of thoracic surgery is performed by surgeons with no NIH involvement. So why might this topic even be of interest to the vast majority of thoracic surgeons?

Permit me to share a personal experience. After training at a large academic medical center, I joined a cardiac surgical group that was performing bilateral internal mammary artery (BIMA) grafting as the preferred operation for coronary artery bypass surgery during the 1980s and 1990s, when much of the country was trying to come to terms with the use of a single IMA graft. Although a retrospective, careful analysis of long-term follow-up suggested a survival advantage³—a finding corroborated by multiple other retrospective studies,⁴ in examining the many reasons why <5% of coronary artery bypass grafting (CABG) recipients undergo BIMA grafting, one factor that clearly emerged was a failure of education. Our practice was composed of good surgeons who developed an excellent operation that helped many people—no regrets. But, as busy private practitioners, we trained no residents, provided no courses, and

offered no fellowships. The subtleties of patient selection and surgical technique that had been developed over decades disappeared with the end of the practice. The point? It is the educational enterprise that gives our profession its longevity/continuity, and it is the dedicated researchers who keep the profession fresh, innovative, and interesting for all of us, and for our patients.

References

1. Lauer M, NIH Office of Extramural Research. Grant renewal success rates: then and now. Accessed February 5, 2021. Available at: <https://nexus.od.nih.gov/all/2016/05/26/grant-renewal-success-rates-then-and-now/>.
2. Narahari AK, Mehaffey JH, Chandrabhatla AS, Hawkins RB, Charles EJ, Roeser ME, et al. Longitudinal analysis of the National Institutes of Health funding for academic thoracic surgeons. *J Thorac Cardiovasc Surg*. 2022;163:872-9.e2.
3. Kurlansky PA, Traad EA, Dorman MJ, Galbut DL, Zucker M, Ebra G. Thirty-year follow-up defines survival benefit for second internal mammary artery in propensity-matched groups. *Ann Thorac Surg*. 2010;90:101-8.
4. Yi G, Shine B, Rehman SM, Altman DG, Taggart DP. Effect of bilateral internal mammary artery grafts on long-term survival: a meta-analysis approach. *Circulation*. 2014;130:539-45.

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Commentary: National Institutes of Health–funded cardiothoracic surgeon-scientists: A scar is forming in the wound

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There are numerous reports in the literature documenting the decline in number of surgeon-scientists in recent years. As outlined in recent editorials,^{1,2} there are numerous

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CENTRAL MESSAGE

Thoracic surgeons have documented success in obtaining National Institutes of Health funding, but the future for cardiothoracic surgeon-scientists remains concerning.

reasons for this decrease. First, increasingly high clinical and administrative demands have become associated with clinical practice. Second, the environment of extramural funding is increasing in difficulty, with competition for grant funding having markedly increased in both the United States and Europe over time. Third, the lack of departmental

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or institutional support may further drive surgeons away from research. Fourth, a generally increasing desire among surgeons for better work–life balance has led to decreased valuation of academic advancement and tenure as key drivers of a career. Fifth, quality mentors who can nurture and promote the surgeon-scientists of the future are declining in number.

In this issue of the *Journal*, Narahari and colleagues³ report a longitudinal analysis of National Institutes of Health (NIH) funding for academic (noncardiac) thoracic surgeons. The authors identified 395 general thoracic surgeons working at the top 140 NIH-funded institutes in the United States. These surgeons were then queried about their funding history in the NIH Research Portfolio Online Reporting Tools Expenditures and Results (NIH RePORTER). This resulted in an analysis of grants awarded to 63 (16% of the total) surgeons between 1980 and 2019. These surgeons received 136 grants totaling \$228 million, resulting in 1772 publications and generating more than 50,000 citations. Although the analysis indicated increased success in obtaining NIH funding, there was a low percentage of R01 renewals (17.3%). NIH-funded thoracic surgeons were more likely to have a higher academic rank professorship level, and also more likely to have worked in a top-tier academic institution. The authors concluded that thoracic surgeons have received more NIH funding over time and are able to fill the roles of modern surgeon-scientists by obtaining NIH funding during an era of increasing clinical demands. Consideration of certain aspects of the data presented, along with a lack of other supporting data, may challenge these conclusions to some extent.

No information is provided regarding the clinical demands, clinical activity, institutional protected time, and other support given to funded surgeons compared with their nonfunded counterparts. Furthermore, the authors provide no clinical relative value unit or salary data, which would shed further light on the relative clinical activity of funded versus nonfunded surgeons. The authors note that in general, a seamless mechanism of progression from research in training to research as a faculty member does not exist, which presents a daunting challenge to young surgeons interested in making this transition. Although the number of R01 grants has slowly increased, the overall grant dollars won have not increased in proportion to the approximately 7-fold increase in available funding dollars

in the National Cancer Institute and National Heart, Lung and Blood Institutes between 1980 and 2020. The low rate of R01 renewals is also concerning. The authors also state that “the NIH continues to get good return on the investment in funding thoracic surgeon-scientists”; however, they provide no data on citation scores for funded and nonfunded surgeon-scientists. Is there more translation to clinical medicine and surgery with federally funded research than with non–federally funded research? This is not clear.

Despite the foregoing limitations, Narahari and colleagues document success in obtaining grant funding over the years by thoracic surgeons. They found that successful grantees tended to have made transitions from F32 or T32 grant mechanisms, have more graduate degrees and higher academic ranks, and are working in the uppermost tier of academic institutions. In addition, many surgeons are opting for multidisciplinary team grants; however, by so doing they risk exchanging the situation in which they are actively involved in the conception, execution, and reporting of experiments to one in which they are merely providing tissue and plasma for analysis and signing off on manuscripts written primarily by someone else.

Despite the seemingly positive data presented in this study, the viability of the cardiothoracic surgeon-scientist paradigm remains critically worrisome. Given the current highly competitive funding climate, use of NIH funding as a benchmark for progress and success in research is becoming antiquated. The authors suggest other funding agencies to consider when applying for support, all of which could be used as reasonable benchmarks. It would appear from this analysis that the “open wound” of cardiothoracic surgeon-scientist viability is in a cicatrization phase, with the greatest numbers of successful scientists are concentrating themselves at the highest-tier institutions. A deep dive into the causes of this phenomenon may provide further insight into approaches to preventing further contraction.

References

1. Narahari AK, Mehaffey JH, Chandrabhatla AS, Hawkins RB, Charles EJ, Roeser ME, et al. Longitudinal analysis of National Institutes of Health funding for academic thoracic surgeons. *J Thorac Cardiovasc Surg*. 2022;163: 872-9.e2.
2. Ikonomidis JS, Menasché P, Kreisel D, Sellke FW, Woo YJ, Colson YL. Attrition of the cardiothoracic surgeon-scientist: definition of the problem and remedial strategies. *Eur J Cardiothorac Surg*. 2019;56:220-3.
3. Ikonomidis JS. Solutions for surgeon scientists. *J Thorac Cardiovasc Surg*. 2020; 159:1917-20.