The Need for Academic Leadership in Full-Spectrum Translational Research

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We both have had many discussions with the broad spectrum of faculty at our institutions, and the diversity of opinions about the definition and proper role of translational science remains profound. In a recent conversation, a very accomplished physician-researcher argued that the fundamental engine of translational research is basic research, which therefore should receive all possible research funding. From his perspective, basic innovations, if grounded in sound science, will translate into important treatments for patients and the public at large—without major engagement on the part of academic medicine. Translation of discovery science into practice would, in this framework, fall to industry.

Basic research is indeed essential, but evidence suggests that the translation of discoveries into effective treatments is fraught with inefficiencies and errors, which should inspire academia to focus on this area. For example, Ioannidis surveyed articles in basic science journals published from 1979 to 1983 *(Science, Nature, Cell, Journal of Biological Chemistry, Journal of Experimental Medicine, and Journal of Clinical Investigation)* and found 101 articles that promised major clinical applications of their findings.[1] Yet *two decades later,* only *five* of these projected treatments were in licensed clinical use, and only *one* had achieved any major impact on medical practice. Indeed, three-quarters had not yet been tested in a randomized trial. Such revelations no longer surprise us; our current focus on translational medicine is in reaction to this disappointing performance. Yet, the response to this translational gap by the academic and research communities must evolve further.

Given both the importance of translating basic science insights into improved healthcare and the current squeeze on the Federal research budget, we believe it is critical to encourage widespread discussion of this issue. There is now ample evidence; if we seek to improve human health, we academics must take responsibility for priming the translational pump rather than naively assuming that industry will do it for us. Appreciation of the complexity and potential for failure in translation into health impact has led to the focus on full-spectrum translational research—as exemplified by this journal, by the NIH's Clinical and Translational Science Awards (CTSAs), and by our Society for Clinical and Translational Science (SCTS). However, we continue to be reminded that not everyone shares our perspective. In some quarters the view still prevails that innovative basic science leads almost automatically to translation into improvements in care, and thus is not the concern of academic medicine.

If we needed a reminder of the importance of this challenge, the National Academy of Science and the Commonwealth Foundation's recent reports should remove all doubt: for *the United States is losing ground to other economically developed countries, both in terms of life expectancy and the quality of healthcare*—we now rank 50th in life expectancy worldwide and at the bottom of fquality ratings in the commonwealth report.[2] Leaving industry to address this crisis alone will not suffice. Instead, we must develop systematic approaches to collaboration across the spectrum from bench to bedside to widespread clinical practice and public benefit. We need approaches that identify best practices and technologies and then make them available in ways that improve health.

Many translational research steps must be traversed prior to a basic insight or a molecular target in a nonhuman model being translated into effective care, including clinical research, community-based participatory research, and dissemination science. In reporting the paltry rate of translation of basic science into clinical care, Ioannidis also pointed out that the strongest predictor for a discovery progressing to randomized trials was industry involvement in the original basic science publication.[1] However, simply enhancing industry's role and further easing translation will not diminish the need for academic involvement. A recent review of the evolution of clinical trials over the past 50 years[3] illustrated how an enterprise increasingly focused on developing "blockbuster" drugs has largely bypassed the academic community, relegating it to largely ancillary roles. Investments in less commercially attractive drugs and devices, even ones that are potentially very important to special groups or the general public, have continued to shrink. The application of the powerful tool of the randomized clinical trial for commercial development is good; but what remains problematic is that the academic community has not ensured that this engine is harnessed for the benefit of the public.

As academics and researchers who are at times guilty of a lack of attention to full-spectrum translation in the public interest, we cannot simply blame industry for following the money: we can blame ourselves, too. We afford great respect and financial support to the researcher who carves out a career from NIH basic science funding and is able to thrive without requirement for a direct connection to improving health. We also highly value the clinical trialists who create successful machines for performing commercially motivated trials. It is no accident that those of us who succeed in these areas are handsomely rewarded; direct and indirect funds from NIH basic science grants are valuable to our institutions, and commercial clinical trial systems are significant financial engines for academic centers. In contrast, translational efforts that focus on the effective implementation of treatments in usual clinical settings and in communities, have neither the cachet of discovery science nor the financial support of industry, and thus remain underfunded and underemphasized, despite the pioneering efforts of the CTSAs.

The academic community must respond to the increasing concerns of patient advocacy groups, policymakers, and the public who point out that our research efforts have yielded inadequate impact on their health needs, even while simultaneously fueling unsustainable increasing healthcare costs. *We academicians must*

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take real leadership in this mission. Our nation needs to understand the critical importance of translational research in all its steps and must rise to answer the needs of our patients and the public. Our inability to translate discoveries into better health is one factor making our society less healthy—as well as less competitive in the global marketplace. To address the public's legitimate expectations for U.S. biomedical research, and to continue as a world leader in medical innovation, *we must play an active public role in leading conversations about, and encouraging serious investments in, full-spectrum translational research*. CTS

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