

EDITOR'S PAGE

Are Academic Medical Centers Placing Translational Scientists on the Endangered Species List?

A Call for Climate Change to Preserve the Species

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Before everyone scrambles to e-mail the publications committee of the American College of Cardiology, calls the department chairs and/or deans of their respective medical centers, or takes to Twitter to voice concerns that the Editor-in-Chief of *JACC: Basic to Translational Science* has gone rogue and does not value the contributions of academic medical centers, I would like to clarify at the outset that this Editor's Page is *not* a repudiation of academic medicine, academic medical centers, scholarship, academic promotion, nor the tenure system. Rather the intent is to discuss how our current approach to academic promotion and tenure may be inadvertently stranding cardiovascular translational investigators in the "valley of death" (1).

Over the past 30 years, the cardiovascular disciplines of basic and clinical research have emerged as distinct scientific entities, with distinct training and career pathways. These disciplines have journalistic homes, separate meetings, and well-delineated support mechanisms through funding agencies, such as the National Heart, Lung, and Blood Institute, American Heart Association, and not-for-profit organizations. Unfortunately, as these scientific disciplines have matured, they have grown farther apart, which has made it increasingly hard for scientists in each field to communicate and learn from one other another. For many years, the pharmaceutical industry was able to serve as an effective bridge for the divide between these 2 disciplines; however, with the increasing expense of phase III trials required to

obtain Food and Drug Administration approval of new drugs and/or devices, and the increasing number of drug/device failures in phase III, it has become harder for the pharmaceutical industry to serve as an effective bridge between the basic and clinical sciences. The widening intellectual chasm that has emerged between basic and clinical science has been referred to as the valley of death (1). Although the National Institutes of Health's efforts, started under Director Elias Zerhouni's "roadmap initiative," have begun to yield dividends in terms of bridging this chasm, and academic medical centers have stepped up by developing new training programs in clinical and translational science that are designed to engage MD, PhD, and MD/PhDs, none of these efforts have, heretofore, addressed the important issue of how to recognize and reward the contributions of translational investigators who work within academic medical centers.

The requirements for academic promotion and/or tenure for researchers have traditionally focused on publishing high-profile papers to which they have made a major contribution, which is generally denoted by "first" or "senior" authorship. Obtaining grant support is another important requirement for promotion, which, of course, is inextricably linked to publishing in high-impact journals. Unfortunately, translational science is a "square peg" that does not always fit nicely into the "round hole" of traditional academic models. First, translational science focuses on useful applications of basic science rather than on intellectual novelty. As noted by Ben A. Barres, Professor and Chair of Neurobiology at Stanford University School of Medicine: "Pure science is what you're rewarded for. That's what you get promoted

for. That's what they give the Nobel Prizes for. And yet developing a drug is a hundred times harder than getting a Nobel Prize" (2). Second, publications in high-impact journals and citation factor scores have long been regarded as surrogate markers of scientific excellence. Pasterkamp et al. (3) believe that "academia has turned publications into a currency they were never meant to be: a system of metrics to assess research, research programs." Citations are imperfect and inconsistent measures of quality, particularly when compared across different scientific disciplines. Moreover, citation data for translational science are skewed, in that the initial scientific discovery and the report of the phase III studies are published in high-impact journals, and all of the other critical studies in between (discovery lead identification, pre-clinical studies, and phase 1 to 2 studies) are published in specialized journals that have lesser impact. As we have noted previously on these pages, one cannot get to phase III without going through phase I and II (4). Pasterkamp et al. (3) further comment that "by giving so much weight to the impact of publications, universities undervalue translational research, putting the careers of their staff in the hands of outsiders and even contributing to the flaws of the system of peer review. Indeed, the pressure to publish in high-impact journals is one of the drivers of poor reproducibility of scientific experimental outcomes" (3,5). What academic medical centers will need to understand is that citation impact factor does not always correlate with the societal impact factor. Third, translational research requires team science, which means that critical members of the research team may often appear as middle authors in multiauthor papers. From my own personal experience sitting on promotion committees, explaining the critical importance of a middle author to the successful completion of a multidisciplinary/multiauthor research paper is a hard sell to the accomplished members of a promotion committee who have been weaned on the primacy of first or last authorship. Big science and team science are here to stay, now and for the foreseeable future. Academic medical centers will need to learn how to recognize and reward all of the members of the translational team for the species to survive.

How can academic medical centers avoid stranding their talented faculty in the translational valley of death? Recognizing that "all politics are local," it would be incredibly presumptuous to suggest that

there is single model that will work in all academic medical centers. That said, awareness of the importance of translational scientists is the first step. The good news is that academic medical centers are aware that translational research is a distinct discipline that provides a critical bridge between the bench and the bedside. None of the problems discussed in the preceding text are insurmountable; however, each of them will require a "climate change" within academic medical centers with respect to the manner in which the qualifications of translational scientists are assessed. Unfortunately, the bad news is that most academic medical centers have not yet recognized the need to develop qualitative tools for recognizing, rewarding, and retaining translational investigators. The academic climate for translational researchers must change today if we are to avoid adding translational scientists to the endangered species list. Many students make their career choices early on in their training. If they don't see a clear path across the translational valley of death, they will opt out for a different career path. Inattention today runs the risk of extinction tomorrow, and extinction is simply not an option giving the rising burden of cardiovascular disease worldwide. In the second annual National Institutes of Health Shannon Lecture in 1999, Dr. Leon R. Rosenberg commented on the importance of maintaining the pool of physician-scientists. His words were remarkably prescient and ring true in 2017 with respect to MD, MD/PhD, or PhDs who engage in translational research: "We must act now to create a national environment conducive to creating a new generation of physician-scientists—rigorous in their training, confident in their ability to compete and succeed, and, above all, imbued with the belief that their efforts are essential if we are to improve the lives of people everywhere—young and old, woman and man, sick and well" (6). As always, we welcome your thoughts, and would like to hear from you about how academic medical centers can better support translational investigation, either through social media (#JACC:BTS; #RogueEditor) or by email (JACC@acc.org).

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