Understanding Total Body Irradiation (TBI)

A Guide for Patients and Families

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This guide was made as a partnership between the L/BMT program and the Radiation Oncology Team at the BC Cancer Vancouver Centre. Information is subject to change and does not replace medical advice given to you by your health care team

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What is Total Body Irradiation (TBI)?

Radiation is a treatment that uses high energy x-rays to destroy or damage cancer cells. It kills cancer cells or other hematological (blood related) conditions such as aplastic anemia by damaging their DNA. These cells whose DNA is damaged beyond repair stop dividing or die. Radiation to the whole body is called Total Body Irradiation or TBI.

How many radiation treatments will I receive?

The number of treatments is a based on your disease type, location, your general health, and the aim of the treatment. Most patients require 6 treatments, although some may require as many as 9. If you are prescribed more than one treatment, you will have two treatments during the same day, typically scheduled around 8am and 2:30pm. The minimum time between treatments is 6 hours.

Your transplant team has recommended _____treatments.
You will receive radiation treatment _____time(s) every day.
You will receive radiation treatment for _____ day/days in a row.

Why do I need Total Body Irradiation?

Total Body Irradiation (TBI) is given as part of your conditioning treatment before your stem cell transplant. Since cancer cells or cells responsible for conditions such as aplastic anemia circulate throughout your body, your entire body needs to be treated with radiation.

TBI, along with other recommended conditioning treatment ahead of a stem cell transplant, is used to:

- destroy any remaining cancer cells or cells responsible for other conditions in your body and
- allows the ability for new stem cells to grow.

In stem cell transplants, TBI is also used to lower or suppress your immune system, which can help prevent rejection of your new donated stem cells for allogenic (stem cells from a donor) transplant patients.

Like other X-rays or CT scans you have had in the past, you will not be radioactive.

What will happen on my first visit to the Radiation department?

Before being admitted to hospital, you will meet with your Radiation Oncology team at the BC Cancer Vancouver Centre. You will have two appointments:

- A consultation meeting with your radiation oncologist to go over information about the TBI treatment.
- A CT scan used for planning by members of your radiation team.

What will happen during the planning CT appointment?

After initial consultation with your radiation oncologist, you will go for a CT scan to plan your treatment with the radiation team; which includes radiation therapists and possibly a physicist. This will be done in our CT Simulator.

For the planning CT appointment and your treatment appointments, you will need to be in your underwear. There can be no metal worn. Ideally no chest covering is worn. If you wear any chest covering (ex bra, chest binders or compression garments), then you will need to wear the same covering during each of your subsequent treatment appointments. You may need to discuss this with your radiation team at the planning CT appointment.

During this appointment, the radiation therapists will work to create the best positioning for your treatment with the help of the physicist. They will have you lay down on your back and you will go through the CT scanner twice. You will initially pass through the scanner head-first, before being rotated horizontally and brought through again feet-first. This process should take 60-90 minutes.

Our radiation therapists will explain this whole procedure to you as they go, and you are welcome to ask questions. There may be a physicist in the room at times as well.

NOTE: The **CT Simulator** is a **CT scanner with special computer software.** It sends the images from your scan to a treatment planning system to allow your team to create a plan for your radiation treatment.
Unlike other uses for CT scans in cancer screening, this CT scanner does not look for cancer cells, but rather it is used to plan your TBI treatment.

How can I prepare for my planning and treatment sessions?

Clothing:

- Wear clothing that can be removed easily, as you will need to be in your underwear for the initial CT scan and for treatment.
- If chest covering required, there can be no metal.
- Remove all metal objects, including all jewelry, safety pins, or eyeglasses, before TBI treatments.

Medication:

- If you are feeling sick to your stomach before treatment, ask your nurse for medication ahead of your appointment.

Music:

- Staff may be able to play music aloud in the treatment room, but you cannot have earbuds or headphones on. Advise staff of your preferred music genre or if you have a preferred playlist, you may bring your own device.

There are no diet or activity restrictions.

How long will the appointments take?

Your treatment appointments are about **1 - 1.5 hour(s) long**. During each appointment, most of the time is used to make sure that you are in the right position for treatment. The time it takes to deliver the actual treatment is about 30 minutes

How will I get to each TBI treatment appointment?

Our team will arrange for you to be taken to your radiation treatment appointments and bring you back to your room after each session. You will be transported by wheelchair or stretcher. The trip to the radiation treatment units utilizes a corridor, regularly used by staff, that connects Vancouver General Hospital to the BC Cancer Centre. Taking the corridor can take 10-15 minutes; it is easiest to close your eyes during this trip and try to rest or listen to music so feel free to bring your earphones for this trip.

What does the machine look like?

The radiation beams come from a large machine called a linear accelerator.

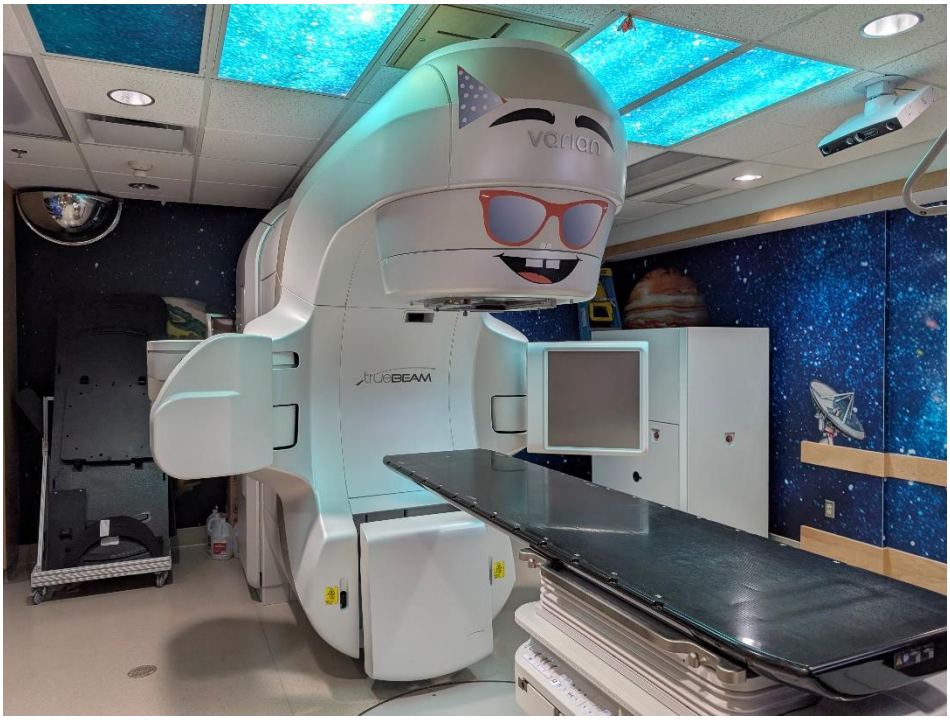

Figure 1: linear accelerator used for treatment

What can I expect during my TBI treatments?

- Radiation treatment is not painful. It is just like an x-ray, you will not feel anything. You may notice some discomfort from laying in the same position for the duration of treatment.
- You need to wear minimal clothing, preferably only undergarments.
- It is important to stay still and breathe normally during treatment.
- Radiation therapists are present for each treatment, and a physicist will be present for your first treatment. The radiation therapists will place you in the correct position to receive radiation treatment.
- You will lie in a customized foam mould that was created based on your CT scan. The mould is to limit physical movement and provide some comfort. See Figure 2 below.

Figure 2: Foam mould for treatment

What can I expect during my TBI treatments (cont'd)?

- This foam will sit on a table that can rotate on top of our treatment couch.
- There may be a red light on at times that shines down on you. See Figure 3. This is part of the technology that helps the therapists confirm your position.
- You may be uncovered in sections throughout the setup and treatment. The staff will give you a warm blanket and cover you up when possible.
- Partway through treatment imaging, you will be rotated to have your feet close to the machine. See Figure 4.

Figure 3:
Red light for set up prior to treatment

Figure 4:
Position change partway through treatment with feet close to machine.

TBI Side Effects

Radiation not only kills the growth of cancer cells but can also affect nearby healthy cells. Damage to these healthy cells can cause side effects. Generally, radiation and chemotherapy side effects are similar and hard to tell apart. Radiation can sometimes make the side effects from chemotherapy feel worse.

What are some possible short-term side effects from TBI?

Some short-term side effects include:

- nausea and vomiting
- indigestion or heartburn
- fatigue
- hair loss
- dry mouth
- swelling of the parotid glands (parotid inflammation) resulting in pain, jaw stiffness or trouble chewing
- sore mouth (mucositis)
- skin changes such as flushing, itchiness or feeling as if you have a sunburn

How can I minimize side effects from TBI?

Some suggestions to help minimize reactions include:

- Dry mouth occurs a few days after treatment. To help with this, you can drink sips of water. It is important to follow the advice by your nurses and doctors.
- Your mouth may be sore a few days after your TBI treatment. Let the nurses and doctors know and they may be able to help with pain medications.
- Wash or shower as usual and gently pat your skin dry.
- Try not to rub or scratch skin.
- Wear loose clothing made of cotton or soft fabrics.
- If you experience a reaction, you can use a water based, unscented moisturizing creams as needed.

What are some possible long-term side effects from TBI?

Some side effects can happen months or years after your treatment and last for a long time. Your Radiation Oncologist will provide information regarding these side effects during your consultation.

Please see the "**Supporting you through Treatment**" booklet provided by L/BMT for suggestions on managing the short term and long-term side effects from TBI.

We believe that the potential benefit of your radiotherapy treatment outweighs any longer-term risks involved. For any further questions, please talk to your health care team.

Document created by:

This longstanding document was revised in Feb 2026 by Aissa Keulen, RT(T) and Isaac Tai, RT(T).

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- **BC Cancer – TBI Radiation Therapy team** including Radiation Therapists Aissa Keulen, Isaac Tai, and Radiation Oncologists: Dr Matthew Chan, Dr Karen Goddard, Dr Andrea Lo and Dr Justin Oh.
- **L/BMT team** and
- **Patient and Family Partners** with the BC Cancer Patient and Family Experience team

The working copy can be found here: H:\RADTXGRP\Resource Therapists\01_Treatment\TBI VMAT\Educational Material\Patient and HCP handouts