

Women in radiology: why is the pipeline still leaking and how can we plug it?

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Abstract

Today, >50% of medical students are women. This proportion, however, dramatically decreases throughout the higher levels of academia, a phenomenon described as the “leaky pipeline.” This gender disparity is particularly pronounced in academic radiology, mirrored by a significant lack of women in editorial board positions, key authorship positions, and conference keynote lectures. The scientific invisibility is not only a key hurdle facing women in radiology, the lack of female role models and mentors in this context might also negatively affect career choices of young female radiologists thereby further widen the existing gender gap. In this article, the origins of the “leaky pipeline,” the reasons for women’s choice or rejection of careers in academic medicine, as well as solutions as to how the continued loss of a large part of the talent pool can be prevented, are discussed. Active monitoring and intervention are needed to identify problems, plan targeted actions, and evaluate their efficacy. Among those are measures that address a lack of support in the workplace, specific mentoring needs of women, flexible working hours and opportunities to align work and family, financial constraints, and support for returners after career breaks. Cooperative steps of politics and universities need to be taken that ensure a sustainable way forward to enable many talented women in radiology to achieve their full potential.

Keywords

Women, radiology, education, academic position, leadership

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On Wednesday 3 April 2019, 17 members (12 women) of the International Diagnostic Course Davos (IDKD) faculty (Figs. 1 and 2) met for the second annual session of the IDKD initiative “Women in Radiology Meet at IDKD” to discuss the topic “Why is the pipeline still leaking and how can we plug it?” A key point of debate was the question why gender disparity persists in academic radiology, focusing on the underrepresentation of women in the scientific literature, in editorial boards, and conference keynote lectures. Indeed, today >50% of medical students are women. This proportion, however, dramatically decreases throughout the higher levels of academia, a phenomenon described as the “leaky pipeline” (Fig. 3) (1). The latter is particularly pronounced in Switzerland, where women account for 62% of medical students but represent only 22.8% of all professors and <12% of full professors (2). In addition, a paucity of women plenary speakers at scientific conferences has been

demonstrated in many academic disciplines (3) and there is an underrepresentation of women on editorial boards of scientific journals as well as in the medical literature. Indeed, female authorship remains significantly less common than male authorship across a variety of medical journals. During the “Women in Radiology Meet at IDKD” meeting of the IDKD

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Participants of the discussion (in alphabetical order; male: m, female: f):

David Bluemke (m, USA), **Catherine Gebhard** (f, Switzerland), **Fiona Gilbert** (f, UK), **Lucie Heinzerling** (f, Germany), **Thomas Helbich** (m, Austria), **Juerg Hodler** (m, Switzerland), **Jeffrey Kanne** (m, USA), **Jeffrey Klein** (m, USA), **Rahel Kubik** (f, Switzerland), **Magda Marcon** (f, Switzerland), **Edith Marom** (f, Israel), **Anagha Parkar** (f, Norway), **Katja Pinker-Domenig** (f, USA), **Hannah Prokop** (f, Netherlands), **Cornelia Schaefer-Prokop** (f, Netherlands), **Gustav von Schulthess** (m, Switzerland), **Katharina Weigel** (f, UK).

Fig. 1. Seventeen members (12 women) of the IDKD faculty met for the second annual session of the IDKD initiative “Women in Radiology Meet at IDKD”.

Women in Radiology meet at IDKD:

IDKD – the Diagnostic Imaging Courses – was founded over 50 years ago in Davos and provides organ-based, interactive education for medical imaging specialists in Davos, Switzerland as well as in Brazil, Greece, Hong Kong and China (see www.idkd.org). At the occasion of its 50th anniversary, the initiative “IDKD - Women in Radiology” was launched by Prof. Hedvig Hricak, Honorary Advisor, and Prof. Rahel Kubik, Co-Director of IDKD. The aim of this initiative is to bring female radiologists together to identify “rising stars” in radiology with the potential to become future teachers, learn about each other’s experiences, develop support networks and mentoring relationships, and create initiatives to reduce the barriers women in radiology face in advancing their careers and establishing leadership positions while balancing professional and personal goals.



Fig. 2. International Diagnostic Courses IDKD Davos, www.idkd.org.

(Figs. 1 and 2), the presence of women in key authorship positions was identified as a crucial point. Although the proportion of female authors in radiology journals has increased during the past two decades, the fraction of female first and corresponding authors currently amounts to only 34% and 24–28%, respectively, and is still unacceptably low (4,5). Notably, with only 14–19% of first and corresponding authors being women, female authorship was least common and has remained unchanged since 2001 in Switzerland, Germany, and Austria in a recent survey (5).

In light of these persistent gender disparities in authorship positions, participants of the “Women in Radiology Meet at IDKD” meeting pointed out that the later the date of one’s debut first-author publication, the later one starts building one’s academic

profile. This delay not only affects one’s academic portfolio but also decreases visibility for potential employers or promotional opportunities. Thus, the gender distribution of authorships seems to indicate that women begin their careers with fewer academic resources and subsequently progress slower than men through academic ranks. While the first authorship position is indicative of the active research involvement of women, the last position is representative of a higher academic rank. The very low number of female corresponding authors therefore mirrors the small proportion of female faculty members. As a significant positive correlation between first author gender and last author gender in two major American radiology journals has recently been reported, the low number of female last authors is another prominent example

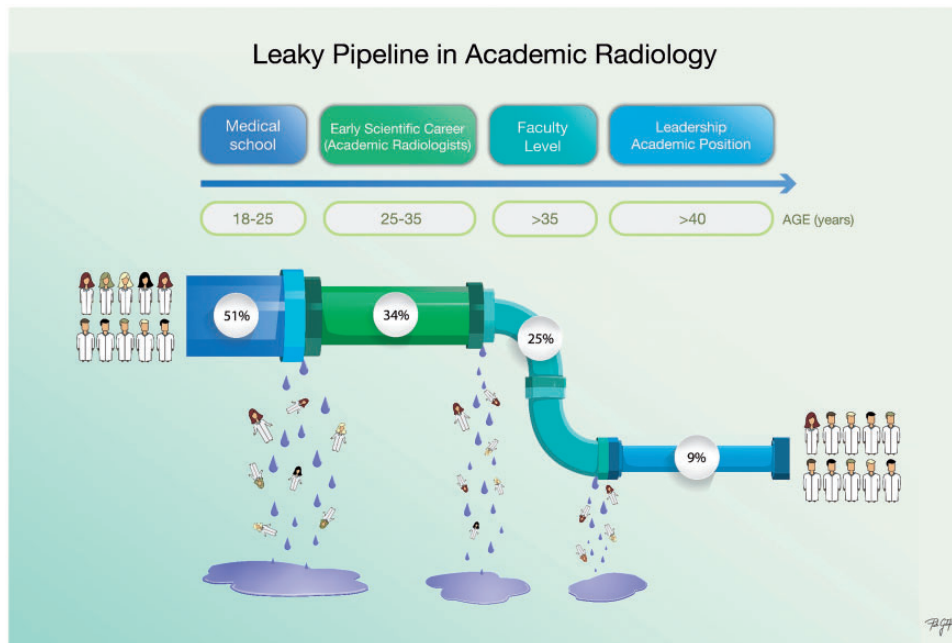


Fig. 3. The “leaky pipeline” in academic radiology. Women represent >50% of all medical students. At the early academic career level, women comprise 34% of academic radiologists, while 24% of faculty members are women with only 9% of women holding a leadership academic position. Data from the United States are presented according to Sepulveda et al. (1).

of a self-perpetuating gender gap in medicine (5). Indeed, the fact that female last authors are more likely to publish with a female first author emphasizes the importance of female role models in encouraging their junior colleagues to engage in an academic career.

Similar mechanisms seem to drive the low representation of women on editorial boards of scientific journals. Although two editors attending the “Women in Radiology Meet at IDKD” meeting emphasized that active efforts were being made at both *Radiology* and *RadioGraphics* to ensure equal representation of women, there is still a significant lack of women in editorial positions. In 2017, only 19–37% of editorial board positions in the journals *Radiology*, *American Journal of Radiology (AJR)*, *Academic Radiology*, and *Journal of the American College of Radiology (JACR)* were filled by women (6). David Bluemke, Editor in Chief of *Radiology*, answers the question as to why it is important to create equal representation in those settings with Michelle Obama’s quote: “Sameness breeds more sameness.” Although Moss-Racusin et al. have shown that unconscious bias is also prevalent among women (7), another study found that increasing female representation on the editorial boards of radiology journals was associated with increasing female authorship (6). Therefore, promoting diversity on decision-making bodies such as editorial boards may help tackle the lasting effects of unconscious bias. David Bluemke’s statement also highlights that not fighting for equality at the editorial board level

will only bolster the invisible barriers that appear to still be hindering women at the early stages of their careers. It should not come as a surprise, however, that women are still outnumbered on editorial boards as long as they are such a minority in high academic ranks. After all, these boards are often appointed by recommendation and tend to reflect the current academic population. Thus, as long as women do not fill the same amount of top academic positions as men do, they will not be able to oversee and drive the same amount of research.

So, what are the reasons for the low female representation in key authorship positions? A study published in *Proceedings of the National Academy of Sciences of the United States of America* in 2012 suggests that unconscious bias might play a bigger role than many of us realize. The publication reports the results of a double-blind, randomized, controlled trial in which a mixed panel of science faculty was presented with applications for a research associate position, which were randomly allocated a gender (7). It was found that female applicants were rated as significantly less competent and were offered a significantly lower starting salary and less mentoring by both male and female evaluators. Similarly, a recent analysis revealed that gender gaps in grant funding are attributable to less favorable assessments of women as principal investigators, not of the quality of their proposed research (8). It has further been shown that the same abstract is likely to receive a more critical review when submitted

under a female name than under a male name (9). Recently, controversy was caused by a reviewer who suggested to find “one or two male biologists” to co-author and help female authors to strengthen their manuscript (10). So, although the idea that inequalities in science are caused by biological sex differences was dismissed a long time ago, this accumulating evidence might be indicative of (un)conscious bias being a persisting hurdle for women in academia.

However, the female radiologists at IDKD stated that regarding scientific publishing, they had never experienced or witnessed an occasion in which bias got in their way of acceptance of a scientific paper. What seemed to be much more easily accepted was the suggestion that there might be factors beyond gender discrimination that are holding women back. That is, while men are often found to push to secure their first authorship position, women are seen to take a more collaborative approach to a project and often step aside on this issue. This phenomenon could also be due to the common concern that if women were to display these typically “male” behaviors, they would not be perceived as assertive and confident but rather as pushy and aggressive. Societal expectations of how a woman is supposed to act still seem to stick with us, manifesting as a form of “unconscious bias.” In addition to external challenges, such as the lack of effective mentors, these traditional gender roles might indeed be an underestimated constraint contributing to the “glass-ceiling” phenomenon in medicine. Whether these stereotypes are expressed by supervisors or by women themselves, who feel the need to act a certain way, it remains a challenge to be overcome.

Fiona Gilbert from Cambridge University, UK noted that the point in time during which female engagement drops the most is during women’s early 30s. It is easily seen that this is most likely because they are starting families. Even though raising children is more of a team effort today than ever before, it seems that combining a family with an academic career remains a struggle for many women. The choice to leave academia is most likely influenced by a combination of personal preference, so called “self-selection,” and unfavorable external factors such as time constraints. Many women may decide that family life takes precedence and an academic career may thus have to take a backseat. However, it needs to be acknowledged that the very nature of an academic career makes it challenging to combine such a career with tending to the needs of a young family. For many clinical scientists, academic work is an effort added on top of other obligations and finding the additional time required is simply not feasible without appropriate support. Furthermore, research does not promise long-term, stable employment, as it is very dependent on

temporary grants. These challenges make it difficult for female researchers to stay active during the early years of starting a family. Losing talented women at this crucial time in their careers is disappointing, both for the promising scientists themselves and for the institution and mentors who have invested in them. In fact, if women withdraw from the scientific landscape in their early 30s, a time where first steps towards an academic career have already been made, their visibility decreases profoundly and they become less attractive to potential employers and mentors in an academic environment. The latter offers one logical explanation as to why there are so many fewer women than men in high academic positions in universities. According to the latest data from the Association of American Medical Colleges, only 15% of department chairs and 16% of deans at US medical schools are women (11). Furthermore, certain programs or grants are only available to specific age groups and, as a result, women who try to re-enter academic life after taking some time out for family could miss out on these opportunities. There are some organizations working to address this hurdle, for example by considering academic years rather than chronological years, as is done for certain grants in the UK. However, too many other organizations are still lagging behind in this area. Given the increasing number of female medical students, tackling the dramatic drop-out of women in their early academic careers by implementing family-friendly structures, life domain balance measures, and re-entry programs should therefore become a priority for universities.

Notably, the relative contribution of self-selection and external barriers to the career choices of female radiologists is currently unknown. According to a recent review and meta-analysis summarizing 52 studies from different medical disciplines (12), it is unclear whether a loss of interest in research, financial considerations, and concerns about work–life balance are major driving forces contributing to the waning in women’s commitment to an academic career. However, while women seem to show similar or more interest in academic careers than men at the beginning of their careers, a substantial attrition in commitment occurs during residency as only 12% of women (vs. 44% of men) maintained their choice for an academic career five years after graduation in a UK cohort study (13). Thus, it seems unlikely that a loss of interest in research per se is the major reason for a women’s decision not to pursue a career in academic medicine. Similarly, Edmunds et al. (12) have reported women’s greater preference of teaching, which might be a result of a greater flexibility and availability of teaching roles, rather than a lack of interest in research primarily. Indeed, the majority of previous studies suggests that

concerns about work–life balance and family commitments affect women in academic medicine more than men (12). Accordingly, both, male and female residents committed to research were less likely to be married and have children than those planning to work in a non-academic environment, while more female than male Fellows had deferred having children in two previous studies (14,15). Although gender roles within the family might be changing, the fact that female and male generation Z students (those born after 1997) and generation Y professionals (born between 1984 and 1996) cite a high level of stress and worries about work–life balance as the main barriers to leadership (16) emphasizes the need to better understand and target concerns that will hold back the next generation of radiologist in their workforce.

Taken together, it seems that the achievement of equality for women in radiology is hindered by a vicious cycle. Breaking this cycle would not only make the workplace fairer but would be beneficial to everyone. After all, losing these talented women along the way not only means losing a large part of the talent pool, but also missing out on their creativity, experiences, perspectives, and discoveries. So, how can we break this vicious cycle and plug the leaky pipeline in academic radiology? During the “Women in Radiology Meet at IDKD” meeting, the attendees all agreed on the fact that nothing will change without active monitoring and intervention. Monitoring is needed to identify problems, plan targeted actions, and evaluate their efficacy. This approach was taken, for example, to appoint new editorial board members at *Radiology* and *RadioGraphics*. It is also how the large drop-off rate of women in their early 30s at the University of Cambridge, reported by Fiona Gilbert, was detected. Now that this problem has been recognized, interventions targeting it can be designed. For example, it has been proposed that instead of letting women completely leave the research sector when starting a family, their institutions should encourage them to continue at a reduced capacity. Allowing women to stay in the workforce during the early years of their scientific careers makes it easier for them to return to science. Adjusting the environment to accommodate for starting a family will allow for a more inclusive future. This must include encouraging partners to play an active part in raising a family and making arrangements that are as applicable to men as they are to women. As previously stated, an important step would also be to further roll out systems that consider academic age under different parameters than chronological age.

Of course, any change needs to be led by women themselves taking an active role. Women need to take credit for their achievements and ask for more opportunities. Katja Pinker-Domening, United States,

shared that in order to ensure an open-minded distribution of authorship positions, she agrees on strict parameters before the beginning of a project. The proposal to establish the author order for a scientific publication at the beginning of the project was unanimously supported by the other participants. Indeed, transparent and explicit acknowledgement of female and male contributors to a scientific project at an early stage may itself act as an intervention to address gender imbalance. While such proposals without doubt pave the way forward, it is essential to make sure that each woman does not have to learn these lessons by herself, as this would unnecessarily put her a step behind her male colleagues. Instead, we should aim to build mentoring networks. All participants agreed that female mentoring is crucial for bringing about change. However, there are concerns that informal mentoring programs could easily miss those women who would benefit most from mentorship. To reach these women before they are lost along the way, a more formal arrangement would certainly be advantageous. Such systems are already in place in some countries, such as the UK, and offer the chance to change public policy and human resource practices.

A simple conversation, as evidenced during this session, can go a long way: it can identify problems, explore their origins, and yield solutions. However, to truly make progress, active and cooperative steps of politics and universities need to be taken that ensure a sustainable way forward to enable many talented women to achieve their full potential.

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