Primary Bone Cancer: Radiation Therapy

What is radiation therapy?

Radiation therapy uses strong beams from X-rays or particles to kill cancer cells.

When radiation therapy is used

Radiation therapy is not used as the main treatment for most types of primary bone cancers (cancers that start in the bones). But it's often part of the main treatment for a type of bone cancer called Ewing sarcoma.

Here are some of the ways this treatment might be used:

- **To treat a tumor that can't be removed with surgery.** Radiation might be used if the tumor cannot be removed because of where it is, or if the person is not healthy enough to have surgery. It can also be given with chemotherapy. In these cases, it's called chemo-radiotherapy.
- **To try to shrink a tumor before surgery.** This may make it easier to remove the tumor. It also might reduce the amount of tissue that needs to be removed. When radiation is used before surgery, it's called a neoadjuvant therapy.
- **To try to kill any cancer cells left after surgery.** When radiation is used after surgery, it's called an adjuvant therapy. This may be done to destroy any cancer cells that may have been left behind after surgery. It might help reduce the risk that the cancer will come back later (recur).
- **To relieve symptoms.** Radiation may be used to help manage symptoms caused by tumors that can't be treated with surgery or that have spread to other organs. For example, radiation can help reduce pain or swelling caused by a tumor pressing on nerves or blood vessels. This is called palliative therapy.

To make your treatment plan, you'll meet with a team of cancer specialists. This might include a surgeon, radiation oncologist, and medical oncologist.

What happens during radiation therapy

The most common way to get radiation for bone cancer is from a machine outside your body that sends out an invisible X-ray beam. This is called external beam radiation therapy (EBRT).

Sometimes special types of EBRT are used to try to limit the radiation damage to nearby normal cells:

- **Intensity-modulated radiation therapy (IMRT).** IMRT uses a computer to control both the direction and the strength (intensity) of the radiation. The beams are matched to the shape of the tumor. This allows the healthcare provider to give high dose of radiation to the tumor. It also can limit the damage to healthy tissue and reduce side effects.
- **Proton beam therapy.** This newer type of treatment uses proton beams instead of X-rays. Protons are a kind of radiation particle that do the damage at the end of the beam, so there's little damage to the normal tissues around the tumor. This means there's less side effects than X-ray radiation.

A healthcare provider who specializes in treating cancer with radiation is called a radiation oncologist. They work with you to determine the kind of radiation you need. This healthcare provider also plans the dose and how long you need treatment.

You'll likely get radiation therapy as an outpatient in a hospital or a clinic. This means you will be able to go home the same day. Radiation is most often given once a day, 5 days a week (Monday to Friday), for many weeks.

Getting ready for EBRT

Before your first radiation treatment, you will have a session to plan for the treatment. This is called simulation. During this visit:

- Imaging scans, like CT MRI, PET (, or bone scans, will be used to find where the cancer is.
- You'll lie still on a table while a radiation therapist uses a machine to find exactly where the radiation will be aimed. The therapist may mark your skin with tiny dots of semipermanent ink or tattoos. These are used to aim the radiation at the exact same place each time.
- You may have a plastic mold made of your body. The mold puts you into the same position for each treatment and prevents you from moving during treatment.

What to expect for your treatment

On the days you get radiation treatment, you'll lie on a table while the machine moves over you. The machine will move around you, but it won't touch you. Each treatment is much like getting an X-ray, only longer. Radiation treatment doesn't hurt.

On the day of treatment, you're carefully put into the right position. You may see lights from the machine lined up with the marks on your skin. These help the therapist know you are in the right position. The therapist will leave the room while the machine sends radiation to your tumor.

During this time, the therapist can see you, hear you, and talk to you. When the machine sends radiation to your tumor, you'll need to be very still, but you don't have to hold your breath. Treatment itself takes only a few minutes. But plan to be there about an hour. Most of the time will be spent getting you ready for treatment.

Side effects of EBRT

Radiation therapy kills cancer cells. But it can also damage normal, healthy cells. This can cause side effects. The side effects from radiation are usually limited to the area being treated. Some people have few or no side effects. But if you have severe side effects, your healthcare provider may change the dose of your radiation or how often you get treatment. Or, treatment may be stopped until the side effects get better. Be sure to tell your healthcare provider about any symptoms you have.

Possible short-term side effects

These are some of the common short-term side effects:

- Skin irritation, sores, or changes in the treated area
- Nausea or diarrhea (for radiation to the belly or pelvis)
- Bladder irritation, which can make you feel that you have to urinate often. Or it may cause pain or burning when you urinate (for radiation to the pelvis).
- Extreme tiredness (fatigue)
- Low blood counts, as seen on a blood test
- Slow wound healing. If radiation is given after surgery, it may take longer for the wound to heal.

If you have any of these or other side effects, talk with your healthcare provider. Ask about the best ways to deal with them and how to know when they become serious. Side effects might not start until you're a few weeks into treatment. In most cases, they go away over time after you stop getting treatment.

Possible long-term side effects

Radiation therapy can also cause some long-term side effects. These depend on where the radiation was aimed. This can be a special concern in treating bone cancer, which often affects children, teens, or young adults.

Long-term side effects may include:

- **Slowed bone growth** in children because their bones are still growing. For instance, radiation can cause one leg to be shorter than the other. This isn't as much of a concern in older teens or adults, whose bones are no longer growing.
- **Bone weakness** in the treated bone, which may break (fracture) more easily.
- **Second cancers** are more likely to form in areas that been treated with radiation. These cancers may develop even decades after treatment.
- **Reduced fertility** because radiation to the pelvis can damage reproductive organs. This might affect the ability to have children later in life. Talk with your healthcare team about fertility preservation choices before starting treatment if this is a concern.
- **Damage to other organs** like the heart or lungs might happen with radiation to the chest.

Talk with your healthcare provider about what you can expect treatment to be like and the side effects you should watch for. Be sure you know how to get help any time, including after office hours, on weekends, and on holidays.