



2009 American Society for Clinical Investigation Presidential Address

Can we keep the “academic” in academic medicine?

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Good afternoon, and thank you for coming to the 101st meeting of the American Society for Clinical Investigation.

Today I want to talk about where our first century of advocacy for academic medicine has brought us. But rather than highlight the remarkable history of achievement in biomedical research over this period, I want to focus on legacy systems that now threaten the research mission of academic medical centers. We classically think of academic medicine as having three pillars — education, research and clinical care. The ASCI emerged from the tradition of the “triple threat.” But I see a broadening divide that now causes us to talk about separate “academic” and “clinical” parts of our organizations, with growing tensions between those two aspects of our profession and view of the world. In this talk, I want to critically examine what we are doing in the academic domain, where it is not thriving, and what problems I believe we must deal with going forward.

The ASCI was founded in 1909. That year, William Taft succeeded Theodore Roosevelt as President of the United States. Construction began on the Titanic, on the Cape Cod Canal, and on the city of Tel Aviv. The Wright Brothers advanced their new airplane technology. And Abraham Flexner was about to publish his landmark critique of medical education (1).

It was probably not a coincidence that the founding of the ASCI roughly coincided with the Flexner Report. The premise underlying Flexner’s treatise was that medicine and medical education should be based on analytic thinking and science. Flexner argued that medical schools should be appendages of universities, that medical

training should follow a college education, and that a 4-year curriculum should be split equally between preclinical (basic) sciences and experiences in a teaching hospital. These recommendations accelerated major changes already under way. Over the next few decades, proprietary medical schools went out of business and what we know as modern medicine became dominant over homeopathy, osteopathy, and other approaches.

Those were intended consequences. A major, unintended consequence came later, when scientific research became more highly valued than teaching. Today, stature, promotions, and even self-esteem are often determined more by research productivity than by teaching contributions. This has helped drive a massive expansion of medical school faculties, putting us out of balance in ways that, I believe, create a threat to keeping the “academic” in academic medical centers.

The ASCI is two decades older than the NIH. In 1930, Congress established the National Institute of Health through the Ransdell Act. This original NIH arose during the Great Depression and was modestly funded. The National Cancer Institute was chartered seven years later to provide the first extramural research grants, preceding the rest of the NIH, which it joined in 1944. During World War II, the NIH focused on infectious diseases and industrial toxicities related to the war. As the war came to a close, the 1944 Public Health Service Act provided for an overall NIH grants program, which began in 1946. In 1947, the NIH budget was \$8 million. Two decades later, in the mid-1960s, it had grown to more than \$1 billion. Most of this growth started during the visionary leadership of James Shannon, who served as NIH Director from 1955 to 1968. By 1998, there were 27 institutes and centers. Thereafter, the budget continued to grow geometrically (Figure 1).

Prior to the 1960s, education, research, and clinical care were intimately entwined, making it relatively straightforward for

individual physicians to be “triple threats.” But several things changed in that decade. First, passage of the Johnson version of the Social Security Act of 1965 established Medicare and Medicaid, providing a new source of revenue and stimulating growth of the clinical enterprise in academic medical centers. In parallel, advances in biochemistry and cell biology drew clinician-scientists away from patient-oriented studies. Research laboratories became more remote from the clinics, and it became increasingly difficult to move from patient to lab to study a clinically inspired research question. The allure of straightforward, data-rich molecular biology put clinician-scientists in competition with full-time basic scientists on their own turf. Over time, many physician-scientists minimized their clinical practice or did away with it altogether.

For almost four decades, from 1966 to 2003, the NIH budget in actual dollars, not adjusted for inflation, grew exponentially (Figure 1). The total national number of medical school faculty members grew in parallel. Largely in clinical departments, this growth was even steeper than NIH growth if you factor in inflation. In the 1960s, growth was largely due to addition of clinicians. Basic science faculty numbers grew some in the 1970s, but have remained almost flat since. A large expansion in clinical faculty size, beginning in the 1980s, correlates with the boom years of molecular biology. This leveled off as the NIH budget flattened in the middle of the current decade. Today, a new phenomenon seems to have begun. We are seeing faculty growth due to a species that is relatively new to academic medicine — full-time clinicians who are hired solely to increase clinical productivity — “clinician non-teachers.”

I think we have reached a historical inflection point, where our approach must change. It is indisputable that rapid growth of the NIH budget and portfolio has yielded discoveries, innovations, and patient care advances that have had an enormous impact on human health. The investment has paid

This article is adapted from a presentation at the ASCI/AAP Joint Meeting, April 25, 2009, in Chicago, Illinois, USA.

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Citation for this article: *J. Clin. Invest.* 120:390–393 (2010). doi:10.1172/JCI41934.

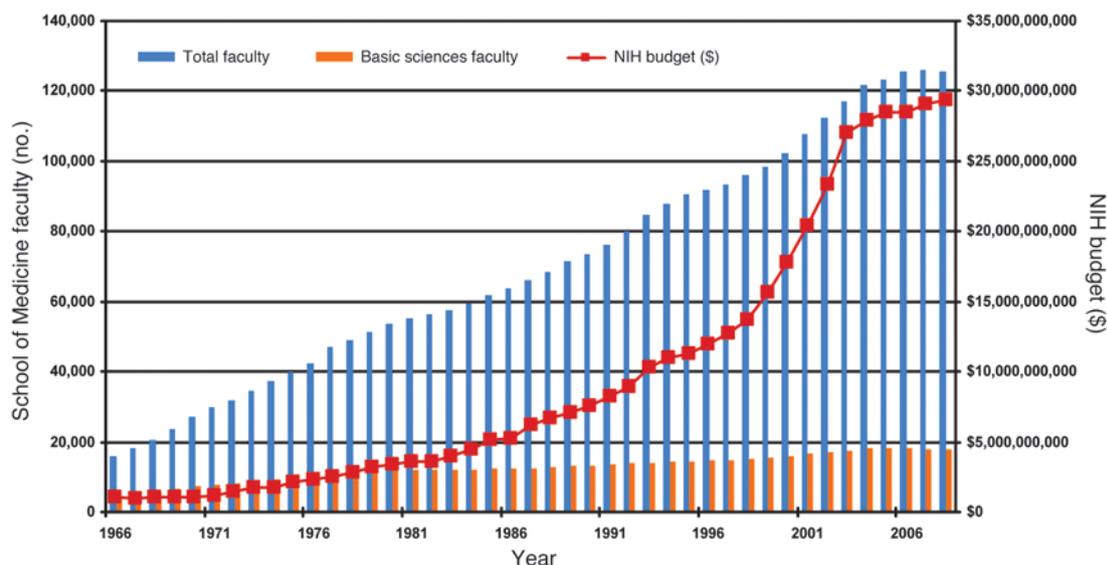


Figure 1

Increases in the total NIH budget and the total number of medical school faculty members since 1966. Data used to prepare this figure were obtained from refs. 2 and 3.

off exceedingly well. To be very clear, I think the NIH budget should be revived from its recent doldrums, and future growth should exceed the biomedical inflation index. But I do not think we can continue to grow medical school faculties.

Ballooning faculty size has changed how academic medicine works, and not always for the better. Among other effects, we have seen the rise and perhaps the start of the fall of strong, autonomous clinical departments. Some of these, particularly internal medicine departments, have become so large and unwieldy that it is challenging for them to function as more than federations of divisions. There is far less intellectual commerce between divisions and departments than there once was, leading to increased specialization and intellectual isolation. This likely accounts, at least in part, for the decline in attendance at the ASCI meeting, which has been commented on before.

I am also worried about a second problem. I think we have neglected to grapple with the problem that the sponsored research funding that has supported the expansion of academic medicine, whether it is from NIH or almost any other source, does not cover the true costs of the academic research enterprise, much less provide a margin for new innovation. By design, funding from the Howard Hughes Medical Institute does pay for all of the direct and indirect costs associated with doing

science and it does encourage scientists to innovate, but HHMI focuses on a very narrow slice of biomedical research. By design, funding from the federal government never pays the full cost. As determined through individual negotiations with research institutions, the federal government partially supports administrative and space costs, but it demands a partnership in which the institution contributes some of the necessary overhead support for those same costs. Federal overhead does not cover the costs of other functions, resources and services that must scale to faculty size but that are not included in the overhead formula. Other non-federal sponsors contribute even less towards the true indirect costs of getting the work done.

As reputation has become more dependent upon research accomplishments, academic medical centers have tried to expand their research portfolios. Success in getting grants stimulates construction of new buildings, which are meant to be filled up with grant-getting scientists to keep the cycle going. Over the past 14 years, the 25 best-funded academic medical centers in this country, excluding Harvard and its affiliates, have collectively built almost 19 million square feet of new research space. The stature of institutions and individuals, and at times even faculty rank, are directly tied to grant-getting prowess.

I worry that the dramatic growth of academic medicine may, in some ways, resem-

ble the recent subprime mortgage fiasco. Success has fueled expansion beyond what relatively fixed revenue sources available to academic medical centers can provide for. While we can be very proud that our contributions have improved and extended lives of people around the globe, we have adopted a business model that, I believe, cannot continue to work in the way it has in the past.

There are substantial costs associated with faculty growth that are not covered by direct or indirect revenues from grants. Start-up packages for productive investigators are expensive and have become larger as institutions compete for top scientists. New space that lies empty for a period of time is expensive, as are renovation costs for old space. We will soon find that space added during the building glut of the past two decades needs renovation to stay functional and attractive. Core facilities, providing important access to state-of-the-art technologies, are expensive. Animal care costs are expensive, both for the institutions that subsidize work with rodents and primates and for the investigators who study them. Grants and their overhead can help support some of these costs, but much of the residual cost of the academic research enterprise must come from other sources.

Over the first few months of 2009, it was interesting to watch the American Recovery and Reinvestment Act, or ARRA, unfold. This large, abrupt and very wel-



come bolus of NIH and NSF funding came about through the vision and fortitude of Senator Arlen Specter, honored by the AAP and the ASCI at this meeting. Because of its magnitude and a requirement to allocate funds within 2 years, ARRA has been a game changer. Suddenly, it looks like there is much more funding to do — to fortify translational research, to buy expensive shared equipment, to establish new core facilities, to renovate aging buildings, to improve information technology infrastructure, and to provide supplemental support for great new ideas that pop up during the four- to five-year cycle of funded research grants. The ARRA stimulus package has altered the dynamic in the short term and opened a Pandora's box of what ifs. What if federal dollars always helped fund needed renovations, shared equipment, multi-user cores, information technology, and supplementary ideas at a substantially higher level?

I would like to assume for a few minutes that it might be possible to restructure how biomedical research is supported and to talk about what I would try to fix. Here are the problems we face. First, as I have described, we cannot continue to grow our medical school faculties at an unmeasured pace. Such growth is not sustainable from a financial perspective, and it taxes the culture of academic medical centers. In the past, clinical revenues were used to supplement sponsored research funding to balance the books. This is unlikely to work going forward, particularly as national health care reform measures, though much needed, will likely push margins down further. The Bayh-Dole Act resulted in some new revenues from intellectual property and inventions, but these have been modest overall. And we have recently experienced the fallacy of assuming that historically large returns on investments will fund long-term growth. We must not mortgage the future to pay for the present.

Some institutions have expanded their faculties by expecting researchers to pay most or all of their own way. Charging nearly all salary expense to grants makes it possible to hire more scientists, who are compelled to bring in more grant funding because their own compensation bites big chunks out of their research support. However, increased scrutiny of professional effort reporting has created a Catch-22 situation for those who previously charged close to 100% of their salary to grants

— they have no “percent effort” available to dedicate to developing new scientific themes and new grant applications. Without guaranteed “hard” salary support, it has become difficult to find time to teach, to mentor, to think, to innovate, and to come up with clever new ideas.

As a result, while we are fortunate to attract many of the best and brightest into academic medicine, I worry that young people may find it difficult, frustrating, and demoralizing to make use of their creativity and their intellects in the current environment. It is painful to lose junior academic scientists early in their careers to other jobs that seem more secure. They have already shown that they are capable of contributing at a very high level, and they have received advanced training to the exclusion of others. The true costs of their dropout are substantial.

I worry that some of our core values seem to be slipping away as academic medicine evolves. I think most people attending the Joint Meeting subscribe to the idea that physician-scientists benefit from interacting with patients. In my own career, observations of patients with different presentations of anemia gave critical clues in figuring out the details of iron homeostasis. We need to find ways to ensure that physician-scientists have access to patients to learn from them, ideally in a context that is uncoupled from the need to generate clinical revenues. This is particularly important if we are going to fully embrace translational, patient-oriented research and our colleagues who do it. We need to discard prejudices about which types of investigation and investigators are important and celebrate the broad intellectual diversity of the group that began the ASCI as clinical investigators and now get called physician-scientists.

We should acknowledge and deal with developmental differences over the course of an academic career. We must provide better support for select junior scientists so that they can incubate their ideas without becoming overwhelmed by pressure to quickly become successful, self-sufficient, and tenurable. We need to make sure that we don't eat up our seed corn. At the other end of productive careers, some senior faculty members will come to a point where they are no longer using their skills and wisdom to contribute to the academic environment. As each of us gets there, we need to find ways to make space for more junior colleagues to grow their careers.

Along with other changes to keep academic medicine strong, I hope that medical schools will foster closer relationships with their parent or partner universities, particularly as interdisciplinary approaches become necessary to solve complex problems. There are cultural and often geographical barriers that must be overcome, but the rewards are much richer scholarship and better access to solutions for real-world issues. Entrepreneurialism should be appreciated and nurtured, but corporate values must not push aside professional values. We need to adhere to conflict-of-interest policies that keep science objective, adapt to them as they become more sophisticated, and make a more deliberate effort to earn and maintain the public's trust.

I will not venture into a philosophical discussion of how much government and society should pay for biomedical research — those are difficult but important questions that will need to be answered elsewhere. Instead, I suggest that there needs to be a reallocation, over time, of dollars already committed. Medical schools will need to consider “right sizing” their faculties and providing more funds in direct support of the academic mission. To make this possible, I would like to see the NIH and other sponsors provide more consistent, predictable funding to investigators and teams, with overhead funding that comes closer to meeting true costs. The goal should be better, and perhaps fewer, faculty members, more strongly supported and more productively engaged in important research and teaching.

Most academic medical centers are experiencing stresses that threaten to fracture the academic medical center monolith. Those of us who primarily focus on bench research have felt squeezed as the NIH budget has lost spending power and paid for less, grant applications have come to require multiple submissions to get to the front of the queue, and costs of running a laboratory have continued to increase. We have become increasingly distant from our patient-oriented colleagues. At the same time, master teachers feel underrespected, underappreciated, and with increased focus on how every fraction of percent effort is allocated, undercompensated. Some faculty colleagues who are primarily clinicians feel that corporate values are in conflict with their professional values, that they must move faster and faster to support their salaries and appease their institutions, often sacrificing time for the



activities that attracted them to academic medical centers to begin with.

I believe that we have reached, or will soon reach, a point at which we must abandon our legacy approach if academic medicine is going to continue to nurture physician-scientists and clinical investigators. I think we need to attend to a wake-up call. Although the warnings have been heard for a long time, we have responded by hunkering down and trying to protect academic medicine as we believe we have always done it. Perhaps we could do that for a bit longer, but I think we are much better off looking critically at what we do, how we do it, and how we might do it better. It is time for disruption, and it is much better for it to happen deliberately, orchestrated by those who value all of the benevolent missions of academic medicine — education, research, and care for the underserved.

What happens if we do not change? Here's a possible scenario. Academic medical centers will become even more fractured, fragmented, and unhappy. Competitors will emerge who can do the same work outside of academic medical centers, and do it less expensively and more efficiently. Younger generations will lose interest and go in other directions. And we will forfeit an incredible opportunity to better the human condition in our own time.

I started off talking about 1908, when this society was founded. I deliberately used this talk to call attention to some worrisome patterns that have emerged over the past few decades. There is, of course, much to celebrate about clinical investigation in 2009, and the rest of the meeting has been a chance to do that. The fundamental values, drives, and goals that caused the ASCI

to form are still with us, and I believe that we have a lot more important work to do.

Acknowledgements

I am grateful to Leroy Lee and Lisa Varani for collecting and plotting the data shown in Figure 1 and to Scott Gibson, Sally Kornbluth, and Victor Dzau for reading the manuscript prior to presentation. The views expressed here are my own, and other ASCI members may not share them.

1. Flexner A. *Medical Education in the United States and Canada*. New York, NY: The Carnegie Foundation for the Advancement of Teaching; 1910.
2. The NIH almanac - appropriations. National Institutes of Health. <http://www.nih.gov/about/almanac/appropriations/part2.htm>. Accessed December 3, 2009.
3. 2009 Annual Meeting. Association of American Medical Colleges. <http://www.aamc.org/start.htm>. Accessed December 3, 2009.