colleges. The third and fourth years are the professional program and are taught at the UW and administered by the Medical Technology Program, Department of Laboratory Medicine, School of Medicine.

Pre-professional Requirements - The first two years constitute the pre-professional program as follows:

Students complete 24 quarter credits in chemistry, 15 quarter credits in the biological sciences, 5 quarter credits in statistics and/or mathematics, and additional credits in general subjects to total a minimum of 90 quarter credits.

Professional Program - The last two years constitute the professional program as follows:

Junior year courses (3rd year, didactic program) are designed to provide students with the appropriate theoretical background and basic technical skills that will enable them to function effectively in the core clinical rotations. The following subjects are taught primarily by faculty in Laboratory Medicine and also by the Departments of Biochemistry and Microbiology:

Bacteriology	Biochemistry
Chemistry	Coagulation
Hematology	Immunology
Mycology	Parasitology
Phlebotomy	Virology

Urinalysis & Body Fluids
Selected studies in Laboratory Medicine

Senior year courses (4th year, core clinical rotations) are offered in the clinical laboratories of UW Medicine (University of Washington Medical Center and Harborview Medical Center) and our affiliates. Core clinical rotations are provided in chemistry, hematology, immunohematology, and microbiology.

The UW MTP currently has 11 affiliates including the following:

1. Children's Hospital and Regional Medical Center
2. Dynacare Northwest
3. Evergreen Hospital Medical Center
4. Group Health Cooperative of Puget Sound
5. MultiCare Health System
6. Northwest Hospital
7. Providence Everett Medical Center
8. Providence St. Peter Hospital
9. Puget Sound Blood Center (PSBC)
10. Veterans' Affairs Puget Sound Health Care System (VAPSHCS)
11. Virginia Mason Medical Center

An additional senior year course (4th year, required elective) offers pathways in research, a specific scientific area, or as a generalist.

In addition to the core clinical rotations and elective course, senior students participate quarterly in the Department's Grand Rounds, the Medical Technology Senior Seminar, and Case Based Learning (CBL). The former provides current information on scientific advances in Laboratory Medicine while Seminar topics cover areas such as blood-borne pathogen training, cultural diversity, compliance, specific management topics and theory, concepts and principles of laboratory operations, and educational theory.

Graduation Requirements for Medical Technology

Students completing the Medical Technology Program are expected to have in-depth knowledge of the relationships between laboratory data and pathology. They should have an understanding of and experience in the performance of routine and special testing procedures. They will have had experience trouble-shooting and resolving typical problems in the clinical laboratory. In addition, students work with laboratory information systems and are exposed to laboratory supervision, management, regulatory issues, research, and educational methodologies.

A minimum of a "C" grade in all laboratory medicine courses and a GPA of 2.00, both cumulative and in required courses, are required for graduation.

Graduates are eligible for certification as Medical Technologists by the Board of Registry of the American Society of Clinical Pathologists (ASCP) and for certification as Clinical Laboratory Scientists by the National Credentialing Agency for Laboratory Personnel (NCA).

Medical Technology Program Faculty

All faculty in the Department of Laboratory Medicine are involved in the education of students in the Department, regardless of laboratory discipline. In addition, there are faculty and staff who are directly responsible for the Undergraduate Medical Technology Program. They plan and implement the overall curriculum in the Professional Phase of the Medical Program. The Director of the program is Mary F. Lampe, Ph.D.

Evaluation by the University of Washington Medical Technology Program

In the last ten years, 212 students have graduated from the Medical Technology Program. During this time, 88% of the graduates who took national certifying exams passed them. All students who want to start work immediately are offered jobs either in the Department of Laboratory Medicine or at our affiliate sites before they graduate. Approximately 48 per cent are currently employed as Medical Technologists in the University of Washington Academic Medical Centers (University of Washington Medical Center and Harborview Medical Center) and our affiliates. The others have left the area or the profession or there is no information available about them.

The Medical Technology Program undergoes continuous evaluation, both internally and externally.

External evaluation occurs in many ways, including the National Accrediting Agency for Clinical Laboratory Sciences (NAACLS) self-study/site visit program and national certifying examination scores. In addition, evaluation forms are sent to employers of recent UW MTP graduates requesting evaluation of the adequacy of their training. Evaluation forms are also sent to all graduates of the program six months after graduation.

Internal evaluation occurs with each medical technology course taught in the Department of Laboratory Medicine. There are different evaluation instruments used, including those available from the UW Educational Assessment Center and the evaluation instruments designed by the MTP faculty for didactic courses and clinical rotations. In addition to these evaluation instruments, there is an annual meeting held with the junior MT students, the program director of the MTP, and the chair of the Department of Laboratory Medicine to discuss the perceived strengths and weaknesses of the program and curriculum.

The final student evaluation occurs just prior to completion of the MTP with an exit interview. Each student meets individually with the program director to discuss the strengths and weaknesses of the MTP. This gives students an opportunity to summarize their experiences and to give a more "global" perspective, rather than that provided through the course-by-course evaluations. The students complete an evaluation form and notes are taken during their interview. These documents are then reviewed by the entire MTP faculty and staff.

Another opportunity for review occurs with scientific area and program wide curriculum review committees. Three scientific area curriculum review committees covering chemistry, hematology, and microbiology were assembled in 2000 and a fourth covering immunohematology in 2002. These committees are made up of all MTP faculty and staff, supervisors of the laboratories at UWMC and Harborview Medical Center (HMC), Department of Laboratory Medicine faculty, outside employers, and recent graduates of the program. The supervisors, faculty, employers, and recent graduates all work in the scientific area of each committee. These committees meet once a year to discuss the effects of changes made to the curriculum the previous year and to recommend changes to the curriculum for the coming year. The committees are provided with the course syllabi for the MTP classes, the American Society for Clinical Laboratory Science (ASCLS) MT entry level competencies, National Credentialing Agency (NCA) MT certifying exam content outline, Board of Registry (BOR) certifying exam content outline, BOR certifying exam results, and a summary of the previous year's class by the MTP faculty. A separate program-wide Advisory committee is made up of the MTP Director, the Chairman of the Department of Laboratory Medicine, a MTP faculty member, a supervisor of a Department of Laboratory Medicine laboratory, an MT from the outside community who was a Hematology supervisor and who now coordinates all education at her site, and a recent graduate of the MTP. The goal of this committee is to provide long-term guidance to the MTP in light of changes in Laboratory Medicine and Clinical Laboratory Science.

The University of Washington Medical Technology Program is accredited by the National Accrediting Agency for Clinical Laboratory Sciences (NAACLS).

The National Accrediting Agency for Clinical Laboratory Sciences (NAACLS) is a nonprofit organization that independently accredits Medical Technology Programs. The main components of the NAACLS programmatic accreditation process are: (1) the self-

study process; (2) the site-visit process; (3) evaluation by a review committee, and (4) evaluation by the Board of Directors. The continuing accreditation process begins approximately 18 months before the end of the program's current accreditation period.

(1) The self-study process

The self-study process is one of the primary aspects of the accreditation process. It involves a programmatic self-review of internal policies, functions, resources and external relationships to allow ongoing improvement of the program. The program director presents the results of the self-study process in a Self-Study Report, which demonstrates the program's compliance with Standards. Standards are the minimum criteria used for the development and evaluation of accredited educational programs. They are developed through a process that requires the input and review of peer groups, sponsoring and participating organizations, affiliating organizations and other interested professional groups. The Standards describe the general characteristics of an acceptable accredited program.

The UW MTP prepared a Self-Study Report for submission to NAACLS in May, 2003. The Self-Study Report was 722 pages long and was a thorough, comprehensive analysis of the Program. A supplemental Sample Curriculum Unit was also submitted that was 266 pages long and summarized the Microbiology component of the MTP curriculum.

NAACLS submitted the UW MTP Self-Study Report to a paper reviewer who determined: (1) if the program had submitted all required information, and (2) if the narrative and documentary materials clearly described the program. The paper reviewer wrote a Self-Study Report Paper Review summarizing their findings that was forwarded to the UW MTP. The program director must submit to NAACLS a response to the Paper Review and submit materials cited as lacking or in need of clarification. Following is a summary of the major findings of the Self-Study Report Paper Review with our response in bold type.

1. The review stated that the UW MTP must provide current, signed, active affiliation agreements for all affiliates**. Current, signed, active affiliation agreements for all affiliates are maintained by the UW MTP and were provided at the site vis**it.

2. Textbooks required by each affiliate must be listed and were missing for some affiliates. **The list of required textbooks for each affiliate was provided to the site visitors in our "revised" self-study at the time of the site visit.**

3. Access to periodicals must be described for each affiliate and was missing for some**. This information was provided for each affiliate in our "revised" self-study at the time of the site visit.**

4. Utilization of computer technology must be described for each affiliate and was missing for some affiliates**. This information was provided for each affiliate in our "revised" self-study at the time of the site visit.**

5. Objectives and evaluations utilized by the facility must be provided. **Objective and evaluation examples were submitted in the sample Microbiology unit because they are specific for courses, not the affiliate site. Objectives and evaluations for all courses in the UW MTP were provided at the time of the site visit.**

6. A mechanism for reviewing the effectiveness of the facility must be provided for each affiliate and was missing for some. **This information was provided for each affiliate in our "revised" self-study at the time of the site visit.**

7. A mechanism for student counseling and guidance must be provided for each affiliate and was missing for some affiliates**. This information was provided for each affiliate in our "revised" self-study at the time of the site visit.**

8. Data from outcome measures must be provided. **Data from outcome measures was provided for the UW MTP since they are measured for the Program as a whole and not for the affiliate sites. Data include course evaluations, exit interviews of all graduating students, certifying exam scores, and surveys of employers and recent graduates. Site-specific data are available in the exit interviews and course evaluations, which was available at the site visit.**

9. Documentation of the analysis of outcome measures and any changes that have been implemented must be provided**. Analysis of outcome measures was provided for some affiliates since many affiliate sites were very new. In general, the UW MTP provides outcome measure data to affiliate sites and evaluates these data with the affiliate educational coordinators or supervisors. Changes are made as necessary and future outcome measures reviewed to ensure that the changes were positive. Documentation of these interactions between the UW MTP and affiliate coordinators are maintained by the** MTP.

10. Affiliation agreements with affiliates should address student health issues**. An incorrect affiliation agreement template was provided in the self-study. The correct template was developed in collaboration with the University of Washington School of Medicine and contains the following section on student health policies. "On any day when a student is participating in the clinical education program at its facilities, Training Site will provide to such student necessary emergency health care or first aid for accidents occurring in its facilities. The student will be responsible for the costs of any and all care." The template including this statement was used for all the current, signed, active affiliation agreements for all affiliates that was provided at the site visit.**

11. The program must have appropriate objectives in the affective domain. **Affective domain objectives were submitted in the sample Microbiology unit in the objectives for the entire course. Affective domain objectives for Microbiology were extracted, listed separately, identified as such, and submitted to the site visitors. Affective**

domain objectives for all courses in the UW MTP were available at the time of the site visit.

12. Concepts and principles of laboratory operations must include:
    a. Critical pathways and clinical decision making;
    b. Performance improvement;
    c. Dynamics of healthcare delivery systems as they affect laboratory service;
    d. Human resource management to include position description, performance evaluation, utilization of personnel, and analysis of workflow and staffing patterns, and;
    e. Financial management: profit and loss, cost/benefit, reimbursement requirements, materials/inventory management.

Concepts and principles of laboratory operations including topics 9a-e were addressed in detail in the LabM 427 course (Selected Studies in Laboratory Medicine), not the sample Microbiology unit provided in the self-study. Materials indicating inclusion of concepts and principles of laboratory operations in 9a-e were provided in the LabM 427 course materials available at the time of the site visit.

13. Experiences at different clinical sites must be comparable and appropriate to enable all students to achieve entry level competencies. **Common goals and objectives, competency checklists, training logs, and procedure evaluation/instrument checkout logs have been developed by the UW MTP for all clinical rotations. These tools are used to insure that students are required to meet the same entry-level competencies at all affiliate sites. If a site cannot provide any portion of the required educational experience, the student is assigned for a short time to another site where that particular training can be obtained. Goals and objectives, competency checklists, training logs, and procedure evaluation/instrument checkout logs for all courses in the UW MTP were provided at the time of the site visit.**

14. Academic standards and essential functions required for admission to the program must be:
Provided to prospective students
Made available to the public
The essential functions required for admission to the program were included in the packet of information given to prospective students. The essential functions required for admission to the program were added to our website, which is available to the public.

15. Student records must be maintained for counseling or advising sessions. **A log of all counseling or advising sessions is kept by all UW MTP faculty and staff and kept in each individual faculty/staff's files.**

16. There must be a procedure for determining that each applicant's or student's health will permit the individual to meet the written essential functions of the program. Students must be informed of, and have access to, the usual health care services of the

institution**. All applicants are provided with the Program's essential requirements and must sign a form indicating that they can meet these requirements upon entry into the Program. In addition, the UW MTP interviews every applicant that qualifies for acceptance into the Program. All applicants also write a personal essay in their application to the Program. All entering students undergo a color blindness test at Orientation. These procedures are used to determine that each applicant's health will permit them to meet the written essential functions of the program. Applicants are accepted conditionally in terms of these essential requirements and are dismissed from the program after entry if it is determined that they cannot meet the essential requirements. Students are informed of, and have access to, the usual health care services of the University of Washington.**

17. Program evaluation information must be available. **Program evaluation information was provided to the site visitors.**

(1) The site-visit process

After the self-study process has been completed, NAACLS arranges for the program's site visit. During the site visit, NAACLS volunteer peer site visitors meet with faculty and administrators, verify the Self-Study Report's contents, and review materials missing from the Self-Study. They address concerns raised by the paper reviewer and aspects of the program that can only be determined on site. Appropriate contact persons from each clinical affiliate also meet with the site visitors at the sponsoring institution. Interviews of students and recent graduates are also arranged. The site visit team also completes a Site Visit Report and, at the end of the site visit, the site visitors report their findings at an exit interview. All aspects of the program that are included in the Site Visit Report are discussed at the exit interview. Academic program site visits require a minimum of two days and occurred at the UW MTP on October 27 and 28, 2003. The Site Visit Report must be submitted to NAACLS within 21 days of the site visit. NAACLS forwards the Site Visit Report to the program director who must respond to NAACLS. Following is a summary of the major findings of the Site Visit Report with our response, submitted on December 9th, 2003, in bold type.

1. Ethics is mentioned in the Professionalism component; however, there are no objectives. **We added objectives that address ethics and provided them to NAACLS.**

2. A research design component is missing. **We added a lecture on research design and practice that is given annually to the senior students.**

3. Most cognitive objectives are present although some Chemistry areas are missing. **Objectives were written for all areas of Chemistry and were provided to NAACLS.**

4. Measurable verbs were not present for Hematology, Hemostasis, Chemistry, Body Fluids, and Management Objectives were revised or written for all the areas mentioned and were provided. **Verbs were changed or chosen so that they are measurable.**

5. Immunology, which is taught in several courses, has minimal measurable verbs. **Immunology objectives, while minimal and thus not requiring a formal response, were revised.**

6. Cognitive objectives in Hematology, Hemostasis, Chemistry, Body Fluids, and Management are not at the appropriate taxonomic levels. **Objectives were revised or written for Hematology, Hemostasis, Chemistry, Body Fluids, and Management and were provided. Objectives were changed or written so that they are at the appropriate taxonomic level.**

7. Research objectives are missing. **In support of the added lecture on research design and practice that is given annually to all senior students, objectives were written and were also provided to NAACLS.**

8. Psychomotor objectives are minimal in most areas, averaging two per discipline. **Psychomotor objectives, while minimal and thus not requiring a formal response, were revised.**

9. Cognitive evaluations are at the appropriate taxonomic levels, but do not relate to the objectives for Hematology, Hemostasis, Chemistry, and Body Fluids. **Since objectives were revised or written for Hematology, Hemostasis, Chemistry, Body Fluids, and Management so that they are at the appropriate taxonomic level, the cognitive evaluations now relate to these revised objectives.**

10. There is minimal relationship of Immunology test questions to the objectives. **Immunology objectives, while minimal and thus not requiring a formal response, were revised and these revised objectives now better relate to the Immunology test questions.**

11. Management, educational methodologies, and research cognitive evaluations are missing. **Cognitive evaluations were written for management, educational methodologies, and research and were provid**ed.

12. Psychomotor evaluations are missing for Body Fluids, Molecular Diagnostics, Immunology, and Phlebotomy. **Molecular Diagnostics and Phlebotomy evaluations were written at the time of the site visit and are used with the appropriate classes.**

13. Checklists are used for some disciplines but lack criteria with accompanying grading policies/calculations and therefore are not evaluations. **Psychomotor evaluations with appropriate criteria and accompanying grading policies/calculations for Body Fluids, Molecular Diagnostics, Immunology, and Phlebotomy were written or revised and were** provided.

(2) Evaluation by a review committee

The NAACLS Clinical Laboratory Sciences Programs Review Committee (CLSPRC) reviewed our response in conjunction with the Paper Review and Site Visit Report on February 4th and 5th, 2004 and formulated an accreditation recommendation. They recommended that the UW MTP be re- accredited for seven years, the maximum length of accreditation that may be awarded to a program.

(3) Evaluation by the Board of Directors.

The CLSPRC recommendation was forwarded the NAACLS Board of Directors who concurred and awarded the UW MTP re-accreditation for seven years. We received notice of their award on April 19th, 2004.

MASTER OF SCIENCE PROGRAM IN LABORATORY MEDICINE

The Master of Science degree in Laboratory Medicine prepares the graduate for advanced technical and supervisory positions in clinical and research laboratories, as well as pharmaceutical and diagnostic industries. Graduates of our two-year program currently work for public, private and non-profit health agencies, educational institutions, the military, and the pharmaceutical industry.

Each student in the program selects one of the pathways for his/her major area of concentration. The program includes lecture, laboratory, teaching and research experience in a dynamic department dedicated to excellence in teaching, research, and service. Graduate students have opportunities to teach in undergraduate medical technology program courses. In addition, they interact with individuals in the laboratory medicine residency training program, as well as with fellows in the postdoctoral training programs in the major divisions of the department.

Course requirements common to all pathways include laboratory medicine grand rounds (seminars on current topics in all areas of laboratory medicine), seminars in organization and management in laboratory medicine, biostatistics, and a thesis based on independent laboratory research (under the guidance of a mentor) in the student's selected pathway. Other course requirements vary with the individual pathways.
A minimum of 36 credits is required of which nine are thesis credits. A minimum of 18 credits of graduate level graded courses is required. There is no foreign language requirement**.**

There is ample opportunity for students to take elective courses in the selected pathway. Students have the opportunity to customize their curriculum with the direction of their supervising faculty. Students may elect either full or part-time options. Full time students usually complete the program in two years.

The Director of the Program is Hossein Sadrzadeh, Ph.D., D.A.B.C.C., F.A.C.B.

Financial Support

There is no formal departmental support for Graduate Students. Current employee of the department take advantage of the tuition exemption program of the university. Applicants accepted into the program are eligible to apply for department graduate teaching or research assistantships when they are available. Requests for part/or full time employment are always considered.

Prerequisites

The requirements are:
1. An undergraduate degree from a university of recognized rank, in a field appropriate to laboratory medicine (medical technology, microbiology, chemistry, biochemistry, biology, zoology).
2. Achievement of a 3.0 grade point average in the last 90 graded quarter credits or last 60 graded semester credits.
3. Certification as a medical technologist (clinical laboratory scientist) or as a specialist in the field of medical technology (National Registry of Clinical Chemistry, National Registry of Microbiology, Board of Registry of the American Society of Clinical Pathology, or the National Certification Agency for Medical Laboratory Personnel).
4. Completion of the Graduate Record Examination (GRE) Aptitude Test within the last five years.
5. All students must satisfy the basic requirements of the University of Washington Graduate School.

Evaluation of the Graduate Program

The Graduate Program in Laboratory Medicine undergoes continuous evaluation. The graduate committee meets on a regular basis to review course requirements, suitability of classes, the progress of students and the admission of new students.

The students meet monthly as a group with the program director and coordinator. The agendas include announcements, discussions of classes currently in progress, problems the students may be having, instruction on making presentations, etc. Student input is solicited to help improve the program.

The Director meets with each student quarterly, to review their progress. Grades are review as well as current classes and progress on projects. The students have the opportunity to address any problems they are having or suggestion for improvement.

Exit interviews are also conducted as students complete the program. They are asked to evaluate the program, their courses, their mentors and the facilities available to them during their time in the program. Surveys are periodically sent to recent graduates to

assess their experiences in the program. All input (comments and suggestions) is reviewed by the director. Suggestions for improvement are taken to the graduate committee when appropriate.

Results of exit surveys of graduating students

Exit surveys of graduating students have shown positive student attitudes toward the Laboratory Medicine Master of Science program. Quality is ranked on a scale of one (negative) to five (positive). Students remain very satisfied with overall program quality, consistently rating the program between a four and a five over the past five years. Satisfaction with space, facilities and equipment, has increased from a low of 2.0 in 2000 to 3 in 2004. Satisfaction with supervision/guidance has increased from a low of 2.7 in 2001 to 5.0 in 2004. We believe that the change in directorship and an emphasis on mentorship is responsible for this improvement.

POST-DOCTORAL FELLOWSHIPS

Clinical Microbiology

The University of Washington postdoctoral training program in medical and public health laboratory microbiology was founded in 1965 and is one of the oldest CPEP - accredited programs nationwide. Our program has a long record of success, having trained over 50 individuals.
The UW program is two years in length, and offers a training experience tailored to the individual. Applicants must have a doctoral degree (Ph.D., M.D., D.V.M., Sc.D., D.O., D.P.H., or equivalent) with graduate education in microbiology, immunology or medicine. Fellows spend approximately one year, usually their first, completing formal rotations in the following areas: bacteriology, mycology, mycobacteriology, parasitology, virology, infectious disease serology, infection control, pediatric and adult clinical infectious diseases, public health microbiology, management, computing, teaching, and a core course covering major departmental disciplines. These rotations take place primarily at the University of Washington Medical Center, with additional rotations at the following sites:

1) Harborview Medical Center, Seattle/King County's premier community health care and trauma center;
2) the Washington State Department of Health Public Health Laboratories, serving Washington State;
3) Children's Hospital and Regional Medical Center, one of the country's top pediatric tertiary care centers serving the Pacific Northwest; and
4) the Seattle campus of the Veteran's Administration Puget Sound Health Care System.
In their second year, fellows are granted acting director status in order to gain practical experience in laboratory management and an appreciation of a lab director's daily activities. Fellows also actively participate at daily lab plate rounds, take weekday pager

call, and present biweekly Current Topics continuing education talks to the laboratory staff.
The Department is well known for its diverse, clinically based research achievements, and the trainee will therefore be expected to pursue an intensive program of clinically oriented research in infectious diseases leading to publication in peer reviewed journals and presentation at national meetings. This is usually done during the second year of training.
Completion of the Program prepares the trainee for a successful career as director of a clinical or public health microbiology laboratory, and fulfills all training requirements for the American Board of Medical Microbiology.

Clinical Chemistry

The University of Washington postdoctoral training program in Clinical Chemistry is one of the oldest and well respected programs in the country . The program, which is accredited by the Committee on Accreditation in Clinical Chemistry (ComACC), is designed to train applicants with doctoral degrees (Ph.D. in biological sciences, M.D., D.V.M., Sc.D., D.O) in Clinical Chemistry. Our program has a long record of success, having trained over 80 individuals.

This two-year postdoctoral program in clinical chemistry is structured to meet the interests of individual fellows in areas of clinical chemistry, toxicology, management and molecular diagnostics. The first 3 months of training is an intensive didactic course in all aspects of Laboratory Medicine. In the next 6 to 9 months, fellows will rotate through all sections of the clinical chemistry laboratories at the University of Washington, Harborview Medical Center, Seattle Children's Hospital and the Seattle Veterans Administration Medical Center. During these rotations, fellows become familiar with the spectrum of analytical methods and instrumentation used in a clinical chemistry laboratory, along with the interpretation of results from these analyses and with management aspects of these sections. During the remaining 12 to15 months of training, fellows pursue research relevant to laboratory medicine under the mentorship of Laboratory Medicine faculty. The fellows also participate in the undergraduate and graduate teaching programs of the Department. The goal of the program is to prepare the fellows for academic careers in laboratory medicine.

Hematopathology

The Hematopathology Fellowship at the University of Washington is an ACGME-accredited two-year program that provides training in the clinical and laboratory diagnosis of hematologic malignancies, hemoglobinopathies and hemolytic syndromes, hemostasis and thrombosis, and general hematology. Training is provided in all the major diagnostic techniques, including flow cytometry and clinical molecular diagnosis. The fellowship consists of a structured intensive core rotation through the clinical areas listed above followed by a period of research during which clinical duties are reduced. A major goal of the fellowship is mastery of a hematopathology area leading to publication in

quality journals. The fellowship should prepare the trainee for successful completion of the hematology examination given by the American Board of Pathology.

RESIDENCY PROGRAM IN CLINICAL PATHOLOGY

The residency training in clinical pathology (CP) operates in conjunction with the overall residency in Pathology, a program shared with the Department of Pathology. This is a highly competitive program with approximately six residents selected through a national matching program for medical student graduates. Of each starting class of residents, one is selected as a CP only resident, one as an anatomic pathology (AP) only resident, and the remainder enter for training in both AP and CP. Both straight AP and CP tracks are meant for those individuals planning academic careers. The training for AP and CP is a total of four years and for straight AP or CP it is three years. The first year of training is devoted to core teaching and basic rotations in coagulation, chemistry, microbiology, immunology, blood banking, virology, informatics and hematology. The second (and third year for strainght CP) is devoted to subspecialty training where the resident spends the majority of his/her time in one or a limited number of labs developing specialized skills that will prepare the trainee to become a lab director, whether in an academic or community setting. The overwhelming majority of the residents continue their training after residency in one of the clinical fellowships available or research fellowships.

MEDICAL STUDENT EDUCATION

The faculty participate in a number of courses in the first two years of medical school as lecturers. There is no formal course in Laboratory Medicine during this part of their training. In the third and fourth years, the students may elect to take electives in Laboratory Medicine with two week rotations in specific labs (LabMed 680) or through the senior elective in laboratory interpretation (LabMed 695). The medical school has just introduced a new course in 2004 for the graduation seniors, the Capstone course. The first year this was an elective, but it will become required for all graduating seniors in 2005. In this course, the Laboratory Medicine faculty have responsibility for 6 hours of didactic instruction in the use of clinical laboratory testing.

Section G: Graduate Students

1. Recruitment and retention

Recruitment efforts have been one of the weaker aspects of Laboratory Medicine's graduate program over the past decade, as the founding faculty of the department have retired and new faculty have been recruited. The program has had four directors over this period. The search for a long-term program director diverted human and capital resources away from program promotion and other program improvements. However, with the hiring of Dr. Sayed M.H. Sadrzadeh as the program director in Fall 2002, the graduate program is once again poised to improve recruitment and retention strategies.

Already Dr. Sadrzadeh has been instrumental in creating the new brochure for the program (see **Attachments for Section G**) that is sent to prospective students, for updating the program's website

http://depts.washington.edu/labweb/Education/Master/index.htm

and for improving access to program information on affiliated websites (School of Medicine website, etc.). Dr. Sadrzadeh and the department's administrator, Paul Henderson, also expanded the program curriculum to include a specialization in Laboratory Management, broadening the appeal of the program to prospective students with a business or administrative interest and increasing competitiveness with similar programs at other institutions, which offer such a specialization.

Dr. Sadrzadeh is also renewing a commitment toward faculty mentorships with students. Each incoming student is assigned a faculty mentor who provides guidance and scholarly support for the duration of their studies. Through these relationships graduate students receive individualized feedback on their research, presentation and writing skills.

Regular departmental review of graduate exit surveys revealed a negative trend in student's opinions of the supervision and guidance they received during their graduate studies. This was a low of 2.7 in 2001. Increased contact between each student and the program director and with their faculty mentor has reversed this trend with a rating of 5.0 in 2004. Also, increased activities which allow the graduate students to share their work and interests with each other in an informal setting, such as the monthly graduate student meeting, contributes to strengthening the students' positive opinions of their scholarly relationships with their peers and their advisors.

Retention rates for the Master of Science in Laboratory Medicine have remained at a high constant for the past ten years. Not only do our graduates

complete the program within a short period of time, many of the graduates are concurrent University of Washington Medical Center or Harborview Medical Center employees for the duration of their studies. Upon completion of their M.S. degrees many of these employees assume supervisory positions. In the last three years we had one student who did not complete the program. This was due to personal time commitments.

The **Attachments for Section G** include samples of minutes of the graduate student meetings, progress reports of the graduate committee, class photo and information on current students.

2. Inclusion in governance and decisions

As described earlier, the department is a clinical department with major responsibility for the delivery of clinical laboratory testing for the patients served by UW Medicine. On the clinical side, the department reports to the two medical centers and the SCCA, their medical directors and administrations. The department chair is responsible for the operation of the departments laboratories. Under this governance structure there is no role for the graduate student. On the educational side, the departments programs operate within the medical school, with reporting relationships through the school's administration. Again there is no formal governance role for the graduate students. There input has been through the graduate program and it's director.

There have been no grievances lodged by any Laboratory Medicine graduate student over the past three years. Should a grievance arise in the future, the department has a grievance procedure that closely follows guidelines outlined in the "Academic Grievance Procedure" published by the Graduate School in Memorandum No. 33 (revised November 2000) (Appendix J). The departmental procedure is as follows:

1) Informal conciliation – the student is encouraged to resolve their grievance directly with the faculty or staff member(s) most directly concerned. The director of the graduate program or the chair of the department shall facilitate this resolution. Should this informal conciliation fail, the Dean of the Graduate School shall designate an Associate Dean as the informal conciliator for the Graduate School, with or without involvement of the Ombudsman. If the student is dissatisfied with the informal conciliation, he or she may file a formal complaint with the Dean of the Graduate School within 10 days of the conclusion of the attempted informal process. As outlined in Memorandum No. 33, if the Associate Dean attempts informal conciliation directly, he or she may not be involved in subsequent formal complaint.

2) Filing of a formal complaint with the Graduate School follows exactly the process outlined in Memorandum No. 33.