

Crafting a modern surgeon-scientist in cardiothoracic surgery

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The creation of a durable cardiothoracic surgeon-scientist in the modern era is no small feat. With the current pressures of academic medicine and the competitive nature of governmental funding, it is increasingly difficult for today's academic thoracic surgeon to simultaneously master the clinical, educational, and scientific realms of medicine. The latter is more critical than ever, but also increasingly difficult to attain, as funding sources are limited and time invested in securing financial support is not compatible with growing institutional revenue pressures. Therefore, the timing of the recent publication by Narahari *et al.* in the *Journal of Thoracic and Cardiovascular Surgery* could not have been better (1).

The authors have conducted a well-designed, retrospective study comparing general surgery trainees from two T32 research grant funded institutions to those at 2 institutions with strong records of matriculation into cardiothoracic surgery training programs but without T32 support. The primary objective was to identify differences in cardiothoracic surgery matriculation, academic productivity, or subsequent funding beyond training between the cohorts. They report an increase in likelihood of pursuing cardiothoracic surgery after residency, in number of published manuscripts during residency, in probability of pursuing an advanced academic fellowship, and ultimately in securing National Institutes of Health (NIH) funding from trainees from the T32-funded institutions. Interestingly, there was no difference between overall number of publications after completion of training between the two groups. Differences in journal impact

factors in which manuscripts were published were not reported; this would have been informative when comparing academic productivity between cohorts. However, analysis of funding was reported, and CT surgeons who trained at T32 institutions received a total of \$9 million in funding compared to \$600,000 for the non-T32 trained surgeons.

Although the study is retrospective in nature and likely suffers from selection bias as trainees inclined to become surgeon-scientists may pursue T32-funded programs, it is an excellent proof of concept paper and its findings mirror those from other works. In 2015, Kibbe *et al.* reported the merits of NIH funding during vascular surgery training, examining 15 years of retrospective data from recipients of the National Heart, Lung, and Blood Institute (NHLBI) grants, which was the parent funding source for cardiothoracic surgery T32 grants. Amazingly, 45% of the 29 awardees secured R01 funding after training, and ultimately secured \$45,108,174 in NIH and Veterans Affairs funds, demonstrating a 4.8-fold financial return on investment from the original foundation program (2). Similar trends were seen amongst otolaryngology head and neck foundation grants when applied early in trainees' careers (3).

Perhaps one of the most important benefits of the T32 grant program is the mentorship it requires, often drawing young undecided residents toward a career in cardiothoracic surgery. In June of 2007, only 84 of 126 American thoracic surgery positions available through the national match were filled, and many of these positions were taken by undesignated or foreign medical graduates

with little interest in research (4). Thanks to significant effort by our societies, the focus on establishment of robust Accreditation Council for Graduate Medical Education (ACGME)-accredited training programs, and mechanisms such as the T32, the tide has changed. In 2018, 94.7% of the 76 accredited thoracic surgery programs filled, and applications have become increasingly competitive with an emphasis on past and potential future academic productivity (5).

We applaud Narahari *et al.* for shedding quantitative light on a qualitatively hypothesized concept that institutional NIH funding through the T32 mechanism (I) yields research productivity; (II) fosters interest in academic thoracic surgery; and (III) results in a favorable return on investment as participants in these programs are more likely to secure future NIH funding. Identifying the differences in academic pathways is the first step in opening the door to new funding streams, as NIH funding has precipitously dropped in the past decade. If adequate funding is not available, the opportunities to perform quality basic science and translational research will be limited. We must continue to encourage young cardiothoracic trainees to pursue high yield focused research through mechanisms such as the T32, despite the competitive clinical atmosphere, to maintain our tradition of excellence in pushing forward the boundaries of science.

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Footnote

Conflicts of Interest: The authors have no conflicts of interest to declare.

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