Pictorial Overview of the Radiation Therapy Treatment Process

The following are the steps generally followed when a patient is preparing for radiation therapy. These may differ slightly depending on the protocol at your treatment facility or if your treatment is being done on an urgent basis, but many of the steps are the same across treatment facilities.

Initial Consultation

Whenever radiation therapy is being considered as part of your treatment plan, a consultation visit will be arranged for you with a radiation oncologist, a physician specially trained in using radiation therapy for treating your type of cancer. The purpose of this visit is to discuss the role of radiation therapy in your treatment, to determine the type of radiation therapy to be used, the treatment plan for your treatment, and to answer any questions you may have. The consultation will take one or more hours, depending on your particular situation. Please bring with you all X-rays, CT Scans, MRIs, laboratory studies, pathology slides, operative reports and other tests that have been performed so that they can be reviewed by the radiation oncologist.

During the visit, your provider will perform a detailed history and physical examination. Your provider may also discuss their findings with other members of the multidisciplinary treatment team so that all treatments, such as surgery and chemotherapy, will be coordinated to ensure that you can receive the best possible care. At the end of the visit, your provider will review and recommend the role of radiation therapy in your care. If radiation therapy is not recommended, the provider will also discuss the reasons for this.

Informed Consent Process

If radiation therapy is recommended as a part of your treatment, your provider will review in detail the proposed treatment, the reasons for recommending the treatment, and the potential risks and side effects of such treatment. Ample time will be provided so that you have a full understanding of the treatment and related issues and have all of your questions and concerns answered in full. We encourage you to bring family members or significant others with you, as they may be able to help you during the process and have their own questions answered.

Once you feel that you have a full understanding of the proposed treatment, risks, side effects and other possible treatment options, you will be asked to sign a consent form. Before you sign the consent form, you need to make sure that you are comfortable with the explanation that you have received. Even after you have signed the consent, your provider is always available to answer new questions or to provide additional information. You can withdraw your consent at any time for any reason.

CT Simulation

Before radiation treatments begin, you will go through a treatment planning process called “simulation.” This process is where your radiation treatment team will precisely identify the area on your body where you will receive radiation. Positioning is extremely important in radiation therapy and your body will be positioned carefully in order to get the best radiation treatment. You will be in the same position during every treatment, and you will need to remain still during the treatments.

A CT scan of the region to be treated is done. Information from the CT scan is used to precisely locate the treatment fields and create a “map” for the provider to design the treatment to fit your specific case. The CT scanner is specially designed to work with the other equipment in the department, and is not a replacement for other diagnostic scans you may have received. The entire simulation takes approximately an hour, though the actual time may vary. Since you will be lying on a hard table under the simulator for most of this time, you may experience some pain or discomfort. Should this occur, tell the radiation technicians. Keep in mind that the time necessary to deliver the actual radiation therapy treatments is only minutes, not nearly as long as the
time required for the simulation. In certain cases, an MRI or a PET/CT scan will also be done the same day as the CT simulation. The information provided by these scans is also used to plan your treatment.

Tattoos & Immobilization Devices

Tattoos

During the simulation visit, it is necessary to put marks on your skin to outline the treatment field(s). These marks are in the form of very small tattoos, which are dots, the size of a pinpoint or freckle, made using India ink. The process of tattooing causes some temporary discomfort. Generally, between 4 and 8 tattoo marks are placed, but sometimes more or less are necessary. In some treatment plans, a second set of tattoos may be necessary. While the tattoos are permanent, because of their very small size, they are not very noticeable. The tattoos are necessary to make it possible for you to bathe or shower on a daily basis without worrying about removing these important marks that show where the radiation treatments are to be delivered. Also, if any additional radiation therapy is needed in the future, the tattoos serve as a permanent record of previous treatments. In very rare instances, tattoos will not be used.

Steps of the tattoo process
While on the CT simulation machine, laser beams are used to mark the treatment area with a marker.

Supplies for tattooing. The area is first cleaned with alcohol.

A drop of India ink is placed on the mark.
A needle is used to puncture the top layers of the skin, getting the ink under the skin and creating the tattoo.

The small bluish dot in the center of this image is the tattoo.

**Immobilization Devices**

Immobilization devices are made individually for each patient who needs one. Whether or not you need one depends on the area of the body being treated and the treatment plan. These devices can be in the form of a mask that holds the head in position, or "molds" made out of a foam product that hardens and is molded to hold a particular body part in position. These assure that you are in the exact same position for every treatment.

Masks used for immobilization of the head.
Immobilization forms (body molds) for limbs of the trunk.

**Technical Planning Process**

After simulation, details from the procedure are forwarded to medical radiation dosimetrists and medical physicists. These professionals perform highly technical calculations that will be used to set the treatment machine (linear accelerator). The dosimetrist and physicist work closely with your radiation oncologist to develop the treatment plan, a process that can take up to a week or more.

**Set-Up**

Several days after the simulation and after all calculations have been performed, your treatment can begin.

The treatment machines (linear accelerators) resemble the simulator, but are larger. You will be placed on the treatment table in the same position as you were on the simulator. Proper positioning usually takes 10 to 15 minutes. Once in place on the treatment table, a set of X-ray films will be taken. These films will be matched with the simulation films to ensure that the treatment is going to be delivered the same way as it was simulated. Occasionally, the match is not optimal. In these cases, adjustments will be made and will be checked by your attending physician. In rare cases, more adjustments are required and treatment may need to be postponed. Once the films and positioning are confirmed, a treatment will be delivered. While it seems like a lot of time to plan and set up, it is critical that the treatment be given as it was planned to avoid unnecessary toxicity to healthy tissue and to get the correct amount of radiation to the treatment area.

The actual administration of the radiation treatment typically takes about 5 to 10 minutes. Factors that affect the total length of the treatment include the complexity of your treatment, the particular machine on which you are being treated and how quickly you can be positioned properly for treatment.

**Confirmation**
Often, your attending physician will be called to see you at the machine to make sure that your position is correct. This should not cause you any concern, as it is a standard part of practice to ensure the most accurate delivery of the radiation treatments.

**Daily Treatments**

Once the initial set-up is completed, daily treatments normally follow. Treatments are usually given once a day, Monday through Friday, for a number of weeks. Each treatment generally takes only 5 to 10 minutes; however, you will likely be in the department for an hour each day. Sometimes, twice daily radiation treatments will be recommended.

Each day, the technicians will position you on the treatment table, using the tattoos, immobilization devices and laser beams on the machine to get you in the exact same position. Once you are set up for treatment each day, the radiation technician will leave the room to avoid exposing them to radiation. They will be able to see and hear you from a control room just outside the treatment room. They can also give you instructions over a microphone as needed during the treatment. As you lie on the treatment table, the table and linear accelerator may move to get the radiation beams in the correct location. Once your position is confirmed, the treatment is given. The treatment is not painful, nor will you feel anything when the treatment occurs.
Another view of the treatment room and linear accelerator.

**On-Treatment Examinations**

At least once a week, repeat X-ray films will be taken to re-confirm proper positioning. These films will also be performed in most cases where there is a change in your treatment field or treatment plan. The X-rays taken during the course of radiation treatment are not used to help measure your progress or response to the radiation. Rather, they are only used to ensure that the position and treatment arrangement is appropriate.

Your radiation oncologist will examine you at least once a week. The examination will take place just before or after your treatment is administered. These examinations are important because they give your provider and nurse the opportunity to evaluate your physical condition, answer any questions that you may have, and plan and coordinate future treatments.

If you are having a problem, you should not wait until your next on-treatment examination. Instead, you should ask to be seen or call the department. Your nurse will review your problem or concern and if he/she cannot help, will contact your provider. If there are any problems at night or on weekends, call the hospital page operator and ask for "the radiation oncologist-on-call."

**End-Of-Treatment Visit**

Once your radiation treatments have been completed, or a day or two before your last treatment, you will have a final visit with your provider. During this visit, your provider will perform an examination and discuss follow-up care.

**Follow-Up Care**

In general, follow-up appointments occur between 2 and 6 weeks after the completion of radiation therapy. After that, we will follow your progress and see you on a regular basis. We understand that you may be seeing many other providers, but it is important for us to participate in this follow-up process so that any radiation-related problems can be identified early and treated. We will also stay in touch with your other cancer specialists.