The Radiology Fellowship and Fellowship Match: Current Status

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The radiology fellowship is a period, usually 1 year, devoted to additional training after the radiology residency has been completed. In 1991, Brogdon and Herbert (1) wrote, “The fellowship is here to stay.” In the 10 years after their article was published, the number of residents pursuing fellowships rose markedly. However, current job market conditions have decreased the need to complete a fellowship to obtain a satisfactory practice position. In the past 2 years this trend has peaked, and the number of unfilled positions has increased in many top fellowship programs.

HISTORICAL PERSPECTIVE

Prior to the 1960s, radiologists were generalists. There was no subspecialization in radiology. There were no subspecialist role models and no funding for fellowships. In 1959, Juan Taveras organized the first neuroradiology fellowship at Columbia University with funding from the National Institutes of Health (2). Other fellowship programs soon were developed, modeled after this example and similar programs in Europe. Osteoradiology fellowships have existed since 1977 (3).

During the 1980s and 1990s, many fellowships in radiology sought and received approval from the Accreditation Council for Graduate Medical Education. Certificates of added qualification, or CAQs (4), were made possible by the joint efforts of the American Board of Radiology and the Accreditation Council for Graduate Medical Education to further clarify the criteria for certification of fellowship training, and they are now available in neuroradiology, cardiovascular interventional radiology, and pediatric radiology. A separate set of requirements must be met for a certificate of special competency in nuclear medicine.

During the mid-1980s and 1990s, there was an exponential growth in the number of radiology residency graduates choosing to enter a fellowship. In 1984, only 8% pursued fellowships (1), but by 1990, 52% were entering fellowships (1). By 1995, 48% of radiologists reported having completed a fellowship (5,6). The most recent data show an increase in residents taking fellowships, from 80% in 1999 to 85% in 2000 (7). Available data show that women participate in radiology fellowships in equal proportion to men (5).

An American College of Radiology (ACR) survey in 1990 showed that radiologists younger than 45 years were more likely to have had fellowship training. Those with fellowships tended to work at academic centers or in large group practices in larger cities (8,9). Surveys of practicing radiologists confirmed that subspecialization in radiology was an increasing trend. By 1995, 28% of radiologists reportedly considered themselves specialists. Fifty percent reported that they were fellowship trained—a 13% increase from 1990 (9).

According to the results of a recent survey, 85% of radiology residents graduating in 2000 were pursuing fellowships. Ten percent of this graduating class had accepted private practice jobs without pursuing a fellowship, 5% took jobs in the armed forces, and 4% planned to work as locum tenens. Twenty-nine percent of the residents who accepted fellowships chose a fellowship in body imaging; 28% chose interventional radiology; 16% chose neuroradiology; and 27% chose pediatric radiology, nuclear medicine, women’s imaging, musculoskeletal im-

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aging, or magnetic resonance imaging (3%–4% per category). Four percent of residents who had accepted fellowships withdrew prior to starting their fellowships to take positions in private practice (7).

**THE EFFECT OF THE RADIOLOGY JOB MARKET ON FELLOWSHIPS**

The radiology job market has an important effect on residents’ decision to pursue a fellowship (7). Like other job markets, that in radiology tends to fluctuate cyclically. The market is currently very favorable for those seeking a position. In 1988, in the estimation of the radiologists surveyed, the demand in private practice was increasing, and radiology group practices had begun to hire more graduates. By 1994, there were fewer vacancies in the job market, and in 1995 the hiring rate for radiologists was only 70% of the level in 1991 (10,11). At that time, there was much concern over potential changes in health care reimbursement, and many program directors were pessimistic about the future of graduating residents. From 1995 to 1998, as the job market improved for applicants (12–14), program directors were more optimistic regarding the prospects of their residents finding jobs, and by 1999 virtually all who wanted to work had a job. Survey data that year showed that each resident or fellow had an increased average number of offers over the prior year.

For a number of years before 1995, fellowship training was essential if one wanted to practice in a large group in a large city. Most medium-sized and small groups did not require additional training after residency. In the late 1990s, even medium-sized groups began to seek candidates who had completed fellowships. Thus, more residents felt the need to complete a fellowship to be competitive in the job market.

Job satisfaction is another important measure of success in the job market. In 1984, 85% of graduating residents obtained the job that was their top choice. In 1995, 85% reported having accepted jobs that matched their goals (10,15). At the start of 1999, 92% reported that they had jobs that matched their goals (12).

The size of the workforce in radiology is an important question that has generated several research studies (16), many of which have been misleading. Pessimistic projections for job availability in the mid-1990s caused many medical students to be less interested in radiology (17). Medical school deans and other leaders of U.S. medical schools were guiding students toward careers in primary care and general medicine and away from specialization. There was a belief that health care expenses would be reduced and quality maintained if primary care physicians began to perform many of the procedures that previously had been done by specialists. A 1994 study predicted a 60% surplus in specialist physicians by 2000. This study and others suggested that a surplus of radiologists in 2000 was inevitable (18), causing many in the medical profession to prepare for a glut of specialists. However, not everyone agreed with these dire predictions for the future. For example, Brogdon again saw the fallacy in this thinking (19).

In 1994–1995, the number of positions in many U.S. residency programs was reduced (voluntarily, in many cases) in response to a predicted glut of specialists. The result was an overall reduction of 6% nationwide, and an additional 3% reduction was planned (13–20). Practicing radiologists also responded to these predictions by deferring the hire of new associates—not because of managed care but because of the threat of managed care (21). Radiologists chose instead to work harder so as to increase or maintain their income (22).

However, the predicted glut never materialized. In the 1990s, continuing advances in radiologic technology instead led to an increase in the number and type of services available. Leaders in radiology have recently declared a current shortage of radiologists (23), and this perception is supported by data (24). Current 30-year projections indicate a severe shortage of radiologists in the future (25,26).

**REASONS FOR PURSUING A FELLOWSHIP**

During radiology residency, residents are faced with the decision of whether to pursue a fellowship and what fellowship will best suit them. The decision may not be easy, and the resident must weigh the benefits against the costs.

The drawbacks of doing a fellowship are related mainly to time and money. An additional year or more of training is required to complete a fellowship, and during this time, the trainee earns a salary that is only one-third to one-eighth that available in radiologic practice. The fellow must be willing to be a student, subject to the stipulations of the director. Many physicians in their 30s or 40s are eager to be out of training and to pursue independent practice.

The most important factors influencing the decision to pursue a fellowship include the desire to enhance one’s employability or to improve one’s chances of finding the
right job, as well as the desire to obtain more advanced training. Other reasons, mentioned by participants in the ACR survey, were an overwhelming interest in the subspecialty, the need to be an expert, and the ability to practice a preferred specialty. Some respondents cited incomplete mastery in residency or inadequate exposure to a modality during residency (1,5,7). In addition, a fellowship is considered essential preparation for an academic career. There is often an attraction to the idea of being an expert in a particular group, city, region, state, or nation.

An ACR survey conducted in 1994 also examined this topic from the perspective of those doing the hiring. The radiology groups surveyed were asked to rank the factors that were important for hiring an associate. The top three factors were motivation, knowledge of radiology, and the residency program director’s recommendation. Fellowship training was ranked sixth, after personality and ability to communicate. However, a fellowship-trained candidate was still preferred over a non–fellowship-trained candidate (27).

**THE FELLOWSHIP APPLICATION PROCESS**

Inconsistency in the fellowship application process is a long-standing problem. A lack of uniformity in application schedules from institution to institution sometimes creates a situation in which an applicant receives an offer from one program before having had a chance to interview at a more desirable program. If this offer is made with a short deadline for acceptance, the applicant may be forced to choose between taking “the bird in hand” and gambling that a better offer may come later. A second concern that has developed in recent years is the timing of the fellowship application process earlier and earlier in residency. In some instances now, residents must choose the type of fellowship they want to pursue at the end of their 2nd year of residency, when they have had little or no exposure to some subspecialties. Furthermore, personal circumstances could change during the last 2 years of residency and alter career objectives. These factors have increased the likelihood that a resident will accept a fellowship position but subsequently renege, creating an unexpected opening that may be difficult to fill.

A third issue of concern to fellowship applicants has been the absence of a universally accepted application form. This has meant that much time and effort must be spent on filling out multiple forms for different programs either by hand or by typewriter, even though the information requested by the various programs is similar or identical.

There have been numerous attempts to solve these problems during the past decade. In 1990 and 1991, the Society for Cardiovascular and Interventional Radiology (now the Society of Interventional Radiology) conducted a computerized match for interventional radiology fellowships, similar to the well-established residency match, in an effort to create uniformity among programs. However, this effort was suspended 2 years later because of poor compliance by many program directors. In 1995, the Society of Chairmen of Academic Radiology Departments (SCARD) recommended that a uniform date be established for the offering of fellowship positions, but this recommendation has not been implemented.

The most important steps toward organization of the fellowship application process took place at the annual meeting of the Association of University Radiologists in 1998, during which SCARD passed a resolution stating that the entire application process should take place between January 1 and June 30 of the 3rd year of residency. The Association of Program Directors in Radiology (APDR) endorsed this resolution, and a subsequent APDR roundtable discussion generated three key questions:

(a) When should the application process begin (in fall of the 3rd year, spring of the 3rd year, or fall of the 4th year)?

(b) Should a system be implemented for matching candidates with appropriate positions?

(c) Should internal candidates (residents in the department in which the fellowship position is offered) be handled differently from external candidates?

Discussion centered mostly around the timing of the application process. The system then in place had residents completing applications at the beginning of their 3rd year of residency and interviewing during the fall of their 3rd year. In many instances, positions were offered and accepted as much as 1½ years before the fellowship was to start. The pattern of residents “dropping out” of accepted positions was well established. A poll of chief residents on the steering committee of the American Association of Academic Chief Residents in Radiology (A’CR2) in November 1998, found that an estimated 25% of residents had backed out of a fellowship agreement. Beginning the application process later, such as in spring of the 3rd year of residency, would allow residents more time to discover the subspecialty area most suited to their interests and might result in a decrease in dropouts. A drawback of this timing would be that 3rd-year residents would be interviewing for fellowships at the same time.
that 4th-year residents are studying for the ACR oral board examination, which could cause difficulty in many residency programs. An even greater advantage might be achieved by beginning the fellowship application process in the fall of the 4th year of residency. This timing would not conflict with preparations for the ACR board examination and would still allow residents enough lead time for relocation and for obtaining necessary licenses.

The 1998 meeting of the Association of University Radiologists also provided the occasion for discussion of fellowship issues at an A³CR² problem-solving session. Subsequent presentation of the results of this discussion at a joint meeting with the APDR led to the establishment of a task force to address the key issues. Charles Resnik, radiology residency program director at the University of Maryland Medical Center, was chosen to chair this task force. Over the course of the next few months, representatives from SCARD, APDR, and A³CR², and from the subspecialties of abdominal imaging, musculoskeletal imaging, neuroradiology, nuclear medicine, pediatric radiology, thoracic radiology, trauma/emergency radiology, vascular/interventional radiology, and women’s imaging, created the National Intersociety Fellowship Application Task Force.

Business was conducted through numerous e-mail messages shared among task force members. A survey regarding the optimal timing of the fellowship application process yielded no responses in favor of keeping the current system, two in favor of spring of the 3rd year, nine in favor of fall of the 4th year, and three undecided. Three members of the task force believed that a universal fellowship match would be optimal, 10 members believed that a match would not be optimal, and one member was undecided. All agreed that residents in a program at the same institution as the fellowship they were applying for should be exempt from the match process.

At their September 1998 meeting, the members of SCARD concluded that the current fellowship system was unworkable and that the cost of a computer match should be looked into. However, over the course of the next 2 years, SCARD was unable to reach a consensus regarding establishment of a fellowship match and moving the application process to the fall of the 4th year.

In 1999, the resident physician section of the ACR proposed to investigate a revision of the fellowship application process. A survey of residents generated 936 responses, with 85% in favor of developing a universal application form (D. Lemley, written communication, September 16, 2001). Sixty-one percent of respondents supported restricting the time for offering and accepting fellowship positions. Thirty-nine percent wanted the process moved to the spring of the 3rd year of residency, and 28% favored the fall of the 4th year. At that time, 59% of residents were against a fellowship match.

By 2000, the National Intersociety Fellowship Application Task Force had grown to 24 members, including addition of representatives of the ACR resident physician section. The Task Force developed a universal fellowship application form, which was posted on multiple society Web sites, including those of APDR, A³CR², and ACR. There was continued strong support for moving the application process to the fall of the 4th year of residency, but there was also a realization that such a move could not succeed without the full support of SCARD.

Because of the impasse that had developed, the American Society of Neuroradiology, with the strong initiative of David Yousem, neuroradiology fellowship program director at the Johns Hopkins Hospital, established a match for all 2002 neuroradiology fellowship positions. The match process was administered by the National Resident Matching Program, and the costs to departments were $100 for each fellowship program and $25 for each matched applicant. The cost to applicants was a single $40 fee.

A survey of neuroradiology fellowship directors conducted in 2000–2001 indicated growing problems with fellowship applications (28). Fifty-five percent of directors reported that they had experienced an applicant backing out of a fellowship agreement. Seventy-one percent reported a decrease in applicants during the 3 years prior to the survey, and only 9% reported an increase. Approximately 25% of fellows in 2-year programs had left after 1 year.

By 2001, however, resident sentiment toward the fellowship process had changed. On a questionnaire completed at the 2001 meeting of the resident physician section of the ACR, 97% responded that they planned to pursue a fellowship. More residents favored a fellowship match (43%) than opposed it (34%), with 20% being undecided. Most (54%) preferred that the match process take place in the fall of the 4th year.

The results of the first neuroradiology fellowship match in January 2001 were very favorable for the applicants. Seventy of 71 active applicants (99%) were matched successfully with fellowship positions. The results for programs were mixed. Sixteen of 74 programs filled all of their positions (22%), and only 70 of 156 positions were filled (45%).
In a post-match survey, 99% of neuroradiology fellowship program directors believed that the match was fair, and 86% of applicants agreed. Ninety percent of applicants were pleased with the results of the match, although 48% believed the interview season occurred too early in residency.

As a result, in April 2001, SCARD voted unanimously to support a match for all 2003 neuroradiology and vascular/interventional radiology fellowships and agreed in principle to move toward a match for fellowships in all subspecialties during the fall of the 4th year of residency. Subsequently, in June 2001, the Society of Interventional Radiology, at the initiative of John A. Kaufman, MD, interventional radiology program director at Oregon Health Sciences University, agreed to participate in a match for all 2003 fellowship positions.

The results of this match in 2002 were mixed. Overall, 172 of 188 applicants matched in either neuroradiology or vascular/interventional radiology (91%). Neuroradiology programs fared better than they had the previous year, with 30 of 67 programs filling all of their positions (45%) and a total of 83 of 134 positions in this specialty being filled (62%). Vascular/interventional radiology fellowship program results were similar to neuroradiology results from the previous year, with 19 of 97 programs filling all of their positions (20%) and 89 of 217 positions being filled (41%). Although many program directors were disappointed with these results, it was generally understood that the high number of unfilled positions was due to a lower number of applicants than expected.

Meanwhile, in December 2001, a newly formed SCARD task force voted on the optimal timing of the proposed match for all 2004 radiology fellowships, with February–May 2003 receiving six votes and September–December 2003 receiving five votes. After much debate, the leadership of SCARD decided to go forward with a match in the spring of the 3rd year of residency, with the expectation that the match would be moved back to the fall of the 4th year of residency for all radiology fellowships scheduled to begin in July 2005.

A document was then sent to all SCARD members, requesting their commitment to include all clinical fellowships in their departments in the match and seeking their agreement to abide by the rules of the match. There was very strong support from department chairs in favor of the match. Reasons for supporting the match included increased organization of the entire fellowship application process, fairness, less pressure on all participants to make a premature commitment, and the goal of ultimately moving the process to the 4th year of residency. In May 2002, an agreement was forged between SCARD and the National Resident Matching Program, establishing the rules of the match.

In June 2002, the leadership of SCARD sent a letter to all SCARD members, all APDR members, and all fellowship program directors who were not APDR members, explaining the match process. The same information was posted on numerous Web sites, including those sponsored by SCARD, APDR, ACR, and A3CR. The February 1, 2003 to May 1, 2003 interview process will culminate in match day, June 4, 2003, for all fellowships scheduled to begin July 1, 2004. The success of this match and the viability of the match process for future years will be aided greatly by program participation continuing to approach 100%. In this way, the demise of the original match conducted in 1990–1991 by the Society for Cardiovascular and Interventional Radiology, and a resulting return to chaos, can be avoided.

CONCLUSION AND FORECAST FOR THE FUTURE

The fellowship match appears to have been successfully implemented, even though many positions still go unfilled because of market conditions. Strong support from the radiology leadership now sustains the match process. The expectation is that the match will be moved back to the fall of the 4th year of residency for all radiology fellowships that begin in July 2005.

Events of the fall of 2001 remind us that the future is uncertain. There is currently a shortage of radiologists, and the predictions are that this shortage will continue well into the future (29). Residency programs are capped in terms of funding for additional slots. Given this limitation, there are only a few changes that could affect the number of radiologists.

The elimination of the fellowship (or the internship) would create only a one-time increase, not sustained growth in the number of practicing radiologists. The only foreseeable long-term curative measure might be a decrease in the term of residency training from 4 years to 3 years (30). This would result in a lasting increase in the number of trained radiologists, because the funded slots in graduate medical education could likely be reapportioned within the institution and could yield an additional 33% of trained radiologists per year over the previous totals. Many would argue that 3 years is not sufficient to train residents in radiology. The one avenue that might
ameliorate the effects of this shortened period of residency would be to better use the internship. We could develop a guide to an ideal internship training for radiology and suggest that programs attempt to adhere to this template. In this way, residents would come to the program having become familiar with basic imaging during internship elective time and would be better prepared for a more intensive program.

One trend that is clear, however (to paraphrase Yogi Berra), is that it is difficult to make predictions, especially if they are about the future of radiology. The unintended consequences of any sweeping changes being contemplated for increasing the radiology workforce should be considered carefully before changes are made.

REFERENCES