

Low-dose Radiation Therapy For Benign (Non-Malignant) Musculoskeletal Conditions

What is low-dose radiation therapy for benign (non-malignant) conditions?

Doctors are increasingly using low-dose radiation therapy (<http://www.radiologyinfo.org>) (LDRT) to treat chronic, benign conditions when conventional treatments are unsuccessful. The therapy uses radiation doses that are significantly lower than those used to treat cancer. LDRT often reduces pain and improves function.

For many musculoskeletal conditions, LDRT works by interrupting the body's inflammatory process in the affected joints with low doses of radiation. This helps to reduce inflammation, relieve pain, and improve mobility.



Your doctor may recommend LDRT if you:

- have not found relief with other treatments such as physical therapy, oral medications, or injections.
- are interested in eliminating or reducing medication use.
- are looking for a non-surgical option to manage chronic pain and/or mobility issues or are not a good candidate for surgery.

What are some musculoskeletal conditions treated with this procedure?

- **Osteoarthritis (OA):** This is the most common benign condition treated with LDRT. It is used to reduce pain and stiffness in joints by acting on inflammatory processes caused by bones rubbing together after protective cartilage wears away with age.
- **Dupuytren's Contracture and Ledderhose Disease:** Fibromatosis of the palm of the hand (Dupuytren's) or foot (Ledderhose), causing contractures that reduce flexibility and function.
- **Keloids and Hypertrophic Scars:** Overgrowth of scar tissue, often occurring after piercing, trauma, or surgery. Surgery alone often results in regrowth of the keloids, but using radiation after surgery prevents regrowth.
- **Plantar Fasciitis:** Inflammation or micro-tearing of the plantar fascia, one of the most common causes of heel pain. Radiation therapy is effective in reducing the heel pain.
- **Heterotopic Ossification:** Abnormal bone growth in soft tissues, often following joint repair or spinal cord injury; radiation therapy is often used for prevention after surgical removal of the bone growth.
- **Inflammatory/Soft Tissue Disorders:** Includes bursitis, tennis elbow, golfer's elbow and, in some cases, painful osteoarthritis.

How should I prepare?

You will have an initial consultation with the radiation medicine doctor (often known as a radiation oncologist). It is important to bring any previous imaging studies, reports, or results related to your condition and the area of the body to be treated to your appointment. Your radiation medicine doctor will also examine the site to be treated. This will assist your doctor and the treatment

team in developing a treatment plan.

Following this evaluation, you will be scheduled for a CT simulation, where you will have a CT scan (<http://www.radiologyinfo.org>) of *only* the area of the body being treated. At this time, the radiation therapist (<http://www.radiologyinfo.org>), along with the doctor, will make any devices needed for treatment (molds, masks) and position you as they will be for treatment.

Next, the dosimetrist (<http://www.radiologyinfo.org>), along with the doctor, will create a treatment plan specifically designed for you, which will then be checked by a medical physicist (<http://www.radiologyinfo.org>), and finally the radiation therapist, who will administer the daily treatments using a linear accelerator (discussed below). The doctor will decide how many times you will need to come for treatment. For osteoarthritis, the most common protocol is to give six treatments every other day over two weeks followed by a 12-week break and a follow-up visit to determine your response. If pain control is adequate, you are done. But about 70 percent of patients experience some mild recurrence in pain and opt to pursue a second phase of radiation for an additional six treatments. This almost always results in more durable pain relief.

What does the equipment look like?

You will be treated using a Linear Accelerator (<http://www.radiologyinfo.org>) – a machine that uses high-energy photon (X-ray) beams or electron beams to precisely target and treat people with cancer, in addition to certain benign conditions and other abnormalities. A linear accelerator produces high-energy radiation, (high energy x-rays), which is delivered to your tumor to kill cancer cells, while minimizing damage to surrounding tissue. In the case of LDRT, lower doses of radiation work by disrupting the inflammatory process that create pain, swelling, and other uncomfortable symptoms created by the condition being treated.

How is the procedure performed?

You will be positioned on the treatment couch exactly as you were during the initial CT simulation, by the radiation therapist. Images (pictures) will be taken first to make sure they match exactly what was done in the CT simulation. The doctor will review and sign off on these images *before* the treatment begins. Once the doctor approves the images, the treatment will begin. The radiation beam is on for less than a minute for each position the machine is in during treatment.

What will I experience during and after the procedure?

You will not see or feel anything from the radiation during treatment. You may hear some “buzzing” sounds from the machine, which is completely normal. Once the treatment is over, you may leave and continue about your day as normal.

What are the benefits vs. risks?

Benefits

- **Non-Invasive Treatment:** No surgery involved; only targeted radiation therapy.
- **Outpatient Procedure:** Treatment involves six or less sessions, each lasting only 10-15 minutes. Treatments can be repeated for more effective and durable response.
- **Covered by Insurance:** LDRT is covered by Medicare and many commercial insurance plans.

Risks

- **Localized Effects:** The most common side effects include temporary hair loss in the treated area, dry skin, and redness (erythema).
- **Long-Term Tissue Changes:** Hardening (soft-tissue fibrosis), although rare, can occur over time.

- **Secondary Cancer Risk:** There is an extremely low, rare potential risk of developing radiation-induced cancer for conventional higher dose radiation used to treat cancer. However, there have been no reports of patients developing secondary cancer with LDRT. This is because the radiation doses LDRT uses to treat benign conditions are ***much*** lower than those used to treat cancer. Treatment planning also minimizes unnecessary radiation exposure to surrounding healthy tissue.

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