Applying for Residency: Radiation Oncology

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Part I: Overview of Specialty

Description of Specialty, Common condition, types of patients
Welcome to Radiation Oncology - we are thrilled you have discovered our specialty! Radiation Oncology is a hidden gem of medical specialties, with only approximately 5,000 practicing radiation oncologists in the United States, but with a diversity of patient exposures, technologies, and expertise represented among its practitioners. Radiation oncologists are cancer and imaging experts who utilize radiation as a therapeutic tool to both cure and palliate. Radiation oncologists employ a combination of advanced technology such as linear accelerators to deliver external radiation treatment, and/or manually implanted radioactive sources (e.g. brachytherapy seeds) for the treatment of certain cancer sites. More than 50% of cancer patients receive radiation, and we routinely work in a multidisciplinary setting, collaborating with surgeons and medical oncologists as well as medical physicists, dosimetrists, nurses, nurse practitioners, physician assistants and radiation therapists to care for them. Radiation oncologists are trained to treat patients of all ages, from children to older adults, with many different cancer types located throughout the body. To do this, we synthesize empirical data with knowledge about cancer pathology and patterns of spread, accounting for a diverse and ever-changing set of considerations for each patient. While it is a common misconception being facile in physics is essential for a career as a radiation oncologist, medical physicists are responsible for the physics employed in developing radiation oncology treatment plans in conjunction with medical input from the physician. Radiation Oncology also provides the opportunity for both long-term and discrete patient and family relationships fostered in a variety of practice settings from major academic medical centers to small community environments.

Career trajectories: academics, clinical, research, teaching, etc.
Radiation Oncology is one of the most data-driven of the medical specialties, with many opportunities for research. Simultaneously, radiation therapy is rarely discussed and often misunderstood, even amongst those in the medical community. Therefore, practicing radiation oncologists must feel comfortable as educators, teaching their patients about radiation treatment, relaying level 1 evidence
from medical studies to justify its use, accurately conveying the risks and benefits of treatment, and empowering patients in these discussions to enable shared decision-making.

**Practice Models**
Radiation Oncology offers a multitude of options and opportunities for practice. Practice models for general Radiation Oncology include academic hospital or cancer center employment, including community based practices as well as traditional private practice, group practice, and employment through a Health Maintenance Organization.

**Residency: Length, typical curriculum**
Residency in Radiation Oncology is four years long and follows either a one-year medical or surgical internship/preliminary year or transitional year. Residents primarily interact with patients in the outpatient setting via new patient clinics or multidisciplinary tumor clinics. They follow patients during weekly visits while patients receive radiation therapy and see patients in continuity clinics after active treatment is complete. In addition, residents will see inpatient consultations and regularly take call on nights and weekends from home. Throughout training, residents are involved in all technical aspects of patient treatment planning and delivery that take place outside of regular clinic times. Training is generally structured into discrete rotations, each focused on a “core” disease site including: breast, genitourinary, thoracic, gastrointestinal, gynecologic, central nervous system, head and neck, hematologic, sarcoma, and pediatrics throughout the four years. In addition, while medical physicists play a large role in treatment planning there are didactics in radiation biology and radiation physics for all residents, to provide a foundation and rationale for the utilization of radiation therapy. Programs may differ on research time, elective rotations, and inpatient call schedules. Some programs may require rotating at more than one hospital. Programs are primarily centered in academic cancer centers, but may also integrate training in community or county hospitals, children’s hospitals, or VA hospitals. Residency training in radiation oncology is considered to be terminal training. Additional fellowship training is not considered necessary in order to specialize.

**Fellowships offered after residency**
Optional one-year fellowships are offered in highly specialized techniques and disease sites including: palliative care, proton therapy, brachytherapy, pediatrics and CNS malignancies.

**Part II: Life as a Radiation Oncologist**

**Demographics**
In 2017 and 2018, women made up approximately 30% of all applicants in Radiation Oncology and in 2017, made up 29% of all practicing radiation oncologists. In 2018, applicant self-reported race/ethnicity demographics included: African American (7%) Hispanic (6%), Asian-American (28%) and Native American/Alaska Native (0.2%). As a specialty, the proportion of women has remained consistent.
over the past decade, but efforts are being made to recruit and attract more women and other groups underrepresented in medicine.

**Earnings Potential**
In 2018, the median annual compensation for radiation oncologists in the United States was $398,662. Incomes vary based on region and location of practice. Higher incomes were reported in the Southern and Midwest U.S. regions and fixed compensation models were more common in academic systems and productivity based models more common in private practice.

**Lifestyle**
In 2017, radiation oncologists reported working an average of 51.4 hours per week and were employed by academic/university systems, private practices, and non-academic hospitals in a 2:2:1 ratio. Overall, the proportion in rural practice appears to be decreasing over time, while suburban practices are increasing (40.6% in 2017), and the proportion practicing in an urban setting remains high (46.8% in 2017). Based on the practice setting, there is wide variation in the frequency of on-call responsibilities with those in private practice taking call more frequently than those in an academic hospital setting. However, on-call responsibilities are generally reserved for inpatient emergencies and do not require being present in the hospital for the duration of on-call hours.

**Academic Medicine**
Academic medicine is a popular choice for many radiation oncologists; approximately 30% of radiation oncologists are in academic medicine. Academic Radiation Oncology departments generally have all specialty areas represented, with individual physicians specializing in a particular type of cancer. Academic Radiation Oncologists participate in clinical, translational and/or basic research, teach medical students, residents, and fellows, and provide clinical care to patients. Radiation oncologists not in academic medicine may still have a teaching role as clinical faculty with local or regional medical schools.

**Part III: Applying in Radiation Oncology**

**How Competitive is Radiation Oncology?**
Radiation oncology is a small field which draws a self-selecting group of competitive applicants. Over the past few years, approximately 5-7% of medical school graduates have entered the field. In 2018, there were 93 programs offering 194 spots, of which 97% were filled overall. 91% were filled by US allopathic seniors. Only 3 (1.5%) were filled by foreign medical graduates and 3 (1.5%) were filled by US osteopathic school graduates; the rest were filled by US allopathic graduates who were already residents or other physicians.

In 2018, there were 221 applicants for these 194 positions. This is a ratio of 1.14 applicants for each position. It is the fourth-smallest specialty, following interventional radiology (136 positions), plastic
surgery (168 positions), and child neurology (168 positions). In 2019, the number of applicants decreased slightly to 190 applicants.

For matched applicants to radiation oncology, the mean USMLE step 1 score was 247 and mean USMLE step 2 score was 253. 35.2% of matched applicants were AOA members. In line with the academic research emphasis of the field, 20.8% of matched applicants had a Ph.D. degree and 19.2% had another graduate degree. The mean number of research experiences was 6.1 with an average of 15.6 abstracts, presentations, and publications.

Planning the post-clerkship and senior years
Once you have decided on a career in radiation oncology, you should meet with your academic Society based and specialty advisors, your radiation oncology elective course director, and the radiation oncology program director in order to plan your post-clerkship clinical experiences and extracurricular activities. Be prepared to discuss your strengths as a future applicant, and be open to discussing research and other opportunities to improve your standing as an applicant.

Clinical Rotations

Sub-Internships
You should complete a medicine sub-internship in addition to a radiation oncology elective. We recommend you complete at least one radiation oncology rotation, and you have the choice to rotate at the Longwood campus and the MGH campus. This rotation should be completed by August of your senior year in order for the department committee to have adequate time for course grades and summative comments to write Departmental Summary Assessment (DSA) for all students (see below). You may want to ask the clerkship director for a letter of recommendation; don’t worry about this - course directors expect to be asked. It is best to make this request early in the rotation to give the course director adequate time to write the letter. You may also want another faculty member from the radiation oncology rotation to write a letter. You should consider asking any faculty member who has spent significant time with you and can accurately remark on your strengths as an applicant to the field. Your specialty advisor will have suggestions for who to approach for letters of recommendation from the radiation oncology elective, as well as helpful letters outside of radiation oncology.

Away electives
Away electives are often sought by students as “audition rotations.” A particular reason for a specific program (partner or spouse in same institution, family or other ties to a region) might serve as a reason to do an away rotation at an institution, but it is not required or expected. You cannot receive academic credit at HMS for more than 2 clinical electives in the same specialty, including away electives. (HMS Student handbook Section 2.14). If you would like to complete an away elective, be aware there are often applications which must be completed in advance.
Other Recommended Electives
Clinical electives outside of radiation oncology will make you a better doctor. For most students, this is your last opportunity to be exposed to many different specialties of medicine. Choose electives that will benefit you and that you are genuinely interested in. Rotations in medicine or surgery will set a groundwork for your transitional or internship year. In addition, cancer impacts many different sites of the body, and so learning to care for patients through rotations in medicine or surgery will help you clinically as a radiation oncologist. Other recommended electives include radiology, emergency medicine, medical oncology, pathology, and even dermatology. Radiation oncology is completely different from every other specialty and you will become intimately acquainted with it during residency, so use this time to broaden your knowledge and experience. You may want to schedule these electives during the fall and winter, but remember to preserve flexibility for interview season.

Research
Radiation oncology is a competitive and academic field and many programs will expect an applicant will have research experience. Research experience does not necessarily need to be in radiation oncology, as the experience of participation in scientific inquiry is paramount. However, research into topics that apply to oncology is preferred.

Research can range from laboratory experience to large database analyses to retrospective or clinical trial research. Medical education, global health, or public health research are all also welcome topics of inquiries. Most HMS students will have some research experience from their Scholars in Medicine project. We also welcome you to meet with radiation oncology faculty at Longwood or MGH to help develop research projects.

Research blocks are also a good choice for the September- January time period when you will need a flexible schedule for interviews. While it is less likely a research project in the senior year will result in a publication, you may have a poster presentation or other avenue for presenting your work.

For students who complete a PhD during or prior to their medical training, publications will be expected in order to show a successful experience. The number of publications is far less important than the quality. For students without a PhD, one accepted presentation (poster or podium) of good quality at a meeting (even if after the 9/15 application deadline) is adequate to show research experience.

National Meetings
If you have the opportunity to present at a national meeting in radiation oncology, take advantage of this. Many students choose to attend and/or present at ASTRO, the annual national radiation oncology conference which takes place in the fall. This meeting and others are an excellent networking opportunity and a way to introduce yourself to program directors and others involved in residency selection committees. Other relevant meetings include site-specific multidisciplinary oncology meetings, such as the breast cancer annual meeting in San Antonio.
Part IV: Assessing your Competitiveness

What Criteria do Programs Consider?
Assessing your competitiveness will determine how many and what types of programs you should apply to. Your application portfolio has many facets, many of which are immutable by the time you reach your senior year. You should realistically assess your competitiveness with your FA; for example, low USMLE Step scores may mean you need to apply to more programs, or different types of programs, to match successfully. There is no uniform number of programs recommended rather, you need to determine a successful strategy for you as an individual, your personal preferences, whether you are couples matching, and your unique strengths as an applicant.

If your self-assessment and your meeting with your specialty advisor indicates you are a less competitive candidate, you might consider applying for an away elective at one or more of your desired programs. A stellar performance, and a letter of recommendation from a faculty member may help your application.

1. Grades and your DSA
While grades are important, not all grades are equally important. HMS is now using the Department Summary Assessment for 2019 and beyond (a small set of seniors will still be in the New Pathways and will not have a DSA in 2019-2021). The DSA is intended to capture a student’s professional growth over time and includes all clinical coursework in the specialty from the clerkship through July of the application year. Radiation oncology programs look at all DSA reports. Poor grades diminish your competitiveness, but many programs (even highly selective programs) use a holistic approach to evaluating candidates.

2. USMLE Step Scores
Many radiation oncology residency programs use Step scores, especially Step 1, as an actual or virtual screening tool. The reasons for this are several, but in general standardized tests are viewed as an objective measure of academic achievement and potential, and programs want to ensure trainees have the academic strength to finish training and successfully pass Board exams. Prominent, highly selective programs have many high-achieving applicants. Prominent programs can afford to screen out applicants who have not met a certain score. Less competitive programs are more likely to consider applicants with lower scores. As a general rule of thumb a score of 240 on step 1 meets the benchmark for any program using step 1 as a screening tool.

Some radiation oncology residency programs will consider granting interviews to applicants without Step 2 scores. Step 2 scores must available to programs by January of your senior year. For candidates who are less competitive, taking the Step 2 exam (and earning a high score) early enough for consideration in the initial review may boost your chances for an interview. Some programs will not rank an applicant for the Match without a passing Step 2 score.
3. Research Experience/Publications
As noted in the section on competitiveness, pursuit of research is important for application to radiation oncology residency. While there are no hard and fast rules about how much research an applicant should do, it is important to demonstrate scholarly curiosity through research experiences. Many students choose to take an additional year to do research to help increase the strength of their application. While publications can only help your application, they are not the only marker of success of a research experience. In addition, conference presentations, recommendation letters, and discussion during interviews of your research can all help your application significantly.

5. Extracurricular Activities
The NRMP data shows successful applicants in many fields, including radiation oncology, had fewer volunteer experiences than unsuccessful applicants. In radiation oncology for example, unmatched applicants reported 7.4 volunteer experiences while successful applicants reported 6.6. Volunteer experiences are viewed most favorably when the student gains leadership experience, for example, serving as an officer in an organization or in student government, the admissions committee or when the student has a role in development or innovation of a program.

Getting an Interview: Attributes Residency PD’s Consider in Granting Interviews
Without question, USMLE Step 1 scores are important in determining which applicants are granted interviews. Letters of recommendation are the second most commonly cited factor in choosing candidates for interviews, followed by demonstrated involvement and interest in research, perceived commitment to specialty, and personal statement.

When programs are ranking applicants for the Match, the attributes most cited as contributing to a candidate’s ranking are interactions with faculty during interview and visit; interpersonal skills; interactions with house staff during interview and visit; and feedback from current residents. Letters of recommendation, interest in program, demonstrated involvement and interest in research, and Step scores are also important.

Letters of recommendation
You will need at least 3 letters of recommendation (LoR). Most HMS students will have 3 supporting letters. At least 1 letter (preferably 2) should come from radiation oncology faculty at the institution where you completed your radiation oncology elective. It is common to ask the elective course director for such a letter, but you can also ask any faculty member who will be a strong advocate for you as an individual, who knows your personal and your clinical strengths. A professor with whom you have done research, particularly if a paper has resulted, is also a good choice, as they can comment on your work ethic and research experience.

If you choose a writer from outside radiation oncology, the writer should know you very well and be able to comment on your abilities to perform as a radiation oncology resident. Sometimes, students think they must identify a well-known faculty member to write a letter of support, but a letter from a radiation oncology junior faculty member with whom you worked extensively on research project may
be a better choice than an attending you worked with briefly from your radiation oncology rotation even if they are very well-known in the field.

If you wish to approach a faculty member for a letter, you should ask as soon as possible to provide them with adequate time to write a letter. Once a faculty member agrees, remember to reach out to them again in May or June to give the writer adequate time to review your record. Give your letter writers your CV and personal statement to review as soon as you have them completed. Plan to meet with each writer in the summer to review your portfolio and give them time to write the letter. Ask the writers to submit their letters before August 31. ERAS provides a letter request form you should provide to your LoR authors. This form assists your letter writer with submission of the LoR, and includes instructions on how to access and use the ERAS Letter of Recommendation Portal. You should send a reminder to the writers around August 20. Remember summer vacations and other commitments may come up, and you want to be respectful of your writer’s time. You should consider writing a thank you note once the letter is on file with ERAS.

ERAS gives you the option to waive your right to review the LoR. There is no benefit to reviewing your letters, and program directors would be concerned if an applicant did not waive this. It is strongly recommended you waive the review.

How many programs should you apply to?
The number of programs you should apply to depends on your competitiveness as a candidate, your geographic restrictions (if any), whether you are couples-matching, and other factors. One of the main predictors of the number of programs needed for a successful match is your Step 1 USMLE score. A lower score does not make you unmatchable; however, lower scores indicate a need to apply more broadly. The AAMC calculates a “point of diminishing returns” based on step 1 scores in each specialty. In radiation oncology, the point of diminishing returns for those with a Step 1 score over 248 was 24 programs (confidence interval 18-30); for those with score 234-247, this number was 38 (confidence interval 31-45) with a likelihood of entering residency of 81%. Keep in mind this is for all types of programs; if you desire a highly selective program, you may need to apply to more programs. Another strategy is to mix the types of programs you apply to, with some “reach” and some “safety” programs. A general rule of thumb is to apply to 20 to 25 programs and accept at least 10 interviews with 2/3 being tier 1 and 1/3 being tier 2 programs. Your specialty advisor can tailor this for your specific application.

Regardless of how many programs you apply to, you want to interview at as many programs as you need to match. In recent years, HMS students applying in radiation oncology have done extremely well with matching into their top 5 ranked programs. When ranking programs, be realistic. Remember, by ranking a program, you are agreeing to employment at that program. Do not rank a program you do not wish to attend. Rank the programs in your preferred order, and (this is the hardest part!) trust that the NRMP will give you your best match.
Common questions you may be asked – specialty specific

Be prepared to discuss everything listed in your ERAS portfolio, particularly anything you discuss in your personal statement. Since this is the area of your application where you have the most “voice”, it is natural for interviewers to use it as a launching pad for getting to know you. Be prepared to talk about how you decided to pursue a career in radiation oncology, about your accomplishments and any current projects, publications, or activities outside of medicine.

Interview questions fall into several categories:

- Career plans:
  - Where do you see yourself in 5,10,15 years?
  - What kind of environment (academic, community, etc.) do you wish to practice in?

- Motivation for applying to this program, and what you will add:
  - Why do you want to come to our program?

- Behavioral
  These questions use a business interview format called STAR (Situation, Task, Action, Result) The interviewer will want to know the situation or task in detail, what the desired outcome of the situation or task was, what action you did or did not do, and what the results were. This type of question is intended to discern a candidate’s compatibility/personality:
    - Tell me about a time you received constructive criticism?
    - Tell me about a time you had a challenging patient- why was this challenging, and how did you handle it?
    - Give me an example of your initiative and/or leadership.

- Unique characteristics:
  - What are you most proud of (academic or in general)?
  - What do I need to know about you that isn’t in your application?

- Unusual Interview Techniques
  - These are rare in radiation oncology, although a few programs will ask knowledge-based questions about radiation oncology or do panel interviews. One recent student reported have 30% panel interviews in radiation oncology, which ranged from typical interview questions (where panels were used to prevent repetition of applicant responses and save the applicant interview time) to very unique behavioral questions (for which you cannot prepare). The overarching takeaway is to not stress out with panel interviews.

For all these question types, have answers prepared and be well-versed. Writing the answers to interview questions out and rehearsing the answers out loud (even if it’s just to the mirror or a houseplant!) are good techniques to prepare.
Common interview errors include:

- Poor preparation, not being familiar with the program
- Inconsistent or inappropriate answers to questions
- Abrasive, condescending, evasive behavior
- Disinterest or flat affect
- Inappropriate humor
- Negative comments on other programs, candidates, or the program itself

**Communication with Programs: NRMP Code of Conduct for Applicants and Programs**

Both candidates and programs are governed in their behavior and communication by the NRMP Code of Conduct. This is a contract you agree to by your participation in the Match. The intent of this Code is to protect applicants’ privacy and confidentiality, to prevent programs from asking illegal or coercive questions, and prevent onerous displays of intent (second interviews or visits, rotations at the program institution, demanding to know how the candidate will rank a program).

Beyond this, in 2015, a group of program directors from top programs co-wrote an editorial in the Red Journal (Wu et al., *IJOBP*) arguing for cessation of post-interview communication. Many programs will now explicitly discourage post-interview communication. In 2018, 42% of respondents to a survey of match processes did not even send thank you cards or emails (Tom et al., *IJOBP*, 2018).

If you have one clear first choice program, discuss with your SA whether you should communicate with the program director. While many programs want to know this information, others may discourage post-interview communication but you are not disadvantaged by letting a program know you will be ranking them first. Never tell a program you are ranking them first if in fact you are not planning to do so. Radiation oncology is a small field and program directors do talk to one another to gather information about candidates, and you do not want a reputation for dishonesty.