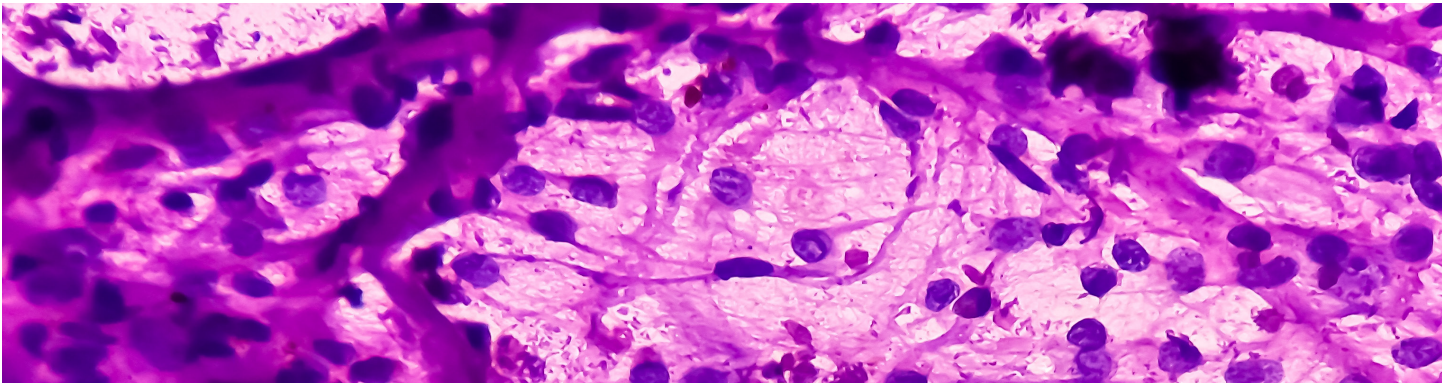


# RadOnc Student Scan

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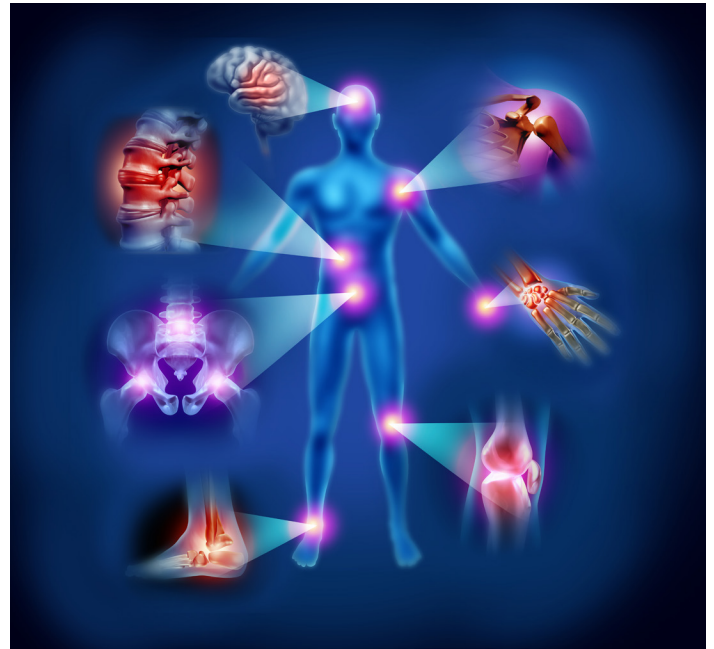
## RadOnc Overview

# Expanding Radiation for Benign Conditions

By Danielle Newhouse

Radiation therapy (RT) is used for the definitive treatment of tumors, to alleviate pain (eg, cauda equina syndrome), and for hemostasis (eg, gastric cancer).<sup>1</sup> The anti-inflammatory, antiproliferative, immunosuppressive, and hemostatic properties of RT have given radiation oncologists something to explore for decades. Due to its anti-inflammatory, antiproliferative, specific vascular impact, and immunosuppressive effects, radiation oncologists have been using RT to treat many benign, noncancerous conditions such as osteoarthritis, plantar fasciitis, and periarticular soft-tissue disorders.<sup>2</sup>

Technological advancements, including modern linear accelerators, image-guided radiation therapy, stereotactic techniques, as well as improved imaging, radiation delivery, and treatment safety, have allowed more precise disease targeting, sparing healthy tissues and surrounding organs.<sup>3</sup> With the reduction of overall adverse effects and toxicities, low-dose RT (LDRT) could be considered a therapeutic alternative for patients who are poor candidates for invasive therapies or have failed prior therapies. The mechanism for the analgesic and anti-inflammatory effects of LDRT is not fully understood, but it is likely due to its immunomodulatory properties. Changes in cytokine production, including reduced leukocyte adhesion and altered levels of pro- and anti-inflammatory cytokines after LDRT, are observed even outside the irradiation field. In bone, LDRT promotes mineralization and reduces osteoclast activity. It also increases apoptosis and



reduces cell growth, which is why LDRT can be beneficial in hyperproliferative diseases.<sup>4</sup>

The use of radiation for benign diseases was commonly practiced in the 20th century for conditions such as arthritis, keloids, and goiters; however, many of these conditions are now being treated with medical and surgical therapies, calling into question how RT fits within the treatment paradigm for non-malignant diseases.<sup>5</sup> Osteoarthritis (OA) has been one of the most studied benign conditions treated with LDRT. What was initially understood to be an inflammatory or degenerative disease has expanded into being a multifactorial process involving different cell types and immunomodulatory factors. LDRT

reduces macrophage and T-cell production of proinflammatory cytokines (eg, IL-1, TNF-), promotes bone mineralization, and reduces ionizing DNA damage to fibroblast-like synoviocytes, which are involved with inflammation and joint damage in OA.<sup>4</sup>

As of now, there is no standard treatment regimen for LDRT in benign conditions. Some proposed protocols include 0.5 Gy in a single fraction for treating OA and other inflammatory and degenerative joint diseases, as well as for bone metabolism, as it shows equivalent or better results in preclinical and clinical studies. A commonly used treatment schedule for treating OA is 0.5 Gy in 6 fractions, 2 to 3 times per week, up to 4 cycles if having persistent symptoms.<sup>4</sup> An intersociety collaboration of ASTRO, ESTRO, DEGRO, and RANZCR is aiming to establish a structured treatment framework for the use of radiation therapy in benign conditions. This framework intends to ensure high-quality evidence to support clinical decision-making, promote the generation of data on its use in nonmalignant pathologies, support education on treatment application, and encourage multidisciplinary collaboration for appropriate patient selection for LDRT.<sup>2</sup>

Few studies have captured the harmful effects of LDRT when used for nonmalignant conditions. A well-known effect is stochastic radiation damage, which leads to transformation mutations in affected cells, driving the development of neoplastic and hereditary

diseases.<sup>4</sup> Prior studies have shown a small increase in radiation-induced cancer (RIC) in patients treated with LDRT; however, these patients were treated more than 30 years ago, when planning was less accurate, larger margins were used, and radiation fields were larger.<sup>6,7</sup> More studies need to be conducted with modern techniques to determine the statistical probability of RIC occurrence.

Although most benign conditions have a wide range of treatment options, advances in imaging, radiation delivery, and overall treatment safety have expanded the potential role of radiation therapy. Low-dose radiation for nonmalignant disorders may represent a significant evolution in the field of radiation oncology, opening new therapeutic options for patients who previously had limited or more invasive alternatives.

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## Expert Interview

### Precision With Purpose

By Ben Talom



For this month's *RadOnc Student Scan*, we have the privilege of highlighting Shearwood McClelland III, MD, a physician-scientist leading the way in radiation oncology and health equity. At the Stephenson Cancer Center at OU Health in Oklahoma City, OK, he specializes in treating complex cancers and also leads the McClelland Lab, which

focuses on making radiation therapy accessible to every patient, regardless of their background. We spoke with him about what drives his work, his lab's mission, and how students can help shape a more equitable future in medicine.

#### Career and Motivation

**What was the moment you knew radiation oncology was the right specialty for you?**

Doing my first radiation oncology rotation.

**If you were not a radiation oncologist, what do you think you'd be doing instead?**

Neurosurgery.

#### Research and Innovation

**Which emerging technology in radiation oncology excites you the most right now?**

Simulation-free treatment.

#### Mentorship and Training

**What is the best piece of advice you ever received during training?**

Take yourself seriously. Be the first one to arrive, and the last person to leave.

**What trait do you think makes a stellar radiation oncology trainee stand out?**

The ability to manage a patient from beginning to end using independent, evidence-based thought, guided by humility.

#### Equity and Access

**If tomorrow you had unlimited resources to improve access to radiation therapy, what's the first thing you would build or implement?**

Sponsored rideshare for patients for all radiation therapy treatments.

**What's one small, practical thing every trainee can do today to help reduce disparities in cancer care?**

See how patients plan to travel for their treatment.

#### Personal

**What book, podcast, or movie has inspired your approach to medicine or equity?**

The Bible.

**What is one hobby or interest outside of medicine that helps you recharge and stay grounded?**

Chess.

## Hot Topics in Radiation Oncology

### Applications of Low-Dose Radiation Therapy in Benign Disease<sup>1</sup>

By Faith Ryu

Low-dose radiation therapy (LDRT) is emerging as a cost-effective, minimally invasive option for multiple benign musculoskeletal and hyperproliferative disorders. LDRT is defined as low-energy x-ray or linear accelerator (LINAC) beams (typically 0.5 Gy × 6 fractions), and it has been found to (i) shift endothelial cells, T cells, and macrophages toward anti-inflammatory phenotypes; (ii) suppress proinflammatory cytokines (eg, IL-1 $\beta$ , IL-6, TNF- $\alpha$ ); (iii) promote fibroblast-like synoviocyte apoptosis; and (iv) enhance osteoblast activity while inhibiting osteoclasts. Clinical series from Germany and other European centers report pain relief in more than 60% of patients and functional improvement in osteoarthritis and tendinitis, with similar benefits in fibromatoses and heterotopic ossification. Adverse effects noted have included deterministic effects (eg, transient, low-grade skin or nail changes) and also stochastic risks (eg, secondary malignancies, genetic effects). However, the stochastic risks are low and can be mitigated by modern techniques such as volumetric modulated arc therapy (VMAT) or orthovoltage shielding. Although robust retrospective data exist, there are few prospective placebo-controlled trials, and many have shown a notable placebo component. Nevertheless, the reproducible biological findings and favorable safety profile support broader adoption of LDRT.

### FLASH Radiation Therapy Mechanisms and Data in Pulmonary Malignancies<sup>2</sup>

FLASH radiation therapy (FLASH-RT) is an emerging ultra-high dose rate (UHDR) modality that delivers high rates of radiation at >40 Gy/s compared to conventional radiation therapy (CONV-RT), which is generally <0.17 Gy/s. Preclinical studies have consistently shown that FLASH-RT is able to maintain tumor control while markedly lowering normal tissue complications. This “FLASH” effect has been especially notable in radiosensitive pulmonary tissue, where it has been shown to reduce radiation-induced lung injury by 40%–70% compared with CONV-RT. There have been many proposed radioprotective mechanisms, including (i) transient oxygen depletion, which blunts reactive oxygen species-mediated damage; (ii) radical recombination that lowers the effective free radical pool; (iii) preservation of mitochondrial function and metabolic quiescence in healthy cells; (iv) reduced DNA double-strand breaks and improved DNA repair fidelity; and (v) sparing of circulating immune cells with enhanced CD8<sup>+</sup> T-cell infiltration into tumors. As these mechanisms continue to be researched and the therapy is optimized, FLASH-RT provides a paradigm shift in radiation therapy, especially for thoracic malignancies.

#### Abbreviation List

CONV-RT, conventional radiotherapy; FLASH-RT, FLASH radiotherapy; LDRT, low-dose radiotherapy; UHDR, ultra-high-dose-rate; VMAT, volumetric modulated arc therapy

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- 1) Deloch L, Steike DR, Pascher F, et al. *Front Immunol*. 2025;16:1588470. doi:10.3389/fimmu.2025.1588470
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## Unique Cases in Radiation Oncology

# Robotic-Assisted Seminal Vesicle Excision (RASVE) vs Brachytherapy for Isolated Seminal Vesicle Recurrence (ISVR): 2 Case Reports<sup>1</sup>

By Marta Karpinski

### Case 1

Case 1 was a 62-year-old patient diagnosed with unfavorable intermediate-risk prostate cancer, initially treated with low-dose-rate brachytherapy in 2014. In 2017, he developed biochemical failure with a prostate-specific antigen (PSA) of 3.9, and no radiographic evidence of disease on MRI and negative prostate biopsies. By 2018, his PSA had increased to 8.8, and a PET scan demonstrated uptake in multiple periaortic lymph nodes. The patient eventually started on leuprolide and received nodal radiation (4000/200 cGy). By 2024, PSA rose again to 2.3 with a testosterone level near castrate.<sup>1</sup>

The patient underwent a PSMA-PET scan, which showed abnormal uptake in the left seminal vesicle (SUV 15). MRI-guided biopsy demonstrated Gleason 4+3 disease in the left seminal vesicle, but prostate biopsies were negative.<sup>1</sup>

The patient ultimately underwent RASVE with extended pelvic lymph node dissection, including resection of both seminal vesicles and the adjacent prostate base. Pathology demonstrated Gleason 3+4 disease of both seminal vesicles with extension into surrounding soft tissue, negative deep margins, and negative lymph nodes. Four months after surgery, the patient's PSA was undetectable, and there were no surgical complications.<sup>1</sup>

### Case 2

Case 2 was a 68-year-old patient with favorable intermediate-risk prostate cancer, who was initially treated with brachytherapy in 2016. He developed biochemical recurrence in 2024 with a measured PSA of 4.8, but negative prostate biopsies. PSMA-PET scan showed abnormal uptake in the right medial seminal vesicle (SUV 16.7).<sup>1</sup>

The patient went on to have treatment with low-dose-rate salvage brachytherapy with rectal spacer placement, with a prescription of 14,400 cGy to the entire right seminal vesicle and proximal mid-left seminal vesicle. At 12 months postimplant, the patient's PSA had dropped to <0.1, and there were no complications from his salvage brachytherapy.<sup>1</sup>

### Discussion

These cases highlight the potential role of local therapy for prostate cancer patients with isolated seminal vesicle recurrence (ISVR). Prior to the advent of PSMA-PET, detecting ISVR was imprecise. Thus, in the setting of biochemical failure, patients were usually treated with androgen deprivation therapy (ADT). PSMA-PET enables more precise identification of areas of disease recurrence,

potentially allowing patients to receive local treatments, such as surgery or radiation, while sparing them from systemic therapy.<sup>1</sup>

The largest series of RASVE reports, comprising 17 patients, showed a 3-year failure-free survival of 53%. Interestingly, pathology demonstrated bilateral seminal vesicle involvement in 71% of patients in contrast to PSMA-PET, which only picked up bilateral disease in 6% of cases.<sup>2</sup> Thus, in the treatment of ISVR, the authors recommend treating both seminal vesicles. Salvage brachytherapy for ISVR treatment has been reported in only a few cases.<sup>1</sup>

The authors note that at their institution, RASVE is the preferred treatment for ISVR because it provides pathologic staging with lymph node assessment. Salvage brachytherapy is typically offered to patients who are poor surgical candidates or who have declined RASVE. Further studies with a larger sample size and longer follow-up are required; however, this may be challenging as these treatments may not be offered at most institutions, where patients with ISVR have historically been treated with ADT.<sup>1</sup>

## Key Concepts

### Disease Recurrence

The definition of prostate cancer recurrence depends on the primary treatment that the patient initially received. For patients initially treated with radical prostatectomy, recurrence is defined as a detectable PSA that increases on  $\geq 2$  determinations or increases to PSA  $>0.1$  ng/mL.<sup>3</sup> For patients initially treated with radiotherapy with or without ADT, recurrence is defined as a PSA increase by  $\geq 2$  ng/mL above the nadir PSA.<sup>3</sup>

### ADT

Prostate cancer is a hormone-dependent disease, with androgen hormones known to increase prostate cancer growth. This has formed the basis of androgen deprivation therapy for the treatment of advanced prostate cancer.

### PSMA-PET

A PSMA-PET scan uses a radioactive ligand that targets the prostate-specific membrane antigen expressed by prostate cancer cells.

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## Industry Insights

# Private Equity Acquisitions in Oncology: Impact on Market Share and Prices

By Colin McNamara

A recent study conducted by Ola Abdelhadi, MD, PhD, MPH, and Daniel Arnold, PhD, investigated the trend of private equity (PE)<sup>1</sup> firms acquiring physician practices within the oncology sector, specifically focusing on those specializing in radiation oncology. While PE investments introduce capital with the potential to advance cancer care and research, Drs Abdelhadi and Arnold identify concerns regarding PE's impact on market consolidation and competition, affordability, and quality of care. It is well established in the literature that PE investments in health care have contributed to increased emergency department visits, hospitalizations, nursing home Medicare costs, elevated dermatology prices, and increased utilization and spending.<sup>2-4</sup> This study is the first to explore the effect of PE acquisitions on oncology practices.

This cross-sectional study analyzed trends, market impact, and socioeconomic effects of oncology practices acquired by private equity firms from 2012 to 2022. Drs Abdelhadi and Arnold identified 497 PE-acquired practices, which were compared to 5872 non-PE-acquired practices, of which 199 of the PE-acquired practices and 1338 of the non-PE-acquired practices were radiation oncology specialty clinics. Geographic analysis showed most PE-acquired practices were located in the South (~50%). PE-acquired practices also had significantly lower mean physician-to-practice ratios and lower percentages of female physicians on staff. Analysis showed a significant increase in office visit prices and spending on radiation therapy following PE acquisition. Low-income areas demonstrated larger changes in price after PE acquisition, raising concerns for the exacerbation of existing health care disparities.<sup>5</sup>

PE firms intend to improve operations and merge multiple practices with hospitals to gain negotiating power with insurance companies as a means of setting higher prices prior to sale, typically within 5 years. The long-term outcome of PE acquisition in oncology, however, is still to be seen. Drs Abdelhadi and Arnold call for strengthened monitoring of PE-acquired practices to evaluate for impact on competition and patient outcomes.

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## Career Development Opportunities in Radiation Oncology

By Colin McNamara

### ASTRO Medical Student Fellowship Award

**Focus:** Introducing medical students from underrepresented backgrounds in medicine to radiation oncology through mentored clinical and research experiences.

**Offerings:**

- Eight-week summer research fellowship in clinical or basic science
- \$6000 stipend for project support and \$1000 for attending the ASTRO Annual Meeting
- Application deadline: February 12, 2026

**Link:** [ASTRO Medical Student Fellowship Award](#)

### Student Engagement Opportunities in Radiation Oncology

**Focus:** Virtual, clinical, and research opportunities, including mentorship and funded electives for medical and pre medical students interested in exploring radiation oncology.

**Offerings:**

- Institutional stipends for away electives (varies by program)
- Opportunities tailored to students from underrepresented backgrounds
- Access to mentorship, in-person clinical exposure, and research experiences

**Link:** [Student Engagement Opportunities in Radiation Oncology](#)

### Memorial Sloan Kettering Medical Student Summer Research Fellowship

**Focus:** Eight-week paid summer opportunity for students between the first and second year of medical school to collaborate on research projects on many different cancer-related topics. Applications for the 2026 cohort will close January 30, 2026.

**Offerings:**

- \$7000 stipend for 8 weeks
- Mentorship and guidance on an established research project
- Shadowing opportunities
- Didactics covering research methods, professional development, and oncology

**Link:** [MSK Medical Student Summer Research Fellowship](#)

### Radiological Society of North America Medical Student Research Grant

**Focus:** Students can apply to receive a \$6000 grant to conduct original research related to radiology, radiation oncology, or nuclear medicine. Applications will close February 6, 2026.

**Link:** [Radiological Society of North America Medical Student Research Grant](#)

### Society for Women in Radiation Oncology

**Focus:** Mentorship for women medical trainees and physics residents pursuing careers in radiation oncology to collaborate with women physician leaders further in their careers.

**Link:** [Society for Women in Radiation Oncology](#)

### Directory of Funded RadOnc Away Electives

**Focus:** Directory of funded away rotations for fourth-year medical students interested in and applying to radiation oncology.

**Link:** [Directory of funded RadOnc Away Electives](#)

## Upcoming Events

### **Multidisciplinary Head and Neck Cancers Symposium**

February 19–21, 2026 | Palm Desert, CA

Link: [Multidisciplinary Head and Neck Cancers Symposium](#)

### **ASCO Genitourinary Cancers Symposium**

February 26–28, 2026 | San Francisco, CA

Link: [ASCO Genitourinary Cancers Symposium](#)

### **ASTRO Advocacy Day**

April 27–28, 2026 | Washington, DC

Link: [ASTRO Advocacy Day](#)

### **2026 Annual Radiation Oncology Education Collaborative Study Group (ROECSG) Spring Symposium**

May 15, 2026 | Rochester, MN

Link: [2026 Annual Radiation Oncology Education Collaborative Study Group \(ROECSG\) Spring Symposium](#)