Juno Choe, MD PhD
Radiation Oncologist

Northwest
CANCER CLINIC

7379 W Deschutes Ave, Suite 100
Kennewick, WA 99336
PHONE: 509.987.1800
FAX: 509.987.1808

Juno Choe, MD PhD
Radiation Oncologist

Cell phone – (206) 387-5520
Call me any time!

Massachusetts Institute of Technology
Electrical Engineering and Computer Science

University of Washington
Doctor of Medicine
Ph.D. in Molecular Biotechnology
Internship in Internal Medicine

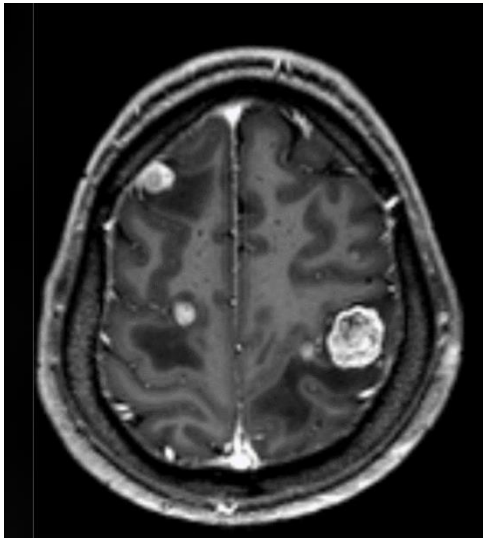
Residency in Radiation Oncology
University Hospitals (Case Western)
Chief Resident 2009

Disclosures

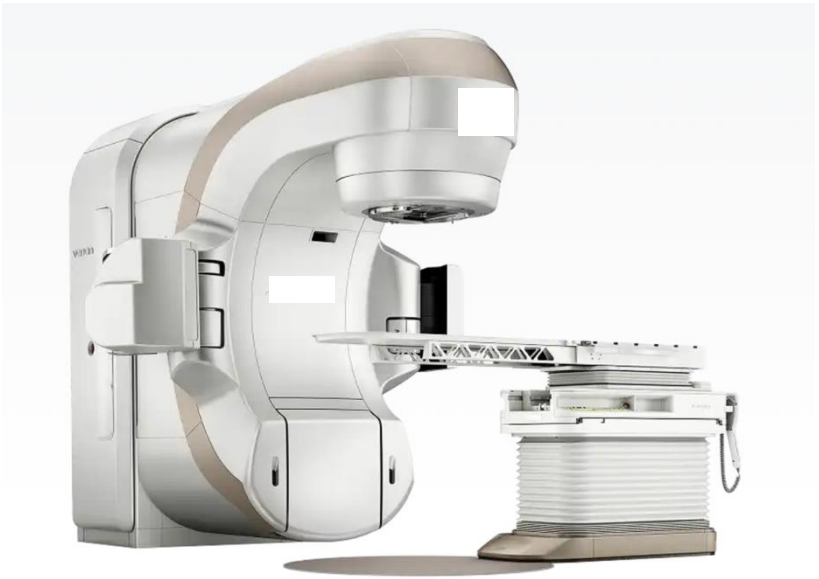
I have no disclosures to report.

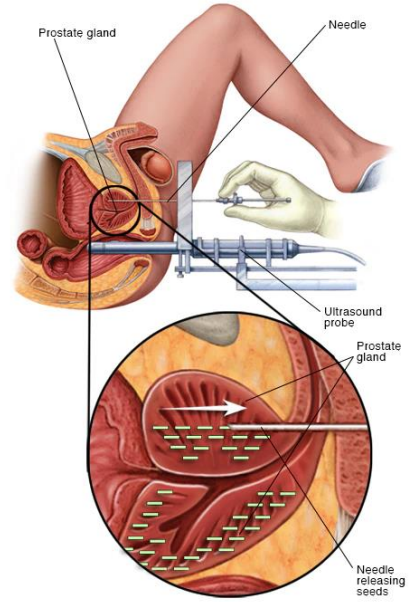
Radiation Oncology

Workup and staging
Arrange biopsies
Referral to other specialists
Radiation Therapy
Radiopharmaceuticals
Cancer Survivorship



How can we deliver radiation therapy?

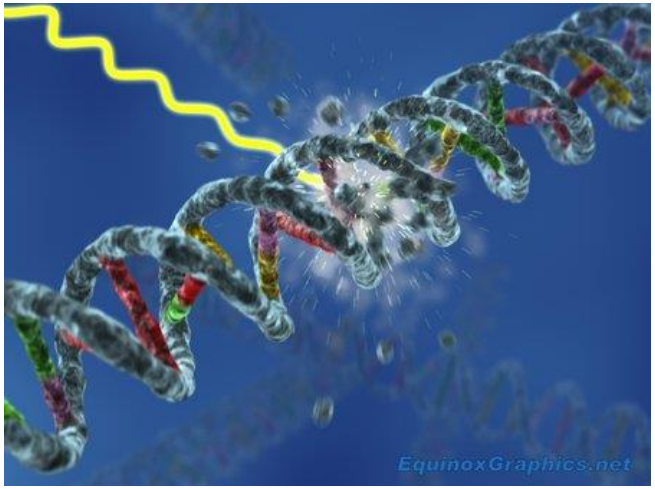


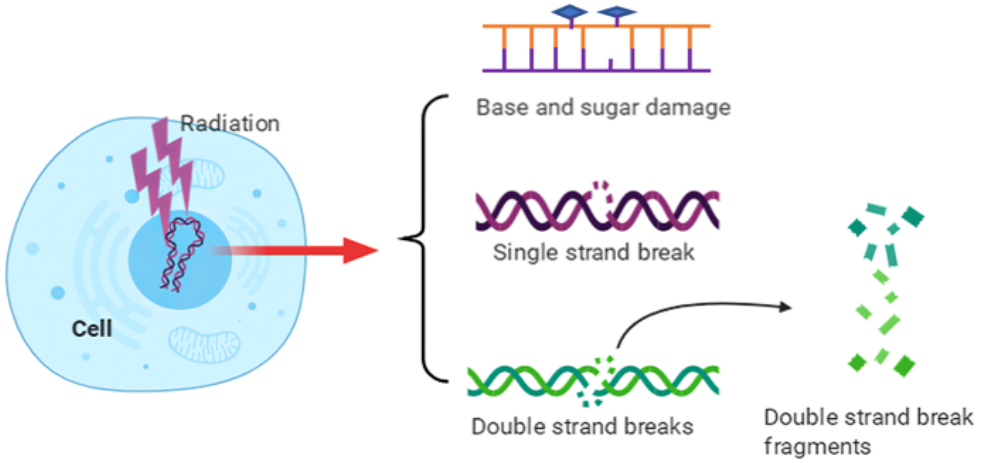


© MAYO FOUNDATION FOR MEDICAL EDUCATION AND RESEARCH. ALL RIGHTS RESERVED.

How does radiation therapy work?

All radiation therapy works by damaging DNA in cells. Tumor cells are not able to repair that DNA damage as efficiently.

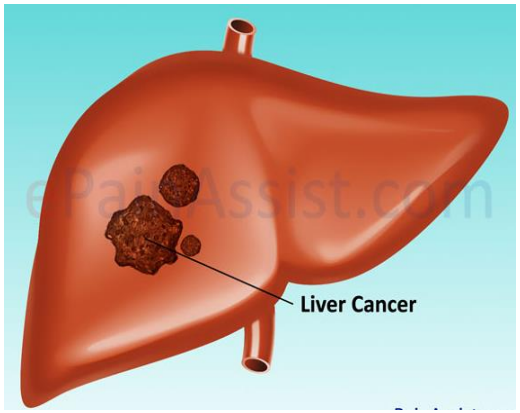


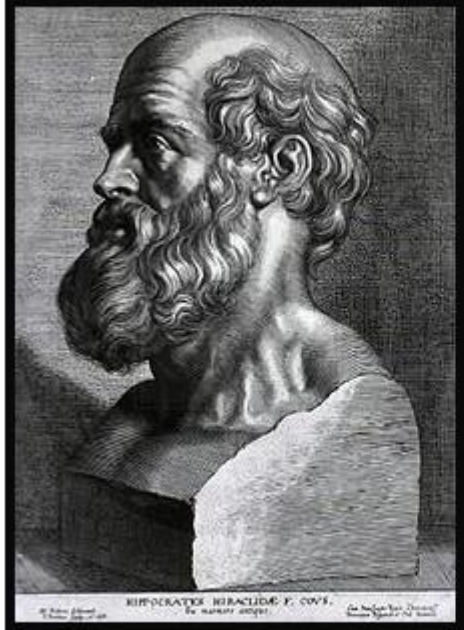


Apoptosis and
Mitotic Catastrophe

Pain and symptom-management for cancer patients

Pleural involvement

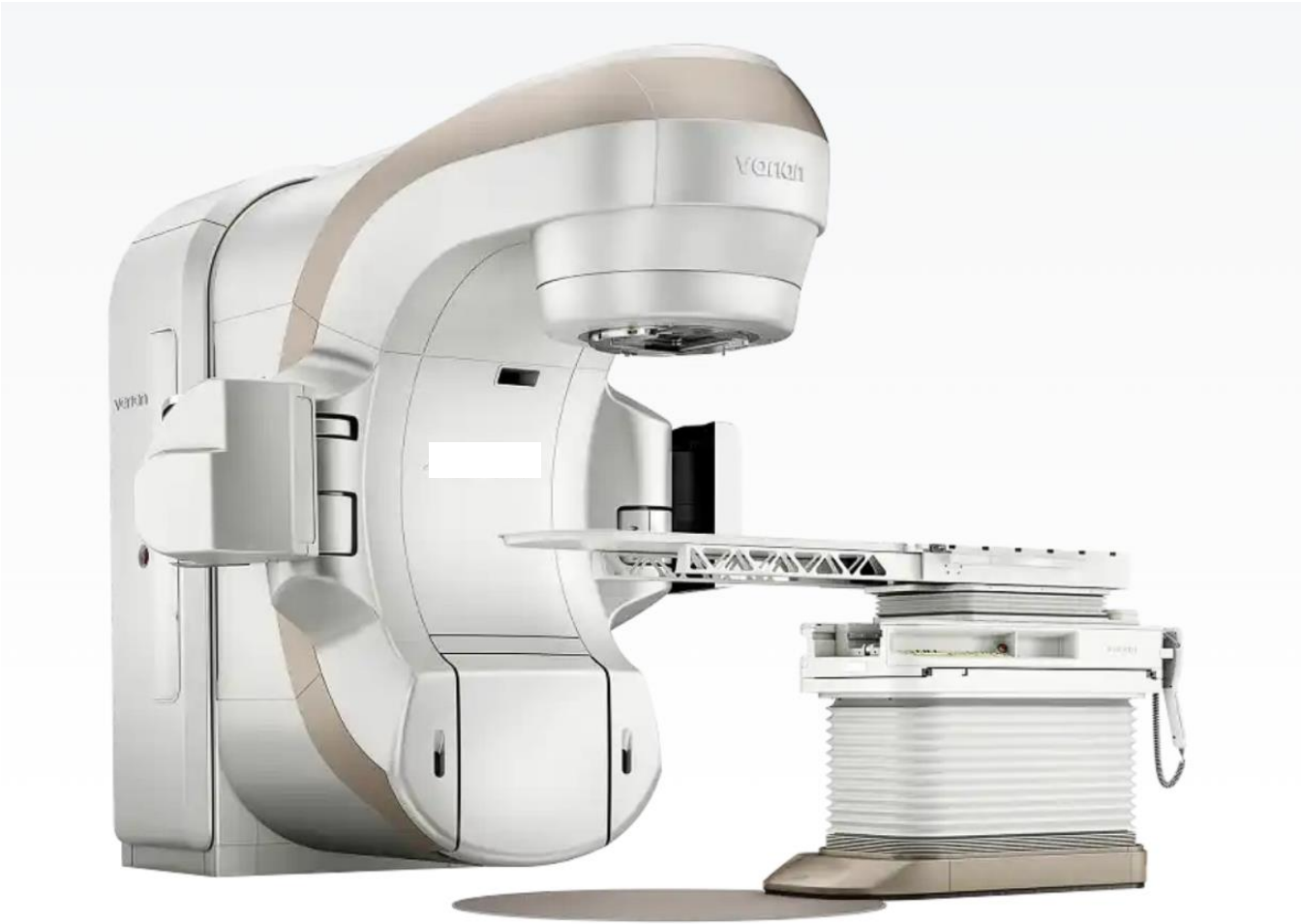




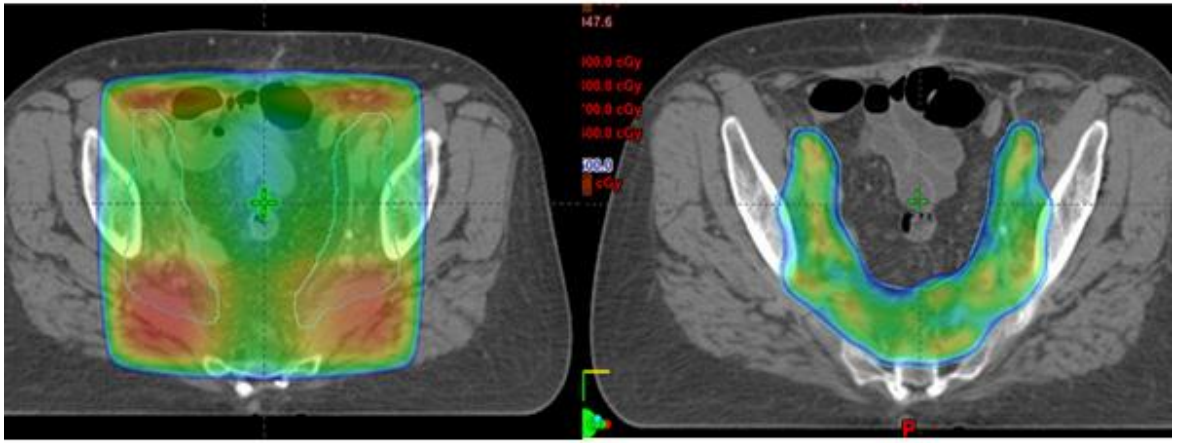
Cure sometimes, treat often, comfort always.

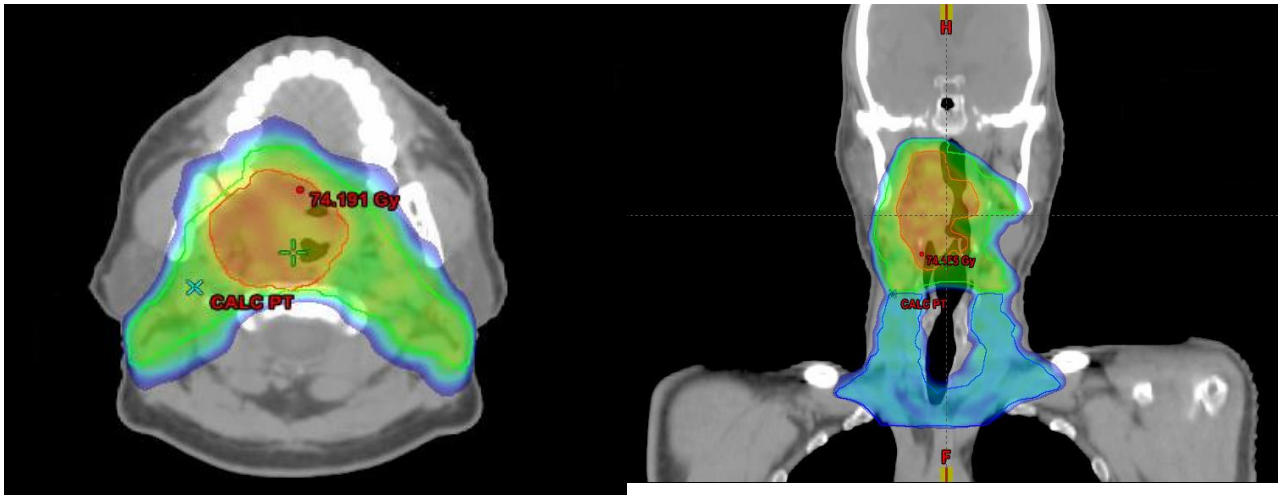
(Hippocrates)

How can radiation therapy help?



3D Conformal vs Intensity Modulated Radiation Therapy

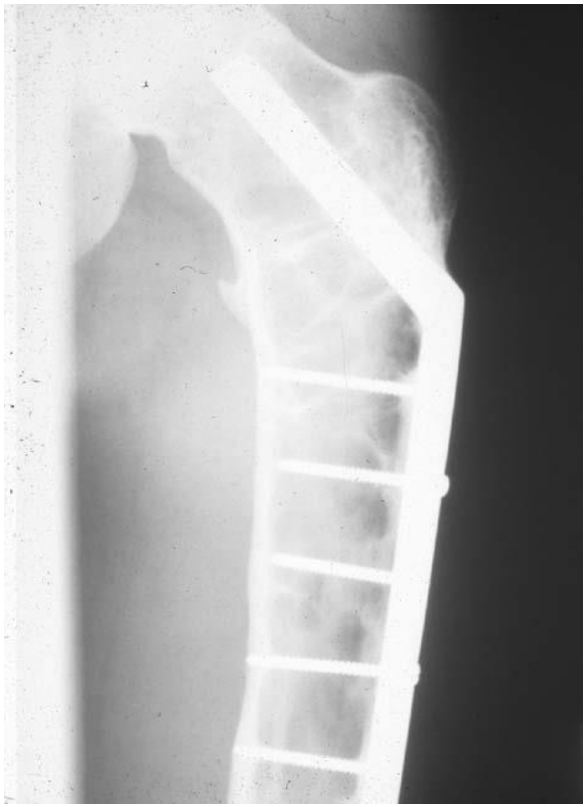


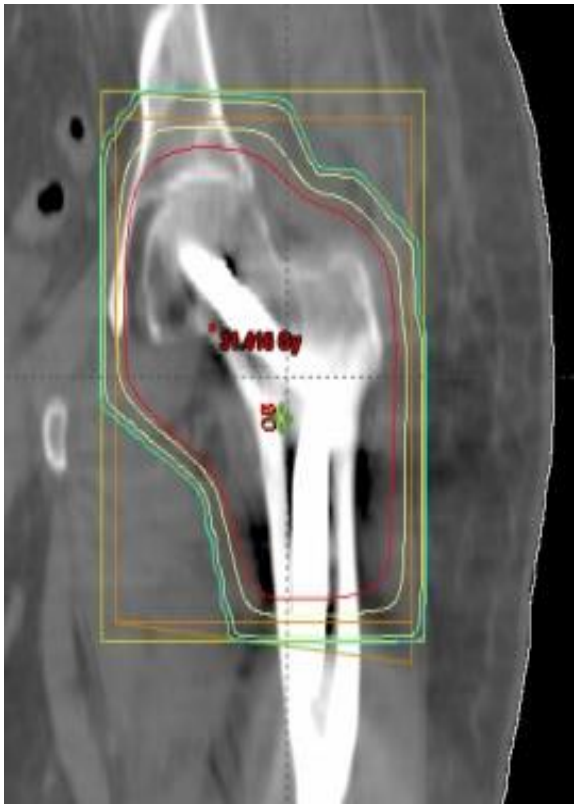


Bone Metastases

Painful bony metastases are often treated with 3D conformal radiation or IMRT, usually in 1, 5, or 10 fractions.

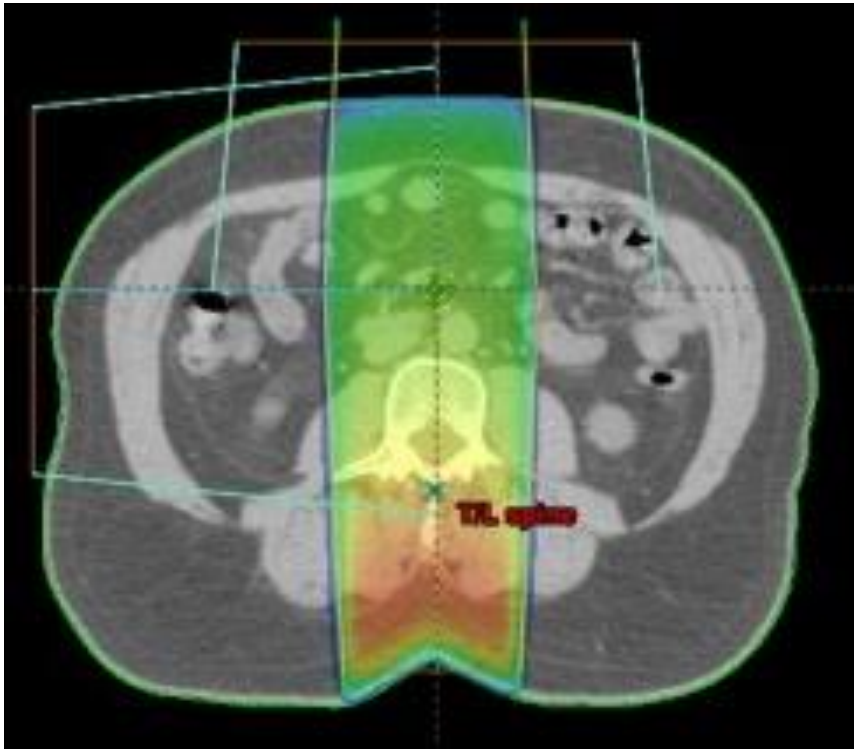
Response rate is ~70%. Complete response rate ~33%.





Spinal Cord Compression

#1 Start Dexamethasone 4mg QID
#2 Call Spine Surgeon
#3 Call Radiation Oncologist



Spinal Cord Compression

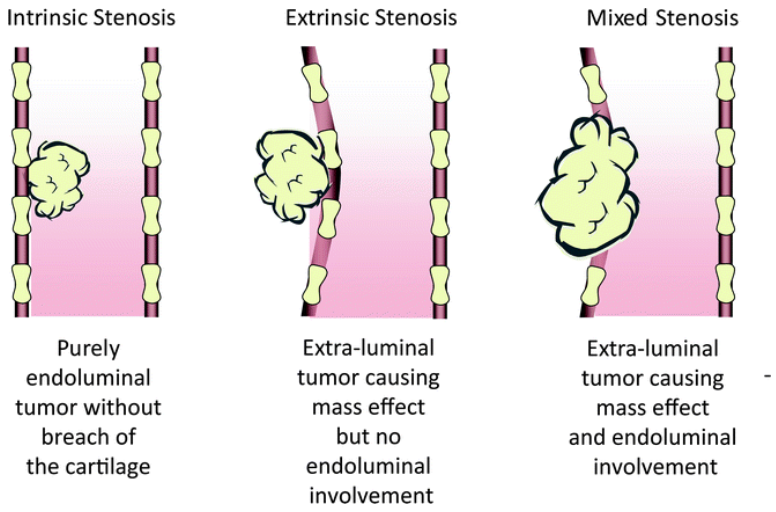
- Major emergency requiring surgical intervention or radiation therapy
- >20,000 cases per year in US
- Most common primary cancers: breast, lung, prostate cancers
- Most common presenting symptoms are: back pain (90%), weakness (80%), sensory deficits (50-80%), autonomic dysfunction (50%)
- Can lead to permanent neurologic dysfunction

Spinal Cord Compression

- Ambulatory status is most important prognostic feature. 80-90% of patients ambulatory at treatment retain function
- Duration of neurologic dysfunction is also an important factor
- Randomized trial: Patchell, et al. 2003. 101 patients randomized to surgery followed by radiation vs radiation alone. There was a higher rate of neurologic preservation in the surgery arm.
- Treatment is individualized to the patient based on a discussion between the neurosurgeon and radiation oncologist.

Airway Compromise

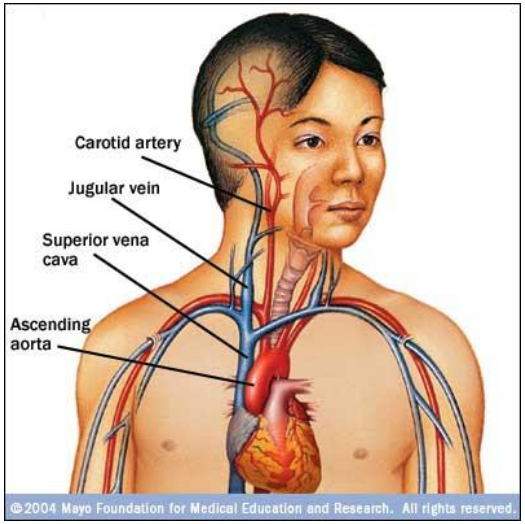
- Can be a major emergency depending on the degree of pulmonary compromise
- >80,000 cases per year in US with 20% having significant morbidity including dyspnea, cough, or pneumonia
- 35-40% of lung cancer patients will die of regional disease
- Can be due to either intrinsic tumor or extrensic compression

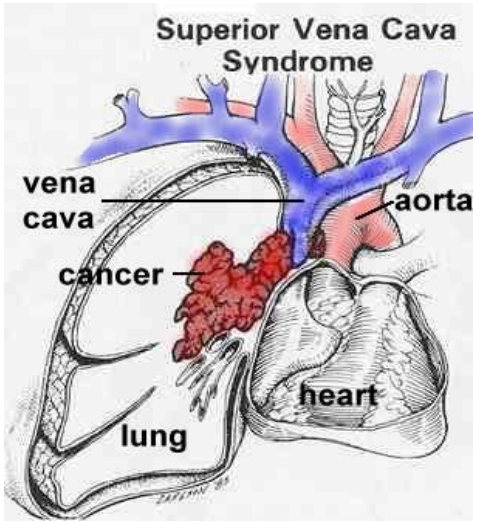


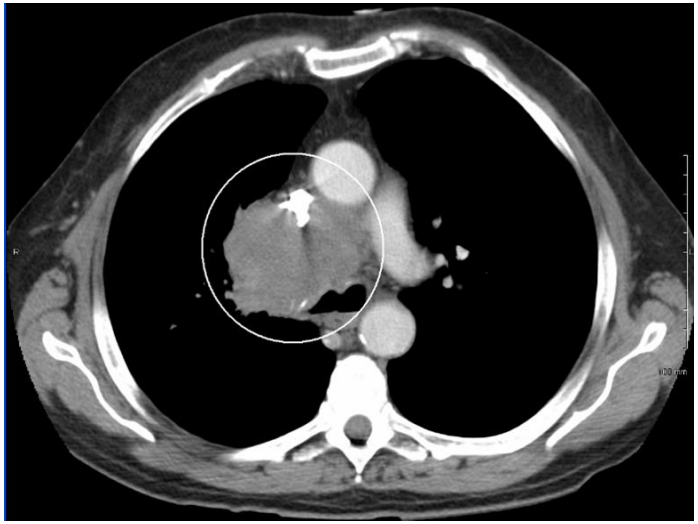
Airway Compromise

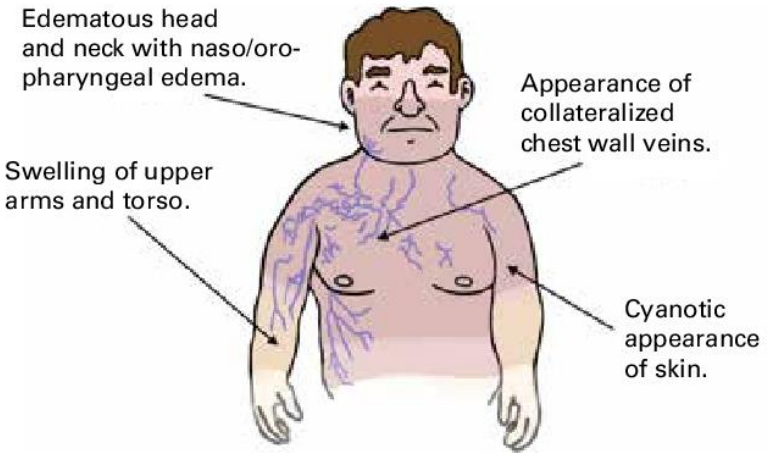
- Call your interventional pulmonologist and radiation oncologist
- Treatment options include bronchoscopy with tumor debulking or laser resection or stent placement.
- Radiation therapy is also highly effective with a ~80% response rate. Median time for improvement in radiologic findings and symptoms is 7 days.
- Treatment is individualized based on a discussion between the pulmonologist and radiation oncologist and capabilities of center.

Superior Vena Cava Syndrome









XRT

Superior Vena Cava Syndrome

- ~15,000 cases per year. Considered an oncologic emergency.
- ~90% of cases due to tumor. Caused by invasion or compression of SVC by mass in right lung or mediastinal lymph nodes.
- Previously unknown cancer in 60% of cases of SVC syndrome
- 50% NSCLC, 25% small cell lung ca, 10% non-Hodgkin's lymphoma
- Call radiation oncology. Sometimes, chemotherapy can also be used for some very sensitive tumors such as lymphomas or small cell lung cancers.
- Radiation can provide relief of symptoms in 60-70% of cases.

Cancer Related Bleeding

Clin Transl Radiat Oncol. 2018 Nov 22:14:40-46. doi: 10.1016/j.ctro.2018.11.007. eCollection 2019 Jan.

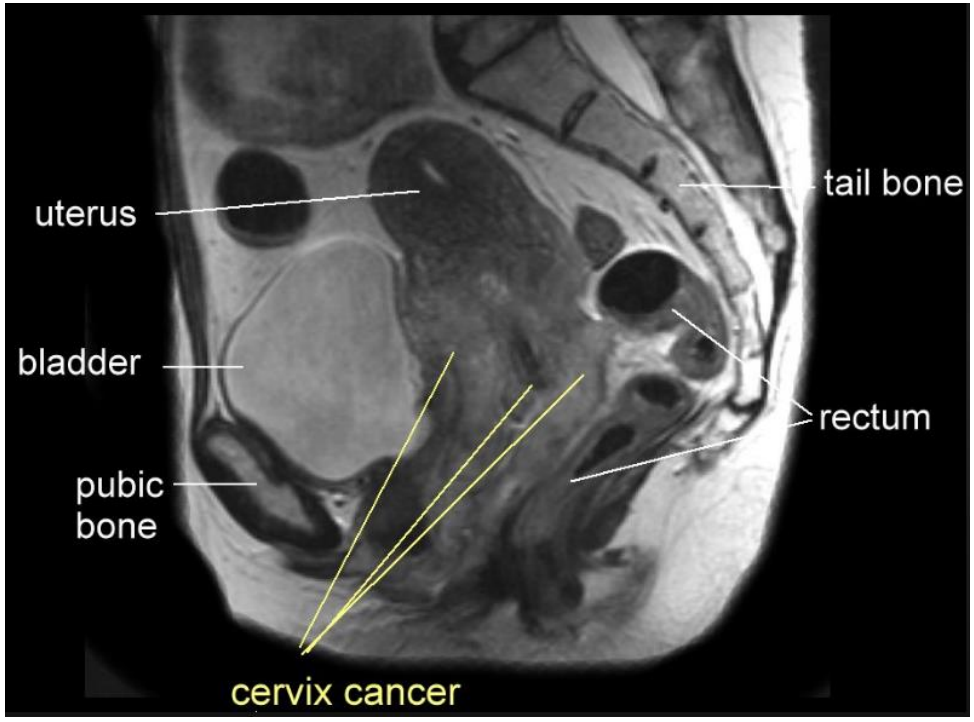
Short-course palliative radiation therapy leads to excellent bleeding control: A single centre retrospective study

Lucas Gomes Sapienza [1,2], Matthew Stephen Ning [3], Anuja Jhingran [3], Lilie L Lin [3], Caio Raposo Leão [1], Bruna Bueno da Silva [1], Antônio Cássio de Assis Pellizzon [1], Maria José Leite Gomes [4], Glauco Baiocchi [5]

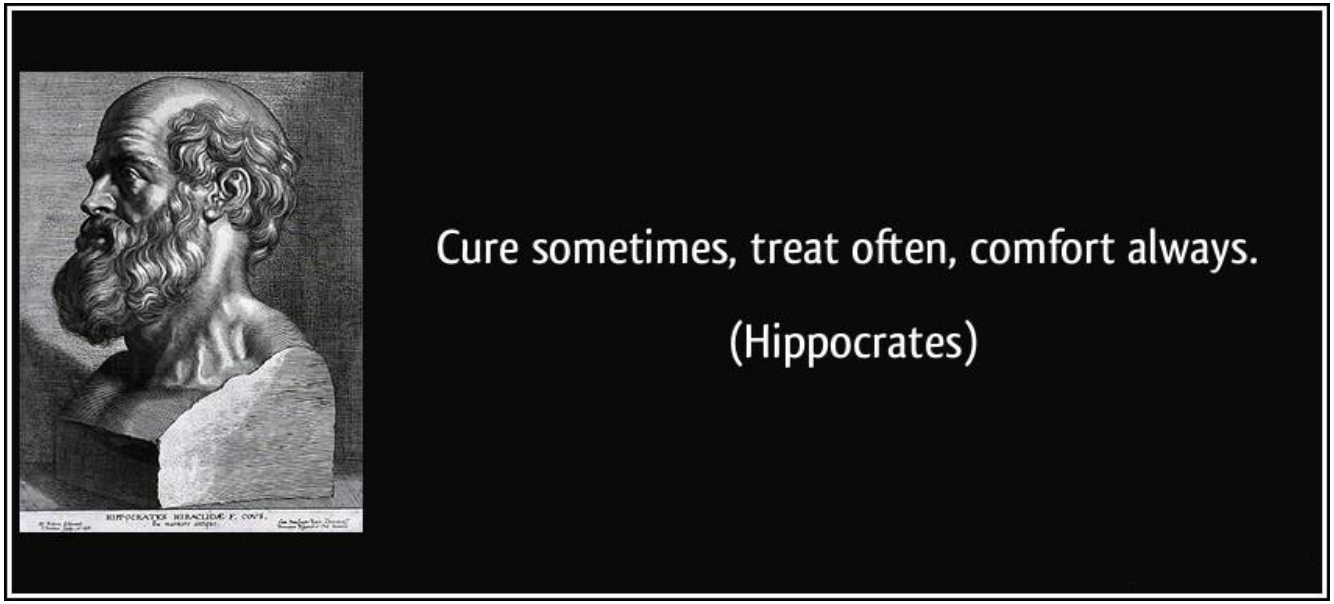
Affiliations + expand

PMID: 30555940 PMCID: PMC6275209 DOI: 10.1016/j.ctro.2018.11.007

112 patients with bleeding from gastrointestinal, genitourinary, head and neck, thoracic, extremity, and gynecologic cancers. They all received radiation in either 1, 5, or 10 fractions. Overall bleeding control rate was 89%. Re-bleeding rate was only 25%.



Inflammatory Disorders



Inflammatory Disorders

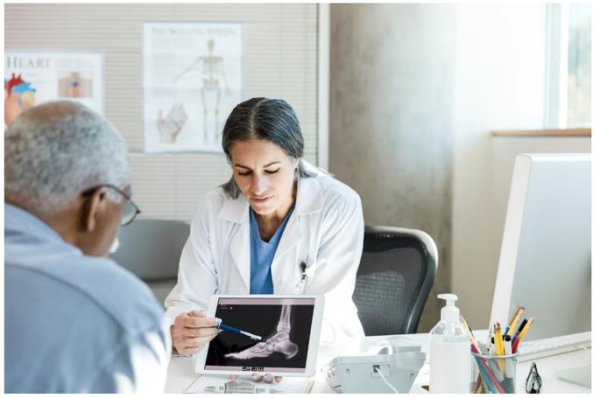
The Washington Post
Democracy Dies in Darkness

Low-dose X-ray treatment is being used for arthritis, plantar fasciitis and other benign conditions

Doctors who use it say the treatment is effective and the low dosage means little radiation exposure

August 3, 2025

6 min Summary 90 Make us preferred on Google

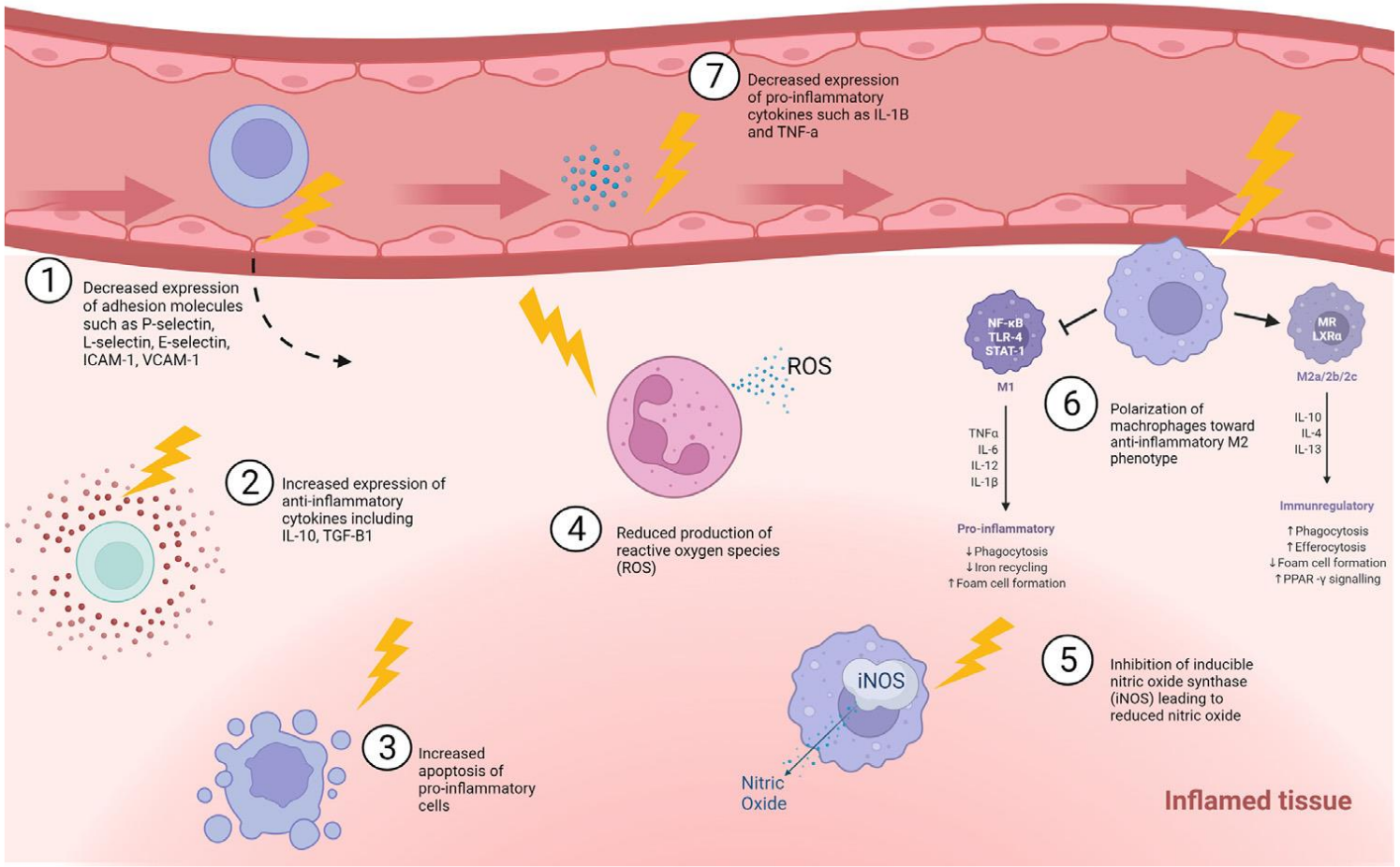


Osteoarthritis, plantar fasciitis and tendonitis are among the conditions being treated with low-dose X-ray treatment. (iStock)

By Caitlin Carlson

In March 2024, radiation oncologist Sanjay Mehta had been dealing with painful Achilles tendinitis on his left ankle for over a year. He'd

Radiobiologic Mechanisms of Anti-Inflammatory Effect of Low-Dose Radiotherapy



Dove et al. IJROBP, 2022.

Inflammatory Disorders

Radiation dose is low. 3 Gy in 6 treatments. 2 treatments per week. Approximately 30 minute treatment sessions.

Treatment is painless!

Minimal side effects: fatigue, pain flare, secondary malignancies.

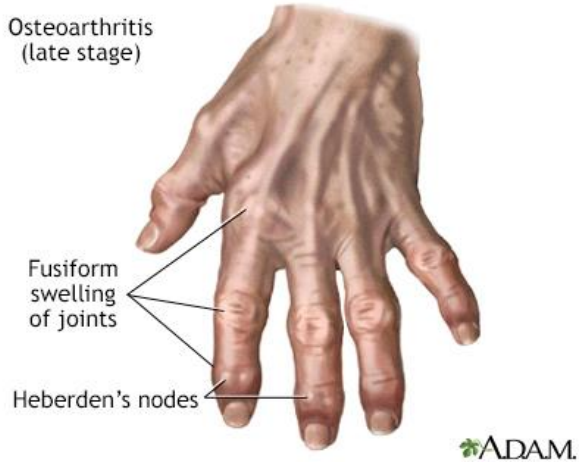
Can be repeated multiple times.

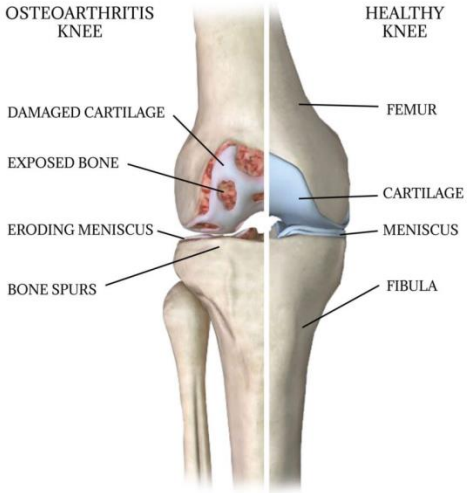
Does not preclude other treatments including steroid injections or surgery.

Osteoarthritis

Thousands of arthritic patients are treated each year in Europe using low dose radiation therapy, achieving significant pain relief.

DEGRO (German Society for Radiation Oncology) recommends consideration of low dose radiation after medical interventions have failed and before more aggressive interventions such as surgery are being considered.

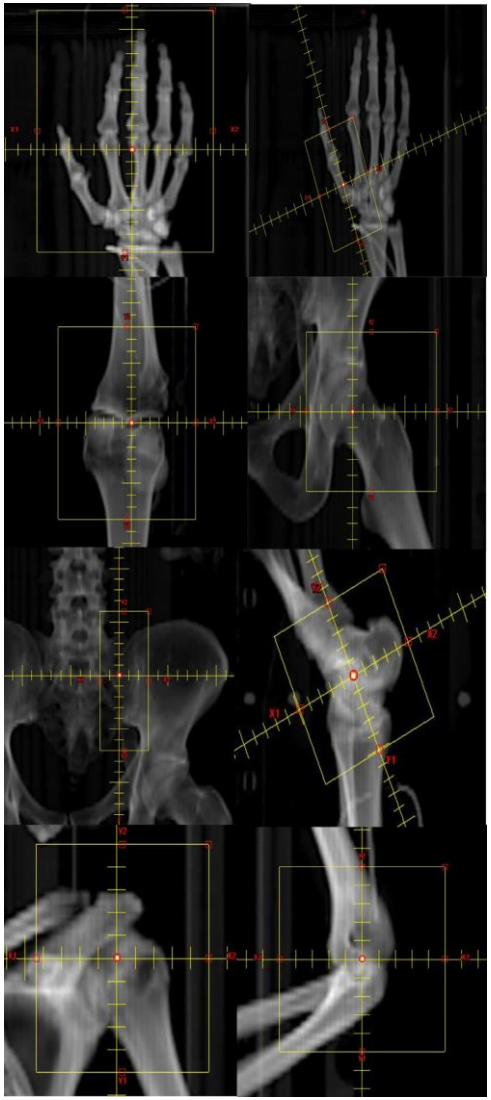




Osteoarthritis

There is published data for the treatment of hands, elbows, shoulders, hips, knees, and ankles. Radiation is also effective for spine and sacroiliac joints.

One of the largest studies looked at 1185 anatomic sites treated in 970 eldely patients from 2008-2020. Pain intensity decreased immediately, and 65.6% of patients reported a pain response at 8 weeks. 384 patients were re-irradiated due to insufficient response with a further pain response in 61% of cases at 8 weeks.
Rühle et al. Strahlenther Onkol, 2021.



Osteoarthritis

LBA 06 · Volume 123, Issue 4, P1198-1199, November 15, 2025 Download Full Issue

Clinical Effectiveness of Single Course Low-Dose Radiation Therapy in Knee Osteoarthritis: Short-term Results from the Randomized, Sham-Controlled Trial

B.H. Kim [1] · D.H. Ro [2] · J.H. Wang [3] · ... · H.S. Han [2] · H.J. Kim [11] · W. Park [12] ... Show more

Affiliations & Notes · Article Info

Download PDF · Cite · Share · Set Alert · Get Rights · Reprints

Show Outline

Abstract

Purpose/Objective(s)

Low-dose radiation therapy (LDRT) has been historically used as a non-pharmacologic option for osteoarthritis (OA), but solid evidence from randomized trials is still limited.

Materials/Methods

In this multicenter, randomized, sham-controlled trial, 114 patients with knee OA were allocated to receive sham irradiation, total 0.3 Gy/6 fractions, or total 3 Gy/6 fractions. The main inclusion criteria are primary knee OA classified as Kellgren-Lawrence grade 2–3 and a baseline walking pain score of 50–90/100. Use of concomitant analgesics, except for rescue drug, was restricted during the first 4 months. Re-irradiation was not allowed. The primary endpoint was the OMERACT-OARSI response rate at 4 months.

Results

All participants completed the treatment with perfect adherence. In the full analysis set, the responder rate at 4 months was significantly higher in the 3 Gy group (70.3%) than in the sham group (41.7%, p=0.014), whereas the 0.3 Gy group showed no significant difference compared to sham (58.3%, p=0.157). Similar results were observed in the per-protocol set. Clinically meaningful improvement (≥16) in WOMAC total score at 4 months was observed more frequently in the 3 Gy group (56.8%) compared to sham (30.6%, p=0.024). However, there were no significant differences in the mean changes from baseline in other secondary outcomes, including VAS, PGA, serum inflammatory markers, and the amount of rescue drug use. No treatment-related toxicity was reported.

Conclusion

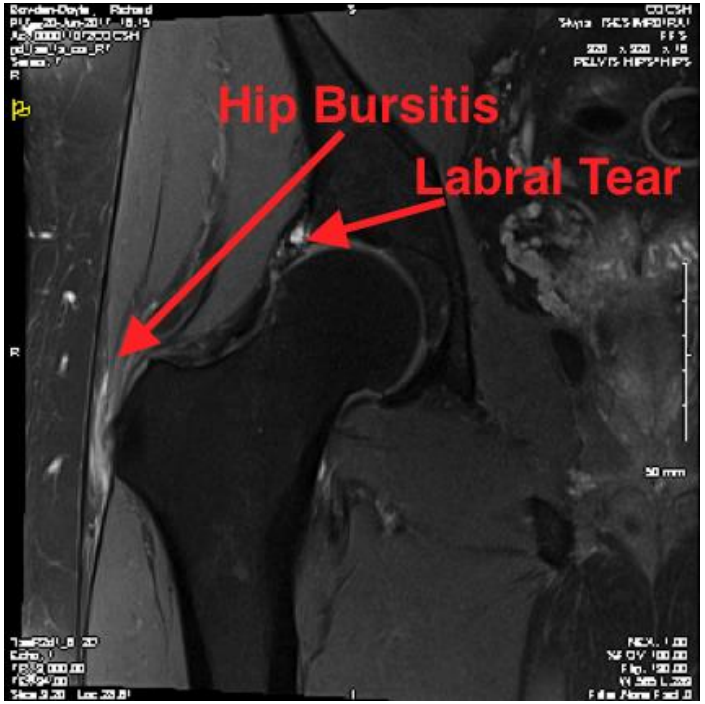
A single course of 3 Gy LDRT led to significant improvement in clinical outcomes for patients with mild-to-moderate knee OA. These findings support its potential as a conservative treatment option. Long-term and imaging-based follow-up is ongoing.

Bursitis

Many studies demonstrate the effectiveness of low dose RT

RT is used for bursitis in Germany on 50,000 patients annually

One series of 155 patients with recurrent or refractory bursitis demonstrated a 83.2% response rate. In 29% of patients, there was a near complete pain response. 53% of patients continued to enjoy pain relief at 5 years.
Biete et al. Clin Transl Oncol, 2022.



Tendinitis - Epicondylitis

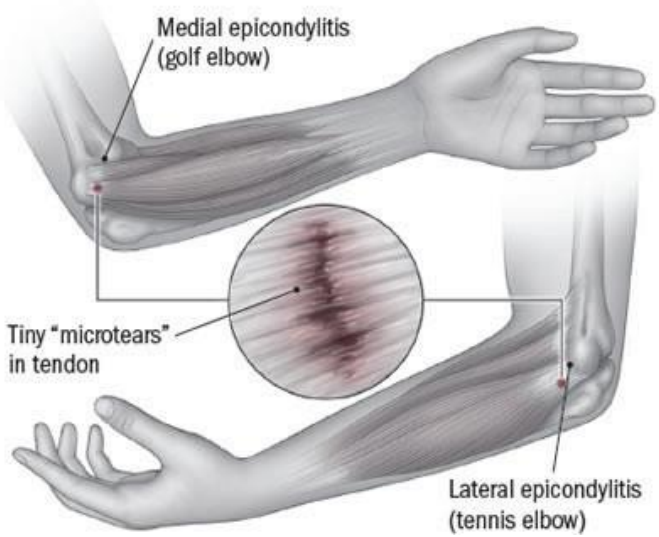
Comparative Study > Strahlenther Onkol. 2019 Apr;195(4):343-351.
doi: 10.1007/s00066-018-1397-9. Epub 2018 Nov 13.

Radiotherapy of epicondylitis humeri : Analysis of 138 elbows treated with a linear accelerator

Matthias G Hautmann [1], Lukas P Beyer [2], Christoph Süß [3], Ulrich Neumaier [4], Felix Steger [3], Franz Josef Putz [5], Oliver Kölbl [3], Fabian Pohl [3]

Affiliations + expand

PMID: 30426149 DOI: 10.1007/s00066-018-1397-9



Abstract

Background: Epicondylitis humeri is a common disease with a prevalence of 1.7%. One of the treatment options is radiotherapy. Most published cases were treated with the orthovoltage technique or with a telecobalt device. Many radiotherapy institutions are nowadays using linear accelerators for treatment of epicondylitis humeri. There is a discussion whether the treatment results with linear accelerators are comparable to the orthovoltage technique. The aim of this study was to analyze the results of radiotherapy with a linear accelerator for epicondylitis humeri.

Material and methods: The analysis was performed on patients of 2 German radiotherapy institutions and included 138 irradiated elbows. Pain was documented with the numeric rating scale (NRS). Evaluation of the NRS was done before and directly after each radiation therapy course as well as for the follow-up of 24 months. The median age of the patients was 49 years with 48.4% male and 51.6% female. In all, 81.0% were suffering from from epicondylitis humeri radialis while 16.7% were treated because of epicondylitis humeri ulnaris. In 65.4% the dominant arm was treated.

Results: A significant response to radiotherapy could be found. For the whole sample the median pain was 7 on the NRS before radiotherapy, 4 after 6 weeks and 0 after 12 and 24 months. The percentage of patients with 0 or 1 on the NRS was 64.6% 12 months after radiotherapy. All subgroups, notably those with epicondylitis humeri radialis and epicondylitis humeri ulnaris had a significant reduction of pain.

Conclusion: Radiotherapy of epicondylitis humeri with a linear accelerator is an effective treatment without showing side effects. All analyzed subgroups showed a good response to radiotherapy for at least 24 months.

Tendinitis - Shoulders

Strahlentherapie und Onkologie (2025) 201:495–500
https://doi.org/10.1007/s00066-024-02302-x

ORIGINAL ARTICLE

Radiotherapy for painful shoulder syndrome: a retrospective evaluation

Ronny Leist[1] · Oliver Micke[2] · M. Heinrich Seegenschmiedt[3] · Irenaeus A. Adamietz[4] · Kashyar Fakhrian[5] · Ralph Muecke[4,6]

Received: 15 February 2024 / Accepted: 2 July 2024 / Published online: 23 September 2024
© The Author(s) 2024

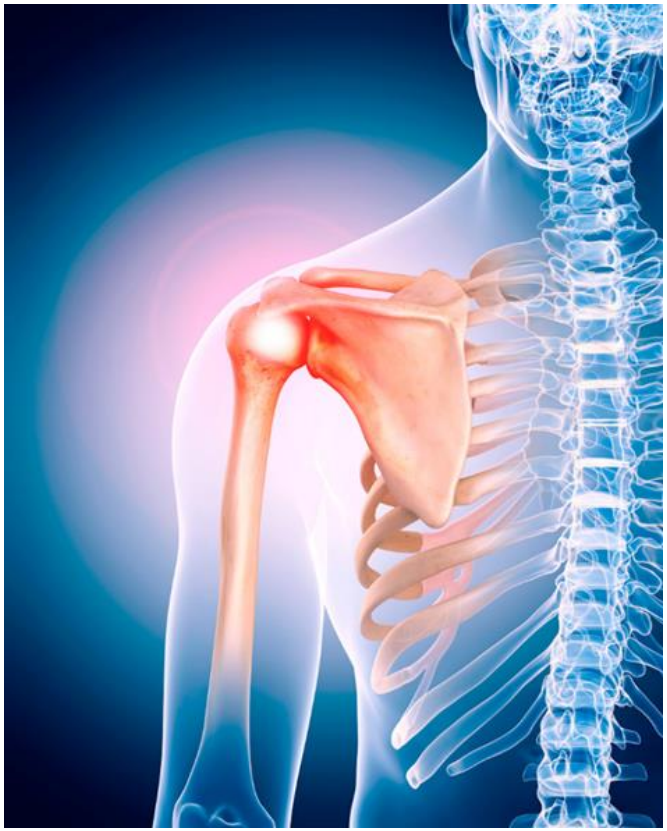
Abstract

Purpose We evaluated the efficacy of low-dose radiotherapy for painful shoulder syndrome from an orthopedic perspective.

Methods Patients with painful shoulder syndrome were recruited for this retrospective clinical quality assessment from January 2011 to December 2017. Patients were treated with a linear accelerator or an orthovoltage device at individual doses of 0.5–1.0 Gy and total doses of 3.0–6.0 Gy. To assess response, we used the von Pannewitz score with five levels: "worsened," "unaffected," "improved," "significantly improved," and "symptom free." "Good treatment success" was defined as "significantly improved" and "symptom free." Within-group and between-group differences were statistically evaluated.

Results Of 236 recruited patients (150 women, 86 men; mean age 66.3 [range 31–96] years), 180 patients underwent radiotherapy with a linear accelerator and 56 with an orthovoltage device. Fractionation was 12 × 0.5 Gy in 120 patients, 6 × 0.5 Gy in 74, and 6 × 1 Gy in 42 patients. Treatments were completed in one series for 223 and in two series at least 6 weeks apart for 13 patients. Of the 236 patients, 163 patients (69.1%) agreed to be re-interviewed at a median of 10.5 (range 4–60) months after radiotherapy completion. Directly after radiotherapy, 30.9% (73 patients) had "good treatment success," which had increased to 55.2% (90 patients) at follow-up.

Conclusion Protracted pain improvement with low-dose radiotherapy is possible in painful shoulder syndrome. Patients with refractory pain because of subacromial syndrome or shoulder osteoarthritis should also be evaluated for radiotherapy.



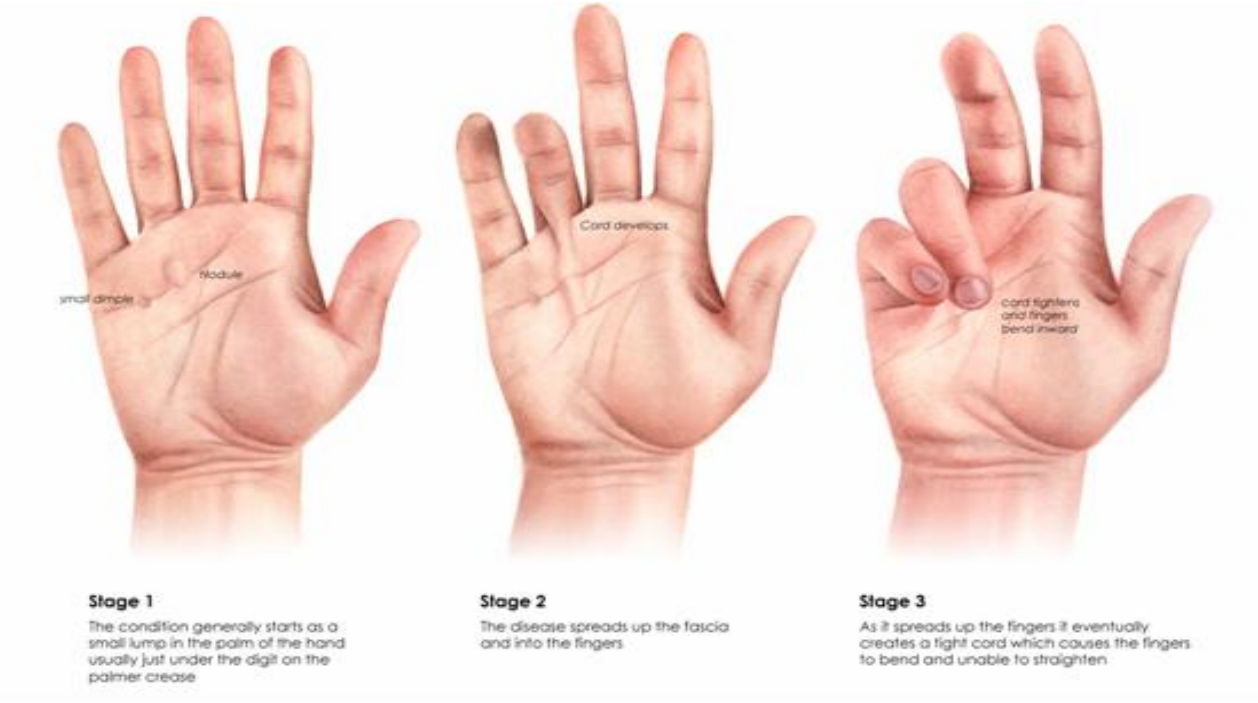
Plantar Fasciitis

Treatment is typically twice per week for 3 weeks. Each treatment lasts minutes and is completely painless.

Miszczyk, et al. TBIR, 2014
86% of patients reported pain relief after radiation therapy. 48% reported complete resolution of pain. Pain relief lasts an average of 72 months.

Radiation vs Steroid Injections. *Canyilmaz, et al. IJRO, 2015.* In a randomized comparison with steroid injections, RT was shown to be superior in both effectiveness of treatment and duration

Dupuytren's Contracture



Stage 1

The condition generally starts as a small lump in the palm of the hand usually just under the digit on the palmer crease

Stage 2

The disease spreads up the fascia and into the fingers

Stage 3

As it spreads up the fingers it eventually creates a tight cord which causes the fingers to bend and unable to straighten

Dupuytren's Contracture

• = very efficient, usually applied in this stage
° = efficient, occasionally applied in this stage

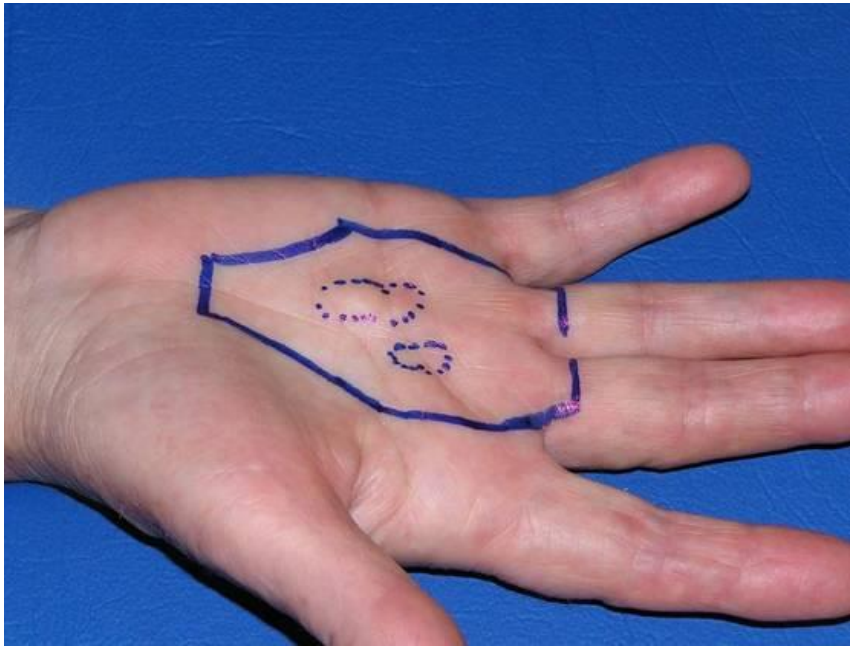
Stage	N	N/1	1	2	3	4
radiation therapy	•	°				
collagenase injection			•	•		
NA		°	•	•	°	°
hand surgery			•	•	•	•

The International Dupuytren Society considers radiotherapy as a very effective, if not the only, means to stop Dupuytren's disease in an early stage and to possibly avoid later surgery.

30% of patients who did not receive radiation required surgery compared with only 8% of those patients who received 30Gy of radiation **(3% for those treated before contracture sets in)**

Seegenschmiedt et al, 2012

Dupuytren's Contracture



Treatment course: 1 week of tx -> 8-10 wk break -> 1 week of tx

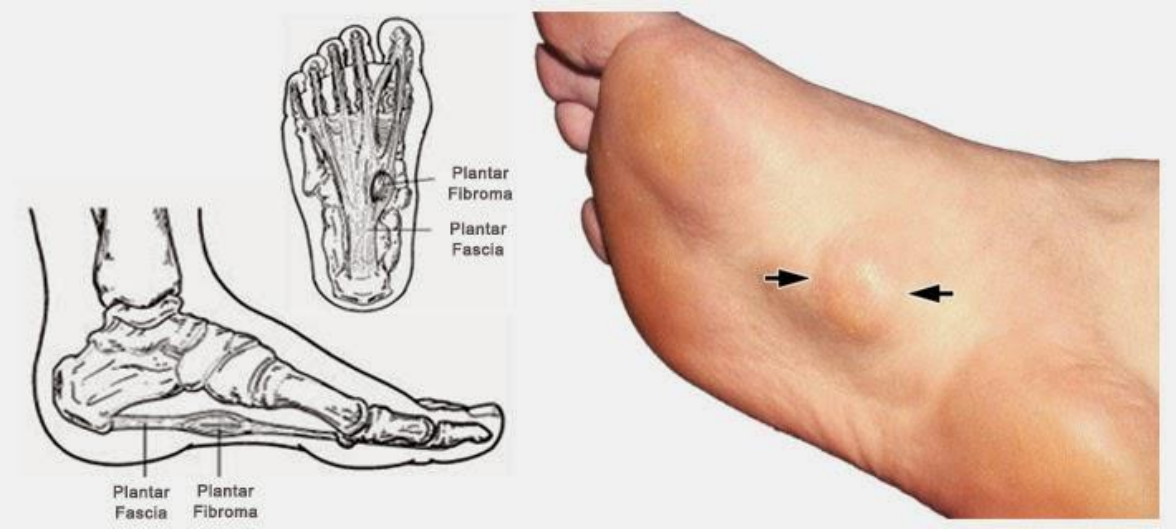
Plantar Fibromas (Ledderhose Disease)

Before radiotherapy the nodule or nodules extend over a large area of the arch.

After radiotherapy the nodule is not gone but reduced in size.

Patient's comment: "I'm really satisfied about my condition nowadays. Even the walking difficulties and pain got much better."

Plantar Fibromas (Ledderhose Disease)



24 patients with symptomatic Ledderhose treated with RT. 33% had complete resolution. 55% had a reduction and size of nodules. 68% reported reduction in pain. 73% reported improvement in gait.

Heyd et al, 2010

Keloids

Excessive formation of granular tissue typically following an inciting skin injury such as a cut, tattoo, or piercing. These can be painful and itchy.

Keloids

Initial treatment is surgery. If radiation is to be applied, it should be started < 48 hours after surgery.

A meta-analysis (*Kal, et al. Strahlenther Onkol, 2005*) looked at 18 studies in which radiation therapy was delivered after resection for keloids. The recurrence rate after surgery alone was 50-80%. The recurrence rate was <10% with post-operative radiation.

BEFORE AFTER SURGERY + RT


QUESTIONS