

# The Relationship Between the University of Pittsburgh School of Medicine and the University of Pittsburgh Medical Center—A Profile in Synergy

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## Abstract

In the synergistic evolution of their research, educational, and clinical programs, the University of Pittsburgh (Pitt) School of Medicine (SOM) and the University of Pittsburgh Medical Center (UPMC) have followed one core principle: What is good for one is good for both. The collaboration is underpinned by UPMC's commitment to its community mission, including support for the academic and research objectives of the SOM. UPMC's conceptual origin was fostered by its experience with Western Psychiatric Institute and Clinic in the 1970s. Over time, UPMC acquired other hospitals through merger and negotiation and, by 2008, had grown

into a \$7 billion global health enterprise. From the outset, the senior leaders of both UPMC and Pitt committed to collaborative decision making on all key issues. Under this coordinated decision-making model, UPMC oversees all clinical activity, including that from a consolidated physicians' practice plan. Pitt remains the guardian of all academic priorities, particularly faculty-based research. UPMC's steady financial success underpins the model. A series of interrelated agreements formally defines the relationship between Pitt and UPMC, including shared board seats and UPMC's committed ongoing financial support of the SOM. In addition, the two

institutions have jointly made research growth a priority. The payoff from this dynamic has been a steadily growing Pitt research portfolio; enhanced growth, visibility, and stature for UPMC, the SOM, and Pitt as a whole; and the sustained success of UPMC's clinical enterprise, which now has an international scope. Given the current stagnation in the National Institutes of Health budget, the Pitt-UPMC experience may be instructive to other academic health centers.

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**B**y 1994, national health expenditures had reached nearly 14% of the U.S. gross domestic product.<sup>1</sup> The failure of the Clinton administration's proposed health care reform plan accelerated the rise of managed care, under which private insurers attempted to regulate health care delivery to reduce costs. In 1998, concerned about the size and potential financial risk associated with its faculty practice plans, the University of Pittsburgh (Pitt) transferred these plans and its hospital management functions to an independent nonprofit corporation, the University of Pittsburgh Medical Center (UPMC). A series of interrelated agreements defined the close interaction and coordination that both institutions saw as essential to their long-term

success, including a substantial number of shared board members and UPMC's ongoing financial support of Pitt's medical school (Figure 1).

UPMC and the Pitt School of Medicine (SOM) have thrived under this model (Table 1). Today, UPMC is western Pennsylvania's largest employer<sup>2</sup> and has expanded its clinical operations to Italy, Ireland, and Qatar. UPMC reported revenues of \$6.8 billion in fiscal year 2007, with \$618 million in net income. Pitt, led by its medical school faculty, became one of the nation's top 10 recipients of National Institutes of Health (NIH) research support in 1997 and has progressed within that status since, even during the recent period of NIH budgetary stagnation.<sup>3</sup> The NIH process is the major national, peer-reviewed, objective metric commonly used to assess overall academic quality in a biomedical-research-focused institution.

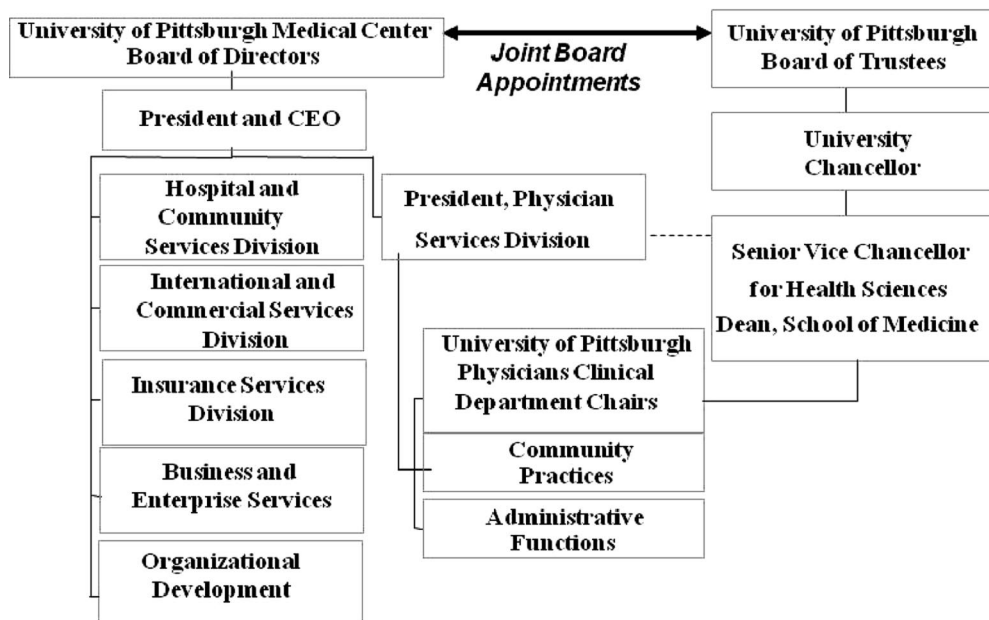
The paradigm underlying the Pitt-UPMC relationship, which is embodied in but extends well beyond the terms of the

formal affiliation agreements, is rooted in one core principle: *In an academic health center (AHC), research and clinical success are synergistic and interdependent. In-depth, committed, strategic collaboration between the clinical and the academic enterprises will enhance the success of both beyond that which would occur with an investment in either alone.*<sup>4</sup>

For Pitt and UPMC, the entry point for implementing this principle was to invest clinical revenue in medical school research, including facilities, equipment, and faculty start-up packages. The SOM complemented this investment by developing infrastructure to encourage and sustain new research initiatives, including technologically rich core facilities and faculty incentives for research productivity. With such an intense, focused resource commitment, faculty members were able to leverage those investments into funded grants from NIH and other federal and private sources. This funding and the ensuing faculty success in reporting their findings

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**Figure 1** University of Pittsburgh Medical Center (UPMC) / University of Pittsburgh (Pitt) relationship (simplified). A series of interrelated agreements formally defines the relationship between Pitt and UPMC, including shared board seats (the senior vice chancellor sits on the UPMC board) and UPMC's financial support of the school of medicine. Appointment of department chairs and service chiefs is also accomplished collaboratively, although the dean has exclusive authority for faculty appointments and promotions.

promoted the visibility of not just the medical school but the entire university. At the same time, UPMC continued to grow, with a significant share of increased volume attributable to the faculty-practice-plan physicians, stimulating the strong financial performance that is the cycle's entry point (Figure 2). To operationalize the principle, however, UPMC required (1) sufficient resources and (2) a willingness to reinvest them in the SOM's academic mission. Both of these conditions were present.

When faced with the volatile health care climate of the 1980s, during which corporate models were increasingly applied to health care in an effort to control declining revenues and spiraling costs,<sup>5</sup> Pitt and UPMC realized that crisis could equal opportunity if both were willing to act boldly. This article describes that process.

### The Pilot Project: Western Psychiatric Institute and Clinic

As Wartman<sup>6</sup> noted, although the perception is that AHCs have a variety of organizational models, in fact, two prototypes dominate: (1) the fully integrated model through which all functions—academic, clinical, and research—report to one person and one

board, and (2) the divided model, where the academic and clinical functions are managed separately and report to different boards. Pitt and UPMC technically fall into the divided model but with a much more robust and structured financial interface than is typical with that model. The current structure is the culmination of a 20-plus-year evolution, which began in the unlikely setting of Western Psychiatric Institute and Clinic (WPIC), a state psychiatric hospital built by the Commonwealth of Pennsylvania in 1942 and transferred to Pitt's fiscal and operational management in 1949.

Until the mid-1980s, the Pitt SOM was recognized mainly as a regional institution with modest research activity. At the time, Pitt's teaching hospitals included five financially and legally independent private nonprofit hospitals (Children's Hospital of Pittsburgh, Eye & Ear Hospital of Pittsburgh, Magee-Womens Hospital, Montefiore Hospital, Presbyterian University Hospital) as well as WPIC, all clustered on or near the Pitt campus. These facilities served as teaching sites for medical students and residents and practice sites for faculty.

Pittsburgh is noted for its private foundations, most of them outgrowths of the city's industrial success, and their role in community development. When the

Richard King Mellon Foundation was created in 1947, one of its priorities was to establish a first-rate health center in Pittsburgh.<sup>7</sup> Progress toward this farsighted goal was painfully slow, and the Pitt-affiliated hospitals remained largely undistinguished. By the early 1970s, the state was sufficiently concerned to threaten major funding cuts because of WPIC's lack of responsiveness to new developments in psychiatry and to the mental health needs of the region's citizens.

In response, Pitt sought and received \$5 million from the Richard King Mellon Foundation to recruit a chair of psychiatry who could bring the department into the modern era of biological psychiatry and also serve as WPIC director. From the outset, the vision of the new chair of psychiatry and WPIC director, one of us (T.P.D.), was to apply emerging knowledge from neuroscience, psychopharmacology, epidemiology, and genetics to the field of psychiatry in a truly interdisciplinary approach and to build a department around rigorous clinical research and what is now called evidence-based clinical practice.

By applying business principles to the department and hospital, the department chair/WPIC director implemented an

**Table 1**  
**University of Pittsburgh Medical Center (UPMC) and University of Pittsburgh (Pitt) School of Medicine (SOM) at a Glance, 2008\***

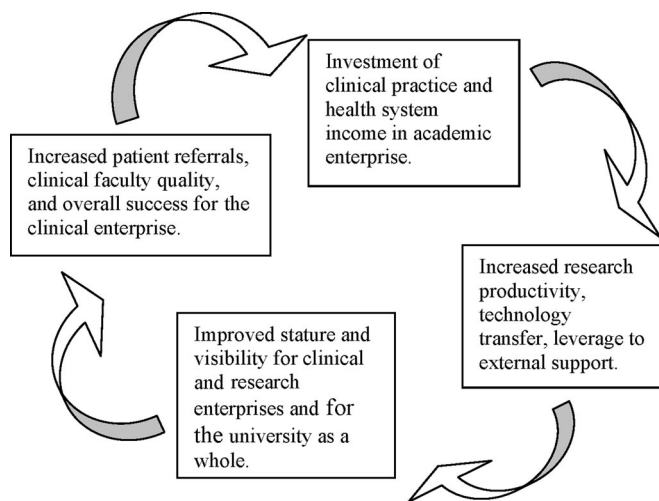
Feature	Description
University status	Quasi-private/state-related (the SOM receives only 1.3% of its budget from the Commonwealth of Pennsylvania).
Administrative model	The SOM is part of Pitt; the senior vice chancellor (SVC) for the health sciences reports to the university chancellor. UPMC is corporately separate from Pitt. The UPMC president reports to a board of directors, one third of whom are appointed by Pitt. The SVC for the health sciences serves on the UPMC board; the UPMC board chair serves on the Pitt board.
Pitt SOM academic model	Six health sciences schools reporting to an SVC, who is also medical school dean.
Pitt SOM faculty	2,020 (All faculty have appointments in the SOM. Many also provide clinical care through the University of Pittsburgh Physicians practice plan, which is part of UPMC and for which they receive separate compensation.)
Pitt medical students	580 (274 women [47%] and 306 men [53%]; of these, 172 [30%] are Pennsylvania residents, and 72 [approximately 12%] are underrepresented minority students)
Pitt graduate students (PhD and MS)	308
FY2006 and FY2007 National Institutes of Health (NIH) funding to Pitt	\$447 million in FY2006 (sixth nationally) \$457 million in FY2007 (not yet ranked)
Number of NIH grants, FY2006	1,082 (fourth nationally)
Clinical residents and fellows	1,442
UPMC hospitals	20 tertiary, community, and specialty
UPMC assets	\$7.4 billion in FY2007
UPMC revenue	\$6.8 billion in FY2007
UPMC employees	48,000 (excluding SOM faculty, even those who participate in the practice plan)
UPMC hospital admissions per year	190,000 (combined for all 20 hospitals)

\* Data are current as of January 2008 and, for UPMC, reflect only data for U.S. operations.

organizational structure and management model that became a scalable template for UPMC. He negotiated two essential components with Pitt: (1) control of the hospital's

clinical revenues so that he could reinvest any excess margin from improved productivity in faculty recruitment, patient care, and research, and (2) retention of an amount of funding equal

to the indirect costs from NIH grants (which were then modest). With these agreements in place, he controlled all revenues, although the department was "on its own bottom," without Pitt resources.



**Figure 2** The University of Pittsburgh School of Medicine and University of Pittsburgh Medical Center (UPMC) have committed themselves to a single core principle for long-term growth and sustainability: What is good for one is good for both. The starting point (top) for translating this principle into practice was UPMC's commitment to invest in medical school research, including facilities, equipment, and faculty start-up packages. This agreement was first formalized in 1998 and has since been renewed for an additional 10 years with an increase in support for the medical school.

The department used its revenue for improvements to clinical facilities, infrastructure to support the growing research portfolio, incentive payments to faculty who secured grant funding, and recruitment of new faculty from fields including neuroscience, imaging, genetics, and social science. The department also created an Office of Research to provide technical assistance in grantsmanship (e.g., study design, statistical power calculation and analytic design, budgeting, responsiveness to NIH priorities) and mandated a presubmission peer-review process for all grant proposals. As research prospered, so did WPIC's clinical volume and community interaction, which became a de facto marketing strategy. Between 1974 and 1982, the department's full-time faculty grew from 36 to nearly 150. Within 10 years, Pitt's Department of Psychiatry was one of the nation's top

three in NIH funding and was a driving force in Pitt's overall NIH support, which was approximately \$3.4 million in 1980, placing Pitt 36th among NIH grant recipients.

The Department of Psychiatry/WPIC financial structure came to define the UPMC business model, whereas the department's interdisciplinarity was a model for the SOM's ensuing success.

### **From a Loose Consortium of Hospitals to UPMC**

From the mid-1970s through the mid-1980s, U.S. health care costs skyrocketed, fueled by inflation, Medicare and Medicaid growth, fee-for-service-based reimbursement under private insurance, cost-based reimbursement under public insurance, and technological advances that increased hospital use and costs. However, this reimbursement structure enabled hospitals to recover all costs; many hospitals, including those affiliated with AHCs, became cash cows that fueled faculty and research growth.<sup>8</sup>

Pitt was still affiliated with the aforementioned five independent teaching hospitals, which had loosely organized as a voluntary consortium, the University Health Center of Pittsburgh (UHCP). The Pitt-controlled WPIC was also a UHCP member. The consortium's goal was to support members' common objectives in advancing teaching, research, and patient care. In addition, the SOM's faculty, under Pitt auspices, had developed departmental practice plans to subsidize their departments by billing patients in UHCP hospitals and outpatient clinics; each plan was an independent corporation.

In 1982, the Pitt administration, having witnessed the Department of Psychiatry's success, asked the department chair/WPIC director to serve as associate senior vice chancellor for the health sciences and, in 1984, as senior vice chancellor (SVC) responsible for all six health sciences schools (Medicine, Dental Medicine, Health and Rehabilitation Sciences, Nursing, Pharmacy, and Public Health). The new SVC, one of us (T.P.D.), set out to apply the WPIC model to the entire SOM, including retention of all revenues, and to plan interdisciplinary centers of excellence in key areas such as cancer and

transplantation, a promising but still high-risk, highly speculative research area.

In 1983, new legislation changed Medicare from cost-based reimbursement to flat-rate prospective payment, potentially constraining hospital use and income. The new system required more efficient operations for hospitals to survive and heralded a spate of hospital mergers nationwide. In 1984, two UHCP hospitals, Presbyterian-University and Eye & Ear, tried unsuccessfully to merge. After negotiations failed, Pitt approached Eye & Ear with a management offer. The hospital agreed to enter into a shared management arrangement with Pitt, under the direction of the SVC management team, and to include two-thirds Pitt-appointed trustees on its board.

Then, in 1985, with seed funding from the Richard King Mellon Foundation, Pitt recruited a highly regarded senior scientist from the National Cancer Institute (NCI) to direct what would become the University of Pittsburgh Cancer Institute (UPCI). In 1990, UPCI became the youngest cancer center to be designated an NCI comprehensive cancer center. (To receive this designation, a cancer center must engage in research across the full spectrum from basic science to cancer prevention and control studies including clinical trials; provide outstanding clinical care; and serve as a community resource for cancer information, education, and outreach.)

UPCI and what eventually became the Thomas E. Starzl Transplantation Institute were pilot tests for a foundation of the UPMC-Pitt health sciences model—*interdisciplinary, interinstitutional centers of excellence*. These centers integrate the best research, clinical care, and teaching from multiple departments, hospitals, and institutions under a matrix management structure (see List 1). Each center director reports to the SVC, assuring equal status for all participating entities. Entities opting into such centers must provide financial support for the center's core services and discretionary funds for research and development.

Also in 1985, recognizing that UHCP had failed to coordinate members' interests, the Presbyterian-University Hospital

board commissioned the SVC management team to review options for improving and strengthening the organization. The resulting concept paper proposed an organizational relationship among Presbyterian-University Hospital, Eye & Ear Hospital, WPIC, and Pitt, with centralized management of the clinical facilities under a single administrative structure that remained linked to Pitt's academic mission. The concept paper further proposed a shared governance and management model, with equal community and Pitt representation and stronger faculty input into planning and decision making. The model linked the clinical enterprise to Pitt through board membership (Pitt would appoint half of Presbyterian's 24-member board) and led to the creation of Pitt's Medical and Health Care Division (MHCD) as the centralized management entity for all of these facilities under the SVC's direction. The hospitals adopted the model in July 1986, and Pitt named one of us (J.A.R.) executive vice president of the new division.

MHCD, now with management responsibility for Presbyterian and its increasingly successful transplantation program, focused on improving the financial performance of the facilities it managed. MHCD expanded Presbyterian and integrated the management of Presbyterian, Eye & Ear, and WPIC. This consolidation enabled MHCD to invest \$230 million to expand the transplantation program and provide space for the growing cancer institute and other research initiatives. By 1988, more than half the world's liver transplantations were performed in Pittsburgh.<sup>9</sup>

In 1990, Presbyterian agreed to buy the assets and assume the debt of Montefiore Hospital for \$150 million. Montefiore, an adult tertiary hospital adjacent to Pitt, was suffering as a result of the changing reimbursement landscape. Presbyterian, located proximally to Montefiore, was facing capacity constraints and planning to expand. As a result of the acquisition, Presbyterian University Health System, Inc. (PUHSI), Presbyterian Hospital's parent company, gained the right to appoint two thirds of Montefiore's board and manage the hospital; to promote various efficiencies, Eye & Ear was merged into Montefiore. Also in 1990, Pitt's board of trustees approved



## List 1

**Selected Core Facilities and Interdisciplinary Centers and Institutes With the Years They Were Established****Core facilities available to all faculty**

- Bioinformatics Core (2007)
- Cellular Products Laboratory (1986)
- Center for Biotechnology and Bioengineering—includes Biosensor Facility, DNA Sequencing Core, Mass Spectrometry Core, Peptide Synthesis Core, Structural Biology Facility (1993)
- Center for Biologic Imaging (1991)
- Division of Laboratory Animal Resources (consolidated 1992)
- Flow Cytometry Facility (1986)
- Functional Imaging Research Program—includes Magnetic Resonance Research Center and Position Emission Tomography Facility (1990—grant awarded; 1992—facilities functional)
- Genomics and Proteomics Core Laboratories (1996)
- Micro and Nanotechnology Lab (2002)
- Transgenic and Chimeric Mouse Facility (2001)
- Vector Core Facility (1991)
- Zebrafish and primate facilities (both very extensive) (1967–2006)

**Major substantive interdisciplinary centers and institutes involving multiple participating departments\***

- Cardiovascular Institute (1998)
- Center for Research on Health Care (1994)
- Center for Vaccine Research (2006)
- Clinical and Translational Science Institute (2006)
- Diabetes Institute (2000)
- Drug Discovery Institute (2006)
- Functional Genomics Research Center (2002)
- Clinical and Translational Research Center—formerly General Clinical Research Center (1960s)
- Hartford Foundation Center of Excellence in Geriatric Medicine (2004)
- Homeostasis and Vascular Biology Institute (2008)
- Institute on Aging (2002)
- Magee-Womens Research Institute (1993)
- McGowan Institute for Regenerative Medicine (2001)
- Pittsburgh Center for Pain Research (2006)
- Pittsburgh Institute for Neurodegenerative Diseases (2006)
- Starzl Transplantation Institute (1985; renamed “Starzl” in 1996)
- Systems Neuroscience Institute (2006)
- University of Pittsburgh Cancer Institute (1985)

**Interinstitutional collaborations**

- Center for the Neural Basis of Cognition—with Carnegie Mellon University (1994)
- Intel University Lab—with Intel Corporation, Carnegie Mellon University, and UPMC (2002)
- Pittsburgh NMR Center for Biomedical Research—small animal MRI with Carnegie Mellon University (1985)
- Pittsburgh Supercomputing Center—with Carnegie Mellon University (1986)
- RAND–Pitt Health Policy Institute—with RAND–Pittsburgh (2001)

\* There are additional, primarily disease-focused centers administered within departments.

changing MHCD’s name to the University of Pittsburgh Medical Center; in 1992, the Pitt chancellor named one of us (J.A.R.) SVC for health administration and UPMC president.

Separately, the PUHSI board of directors agreed to change its name to UPMC System in 1994. Both the UPMC System hospitals and the Pitt-based hospital

management group operated under the UPMC name, and, since then, 16 additional hospital consolidations have occurred under this name. An interesting and important outgrowth of these consolidations was the creation of several new private “conversion” foundations, formed by the transfer of assets from the merging institution to a new nonprofit

entity. The largest of these, the Jewish Healthcare Foundation of Pittsburgh, was created with \$75 million from the Presbyterian-Montefiore merger. The Eye & Ear Foundation was also created through these mergers.

Not only were hospitals merging, but also, recognizing AHCs’ increasing belt-tightening, the SOM began consolidating basic science departments both to eliminate redundancies and to stimulate interdisciplinary collaboration. To house these departments, Pitt built a new, 15-story research building, which was dedicated in 1990.

**The Emergence of UPMC**

As UPMC was growing, so were national health care expenditures, rising to nearly 14% of the gross domestic product by 1994.<sup>1</sup> To achieve economies of scale, to rationalize excess capacity, and to compete in the emerging managed care environment, hospitals consolidated and formed networks. In western Pennsylvania, the two leading health care network organizers were UPMC and the Allegheny Health, Education, and Research Foundation (AHERF). UPMC emerged as what is now a 20-hospital regional system committed to sustaining the first-rate AHC that had been evolving at Pitt. AHERF, in 1998, having amassed \$1.3 billion in debt, was declared the largest nonprofit medical system bankruptcy in history, leaving UPMC as the region’s only financially robust health care network.<sup>10</sup>

In bringing community hospitals into its system, UPMC approached each hospital at three levels—(1) the governing board, (2) hospital management, and (3) medical staff—and sought to understand each institution’s core culture and values. Although most hospitals needed to merge to survive, they were also seeking a trustworthy partner. UPMC consistently acted to balance the interests of the community-based private practitioners who composed the majority of the medical staffs of the merged community hospitals with those of the SOM clinical departments and faculty who sought to increase their patient volume and market share. For most of the merged hospitals, UPMC implemented a five-year integration period for the transfer of authority, which gave board members, executives, physicians, and staff an

opportunity to know one another without the fear of major changes in services or structure and to provide stability during the period of full integration. Unlike the model for many mergers between AHCs and community hospitals, UPMC did not require the appointment of Pitt faculty as clinical department chiefs in the merged hospitals, and UPMC insisted that cases referred for consultation to Pitt faculty remain on the rosters of the referring community physicians. Many community physicians became clinical faculty members in the SOM. The one exception to this model is that many physicians in hospital-based specialties (anesthesiology, pathology, and radiology) became UPMC employees because of their existing hospital employee contractual status as well as UPMC's desire to establish uniform approaches to the standard of care, when possible.

UPMC also introduced the matrix organizational model to the newly integrated hospitals. Under this model, whereas the hospital CEO had responsibility for managing a specific facility, every hospital's administrative and clinical staff reported both to the hospital CEO and to the corporate-level executive who oversaw system-wide operations in their areas of responsibility, just as each hospital's CEO reported to the UPMC president. UPMC applied this model across the board—materials management, purchasing, pharmacy, government relations, communications and marketing, and clinical service lines. UPMC's management team kept cost increases below 1% at a time when health care spending was rising annually about 2.4 percentage points faster than the gross domestic product.<sup>11</sup> By creating a truly integrated system, UPMC achieved savings in administrative functions approaching 30%, putting the entire system on sound financial footing.

Although some of the mergers went smoothly, others were fraught with difficulty, reflecting the ambivalence any organization feels when making what it perceives as an identity-transforming change. UPMC faced two particular challenges: (1) melding many, often fiercely independent community hospital cultures and their physician groups into a unified system with shared goals, standards, and values (a far different

process than growth from within), and (2) effecting the logistic integration of services required to exert the leverage of scale. However, the five-year integration period gave each hospital's leadership time to understand and adapt to UPMC's highly integrated model.

A shared vision between Pitt and UPMC, underpinned by UPMC's financial acumen, led to the UPMC AHC in its current form. What UPMC's creators did uniquely well was to bring business-like discipline to hospital operations. They also made a firm commitment to supporting research, making the SOM more productive academically, clinically, and economically than ever in its history. Not only did the UPMC clinical enterprise thrive, but, by 1997, Pitt, driven by the SOM, reached and remained among the nation's top 10 NIH-funded universities. Pitt's share of NIH support between 1985 and 1995 grew more rapidly than any other university's. UPMC's growth, integration, and evolution necessitated further redefinition of its role and relationship to Pitt.

In 1997, discussions regarding the form of that relationship began; these discussions culminated in a series of four formal agreements through which the Pitt-based hospital management structure was integrated with the hospitals' parent corporation, which had always been independent. (The parent corporations of Eye & Ear and Montefiore had already become part of PUHSI, which then became UPMC.) All UPMC functions were now independent of, but still intimately affiliated with, Pitt. The agreements include specific provisions related to governance, financial relationships, faculty, identity, and other matters. Particularly important to the SOM's stability is the definition of UPMC's financial commitments to the school in specific dollar amounts rather than as a percentage of UPMC revenue. Thus, UPMC's legal structure and contractual commitment to the SOM are independent of leadership changes or financial swings, although contributions above the mandated amounts may be influenced by either. The agreements became effective in July 1998, have 10-year interdependent terms, and were recently renewed for a second 10-year period with a substantial increase in

UPMC's financial commitment to the SOM. Core terms are as follows:

- *Reorganization agreement*—Transferred certain clinical and administrative functions (e.g., hospital and clinical services management) from Pitt to UPMC; provided for and facilitated development of the unified University of Pittsburgh Physicians (UPP) practice plan by shifting ownership of and responsibility for the individual clinical practice plans from Pitt to UPMC; defined governance mechanisms; addressed asset transfers; and provided assurances that the assets, programs, and practice plan would continue to operate in a manner that advances Pitt's teaching, research, and community service obligations.
- *Academic affiliation agreement*—Reaffirmed Pitt's and UPMC's commitment to each other and to their interrelated teaching, research, clinical care, and community service missions; defined certain operational features in their ongoing relationship; established the exclusivity of the affiliation with respect to academic and clinical practice matters; and established the financial and operational relationship between UPMC and Pitt with respect to Pitt faculty who perform clinical and also academic duties.
- *Trademark license agreement*—Described how Pitt permits UPMC to use the name "University of Pittsburgh Medical Center" and the Pitt seal.
- *Support services agreement*—Identified contract and leasing services, such as building maintenance and communications functions, that may be provided by one entity to the other, and identified how the costs for these services will be determined.

Under the agreements, Pitt designates one third of the UPMC board of directors and its executive committee, whereas the chair of the UPMC board is a member of the Pitt board of trustees. The parties also agreed to provide financial support to each other at a level consistent with prior practice. Table 2 shows UPMC's annual academic contributions to the SOM, which have consistently exceeded the agreement's mandate. In turn, the SOM supplements funds for the other health sciences schools, which function on a different model through which Pitt provides major support but retains a

Table 2

**University of Pittsburgh Medical Center's (UPMC's) Revenue and School of Medicine (SOM) Investment in Millions of Dollars**

Finances	FY2001	FY2002	FY2003	FY2004	FY2005	FY2006	FY2007
UPMC revenue	2,883	3,488	4,008	4,607	5,121	5,991	6,770
UPMC academic support to the University of Pittsburgh (Pitt)*	78	73	78	82	95	108	135
National Institutes of Health funding to Pitt†	289	339	380	396	431	447	457
SOM revenues	792	849	943	1,027	1,148	1,295	1,449

\* Additionally, UPMC contributes to laboratory construction, endowed chair positions, and recruitment packages for clinical department chairs, which have totaled \$50–\$70 million annually in recent years.

† Reported data are for grants to Pitt faculty. Approximately 80% of this funding was to SOM faculty in FY2006, the latest year for which final data are available; the amount noted in the column for FY2007 is an estimate because NIH has not yet released final data.

significant proportion of tuition and indirect cost income.

UPMC funding includes academic support for schoolwide research and teaching programs, including a dean's tax on clinical revenues, which is used to support academic activities. As part of this support, UPMC provides the SVC with discretionary funds of almost \$40 million per year (used, for example, to support faculty recruitment, innovative pilot research, or major equipment purchases), plus an annual increase. UPMC also provides annual financial support for academic activities directly to the clinical departments and institutes. Thus, in recent years, UPMC has provided an average of \$200 million annually to support the SOM, its institutes, and its clinical departments, including facilities construction, clinical-chair-recruitment packages, partial clinical faculty salaries, endowed chairs, and contributions defined by the affiliation agreements.

UPP is the sole practice plan for Pitt medical faculty, and the SOM is the sole medical school for UPMC. Physicians employed by UPP must maintain Pitt faculty appointments, with very few exceptions. Clinical faculty, including clinical department chairs, participate in the SOM/UPP compensation plan. This plan encompasses a common paymaster mechanism, with Pitt and UPMC each providing separate paychecks to faculty members but only one W-2. The collaborative relationship between the leadership teams of both the SOM and UPP has allowed for a structured faculty accountability and incentive system that is aligned to each faculty member's designated role (academic, clinical,

research) and agreed-on priorities. UPMC's ownership of the clinical practice plans has been invaluable to the health system's rapid growth by mandating the professional and economic values of quality improvement and ready patient access to evidence-based care by Pitt faculty.

Appointment of department chairs and service chiefs is also accomplished collaboratively, although the dean has exclusive authority for faculty appointments and promotions. Strategic planning is likewise collaborative, particularly in major program areas such as oncology or for initiatives with potential long-term business opportunities such as drug discovery. Appointments to all major clinical leadership positions are discussed collaboratively by the SOM dean and UPMC president. Pitt and UPMC agreed to maximize research collaboration, with all federally funded, peer-reviewed research involving Pitt faculty to be administered through Pitt, which retains responsibility and authority over traditional matters of academic governance, including tenure. This integrated approach has permitted both organizations to structure and reinforce faculty behavior to effectively advance all three traditional academic missions—research, teaching, and patient care—and to begin to develop a fourth mission—entrepreneurship—through which faculty are encouraged to consider the potential commercial viability of their intellectual property.

As community hospitals joined UPMC—including the highly regarded Shadyside Hospital in 1997, UHCP members Magee-Womens Hospital in 1999 and

Children's Hospital of Pittsburgh in 2001, and Mercy Hospital, Pittsburgh's traditionally Catholic facility, in 2008—the organization evolved into a fully integrated delivery and financing model, emerging in 2008 with four core operating units supported by a group of system-wide organizational advancement functions (e.g., quality, nursing, ethics, compliance) and business and enterprise services (e.g., human resources, finance, information technology). The four core operating units are the Hospital and Community Services Division (which has clinical care responsibility across the spectrum of care sites, including UPMC's 20 hospitals and extensive network of rehabilitation, home care, senior, and other services), Insurance Services Division (which now covers more than 1.2 million lives), Physician Services Division (which is responsible for the clinical activity of Pitt faculty and for the community-based physicians employed by UPMC), and International and Commercial Services Division (which comprises commercialization initiatives and overseas clinical management and technology ventures). UPMC has adopted best-in-class governance and organizational transparency standards and, in 2006, became the first and only nonprofit health enterprise to voluntarily and fully adopt the stringent requirements of the landmark 2002 Sarbanes-Oxley Act mandating new or enhanced standards for all U.S. public company boards, management, and public accounting firms.

### **Taking Research and Education to the Next Level**

The SVC recognized that whereas most paradigm-shifting medical advances

would evolve from the basic sciences, the most immediate and publicly apparent advances would be in clinical and translational research. He focused the SOM's research programs on these areas. By 1997, Pitt had durably reached the ranks of the top 10 NIH-funded institutions, with 21 NIH-supported interdisciplinary centers of excellence, some of which involved not just Pitt but also neighboring Carnegie Mellon University and other partners (List 1). Pitt began to search for an SVC who could build the basic science infrastructure that would advance the institution to the next level of research productivity. The implementation of the affiliation agreements, which outlined the mutual expectations and obligations between UPMC and Pitt, laid important groundwork for a successful search for a successor because the agreements simplified complex organizational relationships by separating the clinical functions of UPMC from the academic functions of Pitt and by codifying and making transparent lines of authority and responsibility, financial commitments, and mutual obligations.

The search ultimately led to one of us (A.S.L.), who became SVC for the health sciences and dean of medicine in 1998. His charge at Pitt was to strengthen the basic sciences while sustaining the clinical research strength and to effect, within the SOM, the economies of scale that UPMC had achieved by integrating core functions across the system. He focused on leadership, faculty, education, research support, and organizational structure (Table 3). At the leadership level, he recruited research-experienced leaders throughout the organization, consistent with best practice in successful research enterprises.<sup>12</sup> He reorganized and expanded the existing Office of Research, Health Sciences, to have both a basic and clinical research arm. He expanded centralized administrative support to provide technical assistance to investigators at every rung of the career development ladder. For example, Pitt developed one-site access to online training modules in research conduct and compliance, patient safety, the Health Insurance Portability and Accountability Act, animal care and use, and other compliance issues. Specialized research support staff were hired to organize program project submissions and to seek additional industry-sponsored grants.

The Health Sciences Library System hired molecular biologists to assist faculty in using emerging DNA- and protein-analysis databases and other tools. The SVC established a formal Office of Academic Career Development in July 2002 to offer guidance, assistance, and mentoring to members of the health sciences academic community at all levels to achieve their professional potential. This office also played a major role in harmonizing the definition, responsibilities, salary, and benefits for postdoctoral fellows across schools and departments.

Since 1998, the SOM has created four new basic science departments—Immunology, Structural Biology, Computational Biology, and Biomedical Informatics—with planning underway for a Department of Developmental Biology, and the SOM has preferentially hired basic sciences faculty whose research themes foster translational research in priority areas: drug discovery and design, regenerative medicine, cancer and immunology, bioinformatics and computational biology, psychiatry and neuroscience, vaccine development, structural biology, developmental biology, and clinical trials management.

The SOM also revised its rank and tenure policies both to clarify expectations and to emphasize and support research productivity. The tenure clock has been lengthened for faculty who conduct research but also have clinical responsibilities; flexible time-out options for tenure-track faculty accommodate family and personal needs. Strengthened faculty policies provide consistent research incentive plans, and an entrepreneurial leave policy allows faculty members to create start-up companies based on their intellectual property.

Interdisciplinary research and “team science” have been reinforced as the school's cultural norm through the creation of centers and institutes (List 1), as has been common at research institutions nationally.<sup>13</sup> These entities provide a physical or virtual environment for topic-specific intellectual interchange and are often important for faculty recruitment and retention. To sustain the pipeline of scientists trained to conduct this new genre of integrated science, the SOM initiated interdisciplinary

doctorates in fields such as integrative molecular biology and structural biology/molecular biophysics and required all medical students to complete a four-year research project as a graduation requirement.

The SOM also implemented measures to stop the pipeline from leaking, ensuring that promising young faculty members would not abandon their biomedical research careers for other options. These include several internal pilot funding programs (e.g., a Competitive Medical Research Fund that provides up to \$25,000, Clinical and Translational Science Institute pilot grants that require collaborators from both basic and clinical disciplines, and grants for applicants proposing high-risk/high-yield research through the NIH Innovator and Pioneer Awards who have not been funded). Other measures meant to retain excellent faculty researchers are bridge funding for investigators who have to resubmit their NIH applications (NIH has subsequently funded 79% of these investigators) and support for technical help for junior faculty who have demands in their personal lives (such as young children or family illnesses) that would slow down their research productivity.

Since 1998, Pitt's health sciences schools have expanded their facilities to about 4.5 million gross square feet, including the 335,000-square-foot, state-of-the-art Biomedical Science Tower 3, dedicated in the fall of 2005, with another 750,000 gross square feet in the construction and planning stages. Pitt's research development activities foreshadow the June 2006 Association of American Medical Colleges' guidelines on how AHCs can attract, nurture, and support more clinical and translational physician-scientists.<sup>14</sup> Although such activities—recognizing and appropriately rewarding team science, requiring more rigorous and mentored postdoctoral training, developing research tracks in all clinical training programs, and educating all medical students and residents in research fundamentals—are by no means unique to Pitt, the partnership with UPMC has enabled their rapid and effective implementation.

To support translational and clinical research, particularly clinical trials,



Table 3

**University of Pittsburgh (Pitt) School of Medicine Research Development Strategies, 1985–2008**

Area of improvement	Strategy (year)
<b>Leadership</b>	Recruited heavily research-experienced and -oriented leadership at decanal and department chair levels; recruited scientists for specific scientific areas (ongoing)
<b>Faculty</b>	
Rank and tenure changes	Lengthened tenure clock for those with clinical duties (2000) Clarified tenure salary implications (1997–2000) Created additional nontenure options (2001) Generally expected a second National Institutes of Health (NIH) Research Project Grant (RO1) or RO1 renewal for tenure (2000) Created entrepreneurial leave of absence (2005) Provided increased time-out options for tenure-track faculty (2000)
Faculty policies	Implemented more formal written annual review, with 20% audited by the dean's office (1999) Strengthened interim faculty reviews before the tenure decision (2000) Implemented a uniform research incentive plan across basic and clinical departments (2002)
Faculty development	Developed master's degree programs in clinical epidemiology, public health, and patient-oriented research, in addition to a certificate series on patient-oriented research for clinical investigators (2000–2002) Added the Office of Academic Career Development at the associate vice chancellor for the health sciences level (2002) Received NIH funding for K12 Clinical Research Scholars Program to provide career development grants, research resources, and mentoring (2004) Created Institute on Clinical Research Education (2006)
Faculty type	Increased the number of PhDs and MD/PhDs in clinical departments and established five new basic science departments
<b>Education</b>	
Biomedical graduate education	Added decanal-level appointment (1997) Strengthened and expanded MD/PhD program, a joint initiative with Carnegie Mellon University (1997–1999) Increased the number of PhD students (1998–ongoing) and the number of types of programs (2006, 2007) Strengthened central administrative support (expansion began in 1997)
Postdoctoral education	Increased the number of postdoctoral fellows, made expectations for postdoctoral positions and their mentors explicit, and increased and harmonized postdoctoral pay (2003–2006)
Medical student research experience	Increased MD/PhD program participation from 47 in 1995 to 98 in 2007 Created the tuition-free Clinical Scientist Training Program, which leads to a certificate or, with an additional year, an MSc in clinical research (Dean's Merit Scholars; 2003) Developed required longitudinal (four-year) research project, with experience to start at the beginning of medical school (2004) Created the tuition-free Physician Scientist Training Program, a five-year program for Dean's Merit Scholars interested in basic science (2007)
<b>Research</b>	
Central support for research	Added Offices of Basic Biomedical (1992) and Clinical (2001) Research at the associate vice chancellor for the health sciences level Increased number of IRBs to handle volume more quickly (2002–2004)
Translational research	Obtained NIH Clinical and Translational Science Award (2006) Added a graduate-level program to develop clinical investigators with an emphasis on translational research (2008) Increased the number of MD/PhDs in clinical departments (ongoing)
Changes in revenue/expense structure	Investigators received a research incentive equivalent to a maximum of \$50,000 in indirect cost dollars (2002). All indirect cost recovery dollars were returned to all departments, which were charged for space and other overhead.
Research facilities	Added multiple core facilities (1985–2006; see List 1)
Research support funds	Established a Competitive Medical Research Fund to provide new investigator awards and collaborative research awards (1985) Established a bridge support fund (2006)
<b>Organizational structure</b>	
Academic infrastructure	Added multiple interdisciplinary centers and institutes (1985–2006; see List 1)
Entrepreneurship	Created the Office of Enterprise Development as a resource for health sciences faculty pursuing entrepreneurship and interactions with industry (2001)

UPMC and the SOM are currently developing a unique clinical research registry as part of Pitt's Clinical and Translational Science Institute, which was established in 2006 with an \$83.5 million NIH Clinical and Translational Science Award. This database of patients who are informed about the value of research participation and are willing to be contacted to participate in clinical trials will be embedded in UPMC's interoperable electronic health record system and linked with an ongoing database of current Pitt studies, giving researchers potential access to people who use UPMC's 400 outpatient sites, 20 hospitals, and international venues.

In terms of medical education and residency training, the Pitt–UPMC partnership has provided a vast diversity of settings for clinical and research training, including the medical students' required rotations (e.g., to hospitals and physicians' offices in rural areas of Pennsylvania and to the UPMC-managed Mediterranean Institute for Transplantation and Advanced Specialized Therapies in Palermo, Italy) and mandatory research projects (students have studied topics in the basic sciences, clinical outcomes, health care access, and medical applications of information technology, among others), as well as selective areas of concentration (in subjects such as women's health, neuroscience, and global health). Discretionary funds available to the SVC through the affiliation agreement have enabled the SOM to increase scholarship support, making Pitt both more attractive and more competitive to the best and brightest medical students. The UPMC Office of Graduate Medical Education is supervised jointly by the dean of medicine and UPMC's chief medical officer, both of whom emphasize resident education and training in the context of translational science and evidence-based care.

### **Pitt and UPMC in 2008—Reflections and Lessons Learned**

What began as a regional medical school, one Pitt-managed hospital (WPIC), and a voluntary consortium of five independent, affiliated teaching hospitals has evolved during the past 25 years into a global health enterprise and a leading biomedical education and research institution. The process

illuminated several fundamental lessons:

- Both partners must be committed to the academic mission, including research excellence, and both must be willing to invest resources in the achievement of excellence.
- The leaders of both organizations must enjoy a collaborative and seamless working relationship. UPMC and the SOM have worked together to create succession plans that ensure that the momentum of each is sustained.
- UPMC's operational and financial success, as well as its commitment of financial and other resources, has enabled the SOM to continue to build its research programs, especially in the context of the currently constrained NIH appropriation. This research strength, in turn, has been a key element in attracting leading physician–scientists, who play critical roles in both organizations.
- The affiliation agreements between Pitt and UPMC codify the relationship and are durable beyond the current leadership. The clear delineation of roles for Pitt and UPMC contributed significantly to the recruitment of a new SVC; two previous searches had failed, in part, because the roles of the SVC for health administration and the SVC for the health sciences were not clearly distinguished.
- It is critical to protect and ensure accountability for all of the traditional functions of the AHC—research, teaching, and excellent patient care. Pitt and UPMC leaders have clarified expectations by delineating faculty accountability, in terms of each individual's priorities and role, and rewarding faculty members for meeting agreed-on goals and expectations. Both institutions evaluate faculty members who have responsibilities related to both.
- Strong governance and a focus on mission are essential components of a best-in-class relationship.

For UPMC and Pitt, success has been an outcome with many contributing factors: institutional commitment to excellence throughout the entire enterprise—research, education, and clinical care—backed by entrepreneurial investments and

initiatives, strong and progressive leadership, strategic and controlled facility and business expansion, and recruitment and retention of personnel with the expertise to ensure sustained results. The shared vision of Pitt and UPMC is grounded in science and in the movement of new biomedical knowledge into clinical practice. All of the partners' intellectual and financial resources are required to span this spectrum.

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## Teaching and Learning Moments

### **BST3 Fisher: Artist's Statement**

*BST3 Fisher* was inspired by and created for the operations manager of the newly completed Biomedical Science Tower 3 at the University of Pittsburgh.

After countless hours of reviewing equipment specifications, security access requirements, telecommunication issues, and minute details such as the size of file drawers, it seemed appropriate to capture the “genome” of the building.

The piece reflects the history of the materials and processes involved in

the creation of a state-of-the-art science building. Materials overlap and are aged to reflect the passage of time from conception to conclusion; a light spray of acrylic and water are symbolically friendly to reflect the cooperative relationship needed from all to achieve success; the heavier brush technique represents strength; metallic paints capture the modern aesthetics of the building. Concentric circles highlight the tenth-floor nuclear magnetic resonance magnet, and the painted

“ovals” on the right of the painting show the percolation of ideas throughout the building from basic science to developed concepts.

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*Editor's Note: This Teaching and Learning Moments essay was contributed as a companion to this month's AM Cover Art selection, which appears on the cover.*