

How to Succeed in Fellowship Acquisition: A Survey of Pathology Residents

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Abstract

Medical school curricula limit students' exposure to pathology practice while pathology subspecialty training programs require residents to apply for fellowships as early as the end of their first year of training. Thus, limited exposure to pathology practice creates significant confusion and anxiety, often making the fellowship application process premature. Additionally, early focus on subspecialty training in order to acquire a fellowship adds to the initial lack of emphasis on general pathology training. We prepared a voluntary online survey with questions developed through focus groups and advice from an expert in survey design to determine which fellowships are desired and how successful residents are in their pursuit of these fellowships. The survey was distributed through the Pathology Residency Program Directors' (PRODS) listserv. Answers were solicited from pathology trainees throughout the entire training cycle. There were 141 (4.6% response rate) total respondents with each postgraduate year represented. One hundred twenty-two (95%) of 129 residents plan on completing 1 or 2 fellowships after residency training. Encouragingly, 94 (75%) of 126 pathology residents attained their desired specialty fellowship. However, 32 (32%) of 99 residents who acquired at least one fellowship chose a general surgical pathology fellowship. Furthermore, 33 (24%) respondents had already decided to pursue a specific specialty while still in medical school. An additional 32 (23%) came to their decision during postgraduate year 1. Therefore, although most residents are successful in attaining their desired fellowship, further research is needed to understand the effect of early commitment to a subspecialty and its impact on pathology education.

Keywords

survey, pathology, fellowship, residents, subspecialty

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Introduction

The majority of pathology residents pursue at least one fellowship; in fact, approximately 40% pursue 2 fellowships.¹ However, choosing a fellowship can be daunting. Complicating matters is that medical school does a poor job of exposing students to the practice of pathology and its subspecialties as a career choice.² This limited exposure in medical education to the practice of pathology not only limits the number choosing pathology³ but also decreases an applicant's understanding of general pathology and the various subspecialties available. Further complicating the issue is that during residency, fellowship applications may start as early as the postgraduate year 1 (PGY-1), thus limiting the exposure needed to make informed choices.⁴ All of these factors can lead to angst and frustration for pathology residents during their

early years when they are trying to acquire general pathology skills and discover which subspecialty areas most interest them.

Previous studies have focused on how prior changes to pathology curricula have affected resident choices of fellowships^{5,6} and how residents' early commitment to a subspecialty negatively

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impacts programs when they unexpectedly withdraw from the program, leaving them without a fellow.⁴ However, studies that focus on a resident's perspective of acquiring a fellowship or how this early timeline for fellowship acquisition affects residents have not been adequately explored. Furthermore, residents are dissatisfied with the current fellowship selection process and have suggested that the process is biased.⁴ Previous surveys have demonstrated that residents desire a unified timeline that would give them the opportunity to make an informed decision, but they would not necessarily prefer a fellowship match.⁷

The purpose of this study is to clarify whether or not residents are given the necessary tools to acquire their desired fellowship in the current fellowship process and to determine the factors impacting a resident's success in this process. Additionally, we aim to discern how early in residency residents are focusing on the fellowship process and what effect this might have on subsequent career choice.

Methods

A survey was created (Supplemental Appendix 1) and the study data were collected and managed using REDCap electronic data capture tools hosted at Montefiore Medical Center.⁸ REDCap (Research Electronic Data Capture) is a secure, web-based application designed to support data capture for research studies, providing (1) an intuitive interface for validated data entry; (2) audit trails for tracking data manipulation and export procedures; (3) automated export procedures for seamless data downloads to common statistical packages; and (4) procedures for importing data from external sources. The survey domains and questions within each domain were developed from prior surveys, senior faculty advice, and focus groups with residents. Survey questions were pilot tested by asking 10 residents and fellows to review each item and suggest, as appropriate, revisions to wording and organization. This group was composed of 5 residents from Montefiore Medical Center and 5 fellows who were at Montefiore Medical Center and had completed their residencies at institutions in the Midwest and northeast. The final survey consisted of 10 sections listed A to J. Section A consisted of demographic questions. Section B looked at factors affecting choices of desired fellowship from outside factors. Section C assessed whether participants were pursuing a fellowship and possible factors within pathology that could affect that decision. Section D gathered data on the application process. Section E was used to assess the participants' academic pursuits/accomplishments. Section F was used to determine the networking of participants, also referred to by some as "connections." Section G gathered data on which fellowship(s), if any, was/were acquired and some related data. Section H dealt with the interview process. Section I determined the success of the participants. Section J was strictly to determine whether participants would like a fellowship match or not.

Several rounds of e-mails were sent to program directors of 143 pathology residency programs and 535 Accreditation Council for Graduate Medical Education (ACGME) approved fellowship programs to distribute the survey and encourage

Table 1. Demographics and Qualifications.

Total Responses	141
PGY	
PGY-2	22 (15.6%)
PGY-3	33 (23.4%)
PGY-4	35 (24.8%)
PGY-5	28 (19.9%)
PGY-6 or later	17 (12.1%)
Sex	
Male/female	67/72 (0.93)
Training track	
AP/CP	118 (83.7%)
AP	12 (8.5%)
CP	8 (5.7%)
AP/NP	1 (0.7%)
Race	
Caucasian	83 (59.7%)
Black	1 (0.7%)
Hispanic	12 (8.6%)
Eastern Asian	21 (15.1%)
Central Asian	3 (2.2%)
Middle Eastern	2 (1.4%)
Other	8 (5.8%)
Education	
International medical graduate	36 (25.5%)
US MD	87 (61.7%)
DO	15 (10.6%)
Other degrees	
PhD	23
Masters	20
Other	15
USMLE/COMLEX scores (highest step)	
<200	1 (0.7%)
200-210	8 (5.8%)
211-220	13 (9.4%)
221-230	22 (15.8%)
>230	69 (49.6%)
400-500	1 (0.7%)
500-550	2 (1.4%)
551-600	5 (3.6%)
>600	5 (3.6%)

Abbreviation: AP, anatomic pathology; CP, clinical pathology; NP, neuropathology; PGY, postgraduate year

their residents and fellows to complete the survey. The completed survey data were gathered, compiled, and analyzed using Microsoft Excel. The first e-mail for the survey was sent out in August 2017 with additional reminder e-mails sent two additional times. The survey was closed in November 2017. This project was approved by the Montefiore Medical Center/Albert Einstein College of Medicine Internal Review Board before the survey was distributed.

Results

Demographics

In 2017 to 2018, there were a total of 143 ACGME accredited pathology residency programs with approximately 2341 filled

Table 2. Choice of Fellowship.*

Factor	Mean	Median	Standard Deviation
Desired fellowship	1.2	1	0.62
Prestigious program in desired field	1.7	2	0.83
Location	1.8	2	0.94
Big named institution	1.9	2	0.89
Leader in chosen field at institution	1.9	2	0.86
Family	2.1	2	1.1
Spot available for desired year	2.3	2	1.1
Other social constraints	2.9	3	1
Monetary considerations	3.1	3	0.88

*Scale of 1-4, 1 = most influential, 4 = least influential.

Table 3. Decision of Fellowship to Pursue.

Decided to pursue specific fellowship	
Before residency	33 (23.9%)
PGY-1	32 (23.2%)
PGY-2	54 (39.1%)
PGY-3	17 (12.3%)
Started pursuing fellowship	
Before residency*	7 (5.1%)
PGY-1	17 (12.3%)
PGY-2	61 (44.2%)
PGY-3	46 (33.3%)
PGY-4	1 (0.7%)
Which fellowship (N = 135, could answer more than once)	
	If more than 1 fellowship was selected, which was preferred (N = 76)
Breast subspecialty	10 6
Cytopathology	21 6
Dermatopathology	18 7
Forensic pathology	9 2
General surgical pathology	38 4
Gastrointestinal pathology subspecialty	20 9
Genitourinary pathology subspecialty	6 3
Gynecologic pathology subspecialty	16 8
Head and neck subspecialty	5 3
Hematopathology	24 9
Medical renal pathology subspecialty	5 1
Pulmonary pathology subspecialty	1 0
Soft tissue pathology subspecialty	3 1
Transplant pathology subspecialty	1 0
Blood banking/transfusion medicine	13 6
Chemical pathology	2 1
Medical microbiology	3 1
Molecular genetic pathology	16 7
Other	6 2

Abbreviation: PGY, postgraduate year.

*Actively pursuing fellowship before residency refers to the same activities as pursuing a fellowship while in residency. This means publishing articles, away rotations, attending meetings and performing other tasks that might help an applicant acquire a fellowship.

Table 4. Fellowship Application.

Institutions applied to for fellowship	
0	1 (0.7%)
1-5	67 (48.2%)
6-10	26 (18.7%)
10-20	19 (13.7%)
21-30	8 (5.8%)
>30	1 (0.7%)
Institutions encouraged to apply to for fellowship	
1-5	52 (37.4%)
6-10	15 (10.8%)
10-20	16 (11.5%)
21-30	9 (6.5%)
>30	4 (2.9%)
Initial number of types of fellowships applied to (eg, hematopathology and cytology or blood banking/transfusion medicine and surgical pathology)	
1	95 (68.8%)
2+	18 (13%)
Subsequently applied to second fellowship type	48* (50.5% of original)
Type of fellowships applied to subsequently (N = 48, could have applied to more than one type)	
Breast subspecialty	1
Cytopathology	8
Dermatopathology	6
Forensic pathology	2
General surgical pathology	7
Gastrointestinal pathology subspecialty	5
Genitourinary pathology subspecialty	2
Gynecologic pathology subspecialty	4
Head and neck subspecialty	0
Hematopathology	2
Medical renal pathology subspecialty	1
Pulmonary pathology subspecialty	1
Soft tissue pathology subspecialty	2
Transplant pathology subspecialty	0
Blood banking/transfusion medicine	2
Chemical pathology	0
Medical microbiology	2
Molecular genetic pathology	8
Other	2

*Of the 95 respondents who originally only applied to one fellowship type, 48 of them ended up applying to other fellowship types in addition to their original subspecialty choice.

spots. Additionally, there were a total of 535 ACGME accredited pathology fellowship programs with approximately 749 filled positions. There was a total of 141 pathology residents/fellows who completed the survey for a total response rate of 4.6%.

This is similar to, yet slightly lower than previous surveys of this type,⁶ but it is a significantly lower yield than the American Society for Clinical Pathology (ASCP) survey.¹ The phenotype of the respondents in our study can be found in Table 1. Interestingly, there was a disproportionate number of US graduates who completed the survey (87, 62%) as only 37% of medical students going into pathology are US MDs.³ Approximately, 91 (65%) had USMLE scores greater than

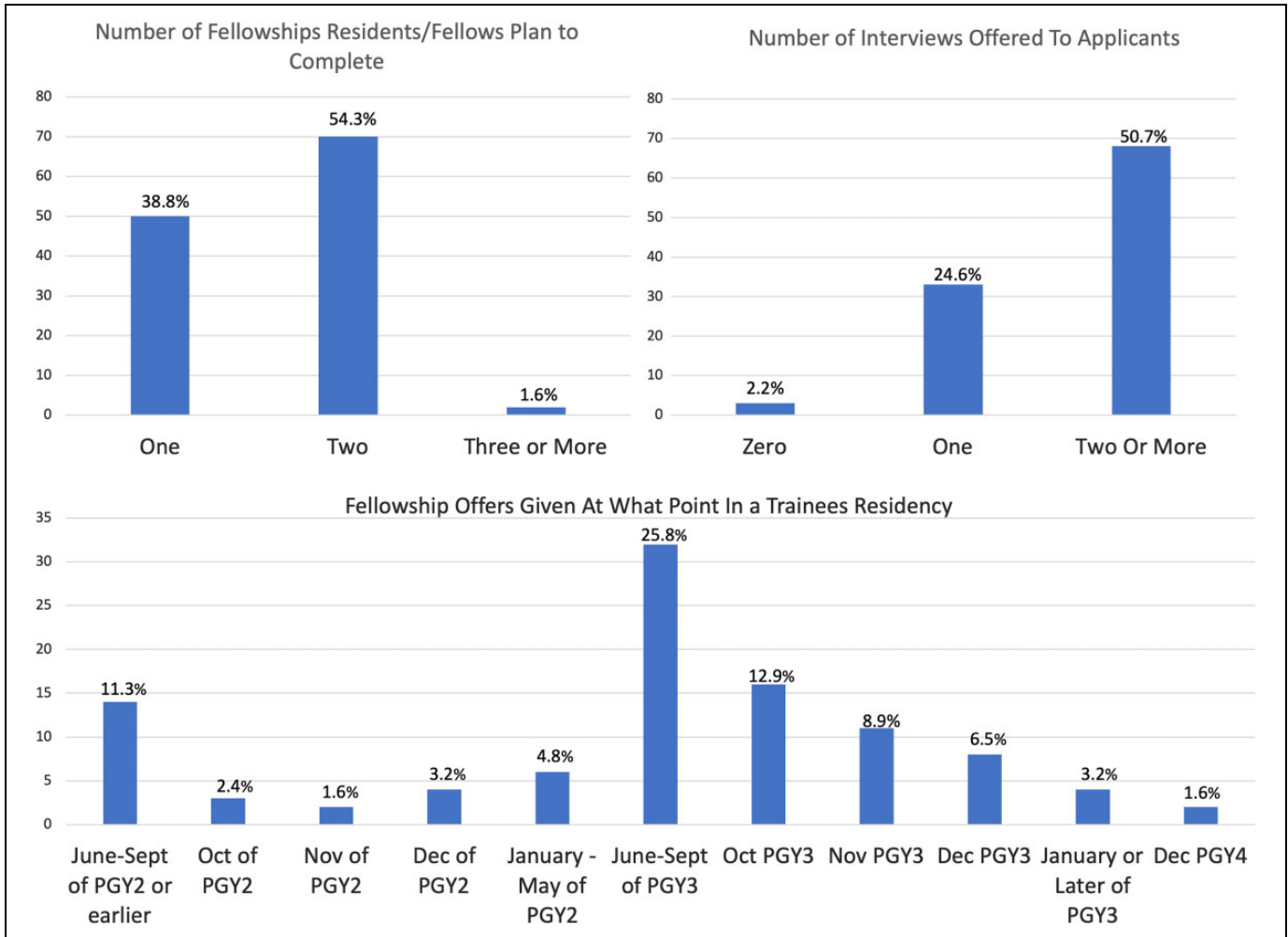


Figure I. The number of fellowships respondents plan to complete, how many interviews were offered, and when during training fellowship offers were given. Percentages do not include no response answers and, therefore, do not add up to 100%.

220. In addition, 58 (41%) respondents had other degrees. Of these other degrees, 23 (40%) had attained a PhD, 20 (34%) had a masters, and 15 (26%) had some other type of degree. Given the small sample size and some characteristics of our respondents, we may be analyzing a selected group of residents who are high achievers with defined career paths.

Factors Affecting Choice of Fellowships

The single most important factor in selecting subspecialty training for our cohort was the particular subspecialty itself (Table 2). All other factors that usually come into play such as family, location, and institution were secondary suggesting that the respondents had clearly defined a career path. Of significant interest is that 33 (24%) of the respondents had decided to pursue a specific fellowship (or fellowships) in pathology, while they were still in medical school (Table 3). Another 32 (23%) had already decided on their fellowship (s) during PGY-1 indicating that almost 50% of respondents had decided on their career path before having a full academic year in basic pathology training. Additionally, 85 (62%) actively started

performing activities that they felt could assist them in acquiring their desired fellowship (s) by PGY-2 or earlier. Finally, we asked which specific subspecialties residents were interested in acquiring. The most popular choice, general surgical pathology, had 38 (28%) residents interested. It is not clear why residents choose general surgical pathology as a fellowship. It could be that it reflects their desired future practice setting; that is, community practice pathology. Alternatively, this choice could reveal that training programs do not develop residents sufficiently for independent practice and residents feel further surgical pathology training is necessary for competence in signing out cases. In addition, this trend could be a manifestation of compelling residents to choose a fellowship too early before they are competent and have the ability to make an informed career decision on which subspecialty to pursue.

Application Process

Almost half of all residents only applied to 1 to 5 programs, 67 (48%; Table 4). Interestingly, 23% (29) of respondents were offered a fellowship during their PGY-2 or earlier, with 14

Table 5. Factors Pursued to Improve CV for Fellowship Acquisition.

Activities Pursued	Number of Residents
Attended professional meetings	82 (59%)
Membership in professional society	89 (65%)
Away electives	36 (26%)
Away elective performed during:	
Medical school	3 (8%)
PGY-2	19 (53%)
PGY-3	12 (33%)
PGY-4	2 (6%)
Presented abstracts/posters at meetings	120 (86%)
Abstracts/posters in area of desired fellowship	83 (70%)
Publications during residency	101 (73%)
Peer reviewed publications	91 (91%)
Open-access publication	31 (31%)
Lay press	8 (8%)
Other publication	12 (12%)
Publication in desired fellowship field	62 (61%)
Publication in field unrelated to desired fellowship	25 (25%)
Publication related to desired fellowship field	12 (12%)
Letter of recommendations from:	
Residency program director	110 (89.4%)
Nationally known attending at own institution	66 (62.3%)
Attending at own institution in desired fellowship field	101 (84.2%)
Attending at own institution	96 (87.3%)
Nationally known attending from another institution	10 (11.2%)
Program director of desired fellowship field at another institution	5 (5.7%)
Attending at another institution	10 (11.1%)
Someone else	8 (9.5%)

Abbreviations: CV, curriculum vitae; PGY, postgraduate year.

Table 6. Perception of Important Factors for Acquisition of Fellowship Average Rating of Importance.*

Factor for Acquisition of Fellowship	Mean	Median	Standard Deviation
Other connections to desired program	1.61	1	0.93
Letters of recommendation	1.9	1	1.15
Away electives	1.9	1	1.15
Meeting program directors	2.1	2	1.09
Publications of any kind	2.15	2	1.03
Meeting previous fellows/current fellows	2.18	2	1.05
Abstracts	2.42	2	1
Knowing/meeting people through family and friends	2.64	3	1.24
Attending national meetings	2.81	3	1.07
Other factors	2.81	3	1.29
Other factors leading to some connection	3.1	4	1.18
Board scores	3.17	3	0.89
Attending visiting professor lectures	3.28	4	0.9

*1-4, 1 = most important, 4 = least important.

(11%) being offered a fellowship position during the first few months of their PGY-2. Of the 129 respondents who answered, 50 (38.8%) plan on completing 1 fellowship, 70 (54.3%) plan

Table 7. Interview Process.

Important Factors	Number of Applicants (N = 141)
CV mentioned in interview	27
Specific areas of CV that were mentioned on interview	
Letters of recommendation	21
Publications	16
Abstracts	15
Other topics	11
Away elective	3
Board scores	3
Some connection	3
Interview questions	
General conversation	104
Future goals	100
Personality questions	62
Other types of questions	47
Quizzed on specific specialty applied to	32
Quizzed on areas not specific to specialty	12

Abbreviation: CV, curriculum vitae.

Table 8. Residents' Success in Acquisition of Fellowship.

Fellowship Acquired (Can Have More than One Per Applicant)*	
Breast subspecialty	5
Cytopathology	15
Dermatopathology	10
Forensic pathology	4
General surgical pathology	32
Gastrointestinal pathology subspecialty	12
Genitourinary pathology subspecialty	4
Gynecologic pathology subspecialty	10
Head and neck subspecialty	5
Hematopathology	16
Medical renal pathology subspecialty	3
Pulmonary pathology subspecialty	1
Soft tissue pathology subspecialty	2
Transplant pathology subspecialty	1
Blood banking/transfusion medicine	9
Chemical pathology	2
Medical microbiology	4
Molecular genetic pathology	10
Other	4

*These are total fellowships acquired from applicants and include a single applicant who has acquired multiple fellowships.

on completing 2 fellowships, 2 (1.6%) plan on completing 3 or more, and 7 (5.4%) gave no response (Figure 1).

Activities in Pursuit of Fellowship

The key elements in obtaining a desired fellowship include having a connection to a program and a demonstrated interest in the subspecialty field through publications and presentations of research (Tables 5 and 6). One major activity in pursuit of a fellowship was completing an away elective which is often done during PGY-2 (36, 26%). The away elective is often an audition

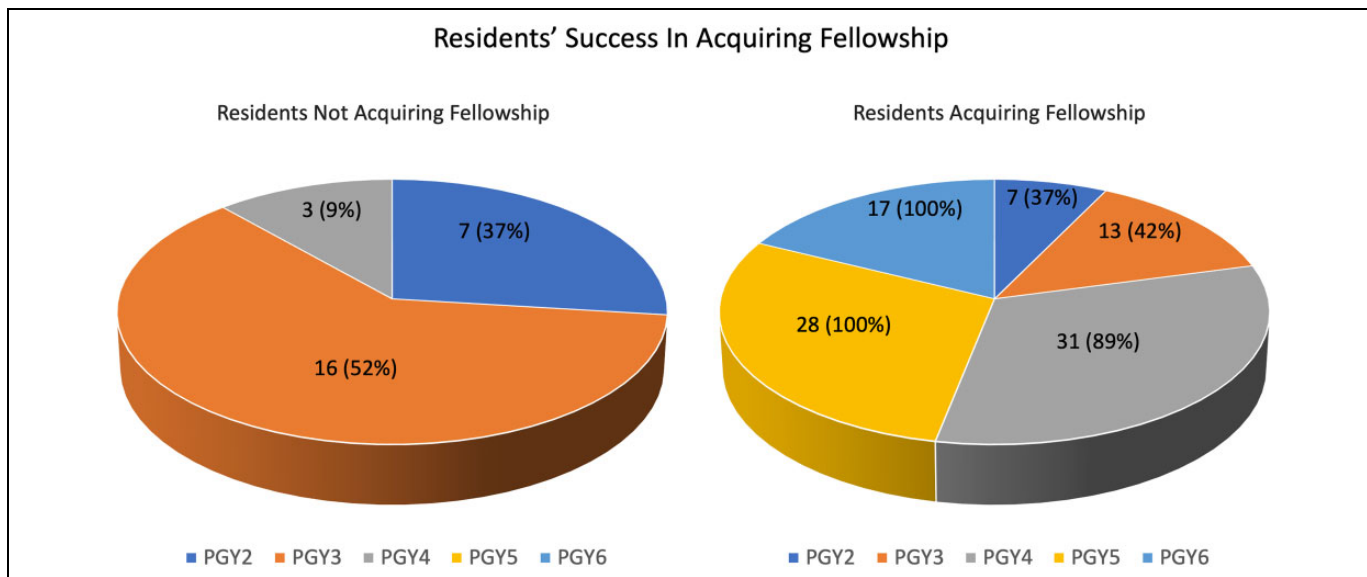


Figure 2. Residents' success broken down by PGY. On the right are the numbers and percentages of respondents who acquired fellowships and on the left are the numbers and percentages of respondents who have yet to acquire a fellowship. Percentages reflect that of the PGY. PGY indicates postgraduate year.

rotation that is a double-edged sword for a resident. Even if a resident is not the top candidate at the away elective, she or he may perform well enough to get a letter of recommendation from prominent faculty for applying to other programs. Residents show interest in subspecialties by performing research and presenting their findings. This shows both accomplishment and enables the resident to connect with faculty and program directors at national meetings. In fact, 62 (61%) residents had publications that were specific for their desired subspecialty field.

The Interview

While most programs probably do not perform a formal behavioral interview, the vast majority of respondents said their interview consisted of general conversation with almost half being asked personality questions (Table 7). This suggests the most important aspects of the interview pertain to the personality fit with the program. Fellowship programs train very few individuals and close working conditions demand a tight connection between faculty and fellows. In addition, some programs may test the knowledge of the applicant in the particular subspecialty.

Acquisition of Fellowship

This section assessed how successful applicants were with acquiring their fellowships and ascertained if there was a need to modify the process to aid residents in fellowship acquisition. The results are summarized in Table 8. There were 99 (74%) who reported they had acquired a fellowship, 26 (20%) said they had not yet acquired a fellowship, and 8 (6%) gave no response (Figure 2). Of the total 99 who acquired a fellowship, 32 (32%) of those residents pursued a general surgical

pathology fellowship. Of the respondents, 94 (75%) said they attained their desired fellowship type and 88 (72%) said they obtained their desired program/location (Figure 3).

Fellowship Match

Respondents were finally asked if they would prefer a fellowship match to the current method of application to fellowship. Of the 130 respondents, the breakdown was before fourth year/last year of fellowship (43, 33%), during fourth year/last year of fellowship (22, 17%), no fellowship match (54, 42%), no response (11, 8%; Figure 4). Residents are split on whether a match for fellowships is a good idea. However, most of the residents, 65 (50%), do feel that a fellowship match would be preferable to the current system.

Discussion

In the past 2 decades, the number of pathology trainees who have pursued pathology subspecialty training after residency has increased,^{9,10} and this has led to a highly competitive atmosphere among residents. However, it is difficult for pathology trainees to have adequate exposure to and understanding of how to best pursue and acquire their desired fellowship. Additionally, the current pathology fellowship application process results in many trainees with limited exposure to pathology subspecialties prior to applying for Fellowship.

This is reflected in the large number of respondents who chose a pathology subspecialty fellowship before or during their PGY-1. Additionally, 32 (32%) of respondents pursued general surgical pathology fellowships, which may suggest a lack of confidence in either their residency training of general surgical pathology, their own skills or, perhaps, a "safe" choice

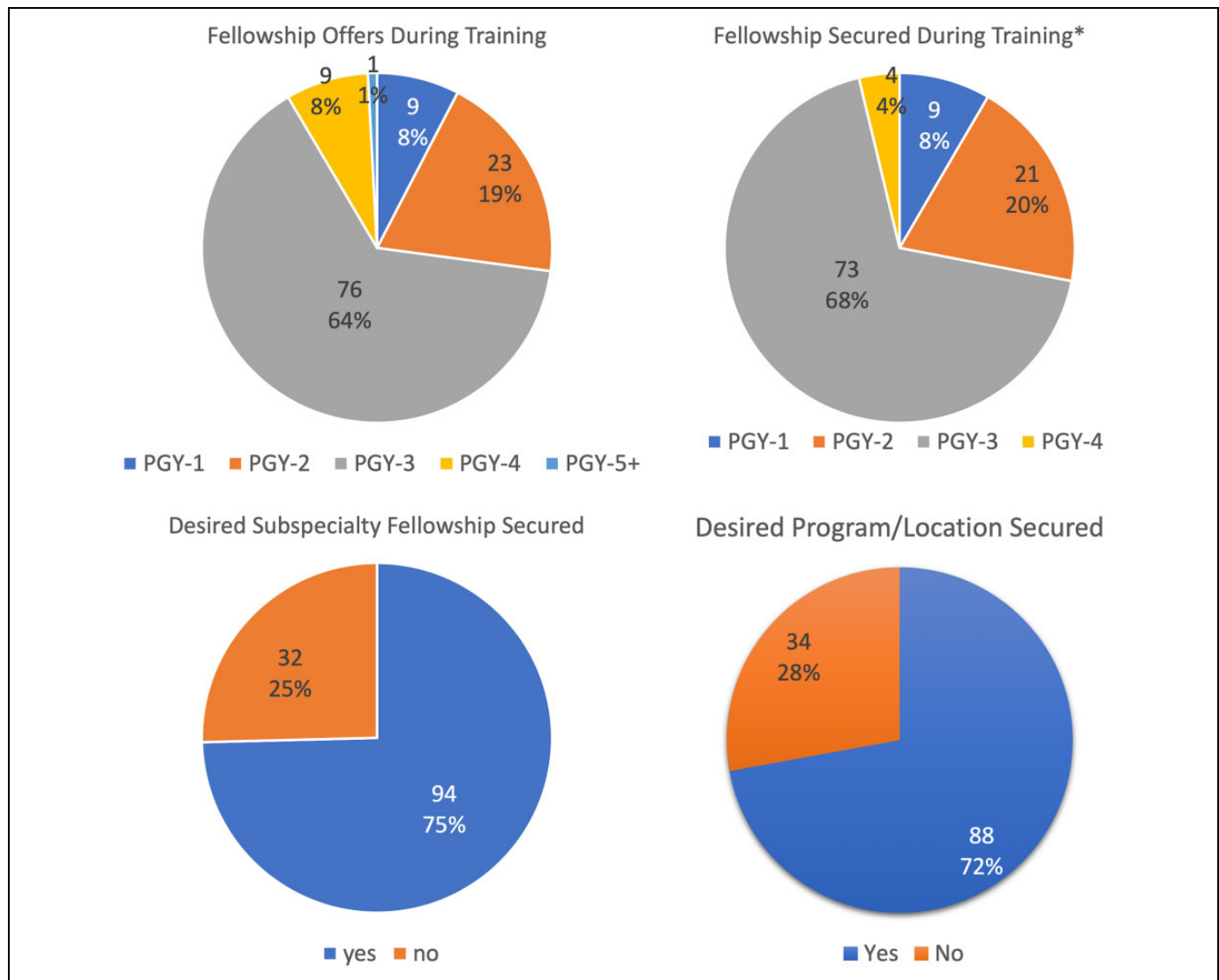


Figure 3. The breakdown of which PGY fellowship offers were given, when fellowships were secured, how many and what percentage of respondents secured their desired specialty, and if that was their desired location/program. *One respondent said they secured their fellowship during medical school. PGY indicates postgraduate year.

made early in training. Another possibility is that trainees use surgical pathology fellowships as a resume enhancer to obtain a desired subspecialty fellowship.

In a recent survey performed by Post et al,¹¹ of employer expectations of recently graduated pathology trainees, it was found that many employers would either hire a resident without fellowship training (26%) or at least consider it (31%), with only a minority stating they would require fellowship training (43%). Additionally, when employers who preferred fellowship trained candidates were asked why they preferred fellowship trained pathologists, the majority (58%) stated that their practice required subspecialization. These findings reveal that if a trainee attains the appropriate skills in residency, a fellowship such as general surgical pathology is unnecessary for job acquisition. Furthermore, only 1 subspecialty fellowship should be necessary in the specific cases that require

special skills and not 2, revealing that the majority of our respondents, who chose 2 fellowships, are most likely seeking what should be unnecessary additional training.

Programs are accepting applications and interviewing earlier and earlier in a resident's career. Therefore, a fellowship match, or at least a unified timeline in either the last or second to last year of a resident's career may help curb this trend. However, our survey shows that a high number, 54 (42%), of residents are not interested in a fellowship match. This could be due to the unique population that responded to our survey, as they appear to be high achievers, or it could be due to the comfort of the known versus the unknown. The current process has been going on for years and residents are familiar with it. If a match is implemented, it adds another level of uncertainty to the process that might make residents uncomfortable.

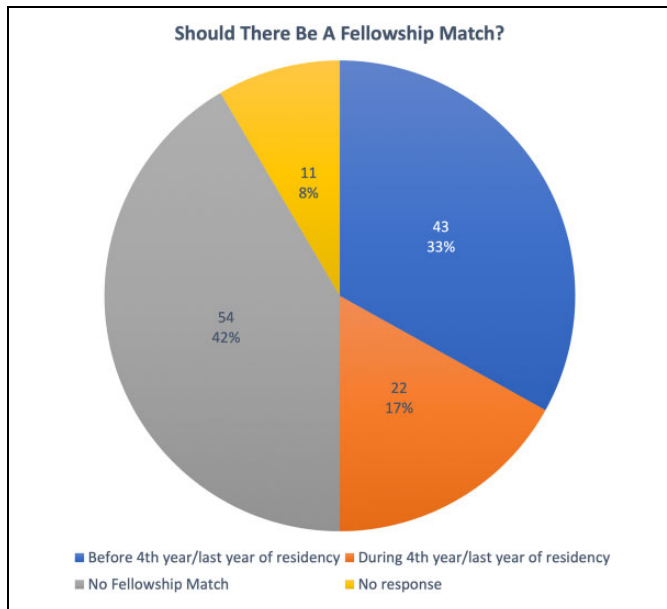


Figure 4. Breakdown of respondents on how they felt about a fellowship match instead of the current system.

It is our opinion that pushing the fellowship application process into the later years of residency would be beneficial in many respects. It would alleviate the stress of fellowship acquisition during the early years of residency when pathology residents should focus on the acquisition of basic pathology skills. Additionally, it would allow for a different model of residency education.^{12,13} Briefly, this model consists of onboarding new residents with a focus on basic pathology skills with a limited focus on subspecialties and, subsequently, residents would be exposed to the basic principles of laboratory medicine. In addition, the first 2 years would consist of acquiring additional diagnostic skills as well as proficiency in analytics and computational pathology, interpersonal skills which would facilitate teamwork, and communication skills enabling interdisciplinary cooperation. This would allow residents to slowly acclimate to pathology and gain the basic skills in both anatomic and clinical pathology before exploring the diverse range of subspecialties in the latter part of residency. This would allow them to become proficient in all areas of pathology before narrowing their focus. Once proficient in basic pathology practice, then residents would be able to focus on specific areas of pathology and be sufficiently prepared to choose the most appropriate fellowship or apply for positions without a fellowship.

We recognize that our survey shows some bias because of the low response rate; we only had a 4.6% response rate. Additionally, we had a high proportion of US MDs when only 37% of medical students going into pathology are US MDs.³ One reason for the low response rate could be that our survey was too long and was not connected to a mandatory test like the ASCP survey.

This survey reveals some, perhaps, unrecognized trends; pathology residents are deciding on which fellowship(s) to

pursue earlier than their clinical exposure would dictate. This could be a strong contributor to why residents pursue so many fellowships. Nevertheless, it appears that our small pool of respondents has successfully navigated the fellowship application process. What is clear from our small sample of successful residents is that interpersonal skills and being “known” at the institutions they applied to contributes to their success. Using their experience as a guide, hopefully, future applicants will better understand what actions to pursue in order to acquire their desired fellowship. It is our hope that the information extracted from this survey will help change the culture of the fellowship application process and be the impetus for a review of the potentially detrimental effects of this premature involvement in the fellowship process. A change in the fellowship process has been attempted in the past¹⁴ without success. Hopefully, it is not too late to change the culture of pathology training.

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Supplemental Material

Supplemental material for this article is available online.

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