

# Women as Radiologists: Are There Barriers to Entry and Advancement?

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**Purpose:** In consideration of the fact that women constitute only 25% of radiology residents, even though they constitute 45% of medical students, this study was conducted to determine if the trend of women choosing radiology as a career differs from that for other medical specialties and if there are differences on the basis of the gender of program directors or geographic location. The authors also wished to determine if constraints exist that prevent women from advancing into positions of leadership in radiology.

**Method:** The percentage of women in each of the 186 radiology residency programs was compiled to determine the mean and standard deviation of women represented and from those data to examine if there were patterns of exclusion related to program size, location, or the gender of program directors. The membership and committee lists of the ACR and the Radiological Society of North America (RSNA) were examined to gauge the participation of women as leaders in these 2 organizations, as were the mastheads of *Radiology* and the *American Journal of Roentgenology*. The number of female chairs of academic departments was also examined.

**Results:** Over the past decade, the percentage of women in diagnostic radiology residencies has remained remarkably constant at or slightly above 25%. There was no discernable prejudice against women applicants by program size, location, or program director gender. In both the ACR and the RSNA, women are represented in positions of leadership approximately in proportion to their percentage in the general membership. Journal mastheads have fewer women than might be expected given the participation of women in academic radiology. There are a small but increasing number of women chairing academic radiology departments.

**Conclusion:** The relatively low percentage of women in diagnostic radiology residencies is not a reflection of the gender of program directors. Women are represented in positions of influence and authority in major organizations in American radiology in proportion to the overall number of women in the organization. However, women continue to be underrepresented in radiology chair positions. Explanations must be sought for the relative unattractiveness of radiology to prospective women residents and barriers to the advancement of women in academic radiology.

**Key Words:** Women, residency, leadership, barriers to entry and advancement

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## INTRODUCTION

In 2004, women were the recipients of 44% of the medical degrees granted in the United States [1]. This past year has seen women reach parity with men in the number of applicants to American medical schools. These percentages reflect a continuation of a more than decade-long demographic trend toward greater participation by women in the medical profession. Correspondingly, for most residencies, women constitute an increasingly larger fraction of the total complement of trainees [1-10].

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One notable exception is diagnostic radiology, which has seen no appreciable change in the percentage of female residents in the past 10 years. Are there gender-related barriers to admission among a substantial number of programs that in the aggregate limit the overall number of women in training in our specialty? And at the same time, is there demonstrable evidence of the restriction of female radiologists from advancement to positions of responsibility in the hierarchy of the Radiological Society of North America (RSNA) and the ACR, the 2 organizations whose many members come from all types of imaging practices and from all sections of the country? The purpose of this study was to examine these 2 questions to determine if an inference of bias can be drawn relative to the issues of initial acceptance and later leadership in our specialty.

## MATERIAL AND METHODS

The number and percentage of radiology residents and residents in all specialties in each year over the past decade are listed in the annual medical education issue of *JAMA* [1-10]. A roster of radiologists in training in 2003, available by name, gender, and program, was obtained from the ACR's register of residents. Demographic information with respect to the distribution of women residents was provided by the membership department of the ACR and by the corresponding department of the RSNA. The Web sites of these 2 organizations provided information on the names of the constituents of their various committees. Because gender is not part of the demographic data, gender was determined by reviewing the name of each listed individual.

Data on female representation in editorial positions in 2 leading radiology journals (*Radiology* and the *American Journal of Roentgenology*) were derived from their masthead lists, assessed annually.

The number and percentage of women program directors were derived from their listing in the 2000-2001 version of the American Medical Association's *Graduate Medical Education Directory* ("the green book"). The identities of women chairs in radiology came from the current roster of members of the Society of Chairmen of Academic Radiology Departments. Chi-square and analysis of variance (ANOVA) tests were used for statistical analysis.

## RESULTS

### Entry Into Radiology Residencies

Currently, there are just under 100,000 trainees in Accreditation Council for Graduate Medical Education–approved residency programs in the United States. Over the past decade, the percentage of women in all residencies in the United States rose from 27.2% in 1995 [10] to 37.3% in 1999 [6] and then to 40.0% in 2003 [2]. Further increases should be expected, because women constitute 45% of the 66,677 students currently matriculating [1].

Despite the increasing number of women residents in general, the percentage of women residents in diagnostic radiology training programs has remained nearly constant ( $p = .05$ ). The percentage of women residents in diagnostic radiology was 26.9% in 1994 [10] and 25.7% ( $s = 12.72\%$ ) in 2003 [2]. During this interval, the total number of radiology residents did not rise appreciably. Of the radiology residencies with percentages of women trainees more than 1 standard deviation below the mean, there was no correlation with program size or urban, suburban, or rural location and no significant variance among regions of the country, although of the 7 univer-

**Table 1.** Percentage of women in "controllable-lifestyle residencies" (1999 to 2003)

Year	Radiology	Anesthesiology	Pathology
1996	27.9	21.7	41.4
1998	26.3	26.6	42.8
1999	26.9	24.3	40.9
2000	23.4	24.4	43.8
2002	24.7	28.0	48.2
2003	25.7	27.0	49.4

sity programs with few women, 5 were in the South. Two notable programs in the South included 1 university program that had 25 men and 1 woman and another that had 22 men and 2 women. On the other hand, there were several radiology programs in scattered locations in which women currently occupied more than two thirds of house staff positions.

Among all other residencies characterized by a so-called "controllable lifestyle," other than diagnostic radiology, only anesthesiology continues to have a percentage of women trainees less than 40% of all residents. In that specialty, it was 24.3% in 1995 [9], sank to 21.7% in 1996 [8], and rose to 27.0% in 2003 [2] (Table 1). In comparison, the percentage of women residents in pathology increased from 40.9% in 1995 [9] to 49.4% in 2003 [2]. Over 57% of dermatologic trainees and 52.0% of psychiatry residents are women. Even urology has since 1995 become more popular for women, with their percentage in training programs in this specialty increasing from 6.5% [10] to 10.9% in 2001 [4].

In each case, differences are statistically significant (ANOVA,  $p = .05$ ). In Canada, where 59% of medical students are women, only 37% of radiology residents are women (personal communication, David Hawkins, MD, director, Association of Canadian Medical Colleges). A significant difference of approximately 20% between the relative number of women medical students and women radiology trainees seems to occur on both sides of our northern border (chi-square,  $p < .01$ ).

### Program Directors

In the list of radiology programs in the 2000-2001 *Graduate Medical Education Directory*, 22% of the directors were women [11]. Of the 22 programs with percentages of women trainees more than 1 standard deviation below the mean in 2000-2001, 16 program directors were men and 6 were women. Yet of the 26 programs in which the percentages of women residents were more than 1 standard deviation above the mean, 20 program directors were men and 6 were women (chi-square,  $p > .08$ ). Thus, the gender of program directors seems unrelated to the likelihood that a residency would have a relatively

**Table 2.** Percentage of women in ACR leadership positions, 2003

Position	Total	Female	%
Board of Chancellors	26	4	15.4
Council Steering Committee	21	3	14.3
Specialty commissions	579	89	15.4
Operational commissions	329	51	15.5
Free-standing committees	196	32	16.3

lower percentage of women in training than the national average for all radiology residencies.

### Female Radiologists in Positions of Leadership

The ACR had 29,466 members in 2000, of whom 13.1% were women. In 1999, 20% of ACR officers, 15.4% of its Board of Chancellors, and 14.3% of its Council Steering Committee were female. Of its various commissions and committees, representation by women was proportional to their percentage in the membership at large. Women members occupied 15.5% of the positions in specialty commissions, 15.5% of operational commissions, and 16.3% of free-standing committees and task forces (Table 2). Among state chapter officers, counselors, and alternate counselors, 11.7% were women. In the ACR's 2004 elections, 2 of 6 candidates for officers were women, and 1 of the 5 candidates for the college nominating committee was a woman. Thus, the hierarchy of the ACR is well represented by women, at least in relation to their membership percentage overall (ANOVA,  $p = .01$ ).

In the RSNA in 2002, 15.8% of the US membership of 25,337 radiologists were women. On the 2 committees for which membership might be considered a stepping stone to higher office within the organization, significant participation by women was evident. Four of the 34, or 12%, members of the Refresher Course Committee were female. On the Scientific Program Committee, 23 of 121, or 19%, were distaff members. Four of the 16 subcommittee chairs were women (Table 3). Therefore,

**Table 3.** Women in the radiological society of North America

Position	Total	Women	%
Membership	25,337	3994	15.8
Refresher Course Committee	34	11	12
Scientific Program Committee	121	23	19

the hierarchy of the RSNA is also well represented by female members (ANOVA,  $p = .01$ ).

### Journal Mastheads

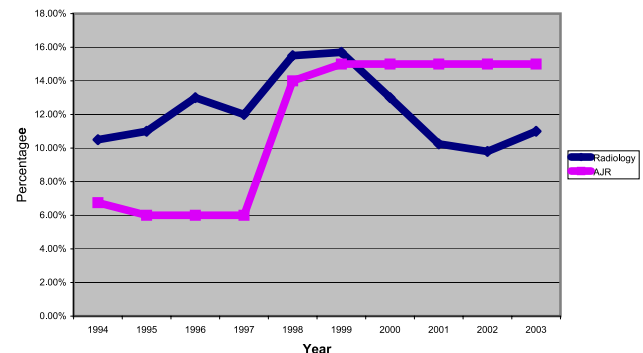
The mastheads of *Radiology* and the *American Journal of Radiology* do not lack representation by women. For the past decade, the percentage of women editors and assistant editors has varied from 10% to 12% for *Radiology*, slightly below the percentage of women in our specialty as a whole. Yet these rates are still appreciably below the national percentage of women in academic practice, which in 2000 was 23% [12]. For the *American Journal of Radiology*, the percentage of women editors and assistants rose from 5%, where it had been for several years until 1997, when it jumped to 15%, where it has remained (Figure 1).

### Society of Chairmen of Academic Radiology Departments

In 2004, among 113 active members of Society of Chairmen of Academic Radiology Departments, only 9 (8%) were women. Yet this number represented an advance from the mid-1990s, when fewer than a handful of permanent chairs were women.

### DISCUSSION

The failure of radiology to attract more women medical students is troubling. Even though their number continues to increase, the percentage of women in diagnostic imaging training programs remains static. Most likely, the reasons are multifactorial and may involve such influences as attitudes toward work, technology, training length, patient interaction, and exposure to radiology mentors during the basic science and clerkship years of medical school [13,14]. Perhaps even more subtle considerations might also be at play here. For example, a study by Frank et al [15] that entailed a questionnaire



**Figure 1.** Women editors and assistant editors, *American Journal of Roentgenology* (AJR) and *Radiology*.

sent to 4,501 women physicians in 1999 found that only 35% of women in radiology were “almost always” or “always” satisfied with their careers. This percentage had decreased from a previous study of women’s attitudes in 1995 that demonstrated that 47% of women in radiology were satisfied with their careers [16]. A transmission of this dissatisfaction from women radiologists to initially interested medical students may in some way dissuade them from further consideration of our specialty before the application process begins.

Our information suggests that there are no differences in the percentage of women in individual training programs on the basis of the gender of the program directors. One might assume that women program directors are in positions to be role models for medical students. Even though they may act in that fashion, it does not translate into more women choosing radiology as a career.

Among the major organizations in American radiology, there is a definite record of the nonexclusion of women from positions of influence and authority, as demonstrated by the assignment of women radiologists at least in roughly proportionate numbers to their percentage in the general membership roles. However, what might be true for these 2 organizations, 1 dedicated to education and the other to practice quality and political advocacy, may not be true for advancement in academic practice.

In 2000, Vydareny et al [17] demonstrated that men and women remained at the assistant professor level for roughly the same time before promotion to associate professor but that women lingered at the associate professor level longer and were less likely to gain tenure. Correspondingly, they were less likely to advance to chair positions. In 2004, there were only 9 women as active members of the Society of Chairmen of Academic Radiology Departments. Part of the reason for this discrepancy in advancement could be that women, even in academic practice, were more apt to choose to work part-time, at least for some time in early and midcareer, or that they are more frequently designated for roles such as clerkship director, for which the imputed value of that task to a promotions committee would not be as great as assignment as section head or program director [18,19]. Also, part-time workers would be less likely to obtain grants, which is another criterion often used for tenure decisions by both in-house promotions committees and search committees at other institutions. Another reason, although less attractive, that must be considered is bias toward women working in academic settings [20].

Our population in general and in the medical profession in particular is becoming more diverse. Members of

all groups encompassing both women and minorities must be accommodated to maximize their participation in the workplace, both at entry levels and in positions of responsibility. That should occur even if it requires at times according them, if not overt preference then at least concerted attention, to the particularities of the obligations they face and the predilections they bring to the job. Ensuring the equality of opportunity for self-fulfillment is a responsibility for all of us. If we make substantive progress in this area and articulate its validity persuasively, we might then anticipate that women medical students would become more interested in joining and enriching our specialty.

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