RadOnc Student Scan

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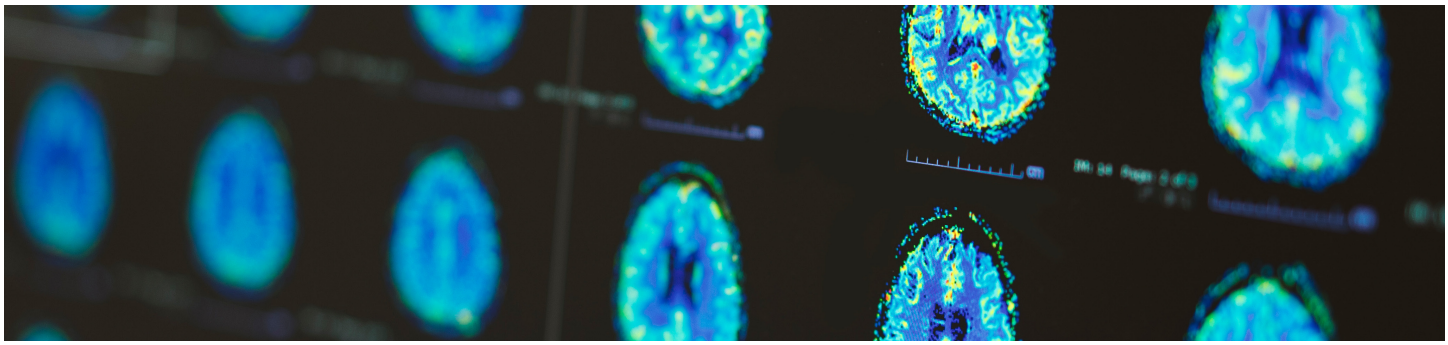

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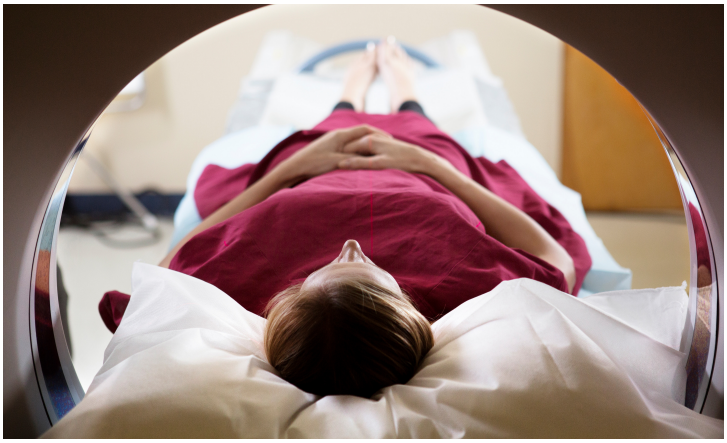
Introduction to Radiation Therapy: Beams, Techniques, and Clinical Impact



Radiation therapy is one of the most versatile and effective tools in the fight against cancer, offering targeted solutions for a variety of malignancies. With technological advancements and cancer-specific techniques, physicians have a range of options to tailor radiation therapy to the unique needs of each patient. Understanding the types of radiation therapy and the physics behind different beam arrangements is essential for medical students aiming to excel in radiation oncology.

Types of Radiation Beams

Radiation therapy encompasses three different modalities, including photon, particle, and electron beams. Photon beam radiation therapy delivers high-energy X-rays deep into a tumor with a machine called a linear accelerator. Because these X-rays must travel through the body on their way to the tumor, there is a risk of injuring healthy tissue.[1] A second type of radiation therapy, known as particle beam therapy, also delivers radiation deep within the body through the use of protons, neutrons, and heavy ions such as carbon. However, particle beams can only be emitted a specific distance, termed the Bragg peak.[2] Consequently, healthy tissue beyond the Bragg peak is spared from radiation. In addition, particle beam therapy has been shown in many cases to have milder side effects than photon beam therapy. Lastly, electron beam radiation therapy, also emitted by a linear or particle accelerator, is commonly used to treat superficial malignancies owing to its limited distance of penetration. Depending on the dose, radiation is typically delivered 1.2-3.5 cm below the skin surface and can be shifted superficially by a silicone bolus that mimics the properties of normal tissue when irradiated.[3]

3D Conformational Radiation Therapy

Three-dimensional conformational radiation therapy uses CT, MRI, and PET scans to simulate a treatment plan and configure radiation beams to the shape of the tumor. Intensity-modulated radiation therapy (IMRT), a subtype of 3D conformational therapy, uses fewer beams than its conventional counterpart. Image-guided radiation therapy (IGRT), meanwhile, uses repeated imaging to detect tumor size, margins, and precise location, and to adjust treatment as necessary to improve accuracy. The use of IGRT versus IMRT varies with disease site; however, some studies have shown benefit in combining the two. In head and neck cancer, IGRT has been proven to reduce radiation delivered to the spinal cord, thus preventing damage. Used in conjunction with IMRT, a therapeutic radiation dose can be prescribed.[4]

Stereotactic Radiosurgery

Stereotactic radiosurgery (SRS) was first performed by Swedish neurosurgeon Lars Leksell, who defined its use as "delivery of a single, high dose [of irradiation to a] small and critically located intracranial volume through the intact skull."[5] Stereotactic radiosurgery uses a single session to amplify radiation dose to a small tumor volume. What makes SRS unique is its ability to deliver high-energy gamma rays, protons, or X-rays to a discretely modified tumor volume.[6] This allows for a focused, precise therapeutic dose while minimizing exposure to surrounding healthy tissue. Over the past decade, SRS has become the preferred treatment option for brain metastases, supplanting whole brain radiation therapy (WBRT), in which high-energy X-rays are delivered serially to the entire brain for palliative management of neurological symptoms of intracranial malignancies.

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Owing to improvements in imaging and symptom management, attention has shifted to addressing long-term complications of radiation therapy, such as radiation necrosis. When used alone or in combination with WBRT, SRS has superior efficacy to WBRT alone for the treatment of solitary intracranial tumors. When delivered outside of the brain parenchyma, SRS is known as stereotactic body radiation therapy (SBRT); a few examples among many SBRT technologies include X-knife, CyberKnife, and Clinac.

Maximizing Treatment, Minimizing Side Effects

By understanding the principles behind photon, particle, and electron beam radiation therapy, as well as advanced external techniques like IMRT, IGRT, and SRS, medical students can appreciate the intricate balance of maximizing therapeutic effects while minimizing injury to healthy tissue. This knowledge lays the groundwork for a deeper exploration of radiation oncology and its critical role in improving patient outcomes.

Mentorship Opportunities

ASTRO Mentor Match Program: Career guidance and residency insights.
Website: www.astro.org

ARS Mentorship Program: Tailored support for early-career professionals.
Website: www.americanradiumsociety.org

RSNA Mentor Program: Connects students with radiologists and radiation oncologists.
Website: www.rsna.org

Global Health Mentorship Network and LinkedIn: Networking and mentorship opportunities in radiation oncology.
Website: https://www.ghmentorships.org/

Society for Women in Radiation Oncology: mentorship opportunity for women interested in building a career in radiation oncology.
Website: https://www.societywomenradiationoncology.com/mentorship

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Guiding Tomorrow's Oncologists: A Conversation with UVA's Program Directors

David R. Penberthy, MD, MBA, is the program director of the Radiation Oncology Residency Program at the University of Virginia (UVA) Health System. With expertise in advanced radiation therapy techniques, Dr. Penberthy focuses on treating breast cancer, central nervous system tumors, and lymphoma. He brings a rich background in clinical and administrative roles, having served as medical director at the Milton S. Hershey Medical Center and president of the Association of Community Cancer Centers (ACCC). Dr. Penberthy received his MD from Virginia Commonwealth University, completed his residency at UVA, and earned his MBA from the UVA Darden School of Business.

Christopher Luminais, MD, is an assistant professor in and the associate program director of radiation oncology at UVA Health System. Dr. Luminais specializes in treating sarcoma and genitourinary cancers, employing advanced radiation therapies such as intensity-modulated radiation therapy (IMRT), stereotactic body radiation therapy (SBRT), and high-dose-rate (HDR) brachytherapy. Dr. Luminais is also dedicated to medical education, mentoring medical students and residents.

What are some aspects of a residency program that you think every applicant in radiation oncology should look for?

Dr. Luminais: I would say breadth in what you're going to see within the field. There are some aspects of radiation oncology that you don't get as much of in every program. Brachytherapy is one of them. I do primarily genitourinary cancer, so a lot of prostate [cancer]. Additionally, I'll also back up our gynecologic oncology subspecialists with our gynecologic brachytherapy procedures. It's a really fun, rewarding, and important part of our field, and if you look at Accreditation Council for Graduate Medical Education (ACGME) minimums, it's really easy to hit your minimums for brachytherapy. But those minimums don't correlate very well with the case volume you need to actually feel comfortable going out and practicing it. That's a real strength of our program—brachytherapy and procedural training. Something I always tell medical students who are rotating with us and looking at our program and elsewhere is to make sure you get those skill sets because you never really know when your future practice is going to call on you to do that.

Dr. Penberthy: I may just add one really nice thing about UVA. It's an NCI-designated comprehensive cancer center, and so we have pretty much every specialty you could imagine, and we have a deep bench in all those specialties. I had been in private practice before coming back to academia, and I am thrilled to be part of a program that has 15 neurosurgeons and many ENT surgeons, so the surgical services are outstanding at the University of Virginia. Where I am right now is in the Gamma Knife Center, an example of innovation within UVA. We were, I believe, the second operational Gamma Knife program in the US, dating back to 1989, so we have 35 years of experience. Dr. Sheehan, my colleague and the neurosurgeon who runs the program, is internationally recognized and speaks all over the world. I get to hang out with him periodically, and so the people around you are kind of spectacular.

How do you think UVA's designation as an NCI comprehensive cancer center impacts your resident training?

Dr. Penberthy: You get world-class care at UVA, and so you'll see everything. You'll see bone marrow transplants. You'll see CAR-T therapy. You don't always see that in private practice. We have an active traumatic brain injury program. We're starting up a total skin electron program, and so you get a full spectrum of oncology care.

Dr. Luminais: I agree. NCI comprehensive status means you have all the more niche therapies within cancer care, such as MRI-LINAC with daily adaptive planning, a brachytherapy suite on the radiation side of things, and surgical and medical oncology specialists. We want our residents to interface with other cancer subspecialists. There are always interesting questions like, "What does CAR-T do to our sequencing of radiation?" Some interesting changes are happening, and we want our residents to see that.

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Guiding Tomorrow's Oncologists (*continued*)

What qualities of the best residents you've had in your program or those you've worked with do you look for in prospective applicants?

Dr. Penberthy: For me, a coachable attitude. I think [all applicants have] the aptitude for it, and when you have the right attitude, that just makes everything kind of a joy, and we've had just outstanding people in that regard. I did my residency training and met some of my very best friends at UVA years ago. I text them probably two or three times a week still to this day. You will develop strong relationships and friendships wherever you go, because you're in an intense period, from medical school to residency to independent practice. In a way, you are in a crucible, and through that forging process, deep friendships are created and maintained. I have friends all over the country, and when I go to national meetings it's just like old times. It's just a good group of people that you'll connect with.

Dr. Luminais: [I look for] someone who never stops asking questions. I had a senior resident tell me that when I was training early on. One of the things that I love about our program is that our faculty are really approachable. Even in my first year of residency here at UVA, I felt comfortable going to the chair, the program director, or another subspecialist in the tumor board to ask a question about whatever we were doing. Building those relationships is collegial and makes the work environment fun, but you also learn so much from it. So many little things in medicine might not be central to what you're treating [today] but may become central to some case you're going to see a year from now, so you'll appreciate having learned it.

UVA's residency program consists of only six positions over four years. How do you think a smaller program like ours might be beneficial for trainees?

Dr. Penberthy: I would say that small or large programs that align with your values could be nirvana either way. Small programs may be a little bit more intimate. Still, we oftentimes talk about being small but mighty because radiation oncology departments are usually big revenue generators for a hospital. So we're kind of under the microscope for all sorts of reasons, but you get accustomed to that, and that's common in lots of places.

Dr. Luminais: A small [program] makes mentorship opportunities happen easily. If you rotate with seven different attendings who all treat prostate cancer, you might not get much time with any one of them, and it might put the onus on you to build deeper mentorships with the right people. That can certainly still happen in big programs, but I think smaller programs help with that.

What do you think could be the single biggest advancement in radiation oncology in the next 10 years?

Dr. Penberthy: One of the things that I study and speak a lot about is artificial intelligence (AI). When I talk to audiences, I ask how many are using it in the clinic. Very few people raise their hand. Then I say, "How many of you do Google searches or use your car navigation system? Most people raise their hand. And that's an example of narrow AI. It's already infiltrating our lives, and it will continue to do this in increasingly meaningful ways. In the clinic, we're using auto-contouring software. It's a challenge because we want residents to learn the appropriate anatomy, so we're figuring out how to do that intelligently while also incorporating these auto-contouring software tools. I think we're going to see [AI] continue to assist us.

The human aspect of oncology care is going to be as important as ever. One thing that I say a lot is patients can read everything I can read. Doctors are not the sole repository of information, but we have experience in the field. We may have a different insight into the information that we read than a patient that's reading about it and who may be emotionally charged at that time. Someone in the field for the right reasons and with the right attitude will interact well with patients. That's going to be a critical skill for the future, but exactly how it changes is hard to say.

Dr. Luminais: I'd say daily adaptive radiation is a big one. We're already doing it with our MRI-LINAC, which incorporates MRI guidance and daily adaptive replanning, so you're not making one plan and assuming the anatomy is the same. You're accounting for every day's anatomy. If the tumor is shrinking or growing, you account for it. If the bowel is moving closer or further away, you optimize every day. We can do that on the MR-LINAC, but not a lot of centers are doing it. It takes a machine with a greater than $10 million price tag and it often takes an hour on the table. It's a huge clinical effort and one I'm excited to be part of. However, we can only offer it to a select set of patients where we can do the treatment fast enough, usually with SBRT, for it to be practical. Applying better technology and AI to take the labor out of that and move it to CT-based platforms will allow us to create a workflow that doesn't take an hour of intensive effort from an entire team. That will both reduce toxicity and increase the doses we can give safely. Actualizing that is going to be a lot of work, but it's work we're happy to do.

Interview with a Nurse Practitioner: John Hillson, DNP

John Hillson, DNP, is a dedicated radiation oncology nurse practitioner specializing in head and neck cancer at Atrium Health Wake Forest Baptist Medical Center in Winston-Salem, NC. Hillson holds a Doctor of Nursing practice degree in adult geriatric primary care from the University of North Carolina at Greensboro. With a strong background in clinical nursing from Duke University Medical Center, Hillson is committed to providing compassionate and comprehensive care to his patients. His expertise and dedication make him a valuable asset to oncology nursing.

What sparked your interest in radiation oncology, and when did you decide to pursue it as a career?

After I had spent ten years on a heme onc floor, a chance came up for me to work with head and neck radiation oncology again. I loved the transition, and I already knew I wanted to become a nurse practitioner. At first, I thought I might leave oncology, but when the last two years of my program came around, I knew that I wanted to stay in this field. I ended up getting my dream job working with head and neck radiation follow-up patients and survivorship a year ago.

How did you gain experience as a nurse practitioner in radiation oncology?

I had no onboarding for my job. [I gained] almost all my knowledge thanks to the generosity of colleagues former and present and to the generosity of ROECSG and ROVER. We were taught to hang chemotherapy much like we hung antibiotics. The senior nurses would tell stories about how they used to mix the bags themselves: no PPE, squirting the syringe and droplets of drug up in the air to clear air bubbles. It was scary. The medical oncologists were always the larger group, but I have fond memories of the radiation oncologists who were on our floor. They were a very relaxed and kindly bunch who were happy to teach anyone about what they were doing, told us about what we needed to do to keep safe, and helped us to understand how we could best help our patients.

How did you choose your research topic and how did you get started?

This was the fourth facility where I have worked with radiation oncology, but once again, I had no real onboarding. There were multiple nurses looking at retiring, a number like me who were in graduate school and possibly moving out of the department, and a couple going on maternity leave – over half of our department was slated to leave. Meanwhile, many of the traditional oncology classes through the health system had been shut down. We only had a single hour of radiation oncology. I wanted to increase that, and I wanted better succession planning.

I built a large team for my quality improvement project. I did an education needs assessment for nurses in my department, and I created a curriculum with a pre- and post-test. I reached out to the nursing educators in my facility and my university. I reached out to several relevant national organizations. I had therapists, physicists, nurses, and radiation oncologists all contributing.

How do you see the future of radiation oncology?

There are over a million courses of radiation therapy delivered each year. By 2030, it is anticipated that there will be 22.5 million cancer survivors. The usual estimate is that 50-60% of all cancer patients receive radiation therapy at some point. There is growing attention on minimizing financial toxicity, keeping the public informed, increasing multidisciplinary care, and acknowledging the reality that not all people have access to the same level of care. Radiation oncology technologies are not portable, and that means patients might be traveling farther for treatment.

We do see cutting-edge treatments still coming out, but to me, the future looks like increased survivorship challenges and more coordination with other fields, patients, and the entire radiation oncology team to improve outcomes. There is a growing opportunity to further the team approach. I am impressed with the data that surgery is developing on Enhanced Recovery After Surgery, exploring interventions throughout the course of care. For them, that means pre-op clinics, phone screens, pre-anesthesia in the OR, post-anesthesia, and rehab. I think that model can fit well with radiation oncology. Surgery, radiation oncology, and medical oncology all have roles to play, and there are better outcomes when these elements are well coordinated and well timed.

What resources do you recommend for others interested in pursuing a career as a nurse practitioner in radiation oncology?

ROVER's virtual curriculum is excellent. ROECSG's Introduction to Radiation Oncology and their annual spring conference are free for students and great ways to learn about the field and meet people who are passionate about this discipline. ASTRO, the Association of Radiology and Imaging Nurses, and the Oncology Nursing Society also offer student memberships for free; I believe most professional

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Interview with a Nurse Practitioner: John Hillson, DNP *(continued)*

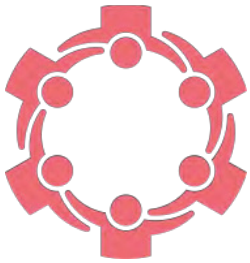
associations related to the field do. When I was trying to learn more about specific topics, the EPA, CDC, and NRC have good introductory curriculums for radiation basics. There is a certificate course offered through the Oncology Nurses Society, but there is still no formal education for nurses or nurse practitioners in this field at this time. In a previous study, it was found that only half of nurses even get onboarded when hired. General oncology is given less attention in nursing schools than you might expect given that cancer is the second-most common cause of death in the country. In a recent Oncology Nursing Society Voice interview, a nursing professor estimated students received five hours of lectures, with only incidental clinical involvement with people with cancer. It is important to recognize that this affects several aspects of radiation in medicine – nurses rarely, if ever, have training on radiology, nuclear medicine, or nuclear disaster management.

The new student does have to be careful. It is all too easy to come across radiation oncology information that is written by people outside the field. Even journals are publishing articles on this subject without a radiation oncologist or someone with medical radiation credentials listed as an author.

Career Development Opportunities

Radiation Oncology Education Collaborative Study Group (ROECSG)
Focus: Enhancing education in radiation oncology for students, residents, and faculty.
Offerings:

- Comprehensive undergraduate, graduate, and continuing medical education, as well as patient and interprofessional education.
- Annual symposia on advancements and topics in radiation oncology.
- Extensive online resources and information on global health, clinical practice, and study materials.
- Social media engagement for knowledge sharing and community interaction.
- Website-based current publications and reports.
  Website: www.roecsg.org



Radiation Oncology Virtual Education Rotation (ROVER)
Focus: Online educational platform for medical students interested in radiation oncology.
Offerings:

- Networking opportunities to connect with radiation oncologists across the country.
- Membership resources on joining professional organizations such as ASTRO and AROA.
- Educational content, including videos and articles on radiation oncology practice.
  Website: www.radoncvirtual.com

American Radium Society ROCKET (Radiation OnCology Knowledge for Early-career and Training) Program

Focus: Support for early-career professionals and residents
Offerings:

- Webinars on such topics as residency applications, away rotations, and oncology career pathways.
- Legal guidance and insights into law-related considerations for oncology practice and job applications.
  Website: www.americanradiumsociety.org/rocket

Funded Radiation Oncology Electives
Focus: Stipends for medical students completing visiting electives in radiation oncology
Offerings: Funding availability and eligibility vary by institution
Website: https://roecsg.org/funded-electives/

Industry Insights: Salary Trends and Job Outlook

Radiation oncology remains a lucrative specialty, with salaries ranging from $400,000 to $550,000 depending on experience and location.[7] However, the job market is evolving, with changes in compensation models and job availability.[8] Prompted by a drop in interest during the NRMP Match process and concerns about a potential imbalance between radiation oncologist supply and demand, the ASTRO Board of Directors formed a Workforce Task Force in 2021.[9]

The Task Force commissioned a study titled, "Projected Supply and Demand for Radiation Oncologists in the U.S. in 2025 and 2030," which analyzed current and future dynamics. The study projected that workforce growth would balance with the increasing number of Medicare beneficiaries, though localized imbalances could occur. Productivity changes, such as the adoption of hypofractionation and the loss of some indications were identified as moderate influences.[8,9] To support planning, a modeling tool was developed to help programs evaluate workforce scenarios based on local conditions.[9]

Interest in radiation oncology has increased, with an 8.6% rise in applicants for the ERAS 2025 cycle and a nearly 50% increase over the past three years according to the 2025 ERAS Residency Preliminary Report data as of October 5th of each year.[10] While this growth reflects renewed enthusiasm, it also intensifies competition for positions, particularly in urban areas with fewer job opportunities. This trend highlights the need for innovative residency pathways, such as combined training programs, to prepare future radiation oncologists and address workforce challenges.[11,12]

Changes in reimbursement structures, including the endorsement of the Radiation Oncology Case Rate Value-Based Payment Program Act of 2024, and updates to the Medicare Physician Fee Schedule in 2025 signal a shift toward value-based care. These reforms aim to stabilize salaries and create opportunities, especially in underserved areas.[8,9] Technological advances in imaging, such as CT and PET scans, continue to improve treatment precision, enhancing radiation oncology's role in multidisciplinary cancer care teams.[8]

Despite the emergence of targeted therapies that may reduce the need for radiation therapy in some cases, radiation oncologists remain essential to complex cancer treatment. Graduates should remain adaptable to the evolving landscape, including changes in care delivery models and geographic job availability.[12] ASTRO's ongoing monitoring efforts will provide valuable insights to guide workforce planning and innovation.

Interview with a Radiation Oncologist: Jennifer Chiang, MD, MS

Jennifer Chiang, MD, MS, is a current PGY-3 at the Stanford Medicine Department of Radiation Oncology. Originally from Arizona, Dr. Chiang made her way to the East Coast to study neurobiology and East Asian studies at Harvard University and later attended the Mayo Clinic School of Medicine in Arizona. She also obtained a Masters of Science in the Science of Health Care Delivery. Dr. Chiang completed a transitional year at Riverside Community Hospital. Her research interests lie in patient advocacy and health disparities, specifically in examining accessibility to more advanced forms of radiation therapy. Outside of medicine, she enjoys hiking, baking, and spending time with her friends and family.

How did you learn about radiation oncology?

I was introduced to radiation oncology through research under the mentorship of Dr. Terence Sio during my first year of medical school at the Mayo Clinic in Arizona. Through research, I was drawn to the field's diverse and advanced technology and the exploration of its potential influence on clinical outcomes, procedural opportunities such as brachytherapy, the continuous pursuit of the optimization of treatment delivery, and the chance to address gaps in the quality of and equitable access to oncologic care. During my first two years of medical school, I spent nearly all my free time shadowing radiation oncologists in clinic, where I deepened my passion for working with patients with cancer. I was inspired by oncologists' close relationships with patients, through which they learned everything about their patients' lives and witnessed the profound love and support among family and friends during their most critical moments. By my third year, I approached every clerkship with an open mind in order to seriously explore whether another field may resonate with me more, but no other specialty gave me the same sense of satisfaction and fulfillment as radiation oncology. The combination of cutting-edge technology, hands-on procedures, and meaningful patient relationships solidified my decision to pursue this incredible field.

What have been the most rewarding and the most challenging parts of your residency so far?

My happiest moments in residency often align with the milestones of our patients: when our patients ring the bell in the department after finishing radiation, sharing positive news from a follow-up scan, or hearing about significant life events like graduations and birthdays after treatment. It's also incredibly rewarding to help patients persevere through the toughest toxicities of radiation, when they doubt their ability to finish, and they end up proving themselves stronger than even they believed. However, the most challenging aspects I have found are those beyond our control: as providers, we often witness the benefits of the treatments we recommend, but it's the patients who bear the cost, not only literally, but also physically and emotionally. Two patients can receive the same treatment regimen and have vastly different experiences — some tolerate radiation better than others, and some may relapse early in the absence of a clear explanation. However, it's our duty to continually refine our knowledge and offer the best recommendations we can to help our patients make decisions that align with their goals, and this is what we can control.

What resources or study strategies have helped you the most during residency?

The most valuable resources during my residency have undoubtedly been the people around me. I deeply appreciate my co-residents, who have supported me in everything from challenging clinical cases to navigating grant applications. I remember calling one of my chiefs for advice during my first weekend on call, only to later find out she was helping me while standing in line for a ride at Disneyland! From teaching me which buttons to click when contouring to offering a listening ear, I know I can always count on my co-residents' patience and generosity.

Equally remarkable have been my attendings, who have not only provided incredible research and networking opportunities but have also shown compassion during the most challenging times of my life. When I lost my grandparents after long ICU stays, this community became my anchor. My co-residents cried with me when my grandparents moved to comfort care, my program leadership arranged bereavement leave immediately after I booked my flights to and from Taiwan, and my attendings at the time told me to focus on family during such an irreplaceable and critical time.

These experiences remind me how much the amazing people around me have invested in my growth and believe in me. No trainee should underestimate the importance of the community they build and grow with during this transformative time of their life.

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Interview with a Radiation Oncologist *continued*

What advice do you have for students interested in radiation oncology?

Stay curious. Medicine is inherently challenging, but curiosity makes it rewarding and fun; it keeps you engaged as you explore different fields, helping you gain valuable exposure and confidence in your eventual choice. It helps you immerse yourself in the day-to-day life of a specialty to truly understand what it entails, which is crucial in finding a field you're genuinely passionate about. When you approach rotations with curiosity, even the hard work becomes enjoyable, and reaching out to attendings for advice or mentorship feels exciting rather than intimidating. Find the specialty that sparks your curiosity beyond work, driving you to deeply understand your patients' lives and needs. This commitment to truly knowing your patients enables you to advocate for them as if they were family—a mindset that not only guides you in the right direction but, in my opinion, defines what makes the best doctors."

How and why should students and residents get involved in the AAWR and similar organizations?

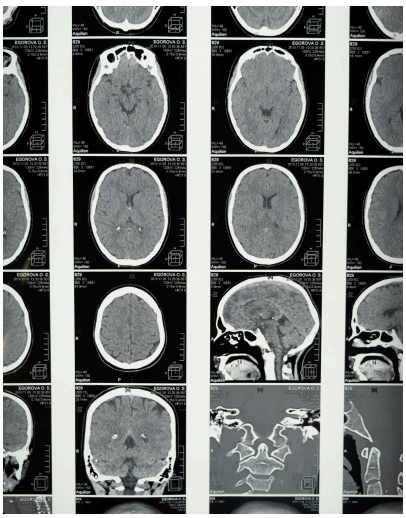
Getting involved in the American Association for Women Radiologists (AAWR) and other organizations, such as the Society for Women in Radiation Oncology (SWRO) and the Association of Residents in Radiation Oncology (ARRO), to name just a few, starts with becoming a member and taking advantage of the resources offered, such as mentorship programs, webinars, and networking events. AAWR membership is free for all trainees and can be obtained through the AAWR website. Beyond attending events/programs, trainees can also take on active roles by joining the AAWR committees, in which they collaborate with faculty, or the Members-In-Training (MIT) Committee, which I currently co-chair with Dr. Anne Darrow, a breast imaging fellow at the University of Chicago. AAWR uniquely bridges radiology and radiation oncology, fostering collaboration and mentorship in areas like imaging innovation and precision-driven care, which are central to radiation oncology practice.

There are always significant benefits of getting involved, no matter the level of participation. You never know which opportunities may become available to you, just by showing up consistently. These organizations create opportunities to build mentorships, find role models, and expand your professional network. They also provide platforms for presenting research, honing leadership skills, and gaining insights into career development and work-life integration. Lastly, beyond professional growth, being part of such communities fosters a sense of belonging and support among peers who share similar challenges and goals, which is invaluable during training and throughout your career.

What initiatives or events within AAWR are you excited about or have found especially meaningful?

I have absolutely loved my time with the MIT Committee of AAWR. Our members are extraordinarily talented, deeply dedicated, even amidst their busy clinical schedules, and truly amazing to work alongside. Many of our initiatives focus on supporting trainees, and it has been incredibly rewarding to promote both radiology and radiation oncology while contributing to helping future generations of professionals. Some of our recent programs, like our longitudinal and speed mentorship initiatives, mock interviews, and increasing collaborations with SWRO—such as our webinar series on physician infertility and family planning—particularly exemplify our commitment to empowering trainees and have been the most fulfilling to me.

Hot Topics in Radiation Oncology



Salvage Stereotactic Radiosurgery for Recurrent WHO Grade 2 and 3 Meningiomas: A Multicenter Study (STORM)[13]

Gallitto M, Sedor G, Lee A, et al. Intl J Rad Oncol, Biology, Physics.

The STORM study, a multicenter retrospective cohort study, evaluated patients with recurrent grade 2 and 3 meningiomas treated with stereotactic radiosurgery (SRS) across eight academic centers in the United States. Patients with multiple lesions at diagnosis or greater than two lesions at first recurrence were excluded. The study assessed outcomes such as progression-free survival (PFS), overall survival (OS), and treatment-related toxicities. After SRS, PFS rates were 90% at 1 year, 75% at 2 years, and 57% at 3 years, while OS rates were 97% at 1 year, 94% at 2 years, and 92% at 3 years. Poorer PFS was associated with grade 3 tumors, male gender, and prior radiation therapy, though SRS dose and tumor volume had no significant impact on progression. Treatment was well tolerated, with only 3% of patients developing grade 2 or higher radiation necrosis. Among patients with primarily grade 2 tumors and delayed, localized recurrences, SRS demonstrated better local control and low toxicity, demonstrating its potential and the need for further prospective studies.

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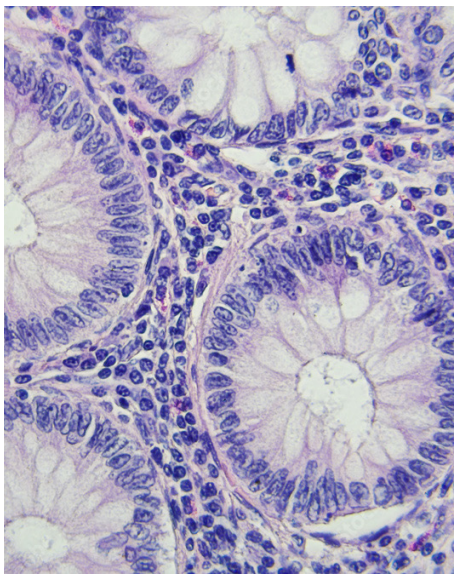
Hot Topics in Radiation Oncology *continued*



Phase 3 Trial of Stereotactic Body Radiotherapy in Localized Prostate Cancer[14]

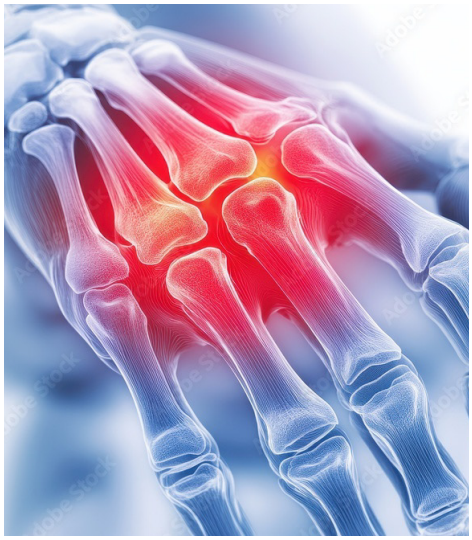
N Van As, C Griffin, A Tree et al., *New England Journal of Medicine*

The PACE-B study assessed men with stage T1 or T2 prostate cancer, a Gleason score of 3+4 or lower, and a PSA level of 20 ng/mL or less, to determine if stereotactic body radiotherapy (SBRT) is noninferior to conventional or moderately hypofractionated radiotherapy. Noninferiority was measured in terms of biochemical recurrence, defined by an increase in prostate specific antigen (PSA) levels, or clinical failure, which includes local or nodal recurrence, distant metastasis, or prostate cancer-related death. The study found that 5-fraction SBRT is not inferior to moderately hypofractionated radiotherapy, with comparable 5-year freedom from biochemical or clinical failure rates (~96% for SBRT vs. 95% for control radiotherapy). While genitourinary toxic effects were initially higher with SBRT, no significant differences were observed at 5 years between the two groups. Transitioning eligible patients to 5-fraction SBRT could significantly reduce the number of radiotherapy sessions, easing the workload for radiation departments and decreasing the socioeconomic burden on patients.

The Use of Low-Dose Radiation Therapy in Osteoarthritis: A Review[15]

Dove APH, Cmelak A, Darrow K, et al; *International Journal Radiation Oncology, Biology & Physics*

The American Board of Radiology published in their most recent issue (December 2024) that the radiation oncology qualifying exam would have an increased number of questions related to treating benign diseases. This article helps provide some insights, considerations of treatment and history in the use of radiation in benign cases of osteoarthritis. The article delves into the effectiveness and radiobiological mechanism in which radiation reduces inflammation and pain of osteoarthritis, improving patient quality of life. In addition, this article also addresses possible risks such as secondary malignancy in certain cases, as well as some criticisms of the practice of radiation therapy in osteoarthritis.



Preventive and therapeutic effects of low-dose whole-body irradiation on collagen-induced rheumatoid arthritis in mice[16]

Ji Young Kim, Yeong Ro Lee, Young Ae Lee, et al; *Journal of Radiation Research.*

This study investigated the effect of low-dose whole-body irradiation in both prevention and therapeutic effects on mouse models. Low doses (0.1 Gy, 0.5 Gy, 0.8 Gy) were given at the time of collagen-induced RA (CIA) induction or after CIA development. CIA clinical scores were reduced by 41% in the preventive model and 28% in the therapeutic model. This demonstrates that low-dose whole-body irradiation can lead to improving the immune response to CIA and therefore may be a potential alternative option for this debilitating disease.

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Host: Sylvia Choo, MS4 at USF Morsani College of Medicine.

This episode features Dr. Adam Scheiner, a laser eyelid and facial plastic surgeon based in Tampa, FL, who discusses doing some of his patient consults in a unique space: virtual reality.

ARO INSIGHTS
BLOGS COVERING TODAY'S ISSUES IN RADIATION ONCOLOGY

Kyra N. McComas, MD
PGY4 resident physician,
Department of Radiation Oncology, Vanderbilt University Medical Center.

ARO Blog: Discovering a Little Bit of CHARM at ASTRO 2024

Author:
Kyra N. McComas, MD, a PGY5 chief radiation oncology resident, Vanderbilt University Medical Center

"Who wouldn't want to shave 2 weeks off their radiation course? As with other hypofractionation regimens, this presents an opportunity to improve accessibility to and convenience of radiation therapy, without undermining oncologic outcomes."

Upcoming Conferences

ASTRO Annual Refresher Course 2025
Date: April 9, 2025
Location: Virtual
Website:
https://www.astro.org/meetings-and-education/micro-sites/2025/annual-refresher-course

National Association for Proton Therapy Annual Meeting
Date: April 26-28, 2025
Location: Philadelphia, PA
Website:
www.cvent.com/event/F31C3876-A4FA-470A-889D-9B628251F464/summary

ESTRO 2025 – European Society for Radiotherapy and Oncology
Date: May 2-6, 2025
Location: Vienna, Austria
Website: www.estro.org/Congresses/ESTRO-2025

2025 Annual ROECSG Spring Symposium
Date: May 16, 2025
Location: Houston, TX
Website: https://roecsg.org/symposium2025/

2025 Annual Conference of American Brachytherapy Society
Date: June 18-21, 2025
Location: Nashville, TN
Website:
https://www.americanbrachytherapy.org/meetings-events/future-meetings/

ASTRO Annual Meeting 2025
Date: September 28 - October 1, 2025
Location San Francisco, CA
Website:
https://www.astro.org/meetings-and-education/micro-sites/2025/annual-meeting

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