

Your guide to radiation therapy

Kaiser Permanente Cancer Treatment Center

Santa Clara Medical Center



Introduction

The Kaiser Permanente Cancer Treatment Center's Radiation Oncology Department specializes in the diagnosis and treatment of cancer. Our skilled staff is made up of caring specialists and therapists who perform thousands of radiation treatments every year. In addition, our advanced equipment and techniques help ensure that you receive high-quality care and treatment.

This brochure explains what radiation therapy is, what to expect, and how you can help make your treatment as comfortable and successful as possible. You'll find information on managing side effects you may experience and a glossary of terms that are used in radiation therapy.

Feel free to discuss any questions and concerns you may have with your radiation oncology team. Your radiation oncologist, radiation therapists, clinical social worker, dietitian, and oncology nurses are all here to help you and those close to you.



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Please note:

This brochure will discuss only external radiation therapy. If you need more information about internal radiation, please ask your radiation oncologist.

Kaiser Permanente Cancer Treatment Center/ Radiation Oncology Department



Map not to scale

Santa Clara Medical Center

3800 Homestead Road, Santa Clara, CA 95051
408-851-8000

From Highway 280 South. Take the Lawrence Expressway exit. Turn left onto Stevens Creek Boulevard. Turn left onto Lawrence Expressway. Drive past the Lehigh Drive entrance to the Santa Clara Medical Center, and turn left on Homestead Road. Turn left into the Kaiser Permanente entrance. Turn right and cross the Calabazas Creek bridge to get to the Cancer Treatment Center.

From Highway 680/280 North. At the 680/280 junction, merge onto 280 North. Take the Lawrence Expressway exit. Drive past the Lehigh Drive entrance to the Santa Clara Medical Center, and turn left on Homestead Road. Turn left into the Kaiser Permanente entrance. Turn right and cross the Calabazas Creek bridge to get to the Cancer Treatment Center.

From Highway 101 South. Take the Lawrence Expressway exit. Turn right onto Lawrence Expressway. After crossing Lochinvar Avenue, turn right on Homestead Road, then left into the Santa Clara Medical Center at the Kaiser Permanente entrance. Turn right and cross the Calabazas Creek bridge to get to the Cancer Treatment Center.

From Highway 101 North. At the junction of 101 and 280, take the 280 North exit. Take the Lawrence Expressway exit. Drive past the Lehigh Drive entrance to the Santa Clara Medical Center, and turn left on Homestead Road. Turn left into the Kaiser Permanente entrance. Turn right and cross the Calabazas Creek bridge to get to the Cancer Treatment Center.

From Highway 880 South. At the junction of 880 and 280, take the 280 North exit. Take the Lawrence Expressway exit. Drive past the Lehigh Drive entrance to the Santa Clara Medical Center, and turn left on Homestead Road. Turn left into the Kaiser Permanente entrance. Turn right and cross the Calabazas Creek bridge to get to the Cancer Treatment Center.

From Highway 17 North. At the junction of 17 and 280, take the 280 North exit. Take the Lawrence Expressway exit. Drive past the Lehigh Drive entrance to the Santa Clara Medical Center, and turn left on Homestead Road. Turn left into the Kaiser Permanente entrance. Turn right and cross the Calabazas Creek bridge to get to the Cancer Treatment Center.



Map not to scale

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|---|---|--|
| ■ Medical Center | E Emergency Department | ♿ Accessible Parking |
| ● Medical Offices | H Hospital | P Parking Lot |
| ▲ Specialty Buildings | Rx Pharmacy | P Parking Structure |
| ← Building Entrance | | |

About radiation therapy treatment

What is radiation therapy?

Advanced technology

Kaiser Permanente's Cancer Treatment Center employs advanced technology that is in use at many of the world's most sophisticated radiation oncology departments.

Radiation therapy is the use of high-energy rays to destroy abnormal cells, typically cancer cells. Radiation applied externally (outside the body) may also be referred to as external beam treatment, X-ray therapy, irradiation, or electron beam therapy. A machine called a linear accelerator (LINAC) is positioned near your body and sends high-energy rays to the area of your body needing treatment.

A special type of external radiation delivery is called stereotactic radiosurgery. In this very precise set of treatments (typically 1 to 5), a high dose of concentrated radiation can be delivered to the target area with submillimeter accuracy. Although there is surgical precision, the treatments are still noninvasive – no cutting is involved – and can be delivered in an outpatient setting.

Radiation may also be applied internally using implants of small amounts of radioactive material (brachytherapy). These implants are placed inside the body or directly on cancer cells. This form of radiation is also available through Kaiser Permanente at various regional referral centers.

Several systems used at our Santa Clara Cancer Treatment Center target tumors precisely, minimizing damage to normal tissues. These techniques and systems include:

- Three-dimensional conformal radiation therapy (3D-CRT)
- Intensity-modulated radiation therapy (IMRT)
- Image-guided radiation therapy (IGRT)
- RapidArc® radiotherapy
- Stereotactic radiosurgery
- Electronic portal imaging device (EPID)
- Multileaf collimator (MLC)
- On-board imager (OBI)
- High-dose rate (HDR) brachytherapy

See the glossary section, pages 11 to 13, for a detailed description of each of these cancer treatment techniques and systems.

Regional referral center

A few types of radiation procedures are available only as part of highly specialized programs at selected universities and hospitals. Our Santa Clara Cancer Treatment Center provides services offered at most advanced radiation facilities, and welcomes patients who are referred from Kaiser Permanente clinicians throughout the Northern California region. As the regional center, it provides specialty services including pediatric radiation oncology and complex HDR brachytherapy.



How does radiation therapy work?

Cancer cells can be destroyed by radiation therapy because they are more sensitive to radiation than normal cells. Cancer cells also have a decreased ability to repair themselves once radiation therapy has been administered. Your radiation oncologist will design your treatment so that cancer cells are destroyed with minimal injury to surrounding normal tissues and organs.

How is radiation therapy used to treat cancer?

External radiation therapy is used to treat people with both malignant and benign tumors. Sometimes radiation therapy alone is enough to destroy the tumor. In other cases, it is combined with other types of treatment.

- Radiation therapy can be effective before surgery to shrink a cancerous tumor and make it easier to remove, or after surgery to prevent any remaining cancer cells from multiplying.
- The use of anti-cancer drugs, also called chemotherapy, may be combined with radiation therapy to improve the effectiveness of the treatment.

Radiation therapy may also help reduce pressure, pain, or bleeding caused by cancer.

Myths about radiation therapy

You will not be radioactive, give off radiation, or endanger others when you receive external beam treatment or stereotactic radiosurgery.

Although side effects can develop, the treatments themselves do not hurt. You will not see, hear, or feel the beams of radiation during the treatment.

What to expect during your treatment

You'll probably visit our Radiation Oncology Department as an outpatient to receive treatment and return home the same day. We'll set up a series of appointments over several days for you. They will include consultation, planning, verification, and first day of treatment.

In certain situations, more than one type of appointment may occur on the same day. For example, when appropriate, a verification appointment may occur on the same day as your first treatment.

Visit 1: consultation

Your radiation oncologist will examine you and review your medical chart, imaging studies, and laboratory tests. He or she can then decide whether you should receive radiation therapy and, if so, what type is best for you. If you need radiation therapy, the radiation oncologist will discuss with you the benefits of treatment and any possible side effects.

Visit 2: planning

This appointment, sometimes called a planning session or simulation, prepares you for your radiation treatment. Lasting 1 to 2 hours, the planning session can be the longest appointment you will have during the course of your treatment. To direct treatment to the cancer site and minimize damage to surrounding cells, your radiation oncologist will use a CT scanner/simulator to locate the area of your body to be treated. After your treatment position is determined and reviewed, a radiation therapist will place tiny permanent ink dots, called tattoos, on your skin. The tattoos, along with immobilization devices, are necessary to make sure you are in the same position each day for treatment.

In some situations, the radiation therapist may only use a marking pen and protective tape to indicate the area to be treated and to help in daily setup. If the marks come off before your radiation treatment begins, do not put the marks back on yourself; we will refresh the marks when you come in for your next appointment.

We will take photographs of your face, the area to be treated, and the position in which you will be placed for every treatment. Your medical team will use these pictures to identify you before each treatment and to verify your treatment area and position. Most patients don't receive a radiation treatment on the same day as the planning session. At the end of the session, we will set up your next appointment.

Using the information from the planning session, your radiation oncologist – along with a dosimetrist and medical physicist – will plan your treatment. This process usually takes several days, and sometimes more than a week.

Visit 3: verification

During this appointment, we will verify your treatment by taking X-rays. These X-ray images help us position you properly for your treatment. Your medical team will also review and confirm all information collected in previous visits. After this appointment, your treatment team will verify that the fields

created during the planning visit match those taken on the treatment machine. Adjustments may be made to achieve this goal. At this point, permanent tattoos will be placed if this was not done at the planning visit. At the end of this appointment, we will usually schedule your entire treatment course. You are now ready for your first treatment.

Visit 4: first day of treatment

The length of each treatment varies, but they are typically 15 minutes or less. Please arrive 15 minutes before your scheduled appointment to give yourself time to change your clothes. We usually give treatments promptly at their scheduled times. Generally, your treatment time will be the same length for each visit.

What about the radiation treatment machines?

Several different machines can deliver radiation treatments. These machines are large and may seem frightening at first. However, they are relatively quiet, and are not confining. They can be moved up and down or around so that the radiation reaches your tumor from different angles.

What happens during a treatment?

A team of radiation therapists will administer your radiation treatment. They will place you on the treatment table and carefully position you for treatment. Once this position is set, it's very important you hold that position while receiving the treatment. You will be alone in the treatment room, but a therapist will watch you on a video screen and can talk to you through an intercom. Stay in position even after the machine shuts off, and wait until the therapist enters the room to help you down from the table.



Are there any side effects from radiation therapy?

It is common to experience some side effects from your treatment. The type and severity depend on many factors, including the area being treated, the amount of radiation applied, and your unique reaction to the treatment. Your radiation team will give you specific information about this at the beginning of your treatment.

You may tire easily because your body is using a lot of energy to fight the cancer, get rid of unhealthy cells, and rebuild any healthy cells that have been injured. Although we encourage you to remain active, if you start feeling tired, you may need to increase the amount of time you rest. It's very important to eat properly throughout your treatment to maintain your weight and strength. Don't use this time to try to lose weight.

You may notice an increase in side effects as your treatment progresses. You can talk with your physician at your weekly treatments about any questions or concerns you have.

Will I see a physician during treatment?

Your radiation oncologist will see you every 5 to 10 treatments to check your progress, answer any questions, and help manage any symptoms you may be having. Members of your team are available every day of your treatment to address your questions and concerns.

How will my treatment affect me emotionally?

You may experience emotional changes before and during your radiation treatment. Maintaining a positive approach to your treatments and to cancer itself can be very important to your recovery. Our Radiation Oncology Department provides a clinical

social worker to talk with you, your partner, or any family member.

To request counseling, simply ask to speak to the radiation oncology social worker.

Preparing for your treatment

When and how often do I come in for my treatments?

Generally, treatments are given once a day, Monday through Friday, except on certain holidays. After the verification session, you will be given a regular appointment time. The length of your treatment depends on the type and location of your cancer. The number of treatments prescribed during your verification session is only an estimate and may change as your treatment progresses. The exact number of treatments will be determined by your radiation oncologist.

Should someone drive me to my appointments?

Most people are able to drive themselves to and from their appointments. Since there is no medical reason related to your radiation therapy to prevent you from driving, you can choose whether to have someone drive you to your appointments or to drive yourself. However, you should not drive if you don't feel well, are taking medication that causes drowsiness, or if your physician advises you not to do so because of your medical condition.

Do I need to change my diet?

Eating well during your cancer treatment can help give you energy, strength, and stamina. Good nutrition also helps you maintain your weight and promote healing and recovery.

A registered dietitian is available to help you develop a healthy eating routine as you go through your radiation therapy treatment.

If you experience or have experienced weight loss, decreased appetite, or any other side effects related to your treatment, call to request a consultation with one of our dietitians. Your physician or registered nurse can also refer you to a dietitian.

Can I take medications during my treatment?

You'll probably be able to take your routine medications during treatment. Be sure to inform your radiation oncologist of all the medications you are taking, including prescription medications, aspirin, laxatives, cold remedies, vitamins, herbs, or any other over-the-counter medications. Check with your radiation oncologist before taking any new medications during your treatment.

Can I work and continue my normal activities while I'm having radiation therapy?

We encourage most people to continue to work and perform their normal activities, as long as they feel well enough. If you find that you are tired, rest until you feel stronger.

When your treatments are completed

What happens after I finish my treatments?

Your therapist will tell you when your treatments will be completed. Near the end of your treatment, your medical team will discuss the plan for your follow-up care. This may include a visit or telephone follow-up with your radiation oncologist.

After I've finished my radiation treatments, are there any special instructions?

Yes. The following applies to all patients who have received radiation therapy to any part of their body:

- Use a moisturizing cream on the treated skin area after you have finished your treatments and your skin has healed. Do not use a lotion with alcohol or perfumes in it.
- When showering, lightly sponge the treated area with a mild soap for 2 weeks after your last treatment.
- Keep treated skin out of the sun and use a sunscreen on any areas exposed to the sun.
- Eat a regular diet unless your physician has given you other instructions.
- If you feel able, continue normal activities, including sex.
- You may be scheduled for a follow-up appointment with your radiation oncologist 1 to 3 months after your radiation therapy. Your other doctors will also continue to care for you.
- Continue to see your personal physician for your routine health needs.

How long will my side effects continue after my treatment ends?

Radiation therapy treatments have a cumulative effect. This means that radiation therapy will continue to affect your body for at least 10 to 14 days after you receive the last treatment. If you've experienced reactions such as mouth sores or inflamed skin, healing may not begin until several weeks after your last treatment.

Remember that treated skin will be more sensitive to sun and heat than the rest of your body for a long time after the end of your treatments. Avoid sunbathing, gardening without protective clothing, and heat applications to the treated area for at least one year after you finish your treatments. Report any new skin breakdown in the treated area to your radiation oncologist.

When will I know if the radiation therapy worked?

It's normal to wonder how soon your radiation oncologist can tell whether the radiation therapy has worked. For patients treated for symptom relief, improvement in symptoms can occur days or weeks after the treatment is completed. Some cancer tumors will get smaller during the course of treatment and may no longer be felt after 5 to 7 weeks. Some take much longer to shrink – perhaps months or years. The first 2 years after treatment are important in determining if the cancer recurs. Only time, patience, and observation by your physicians can reveal the final results of your treatment.

We're here to help

We hope this brochure has given you a better understanding of radiation therapy, what to expect during treatment, and how to make yourself as comfortable as possible during the process.

For more information about your condition and treatment, please go to your physician's website at kp.org/mydoctor. You can also contact the Health Education Department at your local Kaiser Permanente medical center.

We're here to help you in any way we can. Call the following phone numbers for more information.

For routine, nonurgent questions or concerns:

- Kaiser Permanente Cancer Treatment Center/Radiation Oncology Department
408-851-8000, Monday through Friday, 8 a.m. to 4:30 p.m.
- For 24/7 advice, call **1-866-454-8855**.
For TTY, call **711**.

For emergency care,* go to your nearest emergency department or call 911.

*If you believe you have an emergency medical condition, call **911** or go to the nearest hospital. For the complete definition of an emergency medical condition, please refer to your *Evidence of Coverage* or other coverage documents.



Supportive services

A clinical social worker is available to help you and your loved ones with the emotional issues that frequently accompany a cancer diagnosis and treatment.

Services offered include:

- Help with finding and using Kaiser Permanente and community resources, including disability, support groups, and hospice care.
- Short-term counseling to address the emotional effects related to a cancer diagnosis, such as alleviating worry, stress, or sadness, quality-of-life issues, spiritual or religious concerns, relationship conflict, and grief issues.

If you'd like to learn more about Kaiser Permanente and community resources, please contact our social worker or nursing staff for more information on any of the following:

- American Cancer Society services and program
- Emotional issues, including worry, sadness, or stress
- Financial assistance (based on eligibility)
- Health classes (some may require a fee)
- Home or hospice care
- Kaiser Permanente School of Allied Health Sciences Library or other cancer information resources
- Medical benefits questions
- Spiritual guidance
- Support groups or psychotherapy
- Transportation programs (based on availability)



Glossary

Adjuvant therapy: Radiation therapy, chemotherapy, or both, given as additional treatment for a cancer that has been or will be removed surgically.

Block: A thick piece of metal used to shield certain areas of the body from the X-ray or electron beam. Blocks are customized for each patient, but not all treatments require blocks.

Boost: An additional dose of radiation that is given after an initial course of radiation to enhance tumor control.

Brachytherapy: A minimally invasive treatment in which tiny radioactive sources are temporarily or permanently implanted into the area needing treatment through hollow needles or catheters. This alternative to surgery concentrates radiation on the tumor site while minimizing exposure to surrounding healthy tissues. Brachytherapy has been proven successful in treating a variety of cancers, particularly prostate cancer and gynecological malignancies.

Cancer: A general term for more than 200 diseases characterized by abnormal and uncontrolled cell growth. The resulting mass, or tumor, can invade and destroy surrounding normal tissues.

Chemotherapy: Treatment with anti-cancer drugs. Chemotherapy is usually given through the vein, but some drugs are given by mouth. Concomitant chemotherapy is chemotherapy given at the same time as radiation. Sequential chemotherapy is chemotherapy given before or after radiation therapy.

CT scanner: A computerized diagnostic X-ray machine that gives images of the inside of the body. CT scans can be used during planning or simulation.

CyberKnife®: A specialized linear accelerator mounted on a robotic arm for stereotactic radiosurgery. The CyberKnife can deliver radiation from almost any direction, track the target position during treatment, and make adjustments based on any patient or target movement.

Dosimetrist: A specially trained technologist who helps design external beam radiation treatments. The dosimetrist works closely with the radiation physicist.

Electron beam: A type of penetrating radiation generated by a linear accelerator, where electrons are accelerated to high energies. Electron beams can kill cancer cells.

Electronic portal imaging device (EPID): A digital imaging device used to monitor and manage target positioning during the course of treatment (port films).

External beam radiation: Radiation therapy using a machine that focuses radiation on a part of the body.

Fiducial markers: Also called “marker seeds” or “gold seeds,” these are small markers implanted near your tumor to help with tracking the target in your body. These markers are usually placed during a separate outpatient appointment.

Field: The projection of the radiation beam from the machine onto the patient. The shape and size of the field is based on the target and created by the multileaf collimators.

Fluoride therapy: Daily self-application of prescription-strength fluoride. This helps prevent excessive tooth decay in teeth that are in the radiation field.

High-dose rate (HDR) brachytherapy: A type of internal radiation treatment in which the implanted radioactive source is removed between treatments. Because of the high dose rate, treatment time is relatively short. This procedure might require hospitalization.

Hormone: One of many naturally occurring chemical substances in the body that regulate body systems. For example, insulin is a hormone that regulates the sugar level in the body.

Hormone therapy: Also known as endocrine therapy, hormone therapy is the use of hormone-like drugs to control certain cancers. Prostate and breast cancer are examples of cancers that may be treated with hormone therapy.

Image-guided radiation therapy (IGRT): IGRT is the use of X-ray, CT scan, or ultrasound pictures, taken just prior to or during treatment, to guide treatment delivery. The tumor can be precisely located in 3D space immediately before treatment. The ability to correct for movement and any errors during setup means smaller margins can be used, sparing healthy tissue and escalating the tumor dose.

Immobilization device: Customized equipment, such as masks and formfitting bean bags, made at the time of planning and used with each treatment in order to increase accuracy and recapture positioning.

Implant: A small container of radioactive material that is placed inside a tumor.

Intensity-modulated radiation therapy (IMRT): IMRT allows for precise radiation delivery using linear accelerators. With IMRT, the intensity of the radiation beam can be varied, allowing precise 3D targeting of tumors. This technology is particularly useful in treating complex tumors that have spread close to sensitive parts, such as the spinal cord and salivary glands.

Internal radiation: (interstitial and intracavitary radiation) A type of radiation therapy, also called brachytherapy, in which a radioactive substance is implanted in the area of the body needing treatment.

Linear accelerator (LINAC): A machine that creates and uses high-energy X-rays or electron beams to treat cancer.

Mask: A custom-made plastic mold of the patient's head used to keep the head in the proper position during treatment of brain, head, and neck tumors.

Medical oncologist: A physician who has trained in internal medicine and received specialized training in using chemotherapy and other medications to treat cancer.

Multileaf collimator (MLC): A device that helps shape the X-ray beam produced by the linear accelerator (LINAC). It consists of many computer-controlled metal leaves that move back and forth to focus the beam and better avoid normal tissue. All of the LINACs at our Santa Clara Cancer Treatment Center are equipped with this device.

On-board imager (OBI): A high-resolution, low-dose digital imaging device mounted on the linear accelerator that is used to improve tumor targeting.

Oncologist: A physician who specializes in diagnosing and treating cancers.

Port film: An X-ray picture taken at the start of and during treatment by the electronic portal imaging device (EPID) to make sure that the treatment beam is aimed correctly.

Radioactive: Giving off radiation.

Radiation oncologist: A physician who has received specialized training in using radiation to treat cancer.

Radiation oncology nurse: A nurse who has received specialized training in the care of cancer patients receiving radiation therapy.

Radiation oncology social worker:

A social worker who has received special training to provide support and counseling to people with cancer.

Radiation physicist: A person trained in the physics of radiation therapy. Radiation physicists prepare treatment plans, run treatment computers, and make sure that the machines are functioning properly.

Radiation therapist: A specially trained therapist who administers external radiation treatment using the individualized plans prepared by the radiation oncologist.

Radiation therapy: The use of high-energy penetrating rays to treat disease. Radiation can be produced by machines, such as the linear accelerator (LINAC), or emitted by radioactive sources, as used in brachytherapy.

Radiosurgery: See Stereotactic Radiosurgery.

RapidArc®: An intensity-modulated radiotherapy (IMRT) technique allowing for complete daily treatment in a single rotation of the linear accelerator (LINAC) around the patient.

Simulation: Also known as planning. Simulation is the process of designing treatment fields and calculating the details of treatment.

Stereotactic Radiosurgery (SRS): Sometimes referred to as radiosurgery or stereotactic radiation therapy. SRS is a focused, high-dose form of external beam radiation that is used to treat highly selected types of cancer and some benign diseases. The term “radiosurgery” is used to describe treatment with very high radiation doses, typically given in 1 to 5 treatments. Stereotactic refers to the ability to localize the target with submillimeter accuracy during treatment.

Tattoos: Tiny, permanent ink dots marked on your skin in or near the treatment area during the planning phase. These marks are used each day before treatment to align your body in the accurate position.

Three-dimensional conformal radiation therapy (3D-CRT): Radiation therapy treatment that uses a higher dose of radiation that is shaped to conform to a 3D target.

Total body irradiation: Irradiation applied to the whole body, typically to prepare for a bone marrow transplant.

Trilogy®: A model of a linear accelerator capable of 3D-CRT, IMRT, IGRT, and SRS treatments.

X-rays: A type of penetrating radiation generated by a machine. Depending on the machine and the energy of the X-ray, it can be used for imaging (chest X-ray) or for killing cancer cells.



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kp.org/santaclara/cancercare