

# The Challenge for Excellence at the University of Louisville: Implementation and Outcomes of Research Resource Investments Between 1996 and 2006

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## Abstract

In the decade beginning in 1996, the National Institutes of Health (NIH) budget doubled, whereas NIH funding at the University of Louisville School of Medicine increased nearly sevenfold. The schools of nursing and dentistry, the other Health Science Center schools at Louisville, experienced comparable growth. The University of Louisville was thus one of the fastest growing research enterprises in the country during this period. While there was an infusion of state funds, the authors believe that the magnitude of the research growth depended more critically on development of an effective strategic plan with closely

monitored outcomes. This process included first the identification of programs of distinction deserving of investment and then the reallocation of resources from units that were not research-intensive to those that were. The strategy focused on (1) the recruitment of endowed chairs and their teams (thus the popular name for the program "Bucks for Brains"), (2) the implementation of new promotion and tenure standards, (3) the creation of research-productivity linked salary incentives, (4) the implementation of posttenure review, and (5) an effort to improve research infrastructure,

including core facilities, and physical plant. The authors describe how the investment by the Commonwealth of Kentucky was structured and how accountability to the state facilitated this growth. This description of how postsecondary education reform and the infusion of modest resources through the Research Challenge Trust Fund were leveraged into a substantial return-on-investment at Louisville could serve as a guide to schools during this time of NIH budgetary constraint.

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In 2004, the *Chronicle of Higher Education* cited the University of Louisville as the university with the fastest-rising National Institutes of Health (NIH) support in the country.<sup>1</sup> Most of this growth occurred in the School of Medicine (SOM) and other schools in the Health Science Center. Investments from the Commonwealth of Kentucky, provided within a context of accountability, facilitated this growth.

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Here, we describe the form of the investments, the way the University of Louisville used them, and the outcomes for the three Health Science Center schools in existence throughout the decade 1996 to 2006: dentistry, nursing, and medicine.

## Historical and Political Background

In 1996 the Commonwealth of Kentucky, through the leadership of Governor Paul Patton, undertook reform of postsecondary education. Legislation (passed in 1997) created the Council on Postsecondary Education (CPE), which comprises 13 citizen members, a faculty member, and a student member, all appointed by the governor. The role of the council is to coordinate change and improvement in postsecondary education, to be responsible for making recommendations on allocation of higher education funds, and to provide stewardship for the funds and accountability for their use to Kentucky's legislature. The same legislation created a variety of trust funds designed to guide investments in state universities and colleges. One of the trust funds created in

this original legislation, the Research Challenge Trust Fund, primarily benefited the two state research institutions: the University of Kentucky and the University of Louisville. Subsequently, the Research Challenge Trust Fund became affectionately referred to as "Bucks for Brains." This latter name captures how this Kentucky legislation, supporting personnel to enhance research funding, differed from other, more traditional investments of bricks and mortar or equipment made by other states.

The first infusion of funds to support research was in the form of annually recurring increases of \$1 million and \$2 million to the budgets of the University of Louisville and the University of Kentucky, respectively. The governor recommended and decided this distribution, and in 1996 the Kentucky legislature approved and provided the funding for deployment at the universities in 1997. The universities identified, and the Council of Postsecondary Education approved, several "programs of distinction" (see below) for the first infusion of funds. The legislation required universities, in order

to qualify for the funds, to demonstrate an equal *reallocation* into the programs of distinction from lower-priority programs at their university. For example, the University of Louisville identified and eliminated vacant faculty positions in science and engineering and then reallocated them to, and filled them with, investigators in program of distinction areas.

At about the same time, the community of the City of Louisville finished a “visioning” report that identified health-related activities and the two business-school-based disciplines of logistics and distribution as niche areas for growing the local economy. This document also focused on the benefits of creating an entrepreneurial economy and supporting education at all levels. University leaders, who were members of the committee that created the visioning report, returned to the university to initiate discussions among the president, provost, vice president for research, and deans. The result of these discussions led to an agreement that the university would propose four interdisciplinary programs of distinction in support of the community: (1) Molecular Medicine and Biotechnology, (2) Logistics and Distribution, (3) Early Childhood Education, and (4) Entrepreneurship. The choice of these four programs was based on their national reputation and local opportunity or need. The vice president for research convened faculty committees with expertise in these areas, and these committees identified current areas of strength, opportunities for growth, and the kinds of investments needed to enhance scholarship and other projects in each area. Faculty from the schools of medicine, dentistry, nursing, engineering, and arts and sciences worked in committees to further identify opportunities in the Molecular Medicine and Biotechnology area, because it was the broadest program of distinction. They identified University of Louisville research programs of national distinction as well as those believed to be on the cusp of national recognition. Specifically, those on the cusp were programs in which the university faculty agreed that there was a cadre of nationally respected faculty in areas of biomedical research that appeared ripe for strategic investment; such areas included neuroscience, cardiovascular biology, pharmacogenomics, and proteomics. In

addition, although cancer biology was not strong, the committee targeted oncology for significant investment with the long-term goal of creating a National Cancer Institute-designated cancer center.

The university submitted program of distinction proposals and budgets to the CPE in 1997, and the CPE approved the programs and released the Research Challenge Trust Funds to the university. Although there were four programs, the university invested the vast majority of the first infusion of the Research Challenge Trust Funds in faculty in the Molecular Medicine and Biotechnology program.

Subsequent rounds of Research Challenge Trust Fund investments comprised up to \$100 million each—\$66.6 million to the University of Kentucky and \$33.3 million to the University of Louisville. The original legislation guided this division of endowment funds. There were three rounds of endowment funding within the decade covered by this paper. Cash from the regular state budgeting process funded those in 1998 and 2000, and the state bonding authority funded the third, in 2005. To qualify for the funds, the universities were required to raise private philanthropic funds for a one-to-one match, thus doubling the impact of the state investment. In keeping with the intent of the Bucks for Brains theme, the majority of the funds at the University of Louisville were invested in personnel, specifically endowed chairs, to support faculty who were doing biomedical research. Typically, these chairs were supported by a million dollars from the state, which was matched with a million philanthropic dollars.

### The Challenge for Excellence

Fortuitously for the University of Louisville, both postsecondary education reform in the state and these new investments coincided with the hiring of a new president, Dr. John Shumaker, and his appointment of a new vice president for research, Dr. Nancy Martin (an author of this paper), as well as a new provost, Dr. Carol Garrison. Dr. Shumaker supported the governor’s efforts, and, in anticipation of new resources from the state, these university leaders capitalized on this opportunity by

creating the Challenge for Excellence (simply the Challenge hereafter), a sophisticated, 10-year strategic plan for the university that provided the basis for targeted investment and strategic reallocation of resources. Shortly thereafter, a new vice president for health affairs, Dr. Joel Kaplan, joined the university, and he and his deans focused on the Challenge goals for the Health Science Center.

The Challenge moved several university agendas forward. These included initiatives related to

- student retention and graduation with a focus on minority students,
- fundraising/development and entrepreneurial activity,
- expanding graduate programs,
- faculty and staff salary equity, and
- overall salary catch-up with a focus on faculty and staff satisfaction.

The university developed a scorecard to track and measure university-wide progress in five areas<sup>2</sup>: (1) student success, (2) research productivity, (3) accessibility and diversity, (4) partnerships and collaborations, and (5) institutional effectiveness. Each school then developed goals and strategies to help meet the university-wide goals. Each dean and the provost agreed to specific “stretch” goals, those that might be achieved through a combination of extraordinary effort, additional investment, and fortuitous circumstances. Deans and the provost updated these scorecards each year. Research productivity measures included increasing extramural funding, publication rates, and the number of endowed chairs.

In 2000, the president asked each vice president and dean to identify additional resources that could be reallocated from lower-priority programs to higher-priority programs in each school and/or administrative area that, once complete, resulted in the permanent movement of \$21 million from low-priority programs to high-priority programs. Discussion of ideas started at a retreat chaired by the president and attended by the vice presidents and deans. The president and provost then named a blue ribbon

committee of faculty and administrators from across the university to consider programs to eliminate.

The most notable outcome of these discussions was the closure of the entire School of Allied Health Sciences. The dean of the school resigned, and there was an outcry from students, faculty, and the community. The president and provost named the first author of this paper (L.S.) dean of the School of Allied Health Sciences, and she built a compelling case to support the transfer of the school's programs into other community schools rather than to dissolve them. In the end, the programs were shepherded to new homes including Jefferson Community College and Bellarmine University, a local Catholic institution. By 2002, the school closed, and the university completed reallocations to other units. The university reassigned the space formerly occupied by the School of Allied Health Sciences to public health and nursing, and each program of distinction received reallocated resources.

The decade that followed the creation of the Research Challenge Trust fund (1996–2006) and the reallocation it fostered was one during which the NIH budget slightly more than doubled.<sup>1</sup> Many universities benefited from the growth of the NIH budget; however, the University of Louisville's strategy maximized this opportunity, thus promoting disproportionate growth and consequent national recognition.<sup>1</sup> A multipronged investment approach and several tangential factors contributed to the tremendous increase in research funding during this period. Most importantly, these included (1) the recruitment of endowed chairs, university scholars, and their teams, (2) the implementation of new promotion and tenure standards with higher and clearer expectations, especially regarding research, (3) the creation of salary incentives linked to research productivity, (4) the implementation of posttenure review, also with clear and high standards, especially regarding research, and (5) an effort to improve research infrastructure, core facilities, and physical plant. Each of these facets will be elaborated in the following sections.

## Strategies to Increase Research Funding

### Endowed chairs

The provost and the vice president for research worked with the deans to develop guidelines for the Research Challenge Trust Fund endowed chairs and professorships. At the Health Science Center, these chairs required an endowment of at least \$2 million, half provided by the state and half provided by a philanthropic gift. With rare exceptions (funding for PhD scholarships, mission support for core laboratories, infrastructure for a logistics and distribution institute, and a small venture fund to help commercialize university technologies), the deans used incremental funds for chair recruitment packages, attracting new faculty by providing recognition and resources. As with all endowed chairs at the University of Louisville, the deans could use 80% of the income for salary support and the other 20% for discretionary spending to support the academic activities of the chair. The university required the endowed chair holders to be widely recognized by their peers for exceptional contributions to their fields in research, scholarship, or creative activity; and, in disciplines like the health sciences, deans expected these chair holders to bring major extramural grants and contracts to the university.

Although the goal was to recruit faculty who would hold the chairs or professorships for their entire careers at the university, Research Challenge Trust Fund chairs had special accountability that other endowed chairs at the university did not. Specifically, the salary of the chair holder was composed of a base salary and a salary supplement. The recruit and the dean agreed on performance measures and a five-year review based on these measures. The incumbent received his or her base salary but received the supplement and title only if reappointment to the chair was still warranted on the basis of a five-year review.

### The University Scholars Program

The University of Louisville also expanded a faculty recognition program meant to attract and retain additional nationally recognized faculty beyond those who could be named to endowed chairs. This program differs from the

endowed chairs described above in that, for the health sciences, it provided a salary supplement but not program support. Scholars in all fields were eligible for nomination as either University Scholars (at the associate professor rank) or Distinguished University Scholars (at full professorial rank) at the time of recruitment. They could also be nominated for these roles after five years of service to the institution. Deans could offer prominent faculty for whom an endowed chair was not available a scholar supplement of between 25% and 40% of base pay. While the expectation was that scholars would maintain their appointments throughout their careers, the appointment was not guaranteed. The administration required of the scholars, as they did of the Bucks for Brains endowed chairs, a contract between the candidate and the dean with accountability measures, and deans reviewed appointments for scholars on either three- or five-year cycles.

### New promotion and tenure standards

In 1996, Provost Garrison led a discussion about promotion and tenure reform with the deans that resulted in reconsideration of existing documents and the objectification of standards. That year, the SOM began to consider, and in 2000 ultimately adopted, a new promotion and tenure system that was not only based on individualized work assignments but also intended to raise the bar, especially in research, while having the flexibility to recognize and reward all faculty for their unique contributions to the school.<sup>3</sup> Chairs and faculty annually negotiated work assignments, agreements regarding the distribution of effort for the next year as well as percentages of effort specified in research, teaching, and service (discussed below). The school required proficiency in all areas of academic involvement. Promotion in rank further required excellence in the area of greatest percentage effort as specified on the annual work assignment. In this way, the SOM fostered cooperation among faculty, regardless of whether their primary efforts were in research, teaching, or clinical service.

An important aspect of the new promotion and tenure policy was that it provided an explicit advancement path for clinicians and teachers. While university leaders encouraged research, the school promoted it in a way that

avoided conflict among clinicians, teachers, and investigators. The system recognized that while every department was supposed to represent a “triple threat,” it was the rare individual who could be truly excellent in clinical care, teaching, and research. The result was that clinicians and teachers felt that they could support the university’s push to increase research without feeling left out or unrewarded. We believe that the harmony this produced was critical to the university’s successful push to augment research.

In research, for the first time, the school specifically detailed promotion and tenure standards.<sup>3</sup> Briefly, the requirement for excellence in research included regular (on average, at least annual) publication as a major author, extramural funding (federal applications required, national peer-reviewed funding at minimum), and letters from national experts supporting a rating of *excellent*. Promotion to professor required sustained and renewed federal funding as primary investigator as well as documented national prominence.<sup>3</sup>

#### Research-productivity linked salary incentives

The university had a strong, well-established, decades-long history of merit raises that were based on annual performance reviews. However, in 2001, the SOM administration and the compensation committee of the faculty tightly linked performance-based raise evaluations to the new promotion standards.<sup>4</sup> There was a mandate that chairs use the percentage efforts on annual work assignments, which served as the basis for promotional reviews, as weighting factors for calculating annual raises. Furthermore, chairs transformed each faculty member’s research productivity (measured by grants and publications), as well as productivity in teaching, clinical service, and university service, into quantitative values that were then multiplied by the weighting factor (percentage effort) in each area to calculate the final raise amount. In this way, the dean directly tied research productivity to compensation increases, as was already the case for promotion.

In each area of effort (teaching, research, service), departmentally based standards determined a rating from 0 (unsatisfactory) to 4 (outstanding),

which was then multiplied by the percentage effort. As an example of how this would work, a faculty member, with a 30% teaching, 50% research, and 20% service assignment who received a rating of 4 in teaching, 3 in research, and 1 in service would receive a score of 290 ( $30 \times 4$  plus  $50 \times 3$  plus  $20 \times 1$ ) out of a total possible 400 points. All faculty have the opportunity to score 400 points.

Department heads then distributed available funds for raises to department members on a prorated basis as a function of their scores. No one received cost-of-living raises; rather, this merit-based calculation determined all raises. Regardless of the percentage distribution of effort in research, teaching, and service (clinical and/or university service), all faculty could earn the maximum raise if they demonstrated outstanding effort in each area of their assigned percentage effort. Faculty thus felt valued regardless of their profile of efforts. We have previously described the details of this system.<sup>4</sup>

In addition to annual raises, university administrators established an at-risk compensation supplement system for researchers who exceeded certain standards of extramural salary support. Raises were continuing and guaranteed, whereas these research incentive supplements were “at-risk” in that they varied yearly on the basis of performance. The first Health Science Center school to implement supplements was the School of Dentistry. The dental school plan made explicit that securing salary appropriate to effort on extramural grants would be rewarded in annual performance reviews with a performance supplement in the subsequent year.

The SOM followed suit with a variation on the dental school plan. Eligible faculty included those who had at least 25% effort and 25% salary support from grants (this amount was defined as the baseline, and departments and individual contracts could modify this baseline upward, requiring greater support before incentives were granted). These performance supplements recognized outstanding research performance from the previous year. The at-risk supplement could vary from year to year, but it was capped at 50% of the amount of salary recovered above the baseline.<sup>5</sup> For example, a researcher with 50% research effort and 40% salary support on grants

might be awarded up to a 7.5% supplement during the next fiscal year (half of the salary recovered over the 25% baseline). These performance-based supplements were not for getting grants per se, but for recovering salary appropriate to effort. The university took care to comply with all federal regulations regarding such supplements.

#### Posttenure review

In 1994, the University of Louisville Board of Trustees mandated implementation of posttenure reviews no later than 1996.<sup>6</sup> The SOM set the bar at the level of proficiency in all areas of academic involvement.<sup>3</sup> Failed reviews triggered the creation of a faculty development plan and a rereview two years later.<sup>7</sup> The development plan included specific and measurable requirements to be met within one year, with an additional year to demonstrate success.

For those faculty who failed because of inadequate research productivity, chairs and the associate dean for faculty affairs assigned research mentors along with research training including grant writing and, in some cases, sabbaticals. Mentors were funded investigators in a research area aligned with the faculty member, preferably in a lab that would benefit from the skills of the failed faculty member.<sup>7</sup> As described previously, posttenure review proved remarkably effective: for example, there was a significant increase in publication rate for faculty who underwent remediation in research. One of the faculty achieved independent NIH funding while all others attained industry funding or functioned as collaborators on funded projects.<sup>7</sup> An important component of the plan’s success was the enhanced willingness of nonresearch intensive faculty to accept larger teaching and clinical service roles. We have previously described the implementation, reactions to, and outcomes of posttenure review in the SOM.<sup>7</sup>

#### Improved research infrastructure

While people are the most important infrastructure in driving funded research growth, administrative support units and facilities are also critically important. University leadership realized that substantial increases in administrative infrastructure would be necessary to

provide the services that faculty require to submit, accept, and disperse grant funds in support of their research endeavors. The university directly tied resources available for increasing administrative research infrastructure to the increase in funding: as funding increased, the university rapidly increased staff in the existing sponsored program development office and the preaward and postaward offices. Subsequently, to meet the different needs of government, foundation, and industry sponsors, the university split the preaward office into one that served government and foundation grants and another which served industry contracts.

Other areas required significant strengthening through the creation of new offices or programs. For example, creating a separate office with a new reporting line, hiring a high-level director, and substantially infusing funds to increase staff considerably strengthened the Human Subject Protection Program. These strategies enabled the university program to be among the first accredited by the Association of Accreditation of Human Subject Protection Programs while simultaneously reducing approval times. Between 2003 and 2006, the average number of days for an exempt review decreased from 20 to 14, for expedited review from 35 to 23, and for a full board review from 64 to 28. Further, in 2005, the university began developing an electronic system for submission and approval of protocols, eliminating much repetitive work. The system received faculty support and was fully implemented in 2007.

To provide guidance and a clear conduit for the transfer of technology from the university to the private sector, the university replaced an ad hoc technology transfer activity with an Office of Technology Transfer, hired an experienced director, and provided support for additional staff.

To assist grantees in meeting their education and compliance obligations, the university implemented a Research Integrity Program and developed online training modules for fiscal responsibility regarding grants and contracts, human subject protection, the Health Insurance Portability and Accountability Act, and environmental health and safety. An

online system for disclosing financial interests replaced a laborious paper process.

There was substantial investment in core facilities during this time. University administrators used the original Research Challenge Trust Fund to create a transgenic animal core facility, to modernize a DNA-sequencing core facility, and to create a proteomics core facility. Grant funding for infrastructure development supported a core dedicated to gene-array services, including bioinformatics support. Equipment grants allowed for the expansion of infrastructure necessary for structural biology studies including large-scale protein expression and purification, biophysics cores to support thermodynamic and kinetic methods, and a state-of-the-art nuclear magnetic resonance spectroscopy facility.

The university also modernized and expanded facilities. The university started with 220,000 net square feet of research space. In 1997, one of the early years of the Challenge, the Health Sciences Center became the focus for facility growth. In 2003, the university completed construction of two new research buildings, expanding the Health Sciences Center campus by an additional 150,000 square feet. The university completed an additional 60,000-net-square-foot expansion by the end of 2006 and started construction on an additional 176,000-net-square-foot building. In addition, the university refurbished about 10% of the existing laboratory space during the 10-year period, including, for example, the space used by the Kentucky Spinal Cord Injury Research Center.

The vice president for research worked with the deans to ensure that each school implemented a space policy so that research space was allocated on the basis of productivity measures that included extramural funding, publication, lab census, and special equipment needs. In the dental and medical schools, deans applied these policies not to individual investigators, but at the departmental level so that chairs could manage space resources locally. In the School of Nursing, the dean assigned office space for research personnel on a grant-by-grant basis. Managing research space through explicit space policies represented a substantial culture change

at the institution and resulted in annual reallocation of space on the basis of productivity. As research funding grew faster than space, productivity metrics rose, resulting in more efficient use of facilities.

Of special mention is the fact that at the beginning of the Challenge, the SOM was the only Health Science Center school with an associate dean for research. The vice president for research encouraged each school to appoint a research dean, and there was central financial support for these positions. The research deans met at least monthly with central research administration personnel and were a critical guiding force in the development and implementation of the policies and changes discussed above. They ensured that discipline-appropriate decisions were made in infrastructure development and were important conduits for faculty buy-in.

## Outcomes

The CPE required annual reporting on the programs of distinction. Initially, the CPE staff visited the university to talk with faculty about progress being made in research. Eventually, these staff visits ceased, but each year the vice president for research provided a detailed written report to the CPE that summarized the number of faculty hired and students working in each program, the grants obtained, recent publications, as well as all technology transfer and commercialization efforts growing out of the programs. There were separate reporting requirements for Bucks for Brains endowments that used the same criteria but focused more on accomplishments of the individuals recruited rather than programs. In the last year of the decade (2006), administrators simplified the Bucks for Brains reporting, which became Web based.<sup>8</sup>

Through the decade, faculty clearly came to understand that extramural funding and research productivity were priorities for the university. But they also understood that not every faculty member needed to contribute in research per se, which went a long way in promoting a harmonious atmosphere and avoiding the clinical care/teaching *versus* research battles that sometimes accompany such initiatives. This allowed

the research-intensive faculty, especially in clinical departments, to allocate additional time and effort to research, while faculty whose primary interests were clinical care and teaching supported these efforts through their own activities.

An additional important factor is that the research initiatives were based on new resources or reallocation from areas of lower priority rather than funds diverted from clinical care and teaching (both of which also received renewed attention, although outside the scope of this article). Allocation of additional seed resources (like those described by Paller and Cerra<sup>9</sup>) contributed to acceptance of the program because faculty perceived research, in this context, as enhancing the stature of the Health Sciences Center without conflicting with clinical or teaching efforts.

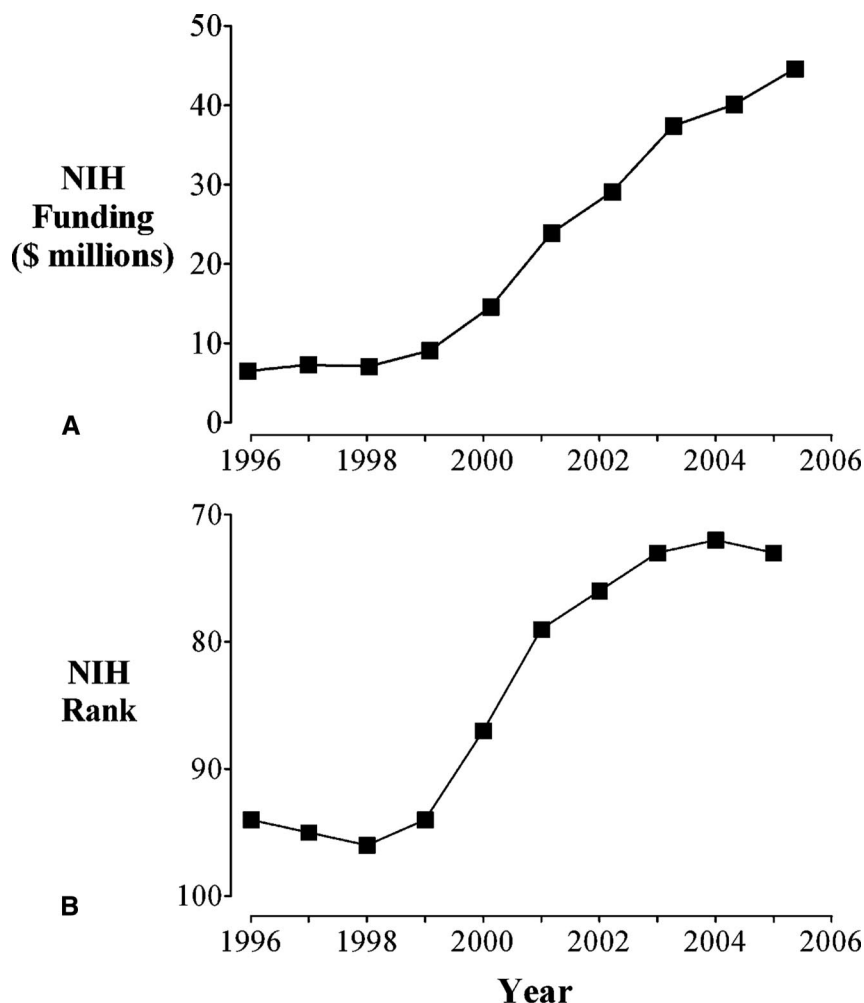
The comprehensive programs detailed above were effective. The number of funded NIH grants to the SOM increased by more than a factor of three from 39 to 127 during the 10-year period covered by this article, and the annual NIH funding increased by nearly a factor of seven (Figure 1A).<sup>10</sup> Consistent with these observations, the SOM's NIH ranking improved from 95th to 73rd (out of 124) from 1996 to 2006 (Figure 1B).<sup>10</sup> Unlike total funding, rank depends on the total NIH budget and how it is distributed among all U.S. medical schools. That the University of Louisville's rank increased so much from 1996 to 2006 indicates that Louisville competed better than other universities during these years. Similarly, total annual extramural funding to the medical school increased by more than a factor of four, from \$20 million to just

over \$90 million (Figure 2).<sup>10</sup> As might be expected, the number of full journal articles published by SOM faculty increased by 60% in this same time frame,<sup>7</sup> with a striking increase in the quality (as measured by the stature of journals) and impact (as measured by standard impact metrics) of the publications. The schools of nursing and dentistry, the other Health Sciences Center schools, although much smaller, showed comparable increases in extramural funding (Figure 2).

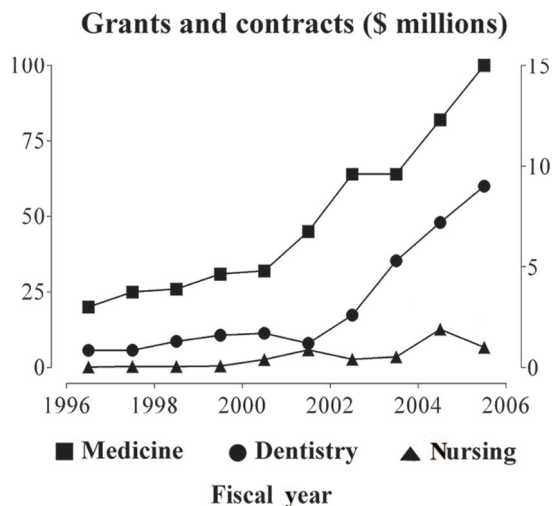
The increase in NIH funding at the University of Louisville occurred during a period of expansion at NIH. However, overall extramural NIH funding only slightly more than doubled,<sup>1</sup> whereas total NIH funding to the medical school more than septupled<sup>10</sup>; it is thus apparent that our growth far exceeded what would be expected on the basis of overall NIH funding patterns.

### Summary

The Commonwealth of Kentucky's Research Challenge Trust Fund provided new research resources to the University of Louisville. Kentuckians widely recognize that the infusion of funds into the colleges yielded significant benefit to the state, as evidenced by the resurrection of Bucks for Brains as a campaign issue for both gubernatorial candidates during the fall of 2007.<sup>11</sup> However, the total amount of new funding from Kentucky (\$33 million per year in endowment funding, which, at 5.5%, yielded a \$1.81 million spending allowance, for three rounds, for a total of \$5.5 million per year) was relatively small compared with an annual university operating budget of approximately a half billion dollars per year. It thus seems unlikely that these funds alone would produce the major, decade-long increase in research productivity that the university experienced. Instead, it was the combination of new funding with clear expectations and innovative administrative policy that not only changed the culture of the university, especially on the health sciences campus, but also more than quadrupled overall extramural funding and increased by seven times NIH funding for the SOM. Expectations for success came from the state and could be traced directly to Governor Patton, whose administration initiated the program. The commonwealth



**Figure 1** National Institutes of Health (NIH) funding for the School of Medicine at the University of Louisville from 1996 to 2006. A, NIH funding in millions of dollars which increased approximately sevenfold; overall NIH funded only slightly more than doubled during this period. B, NIH ranking for the University of Louisville School of Medicine improved over 20 (out of 124) ranks.



**Figure 2** Extramural (total grants and contracts) funding for all three University of Louisville Health Science Center schools that existed from 1996 to 2006. Health Science Center funding increased by more than a factor of four. Funding in millions of dollars is shown on each vertical axis; the School of Medicine values correspond to the left axis, whereas the School of Dentistry and School of Nursing are shown on the right.

held universities closely accountable for achieving the program’s goals. But, to their credit, Kentucky’s administrators set specific goals and expectations without micromanaging how the two major universities might implement their programs.

Was the state investment critical to the progress seen at the University of Louisville during the decade discussed? While it is impossible to be certain, we believe that this new funding, with its associated reporting requirements coupled with the university president’s leadership in creating a novel and comprehensive strategic plan at the university, worked together to create a culture change. Perhaps the strategic plan itself would have accomplished the same end. However, the creation of the Research Challenge Trust Fund made it clear that the state expected increased research productivity, and this not only provided an impetus for faculty acceptance of critical administrative and leadership initiatives but also facilitated implementing the difficult decisions necessary to grow the research enterprise. Certainly, improvements during the decade starting in 1996 contrasted with the previous decade, which was characterized by a flat trajectory in research with little change in national rank.

Use of the term *excellence* in the title of the program at the University of Louisville was no accident; everyone at

every level of the university understood that excellence was exactly what was expected and that all would collectively be held accountable for achieving the commonwealth’s goals. The new policies and administrative procedures discussed above (recruitment of endowed chairs, salary incentives, posttenure review, etc.) were, thus, effective and innovative approaches for local implementation of a new mindset that pervaded higher education throughout the commonwealth.

The administrative team at the University of Louisville focused on meeting the Challenge goals. The team carefully monitored, at frequent (at least annual) intervals, the metrics related to the Challenge, including research productivity—some for the first time. This process alone probably contributed substantially via the Hawthorne Effect (looking closely at a system usually improves performance<sup>12</sup>). At the very least, it made the administration’s preferred values, goals, and expectations perfectly clear. The administration also had the courage to reallocate resources from poorly performing units to ones that were already performing well or those likely to do so. While the most extreme example was completely eliminating the School of Allied Health Sciences, the university dismantled many smaller programs, actions that also made it clear that the university was serious about achieving and maintaining excellence.

Bowman et al<sup>13</sup> have described how investment of clinical revenue at two major top 10 research institutions (the University of Pennsylvania School of Medicine [U. Penn] and the University of Pittsburgh Medical Center [UPMC]) led to increases in research productivity. The University of Louisville, unlike U. Penn and UPMC, did not increase investment of clinical revenues. However, the University of Louisville, did, like U. Penn and UPMC, take care to create synergy between the clinical and research missions, which so often are at odds. The other striking similarity among the three institutions’ efforts was the focus, at the core, on funding designated research leaders and their teams. This focus on people was certainly central in Bucks for Brains.

In summary, a far-sighted program by the Commonwealth of Kentucky provided investments to the University of Louisville. The university provided new funding to programs of excellence with expectations for research excellence, and Kentucky held the university accountable for attaining distinct goals. The university attained these goals through a series of policy changes, administrative procedures, and reallocation of resources that made research excellence a clear expectation. These approaches were multifaceted and created a systemic cultural change. The process was effective, despite a relatively modest financial investment, more than quadrupling extramural funding during a 10-year period.

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## Teaching and Learning Moments

### Am I Going to Die?

After a bicycle accident landed me in the trauma intensive care unit (ICU) in what would be a three-month hospitalization and three-year recovery, I am compelled to share this story. It begins as I am recovering from one of a series of operating room visits to debride my open wounds. Alarms and the bustle of the ICU were familiar to me, a neonatal intensive care physician. However, this role was new. The haze of intravenous narcotics and sedatives was punctuated with intense pain whenever I attempted to move. With my femur in traction, I lay flat on my back. I could see very little, but I could hear and spent many hours listening.

The trauma team and the ICU staff were kind and caring. The nursing staff was attentive to my needs and to the needs of my husband. With a decade of experience as a hospital attorney, he was also comfortable in the ICU, but not in his current role. My husband fares poorly with sleep deprivation, and the days in the ICU had taken their toll on him.

The frustration of being intubated and unable to effectively communicate had been immense. Just the previous day, my respiratory status had allowed for extubation. With my voice back, I was verbally asserting my opinions. On the previous night, I had been agitated and insisted my husband stay late.

Now, after midnight, I demanded the nurses call him back to the hospital. They refused, in an effort to allow him sleep. After bartering, a compromise was struck. They called him and I was handed the receiver. I still remember his voice, gentle, but concerned, questioning my needs. I remember abruptly blurting, “*Am I going to die?*”

Although confused by the question, he reassured me that I was improving and much better than expected. This brief conversation calmed me.

I did not speak of this night for some time, but it was etched in my brain. The fear and confusion I gave voice to in that question haunted me as I listened to the voices at the nursing station, questioning why they were pursuing the current level of medical care. “Why are we continuing to support her? We should let her go.” In my egocentric haze, I was convinced that they were discussing me. These discussions were familiar to me, as I had participated in many before. Although I understood that I had escaped death several times in the preceding days, I was in a panic considering whether it was time to discontinue my support.

Thinking of it still makes me uneasy today. Although I could not see, I could hear and I could listen to those words, spoken by faceless voices.

Because the ICU was busy and the beds were full, the discussion concerned another patient. However, said aloud, the words were out there for everyone to hear. Although the ventilator was gone and all was better than anticipated, the drugs clouded my reality and facts were immaterial.

Intellectually, those of us caring for ill patients understand the importance of avoiding participating in sensitive conversations that can be overheard. We all know that patients are listening, even in the middle of the night. But somehow, the background noise, our familiarity with the ICU, and the daily stress of working there must make us amnesic of this fact. Daily, patients or their families must overhear and misinterpret similar discussions. Families out there have most certainly overheard and misinterpreted my conversations. As I continue to recover from my injuries and return to care for patients in our slightly overcrowded and noisy ICU, I remind myself to be careful of what I say, how loud, and where I say it, as someone may be listening.

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