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A 25-year analysis of the American College of Gastroenterology Research Grant Program::

Factors associated with publication and advancement in academics

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Abstract

Introduction—The American College of Gastroenterology (ACG) has awarded research grants for 25 years. We assessed the characteristics of grant recipients, their current academic status, and the likelihood of publication resulting from the grant.

Methods—Demographic data, year and amount of award, title of project, and recipient's institution were extracted from ACG databases. Using ACG reports and medical literature search engines, we assessed publication based on grant-funded research, as well as career publication record. We also determined the current position of awardees. Similar analysis was performed for recipients of junior investigator awards.

Results—A total of 396 clinical research awards totaling \$5,374,497 (\$6,867,937 in 2008 dollars) were awarded to 341 recipients in the 25 years between 1983 and 2008. The most commonly funded areas of research were endoscopy (22% of awards) and motility/functional disorders (21%). At least one peer-reviewed publication based on grant-funded research occurred in 255 of the awards (69%). Higher award value was associated with subsequent publication. Of 341 past awardees, 195 (62%) are currently in academic positions. Factors associated with staying in academics included higher award value ($p < 0.01$), a Master's degree ($p = 0.02$) and publishing grant-funded research ($p < 0.01$). The junior faculty career development award was granted to 27 individuals for a total of \$3,000,000 (3,398,004 in 2008 dollars). Publication resulted from 90% of the funded projects, and 95% of awardees have remained in academics. Overall, the mean cost in grant dollars per published paper based on the research was \$14,875.

Conclusion—The majority of ACG grant recipients published the results of their research and remained in academics. Higher amount of award, holding an advanced degree, and publication were associated with careers in academics. The ACG research grant award program is an important engine of investigation, publications, and academic career development in the field of gastroenterology.

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Keywords

grant; research award; academic careers; gastroenterology; publication

Introduction

The American College of Gastroenterology (ACG) established a funding program for research in gastroenterology (GI) in 1983. The ACG funds individual clinical research awards as well as career development awards for junior faculty. Awards are distributed annually for clinical research in gastrointestinal disease via a competitive process similar to that used by the National Institutes of Health (NIH). Applicants must submit a detailed research grant proposal and awardees are selected on the basis of the quality, feasibility and strength of their research proposals, academic backgrounds, and research environments.

The ACG funds clinical research awards up to a budget of \$35,000, while junior faculty career awards are currently set at \$75,000 per year for 2 years. In 2008, the ACG reported funding 17 clinical research proposals totaling approximately \$363,000 in a variety of subject areas. In addition, career development awards were also distributed to 3 junior faculty members. The stated purpose of these grants is to support “innovative research” that is “patient-oriented” with “direct applicability to clinical care”(1) and to invest “in the careers of those individuals whose work in academic and clinical settings will define the specialty of gastroenterology in the new millennium.”(2) Awardees are required to submit a final report of their research project within 18 months of receipt of funding.

Because it is currently unknown to what extent the provision of these awards meets the stated goals of the program, we sought to assess the yield of the grants with respect to publications, and to determine factors predictive of success. Specifically, we examined factors related to recipients ultimately publishing the results of their funded projects. We also assessed the proportion of past recipients remaining in academic medicine.

Methods

Subjects and variables

We used the ACG databases to identify all the individual project grant recipients and junior investigator awards from 1983 until 2008. This database also contained information about the award amount and the year of the original grant, the title of grant proposal, as well as the academic rank of the recipient, degree, gender, and institution at time of receipt of the grant. Using progress reports from the recipients and by searching PubMed, we then collected and verified data on publication status of the project results, field of study, number of Medline publications since award, current academic appointment, and leadership positions. Current academic appointment included instructor, assistant professor, associate professor, or full professor. Leadership positions were considered to be: division chief; center director, fellowship program director; or other administrative role. Center director was defined by a title of “director” of a center of research or specialty patient care within the awardees current institution. Past dollar amounts were converted to 2008 dollars by assuming a 3% per year inflationary factor.

Search criteria

To determine the current employment position of each of the awardees, an initial search was performed on their last known location of employment using the ACG and American Gastroenterological Association (AGA) 2008 membership directories. If this was

unsuccessful, a search was performed using a public search engine (www.google.com) to identify the website of their current place of employment. If the search engine yielded multiple or conflicting positions, or did not yield data, a phone call was placed to the last known location of employment to track the employment status of the individual. Data assessed included current academic title, leadership positions, fellowship dates, gender, and degrees held.

To assess the number of publications since award, a PubMed search of the MEDLINE-indexed literature (www.pubmed.com) was performed for each awardee, using the last name and the first initial. Gastroenterology-related publications between July of the award year and present were assessed; for recipients of multiple awards, publications from the date of the first award were used in the per-awardee analysis. For investigators with common names, searches were additionally performed with the middle initial (if available), full first name, and keywords (such as gastroenterology). A PubMed search with keywords from the grant title was also performed for each investigator to determine whether or not they had published based on their grant. A publication was deemed relevant if: 1) a paper was published with an identical or similar title as the grant, or 2) the recipient reported a related publication in an interim or end-of-grant report to the ACG. All recipient-reported data were confirmed using PubMed. To allow for time to do the research (research grants are on a 12 month term, with faculty development grants on a 24 month term) as well as delays inherent in the publication process, a minimum of 24 months from the granting of the award to manuscript publication was required for inclusion in the publication metric. Therefore, only awards through 2006 are included in the final analyses.

Rank of the recipient institution in NIH research dollars was tabulated based on published data on institutional grants from the NIH Research Portfolio Online Reporting Tool (<http://report.nih.gov>). To further obtain an objective measure of the significance of the work, we assessed journal impact rank for all publications using the ISI Web of Knowledge (<http://isiknowledge.com>). Current NIH funding status was ascertained with the use of the Computer Retrieval of Information on Scientific Projects database (CRISP) (<http://crisp.cit.nih.gov>).

Statistical analysis

Statistical analysis was performed using Stata version 9 (StataCorp, College Station, TX). Routine descriptive statistics were initially performed. Bivariate analysis was conducted using chi-square (or Fischer's Exact test when appropriate) for comparisons between categorical variables. Comparisons between continuous variables were performed with Student's t-test (means) or Wilcoxon rank-sum test (medians). Analyses of publication metrics were performed on a per award basis, while analyses of academic status were performed on a per-awardee basis for the first award only. To evaluate predictors of publication and remaining in academics, multivariable analysis was performed with logistic regression using all covariates of interest in the models.

Results

Award demographics

A total of 396 clinical research awards totaling \$5,374,497 (\$6,867,937 in 2008 dollars) were awarded in the 25 year time period between 1983 and 2008 to 341 awardees. For the period between 1983 and 2006 to which the analysis was restricted, a total of 368 individual research awards totaling \$4,775,502 (\$6,261,861 adjusted to 2008 dollars) were awarded to 264 individuals (Table 1). The mean award value was \$13,000. Females represented 72 (20%) of awardees, and fellows in training received 125 awards (47%). Forty-eight

investigators received multiple awards. The median NIH rank of the grantee's institution was 39, however this distribution was broad (interquartile range 18–66). The most commonly funded areas of research were endoscopy (22% of awards) motility/functional disorders (21%), and upper GI (including *H. pylori*, gastroesophageal reflux disease, gastric and esophageal cancer, and Barrett's esophagus)(19%). Figure 1 displays the breakdown of awards by category.

Publication of funded research

Publication based on grant-funded research occurred in 255 of the awards (69%; Table 2). The mean time to publication was 2.7 years. The mean impact factor of the journal of publication was 6.7 (range 0.7 – 52.6). In the bivariate analysis, awards that led to publication had a higher mean value than those that did not (\$13,700 vs. \$11,400, $p=0.02$). Pilot awards ($\leq \$10,000$) were less likely to be translated into publications, though this did not reach statistical significance ($p=0.06$). No other factors we assessed (e.g. degree, gender, NIH rank of home institution, or subject area) were significantly associated with publication (Table 3). In the multivariate analysis, higher award value was again associated with subsequent publication (OR 1.04, CI 1.01–1.08), and motility/functional topic was weakly associated with non-publication (OR 0.42, CI 0.18 – 0.99) (Table 5). Overall, the mean cost in grant dollars per published paper based on the research was \$14,875.

Academic success of awardees

One hundred ninety-five of the awardees (62%) are currently in academic positions, including 61 full professors, 51 associate professors, and 46 assistant professors (Table 2). One former awardee is dean of a medical school, 20 are now GI division chiefs, 31 are center directors, and 2 are fellowship directors. The mean career publications and mean publications per year since award were 32.4 and 3.1 respectively. In the bivariate analysis (Table 4), factors associated with staying in academics included higher award value (\$13,300 vs. \$10,030, $p<0.01$), having a Master's degree ($p=0.02$), not being a fellow at the time of award ($p<0.01$), publishing their grant-funded research ($p<0.01$), and receipt of multiple awards ($p<0.01$). Awards for an inflammatory bowel disease (IBD) topic were more common in the academic group compared to the non-academic group (15% vs. 7%, $p=0.05$), whereas awards in an upper GI topic were less common (15% vs. 27%, $p=0.01$). Compared to those who did not, those who stayed in academics had higher mean numbers of publications (44.7 vs. 12.6, $p<0.01$) and publications per year since award (4.3 vs. 1.1, $p<0.01$). In the multivariate analysis, receipt of multiple awards was associated with staying in academics (OR 6.14, CI 1.69 – 22.26), while fellow status at time of award was negatively associated with remaining in academics (OR 0.15, CI 0.06 – 0.36) (Table 5).

Junior investigator awards

The ACG also distributed 27 Junior Investigator Awards between 1997 and 2008 to 27 different recipients (see Table 6), totaling \$3,000,000 (\$3,398,004 in 2008 dollars). Of the awards between 1997 and 2006, women represented 11/21 (52.4%) of awardees. The mean NIH rank of the institution of recipient was 31.8, but the data were again widely dispersed (range 2–182). The most common area of research funded was hepatology/liver transplantation (33%), followed by motility/functional GI disorders (23%) (Figure 2). Publication resulted from 19/21 (90%) of the funded investigations, and 13/21 (70%) presented their research at the National ACG meeting. Full publication occurred in journals with a mean impact factor of 7.1. All but one awardee (20/21, 95%) have remained in academics, including 2 full professors, 4 associate professors, and 10 assistant professors. One former recipient is now a division chief, and 6 are center directors. One third of recipients currently serve as principal investigators on grants funded by the NIH (7/21).

Discussion

The goal of the grant funding program established by the American College of Gastroenterology is to foster, stimulate, and facilitate important research projects. Equally important is the subsequent publication of the findings of the funded research projects in peer-reviewed journals so as to disseminate the results of the awardees' efforts to the larger community of gastroenterologists and the medical profession as a whole. Another goal of research grant programs (especially in the case of the career development junior faculty awards) is to help support trainees and young investigators in establishing careers in academic medicine, and thereby to encourage academic careers.

Women comprised 20% of research awardees and 52% of Junior Faculty awardees, despite the fact that only 16% of gastroenterology fellowship positions are occupied by women in the US(3). Interestingly, in the bivariate analysis, a larger proportion of female recipients than male recipients were currently in academic careers (74% vs. 61%), but this was not statistically significant ($p=0.06$). Gender was not associated with publication from the grant or selection of academic career in the multivariate analysis.

We found that a majority of clinical research awards translated into publication in journals with a substantial impact factor. The mean impact factor of the publications was 6.7. For reference, the impact factors of *Gastrointestinal Endoscopy*, the *American Journal of Gastroenterology*, and *Gastroenterology* are 5.9, 6.1, and 11.7, respectively. The factor most strongly associated with publication was the amount of the award. One potential explanation for this observation would be that larger awards correspond to larger studies, which had a higher baseline likelihood of publication. Indeed, there was a trend towards non-publication for pilot awards, however this was not statistically significant. Sherer et. al demonstrated that full publication of study results was associated with larger sample size(4). Other authors have shown that statistically significant results correspond to publication in high impact journals, and that studies with positive results were more likely to be published, specifically in the field of gastroenterology(5,6). We did not gather data on oral or poster presentations or abstracts generated from funded research (for individual research awards), which were likely generated at a higher rate than peer-reviewed publications. While these abstracts are important, we concentrated on publication in peer-reviewed journals, as this harder-to-achieve outcome is more likely to impact clinical care.

Several aspects of our methodology deserve further consideration. We chose not to use a survey of recipients, so as to avoid responder bias, and instead to evaluate publication status as objectively as possible with electronic databases. Past studies demonstrate the limitations of surveys in this setting, with similar studies using surveys reporting response rates ranging from 66% to 70%(7,8). We analyzed 100% of recipients. It is possible that our literature search and publication assignment criteria were flawed, leading to some inaccuracies in the number of publications for some researchers. Because our methodology might skew our results to over-estimation of publications for common surnames (9), we utilized a thorough search strategy for these cases, with first and middle initials and keywords, and when necessary, hand review of articles. The observation that those who did not stay in academics had very low numbers of (or no) publications would be expected, and suggests the validity of our methods. Our classification of papers as having originated from the grants was, in some cases, largely circumstantial – the publication was on the same topic with a similar title, using similar methods and was temporally related to the grant. While it is likely that this methodology yielded some misclassification of papers, an in-depth tracing of funding source for each of the over 6,000 papers published by the 313 awardees was not feasible (and unlikely to be successful, given that many publications in gastroenterology do not report a funding source(10)).

We found that 62% of those who received research awards went on to academic careers, which is much higher than the national average for recent graduating fellows(11). A significant proportion of past awardees have now achieved leadership positions within academic institutions including a number of GI division chiefs and one dean of a School of Medicine. We did not find predictive variables apart from award amount in our multivariate analysis for an academic appointment. Most of the junior faculty development awardees remain in academics, as might be expected given that the competitive nature of the award demands significant academic achievement prior to receiving it, and that recipients had ostensibly made their career choices prior to applying for and receiving their grant support from the ACG. Nevertheless, the publication and presentation rates were high amongst this group.

Little is known about the factors influencing career choice in the field of gastroenterology. Oxentenko et. al conducted an analysis of the first job choices of graduating fellows from the Mayo fellowship program. Though they did not use a logistic regression model, very few of their demographic and fellowship criteria were significantly associated with selection of an academic career apart from race, with Asians (including South Asians) and Caucasians more likely to pursue academic careers(12). We did not assess the effect of race in our study. Overall, it might be the receipt of the award itself which was the strongest predictor in our cohort for remaining in academics. To what degree the receipt of such award influenced the ultimate career choice, as opposed to serving as a marker for already academically-inclined trainees and junior faculty cannot be determined from the present data and will await further study.

While there are no previously published studies of society grant funding in the field of gastroenterology, similar studies have been published for other specialties. Miller et. al conducted a survey of recipients of Canadian Anesthesiologists' Society research awards for the period of 1985–2005, and reported that the mean number of original publications per recipient post-award was 30.1 (range 0–115)(7). Amongst respondents, 91% were in tenure track faculty positions, and 35% of the awardees were full professors. In addition, the authors found that 83% of recipients served as mentors during their careers, and the mean number of graduate students mentored was 18 (range 1–185). Young et. al conducted a similar study of recipients of Society for Academic Emergency Medicine Research Grant Awards. Amongst the 19 respondents, 100% remained in academic medicine with a median 1.8 original publications per year since the end of their grant period. In addition, 74% of respondents went on to receive federal funding in their subsequent careers(8). Therefore, our results show that ACG grant recipients have similar rates of pursuing academic careers compared to other specialties.

In conclusion, society research grants such as those offered by the American College of Gastroenterology provide a significant engine of original research and publication. All subject areas within gastroenterology were substantially represented in the awards process. A high proportion of awardees published the results of their funded research and entered academics. The factors associated with publication and future academic career of the recipient include the size of grant, which may be a proxy for size and significance of study.

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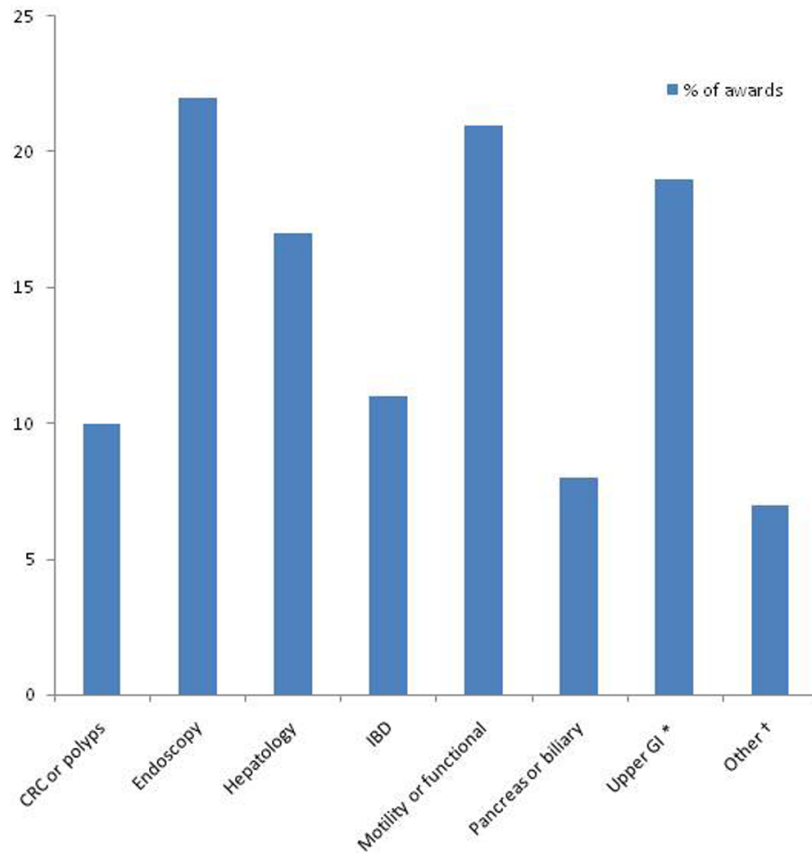


Figure 1. Breakdown of individual research awards by category

Note: some awards were classified in multiple categories

IBD: Inflammatory Bowel Disease, CRC: Colorectal cancer.

*Upper GI includes Gastroesophageal reflux disease, Barrett's esophagus, gastric and esophageal cancer, and H.pylori.

†Other includes celiac disease, health services research, and basic science topic not fitting other categories.

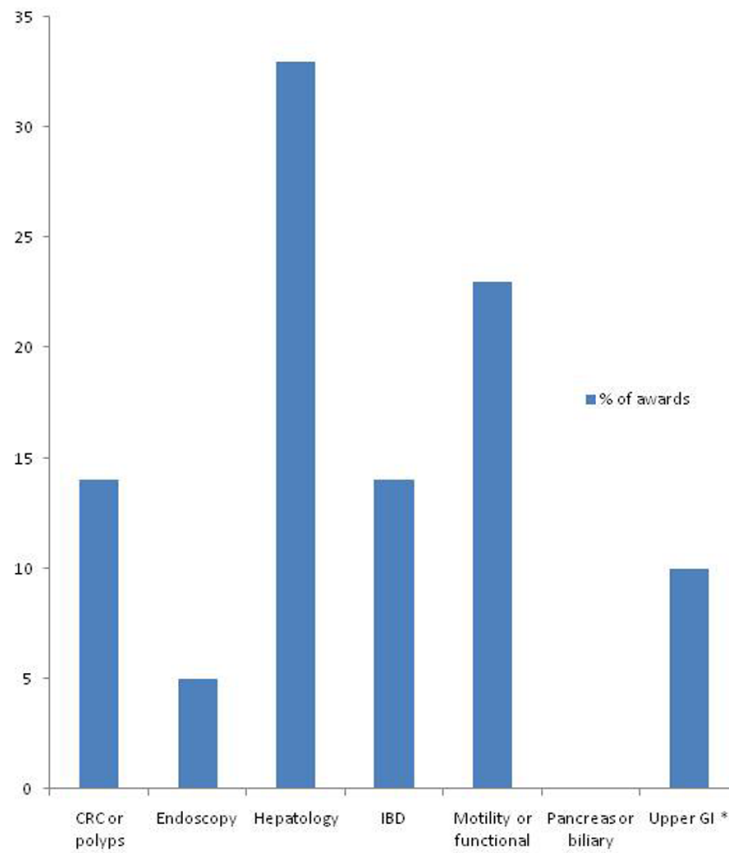


Figure 2. Breakdown of Junior Faculty Awards by Category

Note: some awards were classified in multiple categories

IBD: Inflammatory Bowel Disease, CRC: Colorectal cancer

*Upper GI includes Gastroesophageal reflux disease, Barrett's esophagus, gastric and esophageal cancer, and H.pylori

Table 1

Characteristics of Research Awards and awardees at the time of grant receipt, 1983–2006

| Characteristic | Number or percent |
|--------------------------------------------------------------------------------------------|-----------------------------------|
| Total awards, 1983–2006 (n) | 368 |
| Number of pilot grants awarded (\leq \$10,000) | 133 |
| Total individual awardees (n) | 313 |
| Multiple awardees (n)* | 48 |
| Mean award value (\pm SD, range) | 13,000 \pm 8,500 (1,000–35,000) |
| Total dollars awarded (original \$; 2008 \$) | 4,775,502 (6,261,861) |
| Educational degree of awardees (n, %) [†] | |
| MD | 306 (98) |
| Masters [‡] | 26 (8) |
| PhD | 7 (2) |
| Fellow in training at time of award (n, %) [†] | |
| Yes | 125 (47) |
| No | 140 (53) |
| unknown | 48 |
| Gender (n, %) | |
| Male | 296 (80) |
| Female | 72 (20) |
| unknown (n) | 8 |
| Mean NIH rank of institution (\pm SD, range) | 60.0 \pm 87.7 (1–707) |
| Median NIH rank of institution (IQR) | 39 (18–66) |
| Research subject area [#] | |
| Hepatology/liver transplantation | 64 (17) |
| Motility/functional GI disorders | 78 (21) |
| Endoscopy | 79 (22) |
| Inflammatory bowel disease | 40 (11) |
| Upper GI (GERD, Barrett's, esophageal or gastric cancer, <i>H. pylori</i> , ulcer disease) | 71 (19) |
| Colorectal cancer/polyps | 35 (10) |
| Pancreaticobiliary | 30 (8) |
| Other** | 27 (7) |

* 1 person with 5 awards, 4 with 3, and 43 with 2.

[†] Data presented on a per awardee basis; 29 grant recipients have multiple degrees.

[‡] Includes MPH, MSci, MMSc, MSHS, MS, MHS, MSPH, and MBA.

[#] Grant topics could have multiple subject areas.

** Examples of other topics include celiac disease, gender disparities and health services research, and pure basic science not relatable to one of the listed research subject areas.

Table 2

Outcomes and characteristics of research awardees

| Characteristic | Number or percent |
|-----------------------------------------------------------|--------------------------|
| Publication resulting from the grant (n, %) | 255 (69) |
| Mean time to publication (years \pm SD, range) | 2.7 \pm 2.1 (<1 – 11) |
| Mean impact factor of journal (\pm SD, range) | 6.7 \pm 5.1 (0.7–52.6) |
| Mean career publications to date (\pm SD, range)* | 32.4 \pm 45.4 (0–537) |
| Median career publications to date (IQR)* | 18 (4–46) |
| Mean publications per year (\pm SD, range)* | 3.1 \pm 3.6 (0–30) |
| Median publications per year (\pm SD, range)* | 1.9 (1–4) |
| Current position (n, %) [†] | |
| Academic | 195 (62) |
| Non-academic | 112 (36) |
| unknown | 6 |
| Current academic rank (n, %) [†] | |
| Instructor | 4 (2) |
| Assistant professor | 46 (28) |
| Associate professor | 51 (32) |
| Professor | 61 (38) |
| unknown | 33 |
| Academic leadership position obtained (n, %) [‡] | |
| Division chief | 20 (33) |
| Center director | 31 (51) |
| Fellowship director | 2 (3) |
| Other [‡] | 8 (13) |
| unknown | 134 |

* Publications per awardee as listed on MEDLINE/PubMed (first award only counted for multiple award recipients).

[†] Data presented on a per awardee basis.

[‡] Examples of other leadership positions include: dean of school of medicine, vice chair of medicine, associate chief of division, lab director

Table 3

Bivariate analysis of characteristics associated with publications*

| Characteristic | Publication (n = 255) | No publication (n = 113) | p [†] |
|--------------------------------------------|--------------------------|-----------------------------|----------------|
| Mean award value (\$ ± SD) | 13,700 ± 8,600 | 11,400 ± 8,000 | 0.02 |
| Pilot award (≤ \$10,000) | 84 (33) | 49 (43) | 0.06 |
| Educational degree of awardees (n, %) | | | |
| MD | 251 (98) | 110 (97) | 0.48 |
| Masters | 26 (10) | 7 (6) | 0.22 |
| PhD | 7 (3) | 4 (4) | 0.74 |
| Fellow in training at time of grant (n, %) | 88 (39) | 45 (50) | 0.09 |
| Gender (n, %) | | | |
| Male | 205 (80) | 91 (81) | 0.98 |
| Female | 50 (20) | 22 (19) | |
| Mean NIH rank of institution (± SD) | 62.8 ± 92.8 | 53.2 ± 73.4 | 0.36 |
| Median NIH rank of institution (± IQR) | 39 (18–67) | 38 (18–65) | 0.68 |
| Research subject area | | | |
| Hepatology/liver transplantation | 41 (16) | 23 (21) | 0.30 |
| Motility/functional GI disorders | 50 (20) | 28 (25) | 0.25 |
| Endoscopy | 58 (23) | 21 (19) | 0.39 |
| Inflammatory bowel disease | 26 (10) | 14 (13) | 0.51 |
| Upper GI [‡] | 49 (19) | 22 (20) | 0.92 |
| Colorectal cancer/polyps | 24 (9) | 11 (10) | 0.90 |
| Pancreaticobiliary | 22 (9) | 8 (7) | 0.63 |
| Other | 21 (8) | 6 (5) | 0.33 |

* Data presented on a per award basis.

† p value calculated with chi-square (or Fischer's Exact test) for categorical variables and by t-test for continuous variables. For median values, Wilcoxon Rank-sum test was used.

‡ Upper GI includes: GERD, Barrett's, esophageal or gastric cancer, *H. pylori*, and peptic ulcer disease.

Table 4

Bivariate analysis of characteristics associated with remaining in academics*

| Characteristic | Academic (n = 195) | Non-academic (n = 112) | p [†] |
|---------------------------------------------|-----------------------|---------------------------|----------------|
| Mean award value (\$ ± SD) | 13,300 ± 8,750 | 10,030 ± 5,950 | < 0.01 |
| Pilot award (≤ \$10,000) | 69 (35) | 52 (46) | 0.06 |
| Educational degree of awardees (n, %) | | | |
| MD | 191 (98) | 109 (97) | 0.55 |
| Masters | 22 (11) | 4 (4) | 0.02 |
| PhD | 6 (3) | 1 (1) | 0.22 |
| Fellow in training at time of grant (n, %) | 56 (33) | 68 (71) | < 0.01 |
| Gender (n, %) | | | |
| Male | 152 (78) | 97 (87) | 0.06 |
| Female | 43 (22) | 15 (13) | |
| Mean NIH rank of institution (± SD) | 64.5 ± 93.4 | 53.9 ± 88.6 | 0.35 |
| Median NIH rank of institution (± IQR) | 39 (18–69) | 37 (15–59) | 0.24 |
| Research subject area (n, %) | | | |
| Hepatology/liver transplantation | 36 (18) | 17 (15) | 0.48 |
| Motility/functional GI disorders | 38 (19) | 25 (23) | 0.53 |
| Endoscopy | 47 (24) | 18 (16) | 0.11 |
| Inflammatory bowel disease | 29 (15) | 8 (7) | 0.05 |
| Upper GI [‡] | 30 (15) | 30 (27) | 0.01 |
| Colorectal cancer/polyps | 17 (9) | 11 (10) | 0.73 |
| Pancreaticobiliary | 17 (9) | 10 (9) | 0.93 |
| Other | 15 (8) | 6 (5) | 0.45 |
| Publication resulting from the grant (n, %) | 150 (77) | 60 (54) | < 0.01 |
| Mean time to publication (± SD, range) | 2.6 ± 2.0 | 3.1 ± 2.0 | 0.11 |
| Mean impact factor of journal (± SD, range) | 6.9 ± 5.9 | 6.5 ± 3.8 | 0.67 |
| Mean career publications to date (± SD) | 44.7 ± 50.7 | 12.6 ± 24.4 | < 0.01 |
| Median career publications to date (IQR) | 33 (13–61) | 5 (2–12) | < 0.01 |
| Mean publications per year (± SD) | 4.3 ± 3.8 | 1.1 ± 1.9 | < 0.01 |
| Median publications per year (± SD) | 4 (2–6) | 0 (0–1) | < 0.01 |
| Multiple awards given (n, %) | 43 (22) | 5 (4) | < 0.01 |

* Data presented on a per awardee basis for first award only.

[†] p value calculated with chi-square (or Fischer's Exact test) for categorical variables and by t-test for continuous variables. For median values, Wilcoxon Rank-sum test was used.

[‡] Upper GI includes: GERD, Barrett's, esophageal or gastric cancer, *H. pylori*, and peptic ulcer disease.

Table 5

Multivariate analysis of predictors of academic careers and publications*

| Predictors | OR (95% CI) |
|--------------------------------------------------|--------------------|
| For remaining in an academic career [†] | |
| Amount of grant [‡] | 1.06 (1.00, 1.12) |
| Masters degree | 1.16 (0.33, 4.10) |
| Female | 0.83 (0.33, 2.11) |
| NIH rank [#] | 1.02 (0.98, 1.06) |
| Hepatology topic | 1.65 (0.37, 7.38) |
| Motility topic | 1.16 (0.27, 5.10) |
| Endoscopy topic | 2.25 (0.70, 7.23) |
| IBD topic | 2.32 (0.47, 11.54) |
| Upper GI topic | 0.76 (0.19, 3.01) |
| Colorectal cancer topic | 1.18 (0.19, 7.22) |
| Pancreaticobiliary topic | 1.43 (0.27, 7.56) |
| Other topic | 1.24 (0.20, 7.69) |
| Time to publication** | 0.88 (0.74, 1.06) |
| Impact factor of journal ^{††} | 1.03 (0.95, 1.12) |
| Year of award** | 1.03 (0.95, 1.12) |
| Receiving multiple awards | 6.14 (1.69, 22.26) |
| For publishing from a grant ^{‡‡} | |
| Amount of grant [‡] | 1.04 (1.01, 1.08) |
| Masters degree | 1.39 (0.56, 3.44) |
| Female | 0.89 (0.47, 1.68) |
| NIH rank [#] | 1.01 (0.98, 1.05) |
| Hepatology topic | 0.48 (0.19, 1.23) |
| Motility/functional topic | 0.42 (0.18, 0.99) |
| Endoscopy topic | 0.89 (0.42, 1.86) |
| IBD topic | 0.61 (0.23, 1.60) |
| Upper GI topic | 0.59 (0.25, 1.41) |
| Colorectal cancer topic | 0.71 (0.25, 2.02) |
| Pancreaticobiliary topic | 0.85 (0.31, 2.35) |
| Other topic | 0.82 (0.22, 2.98) |
| Year of award** | 0.99 (0.93, 1.04) |

* For remaining in an academic career, the publication variable was dropped due to co-linearity.

[†] Analysis done on a per awardee basis for first award only.

[‡] OR is per \$1,000 dollar increments.

[#] OR is per 10 rank increments.

** OR is per one year increments.

^{††} OR is per one unit of impact factor increments.

^{‡‡} Analysis done on a per award basis.

Table 6

Characteristics of Junior Faculty Development Awards at the time of grant receipt and outcomes of awardees, 1997–2006

| Characteristic | Number or percent |
|--------------------------------------------------------------------------------------------|-----------------------------------|
| Total awards, 1997–2006 (n) | 21 |
| Total awardees (n) | 21 |
| Multiple awardees (n) | 0 |
| Mean award value (\$ ± SD, range)* | 100,000 ± 27,900 (60,000–150,000) |
| Total dollars awarded (original \$; 2008 \$) | 3,000,000 (3,398,004) |
| Educational degree of awardees (n, %) | |
| MD | 21 (100) |
| Masters [†] | 6 (29) |
| PhD | 0 (0) |
| Fellow in training at time of award (n, %) | |
| Yes | 0 (0) |
| No | 21 (0) |
| Gender (n, %) | |
| Male | 10 (48) |
| Female | 11 (52) |
| Mean NIH rank of institution (± SD, range) | 31.8 ± 39.6 (2–182) |
| Median NIH rank of institution (IQR) | 18 (7–39) |
| Research subject area | |
| Hepatology/liver transplantation | 7 (33) |
| Motility/functional GI disorders | 5 (23) |
| Endoscopy | 1 (5) |
| Inflammatory bowel disease | 3 (14) |
| Upper GI (GERD, Barrett's, esophageal or gastric cancer, <i>H. pylori</i> , ulcer disease) | 2 (10) |
| Colorectal cancer/polyps | 3 (14) |
| Pancreaticobiliary | 0 (0) |
| Other | 0 (0) |
| Publication resulting from the grant (n, %) | 19 (90) |
| Mean time to publication (years ± SD, range) | 2.5 ± 1.5 (0–6) |
| Mean impact factor of journal (± SD, range) | 7.1 ± 5.6 (1.3–25.6) |
| Mean career publications to date (± SD, range) [‡] | 33.2 ± 34.8 (2–122) |
| Median career publications to date (IQR) [‡] | 17 (11–50) |
| Mean publications per year (± SD, range) [‡] | 4.5 ± 3.1 (1–12) |
| Median publications per year (± SD, range) [‡] | 4 (2–5) |
| Current position (n, %) | |
| Academic | 20 (95) |
| Non-academic | 1 (5) |
| Current academic rank (n, %) | |

| Characteristic | Number or percent |
|-----------------------------------------------------|-------------------|
| Instructor | 2 (11) |
| Assistant professor | 10 (56) |
| Associate professor | 4 (22) |
| Professor | 2 (11) |
| unknown (n) | 2 |
| Academic leadership position obtained (n, %) | |
| Division chief | 1 (11) |
| Center director | 6 (67) |
| Fellowship director | -- |
| Other | 2 (22) |
| Obtained subsequent NIH funding (n, %) [#] | 7 (33) |

* Award values are the total amount for the two-year period of the award.

[†] Includes 5 with MPH and 1 with MSc.

[‡] Publications per awardee as listed on MEDLINE/PubMed.

[#] Includes: one each with a K07, K08, K23, K24, and R03; one with a K24, U01, and R01; and one with a K24 and R01.