

# Radiologic History Exhibit

## The American Association for Women Radiologists (AAWR): 25 Years of Promoting Women in Radiology<sup>1</sup>

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On the 25th anniversary of the American Association for Women Radiologists (AAWR), the association's accomplishments in promoting the careers of women radiologists were reviewed. Programs that feature opportunities for women to balance their careers and their personal lives have contributed greatly to promoting networking opportunities at national meetings. Highlights of women's accomplishments in national radiology organizations underline how far women have advanced in the specialty. Future initiatives for the organization center on increasing women's involvement in recruiting and mentoring other women in radiology.

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**Abbreviations:** AAMC = Association of American Medical Colleges, AAWR = American Association for Women Radiologists, ACR = American College of Radiology, ARRS = American Roentgen Ray Society, RSNA = Radiological Society of North America, SPR = Society of Pediatric Radiology

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## Introduction

The American Association for Women Radiologists (AAWR) celebrated its 25th anniversary in 2006. The group's mission is to provide a forum for issues unique to women in radiology, radiation oncology, and other related professions; to sponsor programs that promote opportunities for women; and to facilitate communication among members and other professionals. Its goals are to advance the professional and academic standing of women in radiology, to identify and address issues unique to women, to retain active members and increase membership, and to improve the association's visibility and communication.

## History of AAWR

In 1981 the AAWR was established to address significant concerns unique to women radiologists. It began as a series of informal meetings led by the late Dr Helen Redman (Fig 1) and Dr Ann Lewicki (Fig 2). Both of these women recognized that special programs were needed for women radiologists at national meetings. The Board of Directors of the Radiological Society of North America (RSNA) contributed initial funds to help form the AAWR, which held its first official meeting during the 1981 RSNA annual meeting. Adele Swenson, executive director of the RSNA from 1971 to 1985, (Fig 3) also offered her expertise in the development of the bylaws, incorporation, and the structure of the AAWR.

The founding members formed an AAWR Steering Committee (Fig 4), which deliberated over whether to become an independent organization—like the American Association of Women Psychiatrists—or to ask to be a dependent organization like the American Medical Association Women Physicians Congress. They chose to be independent. The Steering Committee also debated about protesting barriers to women's professional success and decided instead to search for solutions to problems such as maternity and radiation exposure, balancing duties both at home and at work, getting a job, getting promoted, becoming a partner, and attaining professional skills such as negotiating, publishing, presenting, and achieving visibility and national recognition to help women radiologists achieve personal and professional success. A series of refresher courses presented at the annual meetings of the RSNA and the American Roentgen Ray Society (ARRS) became the main venue by which these issues were addressed.



**Figure 1.** Dr Helen Redman, the first woman president of RSNA and a co-founder of the AAWR. (Courtesy of the AAWR archives.)



**Figure 2.** Dr Ann Lewicki, a co-founder of AAWR. (Courtesy of the AAWR archives.)



**Figure 3.** Adele Swenson, the RSNA executive director from 1971 to 1985. (Courtesy of the RSNA archives.)



**Figure 4.** First executive committee of the AAWR (1981): Carol Rumack, MD (president); Linda Fahr, MD (vice president); Katherine Shaffer, MD (secretary); Nancy Whitley (treasurer, not pictured). (Courtesy of the AAWR archives.)

In 1982, RSNA President Dr Theodore Tristan published an editorial in *Radiology* entitled “Women in Radiology” (1), in which he welcomed the AAWR as a new organization and agreed that there were real barriers to fully incorporating a professional identity for women. He further acknowledged that women were neither accepted nor recognized as full peers in the radiologic community and that they experienced difficulties in attaining academic leadership positions and membership in professional organizations,

while at the same time being denied the financial benefits accorded to men. Several chairmen of academic radiology departments joined the new organization, recognizing that the entire field of radiology would benefit from the success of its women members. Among these chairmen were Dr Ernest Ferris, Dr Robert Campbell, and Dr John Tampas. Dr Wayne Houser, the RSNA refresher course chair, encouraged the AAWR to



sponsor a refresher course during the 1981 RSNA annual meeting; AAWR has done so every year since then. RSNA supported the concept of an AAWR booth to provide more visibility for the organization and more accessibility to information for women radiologists (Fig 5).

### Advancement of Professional and Academic Standing of AAWR Members

In 1983, Dr Gretchen Gooding, 1985 AAWR president, reported that women radiologists were underrepresented in the editorial boards of major radiology journals (1.7%) and in the upper echelons of radiologic societies (2). She stated that the newly formed AAWR could act as a conduit to identify talented women radiologists who were eager to serve. For many years, men moderated most scientific sessions at annual meetings and scientific assemblies of radiologic societies. Abstract presenters were usually men, even if the work had been first-authored by a female colleague. Few women were selected to serve on key committees of radiologic organizations; this “invisibility” excluded them from being selected as officers in radiologic societies.

Since the mid-1980s, women have played an active role in local, state, and national radiologic societies and have gained recognition and advanced to many leadership positions. AAWR officers represent its membership at the American College of Radiology (ACR) Intersociety Commission, where leaders of over 40 radiologic organizations discuss important issues in the current practice of our specialty, as well as its future challenges. AAWR provides a voice for its members at the ACR through an ACR councilor and an ACR alternate councilor. Dr Carol Rumack is an ACR chancellor and a current chair of the Ultrasound Commission. Dr Valerie Jackson and Dr Kay Vydareny are ACR past presidents. Dr Sarah Donaldson was secretary-treasurer and chair of the Education Commission. AAWR also provides a voice for its members through representation at the Academy of Radiology Research. The academy identifies sources of support for radiologic research and uses research to improve the knowledge base, educational programs, and patient care activities of our specialty. The academy has lobbied successfully for a new National Institute of Biomedical Imaging and Bioengineering that began in 2002.

The AAWR Executive Committee instituted an ad hoc committee (the Committee to Promote



**Figure 5.** AAWR booth at the 2005 RSNA annual meeting. (Courtesy of the AAWR.)



**Figure 6.** Carol Rumack, MD, and Kay Vydareny, MD, at the 2005 ACR meeting where Dr Vydareny received the 2005 ACR Gold Medal. (Courtesy of the AAWR archives; photographed by Dr Katarzyna Macura.)

the Advancement of Women) charged with nominating nationally recognized women candidates to hold office within major radiologic organizations. In 2002, the AAWR nominated Dr B. J. Manaster and Dr Julie Timins to the ACR Council Steering Committee. In the past 2 years, there were two

**Table 1**  
**All AAWR Awards**

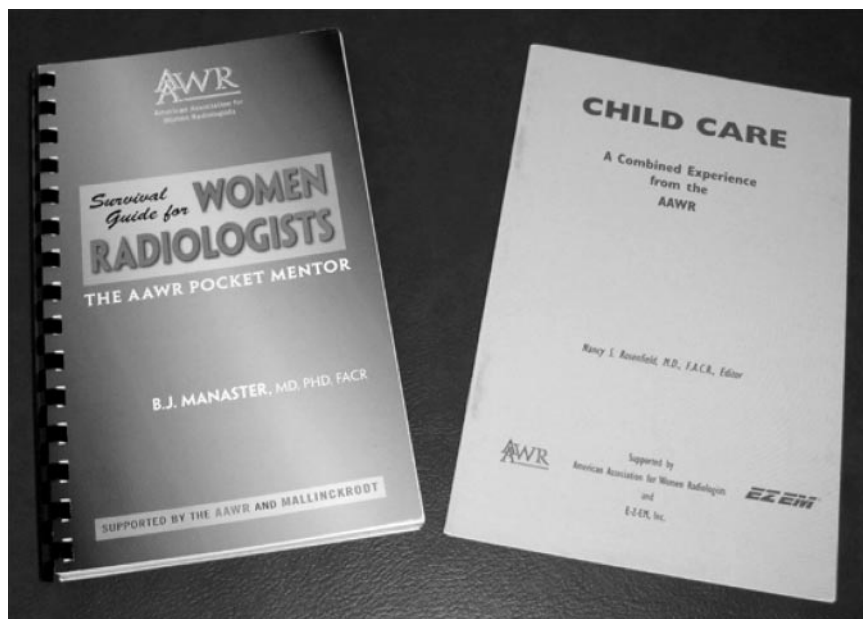
Name of Award	Description
<b>AAWR awards</b>	
Marie Skłodowska-Curie Award	Presented annually to an individual who has made an outstanding contribution to the field of radiology.
Alice Ettinger Distinguished Achievement Award	Recognizes long-term contributions to radiology and to AAWR.
Lucy Frank Squire Distinguished Resident Award in Diagnostic Radiology and Eleanor Montague Distinguished Resident Award in Radiation Oncology	Residents are nominated for these awards for outstanding contributions in clinical care, teaching, research, or public service.
<b>AAWR Research and Education Foundation awards</b>	
AAMC* Professional Development Seminar for Mid-Career Women Faculty	The awardee is a professor or an associate professor, shows a clear potential for advancement to a major administrative position such as section or department head, and attends a national seminar for mid-career women faculty.
AAMC Professional Development Seminar for Early-Career Faculty	The awardee attends a national seminar tailored to women at the assistant professor level who are aiming for a position of leadership in academic medicine. It is targeted primarily at physicians, but is also pertinent for PhD researchers.
Member-in-Training Award for Outstanding ASTRO* Presentation in Radiation Oncology	Cash award for professional development given for an outstanding scientific presentation by a resident or fellow in radiation oncology at the ASTRO annual meeting.
Member-in-Training Awards for Outstanding RSNA Presentations in Diagnostic Radiology and Radiation Oncology	Cash award for the professional development of fellows and residents who are both the first author and the presenter of an abstract accepted for scientific presentation at the RSNA annual meeting. One is awarded for diagnostic radiology and the other is for radiation oncology.
Research Seed Grant	Awards a \$5000 grant to a member of AAWR who requires support to explore the initial approach to a research plan. Also provides experience supporting an application for a more comprehensive study of the research topic.
*AAMC = American Association of Medical Colleges, ASTRO = American Society for Therapeutic Radiology and Oncology	

elected ACR chancellors nominated by the AAWR: Dr Sarah Donaldson and Dr Carol Ruckmick. Dr Kay Vydareny was the AAWR ACR councilor when she was elected the first woman speaker of the ACR. Her outstanding work in this role led to her election as ACR chancellor and later as the first woman president of the ACR. In 2004, the AAWR nominated Dr Kay Vydareny for the ACR Gold Medal (Fig 6). The current chair of the Committee to Promote the Advancement of Women is Dr Valerie Jackson, who is professor and chair at Indiana University Department of Radiology and a past president of ACR.

At present, a good beginning of women in leadership roles in radiology has occurred, as is evidenced by two ACR presidents, six Society of Pediatric Radiology (SPR) presidents, two RSNA presidents, and two ARRS presidents. Recognition of outstanding leadership by women with

Gold Medals in radiology so far includes five ACR Gold Medals (two were given to Nobel Prize winners), two SPR Gold Medals, six RSNA Gold Medals, and five ARRS Gold Medals.

AAWR has instituted four awards to recognize outstanding accomplishments of women in radiology. These are the Marie Skłodowska-Curie Award, the Alice Ettinger Award, the Lucy Frank Squire Award, and the Eleanor Montague Award. In 1991, the AAWR incorporated the AAWR Research and Education Foundation to support professional development and research by women. The goal of the AAWR Research and Education Foundation is to provide professional leadership awards and research grants to AAWR members (Table 1).



**Figure 7.** *Survival Guide for Women Radiologists: The AAWR Pocket Mentor*, published in 2002, and *Child Care: A Combined Experience from the AAWR* (monograph published in 1997). (Courtesy of the AAWR.)

## Gender-unique Issues

### Maternity and Radiation Exposure

In 1986, Dr Sandra Fernbach (1988 AAWR president) and colleagues explored the issue of pregnancy and radiology. They emphasized safety concerns but concluded that it is safe to be pregnant and to practice radiology (3). The AAWR also conducted a series of surveys of academic and private diagnostic radiology and radiation oncology departments regarding pregnancy and maternity leave policies for their house staff. These surveys were conducted in the early 1980s, 1987, and 1993. The last survey documented not only a significant increase in the number of programs that have specific pregnancy and maternity leave policies, but also that these policies were more readily available to members of the department than in previous years (4,5). The publications resulting from these surveys provided guidance in developing a comprehensive maternity policy that included the following elements: planned pregnancy, preconception, antenatal guidance for fluoroscopy and angiography, prenatal sick leave, efforts to complete normal duties during the prenatal period, maternity leave, call requirements, adoption leave, paternity leave, family leave, and insurance. In 2006, Dr Meghan Blake, a radiology resident, was the lead author of an article that proposed program guidelines for maternity leave for radiology residents (6). The project was accomplished in partnership with the

Association of Program Directors in Radiology to ensure that it would be appropriate for all radiology residency programs to adopt. AAWR past presidents Dr Kimberly Applegate and Dr Ewa Kuligowska co-authored the manuscript with Dr Blake. AAWR has provided additional education about radiation exposure from diagnostic procedures performed on women during pregnancy through publications by Dr Julie Timins (7,8).

### Quality of Life

AAWR has also worked toward changing eligibility criteria for the American Board of Radiology candidates to allow all residents to take more than 4 weeks off over the course of a year while still keeping the total amount of time taken off during the residency unchanged. This change allows women residents to take maternity leave, and it affords all residents flexibility in their training in the case of illness or injury.

### Balancing Roles at Home and at Work

In 1982, Dr Linda Fahr (1983 AAWR president) moderated the AAWR-sponsored refresher course at the RSNA entitled "Dual Career Marriages." The speakers were a Chicago psychoanalyst, a mammographer (mother of four and wife of a pediatric allergist), a pediatrician and a pediatric radiologist (parents of two), and an academic cardiovascular radiologist (mother of three) and her son (a third-year medical student). The course evoked much discussion about how traditional roles are changing now that both partners have time constraints and must balance a productive career with the challenges of running a





Figure 8. The AAWR Web site (<http://www.aawr.org>).

home. The conclusion from the course was that a dual-career marriage requires a constant search for equity from both partners; the equilibrium between marriage and career must be constantly evaluated, and the priorities may continually change within the marriage-career structure.

### Child Care

Dr Nancy Rosen (1997 AAWR president) edited the child care monograph, which contains the collective experience of AAWR members and their views on child care options (Fig 7). The monograph reaffirms that suitable, even wonderful, child care is within reach for all of us (9). Through the concerted efforts of many past presidents, led by Dr Kimberly Applegate, child care services were offered at national radiology meetings. These services started in 1998 with the support of Dr Kay Vydareny in the ARRS leadership and in 1999 with the support of Dr Peggy Fritzsche on the RSNA board.

### Retention and Increase of Members

#### *The Pocket Mentor*

Dr B. J. Manaster (1996 AAWR president) was the lead editor of *The Pocket Mentor* (Fig 7), which guides and addresses professional and personal challenges unique to women radiologists

today. The wisdom and practical advice of 20 AAWR authors is presented in seven chapters. A second edition of *The Pocket Mentor* was published in 2002 (10); it is available free of charge to all members-in-training and junior staff.

### International Membership

In response to requests for membership from women radiologists living outside the United States or Canada, AAWR added a corresponding international AAWR member category. This effort to include women from other countries was spearheaded by Dr Ewa Kuligowska and Dr Judy Amorosa. Each year at the RSNA, a special luncheon is dedicated to corresponding international members. To recruit international members and promote their visibility, an AAWR booth is staffed by members who attend the annual European Congress of Radiology in Vienna.

### Improving Visibility and Communication among Members

The main avenues for communication among AAWR members are the AAWR Web site ([www.aawr.org](http://www.aawr.org)) and its quarterly publication, *AAWR Focus*. The AAWR Web site (Fig 8) was initiated

and is maintained by Dr Katarzyna Macura, the 2005 AAWR president and webmaster. The site records the history and achievements of the organization since its founding. It also serves as a platform for AAWR members to network with and mentor one another. *AAWR Focus* (Fig 9) features articles about issues relevant to women radiologists and highlights the accomplishments of the association's members.

### AAMC Recognition

In 2005, the Association of American Medical Colleges (AAMC) gave its Women in Medicine Leadership Development Award to the AAWR (Fig 10). It particularly commended the AAWR for its commitment to helping women realize their potential and for improving the environment for women in academic medicine. Dr Katarzyna Macura was instrumental in nominating the AAWR for this award.

### Discussion

The AAMC statistics for 2005–2006 state that women represent 50% of applicants to medical school, 48% of first-year medical students, 49% of all medical students, 42% of residents and fellows, 32% of medical faculty members, 38% of assistant professors, 28% of associate professors, 16% of full professors, 19% of division or section chiefs, 10% of department chairs, 43% of assistant deans, 31% of associate and senior associate or vice deans, and 11% of medical school deans (11). According to ACR membership statistics, 24% of radiologists-in-training (residents and fellows) and 18% of professionally active radiologists are women (12); these numbers have not changed since 2004. Clearly, there is still much to be done, especially in recruiting women medical students into radiology. This need was the focus of the 2003 AAWR-sponsored RSNA refresher course, which featured Janet Bickel, MA, who was previously the director of the AAMC Women in Medicine programs. She reported that radiology is the only specialty in which the percentage of women residents has not increased between 1995 and 2005 (27% of residents are women). Dr Kimberly Applegate is among the authors of an article that explored this issue (13). It is indeed a concern that although the number of women entering medical schools approaches 50% nationally, women remain underrepresented in diagnostic radiology. These relatively low numbers exist despite many characteristics of the specialty that might be desirable to women, such as reasonable



**Figure 9.** *AAWR Focus*, a quarterly newsletter published by the AAWR. (Courtesy of the AAWR.)



**Figure 10.** The AAMC 2005 Women in Medicine (WIM) Leadership Award, which was given to AAWR. (Courtesy of the AAWR.)

call hours, flexible scheduling, and high salaries. Previous publications suggest that many factors may be responsible for the gender differences in diagnostic radiology and why women do not seem to be choosing diagnostic radiology as frequently as one might predict based on the lifestyle of diagnostic radiologists and the numbers of women currently entering medical school.





**Figure 11.** AAWR past presidents at the 25th anniversary gala, November 26, 2006. Back row: M. Ines Boechat (2000), Ewa Kuligowska (2004), Kimberly Applegate (2003), Kathleen Ward (2002), Sandra Fernbach (1988), B. J. Manaster (1996), Melissa Rosado-de-Christenson (1998), Ritsuko Komaki (2001), Katarzyna Macura (2005), Teresita Angtuaco (1999), Nancy Ellerbroek (2006), and Peggy Fritzsche (1990). Front row: Lynne Steinbach (1994), Katherine Shaffer (1992), Gretchen Gooding (1985), Karen Reuter (1993), Carol Rumack (1981–1982), Linda Fahr (1983), Patricia Randall (1987), and Kay Vydareny (1984). (Courtesy of the AAWR archives; photographed by Dr Barry Rumack.)

**Table 2**  
**AAWR Past Presidents**

1981	Carol M. Rumack, MD
1982	Carol M. Rumack, MD
1983	Linda M. Fahr, MD
1984	Kay H. Vydareny, MD
1985	Gretchen A. Gooding, MD
1986	Anita P. Price, MD
1987	Patricia A. Randall, MD
1988	Sandra K. Fernbach, MD
1989	D. Claire Anderson, MD
1990	Peggy J. Fritzsche, MD
1991	Cheryl S. Hicks, MD
1992	Katherine A. Shaffer, MD
1993	Karen L. Reuter, MD
1994	Lynne S. Steinbach, MD
1995	Judy M. Destouet, MD
1996	B. J. Manaster, MD, PhD
1997	Nancy S. Rosen, MD
1998	Melissa L. Rosado-de-Christenson, MD
1999	Teresita L. Angtuaco, MD
2000	M. Ines Boechat, MD
2001	Ritsuko U. Komaki, MD
2002	Kathleen A. Ward, MD
2003	Kimberly E. Applegate, MD
2004	Ewa Kuligowska, MD
2005	Katarzyna J. Macura, MD, PhD
2006	Nancy A. Ellerbroek, MD

There are many issues that the AAWR needs to explore as it starts its second 25 years. As it creates initiatives to increase the number of women in radiology, it must continue building on its past accomplishments, especially the promo-

tion of networking and mentoring among women radiologists.

## Conclusions

For 25 years, the AAWR has provided women radiologists, radiation oncologists, and other related professionals with educational programs and networking opportunities to enhance both their professional and personal lives (14). It has provided women in radiology with “their own voice” in organizational medicine. Its achievements reflect the growing interest and enthusiasm of women radiologists who have sustained this organization over the years. On its 25th anniversary, the AAWR is proud to honor the past presidents who served this organization (Table 2, Fig 11). It continues to grow from a membership of 1253 in 1995 to its present 2240 members. It will continue to exist as long as there is a need to advance the careers of women in radiology.

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# 35 Years of Experience From the American Association for Women Radiologists: Increasing the Visibility of Women in Radiology

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## Abstract

Women radiologists remain in minority, unchanged for the past several decades. In 1981, the American Association for Women Radiologists (AAWR) was founded to address the problems that women radiologists were experiencing in being subordinate to male radiologists in the workplace and at the national level in organizations with respect to political power and financial compensation, as well as additional issues unique to women in radiology. The AAWR defined goals to meet the needs of women in radiology: improve the visibility of women radiologists, advance the professional and academic standing of women in radiology, and identify and address issues faced by women in radiology. AAWR efforts have included providing opportunities for career development and award recognition, hosting educational programs at national meetings, and publishing numerous manuscripts on issues faced by women in radiology. The AAWR recognizes that although there has been significant progress in the standing of women in radiology over the past 35 years, there is much room for improvement. The AAWR will continue to advocate for the needs of women in radiology.

**Key Words:** Women, radiology, AAWR, diversity

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## INTRODUCTION

Women radiologists remain a minority, with the latest ACR Commission on Human Resources workforce survey demonstrating that only 21% of practicing radiologists in the United States are women, a percentage that has not changed significantly in the past several decades [1,2]. In 1981, the American Association for Women Radiologists (AAWR) was founded to address the problems women radiologists were experiencing in

being subordinate to their male colleagues in the workplace and at the national level in organizations with respect to political power and financial compensation, as well as additional issues unique to women in radiology. Initial problems identified included poor visibility for women at national meetings, low acceptance rate for publications by women authors, lack of recruitment or even interviewing of women, lack of promotion in the academic or private practice, and lack of guidance for work-life balance. Although there have been many improvements in the status of women in radiology over the past 35 years, the continued paucity of women in radiology, especially in leadership positions, remains concerning.

## BRIEF HISTORY OF THE AAWR

The AAWR first officially met during the 1981 annual meeting of the RSNA. The RSNA Board of Directors, with the support of president-elect Theodore Tristan, MD, provided the initial funding and administrative support for the founding of the AAWR [3]. At that time, the founders of the AAWR, Helen Redman, MD, and

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Ann Lewicki, MD, formed a steering committee of approximately 20 members to develop the mission, vision, and goals of the AAWR. The initial first officers included Carol Rumack, MD, Linda Fahr, MD, Katherine Shaffer, MD, and Nancy Whitley, MD [4]. This group strongly supported the importance of offering solutions for change rather than protesting discrimination and laid the groundwork for the current AAWR mission:

To provide a forum for issues unique to women in radiology, radiation oncology and related professions; sponsor programs that promote opportunities for women; and facilitate networking and career development among members and other professionals.

The AAWR defined a set of goals to meet the needs of women in radiology and to achieve its mission:

1. Improve the visibility of women radiologists.
2. Advance the professional and academic standing of women in radiology.
3. Identify and address issues faced by women in radiology.

## IMPROVE THE VISIBILITY OF WOMEN RADIOLOGISTS

Since its inception, a top priority of the AAWR has been to improve the visibility of women in radiology. The initial steering committee members recognized that opportunities for visibility at national meetings improved women's opportunities for publication, recruitment, and nomination for leadership positions. Nominations for leadership positions and committee assignments are often awarded to the person seen as right for the job at the right time (man or woman). Without visibility, women were often overlooked for such positions.

At the time the AAWR was founded, women were rarely invited to speak or moderate at national meetings, even if they were the first authors of presentations. Founding members of the AAWR introduced the concept of comoderators to encourage the selection of women for moderating positions without changing the ability of men to be moderators as well. This small change greatly increased the visibility of women, providing an opportunity for appropriate recognition for their career successes. Maintaining the visibility of women at national meetings and in national societies remains an ongoing goal of the AAWR.

AAWR awards serve as another avenue to increase the visibility of women in radiology. Several awards recognize

women's achievements and provide opportunities for women to pursue career development programs. Awards include the highest recognition, the Marie Curie Award for outstanding achievement in radiology, named after Madame Curie for her pioneering efforts in radioactivity, and the Alice Ettinger Award for lifetime achievement, named after Dr Ettinger, first chair of radiology at Tufts University/New England Medical Center, who brought the gastrointestinal spot film device to the United States from Germany in the 1930s. Additionally, awards for distinguished residents and in-training awards for members presenting scientific abstracts at national meetings are offered. The AAWR also supports early- and mid-career women radiologists nominated to attend the highly competitive Association of American Medical Colleges (AAMC) national faculty development courses by paying the meeting registration fee. These meetings provide an opportunity for early- and midcareer women to gain national academic exposure. Since 2012, the AAWR in association with the American Society of Neuroradiology and the ACR has offered an award to provide leadership training opportunities for midcareer women in neuroradiology by sponsoring the nominee's attendance at the ACR Radiology Leadership Institute Summit. Attendance at the Radiology Leadership Institute is an outstanding opportunity for women faculty members to gain leadership skills and network with leaders in radiology. These awards help the AAWR serve as a pipeline for national leadership positions by offering an opportunity for women's successes to be highlighted at the national level.

## ADVANCE THE PROFESSIONAL AND ACADEMIC STANDING OF WOMEN IN RADIOLOGY

### Educational Programs and Networking

The AAWR aims to advance the professional and academic standing of women in radiology and has designed programs to teach and improve professional skills in domains such as leadership, publication, and negotiation. These skills have been targeted to help women develop the executive presence necessary for career success. Since 1981, the AAWR has hosted a refresher course at the RSNA annual meeting. This refresher course provides speakers with the opportunity to gain national recognition and attendees the opportunity to enhance their professional skills. Topics covered have included quality of life, work-life balance, career transitions, and radiation safety issues in the workplace. The success of the AAWR annual

refresher course at the RSNA meeting has been recognized by the ACR, which now also offers an AAWR educational course at its annual meeting as of 2015 (the inaugural year for educational programming at the ACR meeting). In addition to refresher courses, the AAWR has offered networking opportunities at the RSNA, ACR, ARRS, American Society for Radiation Oncology, and Association of University Radiologists meetings, mentoring sessions at national meetings, and a teleconferenced book club. Many subspecialty societies, including the Society for Pediatric Radiology, have also hosted AAWR speakers on professional skills development.

The personalized style of communication favored in the events hosted by the AAWR offers a unique method to foster women's careers by using unparalleled mentoring access to women in leadership positions throughout the country. As such, the AAWR is able to support the needs of women at all career levels. In addition to offering support to women at the national level, the AAWR has been supportive of members at the institutional level. For example, the AAWR offered mentorship support to an early-career faculty member in the design and implementation of an institutional female faculty development program, which has the potential to be beneficial to all departments [5]. Senior members in the AAWR serve as an outstanding resource to junior members who have similar academic interests.

### ACR Commission for Women and General Diversity

The formation of the ACR Commission for Women and General Diversity has been the result of the efforts of many. The need for dedicated efforts at the national level to advance programs and policies that address the needs of women and other minorities in radiology was brought to the attention of the ACR by the AAWR leadership. Paul Ellenbogen, MD, chair of the ACR Board of Chancellors at the time and a member of the AAWR, established the commission, with Katarzyna Macura, MD, past AAWR president (2005) becoming the inaugural chair of the commission in 2013. This commission has brought the needs of individual women in radiology championed by the AAWR to the national policy level. The goals of this commission are strongly supportive of the mission of the AAWR [6]:

- To increase awareness and recognition of the value created by diversity and make the radiologic professions welcoming and inclusive for women and minorities underrepresented in medicine

- To improve professional opportunities, participation, representation, and contribution of women and minorities to the radiologic professions
- To improve organizational and institutional performance by leveraging diversity

This commission has recognized that diversity and inclusion are critical to the future success of radiology and radiation oncology and has produced several publications to support these findings [7-9]. These publications explore the status of diversity in radiology and radiation oncology, identify the challenges minority groups, including women, face during their careers, and provide strategies to overcome current barriers.

### IDENTIFY AND ADDRESS ISSUES FACED BY WOMEN IN RADIOLOGY

Another area of importance to the AAWR is identifying and addressing issues faced by women in radiology. This includes issues in the workplace such as maternity leave, childcare and lactation facilities, implementation of the Family and Medical Leave Act (FMLA), and salary gender equity. From the beginning, AAWR members have worked together to address these issues in the form of research and publications. The organization offers networking for women to collaborate interinstitutionally with others who have similar interests and goals.

Early members of the AAWR successfully pushed for a change in the ABR's eligibility policy to allow 4 consecutive weeks of leave in 1 calendar year (without changing the total allowed 16 weeks off during residency). This policy was implemented for both men and women and created the basis for maternity leave during radiology residency. Pregnancy and maternity leave policies continue to be pursued by AAWR members, with recommendations made for national policies on pregnancy and maternity leave [10-13]. Additionally, members of the AAWR continue to raise the importance of enacting family leave policies that are in accordance with the FMLA in all departments for both residents and faculty members [14]. The AAWR aims to work with the ABR to implement parental leave policies consistent with the FMLA (12 weeks). AAWR past presidents Kimberly Applegate, MD, and Peggy Fritzsche, MD, first succeeded in securing childcare and lactation facilities at the RSNA meeting in 2001, an important precedent that can help establish both as the expected standard requirements at all major national meetings in the near future. In 2015, Elizabeth Arleo, MD (current AAWR treasurer), and colleagues published recommendations

for all radiology and radiation oncology facilities to provide lactation facilities [15]. Since then, AAWR members have championed implementation of mothers' rooms around the country [16].

Recent data on physician salary gender inequity across specialties demonstrate encouraging results for radiology. According to one study of all specialties in academic medicine, the adjusted salaries of women exceeded those of men only in radiology [17]. However, it is uncertain if the reported salaries in this study include incentive or bonus opportunities for higher ranking physicians. Additionally, there is lack of information to evaluate gender equity among salaries of private practice radiologists. This remains an area of future concern for the AAWR.

## AAWR GROWTH AND RECOGNITION

The success of the AAWR can be seen in its continual growth. What began as an informal series of meetings consisting of two women has developed into a nationally recognized society with more than 800 members. The AAWR has developed partnerships with larger national societies and subspecialty societies to supplement its expansion efforts. Although the AAWR is a relatively small society, these partnerships offer the AAWR the opportunity to host refresher courses and networking events at large national meetings. Attendance at these refresher courses is not limited to AAWR members. Additionally, these partnerships allow the AAWR to continue to gain visibility on a national level. Partnership with the ACR allows cost-effectiveness by sharing staff and administration.

The value of the AAWR has been solidified not only by the individual successes of the women to whom it has offered career development tools but by national recognition of the society itself. In 2005, the AAMC recognized the importance of the AAWR and its efforts to advance women in radiology in the form of the AAMC Women in Medicine Leadership Award. This award commended the AAWR for improving the environment for women in academic medicine and for helping women radiologists to realize their potential.

## STATUS OF WOMEN IN RADIOLOGY

The AAWR recognizes that its members are only a subset of women and men in radiology with particular interest in promoting the career advancement of women in radiology. Overall societal improvements in the recognition of women and the individual efforts of many women in radiology who choose not to affiliate with the AAWR have also played a significant role in the improved

standing of women in radiology. The AAWR's persistent efforts to improve the visibility of women in radiology, offer networking opportunities, and serve as an official resource for nomination ensure constant advocacy for women in radiology that supplements the efforts of individual women.

In the 35 years since the founding of the AAWR, many women, both those associated with the AAWR and those not, have attained positions of leadership as department chairs and radiology society presidents. Although difficult to prove direct impact, the influence of the AAWR can be seen on review of ACR leadership. Only 2 women, both past AAWR presidents, have served as ACR Council speaker and vice speaker. Only 3 women, 2 of them past AAWR presidents (all three AAWR members), have served as ACR president (of 93 total presidents of the ACR). The standing of women in leadership in the ACR has improved, with 10 women (3 of whom are past AAWR presidents) now serving on the ACR Board of Chancellors (33 total current members) and 6 women currently serving on the 2016 and 2017 ACR Council Steering Committee (22 total current members). As of May 2016, Geraldine McGinty, MD, MBA, serves as the first woman vice chair of the ACR Board of Chancellors and will subsequently serve as the first woman chair of the ACR Board of Chancellors. The AAWR applauds the ACR for this major advance in diversity of ACR leadership. Increasing diversity in radiology leadership enhances the future of radiology and, as said by the Commission for Women and General Diversity, "by leveraging diverse backgrounds, experiences, and skills of those in (radiology and radiation oncology), we will create new, effective ways to not only educate our trainees, medical colleagues, and patients but also improve delivery of health care and our service to society" [8].

Since its inception, the AAWR has been instrumental in the nomination of women for national Gold Medal awards. Before 1981 and the foundation of the AAWR, only two women, Marie Curie and Edith Quimby, had been awarded the ACR Gold Medal. To date, 6 more (8 of 204 total [3.9%]) ACR Gold Medals have been awarded to women: Alice Ettinger, Rosalyn Yalow, Kay Vydareny, Sarah Donaldson, Valerie Jackson, and Carol Rumack (2 are past AAWR presidents). Of the 8 women awarded the ACR Gold Medal, 2 are Nobel Prize winners: Marie Curie (physics in 1903 and chemistry in 1911) and Rosalyn Yalow (physiology or medicine in 1977). This indicates the height of the bar set for women to be awarded an ACR Gold Medal, as only 48 women total have been awarded the Nobel Prize.



## TAKE-HOME POINTS

- The AAWR has been instrumental in providing a forum for interested women in radiology to improve their professional and academic standing.
- To promote matters of individual importance for women in radiology at the national policy level, the AAWR has contributed to the formation of the ACR Commission for Women and General Diversity.
- The AAWR recognizes that although there has been significant progress in the standing of women in radiology over the past 35 years, there is much room for improvement.
- The AAWR will continue to advocate for the needs of women in radiology through efforts with the ABR to implement maternity leave policies consistent with the FMLA and efforts to ensure lactation and childcare facilities are consistently provided at all national radiology society meetings.
- Future AAWR efforts will focus on recruiting more women into radiology and providing a voice for the nomination of women for leadership positions at the national level to further increase the visibility of women in radiology.

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# Influences for Gender Disparity in the Radiology Societies in North America

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**OBJECTIVE.** The objective of our study was to outline the gender distribution in leadership positions in the North American radiology societies.

**MATERIALS AND METHODS.** A review of North American radiology societies was conducted to identify committee members and those holding leadership positions. The Scopus database was queried for research productivity metrics of these individuals. Gender, university affiliation, and academic rank were identified from departmental websites. The chi-square test was used to assess for differences in gender distribution, and nonparametric analyses were applied to determine gender differences in continuous variables.

**RESULTS.** Of 2826 radiology society committee members, men outnumbered women 67.4% ( $n = 1906$ ) to 32.6% ( $n = 920$ ). There were 696 society leadership positions, of which men held 501 (72.0%) and women held 195 (28.0%) ( $p < 0.003$ ). Additionally, 26.3% of all men held leadership positions compared with 21.2% of all women ( $p = 0.0032$ ). Overall, men had a higher median h-index (14 [range, 0–113] vs 11 [range, 0–73]), number of publications (52 [range, 2–1264] vs 35 [range, 2–428]), and number of citations (880 [range, 0–54,813] vs 483.5 [range, 0–17,332]) than women ( $p < 0.001$ ). Across university academic ranks of assistant and associate professor, research productivity metrics were similar between genders, but interestingly, female representation decreased with increasing academic rank. A higher proportion of men held a university rank of professor than women (39.5% vs 33.4%;  $p = 0.0017$ ) with parity at the levels of assistant and associate professors.

**CONCLUSION.** Gender disparity exists in the leadership positions in North American radiology societies. We have attempted to study the relationship between gender, academic rank, and h-index with leadership roles in these societies.

**G**ender disparity in medicine has increasingly gained recognition in recent years. Although North American medical school classes have been composed of nearly an equal male-to-female ratio for more than 1 decade, fewer women go on to pursue academics, and women remain significantly underrepresented in senior academic ranks and leadership positions. In the United States in 2014, only 21% of full professors, 15% of department chairs, and 16% of deans were female [1]. In Canada, as of 2016, only one of 17 faculties of medicine had a female dean [2].

In radiology specifically, the gender division is stark. The American College of Radiology (ACR) Commission on Human Resources workforce 2016 survey revealed that only 21% of practicing U.S. radiologists are female and that this has not var-

ied significantly in 25 years [3, 4]. Further, although the proportion of women graduating from U.S. medical schools has risen from 10% in 1970 to 50% in recent times, the ratio of female radiology residents has mostly remained unchanged at approximately 25% in the same time span [3]. These disparities are most pronounced in leadership positions.

A recent review of 51 U.S. academic radiology faculties found that 25% of vice-chairs and section chiefs and only 9% of department chiefs were female despite women accounting for 34% ( $n = 3764$ ) of academic radiologists [5]. Moreover, of the 93 ACR presidents to date, only three have been women and of the ACR Board of Chancellors Chairs, none has been female [3, 6]. As the American Association for Women Radiologists notes, however, the number of women in leadership positions has improved. A retrospective study

assessing trends in women's leadership in the ACR between 2001 and 2015 found an overall increase in female representation [3]. The study reported a rise in the number of women achieving fellowship in the ACR, now equal to that of male members, and in the Board of Chancellors members where female representation increased from 9% to 33% [3].

The assessment and promotions of faculty members at academic institutions is reliant mainly on academic activities including research output, number of publications and number of citations. Indexes calculated to measure a researcher's impact have been developed. The Hirsch index (h-index), proposed initially in 2005, is primarily considered superior and is now readily available on academic search engines [7]. The index is defined as the number (h) of publications with a citation number greater than or equal to h (e.g., an h-index of 10 = 10 publications with  $\geq 10$  citations) and provides a measure of the quantity and quality of research output. In radiology, few studies to date have analyzed h-indexes [8–13]. In particular, these studies have reported significant associations between higher h-index and higher academic rank [9], greater National Institutes of Health (NIH) funding for professors with at least one NIH award [11], and editorial board members of journals with a higher impact factor (IF) compared with those of journals with a lower IF [10].

Our study aimed to outline the gender distribution in North American radiology society committee members and leadership and to analyze for associations between gender, h-indexes, institutional academic rank, and leadership roles in these societies.

## Materials and Methods

Institutional review board approval was not required for this retrospective study because all data analyzed are publicly available. An Internet search for all North American radiology societies was conducted. Thirty societies were identified, 26 of which are predominantly represented by radiologists with Doctor of Medicine (MD) degrees (Table 1). Societies for which a complete list of executive and committee members was not provided were excluded from the analysis. Overall, 18 societies provided this information on their websites and were thus included in our study. All data were collected between June and August 2017.

From each society's website, full lists of executive and board members and of committee members were extracted along with respective committee ranks. Executive positions included president, immediate past president, vice-president, secre-

tary, and treasurer. Committee ranks included member, vice-chair or cochair, and chair. A note was also made of whether the individual held a leadership position or not. Leadership positions included any executive or board of directors position as well as committee chairs and cochairs or vice-chairs. Often, a single society member held multiple positions on various committees. All data were carefully reviewed and duplicate or redundant data were removed so that each committee member was listed only once for the highest position held in each society.

Next, the Scopus database (Elsevier) was queried for all committee members; from their profiles, the h-index, along with the numbers of publications, citations, and years of active research, was collected. A single database was used because previous studies have found the calculated h-index among different databases to vary by a range of 0.2–9.9 units [14]. Data for institutional affiliations were also collected for each commit-

tee member. When multiple profiles were available for a single member, the profile with the highest h-index was used.

Finally, an Internet search was conducted for all committee members to identify their profile on their respective institutional or departmental website. From the website, gender, academic rank, and division were identified. Academic rank was stratified as instructor or lecturer, assistant professor, associate professor, and professor. Doximity and LinkedIn were searched when information on departmental websites was incomplete.

Overall, exclusion criteria were residents and fellows, all committee members without an MD degree, and all administrative staff. Additionally, committee members for whom a Scopus account did not exist were excluded from the study.

## Statistical Analysis

All analyses were performed using SPSS software (version 20, IBM). The chi-square test was

**TABLE 1: North American Radiology Societies Included in This Study**

No.	Name of Society
1	Radiological Society of North America
2	American Roentgen Ray Society
3	Association of University Radiologists
4	Association of Program Directors in Radiology
5	American College of Radiology
6	Canadian Association of Radiologists
7	Society of Breast Imaging
8 <sup>a</sup>	Society for the Advancement of Women's Imaging
9 <sup>a</sup>	Society for Cardiovascular Magnetic Resonance
10	Society for Pediatric Radiology
11	Society of Abdominal Radiology
12	Society of Nuclear Medicine and Molecular Imaging
13	Society of Radiologists in Ultrasound
14	Society of Skeletal Radiology
15	Society of Thoracic Radiology
16	American Society of Emergency Radiology
17	American Society of Head and Neck Radiology
18	North American Society for Cardiovascular Imaging
19	American Society of Neuroradiology
20	American Society of Spine Radiology
21 <sup>a</sup>	Society of Neurointerventional Surgery
22 <sup>a</sup>	Society of Interventional Radiology
23 <sup>a</sup>	Society of Computed Body Tomography and Magnetic Resonance
24 <sup>a</sup>	American Association for Women Radiologists
25 <sup>a</sup>	American Academy of Oral and Maxillofacial Radiology
26 <sup>a</sup>	Fleischner Society

<sup>a</sup>Societies for which only executive or board members were listed on their web pages.



## Gender Disparity in the Radiology Societies in North America

**TABLE 2: Academic and Committee Ranks, Leadership Positions, and Board of Directors by Gender**

Rank	All Members ( <i>n</i> = 2826)	No. (%) of Men ( <i>n</i> = 1906 [67.4%])	No. (%) of Women ( <i>n</i> = 920 [32.6%])	Proportion of All Men (%) ( <i>n</i> = 1906)	Proportion of All Women (%) ( <i>n</i> = 920)	<i>p</i>
Academic rank						
Instructor or lecturer	191	128 (67.0)	63 (33.0)			
Assistant professor	696	451 (64.8)	245 (35.2)	23.7	26.6	0.086
Associate professor	718	469 (65.3)	249 (34.7)	24.6	27.1	0.16
Professor	1060	753 (71.0)	307 (29.0)	39.5	33.4	0.0017
Unclear	161	105 (65.2)	56 (34.8)			
Society committee leadership						
Nonleadership position	2130	1405 (66.0)	725 (34.0)			
Leadership position <sup>a</sup>	696	501 (72.0)	195 (28.0)	26.3	21.2	0.0032
Committee rank						
Member	2183	1450 (66.4)	733 (33.6)			
Vice-chair or cochair	94	66 (70.2)	28 (29.8)			
Chair	265	191 (72.1)	74 (27.9)			
Vice-president	15	7 (46.7)	8 (53.3)			
President or president-elect	45	32 (71.1)	13 (28.9)			
Secretary	41	26 (63.4)	15 (36.6)			
Past president	27	22 (81.5)	5 (18.5)			
Councilor, director, or other president	156	113 (72.4)	43 (27.6)			
Rank higher than member	644	457 (71.0)	187 (29.0)			

<sup>a</sup>Leadership positions included any board of directors and executive positions as well as committee chairs or cochairs.

used to assess for differences in gender distribution across academic ranks, divisions, leadership ranks, committee ranks, and current board of directors members. For continuous variables (h-index, number of citations, number of publications, and number of years of active research), data were tested for normality, and log transformation was performed. All continuous variables showed a skewed, nongaussian distribution. Therefore, non-parametric analyses (Mann-Whitney *U* test and Kruskal-Wallis tests) were applied to identify significant gender differences in these continuous variables. A *p* value of < 0.05 was considered significant for all analyses.

### Final Model

A multiregression analysis was conducted to create a model to predict h-index. At the univariate level, a simple linear regression was applied. Each variable was regressed independently with h-index, and their significance was reported. We checked for multicollinearity between independent variables, and these variables were assessed using a correlation coefficient. The Cramer V test was used for one nominal variable and one ordinal variable, and the Spearman test was used for one continuous variable and one ordinal variable. A correlation of 0.8 was treated as the presence of multicollinearity. The main effects were identified

using a stepwise selection strategy and on the basis of the *p* value. We decided to include a variable in the model or drop it. The final step was to check for interaction. Interaction terms were created between each of the main effects in the model, and there were no significant interactions.

### Results

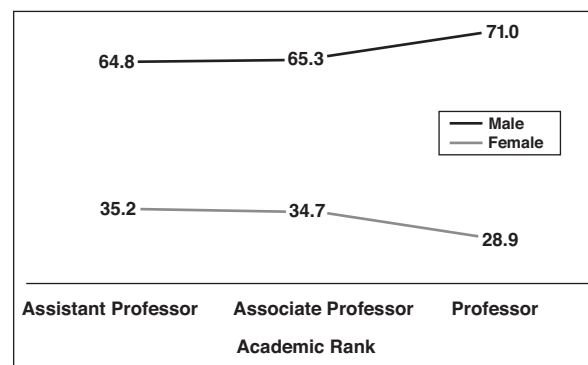
#### Gender Distribution Within Radiology Societies

In this study, 3257 committee members from 26 North American radiology societies were identified: 2826 met the inclusion criteria, of which 1906 (67.4%) were male and 920 (32.6%) were female. Committee rank distribution by gender is shown in Table

2. With regard to overall distribution, there were fewer women than men, but this difference was not significant (*p* = 0.21;  $\chi^2$  = 12.4).

In total, 696 (24.6%) of all society committee members held leadership positions; men held more (*n* = 501, 72.0%) than women (*n* = 195, 28.0%) (*p* = 0.003;  $\chi^2$  = 8.66). This was inconsistent with overall male and female representation in these societies (67.4% men, 32.6% women). Additionally, when looking at the proportions of all men and women holding society leadership positions, a significantly lower proportion of women held a leadership position than men (21.2% vs 26.3%; *p* = 0.0032) (Table 2).

**Fig. 1**—Line plot shows changes in gender representation with increasing university academic rank. Numbers denote percentages of faculty members by academic rank and gender. Note that as academic rank increases, female representation decreases.



**TABLE 3: Research Productivity Metrics by Society Committee Rank**

Rank	Publications	Citations	h-Index	Years of Active Research
<b>Committee rank</b>				
Member				
Male	45 (2–950)	715 (0–46,119)	13 (0–112)	18 (0–63)
Female	31 (2–414)	373 (0–17,332)	10 (0–73)	16 (0–47)
Vice-chair or cochair				
Male	49.5 (2–1264)	941 (0–35,623)	14 (0–96)	17.5 (1–40)
Female	47.5 (2–195)	752.5 (2–6324)	14 (1–44)	18.5 (0–41)
Chair				
Male	66 (2–464)	1086.5 (11–11,931)	17.5 (1–53)	21.5 (3–46)
Female	52.5 (3–428)	761.5 (2–13,492)	14 (1–64)	18 (1–45)
Vice-president				
Male	55 (2–216)	695 (56–10,356)	15 (2–42)	19 (6–34)
Female	70 (11–143)	1155 (109–4652)	18 (3–38)	25 (8–33)
President				
Male	113 (3–464)	3896.5 (23–20,293)	30 (3–66)	25 (1–39)
Female	75 (3–197)	1562 (57–9140)	24 (3–53)	21 (3–31)
Secretary or treasurer				
Male	81.5 (4–434)	2484 (6–8877)	25 (1–52)	23.5 (11–44)
Female	55 (13–146)	1118 (145–4426)	15 (6–38)	20 (12–37)
Immediate past president				
Male	165.5 (4–499)	4203 (119–46,691)	37.5 (4–108)	26 (16–39)
Female	54 (16–191)	1244 (300–6728)	20 (7–38)	26 (11–35)
Leadership position				
No	40 (2–1003)	571.5 (0–54,813)	12 (0–113)	17 (0–63)
Yes	63.5 (2–1264)	1197 (0–46,691)	17 (0–108)	21 (1–56)
<i>p</i>	< 0.0001	< 0.0001	< 0.0001	< 0.0001
Leadership position by gender				
No				
Male	47 (2–1003)	718 (0–54,813)	13 (0–113)	18 (0–63)
Female	31 (2–414)	377 (0–17,332)	9 (0–64)	16 (0–47)
<i>p</i>	NS <sup>a</sup>	NS <sup>a</sup>	NS <sup>a</sup>	NS <sup>a</sup>
Yes				
Male	75 (2–1264)	1377 (0–46,691)	19 (0–108)	22 (1–56)
Female	50 (2–428)	816 (1–13,492)	14 (1–64)	19 (0–45)
<i>p</i>	NS <sup>a</sup>	NS <sup>a</sup>	NS <sup>a</sup>	NS <sup>a</sup>

Note—Results are reported as median (range). NS = not significant.

<sup>a</sup>Of members holding leadership positions, there were no significant differences in research productivity metrics between genders.

#### *Gender Distribution of Society Committee Members Stratified by University Academic Rank*

After identifying the academic affiliations of society committee members, results were stratified by university academic rank (Table 2). There were 1673 men and 801 women holding academic ranks higher than instructor. Although men were in higher numbers

overall, there was no difference in gender distribution ( $p = 0.118$ ;  $\chi^2 = 12.8$ ). There was also a similar proportion of each gender who held academic ranks of assistant professor and associate professor. At the level of professor, however, there was a higher proportion of men than women (39.5% vs 33.4%;  $p = 0.0017$ ). Finally, with increasing university academic ranks, male representation in-

creased whereas female representation decreased (Fig. 1).

#### *Research Productivity Metrics Stratified by Society Committee Rank*

Research productivity metrics (h-index, publications, citations, and years of active research) of all society committee members stratified by committee rank are displayed in

## Gender Disparity in the Radiology Societies in North America

Table 3. Committee members holding society leadership positions had significantly higher research productivity metrics than those with nonleadership positions (Table 3). Statistical significance was held when grouped by gender as well (i.e., women holding leadership positions vs women with nonleadership positions). Finally, there were no differences in research productivity metrics when looking at men versus women in leadership positions.

### Research Productivity Metrics Stratified by University Academic Rank

When looking at all society committee members, men had significantly higher research productivity metrics (Fig. 2). However, when stratifying the results by university academic rank, both genders interestingly had similar research productivity metrics (Table 4). Differences were most pronounced at the rank of professor in favor of the male cohort, but this difference was not statistically significant.

### H-Index as a Predictive Factor

As reported previously [9], our study found that h-index ( $r$ [Spearman test]  $r_s = 0.60$ ) and the numbers of publications ( $r_s = 0.61$ ), citations ( $r_s = 0.61$ ), and years of active research ( $r_s = 0.56$ ) were significantly predictive of higher academic rank for both genders ( $p < 0.0001$ ).

### Distribution of Data

Continuous variables investigated in this study included the h-index and numbers of publications, citations, and years of active research. In testing for normality, all showed a skewed nongaussian distribution.

### Final Model

The following multiregression analysis model to predict h-index was developed:

$$y(x) = \beta_0 + \beta_1 (\text{female}) + \beta_2 (\text{academic rank}) + \beta_3 (\text{years of active research}) + \beta_4 (\text{publications}) + \beta_5 (\text{citations}) + \beta_6 (\text{leadership rank}) + \beta_7 (\text{committee rank}) + \beta_8 (\text{division}), \text{ where } \beta_0 \text{ is constant.}$$

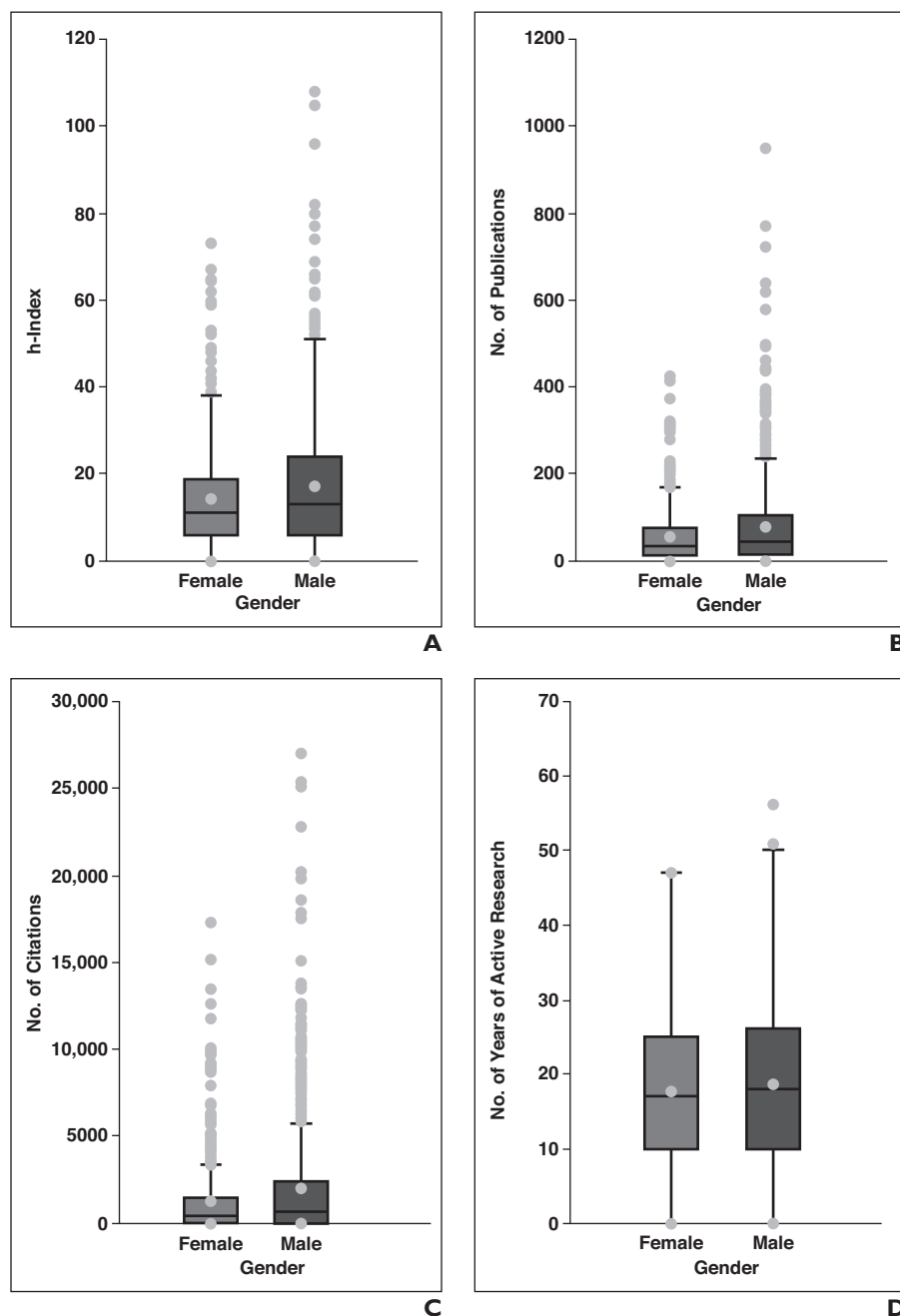
This model showed that female faculty have 1.04 times the odds of having a higher h-index than male faculty, keeping all other variables constant. In other words, after adjusting for citations, publications, years of active research, academic rank, committee rank, and division, women had slightly higher odds of having a higher h-index than men.

## Discussion

This study investigated the gender distribution within North American radiology societies with an emphasis on committee leadership roles. Additionally, we identified the

university affiliations of the society members, their academic rank, and their research productivity metrics.

Overall, male representation in societies was significantly larger (male-to-female ratio



**Fig. 2.**—Box-and-whisker plots show research productivity metrics of all society committee members by gender. Whiskers show values that are 1.5 times interquartile range (IQR) above and below quartile (Q1) and quartile 3 (Q3), respectively ( $Q1 - 1.5 \times IQR$ ;  $Q3 + 1.5 \times IQR$ ). Dots outside whiskers represent outliers. **A–D.** Plots show results for h-index (**A**), number of publications (**B**), number of citations (**C**), and number of years of active research (**D**). Overall, men had higher median h-index (14 [range, 0–113] vs 11 [range, 0–73];  $p < 0.001$ ), number of publications (52 [range, 2–1264] vs 35 [range, 2–428];  $p < 0.001$ ), number of citations (880 [range, 0–54,813] vs 483.5 [range, 0–17,332];  $p < 0.001$ ), and years of active research (19 [range, 0–63] vs 17 [range, 0–47];  $p < 0.001$ ) than women. Interestingly however, across same academic rank, there were no differences in research productivity metrics between genders (Table 4).



tio, 2.1:1). This result is in par with a recent review of 51 academic radiology faculties where men outnumbered women 2:1 as academic faculty members and 3:1 as section heads or vice-chairs ( $p < 0.01$ ) [5]. Similarly, in our study men held more society leadership positions than women (male-to-female ratio, 2.4:1). Although this difference can be seen to be the result of a larger male cohort, the gender distribution of those holding society leadership positions is not at parity with the overall gender distribution in these societies—that is, a higher proportion of men held leadership positions (Fig. 3). This finding suggests that a gender disparity concerning leadership positions does exist as noted in other studies [15–18].

Although career advancement in academics is largely reliant on research productivity, advancement within radiology societies is not as well defined. Perhaps high research productivity leads to academic promotion and increased recognition, which in turn leads to higher likelihood of recruitment to more senior positions on a society committee. In fact, in the current study, research productivity metrics increased with increasing society committee rank and those who held society leadership positions had significantly higher research productivity metrics than those who did not. These results suggest that academic productivity, whether directly or indirectly, may be one factor that determines advancement to a higher society rank. If fewer women are interested in focusing their careers on academic productivity and excelling in research, as suggested in other studies [19], this could explain the gender disparity seen in society leadership.

**TABLE 4: Research Productivity Metrics by Academic Rank**

Rank	Publications	Citations	h-Index	Years of Active Research
All society members				
Male	52 (2–1264)	880 (0–54,813)	14 (0–113)	19 (0–63)
Female	35 (2–428)	483.5 (0–17,332)	11 (0–73)	17 (0–47)
$p^a$	< 0.0001	< 0.0001	< 0.0001	< 0.001
Academic rank				
Instructor				
Male	10 (2–238)	122.5 (0–7184)	4 (0–32)	11 (0–52)
Female	8 (2–118)	70 (0–3979)	4 (0–34)	8 (0–32)
Assistant professor				
Male	21 (2–499)	156 (0–46,691)	7 (0–108)	11 (0–46)
Female	16 (2–196)	144 (0–6344)	6 (0–38)	10 (0–36)
Associate professor				
Male	50 (2–1003)	704 (0–49,422)	13 (0–105)	17 (1–46)
Female	41 (2–198)	519 (2–9217)	12 (1–130)	17 (1–44)
Professor				
Male	114 (2–1264)	2836.5 (2–54,813)	28 (1–113)	27 (0–58)
Female	80 (4–428)	1779 (3–17,332)	22 (1–73)	26 (1–47)
$p$	NS <sup>b</sup>	NS <sup>b</sup>	NS <sup>b</sup>	NS <sup>b</sup>

Note—Results are reported as median (range). NS = not significant.

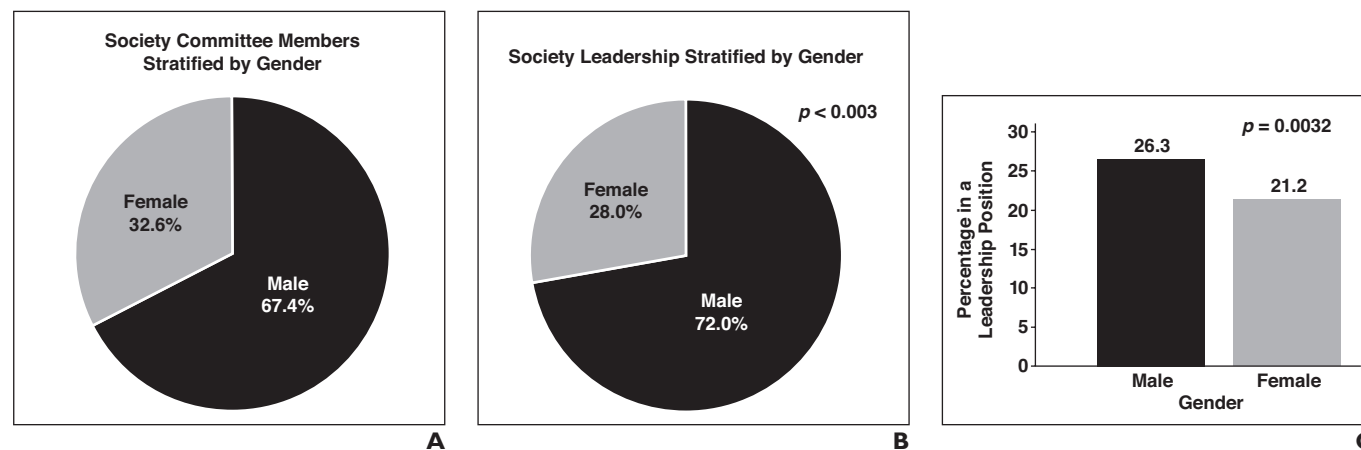
<sup>a</sup>Mann-Whitney  $U$  test  $p$  value for intergender difference.

<sup>b</sup>There were no significant differences in research productivity metrics between genders for the listed academic ranks.

This trend again became evident when looking at the university academic ranks of society committee members and comparing their research productivity metrics. Although men overall had significantly higher research productivity metrics, there were no differences seen across the same academic rank. However, as academic rank increased,

female representation decreased while that of men increased. In other words, female representation peaked at the level of assistant professor, whereas representation for men peaked at the rank of professor (Fig. 1).

Our findings thus suggest that both genders are producing an equivalent quantity and quality of research, but women are progressive-



**Fig. 3—**Graphics show gender distributions of society members and leaders.

**A** and **B**, Pie charts show gender distribution of all society committee members (**A**) as well as those holding leadership positions (**B**). Note that female representation in societies is not at parity with their representation in leadership positions.

**C**, Bar graph shows proportion of all men (26.3%) and all women (21.2%;  $p = 0.0032$ ) holding society leadership positions.

ly underrepresented at higher academic ranks and society leadership positions. Why does this disparity exist? A recent qualitative analysis exploring the gender climate in academic medicine identified, among other themes, a lack of retention of women particularly after reaching the assistant professor level [20]. This trend was also seen in our study. Studies investigating this issue cite reasons ranging from work-life balance, difficulty attaining research funding, lack of mentorship, and greater female interest in teaching and educational tracks over research tracks [21–26]. A recent *Lancet* review investigating empirical evidence for why women choose or reject academic careers found the most evidence for women being less interested in research tracks than men and women lacking adequate mentors and role models [19]. This can explain why, in the current study, female representation decreased with increasing academic rank despite similar research productivity metrics across the same academic rank. Therefore, both a relative lack of women in radiology as a specialty as well as perhaps a lesser interest by women in research-centered careers can account for the gender disparity shown in this study.

To address these issues, it has been suggested that early exposure to radiology in medical school, which traditionally has been limited, can be essential to spark interest and increase the number of female applicants [27]. This interest can be further enhanced with increased presence of female mentors and role models within academic radiology, which can in turn be vital for career advancement and attaining leadership roles [28]. A recent survey found mentorship and radiology clerkship to be two of the most common reasons to pursue radiology among U.S. medical students [29]. Finally, increased recognition for participation in educational and clinical tracks as opposed to research tracks may increase the presence of women in academic leadership and senior positions [19]. With regard to radiology society leadership, it is unlikely that academic productivity is the major factor for promotion, although our study shows that it may play a role. Other factors such as a desire for social interaction, community service, and attaining continuing medical education credits may also play a role. Further studies investigating factors influencing advancement in societies may help to explain the gender disparity seen at the society leadership level.

Some of our results are encouraging. Women represented 32.6% of all radiology society committee members, which is comparable

to a study citing that women constitute 34% of all active physicians in any specialty [30]. Also, within the same academic rank, men and women had similar research productivity metrics, which suggests that the quality and quantity of research output for a given academic rank was not significantly different. In fact, our regression analysis showed that when keeping all variables constant, women were more likely to have a higher h-index than men (1.04:1), albeit a small difference.

Our study has limitations. Because we used the Scopus database, the possibility exists that a publication has been incorrectly credited to an author with a similar or identical name. To reduce the chance of this error, we regularly cross-referenced institutional affiliations and recent publications as shown on an individual's Scopus account with information from his or her departmental website. Further, departmental web pages used to identify an individual's academic rank may not have been up to date and this would have impacted the results; however, at most, it would underestimate academic ranks uniformly across the dataset. Additionally, with the methods used, it was not possible to discern whether an individual held primarily a clinical or research position because this information was not available by web searches for all individuals. Another limitation was multiple profiles for one author in the Scopus database. Although infrequent, when this was the case, we selected the profile with the highest h-index. Finally, for members who have recently changed their name, their Scopus account may not have reflected the change and thus their profile may not have accurate information on Scopus. Given that women change their name more commonly than men for marital reasons, this may have disproportionately affected female society members.

## Conclusion

In North American radiology societies men hold significantly more leadership positions. Although a significantly larger male cohort may be a factor, the gender distribution in leadership is not at parity with the overall gender distribution in these societies. Moreover, as university academic rank increased, female representation decreased, whereas that of men grew despite having similar research productivity metrics in the more junior academic ranks. To address this disparity, higher female enrollment in radiology programs and subsequently in academics is needed. Additionally, the notion of increased recognition and academic promotion of faculty members

interested in excelling in teaching and clinical education as opposed to research-centered careers is gaining attention. Further studies on how to objectively evaluate faculty members interested in such a career path may help implement this into practice and reduce the disparity shown in this study.

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## **A Mentorship and Networking Group for Women in Radiology**

Lauren M. Ladd, Dana N. Bonaminio, Angela S. Gonda, Pauley T. Gasparis, W. Logan Bell,  
Vasanth D. Aaron, Darel E. Heitkamp

### **THE PROBLEM: TOO FEW FEMALE ROLE MODELS IN RADIOLOGY**

Women are underrepresented in radiology [1]. A 2014 study found that the percentages of female practicing radiologists (23.5%), academic radiology faculty (26.1%), radiology residents (27.8%), and radiology applicants (28.1%) were all substantially below the percentage of women graduating from medical school in the United States (48.3%) [2]. Additionally, of the twenty largest residency training programs in the US, radiology ranked ninth for overall size but only seventeenth for female representation [2].

As the medical field has become increasingly diverse, radiology has failed to keep pace. Over the last four decades, the percentage of female radiologists in the United States has held steady in the low to mid-20s [2,3,4,5]. Many studies have been conducted in recent years to better understand the forces behind the apparent gendering of certain medical specialties, a term which reflects the overwhelming predominance of women in some specialties such as pediatrics and obstetrics-gynecology and men in others such as radiology and orthopedic surgery [6,7,8]. Although these studies failed to reveal conclusive evidence as to the causes, they managed to uncover potential contributing factors, such as the presence of gender bias in certain specialties, cultural differences between the sexes, and the presence or lack of identifiable role models in different fields [6,7,8,9]. The forces that produce gender disparity in medical specialties are

vitally important to understand and improve, as diversity is believed to be a key element to improving equal access to health care in the United States [2,10,11,12].

The presence of strong relatable role models is commonly identified as a crucial element in the specialty choices of medical students [12,13,14,15]. Studies in multiple medical specialties including radiology have shown that women, more so than their male counterparts, were found to rate role models as highly valuable resources for the selection of career specialties [12,13,14]. Some authors have suggested that it is the lack of visible female role models in male gendered specialties that makes it difficult for female medical students to visualize themselves in those professions [7,8]. To this point, residents and educators at our institution felt that this was an actionable problem that could be improved with a locally organized mentorship program for women.

#### WHAT WAS DONE: A MENTORSHIP AND NETWORKING GROUP FOR WOMEN

In July 2013, resident organizers at the Indiana University Department of Radiology were approved to establish the Women in Radiology (WIR) Group, a voluntary department-sponsored organization aimed at creating a platform of support for female radiologists in our department and female students at our medical school. The WIR Group has several important primary goals: (1) to provide valuable mentorship and networking resources for women associated with the department of radiology, including medical students, residents, fellows, faculty, and alumni; (2) to enable the development of skills essential for success in medicine today, including leadership, research, business, negotiation, networking, and work-life balance; and (3) to work toward improving the gender gap within radiology by providing successful female role models to mentor and educate medical students regarding potential careers in radiology.

Career planning and advancement are essential elements of the group's focus, relying on the mentorship model of learning. The group also strives to provide an important venue for innovation and exchange of ideas among female radiologists in the department and community. Time is spent discussing topics specific to working mothers such as how to approach colleagues regarding maternity leave, advice on child care, and work-life balance. Other important topics such as philanthropy also constitute part of the regular programming.

### **Structure and Support**

Leadership positions within the group are determined annually and filled by trainees, with appointed positions of president, vice president, and secretary-treasurer. General meetings are held every other month with agendas set by the WIR trainee and faculty leadership. Meeting topics vary but often include guest speakers, leadership and research updates, book and journal club discussions, updates regarding fellowship and job opportunities, and mentor-mentee roundtables.

The group has strong support from the residency director and department chairman and is recognized by the department with an annual operating budget of \$2500. This is used primarily to support mentorship events, visiting speakers, and medical student outreach. There are two primary faculty sponsors who attend meetings and provide guidance for group affairs. Additional female faculty, alumni, and local community radiologists attend meetings, offer input during discussions, and serve as trainee mentors.

### **Mentorship Model**

The WIR organization utilizes a paired mentorship model which matches a trainee with a practicing radiologist in the area. In an effort to optimize compatibility, mentorship pairing is initially made with information provided by surveys taken by both the staff radiologists and the



trainees. These brief surveys, which elicit preferences regarding personal and professional interests, are used to match the goals of the students, residents, and fellows with the interests and expertise of the practicing radiologists. Using this model, the WIR mentoring program is able to successfully address the vast range of needs demonstrated by trainees of different backgrounds and experience levels. For example, in our experience, lower level residents tend to be most interested in advice regarding fellowship specialties, opportunities for leadership and research, and preparation for the American Board of Radiology qualifying examination. Upper level residents, having taken their qualifying exams and secured their fellowships, tend to focus on issues related to job searching and honing the radiology skills needed for smooth transitions to independent practice.

Mentorship events are scheduled during regular WIR meetings and at other times convenient for members, such as working lunch meetings at local restaurants. Female radiologists in private practice also serve as mentors, enabling the discussion of important issues related to private practice group structure, efficiency benchmarks, and contract negotiation. Because the organization recognizes the crucial role that role models play in physician development, the mentorship model serves as the centerpiece of the WIR organization, around which the remainder of the programming is planned.

## **Meeting Topics**

### ***Guest Speakers***

Local women are invited to discuss selected topics of interest to the group. Speakers are recruited from a wide spectrum of careers, including radiology, clinical medicine, and even the business community, in an effort to share their individual perspectives for success. Topics

discussed by outside speakers to date include the gender pay gap and job negotiation strategies for women in radiology.

### ***Journal Club***

The WIR organization values interactive learning through group discussion of books and journal articles. Current literature regarding professionalism, women in the work force, ethics, and leadership are selected by faculty sponsors or WIR leaders for members to read and discuss at meetings. The journal club enables improved awareness and understanding of these important issues.

### ***Fellowship and Job Updates***

Substantial meeting time is also devoted to discussing the important issues regarding fellowship selection and job searching. Upper level residents and fellows share experiences related to the fellowship application process and individual program strengths. Alumni and community radiologists discuss the practice models and current hiring trends of their respective groups. Additionally, job opportunities are shared with members to introduce potential job leads and provide an evolving overview of the local and regional job market.

### ***Medical Student Outreach***

Medical student outreach is an important activity of the WIR Group. The group has an appointed resident member who serves as medical student liaison, a position designed to actively engage and communicate with female students in all four years of medical school. Additionally, a female medical student from the school's radiology student interest group is appointed as WIR liaison to help educate and promote medical student attendance at WIR events.

Educating female medical students about radiology requires both dispelling the common misconceptions and stereotypes as well as outlining the numerous opportunities for patient care,

collaboration, and career satisfaction. Medical student outreach is incorporated into many facets of WIR programming, most notably through the dedicated panel discussions for female medical students featuring current radiology residents, fellows, and faculty. Other opportunities for student engagement include the WIR guest speaker events, which are heavily advertised on student email listservs, and dedicated social events for medical students and radiology residents that are planned throughout the year.

## OUTCOMES

A ten-question web-based survey (SurveyMonkey, Palo Alto, CA) of the WIR trainee membership was performed after two and a half years of group operation. Questions were designed to elicit members' opinions of how well the group provides effective mentorship, camaraderie, and resources related to research, leadership, networking, career planning, work-life balance, fellowship planning, and job opportunities.

The results of the survey showed that 90% of the trainee members agreed or strongly agreed that the WIR group provides a much-needed networking platform for female radiologists in our area. Seventy percent of the women agreed or strongly agreed that the group has improved camaraderie among women radiologists. Sixty percent of respondents felt that the group has been essential to raising awareness of important issues specific to women within radiology. Free-form comments regarding the effectiveness of the group's mentorship program yielded the following responses:

My mentor and I have met outside of the events of WIR and it was great getting to hear unsolicited advice on radiology and life. My mentor is awesome. It was a great idea pairing us with mentors in this "mini match".

I think it has reinforced a bond between myself and my mentor. It gives me an outlet to turn to regarding issues I face as a woman in medicine.



As a first year, it has been great to connect with female staff outside of work and build relationships with these awesome women. It's motivational to see what my future could be like and how women make it work with balancing work and life with a family.

In addition to providing service and leadership positions within the administration of the WIR Group itself, the organization has devoted time to identifying important leadership opportunities elsewhere in radiology and medicine. Members of the group have represented the department at numerous regional and national conferences, including annual meetings of the Indiana Radiological Society, the American College of Radiology, the Association of University Radiologists, the American Roentgen Ray Society, and the Radiological Society of North America. The WIR Group's first president served in a national leadership position as the Resident Division Awards Chair of the American Medical Women's Association.

There also appears to be a slight uptick in the number of female Indiana University medical students pursuing careers in diagnostic radiology since the start of the WIR Group. In the three years that have passed since the inception of the group, there have been thirteen female medical students who have secured diagnostic radiology residency positions through the match. In the three years prior to the WIR Group, there were only ten female students from Indiana University who entered radiology. Although the overall numbers are somewhat low, these preliminary data represent a 30% increase in female applicants after the start of the group.

## CONCLUSION

The WIR Group at Indiana University is a successful networking and mentoring group that provides important resources for female medical students, residents, fellows, and practicing radiologists. We believe that its strong mentorship program and active medical student outreach

are vital to the group's objective of eliminating the gender gap within radiology. Comments from trainee members reflect the vital role that the group is providing in developing female radiologists in central Indiana. We believe the model could be easily reproduced to create similar networking and support groups for women at other institutions.

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# Women Don't Ask

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## WHY WOMEN DON'T ASK

At the ACR 2015™ meeting, I spoke to the members of the American Association for Women Radiologists (AAWR) about an issue I have heard as a recurrent theme from leaders in academic medicine, specifically in radiology (Table 1). This topic came to my attention when I read about research done by Linda Babcock and Sara Laschever [1], which they summarized in a book called *Women Don't Ask*.

You might wonder why this is an issue. I believe it comes from the historical reality women have experienced. They have been told, "We don't accept women to our all-male colleges," until by Harvard University in 1977 and Columbia College in 1983, which is relatively recent. Until Title IX legislation passed in 1972 [2], women rarely played on high school varsity sports teams; they were told that they were too weak and might damage their health. Even now, women are expected to wait to be asked to get married.

When I finished my fellowship in pediatric radiology and was looking for a job in Denver, I was turned down by three different radiology groups. First, a private practice group refused my request to interview. The head of the search committee said, "We have 20 men in our radiology group, and we don't want to hire any women. They get pregnant and quit. Therefore we don't interview women." At that time, radiology groups were already terminating women who became pregnant when working as technologists. They did not feel any pressure to

hire women who might become pregnant.

The second group was a university radiology practice. The chair told me that although I had performed very well as a resident and fellow, he would not hire a female faculty member. He had hired one previously, and she committed suicide, so he planned to hire no more female faculty members.

The third group to turn me down was a city trauma hospital, which had a new chair of radiology from New England. We talked at great length about the opportunity for that hospital to have its first pediatric radiologist, and he was very interested. Later he told me that he could not hire me because the chair of the university practice had told him that he was not allowed to hire any women. After much discussion and a few months later, I was given a contract for one year, after I worked out an agreement with the new chair. The next year, I was appointed to the faculty with a regular academic position.

Linda Babcock, PhD, discovered this problem when she was director of the PhD program and a delegation of female graduate students came to her office. They asked why men were teaching courses and women were only assistants in these courses. The associate dean who handled teaching assignments told them that he assigned courses to those students who asked. Men asked. Women just didn't ask.

The authors also designed several experiments, with the same results. One involved a group of half men and half women. The subjects were told

Table 1. What are the key issues?

- Why women don't ask and men do.
- What happens if women don't ask?
- What happens if women do ask?
- What are positive strategies to change negotiation?
- What will happen if we encourage women to negotiate?

that they would be paid from \$3 to \$10. Each was given a game to play for four rounds. At the end of each session, they were each given \$3 and asked if that was okay. Most men asked for more money, with responses such as "I would like \$10." Both men and women complained about the low pay, but none of the women asked directly for more money. They accepted \$3.

## SOCIAL PRESSURES

There are many social pressures discouraging women from asking. Social expectations typically include that women should wait to be asked to marry, to join a team, or to be promoted. This creates anxiety for women because they prefer not to take a risk and offend their peers. An important concept discussed by Babcock and Laschever [1] is that women see control as external or outside themselves. This approach is appropriate because men typically are actually in control and fill the power seats, including C-suite leaders, boards of directors, and chairs of departments or private medical groups. Women see failure as resulting from

their personal weaknesses and think, “He would ask if I worked harder.”

Social pressures on women include expecting collaboration. Keeping the playing field level is a typical goal for girls’ interactions. Bragging is discouraged as too competitive. Taking a leadership role is less desirable because it requires too much command and control; it does not keep the playing field level.

Social changes have resulted in different expectations of women, particularly as diversity [3,4] has been shown to improve outcomes for business enterprises. Now some women are actually coaches, CEOs, and chief medical officers, as well as female world leaders, such as Margaret Thatcher. Now some women seek control as their own internal decision process rather than waiting to be asked. Women are taking more control of their lives. More women in medicine are risking taking leadership roles now.

A major game changer has been Title IX legislation, passed in 1972 [5]. It prohibits sexual discrimination in any educational program or activity receiving any type of federal financial aid. The issue was politicized in women’s sports and strengthened by Billie Jean King’s founding the Women’s Sports Foundation in 1974. Girls representation in varsity high school sports grew from 4% in 1972 to 40% in 2002 (Table 2) [6]. During the same period, women

earning medical degrees and law degrees both increased to nearly 50%. This dramatic increase in the number of women in medicine has clearly changed medicine over the past 40 years, but the number of female leaders has not reached the same high level.

WHY DO MEN ASK?

Babcock and Laschever [1] reported that men ask for what they want two times as much as women and negotiate four times as much as women. They see control within themselves. They are taught to “take charge.” They see failure and expect to ask again, as they control the moves. They are taught to compete, and bragging is encouraged.

WHAT HAPPENS IF WOMEN DON'T ASK?

Promotions do not occur from hard work alone. Accomplishments that are not visible to a leader or chair of a department will certainly not result in a promotion. Specific promotion criteria may not be met for academics or for partnership in private practice. The specific organizational goals of a woman’s university or private practice may not be met if that woman doesn’t ask, “What is holding me back?” [7].

WHAT HAPPENS IF WOMEN DO ASK?

There certainly can be problems arising from strong assertiveness and a very demanding style. A woman may be called too bossy or too emotional, and if she is very shy and submissive, she may be called too nice. The best role model is Sheryl Sandberg, Facebook’s chief operating officer, who was quoted as saying, “I want every little girl who is told she is bossy to be told instead she has leadership skills” [8].

WHAT CAN HAPPEN IF WOMEN DO ASK?

Their view of risk changes from asking for too much and becomes asking for

more. Positive results are likely to include getting more resources to be successful. They begin their jobs with appropriate salaries and benefits. They start with space and time to advance the organization as well. They learn their organizations beyond the organization chart. They might form personal career advisory groups, which include both career and content mentors who will help find them opportunities locally and nationally. Women learn to actively work at all organizational levels so that they develop national leaders as references who already know their expertise and potential options. Radiology expert leaders can support women to get advanced training in leadership skills, such as the Radiology Leadership Institute of the ACR [9].

POSITIVE STRATEGIES TO CHANGE NEGOTIATION

Women must take the first step and choose to negotiate. Very valuable negotiation skills, best described in *Getting to Yes* by Roger Fisher and William Ury, [10] include cooperatively listening and creating options that satisfy both people’s needs. For women, successful negotiation will depend on developing friendly and trusting relationships with their colleagues and bosses. Women must work to defuse the risk-taking anxiety that can sabotage their success [7]. Deliberate practice with someone else first can develop an approach that separates the people from the problem. Then discussing the problems will be effective [10]. Focusing on a win-win negotiation is critical. It is very important to not threaten to leave unless you have a BATNA—best alternative to a negotiated agreement. If you threaten to leave, your resignation may be accepted, and the negotiation will be over.

There is actually a female advantage in negotiation, described by some authors [11]. Focus on

Table 2. Girls playing high school sports versus medical degrees versus law degrees

	1972	2002
Girls playing high school sports	4%	40%
Medical degrees earned by women	9%	43%
Law degrees earned by women	7%	47%

Modified from <http://titleixedci285.weebly.com/statistics.html>.



collaboration can be an advantage and is a typical approach for many women. A competitive approach is more threatening and less successful in negotiation. Women often seek to build trust early because they regard relationships highly. Sharing information, listening closely, and talking about interests, not positions, is key. Trying to find solutions that benefit both sides and not being demanding or bluffing will be most effective. Sharing personal information early to explain a specific issue that needs to be addressed can lead to a better understanding of the negotiation goals [10].

## WHAT WILL HAPPEN IF WE ENCOURAGE WOMEN TO NEGOTIATE?

An excellent example is demonstrated by Bernadine Healy, MD, the first female director of the National Institutes of Health (NIH), who was appointed in 1991 by President George Bush. She negotiated a major change in all NIH research plans. She pointed out that during her major cardiac research career (she published 220 scientific articles), women had been routinely excluded from clinical studies. Women's responses were different, so research could be less complicated without the inclusion of women. Women's health problems and treatments were not studied. She created the NIH Women's Health Initiative. Research funded by the NIH proved that hormone replacement increased the risk for breast

cancer, heart attacks, and strokes. Men had not perceived these problems as priorities [12].

The AAWR was formed by leaders who chose to be tempered radicals, "to rock the boat from the inside the corporate ship and steer a course for powerful positive change" [13,14]. The AAWR chose to engage within the leadership of radiology nationally so that women could become successful in their careers in both private practice and academics. The ACR has recognized the value of diversity in leadership by developing the ACR Commission on Women and Diversity. Now is the time for women to ask for what they need to be successful and for radiology leaders to strongly support their inclusion in leadership roles.

## CONCLUSIONS

- Women need to ask to negotiate
- Women need to ask for what they need to succeed: salary, space, research support
- Radiology leaders need to encourage women to participate in leadership so that better outcomes come from diversity within our organizations

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