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Authors
Demblowski, Lindsay
Busse, Brad
Santangelo, George
et al.

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NIH Funding for Surgeon-Scientists in the US: What Is the Current Status?

Lindsay A Demblowski, BS,
Surgical Oncology Program, National Cancer Institute

Brad Busse, PhD,
Office of Portfolio Analysis, Division of Program Coordination, Planning, and Strategic Initiatives, Office of the Director

George Santangelo, PhD,
Office of Portfolio Analysis, Division of Program Coordination, Planning, and Strategic Initiatives, Office of the Director

Andrew M Blakely, MD,
Surgical Oncology Program, National Cancer Institute

Patricia L Turner, MD, FACS,
NIH, Bethesda, MD, and American College of Surgeons, Chicago, IL

David B Hoyt, MD, FACS,
NIH, Bethesda, MD, and American College of Surgeons, Chicago, IL

Martha A Zeiger, MD, FACS
Surgical Oncology Program, National Cancer Institute

Abstract

BACKGROUND: Recent literature suggests that the future of surgeon-scientists in the US has been threatened for the past several decades. However, we documented an overall increase in NIH funding for surgeon-scientists, as well as the number of NIH-funded surgeons, from 2010 to 2020.

STUDY DESIGN: NIH-funded principal investigators (PIs) were identified for June 2010 and June 2020 using the NIH internal data platform iSearch Grants (version 2.4). Biographical sketches were searched for key terms to identify surgeon-scientists. Grant research types and total grant costs were collected. American Association of Medical Colleges data were used to determine total surgeon and physician populations. Bivariate chi-square analyses were performed

Correspondence address: Martha A Zeiger, MD, FACS, Surgical Oncology Program, National Cancer Institute, NIH, 10 Center Dr, RM 4-3760A, Bethesda, MD 20892. martha.zeiger@nih.gov.

Author Contributions
Study conception and design: Demblowski, Turner, Hoyt, Zeiger
Acquisition of data: Demblowski, Busse, Santangelo, Zeiger
Analysis and interpretation of data: Demblowski, Blakely, Turner, Hoyt, Zeiger
Drafting of manuscript: Demblowski, Busse, Blakely, Zeiger
Critical revision: Demblowski, Busse, Santangelo, Blakely, Turner, Hoyt, Zeiger

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using population totals and were corroborated using *z*-tests of population proportions using JMP (version 13.0.0). A 2-tailed p value <0.05 was considered significant.

RESULTS: In June of 2020, a total of 1,031 surgeon-scientists held $872,456,710 in NIH funding. The percentage of funded surgeons significantly increased from 2010 (0.5%) to 2020 (0.7%) ($p < 0.05$), and the percentage of funded other physicians significantly decreased from 2.2% in 2010 to 1.6% in 2020 ($p < 0.05$). All surgeons sustained R grant funding at both time points (58% in 2020 and 60% in 2010), and specifically maintained basic science-focused R grants (73% in 2020 and 78% in 2010).

CONCLUSIONS: Our study found surgeon-scientists are increasing in number and NIH funding and are becoming more diverse in their research efforts, while maintaining a focus on basic science. (J Am Coll Surg 2021;232:265e275.

Surgical research has long been credited with revolutionizing the medical field, as evidenced by 9 Nobel Prizes awarded to surgeon-scientists. Among others, these include Sir Frederick Banting for discovering insulin, Charles Huggins for endocrine treatment of prostate cancer, and Joseph Murray, who performed the first kidney transplantation.[1] The future of surgeon-scientists in the US, however, has been threatened for the last several decades. The NIH budget increased by almost $4 billion from 2006 to 2016 ($28.5 billion and $32.3 billion, respectively), yet funding to surgical departments decreased at a rate of $3 million per year ($314 million in 2007 to $292 million in 2016).[2] Various external pressures have been attributed to the diminishing NIH funding of surgeon-scientists, including the time demands required to maintain a surgical practice while simultaneously competing with full-time scientists for funding.[3,4] In addition, increasing administrative and regulatory demands, along with economic pressures to generate more revenue, are only some of the reasons cited as factors challenging the sustainability of surgeons participating in basic and clinical research.[5]

Specifically, several studies have noted the declining rate of surgical research during the past 2 decades. Shifts in both mentored and independent researcher awards granted to surgeon-scientists from 2003 to 2013 have also been noted, as R awards (research projects) and K awards (mentored research grants) dropped by 39% and 33%, respectively.[6] In contrast, an increase of 23% in cooperative agreement awards (U grants) was seen during that same time period.[6] This suggests that surgeon-scientists are evolving towards working in interdisciplinary research teams to secure funding in a highly competitive environment.[7]

To fully understand the current status of NIH funding for surgeon-scientists in the US, we queried the NIH extramural portfolio database for active NIH grants awarded to surgeon-scientists in all surgical specialties and subspecialties in June of 2020. We chose to examine the current status of NIH funding for surgeon-scientists to create a baseline platform on which to develop programming for more funding opportunities in the future. We report on all active and awarded NIH grants to surgeon-scientists by surgical specialty and general surgery-derived subspecialty, total costs, activity codes, and whether the grant supported basic science, clinical outcomes, or clinical trials research. We also report on NIH's total funding portfolios, comparing surgeon-scientist funding to principal investigators (PIs) with PhDs only, and those with MDs, DOs, and/or MBBSs who are not surgeons (other physicians). Finally, we compared the current funding status to funding of surgeon-scientists in June of 2010.

Unexpectedly, we documented an overall increase in the amount of funding for surgeon-scientists, as well as the number of funded surgeons compared with other physicians. We address in detail why our findings differ and are more promising than similar studies published recently.

METHODS

Creation of NIH 2010 and 2020 portfolios and funded surgeon-scientist databases

To identify NIH-funded surgeons who held active grants in June 2010 and June 2020, we queried the NIH internal data platform, iSearch Grants, version 2.4 (NIH Office of Portfolio Analysis's next-generation portfolio analysis platform).[8] First, 2 portfolio databases were created to include all NIH grants that were active during either June of 2010 or June of 2020 by filtering based on budget start and end dates. The portfolios were composed of 128 unique grant activity codes: institutional training and director program projects (D43, D71, DP1, DP2, DP3, DP5, and DP7), fellowship programs (F05, F30, F31, F32, F33, F99, and FI2), research career programs (K00, K01, K02, K05, K06, K07, K08, K12, K18, K22, K23, K24, K25, K26, K30, K43, K76, K99, KL1, and KL2), research programs projects and centers (P01, P20, P2C, P30, P40, P41, P42, P50, P51, P60, PL1, and PN2), research projects (R00, R01, R03, R13, R15, R18, R21, R24, R25, R28, R33, R34, R35, R36, R37, R38, R41, R42, R43, R44, R50, R55, R56, R61, R90, RC1, RC2, RC3, RC4, RF1, RL1, RL2, RL5, RL9, RM1, and UE5), research-related programs (SC1, SC2, and SC3), training programs (T15, T32, T34, T35, T36, T37, T90, TL1, and TL4), and cooperative agreements (U01, U10, U13, U18, U19, U24, U2C, U2R, U34, U41, U42, U43, U44, U45, U54, U56, UA5, UC1, UC2, UC4, UC6, UC7, UF1, UG1, UG3, UG4, UH1, UH2, UL1, UM1, UM2, UT1, and UT2). The following nonresearch grant activity codes were excluded from both portfolios: research construction programs (C06), resource programs (G08, G11, G12, G13, and G20), loan repayment programs (L30, L32, L40, L50, and L60), general clinical research centers program (M01), other transactions (OT2 and OT3), research-related programs (S06, S10, S11, S21, and S22), and commercialization readiness program (SB1), as these grants are considered primarily programmatic and not reflective of PI research.

PI degree information was used to categorize the portfolios into the following categories: surgeons, other physicians (nonsurgeons with a medical degree [MD, DO, and/or MBBS]), and PhDs who did not hold a medical degree. All others were excluded. Surgeons were then categorized into specialties and general surgery-derived subspecialties. Total grant cost was used to calculate the total NIH portfolio for each time point (June 2010 and June 2020), as well as the total amount held by each PI subcategory. Each unique investigator was counted once, verified by their principal investigator identification number (PIID). The number of active physicians in the respective specialties was obtained using the Association of American Medical Colleges (AAMC) Physician Specialty Data Reports for 2008 and 2018.[9] The data on these reports reflects active physician information for 44 specialty groups from the previous year and are reported every 2 years only, resulting in a 3-year gap between the reported AAMC data and our analysis. An analysis of percentage of funded surgeons and other physicians compared with the total number of active physicians and surgeons (AAMC active physician data) was performed. According to AAMC sports medicine, sports medicine also includes the following specialties: emergency medicine, family medicine, internal medicine, pediatrics, or physical medicine/rehabilitation, making it impossible to determine how many in sports medicine are orthopaedic surgeons.[10] Therefore, sports medicine (orthopaedic surgery) was included in the total count of active physicians and not active surgeons. The percentage of funded PhDs was not calculated because an accurate denominator representing the total number of PhDs in the country could not be found.

Surgeon-scientists were identified for the 2010 and 2020 surgeon-scientist databases by searching for the following key terms in the biographical sketches of all contact PIs in each portfolio database: *Surg* OR Ophtha* OR Gyn* OR Urol*. Nearly all surgical specialties and subspecialties were captured by the key term *Surg* with the exception of ophthalmology, gynecology and obstetrics, and urology. The PIID, PI name, and PI degree information were used to exclude non-MDs, non-DOs, and non-MBBSs from the lists of potential surgeons. There were no funded DOs identified as surgeons. The resulting investigators were cross-checked with the American College of Surgeons' Find a Surgeon tool[11] and matched with their American College of Surgeons-affiliated profile. Surgeons who were not American College of Surgeons members were verified using their university or academic online profiles. Those who could not be definitively identified as a surgeon by credentials or surgical training were excluded from the surgeon-scientist database and were still accounted for in their respective PI subcategories (PhDs or other physicians).

Specialties and subspecialties

Surgical specialties and subspecialties were recorded based on board certifications, fellowship training, and online profiles. The final list of PIIDs was then queried in the iSearch Grants portfolio databases (June 2010 or June 2020) to pull all awarded grants associated with the PIIDs, along with the following information: grant activity code, grant title, specific aims, PI institution, grant number, fiscal and support years, and total cost. PI institution was also cross-checked with each surgeon's online profile.

Type of grant, type of research, and grant costs for each specialty and subspecialty

For both databases, total grant cost was calculated for each specialty and subspecialty. General surgery-trained surgeon-scientists included the following: bariatric surgery, colorectal surgery, critical care surgery, endocrine surgery, general surgery, minimally invasive surgery, pediatric surgery, surgical oncology, breast surgical oncology, and transplantation surgery. Specialties that were not general surgery-based included cardiothoracic surgery, neurologic surgery, obstetrics and gynecology, ophthalmic surgery, orthopaedic surgery, otolaryngology, plastic and reconstructive surgery (including oral maxillofacial surgery), urologic surgery, and vascular surgery. Because the training paradigm for cardiothoracic, vascular, and plastic surgery has evolved during the last several years from a general surgery-based model plus fellowship to more integrated options, we chose to consider surgeons in these specialties separate from general surgery-based specialties.

Activity code categories were used to calculate distribution of grants across all surgeon-scientists vs general surgery-trained surgeon-scientists, and were defined as: research career programs (K grants), research program projects and centers grants (P grants), research projects (R grants), training programs (T grants), cooperative agreements (U grants), and other grants (D and F grants). All R01 and R21 grants were then categorized into the following types of research: clinical outcomes, clinical trials, or basic science. K08 and K23 grants were also categorized into the following types of research: clinical outcomes and basic science. Grant titles and specific aims were reviewed to determine the research type, and percentages were calculated for both general surgery-trained surgeon-scientists compared with all surgical specialties. Percentages of research type (basic science, clinical outcomes, and clinical trials) for R01 and R21 and research type (basic science and clinical outcomes) for K08 and K23 grants were determined for all surgeon-scientists and general surgery-trained surgeon-scientists.

Statistical analysis

Data were expressed as physician population totals, with stratification by assessment year, physician specialty, NIH funding status, or NIH grant type. Bivariate chi-square analyses were performed using population totals and *z*-tests of population proportions were also performed, with the proportion from 2010 serving as the null hypothesis. The first analyses compared the number and proportion of surgeons with NIH funding compared with nonsurgeons with NIH funding in 2010 and 2020. Subsequent analyses incorporated the total number of surgeons and nonsurgeons in the workforce around the time of NIH funding status assessment using AAMC data, thereby correcting for physicians without NIH funding. Analyses were performed separately for surgeons and nonsurgeons, as well as the combined physician population. Within the surgeon population, bivariate analyses and *z*-tests were performed to compare NIH grant types in 2010 and 2020. Statistical analyses were performed using JMP, version 13.0.0 (SAS Institute). A 2-tailed p value <0.05 was considered significant.

RESULTS

Current funding comparisons for surgeon-scientists

In June of 2020, a total of 1,031 surgeon-scientists held 1,453 unique grants, spanning 54 activity codes and totaling $872,456,710 in NIH funding. General surgeons comprised 25.0% of the surgeon-scientist population and 37.1% of the total funding with 258 surgeons and $325.4 million in grant cost (Fig. 1A). Obstetrics and gynecology was the second most common specialty, with 162 surgeons (15.7%) and 12.4% of the total funding ($108.4 million). Neurologic surgeons were the third most common surgical specialty, with 125 surgeons (12.1%) and 15.3% of the total grant funding ($133.3 million).

To examine trends, the same analyses were completed for surgeon-scientists funded in June of 2010. At that time, a total of 715 scientists held 1,113 unique grants, spanning 51 activity codes and totaling $614,699,720 in NIH funding. Increases from 2010 to 2020 were seen in both the number of surgeons and amount of funding for each specialty, with the exception of cardiothoracic surgeons (Fig. 1B). In 2010, general surgeons comprised the greatest number of funded specialties and held the most grant funding, 189 (26.4%) of the surgeon-scientist population and $203.3 million (33.1%). Again, obstetrics and gynecology was the second most common specialty, with 104 surgeons (14.5%) and 15.3% of the total funding ($94 million). Ophthalmic surgeons were the third most common specialty, with 94 surgeons (13.1%) and 13.9% of the total grant funding ($85.3 million).

Surgical subspecialties and funding

General surgeons with a subspecialty in surgical oncology led the group of general surgery-trained surgeons in number of surgeons and total grant cost for both years. In 2020, seventy-one surgeons (27.5%) trained in surgical oncology held 44.4% of the total grant cost for general surgeons ($144.5 million), not including those focused on breast surgical oncology (Fig. 2A). Surgical oncology also represented the majority of general surgery subspecialties in 2010, with 54 total surgeons (28.6%) holding $74.8 million (36.8%) of the funding for surgeons trained in general surgery (Fig. 2B). The number of general surgeon-scientists without additional subspecialty training decreased from 2010 to 2020, from 19 surgeons (10.1%) to 12 surgeons (4.7%), and the total funding also decreased from $24.1 million in 2010 (11.8%) to $12 million in 2020 (3.7%).

Grant activity codes

An analysis of activity codes for the entire 2020 surgeon-scientist database found that R01 grants made up 642 (44.2%) of the total 1,453 grants (Fig. 3A). Similarly, in 2010, R01 grants made up 467 (42.0%) of the total 1,113 grants (Fig. 3B). The following activity codes comprised 4% or more of the remaining 2020 data: K08 (7.8%), R21 (6.5%), U01 (5.2%), T32 (4.1%), and K23 (4.0%), and the remaining 2010 data: R21 (8.6%), K08 (5.5%), U01 (5.3%), and T32 (4.4%). R grants comprised the majority (58%) of the overall grant category distribution for all surgeons in 2020, followed by K grants (15%), U grants (13%), P grants (9%), T grants (5%), and other grants (<1%) (Fig. 4A). A similar grant distribution was seen for the 258-general surgery-trained surgeons in 2020: R grants (54%), U grants (15%), K grants (11%), T grants (10%), P grants (9%), and other grants (1%) (Fig. 4B). The grant distributions for all surgeons and surgeons trained in general surgery in 2020 were comparable with those in 2010. R grants comprised the majority for all surgeons (60%), followed by K, P, and U grants (11%), T grants (5%), and other grants (2%) (Fig. 4C). The distribution for the 189 general surgery-trained surgeons in 2010 was as follows: R grants (54%), P grants (14%), U grants (12%), K and T grants (9%), and other grants (2%) (Fig. 4D). An absolute increase in number of K and R grants compared with all other grants (U, P, T, and other grants) was observed from 2010 to 2020 for all surgeons (chi-square, $p = 0.054$). A significant increase was seen in the proportion of K grants (11.4% to 14.7%) and a significant decrease in the proportion of R grants (60.3% to 58.5%) compared with all other grants from 2010 to 2020 for all surgeons (*z*-test, $p < 0.05$), suggesting that the pipeline of surgeon-scientists is increasing.

Research type

R01 and R21—An analysis of R01 and R21 research categories shows a similar distribution among all surgeons and those trained in general surgery in 2020, with basic science comprising the majority at 73% and 68%, respectively (eFigs. 1A, 1B). The R01 and R21 research category analysis for 2010 grants also showed basic science comprising the majority of research topics for both groups of surgeons (78% for all surgeons and 82% for general surgery-trained surgeons) (eFigs. 1C, 1D). Overall, clinical research increased slightly to 27% in 2020 (19% clinical outcomes and 8% clinical trials) from 22% in 2010 (17% clinical outcomes and 5% clinical trials) for all surgeons ($p < 0.05$). A sharper increase in clinical research was seen for surgeons trained in general surgery: 32% in 2020 (23% clinical outcomes and 9% clinical trials) from 18% in 2010 (12% clinical outcomes and 6% clinical trials) ($p < 0.05$). For both all surgeons and those trained in general surgery, R01 and R21 grants focused on clinical trials or clinical outcomes significantly increased in 2020 compared with 2010 ($p < 0.05$). Still, the number of R01 and R21 basic science grants increased by 94 grants for all surgeons and remained stable for general surgery-trained surgeons (5-grant increase).

K08 and K23—The same analysis was completed for K08 and K23 grants. Sixty-seven percent of K08 and K23 grants held by all surgeons focused on basic science and 68% of mentored grants held by general surgery-trained surgeons focused on basic science in 2020 (eFigs. 2A, 2B). Seventy-four percent of mentored grants held by all surgeons in 2010 focused on basic science, and 70% of those held by general surgery-trained surgeons focused on basic science (eFigs. 2C, 2D). A significant change was not observed in the proportion of clinical outcomes and basic science research from 2010 to 2020 for all surgeons or those trained in general surgery ($p > 0.05$). Nonetheless, the overall number of K08 and K23 grants increased from 2010 to 2020 for all surgeons (from 90 to 172) and general surgery-trained surgeons (from 20 to 38).

Funding of other physicians and PhDs compared with surgeons

The details of the NIH 2010 and 2020 portfolio databases, categorized by PI degree, grant cost, number of PIs per degree category, and grant cost per number of PIs, can be seen in Table 1. The overall 2010 portfolio included 45,003 PIs and $33.1 billion, and the overall 2020 portfolio included 43,392 PIs and $38.7 billion. Most notable was the change in grant cost per PI from $986,298 in 2010 to $1,192,044 in 2020 for other physicians. Grant cost per surgeon PI went from $859,720 in 2010 to $846,224 in 2020. Both nonsurgeon and PhD categories decreased in total number of PIs from 2010 to 2020, and surgeons increased from 715 to 1,031 surgeons. Surgeons held 1.9% of the total funding in 2010 and 2.3% in 2020. Other physicians held 36.9% of the funding in 2010 and 33.2% of the funding in 2020. The percentage of funded surgeons increased significantly from 2010 (0.5%) to 2020 (0.7%) ($p < 0.05$), and the percentage of funded other physicians decreased significantly from 2.5% in 2010 to 1.6% in 2020 ($p < 0.05$) (Table 2).

DISCUSSION

Remarkably, during the last decade, the population of surgeons holding NIH funding increased by 316 surgeons, from 715 in 2010 to 1,031 in 2020. Of the funded surgeons, 387 surgeons have remained funded from 2010 until 2020. In addition, a significant increase in percentage of funded surgeons compared with the total number of surgeons was seen, from 0.5% in 2010 to 0.7% in 2020 ($p < 0.05$). However, cost per surgeon has remained essentially flat. Conversely, PhDs and other physician categories saw a decrease in the total number of investigators and yet an increase in total costs allotted to each group, as well as an increase in cost per PI. All surgeons sustained R grant funding at both time points (58% in 2020 and 60% in 2010), and specifically maintained basic science focused R01 and R21 grants (73% in 2020 and 78% in 2010).

Similar to our findings, outcomes reported by Hu and colleagues[6] showed that grants focused on core surgical disciplines observed a nominal decrease (83% to 78%) in basic science research, a slight increase in outcomes research (3% to 9%), and a concomitant decrease of $40,000 per grant from 2003 to 2013. In addition, Narahari and colleagues[2] have suggested that clinical research might be more appealing to surgeons, as it typically requires less resources and less time, given surgeon's clinical demands, than basic science research.Although our data, in part, support these statements, as a significant increase in clinical outcomes and clinical trials research was observed among all surgeons, we also note the proportion of basic science research has remained largely unchanged from 2010 to 2020 and, in fact, increased in total numbers during the decade. However, the increase in less costly clinical research might account for the fact that cost per PI remained essentially the same from 2010 to 2020, and the cost per PI of other groups in our analysis have increased during the same period.

Mansukhani and colleagues[12] also argue that change is happening among surgeon-scientists, who are exploring other types of research besides basic research, such as surgical education, health services and outcomes research, and more. Our data might support this statement, as a substantial increase in the proportion of all other grants compared with K and R grants was observed. We also found an increase in the number of unique activity codes among surgeons from 2010 (51 activity codes) to 2020 (54 activity codes), with an overlap of 38 activity codes across the 2 time points. Most of the new activity codes in 2020 (11 of the 16) were U grants. Hu and colleagues[6] also found a 23% increase in U grants from 2003 to 2013. Our data suggest that as surgeon-scientists have maintained their research focus on R grants and basic research, they have also expanded toward multidisciplinary team research (U grants).

A recent study from Hosfield and colleagues[13] found surgeons take more than 1 year longer than internal medicine physicians to obtain a K08 grant (3.7 years vs 2.6 years, respectively). Yet a significant increase was observed in the absolute number and proportion of K grants from 2010 to 2020 for all surgeons. Our study documenting an increase in mentored grants suggests that the pipeline of surgeon-scientists is continuing to grow despite what current literature indicates.

In comparing our findings to the current literature that reports decreasing funding to surgical departments, the following distinctions are important to note.[2,5,6] Generally, other studies have used NIH RePORTER[14] and Blue Ridge Institute for Medical Research[15] to determine funding to surgeons.[2,5,6,13] These databases are organized by department only, and include grants held by both MDs and PhDs. In addition, only surgery departments are included in analyses, leaving out many of the other surgical subspecialties included in our study.[2,5,6] By querying biographical sketches within iSearch Grants, we were able to capture all surgeons, regardless of department or affiliations, a search field that does not exist in NIH RePORTER. Other studies also tended to focus on specific grants, such as R01 or K08 grants, or only research project grants, which are filters in NIH RePORTER.[2,13] Our data include all grants held by surgeons, highlighting the versatility and breadth of the modern surgeon-scientist.

In addition, it is important to note that 2010 was a particularly interesting year with which to compare the current state of surgeon-scientist funding. The 2009 American Recovery and Reinvestment Act provided $8 billion to NIH research, most of which was spent within 2 years, providing an influx of funding to all investigators during that time.[16] In addition, 2013 sequestration budget cuts resulted in about 5% less funding in 2013 compared with 2012.[17] It is even more promising that after a significant boost in funding for all investigators, likely reflected in the 2010 funding, followed by NIH budget cuts in 2013, the number and proportion of surgeon-scientists still increased substantially from 2010 to 2020.

CONCLUSIONS

We believe this is the most detailed data available on the current NIH funding status of surgeon-scientists in the US, painting a more promising picture than previous literature might suggest. Our study found a considerable increase in percentage of funded surgeons compared with other physicians, as well as a significant increase in surgeon-mentored grants. These data challenge the notion that surgeon-scientists are more severely threatened than nonsurgeons and highlights their tenacity and fortitude in the face of significant clinical, administrative, and economic pressures. In addition, we have found that basic science has largely remained stable since 2010, again challenging the presumption that surgeons are moving away from basic science, but instead are becoming more versatile in their research interests. Our study reaffirms the longstanding success of surgeon-scientists and their important contribution to both basic science and clinical research. However, to ensure that surgeons remain in a unique position to greatly impact future scientific discoveries, we must continue to develop robust and unified programs that provide education, professional development, mentoring, and funding for the future.

Supplementary Material

Refer to Web version on PubMed Central for supplementary material.

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Figure 1.

Number of surgeons and grant cost distribution across surgical specialties. (A) 2020 surgeon distribution (n = 1,031, total = $872.5 million); (B) 2010 surgeon distribution (n = 715, total = $614.7 million).

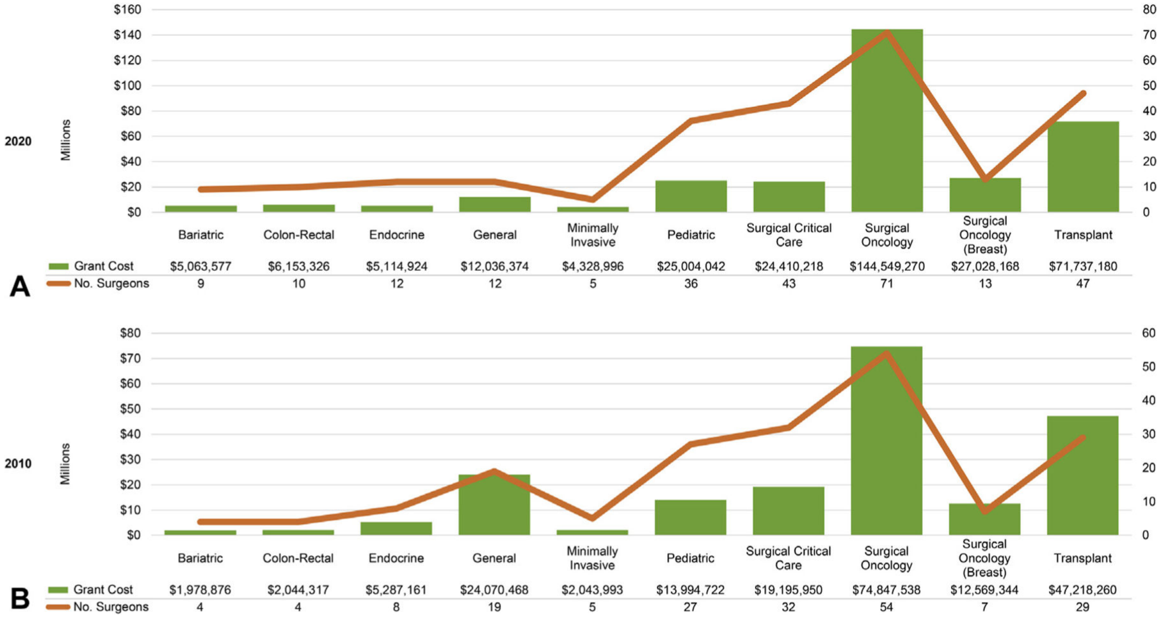

Figure 2.

Number of surgeons and grant cost distribution across general surgery-trained subspecialties. (A) 2020 general surgeon subspecialty distribution (n = 258, total = $325.4 million); (B) 2010 general surgeon subspecialty distribution (n = 189, total = $203.3 million).

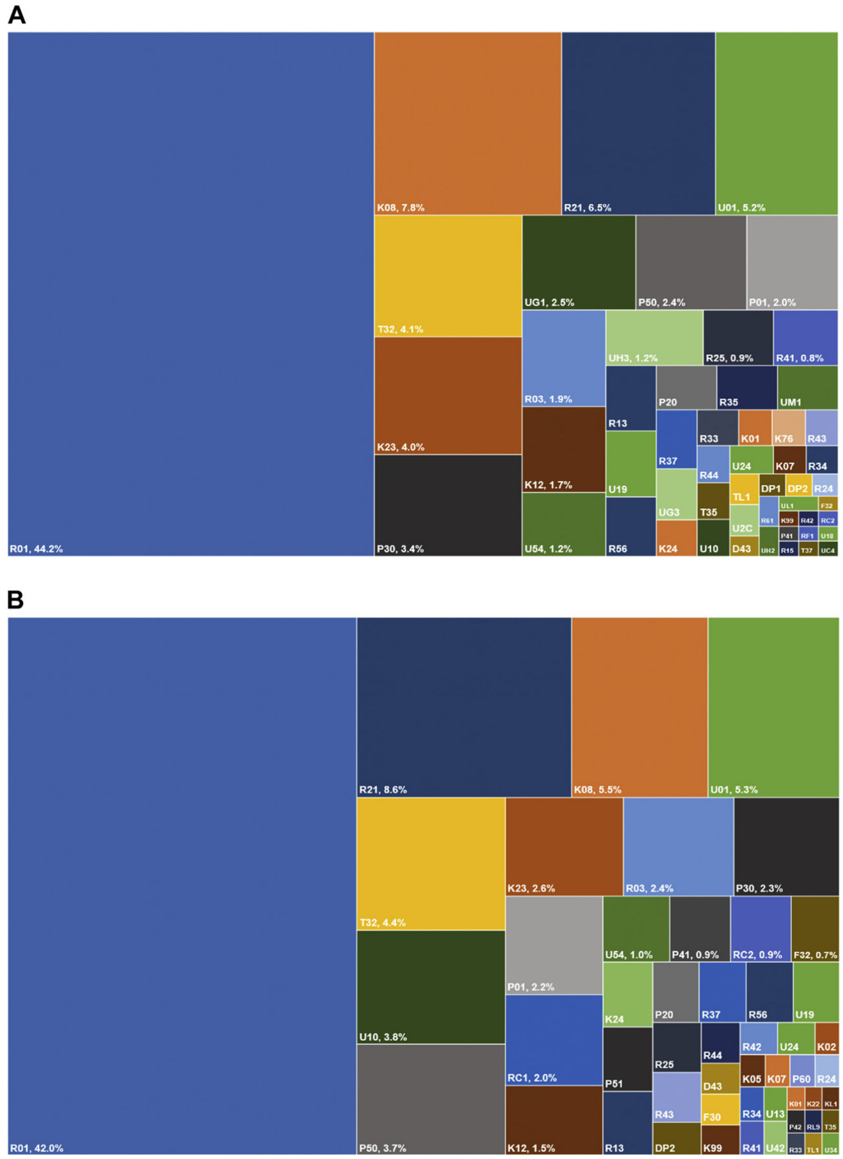

Figure 3.

Activity code mosaic plots. (A) 2020 distribution of 54 grant activity codes (no. of grants = 1,453); (B) 2010 distribution of 51 grant activity codes (no. of grants = 1,113).

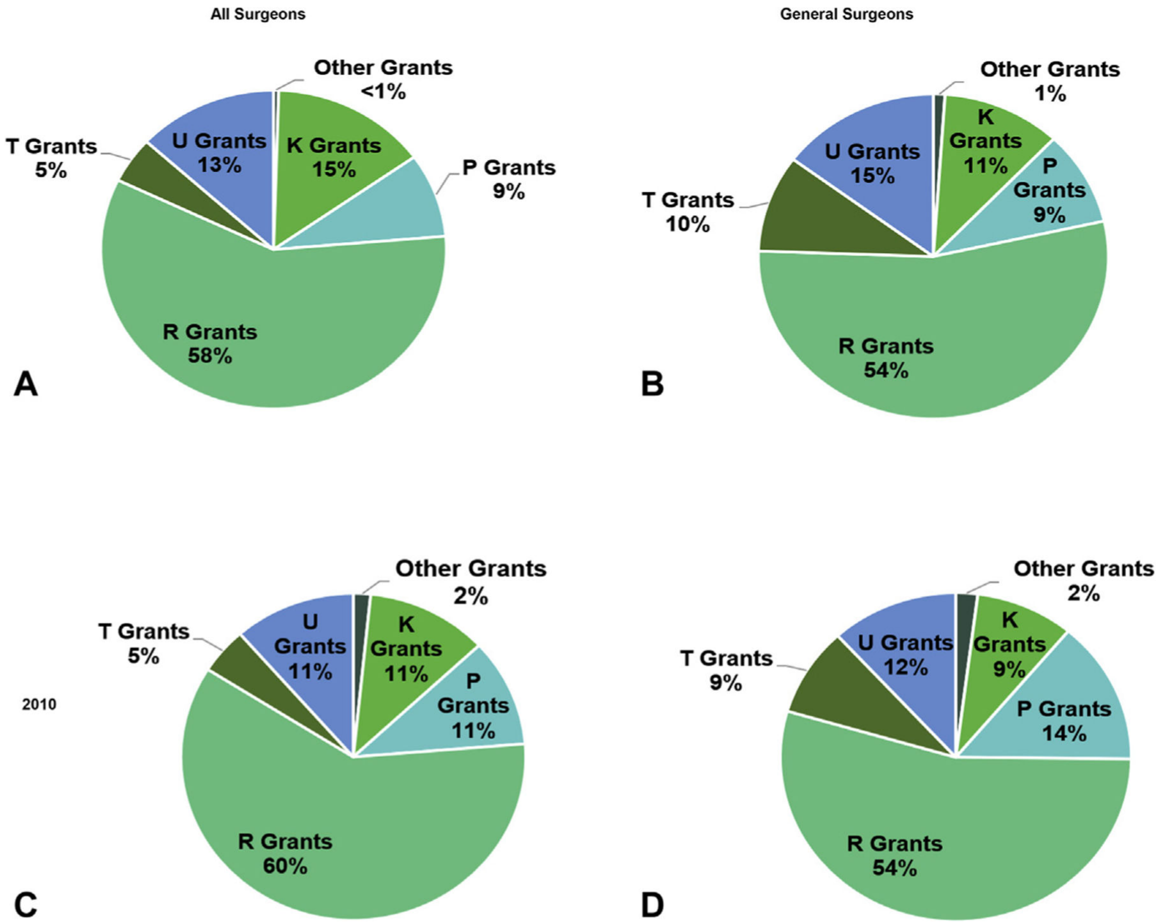

Figure 4.

Distribution of grant categories among all surgeons and general surgery-trained surgeons in 2020 and 2010. (A) 2020 all surgeons and all grants (n = 1,031, no. of grants = 1,453); (B) 2020 general surgery-trained surgeons and all grants (n = 258, no. of grants = 372); (C) 2010 all surgeons and all grants (n = 714, no. of grants = 1,113); (D) 2010 general surgery-trained surgeons and all grants (n = 189, no. of grants = 298). A significant increase in the change in proportion of K grants and a significant decrease in the proportion of R grants compared withall other grants from 2010 to 2020 was observed for all surgeons ($p < 0.05$). Significant changes were not found in the proportions for general surgery-trained surgeons ($p > 0.05$)

Table 1.

The 2010 and 2020 NIH Portfolio Analysis

PI subcategory	2010	2020
PhD		
Cost, $	20,265,889,242	24,981,591,694
No. of PIs	31,883	31,575
Cost per PI, $	635,633	791,183
Other physicians		
Cost, $	12,235,030,139	12,857,385,386
No. of PIs	12,405	10,786
Cost per PI, $	986,298	1,192,044
Surgeons		
Cost, $	614,699,720	872,456,710
No. of PIs	715	1,031
Cost per PI, $	859,720	846,224
Total		
Cost, $	33,115,619,101	38,711,433,790
No. of PIs	45,003	43,392
Cost per PI, $	735,854	892,133

PI, principal investigator.

Table 2.

Active and Funded Physician Data

PI subcategory	AAMC active physicians,* n		Funded physicians, %		p Value
	2008	2018	2010	2020	
Other physicians	560,130	654,291	2.2	1.6	<0.05
Surgeons	142,494	144,735	0.5	0.7	<0.05
Cardiothoracic	4,820	4,411	1.3	1.3	
General	26,769	25,042	0.7	1.0	
Neurologic	4,921	5,531	1.5	2.3	
Obstetrics and gynecology	39,689	41,656	0.3	0.4	
Ophthalmic	17,846	18,817	0.5	0.7	
Orthopaedic	20,032	19,001	0.2	0.3	
Otolaryngology	9,220	9,526	0.6	1.1	
Plastic and reconstructive†	6,671	7,142	0.3	0.4	
Urology	9,916	9,921	0.5	0.7	
Vascular	2,610	3,688	0.8	1.1	
Total	702,624	799,026	1.9	1.5	<0.05

*Based on 2008 and 2018 Association of American Medical Colleges Active Physician Data.

†Includes oral maxillofacial surgeons.

AAMC, Association of American Medical Colleges; PI, principal investigator.