

**Department of Anatomy and Cell Biology
Temple University School of Medicine
Periodic Program Review – 2004
Self-Study Report**

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1. Mission and Vision

The Department of Anatomy and Cell Biology has two primary missions: 1) to provide excellent educational programs to professional students in the Schools of Medicine, Dentistry and Podiatry, and to graduate students in the School of Medicine, and 2) to participate in scholarly activities in pursuit of new knowledge in the biomedical sciences. The department has a rich history of strong educational programs for medical, dental and podiatric students in the areas of gross anatomy, histology/cell biology, neuroanatomy and embryology/human development. The graduate program has a record of training students for careers in academia and industry. Graduates of our programs are well-prepared for careers as clinicians and/or researchers in various disciplines and settings. Research in the areas of cardiovascular biology, neurobiology, reproductive biology and musculoskeletal biology utilizes cutting-edge, state-of-the-art techniques in cell and molecular biology to advance knowledge in these areas of the biomedical sciences.

Over the next 7 years, the goals of the department are to maintain an excellent teaching program and to strengthen our collective effort and reputation in biomedical research. The curriculum will continue to evolve with new trends and findings in the biomedical sciences, and with the rapidly progressing advances in computer-aided technology. Courses offered by the department will continue to focus on student-centered learning, and an interactive, small group environment which are important in helping students develop better problem-solving skills and to become lifelong learners. We will continue to incorporate the use of new computer-aided technologies into our courses as they can serve to improve student-centered learning and change the role of faculty in the educational process. In research, enhancing our effort and reputation will primarily be accomplished by increasing the number of faculty members with strong research credentials, and secondarily, by increasing the number of graduate students and post-doctoral fellows. Recruitment of new faculty will focus on targeted areas of research to strengthen interdisciplinary research programs. This approach will foster new collaborative interactions among investigators and create unique opportunities to obtain additional extramural funding. Increasing the size of the faculty and investing in interdisciplinary research programs will elevate our national research standing, allow us to increase the size of our graduate program, and help attract well-qualified professional and graduate students into our programs.

2. Faculty

a. Historical Perspective

The Department of Anatomy and Cell Biology is unique among the basic science departments in that it carries an exceptionally heavy teaching load accounting for approximately 46% of the entire basic science curriculum in the Schools of Medicine, Dentistry and Podiatry (see section on Professional Education for more details). Under past departmental leadership (prior to 1997), there was a disproportionate emphasis on the educational mission resulting in a department with an excellent reputation in teaching that was realized at the expense of its research mission, the other essential role of any basic science department. Realizing that the research potential was underdeveloped when the current Chairperson (Steven N. Popoff, Ph.D.) was appointed in July of 1997, it was his goal to enhance the department's efforts in research while maintaining its excellent reputation in the area of education. Faculty members with active research programs were encouraged to expand their programs with the expectation that increased activity would translate into greater productivity. In order to allow the faculty to enhance their

research efforts, teaching responsibilities were re-assigned so that the bulk of the teaching effort was distributed among those faculty members who were not active in research. Thus, the research and teaching duties were distributed in a more equitable fashion resulting in increased efficiency of all faculty members allowing the research-active faculty additional time to focus on expanding their programs. As a result, the department's research productivity has grown steadily over the past several years. There have been significant increases in extramural funding (grant submissions and awards) as well as publications and presentations at national and international meetings (see section on Research for more details). New and productive collaborations have been established between faculty (intra- and inter-departmental) at Temple University and with faculty at other Institutions.

The other way in which a department can strengthen its research efforts is through the recruitment/hiring of new faculty members. Until recently (see below), the recruitment of new faculty members in the School of Medicine was a rare occurrence despite the fact that during the past decade many faculty members retired or departed for other reasons. In Anatomy and Cell Biology, from the period of 1992 to 2003, there was only one new Presidential tenure-track appointment (Dr. Safadi in 1999) despite the fact that 12 full-time faculty members either retired or left. Additionally, the acquisition of the School of Podiatric Medicine by Temple University in 1998 resulted in the addition of a significant amount of teaching responsibilities in the basic sciences as well as the appointment of existing basic science faculty members from the School of Podiatric Medicine to the School of Medicine. For the Department of Anatomy and Cell Biology, this resulted in the addition of four courses and three faculty members on the presidential tenure-track. Since all three new faculty members were primarily teachers with inadequate research credentials, they were not considered viable for tenure. Since then one has retired, one has left and only one remains as a full-time Dean's appointment and he plays an important role in the education of professional students.

b. Current Status

Currently the Department of Anatomy and Cell Biology has fifteen (15) full-time and five (5) part-time faculty members (Table 1 and Appendix A), including one (Abdelkarim Sabri, Ph.D.) just appointed March, 2004 as part of the Dean's initiative to replenish the basic science faculty at the School of Medicine. Among the full-time faculty, fourteen (14) are on the Presidential tenure-track with twelve (12) tenured and the remaining two (2) in the pre-tenure period. Among the full-time faculty, there are three (3) Assistant Professors, five (5) Associate Professors and seven (7) Professors: One of the full-time Professors (Dr. Paavola) also has an appointment in the Dean's office as the Associate Dean for Graduate Studies at 50% annual effort (for details regarding the full-time faculty members in Anatomy and Cell Biology, please see individual *Curriculum Vitae* in Appendix B). Five faculty members are women and one is Asian-American. Among the part-time faculty, two (2) are Instructors, two (2) are Assistant Professors and one (1) is an Associate Professor. All part-time faculty have Dean's appointments that are renewed annually as needed to help teach in various courses. The volunteer faculty members have appointments based on their established research collaborations with full-time faculty members in the department. Dr. Owen is a Senior Research Investigator at Pfizer Global Research and Development collaborating with Drs. Safadi and Popoff, Dr. Barbe has a primary appointment in the Department of Physical Therapy in the College of Health Professions and collaborates with Drs. Safadi and Popoff, and Dr. Montgomery has a research position with Centocor, Inc. and collaborates with Dr. Litvin.

Table 1: Faculty 2003 - 2004

FULL-TIME FACULTY					
	Name	Degree	Title	Appointment	Status
1	Black, Mark M.	Ph.D.	Professor & Associate Chairperson for Research	Presidential	Tenured
2	Boyd, Robert B.	Ph.D.	Assistant Professor	Dean's	Non-Tenure Track
3	Lamperti, Albert A.	Ph.D.	Professor	Presidential	Tenured
4	Litvin, Judith	Ph.D.	Associate Professor	Presidential	Tenured
5	Marino, Thomas A.	Ph.D.	Professor	Presidential	Tenured
6	Oleszak, Emilia L.	Ph.D.	Associate Professor	Presidential	Tenured
7	Orth, Joanne	Ph.D.	Professor	Presidential	Tenured
8	Oxberry, Brett A.	Ph.D.	Associate Professor	Presidential	Tenured
9	Paavola, Laurie G.	Ph.D.	Professor	Presidential	Tenured
10	Pearson, Helen E.	Ph.D.	Associate Professor & Assistant Chairperson for Education	Presidential	Tenured
11	Pilder, Stephen H.	Ph.D.	Associate Professor	Presidential	Tenured
12	Popoff, Steven N.	Ph.D.	Professor & Chairperson	Presidential	Tenured
13	Sabri, Abdelkarim	Ph.D.	Assistant Professor	Presidential	Tenure-Track
14	Safadi, Fayez F.	Ph.D.	Assistant Professor	Presidential	Tenure-Track
15	Schneck, Carson D.	M.D., Ph.D.	Professor	Presidential	Tenured
PART-TIME FACULTY					
1	Aker, F. David	Ph.D.	Associate Professor	Dean's	Adjunct
2	DiPrimio, Raymond R.	D.P.M.	Assistant Professor	Dean's	Adjunct
3	Floros, Robert C.	D.P.M.	Instructor	Dean's	Adjunct
4	Speirs, Michael S.	Ph.D.	Instructor	Dean's	Adjunct
5	Washburn, Arthur	Ph.D.	Assistant Professor	Dean's	Adjunct
VOLUNTEER FACULTY					
1	Owen, Thomas A.	Ph.D.	Professor	Dean's	Adjunct
2	Barbe, Mary F.	Ph.D.	Associate Professor	Dean's	Secondary
3	Montgomery, Michael O.	M.D.	Assistant Professor	Dean's	Adjunct
EMERITUS FACULTY					
1	Conway, Francis J.	Ph.D.	Assistant Professor		
2	Olds-Clarke, Patricia	Ph.D.	Professor		
3	Phillips, Steven J.	M.D.	Professor		
4	Sodicoff, Marvin	Ph.D.	Professor		

c. Faculty Roles and Committee Structure

Dr. Popoff serves as the John Franklin Huber Chairperson of Anatomy and Cell Biology, Dr. Black is the Associate Chairperson for Research, and Dr. Pearson is the Assistant Chairperson for Education. For a complete organizational chart of the Department of Anatomy and Cell Biology, please refer to Appendix C. The department has six standing committees that deal with topics related to the research and/or educational missions (Table 2). Dr. Black chairs the research committee, an advisory committee regarding issues of space, resources, facilities and other research-related matters. Dr. Pearson chairs the committee on professional education and curriculum that includes all course directors of courses taught by the department in the Schools of Medicine, Dentistry and Podiatry. In addition, there is a Graduate Studies committee dealing with the Ph.D. and M.S. programs, a faculty recruitment committee, an appointment and promotions committee dealing with new faculty appointments at the level of Assistant or Associate Professor, and a tenure and promotions committee that deals with tenure and promotion to Associate Professor as well as promotion to Professor. All faculty members serve on at least one committee with some serving on multiple committees. Regularly scheduled faculty meetings are held monthly and a specific agenda is developed prior to each meeting. These meetings serve to keep the faculty abreast of new developments at the medical school and University, as a platform for discussion of issues of importance to the faculty, and as an open forum for exchange of ideas and opinions among the faculty. The Dean (Dr. John M. Daly, M.D.) has also utilized these meetings to share his vision of the medical school with the faculty, to update faculty about recent progress, and to have an open dialogue with the faculty.

Table 2: Standing Committees 2003 – 2004

	Member	Faculty Recruitment	Professional Education and Curriculum	Graduate Studies	Appointment and Promotions	Tenure and Promotions	Research (Space, Resources, Facilities)
1	Barbe, Mary	√					
2	Black, Mark			√	√*	√	√*
3	Boyd, Robert		√				
4	DiPrimio, Raymond		√				
5	Lamperti, Albert	√	√			√*	
6	Litvin, Judith			√	√		
7	Marino, Thomas	√	√			√	
8	Oleszak, Emelia	√		√*	√		√
9	Orth, Joanne				√	√	
10	Oxberry, Brett		√				
11	Paavola, Laurie					√	
12	Pearson, Helen		√*				
13	Pilder, Stephen	√			√		√
14	Popoff, Steven		√				
15	Safadi, Faye	√*		√			√
16	Schneck, Carson		√			√	

**Indicates Committee Chairperson*

d. Distribution of Faculty Effort

During the past year, ECG Management Consultants, Inc., was engaged by the School of Medicine to assist in developing a mission-based management (MBM) program for the basic sciences that links available financial resources to faculty performance measures. Anatomy and Cell Biology was selected to serve as the basic science pilot department to test, validate and confirm the components of MBM. A faculty effort survey was conducted to determine the amount of time spent by individual faculty members within each mission category, including research, teaching and administration/service (for details see Appendix D). The cumulative analysis for the department showed that 29.9% of faculty effort (4.74 FTE) was devoted to research, 52.1% (9.13 FTE) was devoted to teaching, and 18.0% (2.63 FTE) was devoted to administration/service. This faculty effort analysis is currently being linked to a financial analysis, and performance metrics for the research and education categories are also being developed for full implementation of the mission-based management initiative in 2004-2005. MBM will be a tool that offers department leadership and individual faculty members the ability to establish and monitor performance goals for each of the mission categories. In the context of annual faculty reviews by departmental chairs, it is expected that MBM will be used both retrospectively to assess performance and success in achieving the goals established for the preceding year, and prospectively to establish the goals and targets for the coming year. It can also be used to manage the overall distribution of faculty effort within a department based on the financial resources available. Finally, MBM can be used by medical school leadership to assess the performance of each department in each of the mission categories.

e. Faculty Recruitment

Under the leadership of the new Dean, John M. Daly, M.D. (appointed November, 2002), the School of Medicine is engaged in a process of replenishing its Presidential, tenure-track faculty in the basic sciences. All basic science departments lost significant numbers of faculty members through the normal process of attrition and voluntary early retirement incentives over the past decade with few new faculty hires during that period. The magnitude of the current effort to recruit and hire faculty with strong research credentials is unprecedented in recent medical school history. The Dean's strategy is to recruit new faculty members in targeted areas of research based on existing Centers, new Centers being developed, or interdisciplinary research groups. A plan was generated by a task force for basic science planning resulting in a document that outlines the purpose of research centers and the relationship between these centers and the basic science departments. This document has been fully endorsed by the Dean (for details see Appendix E). The process of recruiting new faculty is expected to have a very positive impact on all basic science departments, including Anatomy and Cell Biology. The department recently hired a new faculty member in conjunction with the Cardiovascular Research Center (CVRC). Dr. Abdelkarim Sabri's primary appointment is in Anatomy and Cell Biology with a secondary appointment in CVRC. The department is also actively engaged in four additional recruitment efforts. One of these recruitments is also with the CVRC and an offer has been accepted by Dr. Victor Rizzo, an Associate Professor with a funded research program at Albany Medical College; he is expected to begin his appointment on July 1, 2004. One recruitment is in conjunction with the Center for Substance Abuse Research (CSAR) for a neuroscientist, another with the Thrombosis Research Center (TRC) for a vascular biologist, and the fourth recruitment for a bone/cartilage biologist who can interact and help establish the emerging interdisciplinary

group that already has its base in the department (for more information, see section on Research). The department makes every effort to identify qualified women and minority candidates in its recruitment efforts. It is clear that the process of recruiting new faculty members with strong research credentials will enhance the research base in the department and the medical school. Faculty recruitment has been and remains the top priority.

3. Support Staff

The Department of Anatomy and Cell Biology has a support staff consisting of eight (8) individuals with well-defined roles to assist the faculty members in carrying out their teaching and research functions. For details regarding the primary duties and reporting structure of the office personnel, please refer to Appendix C. The administrator, Perry McFarland, manages all of the business affairs of the department and works closely with the department Chairperson to prepare, manage and revise (as needed) the annual department budget. Mr. McFarland devotes 50% of his time to Anatomy and Cell Biology, with the remainder of his time spent managing the business affairs of the Thrombosis Research Center. One of the two administrative specialists, Sydnora Simon, assists Mr. McFarland by reconciling and maintaining grant accounting statements and cost centers with the department's accounting system; she also supervises the two secretaries in the front office. One secretary, Tracey Hinton, is responsible for updating, duplication and distribution of course handouts, record-keeping for the graduate studies program, and returning cremains to families of donors. The other secretarial position, currently filled by a temporary employee, is responsible for placing and following-up on all orders, the preparation of invoices, serving as the office receptionist, and assistance with handout materials when necessary. The second administrative assistant, Angela Murphy, is primarily responsible for assisting the department Chairperson with all matters related to faculty appointments, promotion and tenure, the preparation of departmental reports and documents, scheduling, and preparation of forms related to grant applications. All office personnel are also required to perform other tasks as assigned by their supervisor.

In addition to the office personnel, the department also has a full-time lab manager, Victor Thompson, whose responsibilities include oversight of the use and maintenance of the shared equipment and facilities, scheduling of repairs and service of the equipment, planning and oversight of renovations in the department, scheduling of training sessions for faculty and students, and assuring compliance with all University, state and federal regulations. The lab manager also maintains an updated website for Anatomy and Cell Biology, and he reports directly to the department Chairperson. A full-time histotechnician, Thelma Montara, is responsible for all service activities related to the molecular histology core facility. She processes, sections and stains tissues for various research projects as requested by faculty members at the medical school, including special requests for tissue processing and staining. She has over 30 years of experience in this area, and is supervised by Dr. Fayez F. Safadi, a faculty member in Anatomy and Cell Biology. The department also has a full-time morgue technician, John Clark, who is responsible for all aspects of the preparation (embalming), storage, and cremation of all body donors received through the Humanity Gifts Registry of the Commonwealth of Pennsylvania. Mr. Clark is supervised by Dr. Helen E. Pearson, the Assistant Chair for Education and Curriculum and co-Director of the medical Gross Anatomy course. All members of the staff support the research and educational missions of the department to assure the smooth and cohesive operation of the department on a daily basis. The department is also

committed to diversity in its hiring of support personnel; five (5) are women, four (4) are African American and one (1) is African American/Native American.

4. Space and Resources

The Department of Anatomy and Cell Biology is located on the 6th floor of the Old Medical School Building (OMS) and the adjacent Medical Research Building (MRB). The department occupies a total of 17, 873 square feet of space, including principal investigator (P.I.) and common research laboratories, offices, and teaching space (Table 3). The laboratories assigned to principal investigators accounts for 46.7% of the total space and includes six (6) active laboratories as well as two (2) laboratories for new faculty recruits. The individual laboratories vary in size (range from approximately 800 to 1200 sq.ft.) depending on grant funding, average number of personnel in each lab and other special equipment needs. Laboratory space is assessed on an annual basis being re-allocated to accommodate the changing needs of the principal investigators and to assure that the limited space is being used most efficiently. Some of the laboratory space is common space housing shared equipment or facilities as discussed below that are available to the research faculty.

Table 3: Space Utilization in Anatomy and Cell Biology

Total Area in Square Feet		17,873	100%
Research	Principal Investigator Laboratories	8,342	46.7%
	Common Use Laboratories	2,019	11.3%
		10,361	58.0%
Office	Faculty	2,885	16.1%
	Administrative	781	4.4%
	Other (Post-doc, Scientists, Students)	721	4.0%
		4,387	24.5%
Teaching	Conference Room/ Work Rooms	987	5.5%
	Morgue/ Storage/ Crematorium	2,138	12.0%
		3,125	17.5%

Office space accounts for 24.5% of the total space in the department. Most offices are for faculty members (average size of 225 sq. ft.) with the remainder for the administrative staff, graduate students, post-doctoral fellows and scientists. The department also has a conference room equipped with a state-of-the-art computer projection system and is used for seminar presentations, upper level graduate courses and meetings. One facility that is unique to the department of Anatomy and Cell Biology and occupies a significant amount (12%) of the total space is the morgue, storage freezer and crematorium devoted to all aspects of cadaver preparation, storage, and disposition. This facility is staffed by a full-time morgue technician (see support staff).

The department provides equipment and facilities for shared use by research faculty. For a list of available equipment items for shared use, please refer to Appendix F. The more

commonly used shared equipment includes an autoclave, ultracentrifuge, super-speed refrigerated centrifuges, PCR thermocyclers, spectrophotometer, X-ray film developer, liquid scintillation counter, multiplate reader and a deionized water purification system. The department has an imaging facility complete with upright and inverted Nikon microscopes equipped with epifluorescence, digital imaging capability and Bio-Quant software for image analysis. The department also has an electron microscope, environmental rooms (three cold rooms, one warm room), and a molecular histology core facility. This facility is available for the preparation, sectioning and staining of tissues, including custom services such as tissue preparation for immunohistochemistry and *in situ* hybridization. The facility is staffed by a full-time histotechnician (see support staff) and is available to all investigators at the medical school on a fee for service basis.

The department provides liquid nitrogen, gases and dry ice to all investigators; these are stored in a common room and replenished weekly as needed. The department also provides service and/or maintenance contracts on shared equipment. A full-time lab supervisor provides oversight of the departmental equipment and facilities, working closely with the research investigators to assure availability and smooth operation of the shared equipment and facilities (see support staff).

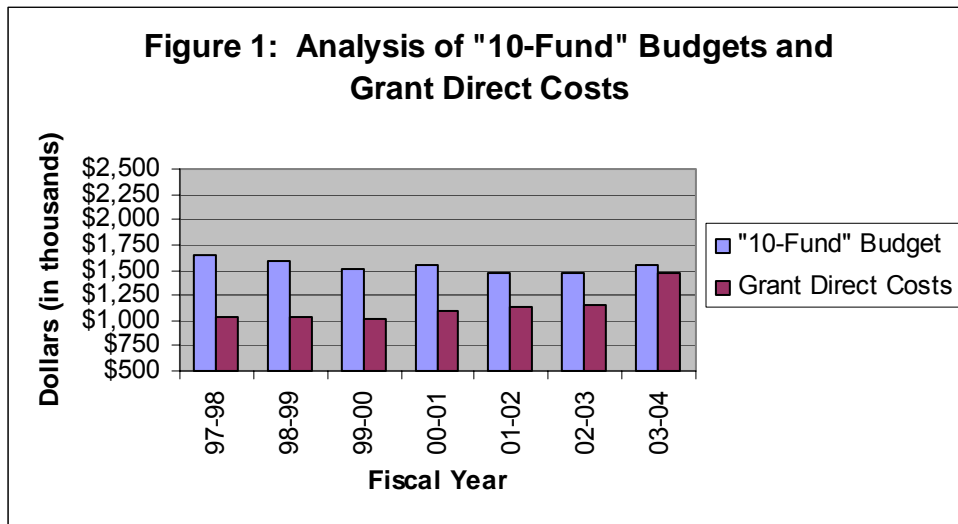
Other full service facilities with a solid reputation for high quality results that are required by some faculty members to carry out their funded research projects are readily available either within the University or at nearby neighboring Institutions in Philadelphia. A recent contractual agreement between Temple University and the Fox Chase Cancer Center provides access to the full-service DNA microarray facility at Fox Chase at a reduced cost (for details see Appendix G). The Bioinformatics Center at the Temple's main campus will help investigators in study design and data mining for microarray analysis; these services are provided free of charge (for additional information see Appendix G). The Affymetrix chip is also available for microarray analysis at the University of Pennsylvania on a fee for service basis (see Appendix G). Flow cytometry and sorting as well as confocal microscopy facilities exist in the FELS Institute at the medical school. DNA sequencing facilities are available at Children's hospital of Philadelphia (CHOP) and the University of Pennsylvania. The Wistar Institute and University of Pennsylvania also offer services for the generation of transgenic and knockout mice.

In general, the department has an adequate amount of space and equipment though space is limited and the infrastructure is aging. The planned construction of a new medical school building will add a considerable amount of new space to the medical school and provide research investigators with state-of-the-art research laboratories. It is anticipated that this construction project will begin in fall of 2005 and be completed in approximately 2 years time.

5. Budget

The budget for the Department of Anatomy and Cell Biology consists of 10-funds provided by the University, gift and endowment funds (e.g, the endowed Huber Chair), other funds (departmental share of indirect cost recovery) and direct costs associated with funded research programs (Table 4). The 10-funds from the University have remained relatively steady over the past seven (7) year period (Figure 1). The John Franklin Huber endowed Chair provides

the department with a source of discretionary funds (approximately \$100,000 per year) that are used for to support the educational and research missions of the department. For education, Huber Chair funds have been used to support a variety of expenses including; 1) travel for teaching faculty members to attend educational workshops and meetings (e.g. the annual meeting of the American Association of Clinical Anatomists), 2) the purchase of desktop and notebook computers for faculty members, 3) the purchase of software for teaching purposes and for the development of customized course software, 4) the purchase of equipment for preparation and handling of cadavers used in the gross anatomy courses, 5) the purchase of anatomical models and other supplemental materials used for teaching purposes, and 6) the coverage of over-expenditures in the departmental 10-fund accounts. For research, funds generated by the Huber Chair have been used to support the following; 1) start-up or interim funding for faculty, 2) purchase of new equipment, 3) travel to scientific meetings, 4) laboratory renovations, and 5) equipment maintenance contracts and repair.



Source: Departmental budgets submitted to the Medical School Finance Office.
Actual expenditure data from University FMS System.

Several years ago, a new policy for the return of indirect costs was implemented giving departments a return of 16.5% of the total indirect costs generated by its faculty members. This resulted in an additional source of discretionary funds, ranging from approximately \$80,000 - \$120,000 annually. These funds are designated to support research-related expenditures in the department, and have been used for equipment purchases, interim and start-up faculty support, maintenance/service agreements and standing orders for gases, dry ice and liquid nitrogen, all of which are provided to the research investigators by the department. The total department budget (all funds) has shown a modest increase over the past seven (7) year period, resulting primarily from the increase in funded research (Table 4 and Figure 1). For more details regarding research funding, see section on Research.

Table 4: Analysis of Budgets from 1997-1998 through 2003-2004

Fiscal Year	<u>Medical School "10-Funds"</u>			Total "10-Funds"	<u>Discretionary Accounts</u>		<u>External Grant Funding</u>			Total Department Budget (all funds)
	Faculty Salaries	Non-Faculty Salaries	"G & A" Expense		Gift and Endowment Funds	Other Funds	Actual Direct Costs	Actual Indirect Costs	Actual Total Costs	
2003 - 2004*	\$1,124,357	\$304,100	\$129,196	\$1,557,653	\$131,985	\$91,352	\$1,462,861	\$655,815	\$2,118,676	\$3,899,666
2002 - 2003	\$1,007,278	\$308,160	\$150,479	\$1,465,917	\$101,003	\$68,687	\$1,146,985	\$551,508	\$1,698,493	\$3,334,100
2001 – 2002**	\$1,085,115	\$297,646	\$91,366	\$1,474,127	\$149,780	\$150,270	\$1,137,382	\$494,440	\$1,631,822	\$3,405,999
2000 - 2001	\$1,171,169	\$287,376	\$83,745	\$1,542,290	\$182,798	\$93,934	\$1,099,050	\$477,818	\$1,576,868	\$3,395,890
1999 - 2000	\$1,207,897	\$240,801	\$62,246	\$1,510,944	\$145,077	\$98,578	\$1,015,023	\$466,731	\$1,481,754	\$3,236,353
1998 - 1999	\$1,151,587	\$286,747	\$148,573	\$1,586,907	\$120,000	\$47,800	\$1,035,015	\$486,867	\$1,521,882	\$3,276,589
1997 - 1998	\$1,252,815	\$259,309	\$139,872	\$1,651,996	\$107,309	\$33,474	\$1,032,017	\$455,347	\$1,487,364	\$3,280,143

Source: Departmental budgets submitted to the Medical School Finance Office.
 Actual expenditure data from University FMS System.
 "10-Fund" amounts reflect the revised incremented targets provided by the Medical School Finance Office.

*The data for FY 2003-2004 are budgeted amounts; not actual expenditures.

**Beginning in FY 2001 – 2002, fringe benefits were removed from the department’s “10-Fund”, and budgeted centrally by the University. The department’s fringe benefits amount to approximately \$400,000 per year.

The 10-fund faculty salary category provides all full-time and part-time faculty salaries that are not paid for from grants or Dean's funds (i.e. administrative supplements or part-time Dean's appointments). This amount has actually decreased over the past seven years primarily because the percentage faculty salary support from external grant funds has increased significantly during this period (see Research section for details). The non-faculty salaries categories includes support for a shared administrator (50% effort in Anatomy and Cell Biology, 50% effort in Thrombosis), two administrative specialists, two secretaries, a laboratory manager, a morgue technician and a histology technician (for more details regarding specific duties, refer to section on Support Staff). The general and administrative expense category covers all non-personnel costs associated with the functions of the department and includes telephones, copier lease, office supplies, postage, literature duplication, and supplies associated with the cadaver program. For a period of time (fiscal years 1999-2002) the amount budgeted for this category was insufficient to pay for these expenses thereby necessitating that we utilize a significant amount of funds from the Huber Chair to cover our obligatory operating costs (Table 4). In the last 2 years, the amount budgeted in this category was restored to former levels which are generally adequate to cover these costs.

6. Research

a. Description of Research Programs and Other Scholarly Activity

The faculty in the Department of Anatomy and Cell Biology are actively engaged in basic research and other scholarly activities with the goal of advancing knowledge in the biomedical sciences. Of the fifteen full-time faculty members, eight have funded research programs in the areas of musculoskeletal biology, cardiovascular biology, reproductive biology, and neurobiology. Others, including some of the part-time faculty members, are involved in various scholarly activities related to education or the practice of clinical medicine. Listed below is a brief description of the research or scholarly interests for each faculty member actively engaged in these activities (for a more detailed description, please see Appendix H).

- Mary F. Barbe (primary appointment in Physical Therapy) - Research uses a rat model of cumulative trauma disorder to examine motor behavioral and pathophysiological changes associated with work-related musculoskeletal disorders.
- Mark M. Black - Research focuses on the neuronal cytoskeleton, which is the major internal structure that defines the external shape of the neuron and also organizes its cytoplasm to perform motile and metabolic activities essential to life.
- Albert A. Lamperti – Scholarly activity focuses on studies of medical student personalities and career choices characteristics and on the development of computer-based courseware for use in our curriculum.
- Judith Litvin - Research uses cardiac myocyte development in the chicken embryo as a model system to study the cellular and molecular aspects of embryological events in heart development with the goal of elucidating the basis of cardiac myocyte proliferation and differentiation.
- Thomas A. Marino – Scholarship and creative work focused on teaching methodologies, and philosophy as well as development of computer-based educational materials for use in our curriculum.
- Emilia L. Oleszak - Overall objective of her research program is to understand the molecular basis of inflammatory demyelinating diseases, such as Multiple Sclerosis (MS)

and virally-induced inflammatory diseases of central nervous system, including HIV-dementia complex.

- Joanne M. Orth - General aim of her research program is to provide a clearer understanding of events that occur during early postnatal development of the testis which play a critical role in forming the foundation for spermatogenesis, and hence fertility, in the adult.
- Brett A. Oxberry – Scholarship and creative work focused on the development and implementation of computer-based learning resources to address the educational objectives and needs of our curriculum.
- Stephen H. Pilder - Research focuses on the genetic, molecular, and cellular bases of spermatogenesis and its relationship to subsequent steps in sperm function during the fertilization process.
- Steven N. Popoff - Research focuses on the regulation of skeletal development and the pathogenesis of various metabolic bone diseases including congenital osteopetrosis, inflammation-mediated osteopenia and estrogen-deficient osteoporosis.
- Abdelkarim Sabri – Research uses intact tissue and cell culture models to focus on elucidating the mechanisms by which inflammatory proteases induce myocyte death and subsequent cardiac remodeling.
- Fayez F. Safadi - Research focuses on the regulation of bone cell development and function, with specific emphasis on growth factors that can enhance osteogenesis.
- Carson D. Schneck – Scholarly activity involving various anatomic and imaging studies of clinical significance.
- Arthur Washburn – Research interests focus on the functional morphology of the sexually dimorphic canine/premolar honing complex in anthropoid primates and early hominids and the subsequent loss of this dental complex in the human lineage.

The following table (Table 5) lists all of the currently active research projects/grants (external funding only) for faculty members with their primary appointment in Anatomy and Cell Biology. From this table it is clear that faculty members with active research programs are involved in more than one project, either as the Principal Investigator or as co-Investigator. There are well-established collaborations among the faculty and the focus on interdisciplinary research programs is a component of the strategic plan for the department as well as the medical school (see section on Strategic Plan). For example, the most recent faculty hire, Dr. Abdelkarim Sabri, was a joint recruitment between the Center for Cardiovascular Research (CVRC) and the Department of Anatomy and Cell Biology. Dr. Sabri's research program will enhance the interdisciplinary group of cardiovascular investigators in the Center and the department. (Please note: Dr. Sabri has received a grant from the American Heart Association and has been notified that his NIH R01 will be funded beginning July 1, 2004. Because his appointment began in March, 2004, his grants are not listed in Table 5). There are also intra- and inter-departmental collaborations in the areas of musculoskeletal biology (Drs. Popoff, Safadi, Barbe and Litvin), arthritis (Drs. Popoff, Safadi, DeLaCadena, and Uknis), diabetes and bone formation (Drs. Safadi and Devlin), cardiovascular biology (Drs. Litvin, Margulies, and Auteri), reproductive/developmental biology (Drs. Orth, Pilder, Latham) and immunopathology of graft rejection (Drs. Oleszak and Platsoucas). Productive collaborations between departmental faculty members and investigators at other Institutions have also been established including 1) Drs. Popoff and Odgren (University of Massachusetts Medical School) on the role of CTGF in

osteoclast recruitment/development and bone resorption in animal models of osteopetrosis, Drs. Safadi, John and Anderson (Jackson Laboratories) on the knockout mutation for osteoactivin, Drs. Popoff, Safadi and Owen (Pfizer Global Research and Development) regarding the role of CTGF and osteoactivin in osteoblast differentiation and function as well as skeletogenesis, Drs. Litvin and Montgomery (Centocor, Inc.) on cardiac myocyte differentiation, Drs. Oleszak, Bechter (Ulm University, Germany), and Herzog (Justus-Liebig University, Germany) on the pathogenesis of schizophrenia and affective disorders.

Table 5: Currently Active Projects/Grants 2003-2004

Faculty Name	Grant Name	Grant Number and Agency	Grant Project Period	Total Costs	Percent Effort	Role on Project
Mark M. Black, Ph.D. *	Changes in the Cytoskeleton During Neurite Growth	RO1 NS 7681-19 (NIH)	3/1/02 - 1/31/06	\$320,625	50%	PI
	Cellular Mechanisms of Neuronal Morphogenesis	RO1 NS 34809-04 (NIH)	5/26/00 - 4/30/04	\$116,984	30%	PI
Judith Litvin, Ph.D.	Genes Regulating Heart Development and Disease	0355798U (AHA Local Affiliate)	7/1/03 - 6/30/05	\$50,000	15%	PI
	Is AAA an Antigen-Driven Autoimmune Disease?	RO1 HL 64340-04 (NIH)	9/30/99 - 8/31/04	\$337,500	10%	Co-Inv
	T-Cells in the Pathogenesis of Systemic Sclerosis	RO1 AR 048042-03 (NIH)	9/21/01 - 5/31/06	\$376,250	5%	Co-Inv.
Emilia L. Oleszak, Ph.D.	Potential Role for Virus(es) in Schizophrenia and Affective Disorder by Analysis of T-Cell Receptor (TCR) Clonal Expansions in the Cerebrospinal Fluid (CSF)	01-199 (Stanley Medical Research Institute)	8/1/98- 7/31/04	\$175,000	15%	PI
	Is AAA an Antigen-Driven Autoimmune Disease?	RO1 HL 64340-04 (NIH)	9/30/99 - 8/31/04	\$337,500	20%	Co-Inv.
	T-Cells in the Pathogenesis of Systemic Sclerosis	RO1 AR 048042-03 (NIH)	9/21/01 - 5/31/06	\$376,250	30%	Co-Inv.
Joanne M. Orth, Ph.D.	Fertility and Sertoli Cell Development	RO1 HD 15563-21 (NIH)	2/15/00 - 2/28/05	\$245,351	30%	PI
	The Basis for Male Infertility: Molecular Models	RO1 HD 31164-10 (NIH)	7/1/99 - 6/30/04	\$185,423	5%	Co-Inv
Stephen H. Pilder, Ph.D.	The Basis for Male Infertility: Molecular Models	RO1 HD 31164-10 (NIH)	7/1/99 - 6/30/04	\$185,423	30%	PI
	Genes that Affect Sperm-Egg Interaction in Mammals	RO1 HD 38359-05 (NIH)	2/1/00 - 1/31/05	\$208,247	30%	PI

Table 5 (Continued): Currently Active Projects/Grants 2003-2004

Faculty Name	Grant Name	Grant Number and Agency	Grant Project Period	Total Costs	Percent Effort	Role on Project
Steven N. Popoff, Ph.D.	The Role of CTGF in Osteoblast Development and Function	RO1 AR 47432-03 (NIH)	4/1/02 - 3/31/07	\$317,250	30%	PI
	Bone Matrix and Bone Resorption	R01 DE 07444-12 (NIH)	7/1/02 - 6/30/07	\$84,175	10%	PI
	The Role of Osteoactivin in Osteoblast Development and Function	RO1 AR 48892-02 (NIH)	8/1/02 - 6/30/07	\$317,250	20%	Co-Inv.
Fayez F. Safadi, Ph.D.	The Role of CDK4 in Bone Formation	RO3 AR 47649-03 (NIH)	7/1/01 - 6/30/04	\$75,250	15%	PI
	The Role of Osteoactivin in Osteoblast Development and Function	RO1 AR 48892-02 (NIH)	8/1/02 - 6/30/07	\$317,250	35%	PI
	Establishment of an ELISA for Osteoactivin	N/A Biomedica, Inc.	1/1/04-12/31/05	\$75,250	0%	PI
	The Role of CTGF in Osteoblast Development and Function	RO1 AR 47432-03 (NIH)	4/1/02 - 3/31/07	\$317,250	20%	Co-Inv.
	Force-Repetition Interaction in a Rat Injury Model of CTD	RO1 OH 0397-05 (NIH)	4/1/00 - 3/31/05	\$290,777	10%	Co-Inv.
	Secondary Prevention of WMSD in a Rat Model	RO1 AR 051212-01 (NIH)	2/1/2004 - 1/31/09	\$332,821	5%	Co-Inv.

***Projects listed by faculty member – for collaborative projects the same grant may be listed more than once.
Source: Department Grant Files and Sponsored Projects**

b. Research Funding

Research funding in the Department of Anatomy and Cell Biology has increased during the period from 1995-1996 through the current fiscal year (2003-2004), despite a significant reduction in the number of full-time faculty from eighteen (18) to fourteen (14) (see Table 6). Perhaps the most significant changes are the greater than 4-fold increase in the percentage of full-time faculty compensation that is funded by extramural grants and the 3-fold increase in the total costs generated per full-time faculty member during this same period of time (Table 6). The latter measure of faculty productivity is perhaps the most relevant, since it allows for an equalized comparison of productivity between other departments and Institutions (see Identification of Benchmarks in section on Strategic Plan).

Table 6: Research Expenditures from 1995-1996 through 2003-2004

Fiscal Year	Actual Direct Costs	Actual Indirect Costs	Actual Total Costs	Number of Full-Time Faculty	Percentage of Faculty Compensation Funded by Grants**	Total Costs Per Faculty Member
2003 - 2004*	\$1,462,861	\$655,815	\$2,118,676	14	33%	\$151,334
2002 - 2003	\$1,146,985	\$551,508	\$1,698,493	14	30%	\$121,321
2001 - 2002	\$1,137,382	\$494,440	\$1,631,822	16	23%	\$101,989
2000 - 2001	\$1,099,050	\$477,818	\$1,576,868	18	17%	\$87,604
1999 - 2000	\$1,015,023	\$466,731	\$1,481,754	18	11%	\$82,320
1998 - 1999	\$1,035,015	\$486,867	\$1,521,882	19	12%	\$80,099
1997 - 1998	\$1,032,017	\$455,347	\$1,487,364	18	10%	\$82,631
1996 - 1997	\$877,468	\$356,915	\$1,234,383	18	8%	\$68,577
1995 - 1996	\$635,459	\$321,942	\$957,401	18	7%	\$53,189

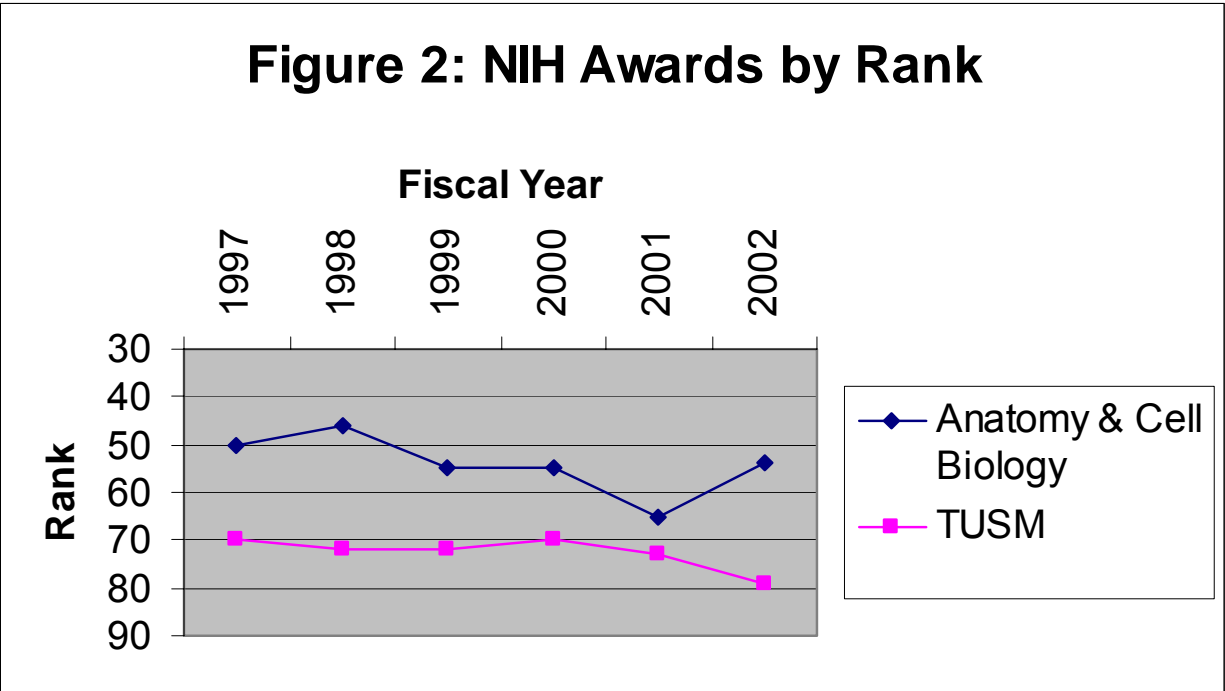
Source: Department budgets submitted to the Medical School Finance Office.
Actual expenditure data from University FMS System.

*The data for FY 2003-2004 are budgeted amounts; not actual expenditures.

Note that data used in the Table are from Fall, 2003, and therefore, does not include new Presidential appointment in March, 2004 (Dr. Sabri). Total current full-time faculty are 15.

**Percentage of total full-time faculty salaries.

The increase in research productivity in the department has been achieved, at least in part, through the re-assignment and re-distribution of faculty effort. Faculty members with active research programs have been encouraged to increase their overall effort in this area by gradually decreasing their teaching and service loads, while other faculty members without funded programs have increased their teaching loads. It is also expected that the percent effort required to carry-out a funded project be correlated with the percent salary support on that project. Faculty members with active research programs are also encouraged to collaborate and secure funding for multiple projects.



Source: www.nih.gov

A survey of the national ranking of the department for NIH awards shows that the department was ranked 54th in 2002 (the most recent year for which data are available on the NIH website) compared to a ranking of 79th for the School of Medicine (Figure 2). For the period from 1997 through 2002, the department has fluctuated in its ranking for NIH awards from 49th in 1998 to 65th in 2001 while the medical school has shown a progressive (modest) decrease in its national ranking over this period of time. The fluctuations in the department ranking are primarily due to faculty retirement, gaps in grant funding, and alternate sources of funding for some projects. However, the recent jump in NIH ranking from 2001 to 2002 is expected to continue with new awards in 2003-2004 and the recruitment of new faculty members with NIH-funded research programs. A survey of the number of proposals submitted versus funded from the period 1998-1999 through 2003-2004 shows an average success rate of 73.8% for faculty members in Anatomy and Cell Biology (see Table 7), which is significantly higher than the NIH success rate for Anatomy/Cell Biology departments in medical schools which is currently at 35.6%. It is the goal of the department to continue to increase its research funding and national ranking for NIH awards and this will be accomplished largely through the current process of faculty recruitment (see sections on Faculty and Strategic Plan).

Table 7: Proposals Submitted/Funded for Anatomy and Cell Biology

FISCAL YEAR	Number of Proposals Submitted	Total \$'s Requested	Number of Proposal Funded	Success Rate (%)
1998-1999	15	6,121,882	11	73.3%
1999-2000	19	6,932,631	14	73.7%
2000-2001	19	6,652,450	15	79%
2001-2002	20	4,029,325	15	75%
2002-2003	19	4,156,931	13	68.4%
2003-2004	16	5,567,769	*	*

* Proposals are pending

c. Research Productivity

Productivity is measured by both the quality and quantity of publications, presentations at scientific/educational meetings, and invitations to give seminars at other Institutions. Over the past five (5) year period, faculty members in Anatomy and Cell Biology have published in excess of 150 papers, reviews, chapters and books. Most publications are in the form of scientific papers published in high quality peer-reviewed journals, including the *Journal of Biological Chemistry* (impact factor 7.666), *Development* (impact factor 10.088), *Journal of Bone and Mineral Research* (impact factor 6.477), *Journal of Cellular Biochemistry* (impact factor 2.817), *Developmental Biology* (impact factor 6.049), *Journal of Cellular Physiology* (impact factor 2.827), *Journal of Clinical Investigation* (impact factor 10.921), *Endocrinology* (impact factor 5.365) and *Journal of Immunology* (impact factor 7.145). Faculty members regularly present their research findings or other scholarly work at various national and international scientific/educational meetings, conferences and workshops. For a detailed list of publications and presentations over the past five years, please refer to appendix I). The frequent selection of abstracts for platform presentations by our faculty is another measure of success since only a small percentage of the total abstracts submitted are chosen for oral presentation, a selection based on the scientific merit and significance of the work. Faculty members have also been recognized for their expertise and reputation in their fields by invitations to serve as Chairs of scientific sessions. For example Dr. Pilder was recently invited to serve as a chairperson at the 7th International Congress of Andrology in Montreal, Canada. Dr. Popoff was invited to chair a scientific session at the annual meeting for Advances in Mineral Metabolism in March, 2003, and has been selected to chair another session at the next meeting in March, 2005. Dr. Schneck, has been recognized for his excellence in clinical education and scholarly work in diagnostic imaging, neuroanatomy and kinesiology by being invited to give over 90 presentations at various Institutions around the country and abroad.

Some faculty members have received awards in recognition of their excellence in research. These awards include travel awards to attend and present their work at meetings, young investigator awards and awards for senior investigators such as visiting research professorships (for details see Appendix J). Recently, the Office of the Provost at Temple University established a One Million Dollar Research Awards Club to honor faculty members who have successfully obtained externally funded research grants and contracts which equal or exceed \$1,000,000 over a specified period of time (July 1, 2001 – January 31, 2004). It is

noteworthy that in April, 2004, five (5) faculty members from Anatomy and Cell Biology were chosen to be inducted into this select group of Temple research investigators in its inaugural year. The novel research findings of some faculty members have also led to the submission of patent applications (see Appendix J).

d. Research Training/Mentoring Activities

Faculty members are also actively involved in research training/mentoring at different levels including graduate students, medical students, post-doctoral fellows, and assistant/associate scientists. The graduate program is an important component of the department's research programs (see section on Graduate Education). In addition to training our graduate students, faculty are also involved in research training of medical students. Students are encouraged to participate in research preceptorships during the summer between the first and second year of medical school and most laboratories are involved in mentoring of these students. During the last five (5) years, faculty in our department have provided research training for eighteen medical and dental students. Some students choose to continue their research projects resulting in co-authorship on research publications and/or abstracts/presentations at scientific meetings. Two such recent examples are David Yucha, M.D. and Robert Garvin, M.D., both of whom successfully secured positions in competitive residency programs in Orthopaedic Surgery (Temple University Health System) and General Surgery (University of Pittsburgh Health System), respectively. Faculty are also active in training post-doctoral fellows, as well as assistant and associate scientists. In the past five (5) years, the department has trained 10 post-doctoral fellows and eight (8) assistant or associate scientists. While some are still in-training in our department, others have secured competitive positions in academia or industry (for details, see Appendix K). The department is committed to diversity in its training of post-doctoral fellows and scientists with an excellent record in the inclusion of women and minorities.

Faculty members have also been involved in training of minority students for careers in medicine and research, such as the Minority Access to Research Careers (MARC) program. This is a research training program funded by the NIH under the directorship of Dr. Moses Williams, in which high school and college students spend their summers conducting research in the laboratory. In the past five (5) years, our faculty have been involved in the training of over twenty (20) MARC students. Many of the students in the MARC program enroll in M.D. or M.D./Ph.D. programs at Temple University School of Medicine or at other medical schools throughout the country following their undergraduate education. Faculty members in our department are also involved in training students in the Future Physicians Program for Minority Medical Students. This program is directed by Dr. DeLa Cadena, Associate Dean for Recruitment and Retention Program (RAR) and Associate Professor of Physiology, and involves research training for minority medical and dental students. Some faculty members have also trained students in the Bridge to the Biomedical Ph.D. Program under the directorship of Dr. Norman Willett, Professor of Microbiology. This program provides a year of training for minority students interested in applying for admission to a graduate studies program in the biomedical sciences, and our faculty have trained seven (7) students in this program over the past five (5) years.

e. Strengths/Weaknesses and Future Considerations

Current strengths of the individual research programs in the department lie in the success of competing for external funding, the excellent quality of the research programs, faculty productivity and national/international recognition, and the active involvement of faculty members in training of students, post-doctoral fellows and scientists. The weaknesses center on the small number of faculty with active research programs in the department, the limited space and aging infrastructure. The process of faculty recruitment that is currently underway will result in a significant increase in the number of research investigators in the department. Research funding and ranking are also expected to increase as a result of faculty recruitment. The focus on hiring faculty with expertise in targeted areas, such as the Centers or interdisciplinary research groups, will enhance opportunities for collaborative research and enable these groups to apply for new training grants and multi-investigator grants, such as program projects. The issues of space and infrastructure will be resolved with construction of the new medical school building.

7. Professional Education

a. Mission

The goal of the department in regard to professional education is to provide students with a foundation in the anatomical sciences and a fund of knowledge relevant for future clinical practice. In achieving this goal, the courses are structured to reinforce skills such as problem solving through clinical cases and self-education.

b. Curriculum

The Department is responsible for teaching fourteen professional level courses in three different colleges, the Schools of Medicine, Dentistry and Podiatric Medicine. Of these fourteen courses, eleven are required courses (mandated by the accreditation bodies and curriculum committees of the respective schools) for all registered first-year students. These required courses are listed in Table 8 below (see Appendix L for course syllabi).

Table 8: Required Courses Taught in the Three Professional Schools

School of Medicine:	School of Dentistry:	School of Podiatric Medicine:
M101 Gross Anatomy	D101 Histology	P100 Histology
M102 Histology	D202 Gross Anatomy	P102 General Anatomy
M103 Neuroanatomy	D203 Neuroanatomy	P103 Lower Extremity Anatomy
M104 Embryology		P104 Neuroscience

In addition to the required courses, the department offers two elective courses to students in the School of Medicine. These elective courses provide more detailed information in specialized areas:

- First and second year elective, “The Sectional Anatomic Basis of Computed Tomography, Ultrasound and Magnetic Resonance Imaging Modalities”
- Fourth year elective, “The Anatomic Basis of the Clinical Specialties”

Finally, department faculty members teach the anatomy component (gross anatomy and histology) of the Summer Educational Reinforcement Activity (SERA). The SERA program is administered through the Recruitment, Admission and Retention Office of the School of Medicine, and provides preparation for minority and disadvantaged students who will matriculate in the Schools of Medicine and Dentistry for the following semester.

c. Course Content

All courses reflect current knowledge in the field. To monitor advances in the field, faculty consult newly published texts and journal articles, consult with colleagues, both clinical and basic science, and attend a variety of professional association meetings. Course directors utilize published national objectives, where available, as well as national board exam content outlines and subject exam item analysis, to ensure that the material covered in the courses is appropriate for students. In December of 2003, several members of the faculty attended a review session of medical national board examination questions provided by the USMLE, which enabled an evaluation of both the content and format of sample questions.

d. Teaching Methodologies

Different courses utilize different teaching methodologies, as relevant for the subject matter and as appropriate for the group of students to which the material is directed. The average class size is 180 for the School of Medicine, 125 for the School of Dentistry and 70 for the School of Podiatric Medicine. All courses, except medical gross anatomy, use lectures as the principal method for delivering information to the class. The gross anatomy courses use extensive cadaver dissection by the students as the method for reinforcing three-dimensional aspects and individual variation. There is considerable use of computer-based images in most of the courses, including diagnostic images, and digitized images of histological and neuroanatomical sections have replaced the use of microscopes and slide sets. Medical gross anatomy and medical neuroanatomy use interactive small group presentations for discussion of relevant clinical cases. Medical neuroanatomy and podiatry neuroscience both include a “wet” lab for examination of human brain material. All courses emphasize the clinical relevance of the material presented.

Each course requires students to purchase a specific textbook or atlas. Handout notes, case studies and dissection guides generated or assembled by the department faculty are provided to the students at the beginning of the course, along with the course syllabus and schedule. In several courses, a CD is provided with software that includes digitized images. This software has also been developed by faculty members in the department.

e. Contact Hours

The number of hours of scheduled class time for courses given by the department is shown in Table 9 below. Also included is the number of faculty per contact hour. For a lecture format, only one faculty member is involved in presenting that lecture, whereas for a lab or workshop format, several faculty members provide instruction simultaneously for different subsets of students within the class.

Table 9: Scheduled Class Time for Courses Taught in the Three Professional Schools

	Lecture/Conference			Lab			Exams			Total
	Hours	# Faculty/hr	Faculty Hours	Hours	# Faculty/hr	Faculty Hours	Hours	# Faculty/hr	Faculty Hours	
Medical:										
Gross	33	6	198	111	6	666	14	4	56	920
Histo	47	1	47	54	6	324	12	3	36	407
Neuro	40	1	40	29	1	29	6	3	18	87
	22	5	110	11	5	55				165
Embryo	29	1	29	0		0	2	1	2	31
Subtotal										1610
Dental:										
Gross	33	1	33	87	4	348	12	4	48	429
Histo	80	1	80	57	2	114	12	2	24	218
Neuro	33	1	33	10	1	10	4	1	4	47
Subtotal										694
Podiatric:										
Gen Gross	59	1	59	107	4	428	17	2	34	521
Histo	39	1	39	57	2	114	11	2	22	175
Neuro	36	1	36	3	2	6	3	2	6	48
LEA	96	1	96	72	6	432	4	4	16	544
Subtotal										1288
Others:										
SERA	56	1	56							56
Electives										425
Grand Total										4073

SERA: Summer Educational Reinforcement Activity

LEA: Lower Extremity Anatomy

For the six basic science departments at the School of Medicine that provide education within the health profession programs, the total number of faculty contact hours is 8899 (see table in Appendix M). The Department of Anatomy and Cell Biology therefore contributes 46% of the teaching effort by the basic science departments.

f. Teaching Faculty

While different faculty members carry different teaching loads, depending on other responsibilities and commitments, all faculty members with primary appointments in the department participate in teaching courses in the professional schools. There are twenty faculty members altogether, including fifteen with full-time appointments and 5 with part-time appointments. The teaching loads for these faculty members vary from 17 - 100% effort. In total, teaching represents 52.1% of faculty effort and 9.13 FTEs.

Several faculty members in the department (Drs. Boyd, Lamperti, Marino, Paavola, and Schneck) have been the recipients of teaching awards during the past 5 years (for details see Appendix N). These include the highly competitive Lindback Award given annually to one distinguished educator from each of the Schools within the University, the golden apple award from the American Medical Student Association, and yearbook dedications made annually by the graduating class of the medical school. These awards are in recognition of faculty's dedication to the students and their excellence in education.

g. Student Assessments

Learning outcomes of students enrolled in the professional degree programs are determined by student performance on examinations. Each course provides outcome assessment in the form of internal, faculty-generated examinations. For most courses, these exams include both written and practical components. In the School of Medicine, both the gross anatomy and histology courses require students to take subject exams provided by the USMLE. Scores on the subject exams become part of the students' course grade. In general, the pass rates for students taking the anatomy courses are at least 95%. Additional help from the faculty outside of scheduled class time is always available for students. The few students who do not pass a course on the first attempt are usually able to take a re-examination during the summer. Successful completion of the re-examination allows the student to continue into the second year. Students who fail more than one course on the first attempt may be required to repeat the semester or the entire first year.

In addition to performance in specific subject exams, at the end of the second year, all students in each of the three schools are required to take licensure (Step/Part 1 National Board) examinations that cover material learned in the anatomy courses. Examination scores and pass rates for Temple students, compared to the national means, are shown in Tables 10 and 11. Both scores and pass rates show that in general Temple students perform at or close to the national means.

Table 10: Scores on National Board Examinations

	Fall 1999	Fall 2000	Fall 2001	Fall 2002	Fall 2003
School of Medicine:					
USMLE total score (National mean)	216 (215)	216 (215)	215 (215)	213 (216)	215 (216)
School of Dentistry:					
NBDE anatomic sciences score (National mean)	82.6 (83.6)	83.2 (83.7)	81.3 (83.5)	81.5 (84.5)	80.6 (83.7)
School of Podiatry:					
National Board of Podiatric Medicine	Not applicable, P/F only				

Table 11: Pass Rates on National Board Examinations

	Fall 1999	Fall 2000	Fall 2001	Fall 2002	Fall 2003
School of Medicine:					
USMLE (National mean)	96 (93)	94 (92)	93 (90)	90 (91)	90 (92)
School of Dentistry:					
National Board Dental Examinations (National mean)	90.1 (90.1)	95.9 (90.9)	85.5 (92.7)	89.8 (91.8)	87.3 (n/a)
School of Podiatry:					
National Board of Podiatric Medicine (National mean)	87 (93)	90 (89)	86 (86)	88 (77)	53 (65)

n/a = not available

h. Course Assessments

Students evaluate each of the required courses at the end of the course, using evaluation forms prepared by either the department or school. These course evaluations include assessment of the methods of presentation, the resources utilized and the faculty members teaching the course. In addition, for the past two years, the students have completed an evaluation form prepared and distributed by the Provost's office (CATE). In the School of Medicine, the curriculum committee also conducts an evaluation of all courses at the end of each year (see table in Appendix O). Results of all of these evaluations are made available to the department Chairperson, the course directors and the individual faculty members, and are used to guide improvements in the courses.

Consultation with other academic units occurs in a variety of ways, both formal and informal. Department faculty members participate as members of the curriculum committees of the Schools of Medicine and Dentistry, and the outcome assessment committee of the School of

Dentistry. In the School of Medicine, department faculty members participate in meetings of course directors for either first year or first biennium courses. Faculty also discuss course content and learning outcomes with clinicians, some of whom participate in teaching the department's courses.

i. Student Qualifications

The students who take courses given by the department are selected by the admissions committees of the individual schools. Criteria for admission include undergraduate grade point average, particularly in the sciences, and performance on the Medical College Admission Test (MCAT) or the Dental Admission Test (DAT). The data for students matriculating into the Temple Schools, compared to national means, are shown in Tables 12 and 13 below:

Table 12: Mean Undergraduate Science GPA for Matriculating Students

Undergraduate grade point average:					
School:	Fall 1999	Fall 2000	Fall 2001	Fall 2002	Fall 2003
Medicine					
Undergraduate Science GPA (National mean)	3.45 (n/a)	3.42 (n/a)	3.42 (n/a)	3.4 (3.54)	3.42 (3.54)
Dentistry					
Undergraduate Science GPA (National mean)	3.17 (3.26)	3.19 (3.25)	3.00 (3.32)	3.15 (n/a)	3.14 (n/a)
Podiatry					
Undergraduate Science GPA	2.94	2.85	2.99	2.93	2.96

n/a = not available

Table 13: Mean Scores for Matriculating Students on Standardized Admission Tests

Standardized Test Scores of Matriculating Students:					
	Fall 1999	Fall 2000	Fall 2001	Fall 2002	Fall 2003
School of Medicine:					
MCAT Verbal (National mean)	9.0 (9.5)	9.2 (9.5)	9.0 (9.5)	8.9 (9.5)	9.3 (9.5)
MCAT Physical Science (National mean)	10.0 (10.0)	10.0 (10.0)	9.8 (10.0)	9.7 (10.0)	9.8 (9.9)
MCAT Biological Science (National mean)	10.0 (10.2)	10.2 (10.2)	10.0 (10.1)	9.8 (10.2)	10.0 (10.2)
School of Dentistry:					
DAT (National mean)	18.1 (18.1)	18.4 (18.5)	18.2 (18.8)	18.7 (n/a)	18.4 (n/a)
School of Podiatry:					
MCAT Combined	20	20	21	20	20

n/a = not available

Other measures of student qualifications and achievement are evaluated also. While specific metrics are not available, the admissions processes for the professional programs generally require matriculants to have some form of prior exposure to the career of choice, demonstration of community commitment through volunteer activities and/or involvement in other extracurricular activities, such as music, art or athletics.

j. Future Considerations

The department faces several challenges in the near future relating to the teaching mission in the professional schools. In general, the greatest consideration is the need to hire qualified teaching faculty to provide coverage of the classes and to maintain appropriate student: faculty ratios as the existing faculty retire. Although new faculty hires will be involved to some extent in the teaching program, they will not carry heavy teaching loads initially. New faculty recruits must be given appropriate opportunities to establish research programs and external funding. In addition, the new curriculum for the medical school is projected for implementation beginning with the 2005-2006 academic year. This new curriculum will require a significant re-alignment of faculty effort and course content, and will impact courses in the other schools regarding faculty availability. Together, these challenges will require the use of new teaching methods that are less faculty-intensive, and/or the increased use of part-time teachers.

8. Graduate Education

a. Purpose of the Graduate Programs

The Department of Anatomy and Cell Biology offers graduate programs leading to either a Ph.D. degree in Cell and Developmental Biology or a M.S. degree in Cell Biology with a Certificate in Business. The Ph.D. program in the Department of Anatomy and Cell Biology can also be coupled with a Certificate in Business if so desired by the student. This is encouraged if the student is noticeably interested in joining the work force in biotechnology or pharmaceutical companies.

The goal of our Ph.D program is to prepare students for biomedical careers in academia, government or industry. We train graduates to pursue research careers and make important new discoveries in the fields of cell and developmental biology. Also, our program provides interested students with the opportunity to gain experience in studying and teaching the anatomical sciences to professional students. In turn, the research engine within the department is constantly fueled and rejuvenated by our graduate students. Through them, the graduate program supports the department by helping to attract new faculty.

The Master's Program is implemented in collaboration with the Fox School of Business. The primary goal of our M.S. Program with a Certificate in Business is to prepare students for biomedical research management careers in the pharmaceutical or biotechnology industry. Graduates of this program are provided with theoretical concepts and education in (1) cellular and molecular biology, (2) clinical correlations, and (3) finance and business management. Following an internship in the private sector, these students are well equipped to enter the workforce with an appreciation of the goals and the skills to meet the needs of the biotechnology and pharmaceutical industries.

b. Description of Programs

A minimum of 30 semester hours, exclusive of dissertation research, is required for the Ph.D. degree. Requisite Anatomy and Cell Biology courses include: Histology, Cell Biology, Cellular Pharmacology or Principles of Development, Seminars in Cell and Developmental Biology, Biostatistics, Research, and Dissertation Writing. In addition, the Graduate School requires attendance at the Scientific Integrity sessions. Recommended courses include: Fundamental Biochemistry, Microbial Genetics, Molecular Biotechniques, Molecular Genetics of the Eukaryotic Cell and Physiology. Courses offered to our students are listed in the Procedures and Policies Documents (Appendix P for the Ph.D. and M.S. programs). The course work for each student is carefully considered upon admission to the program and the courses required and recommended are based on the student's future goals and their previous education and experiences.

Lectures in each team-taught course provided to students in either the Ph.D. or M.S. program at the Medical School are regularly updated by the participating faculty, thereby educating students in the most current scientific findings. This year we introduced a new 500-level, team-taught course in Cell Biology, which addresses contemporary topics in Cell Biology. Participation by faculty members from throughout the medical school, each addressing his/her field of expertise has made this course state-of-the-art. Students throughout the medical school have enrolled and actively participate in classroom discussions. Therefore, this has become a collaborative interdisciplinary course of value to the students and the medical school as a whole.

Research training in the Ph.D. and M.S. programs is focused on biological organization and function at the molecular, cellular, tissue, and organ levels. This includes instruction in the scientific method, in current cellular and molecular biology research techniques, and in oral and written communication skills. Research programs are designed to allow the students to gain the ability to evaluate critical information from both the literature and their own experiments so that they can each present his/her research clearly, logically, and in a manner that makes its significance apparent. Upon entry into the program the student is required to participate in research in 2-3 laboratories within the department. This gives the student and faculty member an appreciation of their mutual scientific interests and compatibility. After these research rotations, the student and faculty together select a laboratory in which the dissertation research will be conducted. At the heart of graduate training is a careful and extensive, original research project carried out under the guidance of a faculty advisor and advisory committee. The culmination of this research will be a carefully written and illustrated Ph.D. dissertation or M.S. thesis. Each research program should also result in one or more peer-reviewed publications.

In the Masters Program, students participate in courses covering information in the core discipline of Cell Biology as well as in specialized areas of molecular and developmental biology. At the Fox School of Business and Management, students are required to participate in a set of core courses and are encouraged to take additional courses in specialized areas, such as FDA regulation. In addition, the internship program at either a biotechnology or pharmaceutical company provides the student with practical experience in preparing a business plan, establishing a new biotech company, managerial skills etc. Ph.D. students may also opt to participate in the certificate program at the Fox School of Business and Management.

c. Student Qualifications and Assessment of Performance

Currently there are seven students enrolled in our Ph.D. program including one M.D./Ph.D. student. Between the fall of 1999 and 2003, twenty eight students applied to our Ph.D. Program in Cell and Developmental Biology. Fifteen students were accepted by our Admission Committee (acceptance rate 53%) and eleven of these enrolled in the program (73%) (for details see Appendix Q). Four students accepted positions elsewhere. One student resigned from the program (18%) because of personal reasons and one student was dismissed because he did not maintain the required GPA of 3.0. Minorities and women are well-represented in our student body. These data show that our Ph.D. program is both selective and inclusive in its admissions policy while striving to maintain high standards for those students that enter the program. Data provided by the University (see Appendix A) was compared to that which was collected within the department. Several minor discrepancies were noted, and the data collected within the department were used in preparing this program review, mainly because we were confident with and could verify the data that we collected.

The Graduate Program in Cell and Developmental Biology is relatively small and of high quality. The GRE scores of the students that are admitted to the program are higher than those in many programs at Temple University (average verbal, quantitative and analytical scores were 43, 81 and 79 percentile respectively, see Table 14 for details). A satisfactory level of performance must be maintained. This means that no more than two grades of less than B- may be earned. No more than one grade of F may be received. Receipt of more than the allowed number of substandard grades will result in automatic dismissal from the program. A student must have a GPA of at least 3.0 in order to graduate. One indication of performance in the program is the student's cumulative GPA (see Table 14). No candidates may graduate with an 'IN' (incomplete) or an 'NR' (no record) on their transcript. Students are required to maintain reasonable academic progress as defined by the Graduate Studies Committee of the School of Medicine (see Appendix P) with monitoring by the department. Lack of progress is grounds for dismissal. A minimum of two meetings of the advisory committee each year (one every six months) is required to evaluate the student's progress. Copies of written evaluations which include suggestions for improvements and expected progress over the next six months are provided to the student.

The high standards set and maintained for our graduate program are reflected in the fact that three students in the program between 1999 and 2002 received competitive University Fellowships, and two students are currently recipients of grants from the Commonwealth of Pennsylvania, Department of Health. The average time to graduation for our Ph.D. students is 5 years (data accrued between 1997 and 2003). All students in the program have published or submitted manuscripts prior to graduation (see Appendix R). In addition, all of our students have presented or will be presenting their work at national and international scientific meetings. Our graduates have always been successful in securing post-doctoral fellowships in nationally – known laboratories and are subsequently successful in acquiring faculty positions in academia (see Table 15).

Table 14: Graduate Student Qualifications

Student	Verbal	Percentile	Quantitive	Percentile	Analytical	Percentile	Undergraduate GPA	Graduate GPA
1	360	16	660	68	620	66	2.9	3.44
2	530	66	550	65	575	58	3.75	3.43
3	680	95	670	73	600	61	3.68	3.52
4	530	66	780	95	790	98	***	3.58
5	300	4	710	80	690	84	3.3	3.77
6	*	*	*	*	*	*	***	3.36
7	350	13	650	68	610	64	3.7	3.85
8	450	45	780	91	740	91	3.6	3.3
9	**	**	**	**	**	**	3.59	3.8
10	660	93	760	84	800	97	3.6	3.93
11	340	10	750	89	340	70	***	3.72
12	*	*	*	*	*	*	***	3.7

Key: **GRE requirement was waived and USMLE scores were accepted instead*
***GRE requirement was waived and MCAT scores were accepted instead*
****Undergraduate GPA's that were not converted to the United States GPA scale are not shown here*
N/A = Not Available

The Masters program admitted its first student in the fall semester of 2003. In addition, one Ph.D. student, specifically interested in joining the work force in the private sector has chosen to obtain a Certificate in Business. This program is expected to grow over the next few years, and plans described below will insure this growth.

In summary, student performance is assessed based on (1) course work GPA, (2) candidacy examinations, (3) research reviews, (4) publications while in the program (5) position after graduation, (6) publications after graduation, and (7) peer reviewed grant support within ten years of graduation for those graduates who remain in academia (this will be added to our list of criteria for evaluation of progress and success).

d. Future Plans and Strategic Directions

Currently there are seven faculty members in the department with active research programs. This warrants a graduate program of the size we currently have. However, with additional faculty presently being added to the department, we anticipate an increase in the size of the program from 7-9 to a critical mass of about 12-15 students. Thus, over the past two years several new recruitment tools have been introduced to attract student applicants to our program. These include:

- Updating and modernizing our website.
- Advertising in the Peterson's Guide.
- Publishing brochures describing the programs (see Appendix S).
- Introducing a major new course (Cell Biology).
- Organizing the 'Annual Graduate Student Research Day' within the department (students present their research orally to the faculty and students at the medical school). Prizes are awarded for the top three presentations. This event facilitates interaction among students

and faculty and has now been adopted by the medical school itself. Each year the medical school has a day when all graduate students present posters. Such events not only promote interaction between scientists but provide students with experience in both oral and written presentation skills.

Table 15: Placement of Graduates

Last Name	First Name	Degree	Year	Current Institution and Affiliation
Hui	L	Ph.D.	2004	University of Pennsylvania School of Medicine, Postdoctoral Fellow
Kanaan	R	Ph.D.	2003	University of Pennsylvania School of Medicine, Postdoctoral Fellow
Ogunkua	O	Ph.D.	2003	Drexel University Medical School, Department of Anatomy, Instructor
Selim	A	Ph.D.	2003	Harvard University School of Medicine, Postdoctoral Fellow
Roy	S	Ph.D.	2001	University of Pennsylvania School of Medicine, Department of Pathology, Resident
Xu	J	Ph.D.	2000	Vanderbilt University School of Medicine, Postdoctoral Fellow
Wang	J	Ph.D.	1996	Faculty, China
Yan	L	Ph.D.	1996	Physician, USA
Hixenbaugh	E	Ph.D.	1992	Assistant Professor and Deputy Chair, Department of Biology and Allied Health, Fairleigh Dickinson University, Madison, NJ
Abrahamsen	DK	Ph.D.	1992	Faculty, Anatomy and Physiology, Owen J. Roberts High School, Chester County, PA
Johnson	L	Ph.D.	1995	Assistant Professor, Department of Natural Sciences, University of Maryland Eastern Shore, Princess Anne, MD
Hermey	DC	Ph.D.	1994	Associate Professor of Anatomy, Nova Southeastern University College of Osteopathic Medicine
McGuinness	M	Ph.D.	1992	Assistant Professor, Philadelphia College of Osteopathic Medicine
Foster	JD	Ph.D.	1987	Associate Professor of Anatomy, Western University of Health Sciences College of Osteopathic Medicine of the Pacific Pomona, CA
Neill	J	Ph.D.	1987	Assistant Professor, Department of Anatomy and Cell Biology, SUNY, Brooklyn, NY
Peng	I	Ph.D.	1986	Faculty, UMDNJ, NJ.

Recent innovations will also help our graduate program achieve prominence and higher ranking in the academic/research community. **First**, the recruitment of faculty members with strong research programs and substantial research support is in progress. One faculty member with a funded research program has already joined the department and four others are expected to do so by the end of 2004. According to the NIH fiscal year 2002 data base, our department was awarded a total of \$2,152,023 (ranked 54th in NIH awards). With the recruitment of additional faculty members this amount will increase. A high level of grant support within the department is one of the essential ingredients to foster and support a healthy graduate program. **Second**, additional faculty members in the department will eventually help alleviate the current faculty-teaching load. Anatomy departments are customarily responsible for teaching the bulk of first year courses at the medical, dental and podiatry schools. With the sharing of the teaching responsibilities amongst a greater number of the faculty, the faculty as a group will have the opportunity to accrue additional grant funds and train graduate students. **Third**, the Associate Dean of Graduate Studies at the Medical School and the Dean of Graduate Studies at the University are aware of the need to institute an efficient ‘Standard Operating Procedure’ for admission and acceptance of a student into the program. In the past, cumbersome policies have

caused extensive delays in the handling of paperwork and the issuing of acceptance letters or letters awarding graduate assistantships in a timely fashion. These practices have seriously affected the ability of our graduate program to compete for students with programs at other institutions. **Fourth**, because of events beyond our control (including the SARS epidemics and the devastation of September 11, 2001) the number of students admitted to graduate programs from abroad was reduced by 50% (as reported in an article in the N.Y. Times). Our program was no exception. Over the last two years we offered admission to a total of 6 international students and sponsored their visa applications. Only two students who were already in the United States joined our program, while none of the students residing abroad were able to obtain visas, despite their repeated visits to American Consulates. **Fifth**, our Masters program although in its inception, has shown that there is a market within the private sector for persons trained in both the life sciences and business. In addition, NSF has issued a call for grants to fund academic collaboration between various departments and small businesses to train and equip life scientists to join the work force in the business world. We will therefore use this opportunity to parlay our existing Cell Biology/Certificate in Business Program into a Cell Biology/MBA program including practical experience in entrepreneurship and innovation in the private sector.

The ‘Ph.D. in Cell Biology/MBA’ program will be a ‘one of its kind’ initiative that, with increased funding, should attract student applicants. Partnerships for Innovation (PFI) is a program supported by the National Science Foundation (NSF) that “promotes innovation by bringing together colleges and universities, state and local governments, private sector firms and non-profit organizations. These organizations form partnerships that support innovation in their communities by developing the people, tools and infrastructure needed to connect new scientific discoveries to practical uses”. Grant applications that are funded will provide \$600,000 over a three-year period to recruit high quality students on a full-time basis. The grant will be submitted from the Department of Anatomy and Cell Biology to NSF on 5-17-04. Once funded, our goal will be to enroll a minimum of two Ph.D. candidates in each incoming class into this program. This collaboration between Temple Medical School, the Fox School of Business and Management, state agencies, and the private sector will not only enhance our program, but will be the first collaborative endeavor at Temple University to provide the private sector work force with uniquely trained scientists capable of contributing at both scientific and business levels.

In summary, our graduate program is striving to meet the rapidly growing demand for well-trained cell and developmental biologists in the private sector as well as academia. With the recruitment of five new grant-funded faculty members and the addition of new courses and degree programs to our department, we should quickly achieve our goals of gaining a critical mass of highly qualified graduate students, as well as attaining an elevated ranking among programs offered nationally and internationally.

9. Service

The faculty of the Department of Anatomy and Cell Biology performs a wide variety of service activities for the department, the medical school, the University and beyond. The following is a summary of those service activities from the past five years, with Appendix T detailing the specifics for each faculty member.

a. Departmental

A perusal of Appendix T indicates that all faculty are participating in a wide variety of administrative functions in the department. From training graduate students and post-doctoral fellows to recruiting and promoting new faculty members, the existing faculty members lend their expertise and work as a team for the effective management of selected departmental functions.

b. Medical School

The faculty of the Department of Anatomy and Cell Biology also participate in a number of significant and important committees of the School of Medicine. They are members of search committees, (e.g., Drs. Black and Popoff), graduate student dissertation committees (e.g., Drs. Barbe, Litvin, Oleszak, Pilder and Safadi), the Medical Student Admissions Committee (Drs. Lamperti, Pearson and Popoff), the Curriculum Committee (Drs. Orth and Pearson), the Tenure Committee (e.g., Dr. Popoff) and a number of faculty governance committees, including the Dean's Advisory Committee. Several faculty hold leadership roles by being selected as Chairpersons of their respective committees (Dr. Orth).

The faculty are not only involved in committees dealing with current issues but are also involved in progressive changes in the medical school, e.g., mission-based management committees dealing with research and teaching aspects of faculty performance (e.g., Drs. Black, Pearson and Popoff), and those dealing with designing teaching with technology curricula for the future of the medical school (Dr. Marino).

In the past five years, two faculty were also members of the Dean's staff by being appointed as Associate Deans of Graduate Studies (Dr. Paavola) and Student Affairs (Dr. Lamperti).

Since the faculty of the Department of Anatomy and Cell Biology have teaching responsibilities in other professional schools of the University, they are also members (Dr. Oxberry), and even Chairpersons (Dr. Marino), of strategic committees of those respective schools.

c. University

The faculty of the Department of Anatomy and Cell Biology are also heavily involved in service activities at the University level. Dr. Pearson serves as the Chairperson of the Institutional Animal Care and Use Committee (IACUC). The Graduate Board (Dr. Litvin), Faculty Senate (e.g., Drs. Barbe, Schneck and Oxberry), Dean's Search (Dr. Orth), Academic Planning (Dr. Oxberry), Accreditation (e.g., Drs. Marino, Safadi, Oxberry, Pearson, and Popoff) and Budget Review (Dr. Schneck) committees are only a few examples of the service given to the University by our faculty.

d. Outside University, Professional

Eight (8) faculty review grants for the National Institutes of Health, National Science Foundation, U.S. Department of Agriculture, American Heart Association, Environmental Protection Agency, Food & Drug Administration and the Canadian Medical Research Council. This attests to their national reputation and expertise in their research fields. In addition, the faculty review manuscripts for over thirty different scientific and medical journals and they also review books for publishing companies.

e. Outside University, Community

Several faculty also devote and volunteer their time outside of the University setting for activities at the elementary, high school and college setting. Their time is also given to hobby groups, youth sports organizations and township planning commissions. The Temple name is carried with them to these groups.

10. Strategic Plan

a. Identification of Benchmarks

In an attempt to identify benchmarks when evaluating individual medical school departments, it is important to consider the faculty size, teaching load and mission of the department. The faculty in most Anatomy and Cell Biology departments in other medical schools do not teach in other professional schools. In addition to medical students, our faculty also teach dental and podiatric students. This excessive teaching load must be taken into consideration when formulating a strategic plan and identifying appropriate benchmarks. The data in Table 16 shows how Temple compares to other urban and Pennsylvania medical schools. The number of medical students is well above the average and the total number of basic science faculty is second from the bottom. The faculty to student ratio is the lowest among the schools listed, and this does not take into consideration the dental and podiatric students that are taught by our faculty. When analyzing the basic science research dollars, Temple is below average, but when normalizing this value to the number of basic science faculty members, the result is remarkably different being in the upper quartile.

b. Research

For research, there is a national ranking by department for NIH awards (see Figure 2 in section on Research). Our department ranked 54th in FY 2002 (the latest year for which data are currently available) with a total of 9 awards in the amount of \$2,152,023. Strengthening our research effort remains the primary goal for our department over the next 7 years. It is reasonable to expect that we should increase our national ranking to a level between the 40th-45th, which is where departments of Anatomy/Cell Biology at Wayne State, the University of Wisconsin, the University of Arizona and Indiana University Schools of Medicine are currently ranked. This increase in our national ranking will require a 50% increase in our NIH funding from current levels and this will be achieved primarily through an increase in the number of faculty members with active research programs. The data shown in Table 6 (see section on Research) demonstrates that there has been a significant (3-fold) increase in the research dollars

generated per full-time faculty member in the department in recent years (currently at \$151,334). Another goal is to continue this trend to meet or exceed the average research dollars generated per basic science faculty member (currently at \$205,880) for the medical school.

Under the leadership of our Dean, John M. Daly, M.D., the medical school is engaged in a process of recruiting and hiring new Presidential, tenure-track faculty with strong research credentials in the basic sciences. The Dean's strategy is to recruit new faculty in targeted areas of research to strengthen existing research centers or interdisciplinary research groups that could develop into new centers in the future. The Dean appointed a task force for basic science planning to establish the ground rules for the co-existence of departments and centers. This task force generated a document that defines a research center, discusses the purposes for having centers, and most importantly, defines the relationship between departments and centers. Departments and centers must be mutually beneficial; centers are not created to undermine the departments and departments must cooperate with and support the centers to allow them to flourish. This type of relationship can have a positive impact on our ability to recruit new faculty with strong research credentials and this will greatly enhance the research efforts at the medical school. The Department of Anatomy and Cell Biology is currently engaged in four separate faculty recruitment efforts (see faculty recruitment under section on Faculty). We have already hired one new Assistant Professor (Dr. Sabri, appointed March, 2004) in conjunction with the Cardiovascular Research Center (CVRC). Dr. Sabri has already received funding from the American Heart Association and recently received notification that his NIH R01 grant application is expected to be funded beginning July 1, 2004. We are also in the process of hiring a second faculty member in conjunction with the CVRC; this research investigator (Dr. Rizzo) has agreed to come to Temple from the Medical College at Albany and has an NIH-funded research program. The department is also recruiting for a neuroscientist with the Center for Substance Abuse (CSAR) and for a vascular biologist with the Thrombosis Research Center (TRC). Both of these recruitments have identified exceptional candidates with whom we are currently negotiating. Finally, the department is actively recruiting a bone/cartilage biologist who can interact with the interdisciplinary musculoskeletal biology group (Drs. Popoff, Safadi, Barbe, Barr, Uknis and DeLaCadena) group that has its base in the department. This recruitment has also identified outstanding candidates and is in the final phases of negotiation with these candidates. **The impact of hiring a total of five new faculty members in Anatomy and Cell Biology within the next year will have a significant effect on strengthening our research efforts. In addition, strengthening the Research Centers and interdisciplinary research groups will also create new opportunities for funding and increase the likelihood of success for funding of multi-investigator proposals, such as program project and training grants.**

**Table 16: Faculty, Student and Research Data
Pennsylvania and Other Selected Urban Medical Schools - Academic Year 2001-2002**

SCHOOL	MEDICAL STUDENTS '02	GRADUATE STUDENTS '02	RESIDENTS '02	BASIC SCIENCE FACULTY* '02	CLINICAL FACULTY '02	TOTAL FACULTY '03	FACULTY TO MEDICAL STUDENT RATIO*	BASIC SCIENCE RESEARCH DOLLARS '02 IN MILLIONS	TOTAL FEDERAL RESEARCH DOLLARS '02 IN MILLIONS	RESEARCH \$ IN THOUSANDS PER BASIC SCIENCE FACULTY MEMBER**	FEDERAL RESEARCH \$ IN THOUSANDS PER TOTAL FACULTY MEMBER**
BOSTON U	614	432	492	111	924	1035	1.7	19.5	151.5	175.68	146.38
BUFFALO	550	323	550	90	653	743	1.4	37.4	56.1	415.56	75.50
CINCINNATI	621	397	482	94	965	1059	1.7	19.8	133.7	210.64	126.25
DREXEL	973	131	464	72	423	495	0.5	9.5	19.5	131.94	39.39
GEO WASHINGTON	625	115	406	92	493	585	0.9	24.3	63	264.13	107.69
JEFFERSON	899	262	579	132	654	786	0.9	28.6	77.2	216.67	98.22
LOUISVILLE	580	249	427	78	496	574	1.0	6.1	26.9	78.21	46.86
MARYLAND	579	296	546	136	855	991	1.7	25.6	115.2	188.24	116.25
PENN ST	454	220	335	112	475	587	1.3	23.6	40.5	210.71	68.99
PITT	575	202	778	121	1580	1701	3.0	25.5	241.1	210.74	141.74
TEMPLE	797	137	394	68	296	364	0.5	14	25.2	205.88	69.23
TULANE	608	457	340	64	405	469	0.8	6.4	18	100.00	38.38
U ILLINOIS	1278	300	879	223	733	956	0.7	25	69.5	112.11	72.70
U PA	578	567	624	241	1863	2104	3.6	63.8	336.1	264.73	159.74
UMDNJ-Newark	698	172	484	134	579	713	1.0	14.9	40.5	111.19	56.80
VA COMMONWEALTH	689	277	464	151	665	816	1.2	16.1	48.7	106.62	59.68
WAYNE ST	1045	416	699	115	872	987	0.9	18.7	69.3	162.61	70.21
PRIVATE SCHOOLS	530	240	557	124	935	1059	2.0	26.5	121.1	213.71	114.35
PUBLIC SCHOOLS	530	203	470	101	603	704	1.3	16.7	64.1	165.35	91.05

*Pathology included with Clinical Departments
FROM AAMC MSPS SYSTEM

c. Education

For education (graduate or professional), there are no national rankings for individual basic science departments in medical schools. The graduate program in Anatomy and Cell Biology has always been a relatively small program (currently 7-9 students), but has been highly successful in producing well-trained Ph.D.s with an excellent record of placement in academia or industry after completing our program (see section on Graduate Education). With the addition of new faculty with active research programs to the department, we envision increasing the size of the program to 12-15 students, and perhaps even more in the future. Our main challenge lies in our ability to attract more well-qualified applicants and to successfully recruit them into our program. The inception of our Master's program with a certificate in business (certificate in business is also offered to our Ph.D. students), has shown that there is a market within the private sector for persons trained in both the life sciences and business. The National Science Foundation (NSF) has issued a call for proposals to fund academic collaboration between various departments and small businesses to train and equip life scientists to join the work force in the business world. Partnerships for Innovation (PFI) is a program supported by the NSF that "promotes innovation by bringing together colleges and universities, state and local governments, private sector firms and non-profit organizations. These organizations form partnerships that support innovation in their communities by developing people, tools and infrastructure needed to connect new scientific discoveries to practical uses." We will use this opportunity to develop a new combined degree Ph.D. in Cell Biology/M.B.A. program including practical experience with entrepreneurship and innovation in the private sector. Dr. Judith Litvin, Associate Professor of Anatomy and Cell Biology, will direct this effort and serve as the principal investigator on the NSF proposal. The development of a Ph.D./M.B.A. program will be a "one of its kind" initiative that should help attract highly qualified applicants. This program will be a collaboration between Temple's School of Medicine, the Fox School of Business and Management, state agencies and the private sector. Not only is it expected to enhance our graduate program, it will be the first collaborative endeavor at Temple to provide the private sector work force with uniquely trained scientists capable of contributing at both the scientific and business levels. **In summary, our graduate program is striving to meet the rapidly growing demand for well-trained cell and developmental biologists in the private sector as well as academia. The recruitment of new faculty members with strong research programs and the establishment of the Ph.D. in Cell Biology/M.B.A. program should help us achieve our goals of attracting highly-qualified applicants, increasing the number of students enrolled in our program and attaining a more prominent reputation in the academic/research community. It is our mission to prepare our graduates for highly successful careers in academia, industry and government.**

The department also faces several challenges with respect to our teaching mission in the professional schools. The faculty:student ratio is extremely low, and the addition of new faculty members should help to improve this ratio. However, the new faculty hires will not carry a heavy teaching load as they are expected to establish and/or maintain externally funded research programs of prominence in their field. The problem of having enough qualified teaching faculty to provide adequate coverage for all of the classes and to maintain an acceptable faculty:student ratio will be compounded when senior faculty members who currently carry the bulk of the teaching load for the department retire in the next few years. In addition, the implementation of

the new medical school curriculum in 2005-2006 will require a significant re-alignment of faculty effort and course content, and will have an impact on courses taught by our faculty in the other professional schools. These challenges will require the continued development and use of computer-based course software by our faculty and the identification of new teaching methods that are less faculty-intensive, as well as the increased use of part-time or full-time Dean's appointments to cover our teaching responsibilities in the other professional schools. In recent years, we have increased the use of part-time teachers in our gross anatomy courses, especially in the labor-intensive laboratory sections of these courses. Another goal is to better prepare our students so that they may increase their scores and the pass rates on the board licensing examinations. The implementation of the new curriculum will involve a re-examination of the required and essential competencies for medical students in each of the disciplines so that the course content can be modified to assure that we are teaching the students what they are expected to know. **In summary, we want to maintain an excellent educational program for the professional students by finding adequate solutions to provide qualified help to cover our heavy teaching load, including the implementation of new teaching methods that are less faculty-intensive. We will continue to incorporate the use of computer-aided technologies into our courses as they can serve to improve student-centered learning and change/reduce the role of the faculty in the education process. We want to help our students develop better problem-solving skills and become life-long learners so that they are well-prepared for careers as clinicians in various disciplines and settings.**