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## Interest in Interventional Radiology at Different Stages of Training: Possible Implications for the New Integrated Interventional Radiology Residency?

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### Abstract

Integrated interventional radiology residencies recently underwent their second year in the match, the first year of which involved only a limited number of programs. Now that students can choose to enter IR directly, student perceptions of IR vs DR are of paramount importance. We surveyed 1<sup>st</sup>–4<sup>th</sup> year medical students and radiology residents regarding interest in IR versus DR. Students considering a radiological career expressed more interest in IR than DR. Conversely, residents expressed more interest in DR. Medical student advisors and IR programs should continue to anticipate a high number of applications for integrated IR positions.

### Keywords

Medical student; residency; diagnostic radiology; interventional radiology; integrated

### Introduction

The American Board of Radiology (ABR) recently introduced a combined certificate in interventional radiology/diagnostic radiology (IR/DR). With each passing year, more integrated IR residency programs are becoming available through the National Resident Matching Program (NRMP). The training required for a combined certificate includes 3 years of diagnostic radiology training and 2 years of interventional radiology training<sup>1,2</sup>. After July 2020, IR training will only be available via integrated residencies and new

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“independent IR residencies” (with or without an “early specialization in interventional radiology”) <sup>3</sup>. A weakness of the match process, in general, is that students must select a field with relatively limited experience. This dilemma holds especially true for radiology and interventional radiology, as most medical students have very limited exposure to these fields during training <sup>4,5,6</sup>.

Although there will be multiple paths to a career in interventional radiology, some candidates will now make the decision to pursue IR while still a student via the main residency match process<sup>4</sup>. As such, there will likely be changes in radiology residency application patterns. Interventional radiology has always been a popular part of radiology amongst medical students. In fact, previous authors have shown that “the strength of the IR program” is one of the primary factors students use when ranking radiology programs <sup>7</sup>. Given students’ relative interest in IR versus DR will now inform the selection between available tracks, we aimed to survey a large group of interested students regarding their interest between IR and DR. To act as a point of reference, we also surveyed radiology residents at our institution using a similar survey instrument regarding their interest in IR versus DR (non-IR) fellowships and career plans.

## Methods

The study design was reviewed by the Institutional Review Board and deemed exempt. All surveys were anonymous and voluntary and no protected health information was involved.

### Our Institution

Our radiology residency training program is based at a tertiary care hospital. Residents receive lectures in DR and IR topics throughout residency during twice daily teaching conferences. The quality of the instruction, faculty, and clinical practice in IR and DR are equally well-regarded at our institution based on resident feedback and evaluations. Our institution offers 8 different diagnostic radiology fellowships as well as interventional radiology and interventional neuroradiology fellowships. Our interventional radiology fellowship typically includes four fellows, many of which are internal candidates who opt to stay for interventional radiology fellowship.

All medical students at our institution are exposed to both interventional and diagnostic radiology topics during approximately 40 hours of lectures and labs that are integrated into their required courses. More in depth clinical exposure to diagnostic and/or interventional radiology is available through electives that span all four years. We provide a combined career mentoring program for medical students interested in applying to radiology residencies, with mentorship by both interventional and diagnostic radiologists.

### Medical Student Survey

A five-question survey on preferences between diagnostic radiology and interventional radiology was given to first through fourth year medical students at a large state university-based medical school between September of 2015 and May of 2016. Participation was optional, and all students in attendance during specific large group lectures sessions (n=253) were invited to participate. Printed surveys were administered.

Interest in DR and IR as a career was assessed on a 5-point Likert scale. Students who reported moderate to high levels of interest in radiology as a career (“somewhat interested”, “highly interested”, or “extremely interested”) were asked three additional questions regarding their level of interest in DR versus IR for residency (using a 10-point scale) and the factors that made DR versus IR appealing (listed in Figure 2).

### **Radiology Resident Survey**

A survey on preferences between DR and IR was provided to all radiology residents at our institution (n=55) between September and November of 2015. The survey questions evaluated level of interest in IR versus DR, meaning their interest in IR vs non-IR fellowships and IR vs non-IR practice after fellowship. This was also assessed on a scale of 1 to 10.

### **Statistical Analysis**

Data analysis was performed using Stata version 14.0 (College Station, Texas). Respondents were aggregated into four groups for the analysis: junior medical students (MS1-MS2), senior medical students (MS3-MS4), junior radiology residents (PGY2-PGY3), and senior radiology residents (PGY4-PGY5), with mean ratings on a scale of 1 (low) to 10 (high) analyzed for each group, as well as between all medical students and all residents as a group. To evaluate the various factors affecting interest in IR versus DR, paired t-tests were used to compare preference differences. A p-value of less than 0.05 was considered statistically significant.

## **Results**

### **Medical Student Survey Results**

In total, 236 of 253 (93.3%) of medical students responded to the survey. Response rates by class were similar: MS1 - 91.5% (76/83); MS2 - 93.8% (45/48); MS3 - 98.2% (54/55); MS4 - 91.0% (61/67).

When students were asked to rate their level of interest in applying to a radiology field (IR or DR), 51/236 (21.6%) were at least somewhat interested, responding “somewhat interested”, “highly interested”, or “extremely interested”. Among this group who were at least “somewhat interested”, junior (MS1-MS2) medical students were significantly more interested in IR (6.5/10) compared to DR (5.2/10),  $p=0.02$ , as were senior (MS3-MS4) medical students, IR (7.2/10) compared to DR (6.5/10), though in this group the difference did not reach statistical significance ( $p=0.24$ ). A graphical representation of the interest of each group in each field is contained in Figure 1. Combined mean ratings for all medical students who were at least “somewhat interested” were 5.8/10 for DR and 6.8/10 for IR ( $p=0.011$ ).

Among medical students considering radiology as a career, when queried about which factors made interventional radiology and diagnostic radiology appealing, there was a significant difference between the IR and DR in ratings for amount of patient contact (8.0 for IR versus 2.8 for DR,  $p<0.001$ ), number of procedures (7.8 for IR versus 3.3 for DR,

$p < 0.001$ ), high income (7.1 for IR versus 6.6 for DR,  $p = 0.035$ ), and a field respected by peers (6.9 for IR versus 6.1 for DR,  $p = 0.002$ ) all of which favored IR, (Figure 2). “Quality of life” and “intellectual challenge” were both rated as appealing factors for both IR and DR by all interested medical students.

### Resident Survey Results

In total 48/55 (87.3%) of radiology residents responded to the survey, and response rates by class were similar: PGY-2 - 100% (14/14); PGY-3 - 100% (13/13); PGY-4 - 78.6% (11/14); PGY-5 - 71.4% (10/14).

In contrast to the medical student preferences, junior (PGY-2 and PGY-3) radiology residents reported a higher interest in DR (7.7/10) compared to IR (5.0/10),  $p = 0.006$ , and an even stronger preference for DR compared to IR was seen among senior (PGY-4 and PGY-5) radiology residents (9.5/10 for DR and 3.3/10 for IR,  $p < 0.001$ ). The overall mean resident interest in diagnostic radiology fellowships was higher compared to interventional radiology fellowships, 8.5 versus 4.3,  $p < 0.001$ .

### Comparison Between Groups

In addition to the above analysis comparing interest in IR vs DR within a group, comparisons were made across groups. Students were overall more interested in IR than residents (6.8 for students versus 4.3 for residents,  $p < 0.001$ ) and residents were overall more interested in DR than students (8.5 for residents versus 5.8 for students,  $p < 0.001$ ). The difference in ratings for IR and DR was greater between PGY4/5 residents and medical students compared to the difference in ratings between PGY2/3 residents and medical students, which is apparent from Figure 1.

### Discussion

Our single-institution survey demonstrated that among students considering a career in radiology, there is a strong level of interest in interventional radiology compared to diagnostic radiology. This finding was particularly true for senior medical students who were close to deciding, or had decided, on a field for residency. Medical student preference for IR seems to be driven by an interest in direct patient care, a higher number of procedures, and being in a field that they feel is respected by their peers.

This finding is in contrast to radiology residents who, on average, were more interested in careers that were not IR focused. The greater interest in DR among radiology residents, interestingly, mirrors both the number of training positions and the current needs of the medical system as there are far more residency, fellowship, and attending radiologist positions in DR. For example, a survey performed in 2009 showed that 10.5% of graduating radiology residents pursued a fellowship in IR, while 79.8% pursued fellowships in non-IR fields, most commonly musculoskeletal and neuroradiology. The remainder of respondents did not pursue fellowship training<sup>8-10</sup>.

What are the possible implications of the popularity of IR amongst medical students in these survey data? One interpretation is that these data are not representative of national trends.

Perhaps broad student interest in DR is greater than that seen at our institution, more closely matching the larger proportion of practicing DR physicians. However, if our results are reflective of a greater trend of high interest in IR, these data could reveal an imbalance between interest and available positions, whereby some trainees may ultimately choose DR due to unavailability of IR. Finally, these data may reflect a strong interest in IR among early learners which becomes surpassed by DR later in training.

Depending on one's interpretation, our study may have direct implications for advising and teaching medical students. Interest in integrated IR programs was strong in the 2017 match. It is difficult to determine the exact number of individual applicants to integrated interventional radiology residencies from the preliminary data, as the same applicants likely applied to both PGY-1 and PGY-2 positions. However, for integrated interventional radiology programs there were 221 applicants for 29 PGY-1 spots and 342 applicants for 95 PGY-2 spots, which at minimum indicates 342 individual applicants for 124 positions<sup>11</sup>. Based on these data and our results, we anticipate that programs will likely continue to witness an imbalance with large numbers of IR applicants compared to the number of available positions. As such it is important to advise students interested in IR that, due to its competitiveness, they need to apply to DR programs as well.

While it will likely be necessary practice for all IR interested students to apply to DR programs, this may be an especially important strategy for a subset of students. Given that medical students and radiology residents expressed significantly different preferences toward IR and DR, our data suggest interest in IR versus DR may evolve over time with greater exposure to both fields. Since students will continue to have several potential pathways to obtain training in interventional radiology, options such as "early specialization in interventional radiology" or independent IR residencies may be the more suitable, flexible option for some students who are not yet fully certain of their preferences toward IR and DR at the time of the match. At present, exposure to radiology and interventional radiology is quite limited in many medical school curricula. Options for improving students' knowledge base before deciding include offering earlier and greater exposure to both interventional and diagnostic radiology, and directly addressing any student misconceptions<sup>12</sup>.

Our study has a number of limitations. As stated early in the discussion, this is a single institution survey which may or may not be representative of national trends. Additionally, we have inferred in the discussion that there may be an evolution of interest over time based on differences in cross sectional data between residents and medical students. While longitudinal data would be superior to reveal trends over time, the time required to perform such a study would be prohibitive, particularly as we are attempting to assess the current state of learner interest early in implementation of integrated IR residencies.

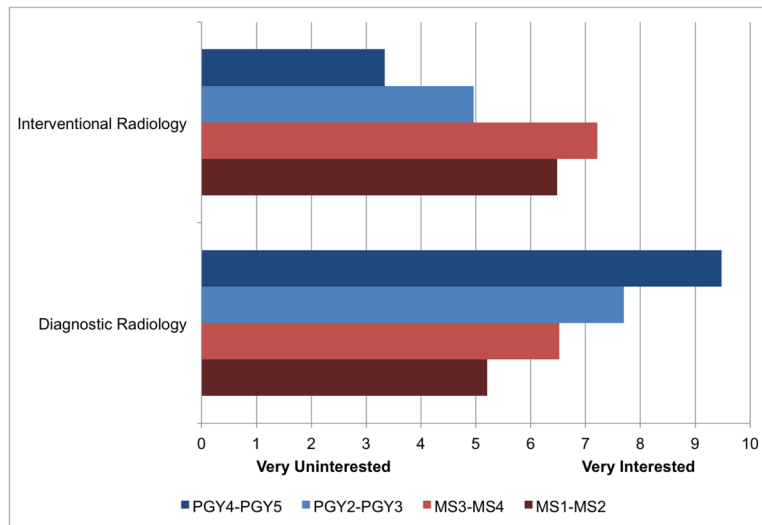
In summary, our survey revealed a strong interest in IR over DR amongst medical students considering a career in radiology. The extent to which these data reflect broader trends, and the effect this will have on future application patterns and application competitiveness remains to be seen.

## Supplementary Material

Refer to Web version on PubMed Central for supplementary material.

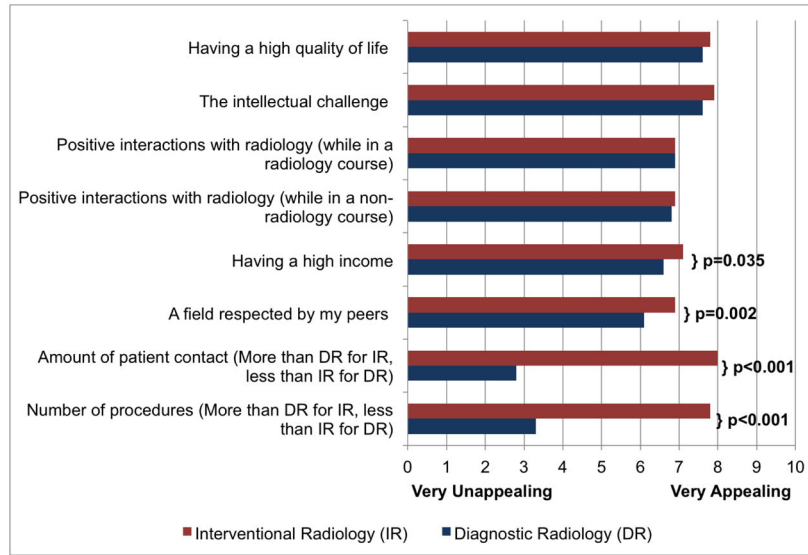
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**Figure 1.** Comparison of resident and medical student preferences for interventional and diagnostic radiology by level of training





**Figure 2.** Medical student rating of factors that make diagnostic and interventional radiology appealing, significant difference between IR and DR indicated by p-values.