



**REDISCOVERING RADIATION
MEDICINE AND EXPLORING
NEW INDICATIONS**

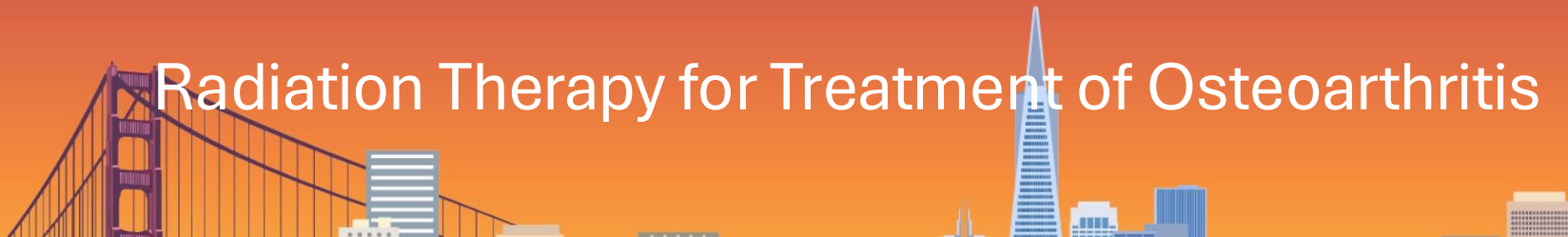
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WELCOME

Radiation Therapy for Treatment of Osteoarthritis



Radiation Therapy for the Treatment of Osteoarthritis

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Disclosures

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- Consulting fees: Boston Scientific
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Outline

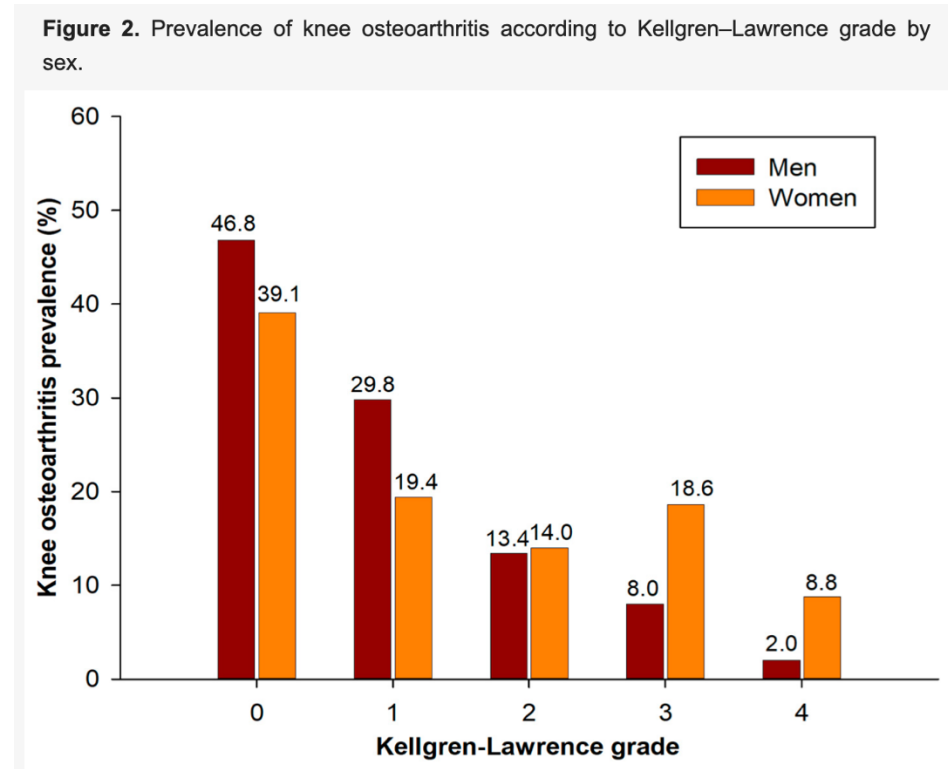
- The problem of osteoarthritis in South Korea and the United States
- Evidence regarding Treatment of Osteoarthritis with Radiotherapy
- Treatment recommendations

Osteoarthritis – South Korea

- Prevalence of osteoarthritis in South Korea around 1 in 3
- More prevalent in women compared to men
- “In general, Koreans tend to avoid surgical treatment because of a desire to use their own joints for as long as possible.”*

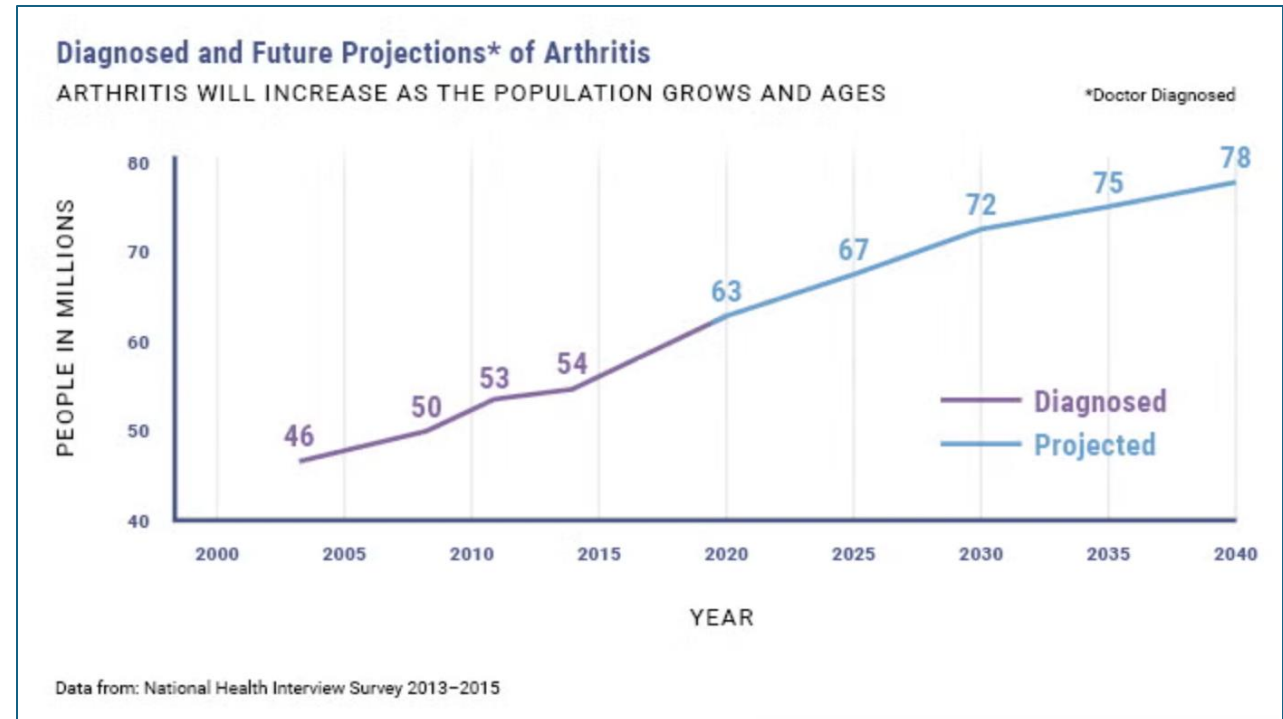
*Kim HY. JKMS. 2018;33:e161.

Lee DY. Medicina (Kaunas).
2024;60:655



Osteoarthritis – United States

- Prevalence in United States approximately 15-20% adults
- Prevalence expected to rise as population ages



CDC 2024

Evidence

- Osteoarthritis involves damage to articular cartilage and characterized by proinflammatory cytokines and chemokines
- Low dose radiation therapy (LDRT) with doses between 0.3 and 1.0 Gy can reduce inflammation
 - (Rodel et al. IJROBP. 2007; 83:357-366, Lodermann et al. IJROBP. 2012; 88:727-734)

Evidence

Study	No. of patients	Anatomic site	Radiation dose	Outcome
Rühle et al, ⁹ 2021	970; retrospective	Multiple sites	0.5 Gy × 6 or 1 Gy × 6	Pain reduction in about 2/3 of treated sites
Alvarez et al, ¹¹ 2022	100; prospective	Hand	0.5-1 Gy every other day × 6; total 3-6 Gy	Reduction in pain at 3, 6, and 12 mo; 63/100 underwent retreatment
Mahler et al, ⁶ 2019	55 (27 LDRT, 28 sham)	Knee	1 Gy × 6 over 2 weeks; total 6 Gy	No substantial effect
Minten et al, ⁷ 2018	56 (28 LDRT, 28 sham)	Hand	1 Gy × 6 over 2 weeks; total 6 Gy	No substantial effect
Niewald et al, ¹² 2022	133 patients/244 joints (LDRT vs very low-dose RT)	64 knees and 172 hands	0.5 Gy × 6, twice weekly (vs 0.05 Gy × 6, twice weekly)	LDRT

ArthroRad

Abbreviations: LDRT = low-dose radiation therapy; RT = radiation therapy.

Evidence at ASTRO 2025...

- LoRD-KNeA study
- Randomized controlled study 1:1:1 of 50 cGy x 6, 5 cGy x 6, and sham for knee osteoarthritis
- N= 114 planned
- Primary endpoint OARSI-OMERACT responders at 4 months
- *No analgesic use allowed until primary efficacy determined*

Kim BY et al. BMJ Open. 2023; 13:e069691

Treatment Recommendations

- Most common treatment: 3 Gy in 6 fractions, given over 2-3 weeks
 - Literature response rate from 25-100%
 - Probably somewhere in the 50-70% range (ex: Dove et al. 2022 IJROBP: 57.6% response rate at 6 months)
- Generally, most practices treat elderly patients given second malignancy risk
- German Society of Radiation Oncology recommends LDRT for age 40 or older
- In surveyed practices in the US, general consensus was treat over the age of 60
- Patients with moderate to severe pain and limited surgical options

Example Fields

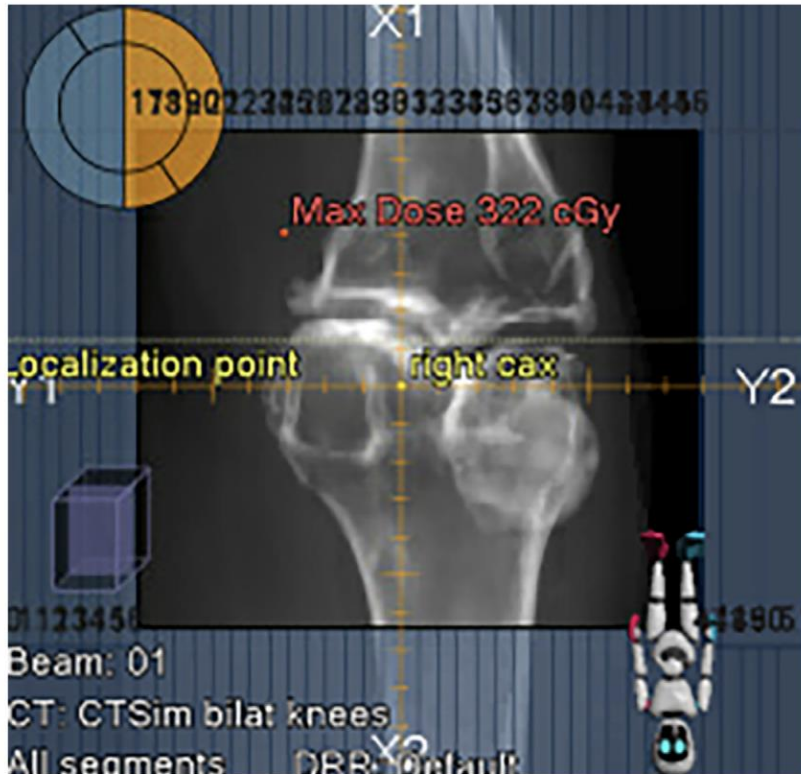
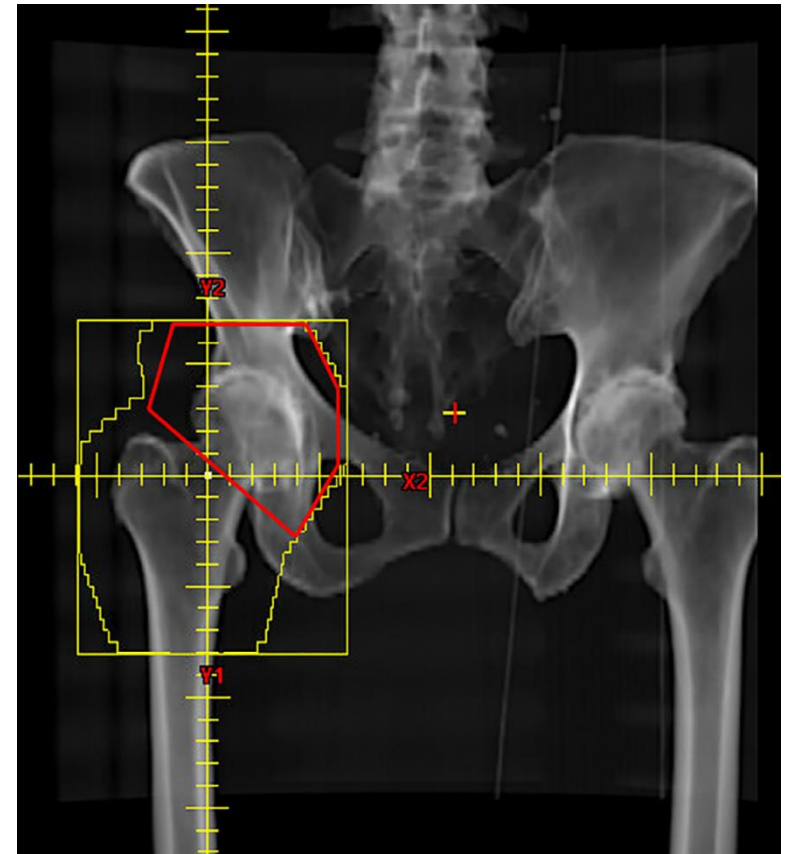


Figure 2 Knee.

Yu JB et al. Pract Rad Onc. 2025; 15: 19-24



Other example fields

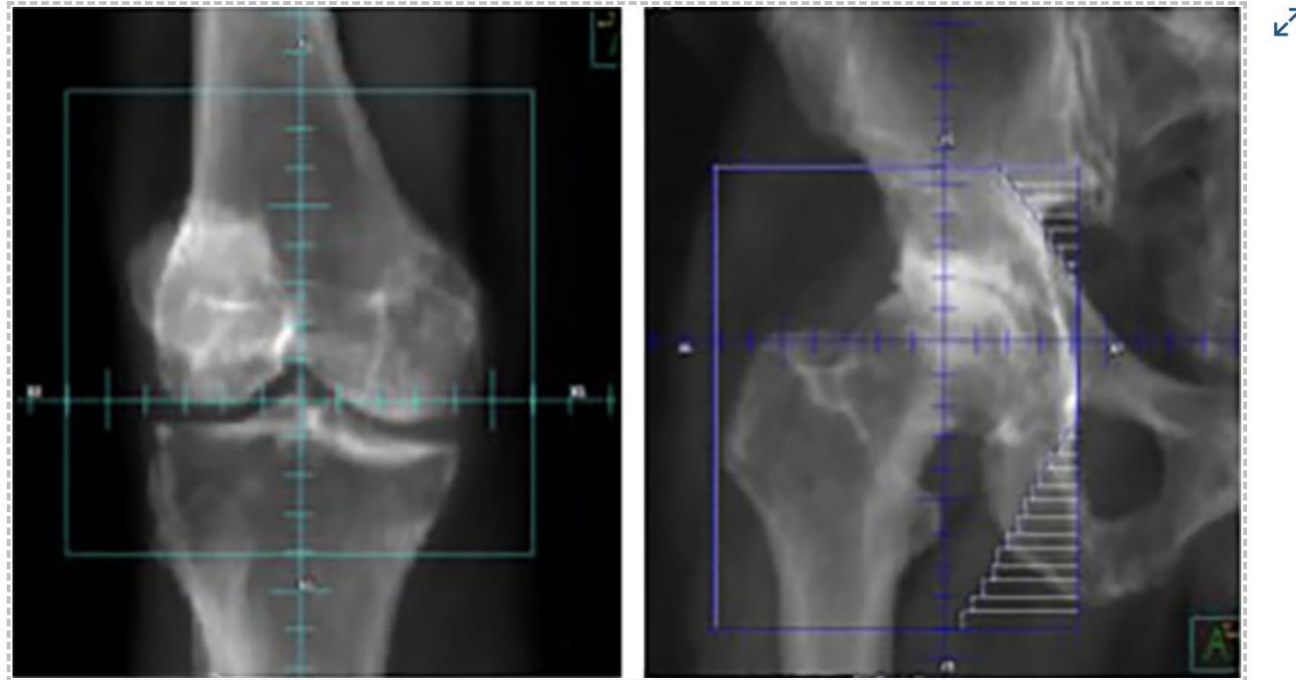


Figure viewer

Fig. 1 Sample treatment fields illustrating the typical setup and field arrangements for various joint treatments. *Abbreviation:* CT = computed tomography.

- Koneru et al. IJROBP. 2025; 2: 232-260

Example Fields

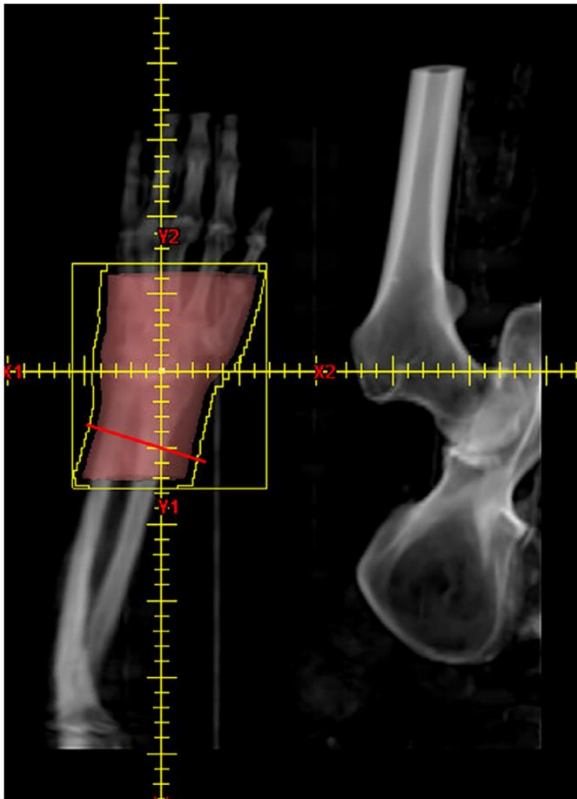


Figure 5 Wrist.

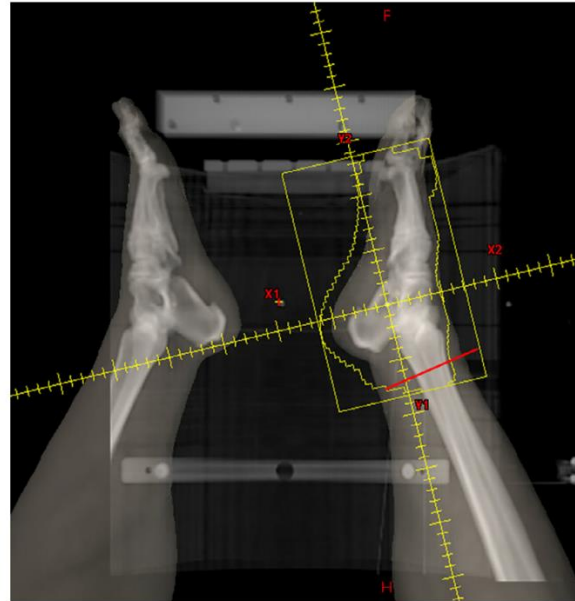


Figure 6 Ankle and feet.

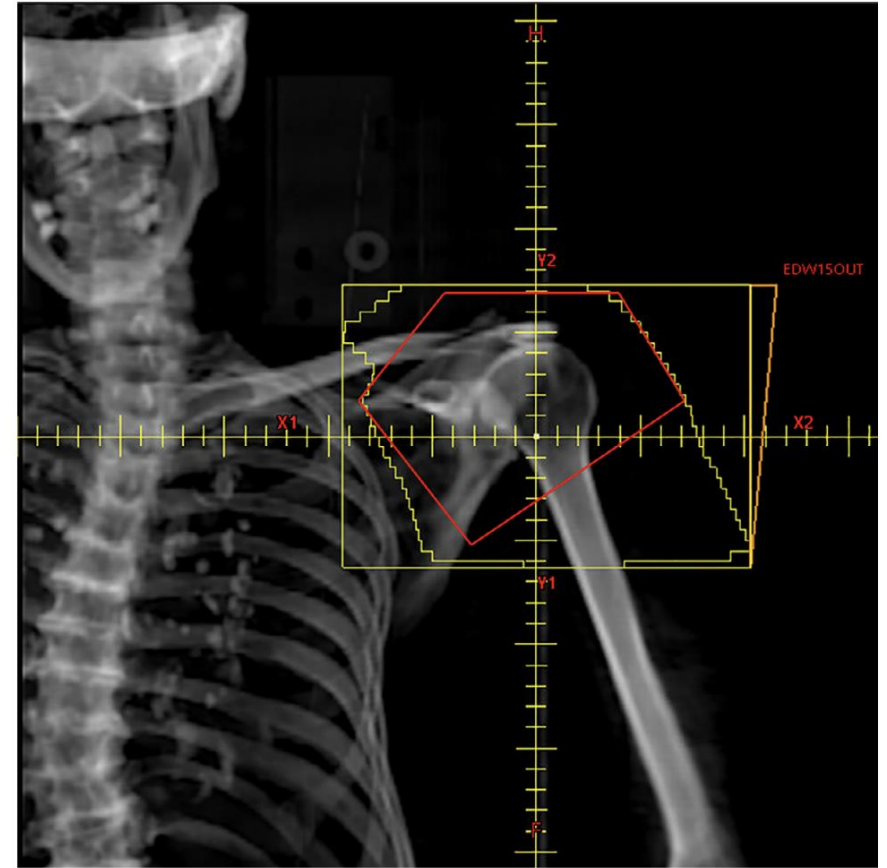


Figure 4 Shoulder.

Yu JB et al. Pract Rad Onc. 2025; 15: 19-24

Questions

- Treatment volume?
 - Given low dose, our technique has been to treat larger areas in order to encompass all areas of potential inflammation that cause pain, including joint capsule, joint ligaments, and tendons inserting or originating around the joint
 - We hypothesize that larger field sizes are more likely to reduce pain and inflammation
- Nail bed blocking?
 - Nail bed blocking is done by some centers given potential for nail loss

Retreatment?

- Retreatment is common and technically feasible
 - Wait at least 3 months to allow for full treatment effect from first radiation
 - Second round of treatment can provide benefit
- Controversial:
 - How many times can you retreat? Some centers allow treatment 3 or 4 times

Summary

- Prevalence of osteoarthritis likely higher in South Korea compared to the United States
- One of the most important LDRT for OA studies reporting from South Korea (LORD-KNeA)
- Treatment of patients over 60 with 3 Gy in 6 fractions over 2-3 weeks likely quite benign
 - Large treatment fields (vs. smaller) may be preferred, with tradeoffs regarding ALARA principles and fear of second malignancy
- Treatment response likely on the order of 50-70%
- Retreatment acceptable after 3-4 months