Caring for Your Child
About Radiation Treatment

What is Radiation Treatment?

Radiation treatment uses high-energy waves or particles to destroy or damage cancer cells. Radiation can target the cancer cells in specific areas of the body. Special equipment is used to aim the radiation.

How does Radiation Treatment work?

- The radiation destroys cancer cells so they cannot grow or spread.
- Radiation also affects nearby healthy cells. After treatment, most healthy cells will recover and work properly. The goal of radiation treatment is to damage as many cancer cells as possible, while limiting harm to healthy cells. To protect healthy cells, your doctor will carefully plan the dose of radiation and space the treatment over time.

What Types of Radiation Treatment are offered for children at The Hospital of the University of Pennsylvania (HUP) Radiation Oncology Department?

- **Conventional radiation treatment** (Photon) uses external radiation X-rays that come from a machine outside the body. It is also called external beam radiation. The machine directs high-energy rays at the cancer. Nearby healthy cells and tissue can also be affected. It is the most common type of radiation treatment. The machine used to deliver the high-energy rays is called a linear accelerator.

- **3D (Three-dimensional) conformal radiation treatment** is a type of external beam radiation. It uses computers to allow doctors to precisely target a tumor with radiation beams. The computer uses width, height, and depth to give the radiation.

- **Intensity-modulated radiation treatment** (IMRT) is a type of 3-D radiation treatment that uses radiation beams (usually X-rays) of various strengths. It can give different doses of radiation to small areas of tissue at the same time. This allows the delivery of higher doses of radiation to the tumor and lower doses to nearby healthy cells and tissue.

- **Proton therapy** is a kind of external beam radiation treatment where protons are directed at the tumor. Proton therapy is effective because it is able to stop within tissues, allowing it to target and kill tumors cells while minimizing damage to the surrounding healthy tissues. It can target tumors near the surface and deep within the body. It is favored for treating certain kinds of tumors where conventional radiation treatment using X-rays would damage surrounding tissues.
Who is on my child’s HUP/CHOP Radiation Oncology Team?

Your child will be cared for by a team of oncologists and radiation oncologists from the Hospital of the University of Pennsylvania (HUP) and, medical oncologists from the Children’s Hospital of Philadelphia (CHOP). This team has been working together for years, caring for children receiving radiation treatment. Your Penn/CHOP team will coordinate and deliver all aspects of your child’s treatment and follow-up care. The members of your team have special education in cancer and radiation treatments. They are here to support you and your child throughout the cancer experience.

Team members include:

- **Radiation Oncologist**: A doctor who is trained in using radiation to treat cancer in children.
- **Medical Oncologist**: A doctor who is trained in treating children and adolescents with cancer.
- **Radiation Oncology Nurse Practitioner**: An experienced advanced practice nurse, who will help manage radiation side effects and help coordinate your child’s care. She will give you her contact information to address your questions and concerns.
- **Radiation Physicist**: This person makes sure radiation equipment is working properly and determines the correct dose as prescribed by your radiation oncologist.
- **Dosimetrist**: The dosimetrist helps the doctor plan the treatment dose and is supervised by the radiation physicist.
- **Radiation Therapist**: This person operates the radiation equipment and positions your child for treatment. The radiation therapist delivers the treatment as prescribed by the radiation oncologist.
- **Nurse Navigator**: Nurse who will coordinate gathering clinical information from your home medical team and coordinate your appointments with the radiation oncology team. The Nurse Navigator is your point of contact for any questions before, during, or after the radiation treatment.
- **Oncology Nurses**: Nurses who have received special training in caring for children and adolescents with cancer.
- **Radiation Oncology Nurses**: Nurses who have received training in caring for children and adolescents with cancer and radiation therapy.
- **Dietitian**: The registered dietitian provides support and information about nutrition to help maintain strength and promote recovery.
- **Social Worker**: A person who provides support and information on specific issues or concerns you may have. The social worker can also provide information about the resources that may be available to you or your child.
- **Child Life Specialist**: A person with training in issues that children and adolescents face during illness, particularly as it relates to a child’s age and development. The Child Life Specialist can provide support for your child during treatments and procedures.
- **Pediatric Neuropsychologist**: A psychologist who specializes in evaluating brain-behavior relationships in children and adolescents with brain tumors.
CT-Simulation

What is Simulation?
Simulation allows your child’s radiation therapy to be planned, and is often referred to as a “planning session.”

- Simulation confirms the exact location on the body where radiation treatment will be given. This location is called the “treatment field.”
- It determines how to give the radiation in the safest and most effective way possible.
- There will be a treatment planning process called CT (computerized tomographic, also referred to as a CAT scan) simulation or “CT sim”.
- We will use a machine called a CT simulator. The CT simulator determines the movements and settings on the treatment machine that will be used to give the radiation treatment.
- CT scans use a special X-ray to make detailed images of the inside of the body. It does this by creating 3 or 4 dimensional pictures of the body.
- While the CT simulator takes pictures, these are for treatment planning purposes only. They do not provide additional diagnostic information. If more diagnostic imaging is needed, your child’s physician will order it.
- Some children have told us that it helps them to have a tour of the CT room and treatment room. Seeing the room ahead of time and talking with the therapist may help you and your child feel more comfortable. Please ask the healthcare team about scheduling a tour.

Before Simulation
- You and your child will be able to see the room with the simulator. Your radiation therapist will explain what will happen during the simulation.
- The therapist will review how your child can let the team know if he needs anything during the process.
- A Child Life Specialist can be available to help guide your child through the simulation.
- Play is a way that the Child Life Specialist can assess your child’s needs.
- The Child Life Specialist can help to prepare your child for treatment by speaking at your child’s level of understanding. Your child will be able to see and touch the equipment.
- You will be able to go with your child to the room and stay with him until he is on the table. Then you will return to the waiting room.

During Simulation
- The radiation therapist is able to see and communicate with your child at all times.
- The entire simulation takes about an hour. The amount of time may vary.
- Although we cannot use pillows or blankets to keep your child in position, special positioning equipment will be provided by the radiation oncology team. It is important that your child is in the same position for every treatment.
- Since your child will be lying on a hard table, he may have some pain or discomfort. The healthcare team can provide medicine to relieve your child’s pain as needed.
- The simulation takes longer than the actual treatments. If your child needs you for any reason, the therapist will let you know.
**During Simulation (Continued)**

- Some children need a piece of equipment called an immobilization device or mask. This device will help your child stay in the correct position during treatment. The Child Life Specialist can help prepare your child for the fitting of this device.
- Some children need an MRI scan (Magnetic Resonance Imaging) to help the radiation oncology team plan their treatment. A MRI uses strong magnets and radio waves to make pictures of the body. The MRI may be done at CHOP or at the Perelman Center.
- At the end of simulation, the therapist will give you instructions to meet with the schedulers to discuss the daily treatment time and overall treatment schedule.

**Why would my child need Tattoos?**

At the end of the simulation visit it may be necessary to put marks, called tattoos, on your child’s skin. This marking is necessary to allow the radiation therapists to place your child in the same position every day for treatment. The tattoos allow for bathing without having to worry that the marks will wash off.

These marks will be very small. They are dots, about the size of a pinpoint or freckle. They are made using India Ink. The tattoos are permanent and will stay on the skin for the rest of your child’s life. Not all children need tattoos. Placing the tattoos may cause some discomfort. The discomfort will not last long. If your child would feel more comfortable, you may return to the simulation room during the placement of the tattoos.

**After Simulation**

After CT simulation and before treatment begins, the information is sent to radiation dosimetrists and radiation physicists. These specialists work with the radiation oncology doctors and perform technical calculations to set the treatment machine specifically for your child’s treatment plan. The treatment plan may take up to several weeks to finalize.

**What is the Set-Up?**

After the simulation and all the calculations have been done, your child will have a set-up appointment (usually the day before treatment begins). Set-up involves positioning your child on a machine similar to the machine that will be used for his treatment. A set of images (pictures) will be taken. These will be checked by your radiation therapist and radiation oncologist. Then your child is ready to being treatment.
**Neuropsychological Assessment**

Neuropsychological assessment is completed when your child has a medical illness or medical treatment which involves the brain. Neuropsychological testing provides important information about your child’s cognitive development after a cancer diagnosis and treatment. Cognitive development is how your child thinks and processes information. Cognitive skills that may be affected by treatment are: how your child perceives, thinks, remembers, communicates, solves problems, and experiences emotions. We strongly recommend that children receiving proton treatment undergo neuropsychological evaluation before treatment begins and at specific follow-up periods after their treatment ends. An assessment is also recommended when you, another caregiver, or any adult in your child’s life notices that your child is struggling. Areas of difficulty include problems maintaining attention, difficulty with school or homework, and difficulty in social situations.

Neuropsychological assessment can help you better understand how your child is able to function and plan for your child’s future. It can also help you advocate for your child in school for an Individualized Education Plan (IEP) or 504 Accommodation Plan. These plans remove barriers to allow students to participate freely in school. A neuropsychological assessment is more complete than an academic assessment done within a school. It will address the specific concerns of a child with cancer.

A member of the radiation oncology team will call you to schedule the neuropsychological assessment. Please note this will be a long day. Breaks will be scheduled, but plan to spend the entire day at CHOP. The goal is to complete this assessment before starting radiation.

**Important Phone Numbers**

**CHOP Oncology:**
- 8:30am-5pm, 7 days a week (including holidays)
  - Call the Oncology Phone Nurse: **215-590-2299**
- After 5pm.
  - Call the Main Hospital, and ask for the Oncology Fellow on call: **215-590-1000**

**Penn/CHOP Radiation:**
- CHOP PACU Nurses’ Desk: **215-615-5691**
- PENN Nurses’ Station Desk: **215-615-5604**