

Students/Sackler School:

Nationally there has been a gradual decline in PhD applications, attributable in large part to the negative publicity regarding their overproduction and the subsequent tight job market. For Academic Year 1997-98, we had 1003 applicants, 99 offers of admission, and 30 matriculants. For Academic Year 1998-99, we had 817 applications, 104 offers and 35 matriculants; and thus far for Academic Year 1999-2000, we have had 882 applicants, 63 offers and, to date, 31 acceptances with the expectation of 35 matriculants. We continue to have excellent applicants from around the country and compete well with all but very large research institutions such as Harvard, Yale, Stanford, etc.

There is a growing recognition that nationally the job market for PhDs is changing, especially with the reduction in tenure-track positions. However, many Ph.D. graduates now are considering employment outside academe. To insure that our students are better informed about such opportunities, the Sackler School is developing a database of graduates' employment in order to create a more comprehensive alumni network. These graduates, many of whom work in industry and biotech companies, are a potential resource for our current students. Several alumni/ae not only have been invited to campus but also have been asked to give informational interviews. Students, themselves, organized a "Career Paths Seminar Series" that has been quite successful. The speakers included people in patent law, biotech industry, technology transfer, public policy, etc. One of the unanticipated benefits has been that students now feel more comfortable talking with their advisors about such alternative career paths without engendering their disapproval - clearly our faculty recognize that the job market is quite different today and such career exploration outside academe is more commonplace and necessary. (The Pew Foundation currently is funding projects on "Re-envisioning the Ph.D.") We also have increased Sackler School support for travel funds for students to present papers and attend important conferences in their research fields. Such exposure enables them to make contacts as well as strengthen their CVs so they are more competitive on the job market. One department has invited search firm executives to talk to their students about specific career opportunities as well as how to strategically market themselves for such careers.

The Associate Dean of the Sackler School has met with the Director of Career Services on the Medford campus to explore ways that her staff and program might be able to offer career advice to Sackler doctoral students. Because the Career Services Center limits its service to Arts and Science students, the Director agreed that there needs to be a collaborative approach to addressing the issue of career services for all University doctoral students. One possibility is cost-sharing a position (half-time) so that a career counselor could be on the Boston campus a day or two per week to meet with students about a range of issues, such as critiquing a resume, interview skills, etc.

Overall Sackler students believe that they are well cared for and not just a source of "cheap" teaching or lab labor for the University, which is often the perception in much larger schools. Our students also play an essential role in the research enterprise of the Health Sciences Center. To reduce student enrollment would damage the critical mass that we need to successfully compete for highly qualified students and grants

Faculty

Strengths: Tufts University Medical Faculty and Sackler School Faculty comprise a group of talented, dedicated researchers (basic and clinical), physicians and medical educators, with an outstanding record of obtaining competitive funding from government and private sources. The basic science departments, NEMC, St. Elizabeth's, and the other affiliated hospitals collectively bring in more than \$120 million annually in sponsored research. In the faculty are investigators who have been recognized for their outstanding research contributions by NIH MERIT grants, Javits awards, NIH outstanding investigator award, Howard Hughes Investigatorships, Pew Scholars, American Heart Association Established Investigators, American Cancer Society Senior and Junior Faculty Awardees. Just recently, Dr. John Coffin, a member of our Molecular Biology and Microbiology Department, was elected into the prestigious National Academy of Science. Dr. Ralph Isberg (Molecular Biology and Microbiology Department), has been a Howard Hughes investigator for several years. A recent award for one of the year's 10 most important papers in Science was given to a research paper authored by Dr. Brigitte Huber (Pathology), Dr. Allen Steere (Medicine/Rheumatology at NEMC), an MD/PhD student (Dawn Gross) and colleagues. Among the clinical faculty long recognized for distinguished clinical research, Dr. Jeffrey Isner (Cardiology at St. Elizabeth's), a Howard Hughes Investigator, is widely known for his genetic vascular research. Dr. Matthew Waldor of the Infectious Disease Unit at NEMC and the Sackler Graduate Program in Immunology recently visited the White House to receive a Presidential Early Career Award for Scientists and Engineers. In the fall of 1998, the ISI Citation Index ranked Tufts as sixth in the nation for the impact of its published research in Clinical Medicine. Other faculty members have received national awards recognizing their work. Most hold R01 grants from NIH. Faculty members also are recognized nationally by invitations to serve on NIH and NSF study sections, journal editorships, and professional and academic society leadership positions. Faculty also chair and organize many national and international conferences. Training grants support many of our graduate programs. In addition, there are program project and center grants crossing both basic science and clinical departments, including GRASP, the DARPA artificial nose project, the General Clinical Research Center, the Center for Adaptation Genetics and Drug Resistance, and a program project on limb development, to name a few. Recruiting of scientific staff is underway to strengthen the NEMC Molecular Cardiology Research Institute, with \$11 million of support from NEMC/Lifespan. Salaries for faculty at TUSM lag behind national averages; this fact, coupled with the high cost of living in Boston, makes recruitment even more difficult.

The clinical faculty include a dedicated core of clinicians from NEMC, St. Elizabeth's, Baystate, Lahey Clinic and the other affiliated hospitals that provide outstanding clinical training. As noted above, many do a considerable amount of first class clinical and basic research as well. The clinical faculty demonstrates a strong loyalty and commitment to teaching, even though their efforts are largely without financial gain to themselves or their organization. To date, the purchase of New England Medical Center by Lifespan (a Rhode Island based hospital system) has not acted as a barrier to our relationship with the School's primary teaching hospital (home base for all of the School's Clinical Department Chairpersons with the exception of Emergency Medicine and Neurology). What effect this new relationship may have on our clinical faculty in the future is unclear, but there is reason to be concerned about all of our

clinical affiliations as a result of the deteriorating reimbursement environment and the time pressure this puts on volunteer faculty.

Recruitment efforts in the basic science departments have been successful in attracting outstanding scientists in spite of the poor state of the current physical facilities. Not all recruitments are successful, however, in obtaining the first choice candidate, because start-up packages and facilities are not always competitive. Faculty strength in establishing collaborative and stimulating intellectual environments, with open scientific exchange, often plays an important role in obtaining outstanding candidates, despite highly competitive offers from elsewhere.

Weaknesses: The poor physical state of our current research facilities, combined with the scarcity of financial resources and "core" facilities, play a major role in failures of recruitment and retention of basic science faculty. The recent construction of modern research facilities at virtually every academic establishment in this area, as well as extensive core resources at these institutes puts the Tufts faculty at a disadvantage. While we have good core facilities in peptide synthesis and oligonucleotide synthesis and sequencing, we have not had transgenic services or cores in other molecular and structural techniques. Competitiveness also involves providing resources, both intellectual and facilities, in key areas central to modern research. These areas include genetics/genomics/bioinformatics, structural biology, core facilities to provide molecular biology services, creation of transgenic animals, and state-of-the-art imaging facilities. Some new cores will be available through the Molecular Cardiology Research Institute, including a transgenic facility for constructing transgenic and knockout mice, and a monoclonal antibody core.

Certain other areas of investigation and techniques that are fundamental to modern research efforts are lacking. A basic science-based Genetics department/graduate program in the Medical and Sackler Schools respectively is widely perceived by the faculty to be essential to research across all programs. Informatics/genomics research using many basic genetics models, and molecular clinical genetics are areas that should be represented. A stronger Structural Biology group would provide support and be an intellectual resource for enhancement and development of research programs and provide strength in recruiting.

A stable source of funds for interim support of scientists with a hiatus in grant funding and a source of pilot project money, or venture capital money would greatly enhance the competitiveness of our investigators and increase their chances of initiating and carrying out new projects. A number of departmental chair positions (both basic science and clinical) currently are open. This vacuum in leadership will affect the shape of development and growth in these departments in the coming years. Identification of resources to recruit and provide outstanding leadership for these departments is critical.

The large number of teaching sites requires a large number of clinical teachers with small time commitments to teaching, as well as a core of extensively involved faculty members. This large faculty poses challenges in definition of requirements for initial and continuing appointments and criteria for promotion in rank. As in most academic medical centers, financial

pressure raises questions about the ability of hospitals to support either basic or clinical research or undergraduate medical education.

Educational Programs (by Education Subcommittee):

While the current TUSM curriculum is successful by numerous measures, TUSM must be prepared for the many changes in health care that are affecting medical education content, methods of instruction, and financial support. As part of the TUSM strategic planning process, Dean Harrington convened a medical education subcommittee of faculty and administrators in the fall of 1998. Their charge was to provide a broad, analytic overview of how the curriculum fits within the overall mission of TUSM, to identify current problems in the undergraduate medical curriculum, and to predict future developments that will affect how and what we teach. They also were charged with focussing on creative approaches and potential solutions to current and anticipated difficulties, and providing recommendations for the next "action steps".

The subcommittee prepared an initial document that raised numerous issues for discussion with the TUSM community, particularly with course and clerkship directors, the Executive Council, and the Curriculum Committee. The dialogue identified additional concerns and possible solutions. The issues identified fall into four major categories:

I. Financing of medical education:

Without explicit funding, both adequate maintenance and continued development of the current curriculum will be extremely difficult. We (and virtually all medical schools) are experiencing a major crisis in medical education as historical sources of "cross-subsidy" are shrinking. Education of medical students requires significant faculty effort. Basic science faculty are heavily dependent on research grants for salary and research funding in an era of increasing competition. Clinical faculty, mostly volunteers, or paid only modest stipends, teach the majority of the TUSM curriculum; they are under increasing pressure to generate clinical income or obtain more grants.

Recommendation:

1. Mount a campaign specifically for an endowment for medical education. The funds would be directed towards supporting endowed teaching positions, supporting key faculty, promoting new initiatives, and improving teaching facilities.

II. Curricular content and methods:

Ongoing information overload, demands for new content, increasing expectation for non lecture-based teaching methods, and movement of clinical teaching to dispersed outpatient settings are examples of forces challenging our curricular content and methods. Exploration of new teaching methods and tools to increase efficiency of learning and information access, such as the Health Sciences Database, must be coordinated and supported throughout the curriculum. As ambulatory teaching and clinical integration in years one and two expand, we must assure both the quality and number of necessary teaching sites and clinical faculty.

Recommendations:

1. Establish a subcommittee of the Curriculum Committee, with protected time/financial support, to evaluate intensively the curriculum and recommend changes to meet TUSM educational objectives, to integrate fully the curriculum, and to promote lifelong learning.
2. Commit the resources necessary to create sufficient infrastructure for Information Technology (IT) and medical informatics.
3. Unite affiliated clinical sites by bringing Tufts' skills and knowledge to the sites for UME, GME, and CME in areas such as curriculum, research, faculty development, and IT/teleconferencing expertise.
4. Create and support a new model for education in the ambulatory setting, such as by making the student a "value-added" member of the community-based practice.

III. Monitoring quality and outcomes of instructional effectiveness and curricular revision:

We must assure that we have "continuous quality improvement" measures for our curriculum, both for monitoring the effectiveness of the current system as well as for assessing the impact of future revisions. While the current Evaluation System of the curriculum serves as a good foundation, we need more systematic evaluation of the competency of both our students and graduates.

Recommendations:

1. Develop a system to survey recent graduates and their residency program directors to assess the quality of a TUSM education.
2. Expand the use of specific measurement tools such as standardized patients and interactive online exercises to assess systematically each core competency attained by the students.
3. Ensure that results of each evaluation tool are transmitted to faculty to aid in curricular revision.

IV. Implementation of curriculum, faculty development and educational resources:

Maintaining and enhancing the quality of the TUSM curriculum requires faculty time, resources, and professional support. More than simple remuneration of time (which neither TUSM nor other private medical schools can afford), TUSM must create an infrastructure that rewards and supports faculty (especially clinical faculty) in their education-related activities.

Recommendations:

1. TUSM should give greater weight to teaching in the promotion process.

2. Commit funds for intramural educational grants to foster faculty-initiated projects.
3. Provide support for medical education grant writing to assist faculty with external grants.
4. Establish a “Director for Medical Education” for each department/discipline/affiliated site to be the TUSM liaison and to provide local support to faculty.
5. Create and support a system for developing “medical educators of the future”.
6. Provide resources and support for development of curricular materials including IT tools.

Opportunities to improve the academic standing of TUSM

Tufts University School of Medicine has built a reputation as an educational innovator in areas such as combined degree programs, hybrid Problem-Based Learning models, managed care education, and computer-assisted teaching and learning through the Health Sciences Database, which is unique in the country. Each of the challenges noted above provides the opportunity for Tufts to achieve even greater standing in the national and international academic community. Providing the direct funding for key educational initiatives (item I) and building the necessary infrastructure to support the teaching faculty (item IV) are essential if Tufts wishes to recruit and retain top faculty, foster their development, ensure that the standards of excellence in our tradition are maintained, and create a cadre of innovative medical educators who will train the next generation of physicians.

“New Course” Subcommittee on Medical Education:

M. Lee (chair), D. Albertini, R. Dickman, F. Scholz, L. Sonenshein, P. Wang

Research (by Research Subcommittee)

Introduction: Over the last year TUSM/Sackler research has enjoyed considerable public attention. The Institute for Scientific Information rated Tufts number six in the country for the impact of its Clinical Medical research for the period 1993-1997; a collaboration by members of the TUSM basic and clinical faculties was selected by the journal *Science* as one of the ten most important papers published in science for the year, and was one of only two papers in biology chosen; a member of our clinical and Sackler School faculty (Dr. Matthew Waldor) was chosen to receive the Presidential Early Career Award for Scientists; and a member of our basic science faculty (Dr. John Coffin) was elected as a member of the National Academy of Science. Such national recognition attests to the quality of the TUSM faculty and the research they conduct.

At present, total sponsored research at the TUSM/Sackler Boston campus is approximately \$40 million. When combined with NEMC research (approximately \$60 million) and other TUSM hospitals (St. Elizabeth’s, Baystate, Lahey), the total amount of sponsored research from all Tufts-affiliated medical campuses reaches approximately \$120 million per year. A major portion of TUSM/Sackler research is funded by the National Institutes of Health (NIH). The NIH ranked the medical school 57th among 125 U.S. medical schools in terms of total NIH research awards in 1998. The reason TUSM does not occupy a place in the top 50 schools is because it

does not own its major teaching hospital, NEMC, which annually accounts for almost \$39 million in NIH research. If NIH research from TUSM and NEMC were counted together, the medical school would rank with the University of Wisconsin Medical School, which at number 30 with \$72 million in federal research grants, is able to count both hospital and medical school grants together. Thus, the long-standing division of TUSM and NEMC research into “separate silos,” has an adverse impact on “objective rankings,” whether rendered by the NIH or U.S. News and World Report. TUSM/Sackler research, particularly in microbial pathogenesis, structural biology, immunology and cell signaling, is outstanding. Nonetheless, there are weaknesses in the area of human genetics (see below) and there has been a paucity of recruitment of funded basic science researchers at the associate professor and professor level.

Capital Improvements: The Jaharis Family Center for Biomedical and Nutrition Research will be a reality in approximately two years, adding 180,000 square feet of research space. Renovation of the infrastructure of the M&V complex at 136 Harrison Avenue has been approved by the Trustees. A strategic priority is the planning for additional new research space. Continued growth of research requires full renovation of the M&V complex and construction of a "twin" to the Jaharis Building. Priority should be given to joint program planning with New England Medical Center, St. Elizabeth's Medical Center, and other affiliated hospitals for the development and utilization of such space; some of this space can be utilized for the recruitment of biotechnology firms to rent the space commercially. Provision of sufficient space for commercial exploitation also could permit TUSM/Sackler-generated “biotechnology spin-offs” to be housed on campus.

The M & V complex must be provided with emergency electrical backup generator. The faculty has identified this as a critical issue involving faculty safety (i.e., chemical hoods must continue to function during power failures), as well as the preservation of critical research (cell lines, etc.) It will cost approximately \$ 1 million, but it is necessary.

Operational Goals: Tufts University School of Medicine and T-New England Medical Center will increase the unification of their research activities, involving joint program planning, strategic planning, and operations. This should result in the development of greater collaboration amongst investigators, the awarding of more program project grants, and greater efficiency. TUSM and NEMC will also develop, where feasible, joint technology transfer programs. Additionally, TUSM will explore development of joint research commitments with St. Elizabeth's Medical Center, Baystate Medical Center, and the Lahey Clinic.

Programmatic Goals: We will build and maintain an expertise database for the entire medical school faculty. Utilizing the "Community of Science" (COS) database, medical school and university officials (and corporate customers of COS) can instantly assess their capabilities in any area, provide uniform faculty profiles for the maintenance of faculty records, and use such a database for strategic planning for initiatives in various areas. Sufficient funds to keep the database updated will be provided; while these funds are minimal, this remains a critical investment in further developing research capabilities.

TUSM will increase medical student research participation (a committee currently is working on this issue). Additional opportunities for student summer research with TUSM endowments will be created. Rewards for faculty mentors taking on non-Ph.D. students would further help to raise faculty consciousness in this area.

The creation of a TUSM/Sackler intramural research fund, modeled after the NEMC Research Fund, and focused on pilot projects (rather than interim support), should be examined. At NEMC, the intramural research fund results have been extraordinarily encouraging – each dollar spent on interim support grants has returned \$4.62 in indirects, while each dollar spent on pilot projects has returned \$1.44 in new indirect cost recovery dollars. Thus, even focusing on the more risky pilot project area brings a 44% return on investment. The goal should be the creation of a \$500,000/year annual investment in pilot projects, selected by a peer-reviewed intramural process. Such a fund can provide great stimulation for the growth of subsequent sponsored research.

Clinical research, particularly pharmaceutical research, has become a major activity in many academic medical centers. TUSM will capitalize on its rich network of academic medical centers and integrated health delivery systems, which include NEMC/Lifespan, Baystate Medical Center, Caritas Christi, and Lahey Clinic, to develop a Contract Research Organization (CRO) or Site Maintenance Organization (SMO) to attract additional clinical and pharmaceutical research.

Academic Programmatic Goals: A major University and TUSM strategic goal is the development of a university-wide genetics program, with the establishment of a Genetics Department located at the Medical School. The Genetics program will combine genetics and molecular biology expertise from the Schools of Medicine, Arts and Sciences, Engineering, Veterinary Medicine and Dental Medicine, as well as NEMC. Strong relations with other Boston universities also will be explored. This Department will help teach genetics throughout the university and will provide programmatic input to each academic area. TUSM and the university will recruit a well-respected geneticist to head and build this program.

The Departments of Pathology and Anatomy will be reinvigorated with the appointments of seasoned academic chairs.

TUSM will recruit, in cooperation with NEMC and the TUSM/NEMC Cancer Center, several world-class oncologic researchers. Recruitment has begun to fill the Desforges Chair with a research oncologist/molecular biologist. Additional research oncologists will be recruited in medical oncology, pathology, gynecologic oncology, surgical oncology, and pediatric oncology.

Nine additional staff researchers will be added to the Molecular Cardiology Research Institute at NEMC over the next three to five years. These positions already have been funded and are being actively recruited. The emphasis will be on vascular biology, with investigators in areas of cell signaling and genetics, added to the MCRI.

A program will be established at the Ph.D. level in the Sackler School to develop clinical investigators. Robust programs in medical decision making, medical informatics, epidemiology, and study design will be integrated to develop a post-graduate curriculum for the training of clinical investigators. A central theme for all of the above initiatives will be to increase the degree of cooperation between basic and clinical scientists at all our clinical affiliates, and to increase the level of translational research that brings basic observations to the bedside.

To summarize, while the state of TUSM/Sackler research is currently healthy, our current level of accomplishments will not endure without continued re-investment and growth. Continued integration of TUSM/Sackler and NEMC research efforts, increased collaboration with investigators at St. Elizabeth's, Baystate, and the Lahey Clinic, the addition of more research space, and the recruitment of additional research faculty, all are required to maintain and improve the capability and research reputation of TUSM:

(by Research subcommittee: J. Gelfand, Chair; L. Lasagna, B. Stollar, C. Squires, H. Selker, M. Mendelson, D. Bianchi)

Development and Alumni Relations

The Office of Development and Alumni Relations for Tufts Medical School and the Sackler School has made significant progress in the last five years. Most importantly, the program now is seen by alumni, faculty and other key constituents of the Schools as stable and responsive, allowing us to develop the kind of longer-term relationships that will pay dividends. TUSM Development has completed, with superb assistance from our colleagues in University Development, the most ambitious building fund project in Tufts' history. In doing so, TUSM has exceeded its Tufts Tomorrow Campaign goal of \$83 million with more than a year remaining. These successes have brought a more sophisticated understanding by the schools' leadership of the fund raising potential of TUSM, as well as rising expectations by the faculty.

Of the top ten priorities identified by the 1999 Strategic Planning committee, fully half depend heavily on fund raising. They goals include (the numbering refers to the overall priority list of goals-see below):

- 1) Increasing the endowment by an additional \$200 million within six years (including a teaching endowment for \$50 million; an endowment for tuition scholarships; doubling the number of endowed professorships; and increasing alumni loyalty);
- 2) Creating a Department of Genetics (likely to cost \$5million or more);
- 3). Adding more research space/buildings;
- 7). Improving student amenities;
- 7). Increasing research funding from industry and foundations (the double "7" simply means these two priorities could not be distinguished by the Committee).

Endowment for scholarships, professorships, and a "clinical teaching fund" will depend on the generosity and foresight of alumni, parents and friends, as will raising monies to enhance student amenities. Building a Genetics Department will require million dollar gifts from

individuals, as well as major support from corporations, foundations, and federal agencies. The same prospect "mix" will be needed to raise monies for more research space and new buildings, similar to what we have seen with the Jaharis Family Center. Grateful patients, as a prospect category, cannot now be utilized. Unless and until we develop the kinds of linkages with our major affiliated hospitals that will allow us to raise monies from patients for programs that will benefit both the medical school and the hospitals, we must rely on alumni, parents, friends, corporations, and foundations. A unified external relations program encompassing communications, public relations, marketing, and development would help to bring about the linkages we envision. Such a program would make the concept of "Tufts Medicine" a reality.

TUSM has some 7000 living alumni. Of that number, approximately 2700 are over the age of 55, with another 1000 or so are between the ages of 45 and 55. Thus, about one-half of the living alumni are in their "peak" giving years. The vast majority of the alumni live in the northeast and middle-Atlantic states. The remainder live in California, the southwest, and Florida. This cohort is TUSM's best hope for endowment and student amenities support. Some will give outright gifts, but many if not most will make planned gifts of some sort. Thus, the Development staff needs to be trained in planned giving and must continue to work closely with the Planned Giving office in University Development. TUSM's key prospect pool has made more money in their practices, specialties, investments and retirement funds than any other medical school cohort in Tufts' history. Thus, there is an historical opportunity to get them "engaged" in TUSM, before they finalize their estate planning. The overwhelming majority are not "engaged" as the case for support has not been made to them personally. As a measure of the potential, TUSM has averaged almost \$3.12 million a year in planned gifts over the last four fiscal years, and expects to reach a similar number in FY99. Personal involvement is the key. Younger alumni, the future of TUSM fund raising, must be cultivated through the Medical Fund. The percent of Medical Fund gifts given by alumni after a personal visit approaches 75%.

Capital support for TUSM and Sackler for the years FY92-FY98 averaged about \$9.6 million. The FY96-FY98 average is \$10.8 million (not counting the \$10 million Jaharis challenge gift). FY 99 currently stands at \$13.5 million. The rise in capital giving is due to an increased emphasis, and success, in planned giving, and an increase in major gifts. Corporate support has increased over the last three years, primarily through the funding of endowed professorships, and faculty-initiated research support. The addition of professional staff has played a major role in the rise in individual gifts. TUSM has two experienced, productive individual gifts development officers, as well as a senior director.

With the staff as currently constituted, TUSM development must choose its priorities carefully, recognizing that it cannot give equal weight to all. Yet the Medical and Sackler schools have major fund raising needs in the near term, all of them "additive", thus requiring new dollars. Accordingly, three areas would benefit from increased staff resources: individual giving; corporations and foundations; and the Fund for Tufts Medicine. The 1999 Strategic Planning Committee believes that TUSM Development should build its resources as follows:

Individual Gifts: 2-4 development officers

Staff Assistants: 2 (one for major gifts; one for Medical Fund)

Corporate and Foundation Relations: make current officer full time for
Medical/Sackler Schools

Fund for Tufts Medicine: 1 development officer for young alumni/ae giving

TUSM/Sackler compete for funds in the most competitive biomedical environment in the world without the benefit of a formal grateful patients program. Recent successes prove that the programs of Tufts Medicine can attract major support. Success breeds success, especially in fund raising, and to be truly competitive, we must build on our strengths.

Health Sciences Library (HSL)

The HSL, a modern 41,000 net square foot library, seats 500, with 55 public work stations, including 16 in a teaching laboratory. With a working collection of more than 150,000 volumes and 1,200 journal subscriptions, the HSL addresses the information needs of the educational, research, management, and patient care programs of the schools of medicine, dental medicine, and veterinary medicine, the Sackler School of Graduate Biomedical Sciences, the Jean Mayer USDA Human Nutrition Research Center on Aging and the New England Medical Center Hospitals. Since 1991, the HSL has offered MEDLINE and other databases free to all faculty, students and staff through the vendor OVID. The university-wide library system from Data Research Associates, St. Louis, is a comprehensive system maintained by the library technology office.

Strengths and Weaknesses: The library's strengths are its knowledgeable staff, its educational services, its web pages, and its strong links and integration with curriculum needs, the most recent example being the Health Sciences Database, the digital curriculum database. Tufts Health Sciences Library's current strengths and weaknesses relative to 141 respondents/competitors are described below. The comparative data are from the 21st Edition of the Annual Statistics, 1997/98, the latest publication of the Association of Academic Health Sciences Libraries. Annual Statistics provides comparative data on significant characteristics of collections, expenditures, personnel and services in medical school libraries. These libraries hold 'institutional' or 'affiliate institutional' membership in the Association of American Medical Colleges, as well as all osteopathic medical school libraries in the United States. Libraries at 133 allopathic and 8 osteopathic medical schools are included, for a total of 141 respondents. Although as large as many of its 141 comparative group members and serving similar sized user groups, the Tufts Health Sciences Library is below the mean in most categories.

Collections:

Tufts Health Sciences Library's collection is below the comparative group mean in every category: total volumes, monographic titles, monographs added, print serials, electronic serials, and total numbers of serials. The mean number of monographic titles is 84,119, Tufts HSL is 50,264, 40 % below the mean; the mean total numbers of serials title is 1907, HSL's is 1480, 22% below the mean.

Expenditures: Information Resources:

Tufts Health Sciences library's expenditures for serials, monographs, total collections and external information resources is well below the mean in all categories. The mean for serials

expenditure is \$814,549, Tufts HSL is \$697,478, 14% below the mean; the mean for monographs is \$116,746; Tufts HSL is \$81,477, 30% below the mean.

Total Recurring Expenditures:

The total recurring expenditures comparative group mean is \$2,282,609; Tufts HSL is \$1,915,459, 16% below the mean.

Staffing and Staffing Expenditures:

The mean salaries and wages for the comparative group is \$1,013,298; Tufts HSL amount is \$877,082; 13% below the mean; the mean for the total number of staff is 35.67; Tufts HSL is 28.04, 21% below the mean.

Educational Service Activity:

Tufts Health Sciences Library's educational and orientation programs are above the comparative group mean. The group mean for numbers of educational sessions is 145; Tufts HSL is 160; the group mean for numbers of orientation sessions is 46; Tufts HSL is 120.

Threats to Market Position: These strengths and weaknesses affect TUSM's market position. Present-day medical students are extremely computer literate. They attended colleges and universities with Internet 2 generation networks, wired dorms, e-mail and universal WWW availability and much individual support. They expect comparable support or more as they enter their graduate professional schools. Students have their own set of requirements and expectations for studying, communicating, learning and developing life-long learning skills. They compare institutional resources when "shopping" for schools. Faculty depend on in-depth subject resources, rapid delivery of requested material, and technical and software instructional support for teaching, research and clinical care. Today there is greater emphasis on digital electronic journals and digital curriculum, e-mail communication, and WWW for needed resources. That said, the printed word, the print journals reaching back in time and the standard texts and atlases, remains a constant information source and required reading. The libraries must manage both print and digital resources, provide support, education, training and be able to retrieve and deliver any and all requested materials rapidly. Information technology and information management are at the heart of all medical library systems as well as being a substantial partner in medical informatics and the medical school curriculum.

A serious consideration for all departments is the recruitment and retention of outstanding and well-qualified staff. Many of the senior library administrative and departmental staff librarians in this category have lengthy tenure. Most were attracted by the early efforts in the mid and late 1980s to improve the library, which included a new building, expanded staffing and budgets and state-of-the-art infrastructure and technology. That scenario was over 15 years ago, progress has halted, other critical priorities have "muscle out" the needs of the library, most staff are carrying several job responsibilities because the library is understaffed, and information technology is a constant struggle.

HSL Strategic Directions: Current Strategies: Clearly, fund raising is the direction we must take to remedy the crisis in the library budget and library priorities. The top funding priorities are the collections, staffing, and information technology. Duplication within the school must be eliminated, partnerships formed, and librarian specialists encouraged to be creative and expansive in information resources access and delivery and in information management and integration. To this end the University Library Council (ULC) is working closely with the Library Board of Overseers, the University Development office, and administration to raise endowment funding and create a grass roots Friends of the Libraries organization for the future. In addition the library director applies for grant funding at every opportunity, raising more than \$500,000 dollars over the past decade.

HSL Future Strategy : Funding Prioritie

Public Workstations/Electronic Classroom: The Learning Resource Center, the library's multimedia center, houses the only public computer laboratory for the Health Sciences Campus. The course-reserved slides, video and other multimedia are distributed here. The digital curriculum and electronic, networked and WWW resources are accessed in the computer laboratory. Staff, librarians, and faculty conduct training and teaching sessions using the LRC computer laboratory resources. This entire LRC facility needs renovating and updating. With respect to teaching needs and equipment, 1999 is very different from 1986, when the building was completed. The video and sound projection system is outdated, the furniture is not functional nor ergonomic, and there is no electronic teaching console/workstation to facilitate instructors use of multimedia or network resources. Albeit heavily used and well staffed, the equipment and software are out of date due to the immense technological revolution going on around us. Potential costs range from \$250,000 to \$400,000 for a one time renovation with approximately \$100,000 every 3 years for renewal and upgrading network, wiring and furniture. An endowed fund generating \$80,000 - \$100,000 every two years would provide needed update monies to upgrade computer workstations and software.

Health Sciences Database, HSDB: The Tufts University Health Sciences Library (THSL), in collaboration with the Curriculum Committee and the Office of Educational Affairs, is spearheading the creation of digital multimedia resources that will address both the changes in medical education and changes in clinical care. Multimedia digital objects, images, sound, movies, and texts are being linked together to create dynamic interactive teaching documents. Large collections are being created, integrated and cross-referenced though hyperlinks created with a uniform indexing language using the NLM Metathesaurus. Funded through a grant from the National Library of Medicine and the School of Medicine, HSDB is now into its third full year. The start up monies and grant funds allowed proof of concept; the HSDB now is an integral piece of the curriculum needs. Needed are support for both staff salaries and development application. The annual operating budget is approximately \$250,000. Endowment funding of \$4-6 million dollars would help to fund this project and to support a unique database for the health sciences schools.

Collection Development: As the numbers of science and technology journals increase (now somewhere near 30,000 world wide), as the price of health sciences journals escalates 15% annually, as more and more electronic journals are available, and as reference materials are digitized and offered electronically, the library's operating budget has remained at a static 4%

annual increase. The library budget has not kept up with the print needs because of escalating journal prices. Moreover, the demand for even more information resources available electronically means more demands on an already stressed budget. Endowment for collection is a critical need. An additional 10-15% annually of the current book and journal budget would provide the ability to keep up with inflating journal prices and with the addition of new formats and more electronic resources on the network. A "Collection Endowment" of \$1.5 million would generate an additional \$60,000 per year.

Endowed Library Director Chair: An endowed library director chair would provide both a budgetary relief and recognition of the importance of the Health Science Library Director position. Today, library leadership is paramount for effective information management and information access. An endowment would assure the recruitment and retention of the best professionals; \$1.5 million is required to endow the library director chair.

Information Technology

Strategic Goals: Expand the use of videoconferencing and digital multimedia to more effectively support academic and administrative functions and to provide better linkages between TUSM and its affiliates. The design of the University data network is more than ten years old and will not support high-demand applications such as streaming video or multimedia. The TUSM Office of Information Technology has to work closely with Tufts Computing and Communications Services (TCCS) to identify problems with our current network, identify user needs, and develop plans for the installation of an advanced data network on the Boston campus. The Educational Media Center, together with the OEA, has been orchestrating videoconferencing sessions among selected affiliates using ISDN telephone lines for several years. More recently, we have begun to experiment with Internet protocol-based videoconferencing as part of the planning exercise for a new data network. The University's advanced network will be designed to support the next generation Internet (Internet 2) and other high-performance protocols. More extensive trials and development efforts will be required so that we will be in position to take advantage of these emerging technologies.

Specific Objectives:

1. An advanced data network on the Boston campus with Internet 2 connectivity.
2. Enhanced collaborations with IT organizations at all of our affiliates in support of videoconferencing and distance education programs.
3. Improved access to the Health Sciences Database and other electronic information resources.
4. Videoconferencing facility for Sackler 8.
5. Upgrade lecture halls and classrooms to support digital multimedia.
6. Development work, in collaboration with TCCS, for advanced networking applications.

Improve research computing services and support. The University's research computer (Amber) provides our faculty and students access to the Genetic Computer Group (GCG) software package and the current releases of several protein, nucleic acid and genetic databases. This computer will be replaced within the next 18 months. We will work with TCCS and the other

schools to determine the functional requirements for the new system. Efforts will be made to identify future research needs particularly in the area of genetics, structural biology and image analysis and plan accordingly for a replacement system. In addition to the central research computer, many of our investigators use separate laboratory workstations and servers for research computing. Support and maintenance of these systems generally have been minimal, resulting in security breaches and loss of data on the compromised systems, as well as on other systems attached to our network.

Specific Objectives:

1. Actively participate in the planning for the replacement of the University's research computer
2. Provide investigators with guidelines and training for proper laboratory workstation administration
3. Establish policies and procedures to protect research data and enhance the security of our various systems and our network
4. Help implement a university-wide software site-licensing program

Redesign the school's administrative databases to facilitate the sharing of electronic information among our various offices and with national associations and agencies. The school relies on more than a half a dozen separate databases to support our administrative offices and functions. Plans have been developed to re-architect our databases so that they will all share a common structure, format and interface. This plan will improve the functionality of our databases, facilitate information interchange and enhance our ability to support and train our users.

Specific Objectives:

1. Redesign the faculty and the course-scheduling databases to more efficiently track our faculty and their contributions to our academic programs
2. Utilize a standardized architecture for all of our administrative databases to facilitate data sharing and provide better and more cost-effective support and training.
3. Develop secure web interfaces for our databases to expedite the collection and sharing of information among our departments and our affiliates.
4. Work with the AAMC, COS and the University to implement electronic data exchange protocols

Utilize the Web and electronic messaging to more effectively market our programs and provide services to our students, alumni and faculty. The Web and electronic messaging services are rapidly growing in importance for communication and for transacting business. Our departments, programs and offices currently utilize several different web sites and e-mail/messaging systems. Coordination of the web-based information presented by the Medical School, the Sackler School, the Development/Alumni Relations Office and our affiliates is essential to promote the unifying concept of Tufts Medicine and efficiently administer a geographically dispersed organization.

Specific Objectives:

1. Formation of a Web Oversight Committee
2. Develop policies and systems to ensure that the information presented on our web sites is current and that our sites are easily navigated and effective
3. Work with TCCS to develop a unified directory and electronic messaging system

Improve access to information technology resources and training. The Multimedia Resource Center (MRC) is our 90-seat computer laboratory with a separate, adjacent 90-seat lecture hall. This facility is used primarily for course-associated computer laboratory sessions and for faculty and staff training. The utilization of this facility (like that of the HSL's public-access laboratories) has increased markedly over the past several years. We recently installed eight public access terminals in the lobby of Sackler 4 to meet increasing student demand for access to e-mail. During the next five years, we likely will see dramatic changes in the way we connect with and use our computer networks and networked information. Portable devices will become the norm and "anywhere/anytime access" will be expected. Major changes in our network infrastructure (see #1 below) and in user identification/authorization mechanisms will be required to make this feasible at Tufts. Since this will be a multi-year process, we will need to address the immediate needs for better access to information technology and at the same time try to anticipate changes in our needs and in current technology.

Specific Objectives:

1. Work with TCCS to develop nomadic computing capabilities (i.e. the ability to connect a notebook computer or PDA to our network, via wired or wireless connections, with appropriate authorization, authentication and security)
2. Improved access and/or redesign of the MRC and the HSL computer laboratories
3. Coordinate user support and training programs with TCCS and the HSL
4. Work with TCCS and Physical Plant to plan the IT infrastructure for the Jaharis Family Center for Biomedical and Nutrition Research

Strategic Directions

Current Strategy:

TUSM remains committed to its essential mission of providing a comprehensive medical educational experience and advancing the science of medicine. In the early 1960's, TUSM moved from being a New England-based medical school with a reputation limited to graduating strong clinicians (which we still do) to a national medical school, recognized for both its educational and its research accomplishments. Over the last 35 years, the growth in research at TUSM has increased dramatically to its current level of approximately \$40 million in sponsored research, compared to only a few million dollars in the 1960's. TUSM now is recognized as a high-quality (and high-priced) private medical school, rigorously training its students in clinical medicine, while simultaneously carrying out first-class clinical and basic research. Equally, we pride ourselves on being, and are recognized as, a wonderful place for students to learn, and for faculty and staff to work. The oral exit report of our recent LCME site visit commended the school as follows:

- a) services and support to students from the Office of Student Affairs are "exemplary" and greatly appreciated by the students;
- b) by his leadership and example, the Dean has established an atmosphere of optimism within the school. Students and faculty, who are exceptionally loyal and highly committed to the school's success, reflect this optimism. Of special note is the dedication of faculty across all departments and affiliated institutions to excellence in teaching.

Our recognized "identity" thus is an amalgam of strong educational programs in both the pre-clinical and clinical years, a high-quality clinical and basic science research enterprise, and exemplary student services. In fact, the LCME, in its recent oral exit report, noted that:

- a) the curriculum committee is effectively organized and thus manages a complex educational enterprise in a well-coordinated fashion;
- b) there has been significant progress in creating and promulgating educational objectives; vertical and horizontal course integration; and formalized course evaluation, due in large part to the collaborative efforts of Dr. Mary Lee (Dean for Educational Affairs) and Dr. Paul Wang (Chair, Curriculum Committee);
- c) the school has successful and strong clinical and basic science research programs with high-quality, well-funded faculty;
- d) the affiliated hospitals value their role as educational sites for the medical school.

In terms of the important and unique characteristics of the school, we believe that the strong cadre of high quality teaching affiliates; the growth in our combined degree programs; the creation of our Center for Learning (in the Office of Educational Affairs); the creation of the Health Science Database; our collaborative programmatic links with other schools within Tufts (Engineering, Fletcher), other colleges (Brandeis, Northeastern, and Emerson) and other medical schools (Brown, with whom we collaborate in a shared Center for Aids Research and shared department chairmen in Otolaryngology and Radiation Oncology); and the rich variety of

programs that encourage student involvement in social service, community service, and research (eg. Sharewood, a student-run free clinic; Kids in Chemotherapy, which pairs students with children who are undergoing cancer chemotherapy; and summer opportunities in both basic science and clinical research) exemplify the creativity of the school in raising itself to a higher level over the last decade. Again, comments from the recent oral exit report of the LCME site visit team support this contention:

- a) the Health Science Database is a unique and powerful educational resource for students and faculty;
- b) the multiple combined degree programs offer a unique opportunity for selected students and enhance the overall academic environment of the school.

We remain committed to our long-standing mission and objectives and believe that they fit well with the University objective of being a student-centered, Research I university. The recent development of two new programmatic links with other schools of the University (Engineering and Fletcher) demonstrate that we are, and will remain, a critical component of the University.

Future Strategy:

The 1999 Strategic Planning Committee strongly endorses the conclusions reached by the LCME Steering Committee (items 1 to 10 on pages 5 and 6 of the Full Report). Overall, the Committee proposed that the school work to achieve recognition as being in the top 20 percent of all US medical schools (as a matter of fact, most of the faculty believe that's where we are now!). The impact of Tufts Medicine on society at large often is less than optimum and a carefully orchestrated and integrated program of External Relations (Alumni and Public Relations, Publications, Communications, Fund-Raising) will be required to remedy this defeat. To achieve our internal goals, TUSM needs to build a larger, stronger development team; increase endowment to reward clinical faculty at all our affiliated clinical sites and to provide more scholarships and low-interest loans for our students; remain committed to the vision of a stronger basic science research program (e.g., new Department of Genetics; full rehabilitation of the "M&V" complex; construction of a "twin" to the Jaharis Biomedical Nutrition Research Building); rebuild the Anatomy and Pathology Departments; recruit Chairs for the six openings in basic and clinical departments; support development of the HSL in its myriad needs and continue the exciting educational work of the Center for Learning and the Office of Educational Affairs.

At its spirited April 10, 1999 meeting, the Strategic Planning Committee ranked its priorities. The Committee stressed the need for additional discussion by all constituencies of the medical school of these priorities over the next six months. The priorities, listed in order of importance, are as follows: ("double numbers" reflect committee's inability to distinguish between the two):

1. Achieve a \$200 million addition to endowment by 2005-2006.
 - Establish a Clinical Teaching Endowment of \$50 million
 - Increase endowment funding for tuition scholarships and low interest loans

- Increase corporation and foundation support
 - Double the number of endowed chairs to support clinical teaching (aiming for at least one chair in each clinical department.)
 - Increase Alumni/ae loyalty to TUSM (including housestaff at our teaching affiliates).
2. Create a Department of Genetics (likely resources required: \$5 million; 5,000-7,500 sq. ft).
 3. Create additional up-to-date research space/buildings (external facelift and internal remodeling of the M&V complex; build a "twin" research building to the Jaharis Building).
 4. Recruit and retain first-class faculty and chairs.
 5. Rigorously examine the curriculum - "think unconventionally".
 - Explore 7-year programs/no tracking
 - Experiment with medical curriculum review models
 - Develop research in medical education
 - Integrate Tufts post-grad training
 - Explore educational links to other health care practitioners
 - Combine 4th year Medical School and internship
 - Re-examine pre-med requirements
 - Continue judicious development of combined-degree programs
 6. Enhance the concept of Tufts Medicine
 - Improve structural and functional links between clinical teaching affiliates and TUSM
 - Integrate all external affairs functions within the school
 - Create better Tufts Medicine communication routes to allow information to flow freely and rapidly across major affiliates
 7. Enhance greater technology transfer and marketing of "products"
 - Increase research funding from industry and foundations
 - Selling of Tufts products (i.e.: CME and International Affairs expertise)
 8. Improve student amenities
 - Increase housing
 - Provide greater access to athletic facilities
 9. Increase % of New England students (approximately 25% now from West Coast)
 10. Re-define clinical faculty and requirements for appointment
 - Define clear criteria for "levels" of faculty (and hours of teaching required)
 - Increase loyalty to Tufts from faculty

Additional worthy goals include:

Strengthen the Development staff to raise funds necessary for support of new programs; Create a "true" tangible presence at Baystate Medical Center (TUSM's Western campus); Improve IT infrastructure (see IT plan above); Establish venture capital fund for support of start-up companies; Reduce tuition - achieve drop in ranking from virtually the most expensive to 7th or 8th most expensive medical school; Increase diversity of students/faculty; Change "needs blind" Admissions policy; Support the building of an endowment for the Health Sciences Library; Support all recommendations of Education and Research Subcommittees.

A preliminary financial analysis of the resources required to implement this strategic plan follows. This financial analysis will be reexamined over the next several months in concert with the planned arrival of two new senior administrators (an Executive Administrative Dean and an Executive Academic Dean) at the medical school this summer. In addition, several "campaign or

implementation teams" will be required to create reality out of this primarily analytic and goal-setting exercise.

Financial Overview:

The Medical School has enjoyed consistent growth over the past 15 years, with the operating budget for the fiscal year 2000 now totaling \$73 million. The Medical School has operated in the black for over 12 years. The growth in the budget has been due to increasing support for research by Congress (resulting in the generous NIH budget increases over the last 10 years), increase in funds from endowment (now approaching \$100 million vs. \$32 million in 1992), the creation of several new masters and combined degree programs, and consistent increases in tuition (of approximately 4% per year over the last decade).

The Medical School Strategic Plan has prioritized its goals so that TUSM will achieve its overall goal as one of the top 25 medical schools in the country. The number one priority is to achieve an addition to endowment of \$200 million for the medical school by the year 2005-2006. In order for this goal to be realized, significant increases in the staffing of our Development Office must take place. The staff increases are for 2-4 development officers for individual gifts, a new officer targeting young alumni, the addition of an half-time position for corporate and foundation relations, and 2 staff assistants to support major gifts and the medical fund. The cost of these additional personnel totals \$520,000, a significant commitment that we will phase in over three years.

Given the growth in our endowment (the result of a successful campaign and a robust stock market), we now can direct these new development officers, along with current officers, to focus on a Clinical Teaching Endowment of \$50 million. This lofty goal would yield approximately \$2.5 million per year for support of clinical teaching and curriculum innovations.

Realization of several other priorities (subsumed in the #1 priority of a \$200 million increase in endowment) will provide additional savings to the annual operating expenses of the school. Increased number of endowed chairs allows the schools to support clinical teaching, without adding direct expense to the instruction line. The ability to increase support for scholarships will enable the school to be competitive in attracting high quality students, not just well to do students. TUSM does not have the resources to support a substantial increase in scholarships from normal operations. Therefore, any increase must come from outside funding. We will aim for an additional \$3 to \$5 million for endowed scholarships so that TUSM could award fifteen half-tuition scholarships per year from the interest income.

Tufts University is committed to remaining a Carnegie classification, Research-I institution, and the medical school is an integral and necessary part of the equation. However, TUSM must have a tangible presence in genetics for teaching and research to hold on to this prestigious distinction. To this end, our planning committee has determined that the creation and support of a Department of Genetics is essential. We estimate that the price for such a department is \$5 million annually (our current department annual budgets range from \$2.5 million to \$7.5 million). The support will be derived from sponsored, endowment, and operating funds. Our assumption is that the initial start-up support will come from the Dean's dowry,

endowment, and operations. As is the case in all departments, the faculty in the department will have sponsored funding to support their operations, and the school will supply an appropriate amount of start-up funding (now, approximately \$250,000 per funded faculty member). As the development office achieves their goals for teaching support, any savings to the operating funds will be allocated to the support of this department. The annual cost to operate the new Department of Genetics from school funds is assumed to be \$400,000; additional growth in the department will be guided and controlled by the Dean.

As listed on page 25 of the Full Report, other priorities for the medical school exist, including the need for more research space and recruitment/retention of high-class faculty and chairs. There are numerous problems attaining and supporting increased space. However, in order to remain one of the top American medical schools, we must continue to support research and retain high-class faculty and students. The support of space and faculty can be achieved by a continued increase in TUSM's endowment. The overall method to determine what types of faculty to recruit will be decided by what is best for the School, not what is best for an individual department.

Even over the past four years, TUSM has experienced significant financial growth largely due to the success of new masters programs and our unique cadre of combined degree programs. These programs contributed an additional \$1 million in tuition income over the past year. The outlook in this area is for continued success given the new programs scheduled to begin in the next few years. These innovative programs are important both in attracting high quality students and in providing other sources of revenue for the school, while keeping the incremental cost of each program at a minimum.

We anticipate additional new sources of income for the school in the near future. The main potential new source is income from royalties for various products and technology derived from our high quality faculty. Our assumption is that this income stream in the next three to five years will total \$300,000 to \$500,000 annually. Technology transfers and patents for intellectual property need greater attention from the University in the hopes of assuring future income distribution for all of the schools. We have many faculty that are working closely with the office of the Associate Provost for Research to bring products and ideas into the market. The "fruits" of this activity will provide additional income for the School in the future.

While our strategic plan has recommended and ranked many resource-intensive priorities, TUSM has a history of operating within its means. The school has experienced only one operating deficit in the past 20 years. An increase in our development staff is essential for long-term viability of the medical school. TUSM will concentrate necessary resources to achieve growth and success in this area. We anticipate that we will remain positioned extremely well for continued success in the new millennium.