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Breast Imaging Fellowships in the United States: Who, What, and Where?

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Abstract

OBJECTIVE—The purpose of this study was to determine the characteristics of fellowship programs offering breast imaging training and their success in filling positions.

CONCLUSION—A comprehensive list of fellowship training opportunities in breast imaging may help potential applicants identify relevant programs.

Keywords

breast imaging; fellowship; training; women's imaging

Mammography is a central component of breast cancer screening, diagnosis, staging, and posttreatment surveillance. Screening mammography is credited with a 20–35% reduction in mortality from breast cancer among women 50–69 years old and an approximately 20% reduction among women 40–49 years old [1, 2]. Numerous organizations, including the American Cancer Society and the U.S. Preventive Services Task Force, recommend biennial or annual screening mammography beginning at age 40 [3, 4]. As the U.S. population ages, an additional 1.2 million women become eligible for screening mammography every year [5].

The Institute of Medicine [6] and the American College of Radiology [7] independently concluded that there are not enough qualified radiologists to serve the growing population of women seeking screening mammography, either in interpreting the initial screening images or in performing the diagnostic evaluations that follow abnormal screening findings. In a 2007–2008 report on the employment market for radiology, Sunshine and Maynard [8] found that the ratio of job listings to job seekers decreased in 2008 compared with 2006. However, breast imaging departments at academic institutions continued to report more vacancies and greater difficulty filling openings than did any other subspecialty department in radiology. In an independent survey of breast imaging practices, the Society of Breast Imaging [9] found that 29% of respondents had at least one job opening for a breast imaging radiologist and that 10% reported two or more openings.

Although graduating radiology residents and fellows are expected to play an important role in solving the staffing shortage in mammography, it has been difficult to attract newly trained radiologists to the field of breast imaging [10]. We sought to ascertain the state of

breast imaging fellowships in the United States by quantifying and describing existing programs and the success of those programs in the most recent fellowship application cycle.

Materials and Methods

Identification of Fellowship Programs

We compiled a comprehensive list of hospital-based radiology fellowship programs offering specialty training in breast imaging in September 2007. We included in this analysis programs that identified themselves as combined breast and body imaging or women's imaging fellowships because at least 6 months of training were dedicated to breast imaging techniques in each program. We first identified all institutions listed on the Website of the Society of Breast Imaging [11] as having a breast imaging fellowship program. We then contacted the 63 National Cancer Institute (NCI)-designated cancer centers [12] to identify additional institutions not listed on the Society of Breast Imaging Website. Finally, we contacted additional institutions named by fellowship directors or administrators of programs found through the other two methods. At each institution, we identified all relevant training programs. Different programs within the same institution (e.g., a breast imaging fellowship and a women's imaging fellowship) were considered separate programs. Before completing this study in March 2008, we performed a second review of the Society of Breast Imaging Website and identified additional institutions that had not been listed 6 months earlier.

Survey

We contacted each program for a brief telephone survey. If a representative of the fellowship program was not reached by telephone, a follow-up e-mail was sent to the program director or administrator. Survey items pertained to the academic year July 2007 through June 2008 and included the number of positions available in the program; current number of fellows; length of time devoted to breast imaging; and, if available, a description of the fellowship year in terms of mammography, sonography, MRI, and other imaging techniques and procedures. Finally, we asked each representative how long their institution had offered the specific fellowship program. The questions were generally answered by administrative coordinators.

Results

Fellowship Program Characteristics

We identified 55 institutions offering any fellowship program in breast imaging, women's imaging, or breast and body imaging. The Society of Breast Imaging Website listed 34 of these institutions (62%), 21 of which (38%) were also NCI-designated cancer centers. We identified an additional 14 of the 55 institutions (25%) by contacting the 42 NCI cancer centers not included on the Society of Breast Imaging list. An additional seven of 55 institutions (13%), not found on either the Society of Breast Imaging list or on the list of NCI-designated cancer centers, were identified through referrals made by administrators of programs contacted in the course of the study.

Forty-eight institutions offered a single relevant fellowship track (breast imaging, breast and body imaging, or women's imaging); six offered two different tracks (breast imaging in addition to either women's imaging or breast and body imaging); and one institution offered all three tracks. In total, 63 fellowship programs in breast imaging, women's imaging, or breast and body imaging were offered at 55 institutions. Of the 63 programs identified, 62 programs responded to our survey. Table 1 shows a complete list of the 54 participating institutions and the programs offered.

The programs were distributed broadly across the United States. Categorized by U.S. census region [13], 20 of 62 programs (32%) were located in the South, followed by 19 (31%) in the Northeast, 12 (19%) in the Midwest, and 11 (18%) in the West. The Northeast offered 34 of the 110 positions (31%); the South, 33 (30%); the Midwest, 25 (23%); and the West, 18 (16%). Although postgraduate training in breast imaging has been offered in the United States for more than 20 years, the histories of the individual programs varied substantially. This information was unavailable for five programs, but among the other 57 programs, 25 (43%) had been in existence for 10 or fewer years. Eleven programs (19%) had existed for 5 or fewer years, 14 (24%) for 6–10 years, 18 (32%) for 11–15 years, 10 (18%) for 16–20 years, and four (7%) for more than 20 years.

Programs varied with respect to curricula. Among the 34 breast imaging fellowship programs, 32 (94%) included a full year of postgraduate training dedicated to all techniques of breast imaging, including mammography, sonography, MRI, and breast interventional procedures. Two breast imaging programs offered 6-month positions. Women's imaging programs offered an average of 6 months of training in breast imaging and 6 months of training in imaging techniques specific to gynecology and obstetrics. Combined breast and body imaging fellowships offered 6 months of breast imaging and a more varied curriculum for the other 6 months of training. In addition, some of the programs surveyed allowed fellows to generate a work schedule tailored to their individual professional interests and goals.

Fellowship Positions and Application Results

In 60 of the 62 programs surveyed, the relevant fellowship programs were 1 year in duration; two programs had 6-month fellowships in 2007. The programs had a median of two fellows per year (range, 1–5): 27 (44%) offered one position, 24 (39%) offered two, eight (13%) offered three, two (3%) offered four, and a single program (2%) offered five positions in 2007. These programs collectively accounted for 110 fellowship positions.

In 2007, 88 of the 110 fellowship positions (80%) offered in breast imaging, women's imaging, and breast and body imaging were filled. The result of these recruitments was that 42 of the 62 surveyed programs (68%) had a complete panel of fellows. The likelihood that a program would become filled was higher for programs in the Northeast than for programs in other regions of the United States and was higher for programs in existence more than 5 years

than for programs 5 years old and younger (Table 2). The likelihood of a program being filled was unrelated to program size (several fellows vs one fellow) or program track (breast imaging vs women's or breast and body imaging). Programs identified only through contact with NCI-designated cancer centers were more likely to be filled (76%) than were programs identified on the Society of Breast Imaging Website (67%). As shown in Table 2, programs identified through both sources were most likely to have a complete panel of fellows (80%).

Discussion

Breast imaging is a critical subspecialty of radiology because screening mammography saves lives [1, 2]. Previous studies have suggested an association between the accuracy of mammographic interpretation and a radiologist's annual volume, years of practice, and fellowship training in the field [14–16]. The shortage of breast imaging specialists in the United States and the potential negative effect of the shortage on access to mammography is an ongoing concern [6]. Currently, mammograms are interpreted by a combination of breast imaging specialists, other specialists, and general radiologists. In a survey of radiologists in 2003 [17], approximately 10% of all radiologists identified themselves as breast imaging

specialists, and 61% of radiologists reported reading mammograms. In total, nearly one third of all mammograms are interpreted by only 10% of radiologists [18].

The trend toward specialization is not unique to breast imaging [19]. An increasing number of graduating radiology residents are pursuing subspecialty fellowships before entering the workforce [20]. Neither breast imaging nor women's imaging has historically benefited from this trend [21]. In fact, graduating residents in a single survey [22] reported using fellowship training in another subspecialty field to negotiate a position that does not require reading mammograms. Because graduating radiologists are increasingly undertaking subspecialty training before entering the workforce, cultivating an interest in breast imaging at the resident and fellowship levels is necessary to educate a sufficient number of radiologists to be trained and willing to interpret mammograms [10].

In 2003, Bassett and colleagues [21] identified 53 programs offering breast and women's imaging fellowship positions; 63 fellows were recruited at 46 programs. The results of our more recent survey suggest that interest in breast imaging may be growing. In 2007, 88 fellows were recruited to 45 programs, 42 of which were completely filled. An increased demand for subspecialty training in breast imaging is further supported by the identification of 11 programs introduced within the past 5 years. However, lack of approval of these fellowship programs by the American College of Graduate Medical Education has caused difficulty in tracking the numbers and in comparing the often variable curricula at individual institutions.

Our study had several limitations. First, our primary information sources—the Society of Breast Imaging directory and contact with the 42 NCI-designated cancer centers—might not have captured all institutions offering postgraduate training in breast imaging. We identified seven programs through referrals alone, and other such programs may exist that we did not identify. In addition, our conversations with fellowship directors suggested that there may be fluidity among the various imaging subspecialty tracks, depending on the interest of trainees and educators in any given year. Our classification of fellowship programs reflects the definitions of these programs in 2007. Finally, information gathered from each program was limited by the knowledge of the representative who responded.

If interest in breast imaging, women's imaging, and breast and body imaging fellowships continues to grow, the need will increase for an updated, comprehensive, readily available list to assist in the application process. Our exercise of searching for institutions offering fellowship training in breast imaging revealed some of the challenges faced by residents interested in the field. Changes in the number of positions and programs available were a major obstacle in developing this list. Although we did not collect information on program applicants, anecdotal reports from program directors and administrators suggested many fellows were internal applicants remaining for an additional year after general radiology residency to specialize in breast imaging. As the number of external applicants grows, programs and residents will benefit from a directory of fellowships offering breast imaging training.

Guaranteeing that a sufficient number of physicians are trained in breast imaging warrants great attention. The list we developed, which has been shared with the Society of Breast Imaging, should facilitate further research on trends in breast imaging training. We hope this list will help those seeking fellowship training in breast imaging to identify relevant programs.

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TABLE 1

Fellowship Programs in Breast Imaging, Women's Imaging, and Breast and Body Imaging, by State

Program	Type of Program	Location
University of Alabama	Breast imaging	Birmingham, AL
Mayo Clinic	Other	Scottsdale, AZ
University of California at San Francisco	All programs offered	San Francisco, CA
University of California at Los Angeles	Breast imaging	Los Angeles, CA
University of Southern California	Other	Los Angeles, CA
University of California at Irvine	Other	Orange, CA
Stanford University	Other	Stanford, CA
Yale University	Breast imaging + one other	New Haven, CT
University of Colorado	Other	Denver, CO
Mount Sinai Comprehensive Breast Center	Breast imaging	Miami, FL
University of Miami, Jackson Memorial Hospital	Breast imaging	Miami, FL
Emory University	Other	Atlanta, GA
Program	Type of Program	Location
University of Chicago	Breast imaging	Chicago, IL
Northwestern University, Lynn Sage Comprehensive Breast Center	Breast imaging	Chicago, IL
Susan G. Komen Breast Center	Breast imaging	Peoria, IL
Indiana University School of Medicine	Breast imaging	Indianapolis, IN
University of Iowa Hospitals and Clinics	Breast imaging	Iowa City, IA
University of Louisville Hospital	Breast imaging	Louisville, KY
University of Maryland	Breast imaging + one other	Baltimore, MD
Beth Israel Deaconess Medical Center	Other	Boston, MA
Brigham and Women's Hospital	Breast imaging + one other	Boston, MA
Massachusetts General Hospital	Breast imaging	Boston, MA
University of Michigan	Other	Ann Arbor, MI
Henry Ford Hospital	Other	Detroit, MI
William Beaumont Hospital	Other	Royal Oak, MI
Mayo Clinic	Other	Rochester, MN
Mallinckrodt Institute of Radiology	Breast imaging	St. Louis, MO
St. Barnabas Medical Center	Other	Livingston, NJ
Morristown Memorial Hospital	Breast imaging	Morristown, NJ
Beth Israel Medical Center	Breast imaging	New York, NY
Columbia University, New York Presbyterian Hospital	Other	New York, NY
Cornell University, New York Presbyterian Hospital	Other	New York, NY
Memorial Sloan-Kettering Cancer Center	Other	New York, NY
New York University	Breast imaging + one other	New York, NY
University of Rochester	Other	Rochester, NY
University of North Carolina	Breast imaging	Chapel Hill, NC
Duke University Medical Center	Breast imaging	Durham, NC
Barrett Breast Center	Breast imaging	Cincinnati, OH

Program	Type of Program	Location
Breast Imaging of Oklahoma	Breast imaging	Edmond, OK
Thomas Jefferson University	Breast imaging + one other	Philadelphia, PA
University of Pennsylvania, Abramson Cancer Center	Breast imaging	Philadelphia, PA
University of Pittsburgh Medical Center	Other	Pittsburgh, PA
Vanderbilt University Medical Center	Other	Nashville, TN
University of Texas Southwestern Medical Center	Breast imaging + one other	Dallas, TX
Baylor University Medical Center	Breast imaging	Houston, TX
M. D. Anderson Cancer Center	Breast imaging	Houston, TX
Methodist Hospital	Breast imaging	Houston, TX
University of Texas	Other	San Antonio, TX
University of Utah, Huntsman Cancer Institute	Other	Salt Lake City, UT
University of Virginia	Breast imaging	Charlottesville, VA
Virginia Commonwealth University	Breast imaging	Richmond, VA
George Washington University	Breast imaging	Washington, DC
University of Washington, Seattle Cancer Care Alliance	Breast imaging	Seattle, WA
University of Wisconsin	Breast imaging	Madison, WI

Note—Breast imaging indicates an institution offering breast imaging only, breast imaging + one other indicates an institution offering breast imaging plus either breast/body or women's imaging, other indicates a program offering either breast/body or women's imaging.

TABLE 2

Proportion of Programs Filled

Characteristic	No.	Programs Filled	Programs Unfilled
All programs	62 (100)	42 (68)	20 (32)
U.S. census region			
Northeast	19 (31)	16 (84)	3 (16)
Midwest	12 (19)	7 (58)	5 (42)
West	11 (18)	8 (73)	3 (27)
South	20 (32)	11 (55)	9 (45)
No. of fellows per year			
1	28 (45)	16 (57)	12 (43)
2	23 (37)	17 (74)	6 (26)
3	8 (13)	6 (75)	2 (25)
4	2 (3)	2 (100)	0 (0)
5	1 (2)	1 (100)	0 (0)
Program track			
Breast imaging	34 (55)	24 (71)	10 (29)
Women's imaging or breast and body imaging	28 (45)	18 (64)	10 (38)
Source			
Society of Breast Imaging Website only	14 (23)	6 (43)	8 (57)
National Cancer Institute cancer centers list only	16 (26)	11 (69)	5 (31)
Both Society of Breast Imaging and cancer centers lists	25 (40)	20 (80)	5 (20)
Referral	7 (11)	5 (71)	2 (29)
Program age (y)			
1–5	11 (19)	4 (59)	7 (64)
6–10	14 (24)	10 (71)	4 (29)
11–15	18 (32)	13 (72)	5 (28)
16–20	10 (18)	10 (100)	0 (0)
> 20	4 (7)	2 (50)	2 (50)
Total ^a	57 (100)	39 (68)	18 (32)

Note—Values are numbers of fellows with percentages in parentheses. The total number percentages are by column, and Programs-Filled percentages are by row.

^aInformation unavailable for five programs.