

Total Body Irradiation for Children

Your child is getting radiation to the entire body, called total body irradiation (TBI), as part of his or her cancer treatment. This factsheet is about the process and side effects that could happen. It also tells ways to help manage the side effects.

TBI is part of the treatment for stem cell transplants. It can kill cancer cells. TBI also weakens the immune system. This helps children who get stem cells donated from someone else. The body is less likely to reject donated cells when the immune system is weaker.

The transplant team from Primary Children's Hospital (PCH) sets up an overall schedule for your child's cancer treatment, including for TBI consultation and treatment sessions at Huntsman Cancer Institute (HCI). The Radiation Oncology clinic is on the first floor of the HCI Cancer Hospital. The AirMed ambulance will take you and your child from PCH to HCI. A pediatric specialist or nurse from PCH will go with you and your child for the consultation, simulation, and daily treatments.

Pre-Treatment Visit

Before TBI treatments begin, you and your child will meet with the radiation oncology team at HCI. They will review your child's medical history and do a physical exam. They will talk with you about TBI and its possible side effects. They will then ask you to sign a consent form that says you agree to the TBI procedure for your child. This visit takes about two hours.

TBI Treatments

Most children get six or eight TBI sessions. Some children need only one or two treatments. The number depends on many factors:

- The type of cancer your child has
- The type of transplant he or she will receive
- Your child's cancer care plan

Usually treatment happens twice each day—morning and afternoon.

Getting ready for TBI treatments. Here are some tips about what to wear and bring to TBI sessions:

- Wear sweat pants or pajama bottoms and slippers. The treatment room can be cold.
- Do not wear any metal—jewelry, eyeglasses, or metal on your clothing such as buttons or zippers.
- Each TBI session takes about an hour. You may want to bring music or a DVD to help your child pass the time.

Simulation session. In this session, the radiation oncology team measures your child so they can set the radiation dose. This usually takes 15–30 minutes.

If your child will have more than one or two radiation sessions, the team will take x-rays of your child's back and chest to help them design thick metal shields for protecting the lungs during TBI. If there will be fewer than three TBI sessions, lung shields are not needed.

Sometimes a CT scan is also part of the session.

TBI treatment sessions. Radiation is invisible, and it causes no pain during the treatment. When the radiation machine is on, only the patient can be in the room.

Parents and family may not watch while radiation is in progress. This is a hospital policy. After treatment is completed, parents are welcome to join their child.

The radiation doctors can see and hear your child with a video camera and intercom system during the sessions. Usually your child will be in the TBI room for about an hour. The first TBI treatment lasts longest.

For half the treatment, your child will face the machine. For the other half, he or she will face away from the machine. Each side takes about 20–30 minutes. Your child can rest for a few minutes between sides.

Based on age and height, your child will either stand or lie down during TBI. Children younger than age six may need medicine to help them sleep and to keep them from moving during the session.

Before each treatment begins, a radiation therapist does these things:

- Puts your child in position for the treatment.
- Checks measurements and adjusts the lung shields, if they are used.
- Takes an x-ray to make sure the lung shields are in the right place if they are used.

When everything is ready, everyone but your child will leave the TBI room. The radiation therapist will turn on the machine. Your child can stop the treatment any time if he or she feels sick, tired, or needs to use the bathroom. Your child can wave, and the radiation therapist will stop the machine at once and help him or her. When your child is ready, the therapist will put him or her back in position, adjust the lung shields, and start the treatment again.

When both parts of the TBI treatment session are finished, your child will go back to the BMT unit at PCH.

Possible Side Effects of TBI

During treatment sessions. Your child may feel sick to the stomach or very tired. Your cancer care team can give medicines to help her or him feel better. Your child can take short rests during the treatment sessions.

Temporary side effects. Your child will have some side effects that last for a while after all the TBI treatments are finished. Your cancer care team can give medicines and tips to help manage side effects:

- Nausea and vomiting
- Diarrhea
- Mouth sores
- Fatigue
- Hair loss
- Skin changes

Nausea. These tips may help your child with feeling sick to the stomach:

- Eat small amounts of food throughout the day instead of three large meals.
- Eat something light such as crackers or toast before the treatment.
- Avoid lying flat after eating.
- Ask your child's cancer care team about medicine to ease nausea before treatment.

Eating well is important. Your child's cancer care team will check to make sure she or he eats and drinks enough.

Diarrhea. Your child may have bowel movements that are more frequent or diarrhea, which is loose, watery stools. Tell your child's cancer care team if he or she has diarrhea. They can suggest diet and medicines to help.

These tips may help with diarrhea:

- Use alcohol-free baby wipes rather than toilet paper to wipe after bowel movements.
- Rinse the anal area with water using a squirt bottle after each movement.
- Treat the anal area if it becomes sore or if your child develops hemorrhoids. Over-the-counter hemorrhoid products can help.

Mouth sores. Your child may get sores in the mouth that make it hard to eat. Soft foods, mouth rinses, or certain medicines can help. Talk with your child's cancer care team if you have any concerns. It is important that your child does not lose too much weight. The dietitian on the cancer care team can suggest ways to make sure your child eats enough to keep her or his weight up.

Fatigue. TBI will make your child feel tired. Many patients find that mild exercise such as walking can improve energy levels. Your child's cancer care team will help make sure he or she gets the right balance of rest and exercise.

Hair loss. After about 2 weeks, your child will start to lose hair. It will usually begin to grow back within 3–6 months after radiation treatment ends. If your child wants to shave his or her head, use an electric razor only. Hair loss may be permanent, depending on the amount of radiation your child gets.

Skin changes. The effects of radiation on the skin depend on many things:

- Number of treatments
- Total radiation dose
- Sun exposure before radiation
- Overall health

Take care of your child's skin from the first day of radiation, before side effects happen.

These skin changes may happen:

- Gets dry or itchy
- Turns darker, pink, or red
- Becomes sore and tender
- Peels or gets blisters

Radiation skin changes happen slowly over time. They may last for a while after radiation treatments end. They usually go away 2–4 weeks after radiation treatments end. Here are some tips to help protect your child's skin:

- Wash gently with warm water. Do not scrub. Use hands, not a washcloth. Pat dry with a soft towel.
- Use a mild soap without perfumes or deodorants.
- Avoid rubbing on treated skin. Wear loose-fitting clothing. Cotton fabrics are the least irritating.
- Avoid temperature extremes. Do not use heating pads, hot water bottles, or ice packs on the skin.
- Keep your child's skin protected from the sun. Use sunscreen with at least SPF 30 when outdoors.
- Wear a wide-brimmed hat and clothing that covers the arms and legs. Do not use tanning beds.

These suggestions can help manage skin changes:

- Use a moisturizing cream, lotion, gel, or oil. Do not use lotion right before your radiation treatments. Put it on at least 4 hours before.
- Choose products for sensitive skin. Avoid products with perfume or deodorant.
- If a product stings, stop using it.
- If your child's skin becomes tender or itchy, try using a 1% hydrocortisone cream from the drugstore. If necessary, your child's cancer care team may prescribe a steroid cream.

Long-term side effects. TBI can cause side effects that may not show up for many years. These are called late effects. Late effects include clouding of the lens in your child's eyes (cataracts), which can affect vision. Another possible long-term effect is low thyroid function. Other possible late effects of TBI relate to growth, fertility, and brain development.

Damage to the heart, lungs, liver, and kidneys is not common. Although very unlikely, TBI can raise your child's risk of getting another cancer later in life. The radiation team will discuss each possible side effect of TBI with you and your child so you will know the long-term risks.