CLINICAL STUDY

Underrepresentation of Women and Minorities in the United States IR Academic Physician Workforce

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ABSTRACT

Purpose: To assess the United States interventional radiology (IR) academic physician workforce diversity and comparative specialties.

Methods: Public registries were used to assess demographic differences among 2012 IR faculty and fellows, diagnostic radiology (DR) faculty and residents, DR subspecialty fellows (pediatric, abdominal, neuroradiology, and musculoskeletal), vascular surgery and interventional cardiology trainees, and 2010 US medical school graduates and US Census using binomial tests with .001 significance level (Bonferroni adjustment for multiple comparisons). Significant trends in IR physician representation were evaluated from 1992 to 2012.

Results: Women (15.4%), blacks (2.0%), and Hispanics (6.2%) were significantly underrepresented as IR fellows compared with the US population. Women were underrepresented as IR (7.3%) versus DR (27.8%) faculty and IR fellows (15.4%) versus medical school graduates (48.3%), DR residents (27.8%), pediatric radiology fellows (49.4%), and vascular surgery trainees (27.7%) (all $P < .001$). IR ranked last in female representation among radiologic subspecialty fellows. Blacks (1.8%, 2.1%, respectively, for IR faculty and fellows); Hispanics (1.8%, 6.2%); and combined American Indians, Alaska Natives, Native Hawaiians, and Pacific Islanders (1.8%, 0) showed no significant differences in representation as IR fellows compared with IR faculty, DR residents, other DR fellows, or interventional cardiology or vascular surgery trainees. Over 20 years, there was no significant increase in female or black representation as IR fellows or faculty.

Conclusions: Women, blacks, and Hispanics are underrepresented in the IR academic physician workforce relative to the US population. Given prevalent health care disparities and an increasingly diverse society, research and training efforts should address IR physician workforce diversity.

ABBREVIATIONS

AAMC = Association of American Medical Colleges, AI/AN/NH/PI = American Indians, Alaska Natives, Native Hawaiian, and Pacific Islanders, URM = underrepresented minorities in medicine

In 2003, the US Congress tasked the Institute of Medicine and the Sullivan Commission on Diversity in the Healthcare Workforce with providing an evidenced-based statement addressing health disparities. Increasing the diversity of health professionals was identified as a strategy to eliminate health disparities with the expectation that academic centers

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Table E1 and Figure E1 are available online at www.jvir.org.

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would lead such efforts (1,2). Diversity among health professionals has been shown to improve access to care for underserved populations, patient satisfaction with their treatment and communication with their provider, and medical student confidence in interactions with patients of varying cultures (3–6). With minority groups comprising nearly 35% of the population and projected to become a majority by 2042 (7), ensuring a diverse workforce is increasingly relevant. Minority physicians continue to provide a disproportionate share of care to underserved populations, serving 54% of minority patients and 70% of non–English-speaking patients (8). Increasing attention has been devoted to assessing diversity in the radiology workforce, finding that women and underrepresented minorities in medicine (URM) are underrepresented relative to other medical specialties (9–11). Meanwhile, limited attention has been devoted to radiologic subspecialties. A previous study found greater representation of women as fellows in pediatric radiology (50.7%) compared with radiology residents (27.8%) but less in interventional radiology (IR) (12.2%) (9). Given the importance of diversity in medicine, the purpose of this study was to assess the diversity of the IR academic physician workforce and comparative specialties.

MATERIALS AND METHODS

Measures

Variables evaluated were race, ethnicity, and sex. US Census Bureau definitions of race, ethnicity, and sex were used (12,13). All original data sources reported sex as male or female; however, within our analysis, "female" may be used interchangeably with "woman," and "gender" may be used interchangeably with "sex." Racial groups assessed were (*a*) white; (*b*) black or African American, referred to as black; (*c*) Asian or Asian American, referred to as Asian; (*d*) American Indians, Alaska Natives, Native Hawaiian, and Pacific Islanders (AI/AN/NH/PI), grouped as 1 category; and (*e*) other, defined in this study as any person with unknown racial information and/or not classifiable by any previous category. Ethnic groups included Hispanic and non-Hispanic. The term "URM" was used as defined by the Association of American Medical Colleges (AAMC) (14) to describe minorities underrepresented relative to their numbers in the general population, specifically blacks, Hispanics, and AI/AN/NH/PI. Certain Asian subgroups (Vietnamese, Hmong, and Cambodian) have historically been included in the URM designation but were not included in this analysis.

Data Sources

Institutional review board exemption was granted, as primary data were obtained from publicly available registries with no identifiable private or protected information. US population data were obtained from the US Census. Medical school graduate numbers reflect AAMC class of 2010 data (15). Faculty data were obtained from the AAMC FAMOUS database (16). Data on IR and other residency and fellowship training programs were obtained from annual *JAMA* supplements (17). Of the 8 Accreditation Council for Graduate Medical Education radiology subspecialty training programs, 5 have > 20 fellows and were included in this analysis—musculoskeletal radiology ($n = 23$), abdominal radiology ($n = 32$), pediatric radiology ($n = 85$), IR ($n = 195$), and neuroradiology ($n = 232$). Cardiothoracic radiology, endovascular surgical neuroradiology, and nuclear radiology have < 20 fellows and were not included. **Figure E1** (available online at *www.jvir.org*) depicts these specialties in relation to each other. For race and ethnicity measures, unduplicated totals were provided for US Census, medical school graduates, and residents/fellows for race and ethnicity separately. For other data sources, Hispanics were included in the "other" racial category, as no breakdown by race was provided.

Statistical Analysis

As race was the only variable with > 2 categories, an omnibus test using Pearson χ^2 test with 40 degrees of freedom was performed for the 5 racial categories (white, black, AI/AN/NH/PI, Asian, and other) and all comparison groups and found to be statistically significant with $P < .0001$. Binomial tests were used to investigate significant differences in the representation of 4 demographic groups: female, Hispanic, black, and AI/AN/NH/PI. IR faculty and fellows individually were compared with the US population and subsequently with each other (12 comparisons). IR faculty was compared with radiology faculty (4 comparisons). IR fellows were compared with (*a*) medical school graduates (4 comparisons), (*b*) radiology residents (4 comparisons), (*c*) other radiology subspecialty fellows (musculoskeletal radiology, abdominal radiology, pediatric radiology, and neuroradiology) (16 comparisons), (*d*) all total radiology subspecialty fellows combined (4 comparisons), and (*e*) neighboring specialty trainees (vascular surgery and interventional cardiology) (8 comparisons). There were 52 comparisons. One-sample binomial test was used for comparison with the US population statistics, and 2-sample tests were used for 2 distinct samples. Owing to 52 statistical tests performed, a Bonferroni adjustment was made, with P value set at $< .0096$ to denote statistical significance for each test, while maintaining an overall type I error rate of 0.05. Raw P values with 3 significant digits are presented, unless $< .001$. To assess changes in percentages by different race, ethnicity, and sex in IR residents over the past 20 available academic years (1992–1993 to 2012–2013), the slope and the associated 95% confidence intervals for each group were estimated using a simple linear regression model where year was used as an independent variable. With 20 years of data and the most conservative estimate of the

percentage (ie, 50%), the minimum detectable slope is 4% with 80% power and 2-sided .01 significance level for a total of .05 α level over 5 regression analyses. Finally, using descriptive statistics, IR fellowship was ranked among the 5 largest radiology subspecialty fellowship training programs and the neighboring specialties in terms of overall size and percentage of women, URM, and individual URM groups as IR fellows in 2012, with #1 being the specialty with the largest percentage of the group in question and #5 having the smallest percentage.

RESULTS

Comparative Cohort Analysis

Figures 1 and 2a–c show the distribution for URM, racial groups, Hispanic ethnicity, and female sex compared with the referenced US population and medical school graduates, IR and radiology faculty and trainees, and neighboring specialty trainees. Table E1 (available online at *www.jvir.org*) shows the raw data for all groups evaluated.

IR Faculty and Fellows Compared with US Population and Each Other

Representation for faculty, fellows, and US Census was as follows: blacks, 1.8%, 2.0%, and 12.6%; AI/AN/NH/PI, 1.8%, 0, and 1.1%; Hispanics, 1.8%, 6.2%, and 16.3%; URM, 5.4%, 8.3%, and 30%; and women, 7.3%, 15.4%, and 50.8%. Women and Hispanics were significantly underrepresented among faculty and fellows compared with the overall US population ($P < .001$ for each comparison). Black fellows were also underrepresented as IR fellows relative to the US population ($P < .001$), but this was not the case for black faculty ($P = .013$). AI/AN/NH/PI showed no significant differences in representation as faculty and fellows compared with the US population (all $P > .001$). When comparing IR faculty with IR fellows, for all individual URM groups—blacks, AI/AN/NH/PI, and Hispanics—and women, there were no significant differences (all $P > .001$).

IR Faculty Compared with Diagnostic Radiology Faculty

Female representation was significantly less for IR faculty compared with radiology faculty (7.3% vs 26.1%, $P < .001$), but representation was not significantly different among any of the racial and ethnic groups, including URM—blacks (1.8% vs 2.1%, $P = 1.00$), AI/AN/NH/PI (1.8% vs 0.4%, $P = .232$), and Hispanics (1.8% vs 4.3%, $P = .506$).

IR Fellows Compared with Medical School Graduates and Diagnostic Radiology Residents

URM comprised 15.3% of medical school graduates, 8.2% of IR fellows, and 8.3% of radiology residents. When comparing IR fellows with medical school graduates, women were significantly underrepresented (15.4% vs 48.3%, $P < .001$), whereas AI/AN/NH/PI (0 vs 1.1%, $P = .281$), blacks (2.0% vs 6.8%, $P = .006$), and Hispanics (6.2% vs 7.4%, $P = .589$) did not differ significantly. There were no significant differences in radiology resident representation for blacks (3.1%, $P = .535$), AI/AN/NH/PI (0.5%, $P = 1.000$), and Hispanics (4.7%, $P = .312$) compared with IR fellows; only women showed significantly greater representation as radiology

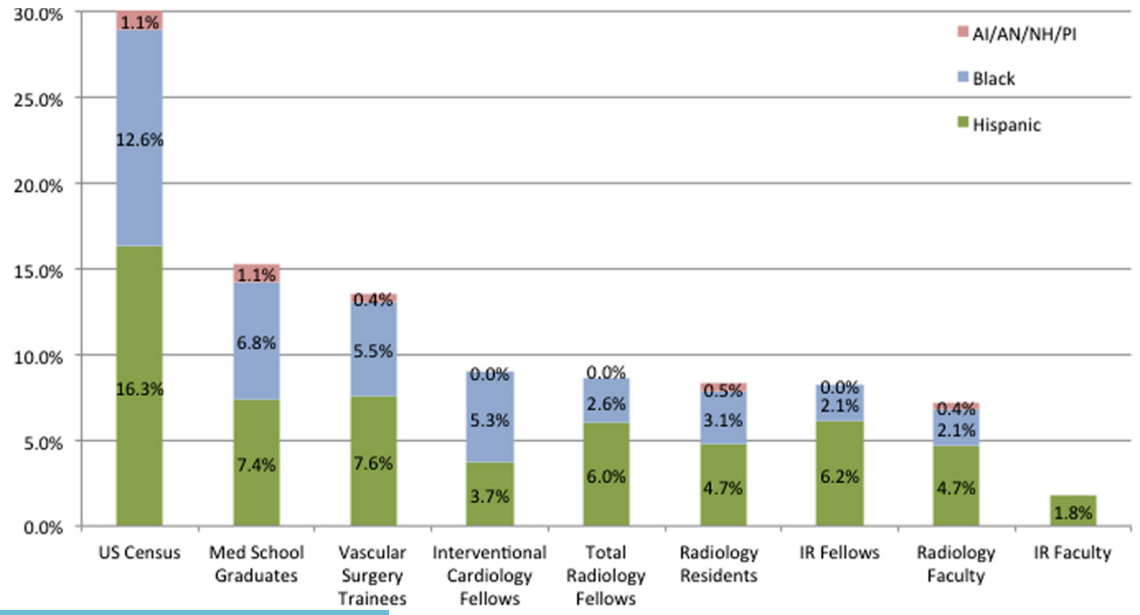
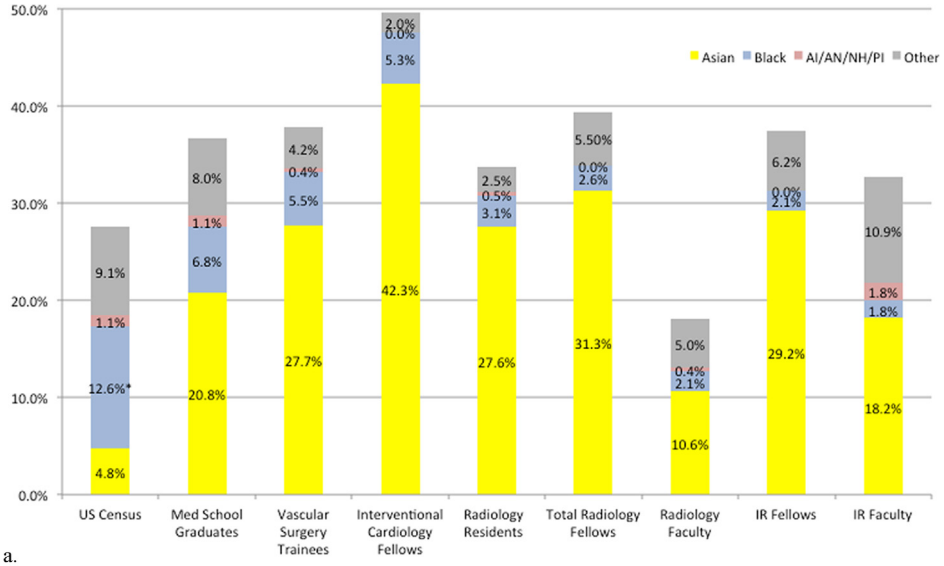
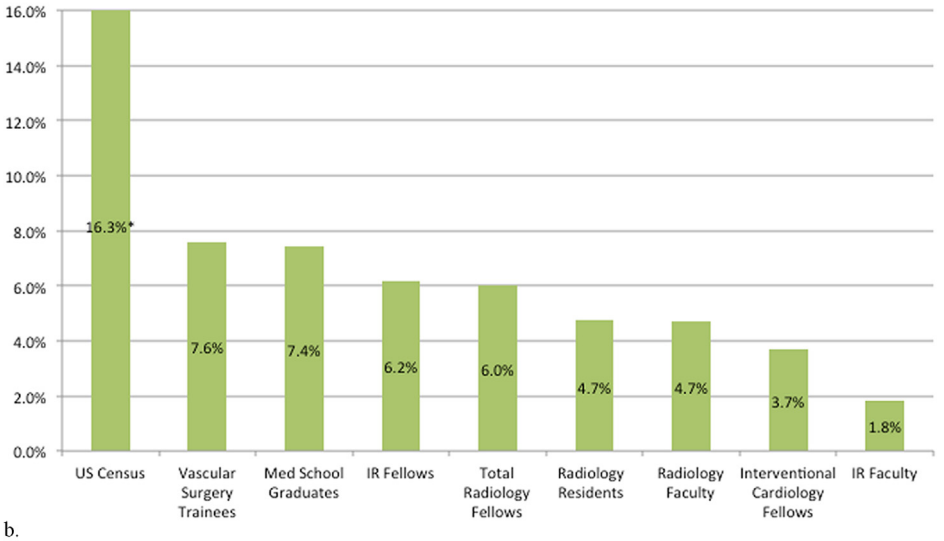


Figure 1. Distributions of underrepresented minority groups in medicine in order of descending representation of the 2010 US population and US medical school graduates and 2012 diagnostic radiology faculty and residents and IR faculty and fellows, vascular surgery trainees, and interventional cardiology fellows. Not shown is the non–underrepresented minority category.



a.



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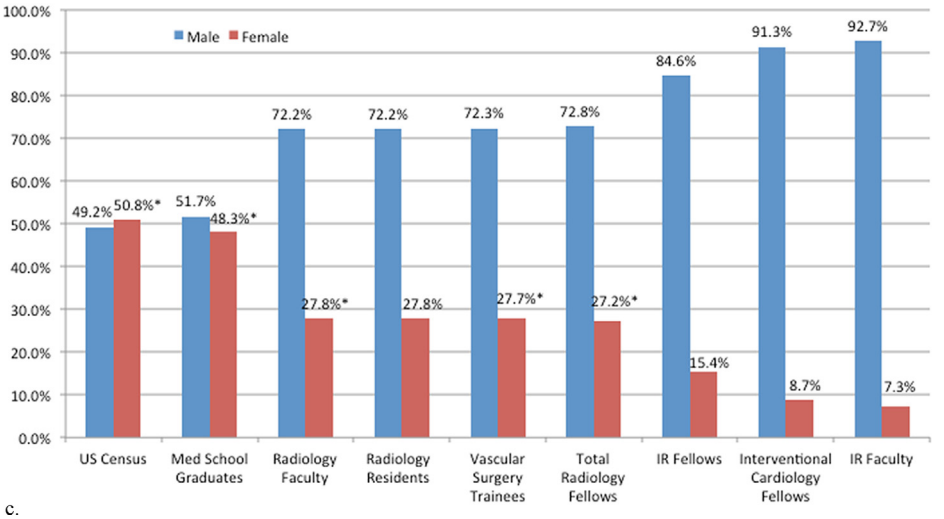

c.

Figure 2. Distribution by race **(a)**, ethnicity **(b)**, and sex **(c)** of the 2010 US population and US medical school graduates and 2012 diagnostic radiology faculty and residents and IR faculty and fellows, vascular surgery trainees, and interventional cardiology fellows. **(a)** Race. Not shown is the white category. **(b)** Hispanic ethnicity, in order of descending representation. Not shown is the non-Hispanic ethnicity category. **(c)** Sex, in order of descending female representation. An asterisk (*) indicates a significantly different proportion ($P < .001$) compared with IR fellows; analyses are not shown for the white, Asian, or other race category or diagnostic radiology faculty.

residents (27.8%) compared with IR fellows (15.4%) ($P < .001$).

IR Fellows Compared with Diagnostic Radiology Subspecialty Fellows

With 195 fellows in 2012, IR was the second largest radiology fellowship program after neuroradiology with 232 fellows. As noted in the Table, of the 5 largest radiology fellowship training programs, IR ranked second in black representation at 2.0% (below neuroradiology at 3.0%), third for Hispanic representation (above pediatric radiology 3.5% and musculoskeletal radiology 0%), third for combined URM representation (above pediatric radiology 7.1% and musculoskeletal radiology 0%), and fifth (last) in female representation. When comparing IR fellows with the other radiology subspecialty fellows and total radiology fellows, no differences reached statistical significance for any URM group. Women showed statistically significantly greater representation as pediatric radiology fellows (49.4%) and in the total radiology subspecialty fellow pool (27.2%) compared with IR fellows (15.4%) (all $P < .001$).

IR Fellows Compared with Neighboring Specialties

When comparing IR fellows with interventional cardiology fellows, there were no significant differences in female, black, Hispanic, or AI/AN/NH/PI representation (all P > .001). Compared with vascular surgery trainees, IR fellows showed significantly less female representation (27.7% vs 15.4%, $P < .001$) and no significant differences for black, Hispanic, or AI/AN/NH/PI representation (all $P > .001$).

IR Fellows and Faculty Historical Representation

Figure 3a shows the distribution of IR fellows by race, ethnicity, and sex from 1992 to 2012. The ranges were as follows: men, 84.6%–100%; whites, 45.3%–75.0%; Asians, 8.8%–32.2%; women, 0–15.4%; URM overall, 3.0%–15.5%; Hispanics, 1.5%–11.3%; blacks, 0.6%–6.8%; and AI/AN/NH/PI, 0–1.8%. When analyzing differences over time, representation was found to be significantly increasing for Asians, 1.27%/y (95% confidence interval [CI], 1.03, 1.51; $P < .001$), and Hispanics, 0.40%/y (95% CI, 0.33, 0.48; $P < .001$); and not significantly changed for all other groups—AI/AN/NH/PI, 0%/y (95% CI, −0.02, 0.02; $P = .989$); blacks, −0.01%/y (95% CI, −0.09, 0.06; $P = .744$); whites, 0.13%/y (95% CI, –0.40, 0.16; $P < .385$); and women, 0.16%/y (95% CI, −0.4, 0.35; $P = .110$).

Figure 3b shows the distribution of IR faculty by race, ethnicity, and sex from 1992 to 2012. The ranges were as follows: men, 85.0%–100%; whites, 65.4%–100%; Asians, 0–18.2%; women, 0–15.0%; URM overall, 0–7.8%; Hispanics, 0–5.4%; blacks, 0–1.8%; and AI/AN/NH/PI, 0–1.9%. When analyzing differences over time, representation was found to be significantly increasing for Asians, 0.73%/y (95% CI, 0.35, 11.06; $P < .001$); decreasing for whites, −1.38%/y (95% CI, −1.88, −0.88; $P < .001$); and not significantly changed for all other groups—AI/AN/NH/PI, 0.03%/y (95% CI, −0.013, 0.072; $P = .174$); blacks, 0 (95% CI, −0.011, 0.011; $P = .984$); Hispanics, −0.08%/y (95% CI, −0.29, 0.13; $P = .440$); and women, −0.31%/y (95% CI, −0.67, 0.06; $P = .099$).

DISCUSSION

In this analysis of diversity in the IR workforce, women, blacks, and Hispanics were underrepresented as IR trainees compared with the US population. Women were underrepresented as IR faculty and fellows compared with radiology faculty and residents, respectively, suggesting that comparably fewer women from the available pipeline of radiology residents are entering IR training. IR ranked last in female fellow representation of the 5 largest radiologic subspecialties and showed less female trainee representation compared with vascular surgery. URM groups showed no significant differences in representation as IR fellows compared with IR faculty, radiology residents, non-IR radiology fellows, or interventional cardiology or vascular surgery

Table. IR Fellow Demographic Characteristics Compared with Other Diagnostic Radiology Fellows* for 2012

Characteristic	IR	Range for Fellows	IR Ranking Among 5 Largest DR Fellowships
Overall size	195	23–232	#2
Female	15.4%	15.4%–49.4%	#5
Black	2.1%	0–3.5%	#3
Hispanic	6.2%	0–12.5%	#3
URM combined	8.3%	0–12.5%	#3
AI/AL/NH/PI	0	0	α

AI/AN/NH/PI = American Indians, Alaska Natives, Native Hawaiian, and Pacific Islanders; DR = diagnostic radiology; URM = underrepresented minorities in medicine.

*Of the 8 Accreditation Council for Graduate Medical Education Diagnostic Radiology subspecialty training programs, 5 have > 20 trainees and were included, in increasing order of size: musculoskeletal radiology (23), abdominal radiology (32), pediatric radiology (85), and vascular and interventional radiology (195), neuroradiology (232).

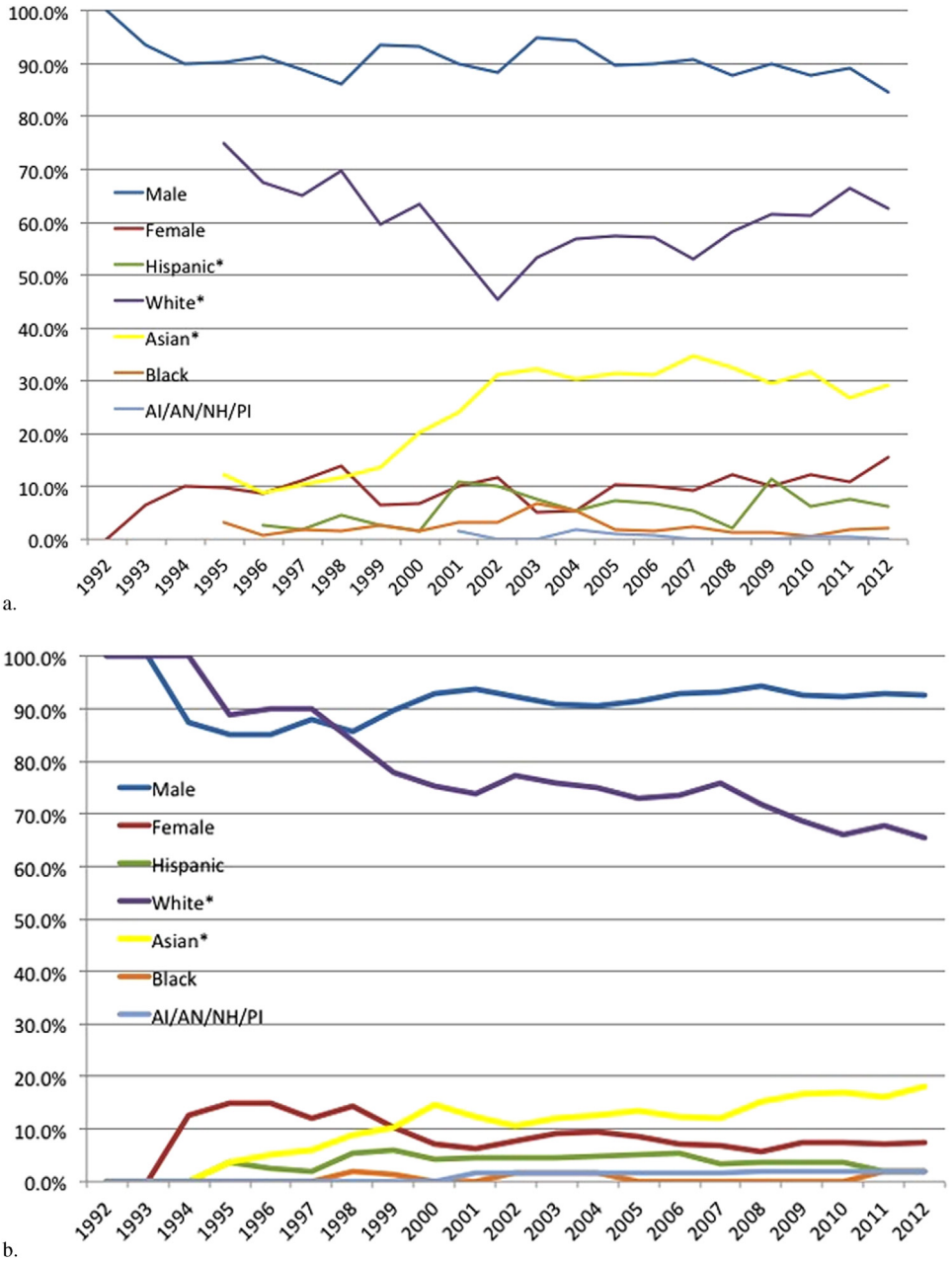

Figure 3. IR fellows **(a)** and faculty **(b)** by race, Hispanic ethnicity, and sex from 1992 to 2012. Not shown are non-Hispanic and other race categories. An asterisk (*) indicates a significant linear trend ($P < .01$) when assessing the percent change per year over time.

trainees. Looking at the past 20 years reveals no significant increase in female or black IR fellow or faculty representation. Hispanic representation increased significantly only for IR fellows. Overall, there remains low absolute numbers of underrepresented minorities in IR among fellows and faculty.

The relative underrepresentation of women and URM in IR is similar to trends reported within radiology. With women comprising 48.3% of medical school classes, the pipeline for female diagnostic and interventional radiologists is robust. However, there is gradually less female representation from radiology residency (27.8%) into IR fellowships (15%) and ultimately into IR faculty positions (7.3%). Increasing female representation in the physician workforce is notable with female physicians numbering nearly 300,000 in 2010, a 447% increase since 1980 (18). This surge has largely impacted primary care with improvements noted only in select other specialties, such as ophthalmology, where women constituted 16% of the membership of the Academy of Ophthalmology a decade ago, increasing to 24% by 2011, and urology, with > 25% female resident matriculation compared with 11.8% in 1999 (18). Meanwhile, along with IR, similar underrepresentation persists in orthopedic surgery, neurosurgery, radiation oncology, otolaryngology, and radiology (19–21). Female trainee representation in vascular surgery was nearly twice as much as female trainee representation in IR. Given the interventional similarities of the 2 specialties, exploring

gender-specific factors leading to more female representation in vascular surgery training at the medical school level, such as a direct training pathway from medical school to vascular surgery residency, should be explored and may yield insight into ultimately increasing female representation in IR.

A recent survey of medical students examining sex-specific preferences influencing IR selection found that the top 5 principal deterring factors for both female and male respondents were radiation exposure, extended work hours, call responsibilities, and career length; further deterring factors for women included male predominance, whereas further deterring factors for men included patient contact (22). Similarly, a survey of first-year medical students before and after a 7-week required introductory radiology course found that, compared with men, women more frequently rated "more patient contact" (89% vs 77%; $P = .02$) as having a positive impact (23). The potentially greater patient contact in IR has not translated to greater female representation relative to radiology and other radiologic subspecialties. In addition to interest and potential deterring factors, previous literature examining radiology workforce gender disparities explored mentorship, noting the paucity of women in leadership roles and limited mentorship programs (11,24).

In contrast to sex representation, URM representation in IR appears additionally limited by the pipeline issue affecting underrepresentation in medicine in general. URM comprise 30% of the US population, 15% of medical school graduates, 8% of radiology residents and IR fellows, and 5% of IR faculty. There is a relative dearth of literature exploring racial and ethnic differences in specialty selection in radiology and IR (10,11). As with women, the issue of patient contact has been suggested as a potential deterrent to residency training in radiology, extrapolating from an AAMC survey of the reasons endorsed by medical students for choosing a career in medicine, which found that blacks and Hispanics rated opportunities for patient contact, exercising social responsibility, and educating patients about health more highly than whites and Asians (20). Thus, similar to women, for URM, the training pathway through radiology residency may be an underlying dissuading factor. Finally, as with women, URM underrepresentation may be affected by limited numbers of URM faculty (1,25,26).

The new IR residency pathway affords earlier dedicated exposure to the full scope of IR, including evaluation and clinical management of patients (27). This earlier exposure may provide the opportunity to attract qualified medical students directly into IR, as opposed to through completion of diagnostic radiology residency. Mentorship can be tailored to an undecided target population earlier in their career and may yield involvement in specialty initiatives, such as research and societal projects, further increasing exposure and potentially interest. Additional opportunities for addressing sex, racial, and ethnic disparities in IR may involve the following strategies: (*a*) promoting a specialty culture that values diversity as a driver of excellence—statements and activities by the American College of Radiology Commission for Women and General Diversity and the newly formed Society of Interventional Radiology (SIR) Committee on Women are examples of such efforts (10,22); (*b*) developing institutional and societal strategic plans to support female and URM recruitment and retention as successfully demonstrated by leadership of the Ohio State Cardiovascular fellowship program, which developed a recruitment initiative that facilitated a transition from having never trained a URM candidate in 2007 to having 25% (4 of 16) URM representation in 2013 (28); (*c*) increasing accountability of academic and societal leadership to aid in the success of diversity initiatives as demonstrated by the American Society for Microbiology in implementing strategic education of its committee leaders and goals to achieve gender equity in representation of speakers at their annual meeting (29); (*d*) creating pipeline training programs for women and URM medical students and trainees to increase exposure, interest, preparation, and mentorship as demonstrated by the Nth Dimensions training program in Orthopedic Surgery (30), the sustained success of the "diverse surgeons' initiative" in general surgery residency (31), and other such programs.

This study has some limitations. Our analysis was limited to available Accreditation Council for Graduate Medical Education fellowship program and AAMC faculty data. Unaccredited fellowships and practicing physicians in non-academic settings with unreported demographics may reflect a dissimilar breakdown. Therefore, this report represents a fraction of graduated practicing interventional radiologists and does not necessarily mirror the specialty at large. National societal membership data may address this information void in the future. Our analysis was also limited to assessment of years of publically available data, acknowledging that medical school graduates in 2010 would become residents in 2012 or beyond. Nonetheless, we present longitudinal data over 20 years to assess temporal trends. Lastly, our intention was not to establish "correct" percentage levels, only to denote the prevailing trends.

In conclusion, women and URM remain underrepresented in the IR academic physician workforce. In particular, women are significantly underrepresented as IR faculty and fellows relative to radiology residents and faculty. Given prevalent health care disparities and an increasingly diverse society, future research, recruitment, academic training, and professional development efforts should involve strategies to strengthen IR diversity.

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Table E1 . Demographic Distribution by Sex, Hispanic Ethnicity, and Race of the 2010 US Population and US Medical School Graduates and 2012 IR Fellows and Faculty and Diagnostic Radiology Faculty, Residents, and Other Fellows

	Sex		Ethnicity		Race					
	Male	Female	Hispanic	Non-Hispanic	White	Asian	Black	AI/AN/NH/PI	Other	Total
US Census	151,781,326 (49.2)	156,964,212 (50.8)	50,477,594 (16.3)	258,267,944 (72.4)	223,553,265 (72.4)	14,674,252 (4.8)	38,929,319 (12.6)	3,472,261 (1.1)	28,116,441 (9.1)	308,745,538
Medical school graduates	8,706 (51.7)	8,129 (48.3)	1,254 (7.4)	15,580 (63.4)	10,665 (63.4)	3,503 (20.8)	1,138 (6.8)	180 (1.1)	1,349 (8.0)	16,835
DR residents	3,205 (72.2)	1,233 (27.8)	210 (4.7)	4,228 (95.3)	2,943 (66.3)	1,226 (27.6)	137 (3.1)	22 (0.5)	110 (2.5)	4,438
DR faculty	581 (73.9)	224 (26.1)	38 (4.3)	767 (95.3)	622 (77.3)	85 (10.6)	17 (2.1)	3 (0.4)	78 (9.6)	805
IR faculty	51 (92.7)	4 (7.3)	1 (1.8)	54 (98.2)	36 (65.5)	10 (18.2)	1 (1.8)	1 (1.8)	7 (12.7)	55
IR fellows	165 (84.6)	30 (15.4)	12 (6.2)	183 (93.8)	122 (62.6)	57 (29.2)	4 (2.1)	0	12 (6.2)	195
Vascular surgery fellows	172 (72.3)	66 (27.7)	18 (7.6)	220 (92.4)	148 (62.2)	66 (27.7)	13 (5.5)	1 (0.4)	10 (4.2)	238
Interventional cardiology fellows	274 (91.3)	26 (8.7)	11 (3.7)	289 (96.3)	151 (50.3)	127 (42.3)	16 (5.3)	0	6 (2.0)	300
Abdominal radiology fellows	25 (78.1)	7 (21.9)	4 (12.5)	28 (87.5)	19 (59.4)	11 (34.4)	0	0	2 (6.3)	32
MSK radiology fellows	15 (65.2)	8 (34.8)	0	23 (100)	15 (65.2)	7 (30.4)	0	0	1 (4.3)	23
Neuroradiology fellows	187 (80.6)	45 (19.4)	15 (6.5)	217 (93.5)	135 (58.2)	77 (33.2)	7 (3.0)	0	13 (5.6)	232
Pediatric radiology fellows	43 (50.6)	42 (49.4)	3 (3.5)	82 (96.5)	54 (63.5)	23 (27.1)	3 (3.5)	0	5 (5.9)	85
Total radiology fellows	279 (72.8)	104 (27.2)	23 (6.0)	360 (94.0)	232 (60.6)	120 (31.3)	10 (2.6)	0	21 (5.5)	383

Note–All values are reported as number (%).

AI/AN/NH/PI = American Indians, Alaska Natives, Native Hawaiian, and Pacific Islanders; DR = diagnostic radiology; MSK = musculoskeletal.

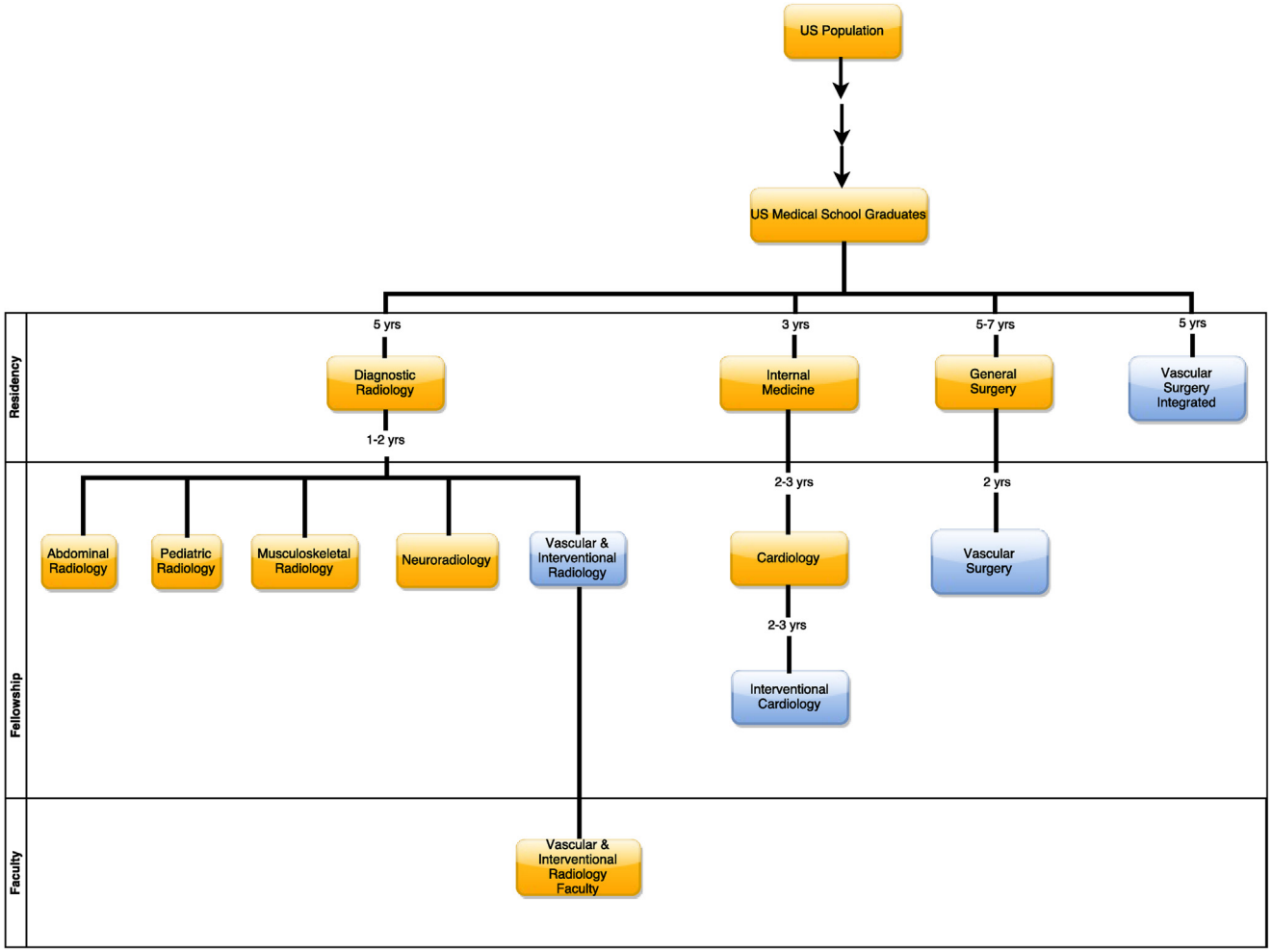

Figure E1. Representative pathway to training in IR and relationship to neighboring Accreditation Council for Graduate Medical Education training specialties analyzed in this study.