# Career Outcomes of the Graduates of the American Board of Internal Medicine Research Pathway, 1995–2007

Robert F. Todd III, MD, PhD, Robert A. Salata, MD, Mary E. Klotman, MD, Myron L. Weisfeldt, MD, Joel T. Katz, MD, Sherry X. Xian, PhD, Darren P. Hearn, MEng, and Rebecca S. Lipner, PhD

## Abstract

### Purpose

In 1995, the American Board of Internal Medicine (ABIM) formalized an integrated residency curriculum including both clinical and research training (the Research Pathway), designed to develop careers of physician–scientists. Individuals who completed Pathway training between 1995 and 2007 were surveyed to determine the extent to which graduates established research-oriented careers.

### Method

In 2012, the authors used a Web-based, 56-question, multiple-choice electronic survey of 813 participants in Research Pathway programs who completed their residency training between the years of 1995 and 2007. Survey questions addressed source and type of funding, research productivity, and job title/content. Descriptive and inferential analyses were performed.

### Results

Forty-seven percent of solicited Pathway graduates participated in the survey. Ninety-seven percent of the respondents completed Pathway training. Ninety-one percent reported some research effort, with a group average of 58.6% of total professional effort spent in research. Seventy-two percent currently hold positions in academic medicine; 8.6% in the biomedical industry; and 2.1% in government medical service. Over 85% reported extramural research funding, with 81.4% receiving research support from federal sources. Among the variables positively correlated with the highest level of research engagement were previous graduate-level research training, any first-author publications arising from the Pathway research experience, and the receipt of extramural career development funding supporting the Pathway research.

### Conclusions

On the basis of a very high level of active research engagement reported by 385 ABIM Research Pathway graduates, this special research training track appears to be effectively meeting its goal of training biomedical scientists.

To foster the careers of physician internists in biomedical research, in 1985 the American Board of Internal Medicine (ABIM) permitted selected residency programs to offer an integrated curriculum in clinical and research training. In 1995, this was formalized as the ABIM Research Pathway. The Pathway was designed for those individuals who have made a serious commitment to a future career in research, which for some may have included prior graduate studies (e.g., the receipt of a PhD as part of a medical scientist training program). The Research Pathway is a modified version of the internal medicine residency curriculum in which participants complete 24 months (as opposed to 36 months in the standard curriculum) of accredited categorical internal medicine training (inclusive of 20 months of direct patient care responsibility). Thereafter, they may complete either 36 months of a research training experience (with at least 80% effort devoted to research), or 12 to 24 months of subspecialty clinical training (the duration depending on the specific requirements of the specialty) to be followed by 36 months of a research training experience. Therefore, the total duration of Pathway training is either 5 years or 6 to 7 years depending on whether subspecialty training is incorporated. On the completion of Pathway training, graduates are eligible to be admitted to the ABIM certification examination. The Pathway is designed to promote the development of future research careers by reducing the time in clinical training from 36 to 24 months and incorporating a requirement of a 36-month, mentored research experience into internal medicine training.[1]

As reported by Lipner and colleagues,[2] a total of 1,009 individuals completed Research Pathway training after 1992 and took the internal medicine certification examination for the first time between 1993 and 2008. Out of 500 residency training programs, 140 (28%) enrolled at least one Pathway trainee, but a small subset of 23 programs at research-oriented academic centers accounted for nearly three-quarters of the Pathway training. Ninety-one percent of residents participating in the Research Pathway fulfilled the required training times, and 90% passed the certification examination on their first attempt (with an overall certification rate of 98%), which was statistically superior to the test results of individuals who received training in the traditional residency curriculum. This, coupled with a superior rating of medical knowledge by program directors, suggested that the medical competency of Pathway graduates was not impaired by the foreshortened general medicine training.

To get a more in-depth assessment of the career outcomes of Research Pathway graduates, the Research Committee

Please see the end of this article for information about the authors.

Correspondence should be addressed to Dr. Todd, Department of Medicine, Baylor College of Medicine, 6620 Main St., 11th Floor, Room 11D.26, Houston, TX 77030; telephone: (713) 798-2450; fax: (713) 798-2451; e-mail: rftodd@bcm.edu.

Acad Med. 2013;88:1747–1753.
First published online September 25, 2013
*doi: 10.1097/ACM.0b013e3182a7f627*

of the Alliance for Academic Internal Medicine (AAIM) and the ABIM conducted a survey of 813 Pathway graduates who participated in the program between the years 1995 and 2007. This time period was chosen because it encompassed approximately 80% of the Pathway graduates (with the end date allowing for an estimated minimum sufficient time to complete all training and the start of an independent career) for whom contact information was more readily available. Questions addressed the extent of research training and experience prior to Pathway training, specific features of the training experience at the institutions where Pathway training was completed, and details of their subsequent employment history and measures of active engagement and productivity in biomedical research. The survey had two major goals: to develop a descriptive assessment of biomedical research career outcomes by Pathway graduates (To what extent did they pursue medical careers with a major focus in research?), and to conduct an exploration of the possible relationship between pre-Pathway and Pathway training variables and the achievement of the highest measures of research engagement in post-Pathway careers (Could characteristics of trainees and Pathway programs which might be predictive of future research engagement be identified?). The latter, if identified, might guide improvements in candidate selection or Pathway training experiences that might better foster biomedical research career development.

## Method

With the assistance of Cornell University Survey Research Institute (SRI) (Ithaca, New York), we developed a 56-question questionnaire to determine the extent to which Research Pathway graduates are actively engaged in biomedical research *after* the completion of Pathway training, the extent to which they had meaningful research experiences *prior* to entering Pathway training, and the specific research training opportunities which existed as *part of* the Pathway experience at the residency training institution. After we received IRB approval to conduct this survey from Baylor College of Medicine, the ABIM made available its database of names and, where available, e-mail addresses of 880 Research Pathway graduates from 1995 through 2007. The database included information for 209 (23.8%) women and 671 (76.2%) men. We e-mailed a presurvey announcement and description of the questionnaire to these individuals on May 15, 2012. For a subset of these individuals, e-mail addresses were either unavailable or no longer current, and up-to-date e-mail addresses were subsequently identified for 813, using relevant professional society directories. Therefore, on June 27, 2012, SRI sent e-mail solicitations to 813 Research Pathway graduates with a link to participate in the online e-mail questionnaire, with follow-up reminder e-mail solicitations sent on June 27, July 2, and July 10, 2012. Survey data collection started on June 20 and was completed on July 16, 2012. To preserve the confidentiality of the respondents, the study file was deidentified before the analysis.

The survey was organized in four sections with multiple-choice questions designed to determine the respondents' current levels of research participation and productivity as part of their total professional effort (25 questions), level of research experience and training in college and medical school (including any formal graduate training) prior to the start of the Research Pathway (7 questions), specific research opportunities encountered as part of the Research Pathway (including unique features of the institutional training experience and respondent research productivity) (20 questions), and demographic information (4 questions). Certain questions allowed open-ended responses to provide additional detail. Unless otherwise indicated, the data are shown as the number of respondents to each question, with the percentage of total responses (which varied across the survey).

To test the hypotheses that certain factors related to the experiences that Pathway graduates had in research *prior to* or *during* Pathway training were correlated with specific indices of research engagement occurring *after* training, statistical analyses (including Spearman correlations among several independent and dependent variables; chi-square test and regression analysis) were conducted on relevant portions of the questionnaire data, using SAS version 9.3 software, as described in Results below.

## Results

### Demographic characteristics of Research Pathway survey respondents

The response outcome included 361 respondents who completed the survey, 24 who partially completed the survey (for 385 responses included in the final data set), 422 who did not begin the survey, 2 who indicated their refusal to participate, and 4 bad e-mail addresses. The overall response rate (complete and partial responders) was 47.4%. The average completion time was 14 minutes. Because not all respondents answered each question, the number of respondents on which calculations were derived is indicated below. Of 350 respondents, 276 (78.9%) reported being male and 74 (21.1%) reported being female. The median year of medical school graduation was 1999, and the median year of completion of Pathway training was 2006. By comparison, the median year of Pathway completion for the 880 individuals in the ABIM database who made up our target population (as defined by the year they sat for the ABIM certifying examination) was 2001–2002, indicating that respondents to our survey were individuals who are earlier in their career development.

### Extent of engagement in biomedical research of graduates of the Research Pathway

A major goal of the survey was to determine the extent to which graduates of the Research Pathway pursued professional careers with significant engagement in biomedical research. On completion of residency and any subspecialty training, 241 (62.9%) respondents reported accepting positions as members of the faculty at academic institutions as their first posttraining employment. Eighty-one (21%) pursued additional postdoctoral research training, 11 (2.9%) reported employment in the pharmaceutical or biotechnology industry, and 5 (1.3%) in nonmilitary government service (e.g., the National Institutes of Health [NIH], Centers for Disease Control and Prevention, etc.). Only 31 (8%) respondents began their careers outside of the research or academic environment, and of those, 27 (7%) were in private practice medicine. When asked to describe their current employment, 275 (71.6%) held academic faculty positions (identical percentages for men and women respondents), 33

(8.6%) were in the pharmaceutical or biotech industries, and 8 (2.1%) were in nonmilitary government medical service. Forty-two (11%) reported careers focused in private practice (39 [10.2%] overall, or 5 [6.8%] women and 31 [11.3%] men respondents) or in other nonmedical, nonresearch careers (3 [0.8%]).

When asked to describe the distribution of their current professional effort, 383 respondents reported an average of 58.6% of time spent pursuing any type of research (42.5%, 14.4%, and 1.6% spent in laboratory, patient-oriented clinical, and other types of research, respectively), 29.3% of effort devoted to medical practice, and approximately 5.0% of effort each focused in teaching and administrative activities. Three hundred fifty-two (91.4%) survey respondents reported having current research effort. Most respondents indicated they performed laboratory research: 258 (73.3%) overall, 47 (68.1%) women and 189 (77.4%) men. A significant proportion were also engaged in clinical research: 134 (38.1%) overall, 27 (39.1%) women and 95 (37.4%) men. Several respondents reported pursuing other areas of research including 21 (6.0%) in health services, 20 (5.7%) in epidemiology, 6 (1.7%) in prevention, and 3 (0.9%) in educational research.

Among the 272 respondents who held academic faculty positions, 161 (59.2%) were assistant professors (32 [61.5%] women and 113 [57.6%] men respondents), whereas 63 (23.2%) were associate professors (14 [26.9%] women and 45 [23.0%] men respondents), 12 (4.4%) were full professors (2 [3.8%] women and 9 [4.6%] men respondents), and 32 (11.8%) were instructors (4 [7.7%] women and 25 [12.8%] men respondents). Forty-five (16.6%) held tenure at their academic institutions. Sixty-eight respondents who did not hold academic positions at the time of the survey reported that they previously held faculty positions (32 [47.1%] as assistant professors, 13 [19.1%] as associate professors, and 18 [26.5%] as instructors, as their terminal ranks; 9 [13.2%] having held tenure).

Of 134 (35.47%) respondents who reported holding a position of leadership at their current employment, (28 [37.8%] women and 95 [34.8%] men respondents), 17 (12.7%) were division/section chiefs, 3 (2.2%) were associate/vice chairs, 4 (3.0%) were department chairs, 7 (5.2%) were vice presidents/presidents, 1 (0.7%) was an associate dean/dean, and 52 (38.8%) were program or laboratory directors.

Three hundred twenty-four (85.3%) of 380 respondents reported having been (at some point their careers) recipients of research awards from extramural sources. Among these individuals, 248 (65.3%), 25 (6.6%), 20 (5.3%), and 16 (4.2%) had been recipients of awards from the NIH, Department of Defense, Department of Veterans Affairs (VA), and other federal agencies, respectively. Two hundred forty-one (63.4%) had secured research support from private foundations and professional societies; 125 (32.9%) from industry, 22 (5.8%) from state funding agencies. Among the 318 respondents who reported current extramural research support (see Table 1), 201 (63.2%) held NIH funding (with a smaller proportion reporting funding from other federal agencies); 147 (46.2%) held awards from private foundations or professional societies, 70 (22.0%) from industry, and 9 (2.8%) from state funding agencies. One hundred five (33%) received some research support from their own institutions. Table 1 also shows the distribution of total extramural support held by 271 relevant respondents, with 157 (57.9%) holding between $100,000 and $499,999 in annual total research awards.

In addition to success in securing extramural research support, other measures of active engagement in research include scholarly productivity, receipt of research-related honors and awards, and invited service to editorial boards, funding agencies, and professional societies. Table 2 shows the distribution of scholarly productivity among the responders. Twenty-three (6.1%) respondents were invited members of the American Society of Clinical Investigation, and one had been elected as a member of the Association of American Physicians. Ninety-six (25.8%) reported having received national awards or honors based on their research contributions. One hundred twenty (32%) were invited members of the editorial boards of a peer-reviewed medical or scientific journal, and 108 (29.0%) were invited members of scientific committees of national foundations or professional societies. One hundred fifty-eight (42.1%) had served as a member of a national federal or foundation review panel or advisory committee. Among these 158 individuals, 61 (38.6%) reported invited service to NIH study sections, 3 (1.9%) to an NIH council, 4 (2.5%) to a VA Merit review study section, and 41 (25.9%) to another federal funding review panel; 116 (73.4%) have served on the funding review panel of a foundation or a professional society.

### Research experiences of Research Pathway graduates prior to the start of Pathway training

Two hundred seventy (72.8%) of 371 respondents completed the requirements of a graduate scientific degree prior to the start of Research Pathway training, with 240 (88.9%) having met the requirements of a doctoral degree (e.g., PhD) and 45 (16.7%) holding master's-level degrees (e.g., MS, MPH, etc.). Outside of the requirements of graduate degree training, 113 (30.3%) respondents reported more than 10

Table 1
**Sources and Magnitude of Research Support of American Board of Internal Medicine Research Pathway Graduates**

| Description of funding | No. (%) of respondents |
|---|---|
| **Funding source*** | |
| National Institutes of Health | 201 (63.2) |
| Department of Defense | 19 (6.0) |
| Veteran's Affairs | 12 (3.8) |
| Other federal agencies | 9 (2.8) |
| State funding agencies | 9 (2.8) |
| Foundations/professional societies | 147 (46.2) |
| Industry | 70 (22.0) |
| Home institution | 105 (33.0) |
| Other sources | 6 (1.9) |
| No current funding, but doing research | 34 (10.7) |
| **Total annual research funding†** | |
| <$50,000 | 26 (9.6) |
| $50,000–$99,999 | 25 (9.2) |
| $100,000–$249,999 | 102 (37.6) |
| $250,000–$499,999 | 55 (20.3) |
| $500,000–$1,000,000 | 37 (13.7) |
| >$1,000,000 | 26 (9.6) |

*Data are for 318 respondents.
†Data are for 271 respondents.

Table 2
**Scholarly Productivity of American Board of Internal Medicine Research Pathway Graduates**

| Number of scholarly products | No. (%) of respondents with peer-reviewed contributions* | No. (%) of respondents with non-peer-reviewed contributions† |
|---|---|---|
| 0 | 18 (4.8) | 51 (15.4) |
| 1–25 | 251 (66.6) | 270 (81.3) |
| 26–50 | 67 (17.8) | 7 (2.1) |
| 51–75 | 27 (7.2) | 3 (0.9) |
| 76–100 | 6 (1.6) | 1 (0.3) |
| >100 | 8 (2.1) | 0 (0.0) |

*Data are for 377 respondents reporting authorship of the indicated number range of publications.
†Data are for 332 respondents reporting authorship of the indicated number range of publications.

months of research training during medical school (91 [24.1%] reported more than 12 months of research experience). Two hundred seventy-seven (75.5%) of 367 respondents participated in a mentored research project during their undergraduate college experience, and 88 (24.0%) conducted research as a volunteer or paid employee for >10 months after completing college and before starting medical school. Three hundred twenty-seven (88.9%) of 368 respondents reported authorship of at least one peer-reviewed publication (248 [74%] as first author) resulting from research experiences that occurred in college, medical, and/or graduate school prior to the start of Pathway training. Of these, 207 (56.3%) authored more than 3 publications, including 35 (9.5%) with 8 to 10 publications and 40 (10.9%) with more than 10 publications.

### Specific features of the Research Pathway training experience

Regarding the general type of the research experience during Pathway training, 301 (82.7%) of 364 respondents reported conducting basic science or translational research, 34 (9.3%) patient-oriented clinical research, and 23 (6.3%) health services, epidemiologic, or prevention research. The factors which most influenced respondents to select a particular area of Pathway research included the particular discipline of subspecialty interest (303 [83.9%] major influence [4–5 on a 5-point scale]), the availability of well-respected scientific mentors (279; 78.6%), and a desire to pursue research in the same area of the previous medical/graduate training (156; 43.6%). The order of factors which most influenced respondents to rank a particular Pathway residency program were the scientific reputation and availability of one or more scientific mentors in a particular area of research (279 [78.4%] major influence), the scientific reputation of the medical school/department of medicine (271; 76.1%), the opportunity to pursue Pathway training as part of a combined residency and subspecialty training experience (266; 75.1%), the opportunity to conduct research with a particular mentor (184; 51.9%), guarantee of a subspecialty fellowship position in a chosen field (141; 39.6%), guarantee of salary and research support during research training (157; 44.4%), special consideration of a junior faculty position on the conclusion of Pathway training (86; 24.6%), opportunity for differential salary support during the Pathway training (60; 17.1%), and opportunity to pursue graduate training during Pathway training (38; 10.9%). Among these opportunities which influenced the preferences of the respondents, Table 3 shows the extent to which they were available at the Pathway residency sites where the respondents ultimately matched.

Table 4 shows the sources of funding support for Pathway trainees as reported by over 360 respondents. Among these sources of support, 141 (38.5%) respondents indicated that they were the recipients of individual grants which were awarded to them from sources external to the department or school. Among these individuals, 130 (35.9%) were awarded NIH K series career development awards, 47 (13.0%) from national professional societies, and 86 (23.8%) from a national foundation (implying support from multiple extramural sources for some respondents).

The vast majority (351; 97.0%) of respondents completed the requirements of the Research Pathway (inclusive of 3 years of research). For 330 (92.7%) respondents, their Pathway research efforts led to at least one publication in a peer-reviewed journal (285 [84.8%] as first author), with 122 (34.3%), 27 (7.6%), and 25 (7.0%) authoring 4–7, 8–10, and >10 publications, respectively. Three hundred twenty-two (91%) made presentations (poster or oral) at national scientific meetings, with 154 (43.5%) making >3 presentations. One hundred forty-three (41.9%) and 100 (30.1%) of respondents were the recipients of local and national research (nonfunding) awards, respectively.

### Correlation between specific variables in pre-Pathway and Pathway training and a high level of engagement in biomedical research after Pathway training

We hypothesized that those Pathway training participants who had significant research experiences prior to the start of Pathway training would be more likely to develop future careers with greater engagement in biomedical research. Similarly, we hypothesized that Pathway

Table 3
**Programmatic Opportunities for American Board of Internal Medicine Research Pathway Graduates at Their Residency Program**

| Opportunity | No. (%) of 367 respondents citing the opportunity |
|---|---|
| Conduct of research with one/more particular mentors | 275 (74.9) |
| Combined residency/ subspecialty Pathway program | 261 (71.1) |
| Guarantee of salary/ research support during research | 184 (50.1) |
| Guarantee of subspecialty fellowship in chosen field | 146 (39.8) |
| Opportunity to pursue MS or PhD degree | 64 (17.4) |
| Special consideration for junior faculty position | 70 (19.1) |
| Special compensation during part/all Pathway training | 52 (14.2) |

Table 4

**Sources of Funding Support for American Board of Internal Medicine Research Pathway Graduates During Pathway Training**

| Source of support | No. (%) of respondents citing sources of support |
|---|---|
| **Funding sources*** | |
| Department of medicine | 131 (35.8) |
| Medical school | 45 (12.3) |
| Training grant to department/school | 216 (59.0) |
| Mentor's research grants | 149 (40.7) |
| Individual external research award | 141 (38.5) |
| **Individual extramural career development award†** | |
| NIH K series | 130 (35.9) |
| Veteran's Affairs | 3 (0.8) |
| Professional society | 47 (13.0) |
| National foundation | 86 (23.8) |
| Other | 48 (13.3) |

*Data are for 366 respondents.
†Data are for 362 respondents.

participants who demonstrated the highest level of research performance and productivity as resident trainees would persist in these qualities in their future careers. To test these hypotheses, we performed a chi-square correlation between the variables shown in Table 5 with the achievement of an aggregate benchmark of future research engagement as defined by *all* of the following: (a) >50% current effort in research; (b) currently holding a faculty position (in an academic medical center or other educational institution) or a position in biotechnology/pharmaceutical industry or a position in nonmilitary government research; (c) ever having been primary investigator on a federal grant; (d) current extramural research support of >$250,000 for Pathway respondents graduating before 2005 (or >$50,000 for those graduating 2006 or later); and (e) authorship of >25 peer-reviewed publications for Pathway respondents graduating before 2005 (or >1 peer-reviewed publication for those graduating in 2006 or later). By Spearman correlation analysis, there was a high degree of correlation among these five indices of high achievement, and the group of "high achievers" constituted a group of 109 individuals (30.3% of the 360 respondents who completed the survey). To avoid a statistical dependence between the variables relating to research productivity prior to or during Pathway training and indice (e), two variables ("Any publications prior to Pathway training" and "Any first author publications from Pathway research") were correlated with the aggregate benchmark of (a+b+c+d), a group of 131 individuals (36.4% of the respondents) (see Table 5).

The only variables related to pre-Pathway research experience that were significantly correlated with achieving the "high level of research engagement" benchmark were the prior receipt of a PhD or other doctoral degree ($P = .0023$) and the prior receipt of a master's degree ($P = .0432$) (see Table 5).

Those variables related to the specific Pathway training experience that were significantly correlated with future research engagement (see Table 5) were any first author publication arising from Pathway research ($P < .0001$), and the receipt of an individual career development award during the Pathway experience ($P < .0001$). Among the variables not reaching statistical significance was the gender of Pathway graduates.

A separate regression analysis of the variables in Table 5 demonstrated a high level of statistical correlation with the prior receipt of a doctoral degree ($P = .0107$) and the receipt of a career development award during Pathway training ($P < .0001$) each as tested with the aggregate benchmark (a+b+c+d+e); and any first author publications arising from the Pathway experience ($P = .0010$), as tested with the aggregate benchmark (a+b+c+d).

## Discussion

Our findings are, to our knowledge, the first comprehensive assessment of the ABIM Research Pathway and specifically address the extent to which the Pathway has met its goal of preparing selected internal medicine trainees for careers in which they are significantly engaged in biomedical research. Over 90% of the respondents reported research activity, which, on average, represented 58.9% of the total professional effort of the entire group. The majority of the respondents (71.6%) reported holding academic faculty positions, whereas only 11% are employed in non-research-oriented careers (with no differences between women and men respondents). Eighty-five percent of the respondents have been the recipients of extramural funding awards, and among the significant proportion of these individuals who are currently funded, nearly 76% report receipt of awards from federal agencies. These data clearly demonstrate a high level of research involvement among the Pathway graduates surveyed and are somewhat higher than those reported by Lipner and colleagues[2] in a survey of a smaller number (166) of Pathway participants who completed their maintenance of certification (a group which may be biased toward those who are more clinically active). An average of 37% professional effort was devoted to research, and 63% reported being in an academic practice environment. The current AAIM-

Table 5

**Variables Related to Prior Research Experience or Pathway Training Opportunities Correlated With Future High Level of Engagement in Biomedical Research for American Board of Internal Medicine Research Pathway Graduates***

| Variable | *P* value |
|---|---|
| Prior PhD or other doctorate degree | .0023 |
| MS, MPH, or other master's degree | .0432 |
| Any publications prior to Pathway training | .7950† |
| Opportunity for combined residency/fellowship | .0778 |
| Special consideration for faculty position | .61444 |
| Receipt of MS or PhD degree during Pathway | .1076 |
| Any first author publications from Pathway research | < .0001† |
| Any national presentations from Pathway research | .2538 |
| Award of individual career development grant | < .001 |
| Gender | .8865 |

*A high level of future research engagement represents the aggregate achievement of five benchmarks as defined in the text (a+b+c+d+e), as achieved by 109 of 360 respondents (30.3%).
†The aggregate benchmark to which these two variables were correlated included four benchmarks (a+b+c+d), excluding benchmark e (career publication record) so as to avoid a statistical dependence of these two variables with the aggregate benchmark to which they were correlated. When tested with this less stringent aggregate benchmark (achieved by 131 of 360 respondents [36.4%]), the same variables achieved statistical significance as with the more stringent benchmark.

ABIM study lacks a comparison with a control group of residents who did not participate in Research Pathway training, but the Pathway participant results of this survey can be roughly compared with the control group of 12,226 physicians who received residency training in programs with a Research Pathway but who did not themselves complete Pathway training. As reported by Lipner and colleagues,[2] these individuals reported 5.3% of professional effort in medical research and 19% employment in an academic practice environment.

A second goal of our study was to determine whether there are factors related to the scientific education of Pathway participants prior to the start of Pathway training that could be correlated with successful research-focused careers. Most (72.8%) respondents completed the requirements of graduate degrees prior to Pathway training, and our hypotheses that prior graduate training (and other significant nongraduate research experience) was correlated with future success in research was confirmed by our statistical analysis. For some Research Pathway programs, completion of PhD training experience is a prerequisite for Pathway selection, but for those programs in which this is not a prerequisite, our findings suggest that prior completion of a PhD or other significant time spent in scientific training should be a major factor in candidate selection.

The Research Pathway training experience is not the same at all departments of medicine where this training program is offered, and our survey sought information about specific features of the Pathway environment as well as outcomes of the training experience which might be correlated with successful research careers after graduation. Among the variables assessed, first authorship of one or more publications arising from Pathway research and the receipt of an extramural career development award demonstrated a statistically significant positive correlation.

Whereas our study and Lipner and colleagues'[2] prior study were the first to examine the outcome of the ABIM Research Pathway as a specific model of residency research training, other researchers have assessed the broader efforts of both university-based and non-university-based internal residency training to meet the Accreditation Council for Graduate Medical Education (ACGME) and Residency Review Committee for Internal Medicine requirement for scholarly activity (which can include original research) as part of the residency training experience.[3–5] Levine and colleagues[3] in 2004 performed a survey of 391 ACGME-approved categorical internal medicine programs, finding that 47% of the programs offered a research curriculum, 46% provided support for resident scholarship, 42% had a research director, 32% offered protected time for resident research, and 31% had a mandatory research requirement. This study was not designed to determine what proportion of trainees who participated in residency research activities ultimately pursued research careers.

Recognizing that a majority of Research Pathway trainees pursue combined residency/subspecialty fellowship training, Whitcomb and Walter[6] in 2000 published the results of a survey among more than 1,000 subspecialty training program directors over a two-year study period (1996–1998) that examined the research training opportunities within six selected internal medicine fellowship programs (infectious diseases, endocrinology, rheumatology, gastroenterology, cardiology, and nephrology). At the time in which the survey was conducted (soon after the Research Pathway was established), relatively few training programs were organized to provide the requisite time (three years with 80% time protected for research) for research training (including the opportunity to obtain advanced graduate research training). On the basis of our findings, it would appear that these opportunities have expanded to meet the ABIM requirement for over 1,000 Research Pathway graduates who pursued research training at 140 departments of medicine over 15 years.

### Limitations

This study is cross-sectional and observational in design, and it cannot definitively establish causality. Characteristics of the residents choosing to enter the research pathway may contribute to their research career trajectory independent of the pathway itself. The survey response rate was not complete and was weighted toward more recent participants, potentially introducing bias.

### Conclusions

Our findings support the perpetuation and expansion of Research Pathway opportunities among departments of medicine at research-intensive academic health centers, as a means of ensuring the maintenance and growth of a highly skilled biomedical workforce in the United States. During current times of constrained federal resources for biomedical research, those individuals who have been the recipients of intensive research training are the most likely to be competitive for resource opportunities leading to successful, productive careers.

*Acknowledgments:* The authors thank Brett Haranin and Yasamin Miller of the Cornell Survey Research Institute of Ithaca, New York, for their assistance with the development and implementation of the survey tool and for analysis of the data. The authors also thank Ms. Margaret Breida and Bergitta Smith of the Alliance of Academic Internal Medicine, and Ms. Leneva Moore of the Baylor College of Medicine, for their staff support and assistance.

*Funding/Support:* This study was supported by the Alliance for Academic Internal Medicine and the American Board of Internal Medicine.

*Other disclosures:* Drs. Todd, Salata, Klotman, Weisfeldt, and Katz are members of the Research Committee of the Alliance for Academic Internal Medicine. Dr. Lipner is an employee of the American Board of Internal Medicine.

*Ethical approval:* This study was approved by the Baylor College of Medicine's institutional review board.

**Dr. Todd** is chair, Department of Medicine, Baylor College of Medicine, Houston, Texas.

**Dr. Salata** is executive vice chair and chief, Division of Infectious Diseases and HIV Medicine, Department of Medicine, Case Western Reserve University School of Medicine, Cleveland, Ohio.

**Dr. Klotman** is chair, Department of Medicine, Duke University School of Medicine, Durham, North Carolina.

**Dr. Weisfeldt** is chair, Department of Medicine, Johns Hopkins University School of Medicine, Baltimore, Maryland.

**Dr. Katz** is program director, Department of Internal Medicine, Harvard Medical School, Brigham and Women's Hospital, Boston, Massachusetts.

**Dr. Xian** is data analyst and programmer, Cornell Survey Research Institute, Cornell University, Ithaca, New York.

**Mr. Hearn** is operations manager, Cornell Survey Research Institute, Cornell University, Ithaca, New York.

**Dr. Lipner** is senior vice president for evaluation, research and development, American Board of Internal Medicine, Philadelphia, Pennsylvania.

## References

1 American Board of Internal Medicine. Research pathway policies and requirements. http://www.abim.org/certification/policies/research/requirements.aspx. Accessed July 18, 2013.
2 Lipner RS, Lelieveld C, Holmboe ES. Performance of physicians trained through the research pathway in internal medicine. Acad Med. 2012;87:1594–1599.
3 Levine RB, Hebert RS, Wright SM. Resident research and scholarly activity in internal medicine residency training programs. J Gen Intern Med. 2005;20:155–159.
4 Alguire PC, Anderson WA, Albrecht RR, Poland GA. Resident research in internal medicine training programs. Ann Intern Med. 1996;124:321–328.
5 Rivera JA, Levine RB, Wright SM. Brief report: Completing a scholarly project during residency training. J Gen Intern Med. 2005;20:366–369.
6 Whitcomb ME, Walter DL. Research training in six selected internal medicine fellowship programs. Ann Intern Med. 2000;133:800–807.


Teaching and Learning Moments

# The Heart of Listening

"You keep telling us to listen, but *how* do we listen?" The student asking the question seemed exasperated, and, as I looked around the room, I sensed that he might be voicing the frustrations of many others. I had been admonishing them, "You're not listening." They assured me that they were. I countered that they weren't, so they challenged me to tell them how to listen.

Now I was frustrated. I was teaching about the importance of listening to our patients, and my students didn't seem to understand how to do it. Listening is something that appears easy but is actually hard to do. We know that we need to listen to our patients, but how do we do it? What is true listening? I thought I knew but couldn't explain it in a convincing manner.

I'm sure that my answer to the student's challenge on that day was inadequate, and it was some time later while I was reading in Japanese that I came across the word to listen—*kiku* 聴. I realized that I had found what I needed.

*Kiku* is composed of several parts. There is an ear 耳, which is no surprise, as in listening we use our ears to hear what is being said—not just the words but the way in which something is said, the tone of voice, the flow of speech.

*Kiku* also contains the number 10 十 and an eye 目. Together they indicate maximal seeing, as listening requires all our senses. So much communication is nonverbal—patients give messages through silences, gestures, facial expressions, and bodily postures, and it is our task to create meaning from these different and even contradictory sources of information.

More ancient versions of *kiku* also contain the symbol for king 王, implying respect for the storyteller, and a number 1一, showing the importance of focused attention. There is no mouth in *kiku*, telling me that our desire to speak often interferes with our ability to listen. While there is a time to ask the right questions, we need to stop interrupting so that the patient can tell his or her story.

The heart 心 in *kiku* impresses me the most—we listen with our hearts. This is the basis of empathy, feeling what another is feeling, and of compassion, feeling moved to alleviate their suffering. Perhaps our ability to listen works much like the diastolic function of the heart—to receive blood in a state of relaxation and expansion. We accept what the patient communicates by creating space within ourselves. We may also go out to meet them more fully just as the heart pumps blood to the body. The heart is both an open receptive dimension of our being and an active expansive opening to the world.

Reflecting on *kiku* has helped me to understand how complex true listening really is. It demands overcoming our inner distractions and desires to assess, analyze, interpret, diagnose, and prescribe by concentrating the full power of our presence on the patient. We have to wrestle with a misguided sense that listening is a waste of time in our evolving sense of professionalism and begin our care by listening to the patient and confirming our reception of their story. Listening allows us to see their needs and desires and receive their suffering, realizing that in our hearts we are no different from them, giving rise to compassion.

Now I use the wisdom in *kiku* when I try to convey the meaning of listening. Students understand when I ask them to listen respectfully, totally, mindfully with their ears, eyes, and heart, joining with the patient as a whole presence, feeling their anguish and extending empathy and compassion. They find that when they listen with their hearts, patients tell them more about their lives, mutual trust builds, and healing occurs. They may hear something important that helps them to understand their patients' illness better and take efficacious action on their behalf. Or they may simply bear witness to their suffering, and in so doing, help to heal their patients' wounds. Listening with the heart may be the best they can offer; at times it may be all they have to offer.


**Stephen Murphy-Shigematsu, EdD**

**Dr. Murphy-Shigematsu** is consulting professor, Stanford University School of Medicine and Stanford School of Humanities and Science, Stanford, California, and Fielding Graduate University, Santa Barbara, California; e-mail: smshige@stanford.edu.